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Wartime Washington

With 12 Illustrations

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Wartime Washington

BY WILLIAM H. NICHOLAS

WAR has changed the face of Washington.

Fifty-three acres of temporary wooden office buildings replace peacetime greensward. Most of them encroach on more than a mile of the open stretch between the Capitol and the Lincoln Memorial.

A mountain of buildings created to house and operate the biggest industry in the world—the war government of the United States—overflows the District of Columbia into adjoining Maryland and Virginia.

Massive as the Great Pyramid of Egypt is the Pentagon, headquarters of the United States Army, which rises just across the Potomac River in Arlington County, Virginia.

A Dormitory with 6,160 Rooms

No hotel can compare in size with Arlington Farms, Virginia, a Federal dormitory project with 6,160 rooms for "government girls," both civilian and military.

Today the first outstanding landmark for motorists approaching Washington from the north is the gleaming 270-foot tower of the huge new National Naval Medical Center near Bethesda, in Montgomery County, Maryland.

Population of the Capital and its environs has jumped 25 percent since Hitler invaded Belgium, the Netherlands, and France. In all the Nation, only the war-boom areas of Mobile, Norfolk, San Diego, and Corpus Christi, Texas, have grown faster.

A million and a quarter people, from every State in the Union and our islands, are here now. They tax streetcars and buses, search for places to live, jam stores and motion-picture theaters, crowd the streets, fill the parks, and stand in line at restaurants.

A civilian army of 283,000 Federal work-

ers in Washington more than doubles the peak figure for World War I.

The Public Buildings Administration transformed downtown Washington with temporary office buildings, erecting them so swiftly that they seemed to spring up like victory gardens.

"Tempo" Buildings of World War II

Design of a typical two-story "tempo" follows roughly the shape of your hand. The main building, corresponding to the palm, is about half a city block long and some 50 feet wide. Five wings, or fingers, jut out from one side. Fireproof cement-asbestos board, in a neutral shade of brown gray, faces the outer walls. Foundations are brick or concrete.

The first tempos were built before Pearl Harbor for our expanding Navy. After war came, construction was stepped up. Tempo R, which cost \$750,000, was built in 38 working days, a record.

When priority snarls threatened delay, private builders threw in reserve supplies of materials to complete the jobs. Some buildings were jammed with thousands of war workers before they were finished.

This war's tempos, trim, well lighted, and well ventilated, are more pleasing to the eye than the ones which dotted the Mall during, and long after, World War I. Most are severely plain. An exception is the U. S. Information Center, across from the Treasury. Designed along more classic lines, it has a pillared entrance.

Washingtonians wonder what the fate of these buildings will be after the war. They remember the "temporary" Navy and Munitions Buildings, fronting on Constitution Avenue near the Lincoln Memorial, which were built for the last war and are still there. The



Harris and Ewing

By Sheer Numbers Pedestrians Take the Right of Way in Downtown Washington

Nearly any business hour is rush hour in the shopping district, because work periods for Federal employees are staggered to spread traffic loads. Many stores open at 12:30 p. m. and close at 9 p. m. on Thursdays to accommodate thousands of 48-hour-a-week workers who have no chance to shop in the daytime.

Munitions Building housed the Army until the Pentagon was completed. The Navy Building still is headquarters for the Navy.

All around, new tempos have sprung up to give the Navy more room. Two covered bridges span the reflecting pool east of Lincoln Memorial to connect four new wings with the old Navy Building (Plate VII).

Drive down Constitution Avenue from Navy headquarters to the Capitol and you will see more of these tempos along the way. Some have been pressed into service by the Army's Quartermaster General and the Chief of Engineers; others house thousands of civilian employees of the new war agencies.

Motor back by way of Pennsylvania Avenue and see how war has changed the White House scene. Formerly visitors could roam through the White House grounds and visit some of the rooms in the mansion.

Now armed soldiers stand guard outside the wrought-iron fencing and bar pedestrians from

a block of sidewalk on the Pennsylvania Avenue side. Little ceremony marks the changing of the guard, mere military routine conducted under the eye of a sergeant.

The narrow streets which separate the White House from the Treasury, on the east, and the State Department, on the west, are closed to traffic. On a stretch of the Ellipse, adjacent to the Executive Mansion, rises an Army barracks where troops on guard duty are quartered.

White House Adds a Guest House

Presidents, premiers, monarchs, and military leaders from other lands come to see President Roosevelt with little fanfare. Wartime keeps the White House so crowded that historic old Blair House, across Pennsylvania Avenue, has been acquired to accommodate visiting notables.

Troops guard the Capitol, the bridges, and buildings housing military units.



Staff Photographer Ernest Cottrell

Through These Portals Pass Myriad Servicemen and War Workers

Soldiers and sailors, WACS and WAVES, Government officials and business men, constantly arriving and departing, through the huge Union Station waiting room day and night. Hard-pressed information clerks answer 80,000 questions in an average day. More than 100,000 passengers pass through the track gates every 24 hours.



Pat Houtrel

"Mr. and Mrs. America"

Under this title, the photograph of the President and Mrs. Roosevelt was entered in the first annual contest of the White House News Photographers' Association at the Mayflower Hotel in June, 1943. The 249 pictures on display, made since Pearl Harbor, showed varied phases of life in Washington.

From the tops of office buildings peep muzzles of antiaircraft guns, or the military caps of some of their crews. The soldiers are part of the garrison of the Military District of Washington.

Yellow air-raid shelter signs gleam from hundreds of buildings. Daytime raid drills halt traffic all over the city. Hotels, restaurants, and night clubs press ingenious black-out equipment into service if the alarm sounds after dark.

More than 200 private office buildings, or parts of them, now are government-leased, along with five apartment houses and a downtown hotel.

Peacetime government agencies moved to some 55 cities scattered throughout the Nation to give more room for war work. The Patent Office started the migration when its first vanload of equipment rolled off to Richmond, Virginia, on January 31, 1942. Within a year, the Public Buildings Administration

had moved 7,720 vanloads of household equipment out of Washington.

Some of the employees of the departing agencies stayed in the Capital to take war jobs, but the net result was to transfer some 35,000 government positions out of the District of Columbia. When the Railroad Retirement Board went to Chicago, office equipment filled 102 railroad cars.

The Army's Amazing Pentagon

Wonder structure of the metropolitan area is the Pentagon Building. From this giant War Department headquarters, a staff as large as the population of Hagerstown, Maryland, directs the operations of the United States Army on the fighting fronts and in training.

Army Engineers could not find enough available space in crowded Washington when they got ready to erect the Pentagon. So they selected a 320-acre site in Virginia, about three miles from the White House.



Staff Photographer Robert Nixon

"Upper Connecticut Avenue!" "Navy Yard!" "Pentagon!" "Northeast!"

Cries of dispatchers and drivers resound in the west entrance of Union Station in morning rush hour as thousands seek seats in taxicabs. Riders going in the same direction must club together.

Join the morning rush-hour cavalcade from Washington over the Potomac. Once across the Highway Bridge, your driver enters a maze of highways and clover-leaf intersections. No red lights delay him. The huge five-sided, five-storied Pentagon looms ahead.

Parking Lots for 4,000 Cars

If you are in a private automobile, you may enter one of two vast parking lots, each with a capacity of 4,000 cars. Under the Pentagon car-pooling system workers' automobiles average three riders each. This saves tires and gasoline and also relieves the heavy demands on public buses to the Pentagon. More than 5,000 cars are registered in the pool.

If you are one of the 15,000 daily bus passengers, you ride directly into the building to a series of loading and unloading platforms, where hurrying workers, uniformed guards, stairways to the concourse, and change booths remind you of New York's subway stations.

At the Pentagon entrances Army officers, enlisted men, and civilians stream past guards who check their identification cards (Plate X). Then the workers fan out through 16½ miles of main and auxiliary corridors to reach their offices, and go from one floor to another by ramps and escalators.

Office equipment includes 21,000 desks, 140,000 chairs, and 1,500 electric clocks. Scattered about the corridors are 650 drinking fountains. Seven hundred janitors and charwomen keep the building clean.

Eight cafeterias, two dining rooms, and ten beverage bars serve 55,000 meals a day. For 35 cents you can buy a lunch of meat, two vegetables, bread, a beverage, and dessert or salad. In the center court you can eat outdoors on a pleasant day at a large circular lunch bar.

The Pentagon is one of the world's largest sellers of hot coffee. Workers buy 25,000 cups every 24 hours, if that much is available. Often the beverage bars hang out "no



Staff Photographer R. Anthony Stewart.

Convalescing Yanks Replace Girl Students at National Park College

Table tennis draws a crowd of spectators to the old balconied ballroom. The Army converted the fashionable finishing school at Forest Glen, Maryland, into an annex to Walter Reed Hospital (page 274). Here wounded soldiers well on their way to recovery come for final treatment in resortlike surroundings.



Army

Soldiers, WACS, and Government Girls Sight-seeing by Bicycle Make Washington Look Like Amsterdam-on-Potomac

Favorite haunts of cyclers are drives along the Potomac River and the Tidal Basin, close to such famous landmarks at Lincoln Memorial (background). One agency rents 500 bicycles and often has a customer waiting list. Many riders make the 34-mile round trip to Mount Vernon.

coffee today" signs; sometimes sugar and cream are lacking.

Non-coffee drinkers buy 3,250 quarts of milk and 17,000 bottles of soft drinks every day.

Civilian employees work at least 48 hours a week; hundreds of officers are on duty many hours longer. Stores in the building serve those who do not have time to shop in downtown Washington.

Any worker may patronize the Pentagon shopping service, drug-store, or bank. The barber shop, operated under Army Post Exchange regulations, is limited to military personnel who can't find time for a haircut and shave outside.

An emergency infirmary cares for civilians who become ill or are injured. Two physicians, a registered nurse, three technicians, and four volunteer Nurses' Aides are on duty daily. The War Department General Dispensary looks after military personnel.

Last February the American Red Cross opened a permanent blood-donor center in the Pentagon. Donors average about 100 a day.

An amazing network of 68,000 miles of wire

connects the Pentagon by telephone with the rest of the world. Engineers of the Bell Telephone System developed the giant switchboard, big enough for a city of the size of Albany, New York. Workmen laid 250 tons of submarine cables in the bed of the Potomac River to link the building with the central Washington office.

In a single day the War Department places more than 100,000 local, 1,500 long-distance, and 125,000 branch telephone calls.

In large conference rooms with map-covered walls, high-ranking officers gather to plan American military strategy the world over.

Luxury Airliners Go to War

Close to the Pentagon Building and three and a half miles from downtown Washington is the Washington National Airport at Gravelly Point (Plate XIV). Most of its 729 acres are "made" land, gravel dredged up from the huge bed which underlies the Potomac here and gives the site its name. Part of the field includes the ruins of the old Custis home where the adopted children of George Washington lived until he took them to Mount Vernon.

Two years younger than La Guardia Field in New York, the National Airport was the last big commercial airfield built before the war. It belongs to the Nation and is operated by the Civil Aeronautics Administration.

From the time of its opening in June, 1941, until the war clamped a lid of secrecy on its operations, the airport was a show place for visitors to the Capital and a paradise for camera fans.

By February, 1942, monthly passenger arrivals and departures had approached the 50,000 mark. Today cameras are barred; commercial traffic has been cut in half.

The Air Transport Command has headquarters here. Once bright and shiny airliners wear dull military camouflage.

Their pilots are the men who gave up their Washington-Detroit and Washington-Atlanta runs to fly the big transports, stripped of luxury fittings, to Dakar, Natal, and other overseas points.*

Most of the men who serviced these planes in peacetime now are in the Army Air Forces. Today curly-haired girls heave mail sacks and baggage aboard the commercial liners still flying.

Wait, and the World Will Come to You

Since Pearl Harbor so many prominent overseas guests have arrived at the National Airport that their names read like a roll call of United Nations' leaders. Among them have been Great Britain's Prime Minister Winston Churchill and Foreign Secretary Anthony Eden, the Soviet Union's Foreign Commissar V. M. Molotov and Ambassador Maxim Litvinov, and many distinguished officials from Latin-American republics.

Headquarters of the Marines fills a large section of the Navy's new Arlington Annex, which stands on a rise overlooking both the Pentagon and the National Airport.

The Navy's Bureau of Personnel is another important tenant of the sprawling three-story building. A year after its occupancy, in October, 1941, its 10 acres of floor space were crowded by 5,000 workers. Now a fourth story is being added.

The Army Signal Corps now occupies Arlington Hall, girls' finishing school before Pearl Harbor.

Before the war, visitors to Arlington National Cemetery stood upon the pillared portico of Robert E. Lee's home and from that vantage point looked across the Potomac upon the city of Washington. They cast only fleeting glances at the expanse of trees and grassland in the foreground, between the cemetery slopes and the river's edge.

Today this area belongs to the WAVES, WACS, women Marines, and government girls. Most of it is the site of the Arlington Farms project of ten "duration residence halls," each with rooms for 610 girls (p. 275). Four additional halls are being completed for some 2,500 WAVES. Adjoining are WAC quarters, military barracks with feminine refinements.

Aim of the Arlington Farms project is to house thousands of girls, who have come here from all parts of the United States to do war work, in pleasant and healthful surroundings.

Gilbert Stanley Underwood, designer of the famous recreation center of Sun Valley, Idaho, was the consulting architect.

When a government girl moves to Arlington Farms, this is what she finds:

A vast community with a tree-lined "Main Street," shady walks, and grounds rapidly being landscaped. Ten sprawling, two-story wooden dormitories, opening on wide courts. A recreation hall with an auditorium and 12 bowling alleys. A central restaurant which will seat 1,800; a canteen or shopping center, and an infirmary. A branch of a downtown Washington department store and a mammoth beauty shop. Outdoor tennis, deck tennis, badminton, croquet, and soft-ball courts. An archery range.

Passing through a decorative doorway to her dormitory, she enters a public lobby, with a big dance floor flanked by "dating benches," similar to those in drugstore ice-cream booths. Inside the entrance is a reception desk and a small canteen and lunch bar.

Her comfortably furnished room, opening on a long corridor, is small, and costs her \$24.50 a month. In selecting it, she had her choice of a dozen color combinations in wall and furniture decoration. Her single bed has a mohair cover. Her lounging chair and ottoman are upholstered to match. She has a reading lamp, table, rug, dresser, cosmetic cabinet with mirror, and a storage closet. Windows have Venetian blinds, chintz drapes, and blackout panels.

Girls in one dormitory voted the ottomans and cosmetic cabinets the most highly prized items of furniture. Equipment for each room cost the Government less than \$70.

Lounging alcoves lie along the corridors. Across from the alcoves are kitchenettes, where groups of girls may prepare informal snacks. Each dormitory has half a dozen bridge rooms. Even more essential are the ironing rooms, each equipped with a dozen boards and two stationary tubs.

* See "American Wings Soar Around the World," by Donald H. Agnew and William A. Kinney, NATIONAL GEOGRAPHIC MAGAZINE, July, 1943.

Our Nation's Capital on Parade



© National Geographic Society

Washington, U. S. Army, Official

Jefferson Memorial—America's Symbol of "Life, Liberty, and the Pursuit of Happiness"

This newest of patriotic shrines in Washington overlooks the Tidal Basin. President Roosevelt dedicated it on April 15, 1943, the 200th birthday of the author of the Declaration of Independence. Designed after the Roman Pantheon, the Memorial is made of marble from Vermont, Georgia, and Tennessee.



© National Geographic Society

"Present Arms!" Bolivia's President Pays Silent Tribute at the Tomb of the Unknown Soldier

General Enrique Puffaranda (center) has just placed a wreath at the foot of the sarcophagus in Arlington National Cemetery. Dipped in salute are the flags of Bolivia (left), of the Military District of Washington (center), and of the escorting troops, the Ceremonial Detachment from near-by Fort Myer (right).

Bolivia—by Robert Meyer



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With the World Their Battlefield, Combined Chiefs of Staff Map Military Strategy in This Washington Conference Room

United States, left, front to back: Lt. Gen. J. T. McNarney, Gen. George C. Marshall, Brig. Gen. J. R. Deane, Adm. W. D. Leahy, Adm. E. J. King, Lt. Col. R. L. Wirtup. British, right: Comdr. R. D. Coleidge, Brig. Gen. H. Redman, Field Marshal Sir John Dill, Air Marshal Sir Charles Postal, Gen. Sir Alan Brooke, Adm. Sir Dudley Pound, Lt. Gen. Sir H. L. Jamay. Their meeting place is in the U. S. Public Health Service Building on Constitution Avenue.

Washington, U. S. Navy, Official



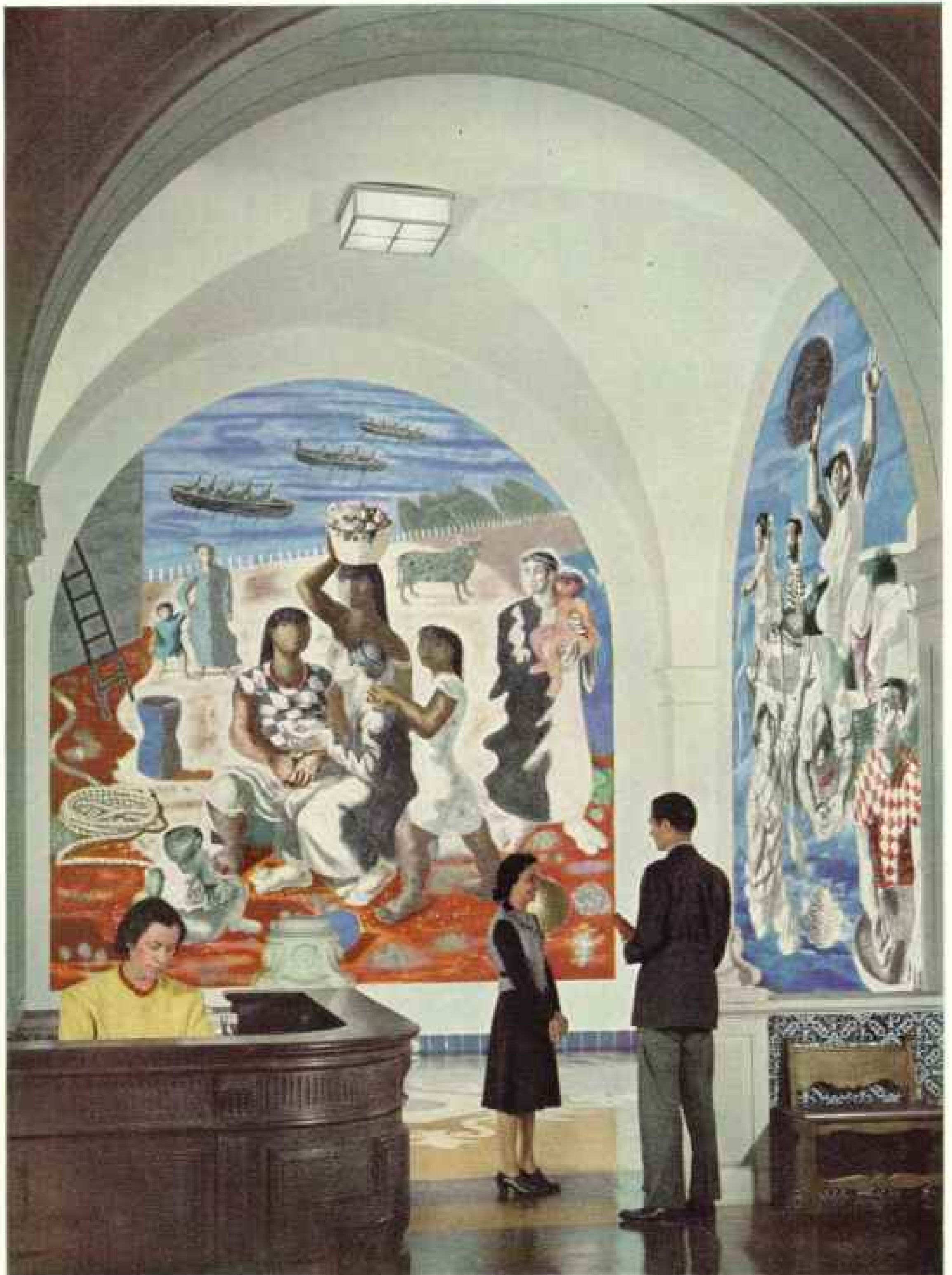
© National Geographic Society

Illustration by H. Anthony Stewart

Red Cross Workers Roll and Fold Bandages in a Massachusetts Avenue Mansion

National groups work for the District of Columbia Chapter in this old residence on specified days each week. Netherlands women start the job every Monday morning. They are followed by British, Greek, Norwegian, Polish, Czechoslovak, Yugoslav, and Latin-American contingents.

Our Nation's Capital on Parade

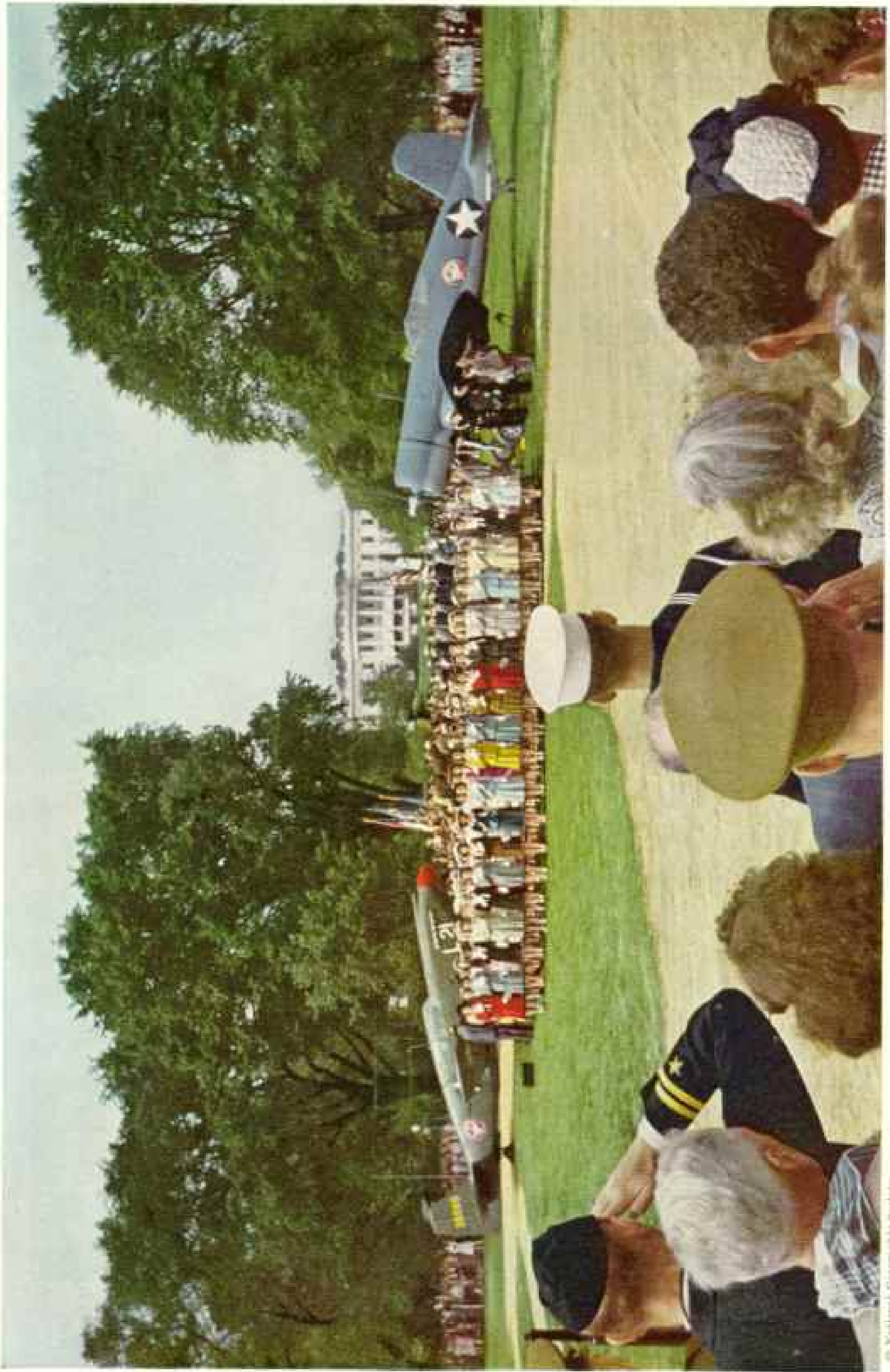


© National Geographic Society

Restoration by Willard H. Carter

Brazilian Murals in the Library of Congress Portray Scenes Common to All the Americas

"Teaching of the Indians by the Jesuits" and, at right, "The Mining of Gold," are two of four paintings by Candido Portinari, Brazilian master. They were acquired through the cooperation of the Brazilian Government and were unveiled last year.



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Government Girls Stand at Attention in the Dedication of Two Warplanes Bought

Stearman Mustang for the Army and grayish-blue Corsair for the Navy are the gifts of 157,000 Federal employees in Washington. The ceremony was held on the Ellipse south of the White House in May, 1943. Both fighters were christened "Government Girl"; both are now in active service.

Reproduction by Walter M. Jitka



© National Geographic Society

Covered Wartime Footbridges Break Washington Monument's Image in the Reflecting Pool

The wooden spans link tree-covered temporary office buildings, behind the fence at right, with Navy Department headquarters, obscured by the pillar at left. The photograph was made from the Lincoln Memorial. A score of "tumpus," occupied by Federal war agencies and military units, stretches from the Memorial to the Capitol.

Illustration by Walter M. Kibben



© National Geographic Society

Katzenberg by H. Anthony Stewart

"Well, a Government Girl Must Have Some Place to Entertain the Boy Friend"

Beau alcoves solve the problem at this privately operated 250-room dormitory for feminine war workers. The booths flank one side of an auditorium where movies and dances are held. Other alcoves are named "Dante-Beatrice," "John Alden-Priscilla," "Romeo-Juliet," "Elsa-Lohengrin," and "You and Me."

Arlington Farms is a ten-minute bus ride from downtown Washington, and within walking distance of the Pentagon and Navy Annex. One contingent of WAVES and women Marines occupies a civilian dormitory now, waiting for its own quarters to be finished.

Bathing habits of the WAVES puzzled Arlington Farms engineers at first. Hot water boiler capacity for their building was the same as that for the civilian dormitories. Yet every morning the WAVES promptly ran out of hot water.

Then the engineers saw the light. Civilian girls went to work at various times; hence they arose at different hours. They did not all bathe at once, and the boilers had a chance to replenish the hot water. In true Navy fashion, the WAVES arose at the same time, and each wanted a bath at the identical moment. The only answer was to add another boiler to the heating plant.

The Arlington dormitories are named for States. Alcott, Barton, and Curie Halls in West Potomac Park are named for famous women. Midway and Wake, at Langston, are for Negro girl employees of the Government.

A County Grows into a City

Before the war, most of Arlington County was made up of suburban and rural communities. In 1940 its population was 57,400. Today that many war workers and their families have moved in to double the figure.

Visit Arlington and you find it in appearance a solidly built-up city. Yet it has no mayor or city council; county officials administer its civic affairs through a county manager.

Builders spent \$18,000,000 in two years on huge apartment-house developments, filling the gaps between Arlington's hamlets and providing more than 8,500 homes. Federal housing agencies built 4,400 temporary dormitory and family dwelling units, exclusive of Arlington Farms.

Despite gasoline and tire rationing, automobile license tags issued in Arlington have doubled in number in the last four years. The county enlarged its 26 public schools to provide for more than 2,000 additional pupils. Six new churches have been built.

The Army has opened a pontoon bridge across the Potomac River to relieve traffic congestion on the Arlington Memorial, Highway, and Francis Scott Key Memorial spans.

The new National Naval Medical Center is the chief wartime activity in Montgomery County, Maryland, which adjoins the District of Columbia to the north.

As motorists whirl by the huge steel and concrete building, its central tower flanked by long L-shaped wings, they are likely to exclaim, "Why, that must be the biggest naval hospital in the world!" They are wrong.

The Medical Center comprises a postgraduate medical school and dental school, a medical library of more than 40,000 volumes, a research institute, and an 800-bed hospital.

At the same time that patients are being cared for on upper floors, a classroom below may be filled with medical officers, hospital specialists, and hospital corpsmen, studying tropical medicine just before going to duty at sea or with combat troops ashore.

In another room specialists may be lecturing on brain surgery, psychiatry, or orthopedics. A group of newly commissioned dental officers may be learning naval hygiene. In a laboratory, technicians may be processing blood plasma.

Sailors, Marines, and Coast Guardsmen, wounded in action in both the Atlantic and the Pacific combat zones, are recovering at Bethesda (Plate IX). One group consists of difficult cases which require especially expert care. Many of the specialists on the staff here are reserve officers who in civilian life were noted authorities in their fields.

Other patients are men whose homes are near Washington. The Navy knows that wounded men recover faster and return to duty quicker if they can be near home and relatives while they are mending.

Sgt. Ralph A. Johnson, 22 years old, of Waynesboro, Virginia, was one of the United States Marines who landed on Guadalcanal that historic day of August 7, 1942. Within a few minutes a Jap struck Johnson on the head with the butt of his rifle, but like a good leatherneck Johnson shook off the blow and kept on fighting. Finally, in November, the Japs hit him in one leg with machine-gun bullets.

Hospital corpsmen picked up the wounded Marine and carried him to a battalion aid station, where they administered blood plasma which saved his life, and set the broken bone. On the same day he was evacuated to a field hospital on the island.

At 5 o'clock the next morning Johnson was put aboard a DC3 ambulance transport plane with eleven other stretcher cases and six "walking" casualties, a Navy doctor and a hospital corpsman. Two and a half hours later the plane arrived in the New Hebrides, where the Marine sergeant received expert care at an advanced base hospital.



Staff Photographer H. Anthony Stewart

Army and Navy Turn to National Geographic's World-wide Collection of Photographs

Your Society's file of a third of a million pictures has been made available to our armed forces. Every day officers visit the photographic library, examining pictures to obtain information of military value.

Several days later he was put aboard a hospital ship which carried him to a larger base hospital "somewhere" in the Southwest Pacific, out of the zone of action. After threatened bone infection had been arrested and his condition was satisfactory, Johnson sailed to the west coast of the United States aboard an evacuation transport which carried a large complement of medical officers and attendants. From the Naval Hospital in Oakland, California, he came to the National Naval Medical Center to complete his recovery.

Public Health Service Goes to War

One of the oldest Federal agencies, the United States Public Health Service, has given up its office building on Constitution Avenue for the duration and is housed in a tempo on the grounds of the National Institute of Health, opposite the Naval Medical Center near Bethesda. The Institute is the research branch of the Service.

Ninety percent of the resources of USPHS have been channeled into war work. Its commissioned corps of medical, dental, and engineer officers directs projects in hundreds of critical war areas to control malaria, venereal diseases, tuberculosis, and typhus fever.

USPHS also provides medical care for merchant seamen in its marine hospitals, including psychiatric treatment for those suffering from effects of enemy attack at sea. Its nurse-training program calls for the recruiting of 65,000 nurses a year.

The Army Medical Corps' famous Walter Reed Hospital, in the District of Columbia, has overflowed into Montgomery County. The Army took over National Park College, fashionable girls' school at Forest Glen, Maryland, about a year ago and turned it into a retreat for convalescent soldiers.

Main building, dining room, and sorority houses are as the girls left them. Recuperating soldiers walk on deep carpets or over 182 acres of lawn and woodland. Some play table tennis in the huge old ballroom while others cheer them on from tiers of balconies which stud the walls (page 262). The Army wanted a place where Walter Reed patients well on the way to recovery could mend psychologically as well as physically. About 500 of them now are doing just that.

Another girls' school, Mount Vernon Seminary, has been taken over by the Navy.

Navigation charts for our warships at sea, our Air Transport Command, and our Merchant Marine come from the Navy's new Hy-



Staff Photographer H. Anthony Hunter

Tiers of Basins and Mirrors Solve Wash-hour Traffic at Kansas Hall

These government girls, here from all parts of the country to hold war jobs, live in one of the big new Arlington Farms dormitories (page 164). The ten "duration residence halls" in the development have private rooms for more than 6,000 women. Each dormitory is named for a State.

drographic Office east of Washington, in Suitland, Maryland. Here the presses turn 24 hours a day to meet the tremendous demands of a war fought on all the seas.

Dwarfing the Navy plant is the new \$4,000,000 Census Bureau building near by, which has been open for a little more than a year. A temporary "duration residence hall" similar to those in the Arlington Farms project houses some of the Census workers and Navy map makers.

A Parade of Alphabetical War Agencies

What are these war agencies with alphabetical designations whose "duration" employees have filled Washington to overflowing? In what surroundings do they carry on?

All stem from the White House, for they are branches of the Executive Department and were set up under authority granted by Congress. A staff of 756, quartered in both the east and west wings of the White House, works long hours to help the President and Commander in Chief fulfill his strength-taxing duties. Late strollers in Lafayette Park see lights burning in the offices across Pennsylvania Avenue every night.

The new Social Security Building houses a

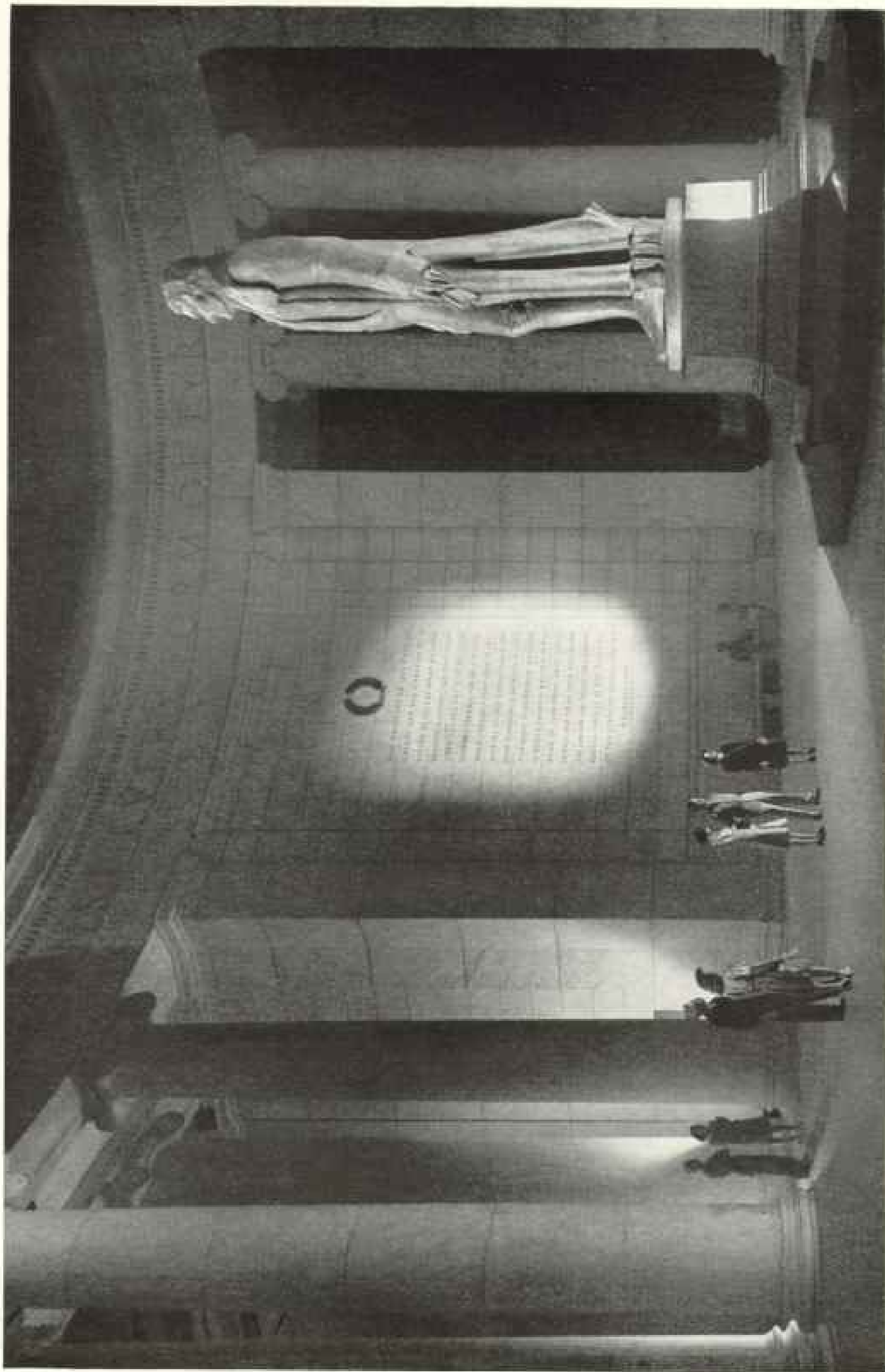
group of big emergency agencies under one roof. Social Security Board workers saw this magnificent structure rising on Independence Avenue in 1940, and looked forward to occupying the new offices. But war ended their anticipation, and many of them now are working in New York, Baltimore, Philadelphia, New Orleans, Chicago, and San Francisco area offices.

Agencies whose alphabetical abbreviations are household words—WPB, ORD, WMC, OWI—center their activities in the Social Security Building.

A Washington staff of 14,000 helps the War Production Board harness America's industry to the job of turning out war materials.* These employees handle the directives which take steel from automobiles and bed springs and put it into tanks, guns, and ships; take away plastics from combs and phonograph records and put them into airplanes. WPB issues the priority orders which authorize the use of raw materials for military and civilian needs.

How soon will the Nation's automobiles get

* See "Miracle of War Production," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, December, 1942.



Phot. Photographer William H. Culver

Marble Columns and Immortal Words Enclose Rudolph Evans' Heroic Statue of Thomas Jefferson

The 10-foot figure, a bronze-tinted plaster cast, stands beneath the dome of the new Jefferson Memorial (Plate 1). It will be replaced by a permanent statue in bronze when that strategic metal becomes available after the war. Famous Jeffersonian quotations are carved in four marble panels on the walls.



AP/WIDE

Winston Churchill's One-piece, Zipper-fastened "Siren Suit" for Air Raids "Panics" Washington Cameramen in the White House Garden



Ollie Atkins

"What Is That Queer-looking Mosaic on F Street?"—Blobs of Discarded Chewing Gum

Only way to remove the sticky substance is to wait until it builds up into so thick a mass that a scraping machine can handle it safely. Thin layers stick so tightly that, when they are removed, chunks of pavement tear off with them. Worst spots are in front of motion-picture theaters.

the synthetic tires necessary to keep them rolling indefinitely? That is the question the Office of Rubber Director, a part of WPB, is doing its best to answer.

Only a part of the WPB staff works in the Social Security offices; the rest are quartered in 22 other buildings all over the city, including the new District library and several tempcos on the Mall. Shuttle buses on regular schedule carry executives and messengers between distant offices.

Business men come to Washington at the rate of 17,000 a week to confer with WPB officials. Writing letters to those who don't wears out more than four-and-a-half miles of WPB typewriter ribbons in the same length of time.

To keep morale and efficiency high, WPB employees have their own symphony orchestra, choral societies, and sports groups.

Whether men shall fight or work comes under the scope of the War Manpower Commission, which has a staff of about 2,500 in Washington. WMC includes the Selective Service System, with its network of 6,500 draft boards all over the country, and the United States Employment Service.

WMC overflows its Social Security headquarters into four other buildings, one an 11-story structure on Pennsylvania Avenue near the White House.

OWI Imports—and Exports—Words!

Newspapermen and magazine writers have come from all over the Nation to help operate the Office of War Information.

The huge OWI newsroom in the Social Security Building resembles those of the big city dailies, with teletypes clicking and scores of writers pounding out copy on their typewriters. OWI's foreign branch sends news to occupied and enemy countries by short-wave radio. Daring OWI men stationed in Allied countries adjoining battle zones smuggle United Nations' literature into hostile territory.

Hundreds of colored pins on a huge map in the Department of Commerce Building mark battlegrounds in the Western Hemisphere. They show where the American republics are waging war on mosquitoes, snakes, fleas, sting rays, electric eels, and carnivorous ants.

Blue pins locate hospitals, dispensaries, clinics; black pins, sewage plants, water systems, drainage ditches; red, United States medical units; green, nurse-training and health-education posts.

From the Washington headquarters of the Office of the Coordinator of Inter-American Affairs, our medical "battalions" are ordered

to the front to do their share in this joint warfare. Floating dispensaries traverse more than 2,000 miles of the Amazon. Health projects are under way in Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Venezuela, Colombia, Ecuador, Paraguay, Bolivia, Haiti, and Peru.

This all-American health campaign, one of many OCIAA activities, safeguards workers and thus increases the flow of rubber, fiber, metals, vegetable oils, and other war materials to North American factories.

Nation's Output Now Six Ships a Day

Women become expert welders.

Midwestern farm boys sail the Seven Seas.

Six big new ships go down the ways of the Nation's shipyards every day.

All are part of the biggest shipping job in the world, headed up by the U. S. Maritime Commission and the War Shipping Administration in Washington.* A staff of 3,800 takes care of the details of a program which produced 8,000,000 deadweight tons of shipping in 1942 and will more than double that figure this year.

Boys from every State in the Union, many of whom never saw an ocean before, enroll at schools on both coasts to learn to be seamen. Biggest of these schools, operated under WSA supervision, is at Sheepshead Bay, Long Island, where several thousand students are taking courses at the same time.

Mass production of Merchant Marine sailors must reach 16,000 officers and 82,000 men this year to handle the new ships.

Not even the Post Office Department touches at first hand more people in the United States than the Office of Price Administration.

When do we eat—and what?

May I have a new pair of shoes?

How far can we drive from here, and where to?

Please, may I have a pair of rubber overshoes?

Sounds like questions the children used to ask father and mother. Now 134,000,000 people ask their Government directly or indirectly through OPA.

OPA rations meats, butter and other fats, canned fish, cheese, canned and processed foods and vegetables, coffee, sugar, shoes, automobiles, tires and tubes, gasoline, fuel oil in 32 States and the District of Columbia, industrial rubber footwear, bicycles, typewriters, and coal and oil stoves.

OPA also sets ceiling prices to be charged

* See "As 2,000 Ships Are Born," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, May, 1942.

for scores of commodities in its battle to keep the cost of living from soaring out of bounds.*

It takes a brand-new Federal building, a temporary structure on the Mall, and the historic Old Pension Office where inaugural balls once were held, to house the OPA offices. Altogether, OPA has 51,000 employees, but only one tenth of them work in the Capital.

OPA does not determine what commodities should be rationed. It carries out the orders of other agencies in direct charge of various products.

Whole divisions of troops move from camps to embarkation centers by rail.

Trainload after trainload of war supplies arrives daily at our Nation's seaports.

Last winter 70,000 tank cars carried fuel oil to eastern States to help relieve a critical shortage.

How can the railroads cope with these taxing wartime demands and meet civilian transportation needs at the same time?

It is the job of the Office of Defense Transportation to supply the answer.

In a room of the new Post Office Building teletypes click with daily messages from 218 railroad terminals, telling ODT where the country's freight cars are. ODT men at our seaports wire daily summaries of rail traffic conditions. Armed with this knowledge, ODT can systematically move troops and war supplies, avert the traffic jams which were so serious at our ports in World War I, and fill essential civilian wants.

Listening in on Tokyo and Berlin

Short-wave radio monitors sit in sound-proof rooms, listening to stations in Japan, Rome, Berlin, and other enemy cities.† They are employees of the Federal Communications Commission.

FCC listens in on all official broadcasts of foreign countries and analyzes Axis radio propaganda. Reports go to the State, Navy, War, and other vitally interested departments.

From the Federal Trade Commission Building, where Pennsylvania and Constitution Avenues cross, the Office of Censorship keeps a watchful eye on American radio, newspapers, and magazines. Editors, including those of your NATIONAL GEOGRAPHIC MAGAZINE, are on their honor to observe the Codes of Wartime Practices which forbid printing of military facts which would help the enemy.

The office of the Lend-Lease Administrator in Washington was originally intended to be the living room of an apartment. It is in a new eight-story brick building, taken over by the Government just before its completion.

On the north wall of this room hangs a map

of the world, with lines leading from the United States across the Seven Seas. Width of each line indicates the volume of munitions, food, and industrial supplies which moves week after week to our allies of the United Nations. The wider the line, the heavier the volume.

A small staff in adjoining offices helps direct the tremendous Lend-Lease program.‡ Actual acquisition of goods for shipment is handled through the procurement divisions of other Government departments, such as War, Navy, Agriculture, Treasury, Maritime Commission, and War Shipping Administration.

From a rambling tempo on the Mall, the long finger of the Office of Economic Warfare extends into every corner of the world where material or information of value to the United Nations is likely to be found. This new agency, created by Presidential order on July 15, 1943, took over the duties of its predecessor, the Board of Economic Warfare.

Roughly, the United States acquires about \$2,000,000,000 worth of strategic materials annually; controls the export of all materials, except Lend-Lease and military shipments; and gathers information on the economic status of every country, particularly enemy nations. Many goods are bought abroad, not because we need them badly, but to keep them out of enemy hands.

When the Office of Civilian Defense took over a 12-story apartment house on elm-ringed Dupont Circle just before Pearl Harbor, residents were loath to move out. All finally did so, except one elderly woman who still clings to her twelfth-floor apartment. Below her, 800 OCD employees prepare the Nation for possible air raids and other wartime emergencies.

The war has increased the scope of nearly all the permanent Government agencies in Washington. For example, the job of financing the war, including the printing of war bonds and stamps, requires the services of 75,000 employees in the Treasury Department (Plate XI). One third of them work in the Capital; the rest in the field.

The National Bureau of Standards today is a military area. Ninety percent of its secret scientific work is directly connected with the war. A heavy iron fence encloses

* See "Farmers Keep Them Eating," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, April, 1943.

† See "Winged Words—New Weapon of War," by F. Barrows Colton, NATIONAL GEOGRAPHIC MAGAZINE, November, 1942.

‡ See "Lend-Lease Is a Two-way Benefit," by Francis Flood, NATIONAL GEOGRAPHIC MAGAZINE, June, 1943.

Our Nation's Capital on Parade



© National Geographic Society

Redesign by B. Arthur Howard

Wounded Sailors, Home from the Sea, Recover at the National Naval Medical Center

Guadalcanal Marines and Coast Guardsmen, too, are patients at this new combination hospital, library, research institute, and postgraduate medical and dental school. Near Bethesda, Maryland, $8\frac{1}{2}$ miles from the White House, the Center's 270-foot tower is a gleaming landmark for motorists approaching Washington from the northwest.



© National Geographic Society

Illustration by H. Anthony Stewart

Paying a Call at the Pentagon? Get a Visitor's Badge and Escort Here, or Those Armed Guards Won't Let You In

This reception desk is in the concourse of the giant War Department headquarters, which houses more than 50,000 war workers. Ramps lead to all floors; the Pentagon has only one elevator. Service personnel and civilian employees, making frequent trips from office to office, would bog down an elevator system.



© National Geographic Society

Illustration by H. Arthur Hackett

War Bonds by the Ton Pass through the Hands of These Treasury Department Counters and Examiners

Each day the Securities Section receives a million bonds from the Bureau of Engraving and Printing for checking. They are sealed in packages of 4,000 to be mailed to all parts of the United States. Workers must account for every bond they handle.



© National Geographic Society

Illustration by W. Anthony Stewart

Inspiration for Soviet Officers in Washington Is Serov's 1917 Revolution Scene

The Soviet military attaché, left, and the naval attaché beside him stand with three other staff officers on the staircase of their Embassy on Sixteenth Street. The huge canvas depicts the historic storming of the Winter Palace. High on the list of diplomatic social events in the Capital are the receptions held here.

Our Nation's Capital on Parade

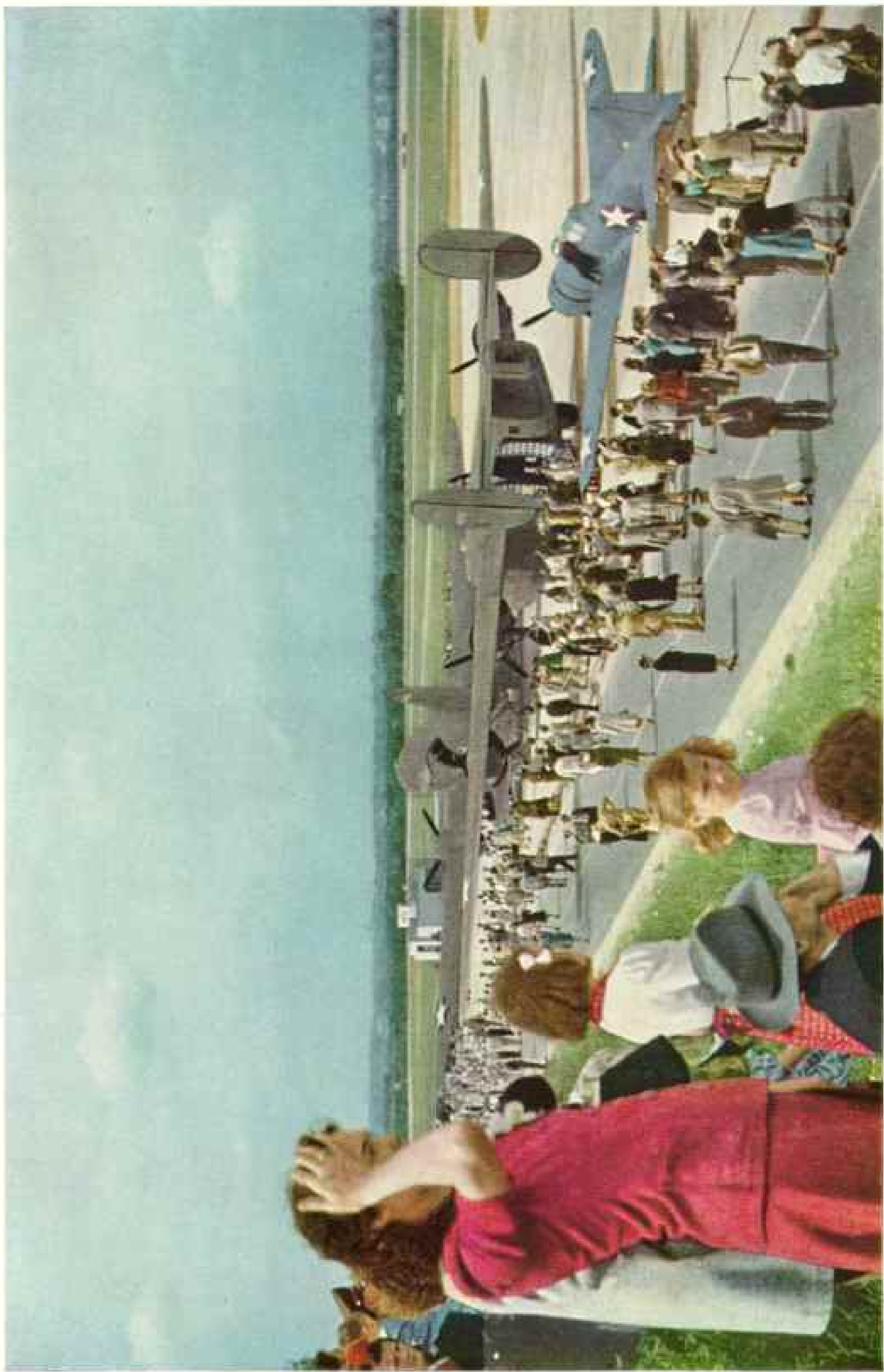


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Reproduction by B. Anthony Stewart

Viscount Halifax Presides at a Meeting of Representatives of British Commonwealth Missions

In this British Embassy conference room, the Ambassador, third from left and facing camera, is talking to Leighton McCarthy, Canadian Minister (extreme left). Between them sits Ralph W. Close, Minister of the Union of South Africa. Military representatives flank Field Marshal Sir John Dill at right side of table (seventh from front).

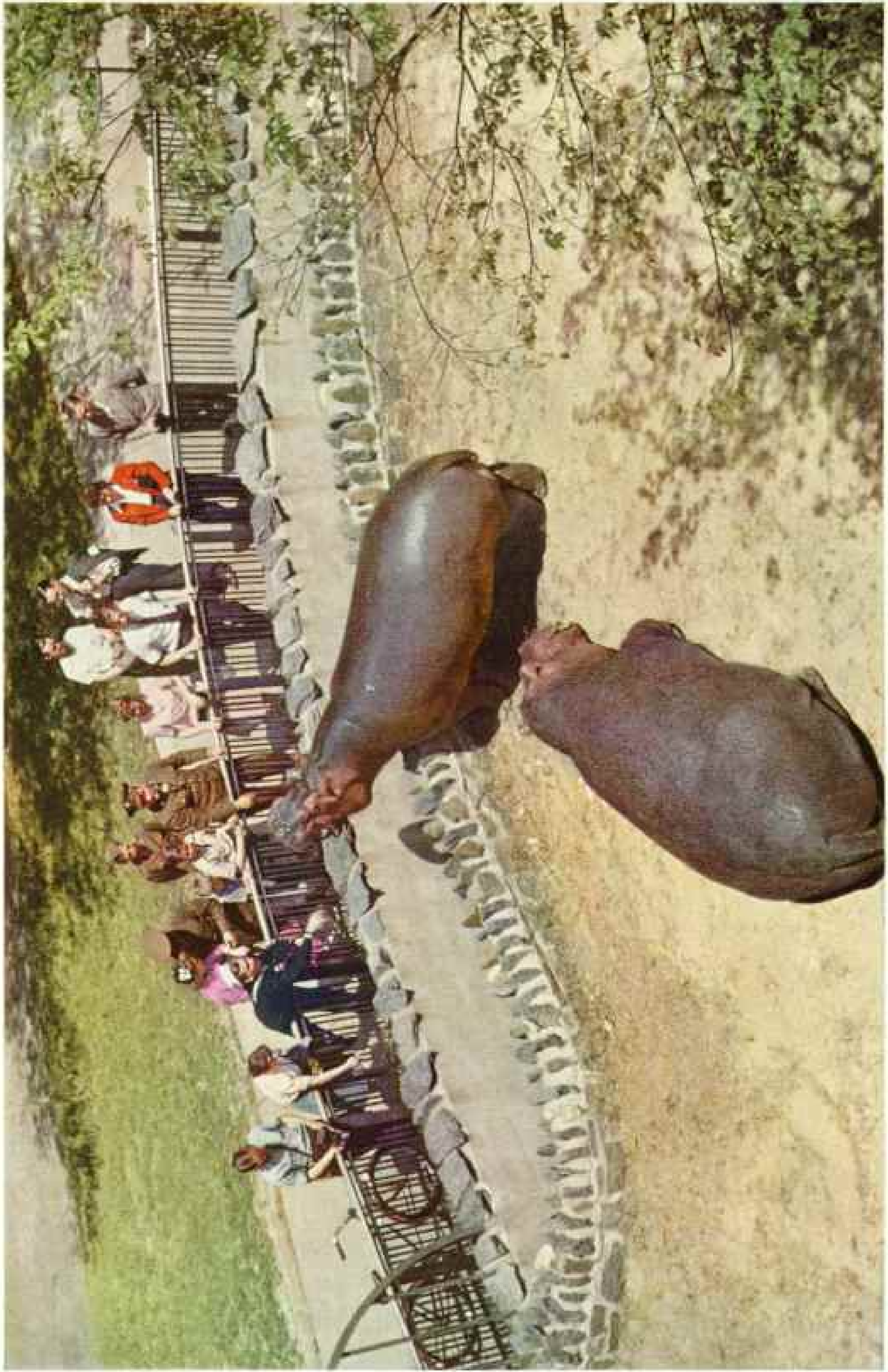


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A Jap Zero Reaches Washington—Trophy of War from the Southwest Pacific

The prize is one of the chief attractions at the air show here at Washington National Airport in celebration of the 25th anniversary of air mail service. Beyond the captured plane is a Consolidated Liberator Express, four-engined transport version of the Liberator bomber. Third in line is a Curtiss Commando transport.

Collection by H. Anthony Stewart



© National Geographic Society

Illustration by Walter M. Edwards

Service Men Ready for Overseas Visit the Zoo to Study Animals They May Meet in Faraway Places

Finlie and her sleepy three-ton hippo spouse are attractions at the National Zoological Park. Because many soldiers are bound for the Tropics, attendants at the snake house are kept busy answering searching questions about their charges. Often medical officers come to acquire first-hand information about reptiles and animals.



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Collaborator: H. Anthony Stewart

Reprints of NATIONAL GEOGRAPHIC MAGAZINE'S Famous Insignia Issue Go to the Services.

Army, Navy, Marine Corps, and Coast Guard have ordered thousands of sets of the 991 color designs and descriptive notes which appeared in the June, 1943, issue. A companion presentation of decorations, medals, and service ribbons, and insignia of women's military organizations will appear in a subsequent 1945 *Geographic*.

the Army-guarded grounds. No visitors are admitted except American nationals who have business with some branch of the Bureau. The staff has been increased to 2,300, more than double our peacetime number.

National headquarters of the American Red Cross, flooded with war work, have taken over two additional downtown office buildings and the first floor of the Metropolitan Club. They also use part of the American University for training classes.

Red Cross District of Columbia headquarters occupy a famous mansion on Massachusetts Avenue (Plate IV) and the basement of the Corcoran Gallery of Art. An insurance company made an entire floor of its building available for the District's busy blood-donor center.

Your National Geographic Society is actively cooperating with State, War, Navy, and other Government departments to further the war effort. More than 250,000 copies of The Society's 10-color wall maps have gone to war.* From its collection of some 300,000 photographs of places and people all over the world, Army, Navy and Marine Corps officers constantly obtain valuable pictorial and geographical information regarding the far-flung theaters of war (page 274).

Foreign Uniforms Add Color

British, Soviet, French, Chinese, Netherlands, and other United Nations' representatives add a colorful cosmopolitan touch to Washington. School children can tell you the branch of service and rank of any American officer or enlisted man they encounter, for they identify him instantly by his insignia.† More puzzling are uniforms worn by soldiers and sailors of our Allies, principally British but with a fair sprinkling from other countries.

Some 2,000 British subjects represent their government in Washington. An enlarged British Embassy on Massachusetts Avenue (Plate XIII) and more than a score of office buildings supply this force and its American assistants with working space.

The British Joint Staff meets regularly around a conference table in the U. S. Public Health Service Building on Constitution Avenue with our own Army and Navy officers. These Combined Chiefs of Staff meetings help map the strategy of global warfare (Plate III).

Other Anglo-American units, all of which require British missions in Washington, are the Combined Munitions Assignment, Raw Materials, Shipping Adjustment, Production and Resources, and Food Boards.

The British Army Staff occupies five build-

ings. Several hundred ATS girls, WAAFS, and WRENS—British counterpart of our WACS and WAVES—came from England to help with office tasks. Their uniforms are well known to Washingtonians. The British Admiralty Delegation works in a large tempo across from U. S. Navy headquarters.

Canada, Australia, New Zealand, India, and South Africa maintain purchasing commissions here in addition to their diplomatic delegations.

The Soviet Union's principal contacts with the United States are through its embassy (Plate XII) and a large Soviet Government Purchasing Commission. China has a military staff in Washington.

Gradually the Capital is solving the problem of finding living quarters for its "duration" residents. Private hotels for government girls preceded the Federal dormitory projects.

"Dante-Beatrice" Beau Alcoves

Two bachelor brothers built a modern 250-room hotel for girls and gave it a collegiate atmosphere, with shuffleboard, wienie roasts, movies, dances every Friday night, and a dating bureau (Plate VIII).

The Meridian Hill Apartments, Government-financed but privately built in less than eight months at a cost of \$1,750,000, has 634 rooms for 725 girls.

Rental ceilings were a financial help to married men with families, but for many months there were not enough houses to go around in Washington. By the end of this year the National Housing Agency program for the metropolitan area will be providing homes for 175,000 people. Many are ready now.

When one huge permanent project in northwest Washington is finished, 720 apartments will be available, and nine residence halls will accommodate 1,400 unmarried persons.

Near Alexandria, Virginia, a giant development of 2,300 apartments covers 323 acres. It was designed in the style of historic Williamsburg, Virginia; the 371 buildings are of colonial-style brick or native stone, with slate and tile roofs.

Best observation post from which to observe the passing show in the Capital is Union Station (pages 259, 261). Here an average day means:

More than 100,000 passengers passing through the gates.

* See "Maps for Victory," by Gilbert Grosvenor, NATIONAL GEOGRAPHIC MAGAZINE, May, 1941.

† See "Insignia of the United States Armed Forces," by Gilbert Grosvenor, "The Traditions and Glamour of Insignia," by Arthur E. Du Bois, and "Aircraft Insignia, Spirit of Youth," by Gerard Hubbard, NATIONAL GEOGRAPHIC MAGAZINE, June, 1943.



International News

First Ladies of the United States and China Pose for News Cameramen

On her official visit to Washington in February, 1943, the American-educated wife of China's Generalissimo was a White House guest. She delivered historic addresses before Congress, arousing admiration for her perfect diction and sending her hearers to dictionaries by her use of such unfamiliar words as "obtunded" and "intransigent."

Information clerks answering more than 80,000 questions.

Forty-four thousand people using the telephones.

Seven thousand eating in the restaurants.

More than 4,000 soldiers, sailors, and Marines patronizing the station's service men's lounge, formerly the Presidential waiting room.

Nearly twice that number eating at the service men's canteen, where everything costs a nickel.

An emergency medical staff handling 200 cases, mostly minor.

Bus and streetcar passengers of the Capital Transit Company number almost a million daily. Women operators are beginning to appear, as the manpower shortage grows. Tokens, once made of nickel, zinc, and copper, now have the nickel omitted as a war-conservation measure.

Washington has 4,700 taxis, many of which used to operate 70,000 to 100,000 miles a year. The Office of Defense Transportation now limits the mileage of a cab to 36,000 annually, to save gasoline and tires. Passengers are required to ride in groups when

their destinations are in the same direction.

A few horses and carriages, and one or two old electric phaetons are seen on the streets occasionally. One restaurant sends out a horse-drawn bus, with a Negro coachman in a high silk hat, to gather up its regular patrons.

Bicycles by the thousand serve a double purpose. Owners ride them to and from work, and also use them for relaxation.

Hundreds of war workers rent bicycles in the evenings in Potomac Park and pedal around the Tidal Basin in the shade of the famous cherry trees (page 263).

The newest public building in Washington stands on the banks of the Tidal Basin. It was not built for war. It is the imposing Thomas Jefferson Memorial, dedicated by President Roosevelt on April 13, 1943 (Plate I and page 276).

The white marble memorial suggests the Roman Pantheon, which Jefferson called "the perfect model of a circular building."

Around the circle of the frieze beneath the dome are the words of Jefferson's famous oath:

"I have sworn upon the altar of God eternal hostility against every form of tyranny over the mind of man."

Revealing Earth's Mightiest Ocean

A new map supplement with this issue of the NATIONAL GEOGRAPHIC MAGAZINE presents a detailed and up-to-date picture of the vast Pacific Ocean. The biggest single feature of the earth's surface with its myriad islands is mapped to a scale of 1:27,500,000 on a sheet 36½ by 26½ inches. Fifty-six large-scale insets chart important island groups. A table shows 1,255 airline distances. The map includes Burma and eastern India. Any campaign launched against Japan from the Aleutians, Pearl Harbor, Australia, or India falls within the scope of this map. Members may obtain additional copies of the new Map of the Pacific Ocean and the Bay of Bengal by writing the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ on paper (folded or rolled); \$1 on linen (rolled only); Index, 25¢. Outside of United States and Possessions, 75¢ on paper; \$1.25 on linen; Index, 50¢. All remittances payable in U. S. funds. Postage prepaid.

BY ALBERT W. ATWOOD

DISCOVERY of the Pacific Ocean came late in man's life on earth.

The ancient world was ignorant of its very existence. Early pilots had to depend on landmarks and knowledge of winds in their own locality; of necessity they felt their way from point to point.

There were no instruments worthy of the name to determine latitude and longitude or even time. Not until the 14th century did the compass come into common use.

Vessels were exceedingly small, and poorly designed for deep-sea voyages. Not did they have adequate living quarters for officers and crew, or sufficient space for water, food, and gear.

Distant parts were filled with terrors of the mind as well as of the deep, with monstrous whirlpools, serpents, basilisks, and leviathans. To most men the very embodiment of Hell lay beyond the known land.

The second-century B. C. Greek scholar Eratosthenes; Ptolemy, who lived in Egypt in the second century A. D.; and the much earlier Aristotle believed that the world was round, but it suited the early Christian Church to arrange it symmetrically with Jerusalem at the center.

Nor was travel encouraged, except for pilgrims on holy journeys or crusades.

The West Discovers the Age-old East

But there came a time, as the Renaissance emerged, when new ideas broke through. Marco Polo had reached Peking. The West and the East, which for centuries had lain side by side with little knowledge of each other, began to come together.

Commerce and enterprise turned toward the East, and it was the hope of finding a shorter and safer route to the Indies that led the Spanish Court to furnish Columbus, who believed the world was round, with a fleet.

One of Portugal's princes, Henry the Navigator, turned his country's face to the sea.

Already the Portuguese had been building better ships and improving the compass.

Prince Henry, eager to continue the holy war against the Moors and to expand Portugal's empire and trade, pushed expedition after expedition down the African coast and built an observatory and school of navigation.

Another Portuguese, Vasco da Gama, opened the road to India, by way of the Cape of Good Hope, shortly after Columbus had failed.

Still another Portuguese, Ferdinand Magellan, in the employ of Spain, followed the eastern coast of South America farther south than any previous navigator, sailed through the strait that now bears his name, and on November 28, 1520, entered the waters of a new sea on which he was the first European to sail. He named it the Mar Pacifico.

Crossing the Pacific, Magellan discovered the Philippines, where he met his death. But one of his ships, the *Victoria*, under Sebastián del Cano, went on home to Seville. It was the first ship in history to sail around the globe.

Thus Magellan's expedition was the first to prove that the earth was round. He linked America and the Far East, the discoveries of Columbus and Da Gama, revealed the huge extent of the Pacific, and made the greatest sea voyage in the history of man.

Ever since Magellan's day, the Pacific, like a giant magnet, has drawn an extraordinary number of exploring expeditions to itself. Seven different nationalities, Portuguese, Spanish, Dutch, English, Russian, French, and American, have made major contributions of their own.

Widest and Deepest Ocean

The Pacific has been described as the most explored and the least known of oceans. Its awful and incredible breadth and the very fact that scattered throughout its vast domain are most of the world's islands, from the tiniest coral speck to those of almost con-



Harrison Howell Walker

Landing on This Rock 173 Years Ago, Capt. James Cook Made Australia British

Over Botany Bay flies a copy of the flag he unfurled, the Queen Anne Union Jack. The inlet takes its name from the profusion of flora Cook found here. He sighted but did not explore Sydney Harbour, 10 miles to the north. Now Sydney's suburbs overflow into Botany Bay (page 300).

tinental mass, have made discovery and exploration at worst haphazard and at best a prolonged, piecemeal task requiring centuries.

The Pacific is not only the widest but the deepest of oceans. It is about 23 times the size of the United States.

The voyages of early navigators, such as Magellan, gave the impression that they sailed upon a vacant ocean, and even so careful an explorer as Captain Cook once sailed 117 days without sight of land.* Most of the islands are small specks in relation to such a vast expanse of ocean.

As Joseph Conrad remarked, with the Pacific in mind, "The world of geography, as far as the apportioning of space goes, seems to have been planned mostly for the convenience of fishes." †

More seriously, Capt. Eddie Rickenbacker said of his recent 21-day drift in a rubber raft that most of the men were afraid no one would know whether they were dead or alive,

as in Amelia Earhart's case, "because this is a terrifically big ocean."

For the early explorers to have traversed the Pacific at all in ill-equipped ships and with none of the modern aids to navigation took hardihood, enterprise, leadership, and superb courage.

Whatever their motives, "laudable or sinful," as Joseph Conrad has said, these men went forth . . . "each bearing in his breast a spark of the sacred fire."

For the frequent lot of Pacific explorers was that of disappointment, failure, and stark

* See "Columbus of the Pacific" (Capt. James Cook), NATIONAL GEOGRAPHIC MAGAZINE, January, 1927; "Greatest Voyage in the Annals of the Sea" (Magellan), December, 1922; "Pathfinder of the East" (Vasco da Gama), November, 1927; and "World's Greatest Overland Explorer" (Marco Polo), November, 1928.

† See "Geography and Some Explorers," by Joseph Conrad, NATIONAL GEOGRAPHIC MAGAZINE, March, 1924.

tragedy, even though their discoveries made them immortal to a later age.

Rarely bringing back the gold and spices expected by their governments, they were neglected and humiliated, often spending years begging for the necessary funds and the seaworthy vessels needed for a follow-up voyage.

They died of poisoned spears, fever, drowning, and scurvy. They suffered from Arctic and Antarctic cold, they were tricked and stabbed, and tortured by thirst and hunger.

But what motives drove them to challenge fate? The ruling impulse varied from age to age, but rarely was there a single end in view.

The Spanish mingled a search for gold with a zeal for converts. Dutch captains sought to expand trade for their employer, the Dutch East India Company. At one time many English navigators were buccaneers out to loot the Spaniards. The chief motive for many voyages was political, the search for national "routes."

Fifty-two years after Balboa discovered the Pacific (1513), the Philippines were being colonized, and the monk-seaman, Andrés de Urdaneta, was soon able to cross the Pacific from west to east, for the first time, by boldly taking a high latitude north of Hawaii.

Thus began regular trips of the Manila galleon between the Spanish empire in the Philippines and Mexico's west coast. No one had the faintest idea, however, what lay to the north or south of "Urdaneta's Passage."

Discovery of the Solomons

But Peru seethed with fabulous rumors of a rich undiscovered continent to the west, and the Incas were supposed to have found gold, silver, and a "copper throne" in outlying islands.

Peru was filled with restless Spanish adventurers who wanted virgin fields, such as Cortez and Pizarro had had. Therefore, in 1567 the Viceroy sent out an expedition with his 25-year-old nephew, Alvaro de Mendaña, in charge, "to convert all infidels to Christianity" and, of course, to discover gold.

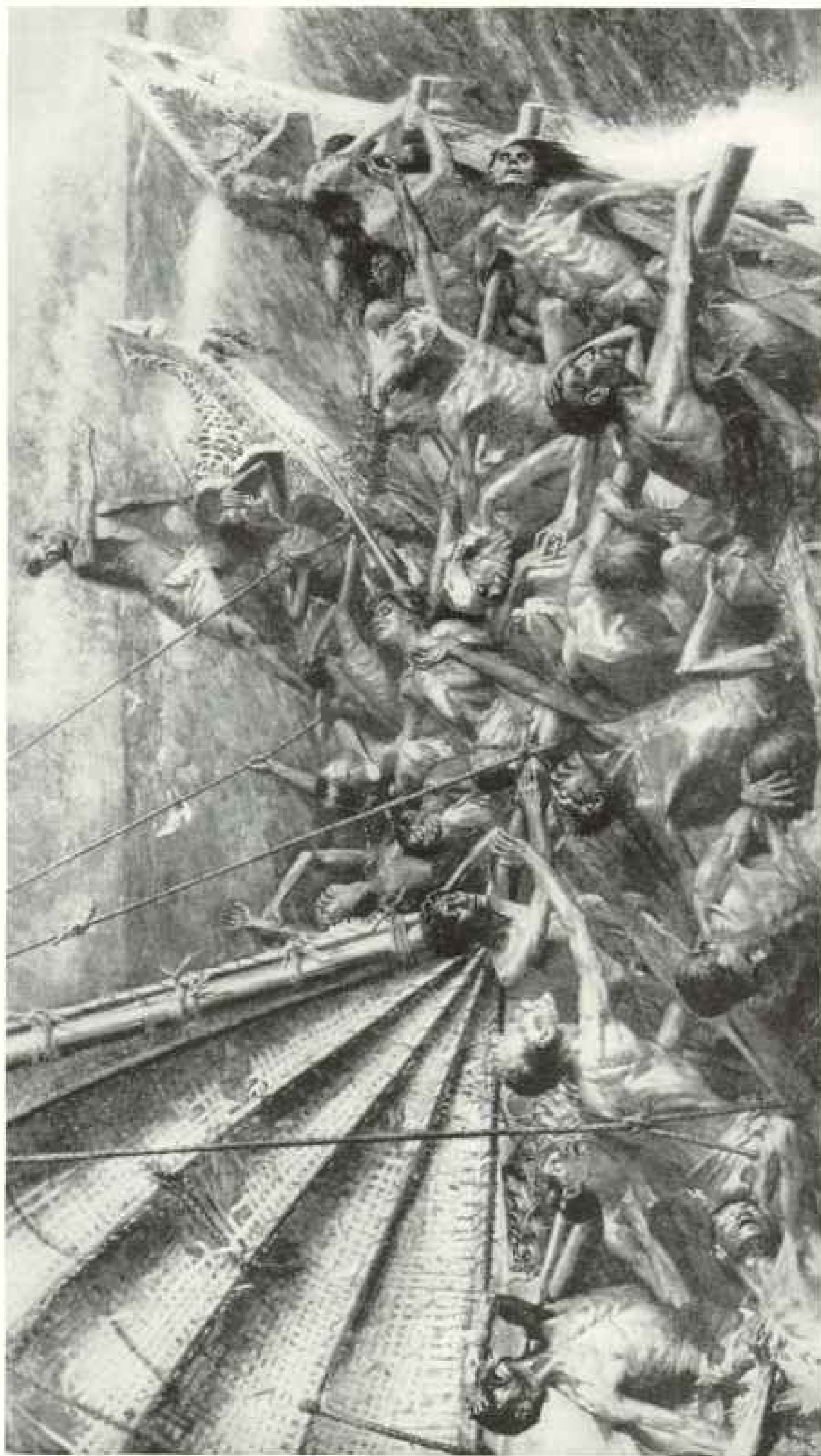
Mendaña was gentle and humane, firm when necessary, with self-restraint beyond his years, and persistent during the remainder of a tragic life in his purpose to colonize the land which he discovered.



© Merl La Ver

Shells Trim the Bow of a New Georgia Canoe

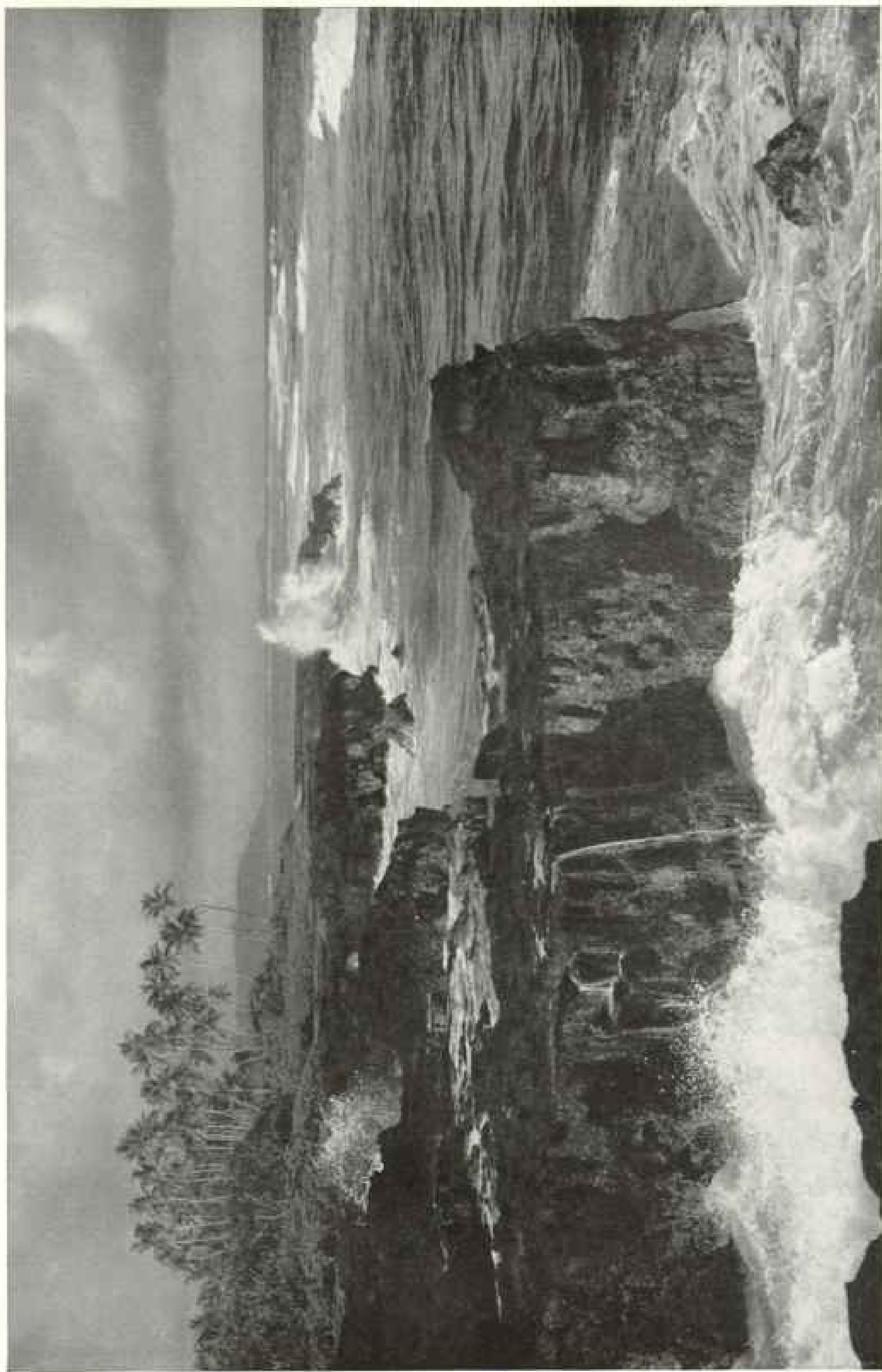
Last July these waters saw much bigger "war canoes." In the first Battle of Kula Gull, the U. S. Navy lost the cruiser *Helena*. Japan paid a far heavier price. Into New Georgia, in the Solomons, strode northern and southern "Yankees," singing "Marching through Georgia."



Auckland Worker News

Emaciated by a Long Hazardous Voyage, Maori Navigators Discovered New Zealand in the Fourteenth Century

Coming from "Hawaiki," their traditional homeland, these early settlers had only stars, winds, and currents to guide cramped, twin-bullied war canoes. Centuries later came the white "discoverers" and colonists with gunpowder. Peace in 1871 ended the struggle between the races. Now the 92,000 Maoris are civilized, responsible citizens. In Libbia their men fought valorously against the Axis. Painted by C. F. Goldie and L. J. Steele, and reproduced by permission of the Auckland Gallery of Art, this picture records graphically the suffering of these colonists from hunger, thirst, and discomfort.



APR 44

Blowholes Spout Like Geysers as the Pacific Surges Pistonlike through Cavities in Tutuila's Lava Cliffs

Like other islands in American Samoa, Tutuila is governed from Pago Pago Naval Station by a United States Navy captain. Off the beaten track of war, this base was shelled ineffectually by a lone Japanese vessel in January, 1942. Native Samoans in colorful uniforms serve as home guards.

His ships were unseaworthy, and he had provisions for only 600 leagues, the supposed distance of the unknown continent from Peru. But he finally landed on the central island of the Solomon group and named it Santa Isabel, after the patron saint of the voyage. He thought it was a continent, so mountainous and seemingly limitless it was.

Among the earliest of the important Pacific groups to be discovered, the Solomons long were the least developed. Before the war some were little explored, although from the group's coconut plantations came copra to yield oil for soap-making. The National Geographic Society had members there.

Mendaña and his friars tried to treat the natives fairly, but the latter were head-hunters (as were their successors for centuries), were hostile to strangers, feared the new and deadly weapons, and resented the Spaniards' insistent demand for food.

Wild pigs were plentiful, but could not be supplied on demand. Clashes and even massacres were inevitable, and Mendaña called a "parliament" to decide whether to settle in these lands, hunt for better ones, or return to Peru. He wished to remain, but the pilots complained that the ships were in bad shape, as were the soldiers' arquebuses.

The Marshall group and Wake Island were touched at on the return trip. But the voyage as a whole was disappointing. A Peruvian official reported to the King that the discoveries were of no importance because "they found no specimens of spices, nor of gold and silver, nor of merchandise, nor of any other source of profit, and all the people were naked savages."

There is no evidence that the islands as a group were given any name, but on the title page of one of the six journals kept by different members of the party appeared the words, "The Western Islands in the Southern Ocean, commonly called the Isles of Solomon." Guadalcanal was one of the islands named by Mendaña.

It took Mendaña until 1595 before he could make another voyage, this time for colonization. He was to take 500 men, 50 of them married, large numbers of cattle, horses, goats, and pigs, found three fortified cities within six years, and receive in part return for his work the title of Marquis.

On the way, he discovered the Marquesas group and went on to Santa Cruz Island (Ndeni), southeast of the Solomons, where he decided to found a settlement. But his wife and her three brothers had gone along, dissension broke out, and Mendaña died soon after.

Two of the ships were lost on the return voyage, but one of the pilots, Pedro Fernández de Quirós, who had stood between the parsimony of Mendaña's widow and mutiny, got his vessel safely back to Manila.

Search for the Great Southern Continent

On the way, Quirós conceived the project of discovering the great Southern Continent, a feat which would not only save millions of souls but would make him as great as Da Gama or Columbus.

Returning to Spain, Quirós persuaded Philip III to send him back to Peru to search for the Southern Continent with the best available ships. He took as second in command Luis Váez de Torres, a good sailor and pilot, and set out on December 21, 1605.

Quirós mistook what he called *Austrialia del Espíritu Santo*, one of the New Hebrides group, for the great Southern Continent, or *Terra Australis Incognita*. Fired by religious zeal, he proceeded to take possession of the new land in an elaborate series of pageants and ceremonies.

He even appointed magistrates, a chief constable, an accountant, a treasurer, and other officers for the New Jerusalem to be founded there, and had them take the oath of municipal office.

He took possession "of all the lands which I sighted and am going to sight, and of all this region of the south as far as the Pole, which from this time shall be called *Austrialia del Espíritu Santo*." (This was in honor of Philip III, who was also Archduke of Austria.)

But within a few weeks the party left the New Hebrides, probably because of illness or hostile natives, and eventually Quirós reached Madrid again. There, after presenting 50 memorials and 200 maps, he obtained permission to make another voyage, and died in Panama on the way back. With him also died the heroic age of Spain.

However, Torres, whose ship had become separated from that of Quirós after they left the New Hebrides, went on. He was the first to sail through the difficult strait between New Guinea and Australia. He did not know that Australia was a continent and, in a sense, the one for which so many explorers searched in vain; nor was the strait given his name until 1792.

To us Quirós seems a strange figure, but the idea of an unknown Southern Continent had long seemed logical enough. Balance and symmetry demanded it; the earth might topple over if Europe, Africa, and Asia in the Northern Hemisphere were not offset by an equal land mass to the south.

No mere Australia of reality was envisaged; the Southern Continent stretched, no doubt, from the Indian Ocean to South America and from the East Indies to the South Pole.

A decade after Mendaña's first voyage Sir Francis Drake, terror of the Spaniards, had burst into the Pacific, and Quirós urged his government to conceal its discoveries. So the Solomons became lost for two centuries, being placed hundreds of miles east of their actual location and touched by tradition with the wonder of a mirage.

The Solomons Re-identified

Several later explorers sighted the Solomons, but without identifying them. Louis Antoine de Bougainville, who had been an aide to Montcalm in Canada and after whom the flowering vine is named, made a scientific expedition around the world, partly in search of the Southern Continent. He came near anticipating Captain Cook in exploring the east coast of Australia, but turned away from the Great Barrier Reef.

Bougainville was one of the first to see Samoa, and two of the northern Solomons, Buka and Choiseul, were named by him. Bougainville Island, largest in the Solomon group, retains his own name.

But, curiously enough, it remained for a French geographer, Buâche, a man of the study rather than a navigator, to make the re-identification of the Solomons possible. In 1781 he located them correctly by a process of inductive reasoning. In 1785 the French Government sent out a scientifically equipped expedition under Jean François Galaup de la Pérouse to find them.

La Pérouse, a brave and gallant naval officer, who attended to his crews with care, was given the most detailed instructions, not only how to treat the "savages or natives," but in general how to fill in the geographical blanks left by Captain Cook. He did spend several years successfully exploring the coasts of California, Alaska, Japan, and Australia, not to mention the Hawaiian and many other islands.

Leaving the Solomons until nearly the end, he sailed from Australia in 1788 to visit them and was wrecked on Vanikoro Island, of the Santa Cruz group. All hands were either murdered by natives or drowned; fragments of one of his frigates were found years later.

Several expeditions were sent out in vain to find La Pérouse, and many imaginary accounts of his voyage have been written.

Final identification of the Solomons was not made until 1792-3, when Joseph Antoine Bruni d'Entrecasteaux and his lieutenant, Huon de Kermadec, verified Mendaña's account, re-

stored many of the Spanish names, and explored the labyrinth of islands that stretches out from the eastern end of New Guinea.

Australia, the last of the continents, except Antarctica, to be explored by Europeans, was not discovered by any visionary seeker for Terra Australis Incognita (opposite page), but as a by-product of many voyages by Dutch sea captains seeking the shortest route to Java after rounding the Cape of Good Hope. Having no exact means of reckoning, they sometimes overran their course and sighted the west coast.

They were interested in getting their cargoes to port, not in finding an unknown continent, and naturally failed to settle this waterless land.

Anthony van Diemen, who was only an obscure clerk when he went to the East Indies but rose to governor general through sheer ability, did send out several exploring expeditions to find "islands of gold and silver."

One of his captains, Abel Tasman, discovered New Zealand and Van Diemen's Land (later named Tasmania), also the Fiji and part of the Tonga groups, and was the first to complete the circle around the Australian Continent (1642-44).

For many years Australia bore the name New Holland, but the Dutch did not follow up their voyages and eventually lost possession through the principle of "non-user." It was left for the English to explore and colonize the east coast.

A Robin Hood of Exploration

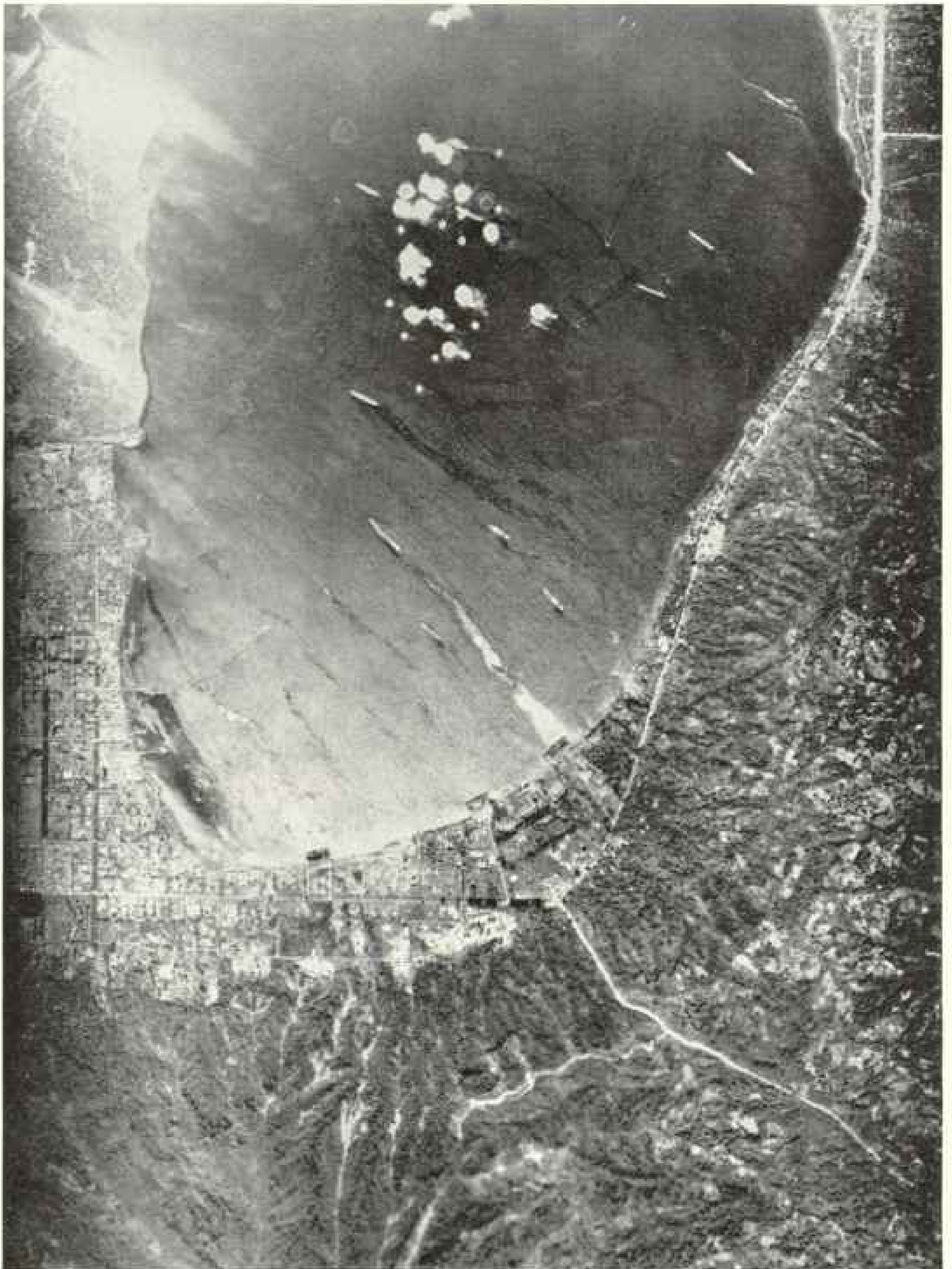
The first Englishman to touch Australia was William Dampier, adventurer, sea rover, and professional buccaneer.

An orphan, he left school at an early age, was apprenticed to a shipmaster, went to Newfoundland, fought in the Dutch war of 1673, was made a Jamaica plantation manager, entered the logwood-cutting trade, and finally joined a fleet of buccaneers.

From this beginning Dampier circumnavigated the earth—his first circumnavigation (he made two) took twelve and a half years when it could have been done in two—serving in many subordinate capacities and on many different ships.

When he became too disgusted with the drunkenness, brawling, and bawdy behavior of the crews, he would escape, sometimes by canoe, and join another piratical captain.

Always he kept a journal, closely observing winds, tides, currents, details of navigation, animals, plants, and natives. These journals, later best sellers of their time, were clear, urbane, tolerant, with natural eloquence.



U. S. Army Air Force, Official

Seen from a Bomber, Japanese Ships at Rabaul Zigzag Like Fish Fleeing a Harpoon

"Four enemy vessels were left sinking . . . all the Fortresses returned," said the U. S. Army communiqué. Rabaul owes its deep, natural harbor to a mighty sunken crater. "Mother" and "Daughters," three volcanic cones, stand guard over it. Volcanic ashes overwhelmed the New Britain Island town as recently as 1937.

Once his party retreated across Darien (Panama), forcing their way through tropical forests, shooting monkeys and gaily colored birds for food. They were pestered by heat and mosquitoes, swam numerous streams, and lost one of their number because he was weighted down by a heavy bag of ill-gotten gold.

But Dampier had provided himself with a large joint of bamboo, "which I stopt at both Ends, closing it with Wax, so as to keep out any Water. In this I preserved my Journal and other Writings from being wet, tho' I was often forced to swim."

Buccaneering, earlier tolerated by the British government, had been a respectable form of revolt against overweening Spanish pretensions, but Dampier was still buccaneering after it had become a mere form of sea robbery, obnoxious to all governments.

Nevertheless, he was received by certain men of importance, and his writings show no particular interest in gold or spices or in his own enrichment and ambition. Perhaps buccaneering with him was merely a way of seeing the world.

Certainly he was interested in discovery for its own sake, and in his one independent naval command he was first to show that New Guinea and New Britain are separate islands. The strait between them bears his name.

Dampier did the world, and particularly his own country, a great service. His writings aroused his countrymen's interest in the South Sea islands and in the Pacific, now no longer a closed Spanish ocean.

He alone of the English navigators had come to the edge of the unknown. Drake and other earlier privateer captains had merely traversed the Spanish tracks.

Dampier had no academic training and lacked the instruments which later explorers used. But his natural genius in bringing the methods of science into nautical discovery made easier the voyages of later countrymen, such as Anson, Byron (grandfather of the poet), Wallis, Carteret, and Cook.

The South Seas of Romance—and Fact

Europeans and Americans have long been fascinated by mental pictures of seductive trade winds, luxuriant vegetation, coral reefs, atolls and lagoons, an easygoing, indolent life, and a background of bold adventure, shipwreck, mutiny, and buccaneering.

But the Pacific is more than the South Seas of the laymen or the Oceania of the geographers!

A first glance at the map of even a small part of the myriad islands of the Pacific pro-

duces an effect of great confusion, but closer study reveals order and direction.

Not only has Asia projected itself southward toward the Antarctic in a series of island stepping stones, including the Netherlands Indies, New Guinea, the Solomons, New Caledonia, New Hebrides, and New Zealand, but also toward North America by means of Kamchatka and Siberia, Japan's Kurile, and America's Aleutian Island festoons.

The Pacific is not a tropical ocean only; it stretches into the Arctic and Antarctic. It knows fog and snow and ice as well as soft trade winds and waving coconut palms.

Tasman and other early captains of the Dutch East India Company had explored the Australian coast and had penetrated into Japanese and Siberian waters. But they found no gold or any mythical "Gama Land," and were vague about such land as they did see.

It remained for the captains of Peter the Great, father of modern Russia, and especially for Vitus Bering to reveal the land and water outlines of the North Pacific and to establish the important fact that Asia and America are separate continents.

Bering was born in Denmark, joined the Danish navy and later that of Russia, fighting in the war against Sweden. Russia had been pushing eastward through Siberia, but with no clear idea of direction.

However, Peter the Great, who added six provinces, outlets upon two oceans, a regular army, a fleet, a naval academy, and a new capital to his country, sought to give his Cossacks intelligent guidance.

He used Swedish prisoners of war to teach the Russians to build vessels, use nautical instruments, and make maps. Shortly before his death in 1725, he wrote out instructions in his own hand for Bering's voyage, not so much for the acquisition of territory as for scientific discovery.

Bering was instructed to sail from Kamchatka "along the shore which bears northerly and which seems to be part of America" and to "determine where it joins with America."

Bering was most successful, geographically speaking. He discovered Alaska and part of the Aleutians, and definitely established the fact that Asia and America are separated by a narrow strait, later to bear his name. He found no Gama Land, but he discovered new wealth in vast numbers of valuable fur-bearing animals.

His second expedition suffered severely from scurvy, was lost for a long period, and had to take refuge on a desolate, uninhabited

island between the Aleutians and Kamchatka, where he died in 1741. Survivors of the party reported their discoveries, and Siberian fur hunters were soon working eastward through the chain of islands to the mainland of America.

In this manner, Alaska came into the possession of Russia, not so much by design as by accident. Russia never really desired or needed it. Catherine the Great regarded it as a drain upon her navy and mercantile marine, preferring to have her subjects colonize Siberia. Therefore, she insisted that she would furnish the fur traders with "neither men, nor ships, nor money." And so her successors, influenced also by threatening international problems, were glad to cement friendship with the United States by selling Alaska as soon as the Civil War was out of the way.

Englishman Explores America's West Coast While Revolution Is Being Fought

Confirmation that Aleutian and Alaskan waters contained large numbers of fur-bearing animals came from the third of Captain Cook's exhaustive voyages of exploration in the Pacific, at about the time of the American Revolution.

James Cook was a farm laborer's son who, after working on a collier, joined the navy and showed ability at an early age. Sent to Canada to help Wolfe, he was rapid, accurate, and persistent in making surveys of the St. Lawrence River and Newfoundland coast.

In 1768 he was put in command of a scientific expedition to make astronomical observations in the South Seas, and added much land to the British Empire. He discovered New Caledonia and sailed around New Zealand, proving it to be an island and not part of a continent, as Tasman had supposed.

Cook did not discover Australia, but for all practical purposes he annexed it to the British Empire, just at the time that half of North America was about to be lost to the colonists.

His studies at Botany Bay, near Sydney, led to English settlement 18 years later, and he explored and named many points on the east coast, despite the dangers of the Great Barrier Reef (page 292).

On his second voyage Cook showed there was no *Terra Australis Incognita* (page 296). He searched for it in several different directions, being stopped by ice to the south.

It is possible that early Spanish navigators may have sighted the Hawaiian Islands, but Cook, on his third voyage, was the first European definitely to locate the group, naming them the Sandwich Islands in honor of a friendly earl.

The Spanish galleons had traveled to the north and south of the islands for 250 years (page 293), but the east-west elongation of the group preserved their solitude until Cook, making the first north-south voyage, intercepted them.

After leaving the islands, Cook tried in vain to find the long-sought-for Northwest Passage. He was unable to pass the ice barrier north of Bering Strait, and, after charting much of the northwestern American coast, returned to Hawaii to meet death at the hands of the natives.

Cook had a real advantage over earlier navigators in his roomier, sturdier, and better equipped ships, and even more in the greater knowledge of astronomy and navigation.

He also prepared for his voyages with a meticulous attention to detail unknown to previous explorers, although common enough for such moderns as Admiral Byrd.

He took a multitude of precautions in respect to food and water and, as a result, lost very few of his men from disease.

Scurvy had mowed down the crews of most previous explorers like a pestilence, affecting the whole course of exploration, colonization, commercial enterprise, mercantile shipping, and naval operations.

Sir John Hawkins, the great Elizabethan seaman, said that in his 20 years at sea scurvy killed 20,000 men in the British Navy.

Magellan lost most of his crews from the same cause, and on Lord Anson's trip around the world nearly two-thirds of the crews of his little squadron died from scurvy. This disease was for centuries the greatest single obstacle to discovery and exploration.

Protection against scurvy lay in potatoes, onions, cabbage, and fruit juices, especially lemon or lime juice, instead of the traditional diet of salt meats and biscuit.

Before medical officers of the British Navy finally compelled the general use of such foods, a few individual navigators had adopted them. In fact, Cook, finding his men did not care for sauerkraut, compelled his higher officers to eat large quantities of it, which made the men eager to have their share.

A Missionary Turns Explorer

Boston merchants became interested in Cook's reports of fur-bearing animals on the northwest coast of America, especially as several men from the American Colonies had served on his ships. One of these was John Ledyard, who entered Dartmouth College to study as a missionary to the Indians, but could not endure the discipline.

He shipped as a sailor, deserted at Gibralt-

tar, joined a British regiment, and later became a corporal of marines for Captain Cook, whose voyages, at the request of Benjamin Franklin, were left undisturbed by the French Navy during the American Revolution.

As a result of his voyage with Cook, Ledyard developed into an ardent advocate of the opening of the Northwest by his countrymen. Seeking to be an explorer on his own account, he attempted to walk across Siberia toward Alaska, and received Thomas Jefferson's approval. But the Empress Catherine refused permission. Later, when she was away, he got as far as Irkutsk before he was arrested.

He tried to walk across Africa, but, because of delay in starting the trip, fell into a violent rage and died.

Ledyard's dreams, however, were not long in becoming reality. About 1790 American sealers and whalers began rounding Cape Horn, and later roamed the Pacific in great numbers.

These Yankee captains were not in search of geographical knowledge for its own sake, but sailed on to Canton where they exchanged pelts for tea and silk for the return voyage.

Unlike many expeditions of other nations, their voyages had no government sponsorship, being wholly private enterprises.

Yet these Yankee captains discovered large numbers of islands and island groups which the explorers of other countries had overlooked.

First American Around the World

Capt. Robert Gray of Boston was the first American to circumnavigate the globe, sailing



Ellsworth Antarctic Expedition

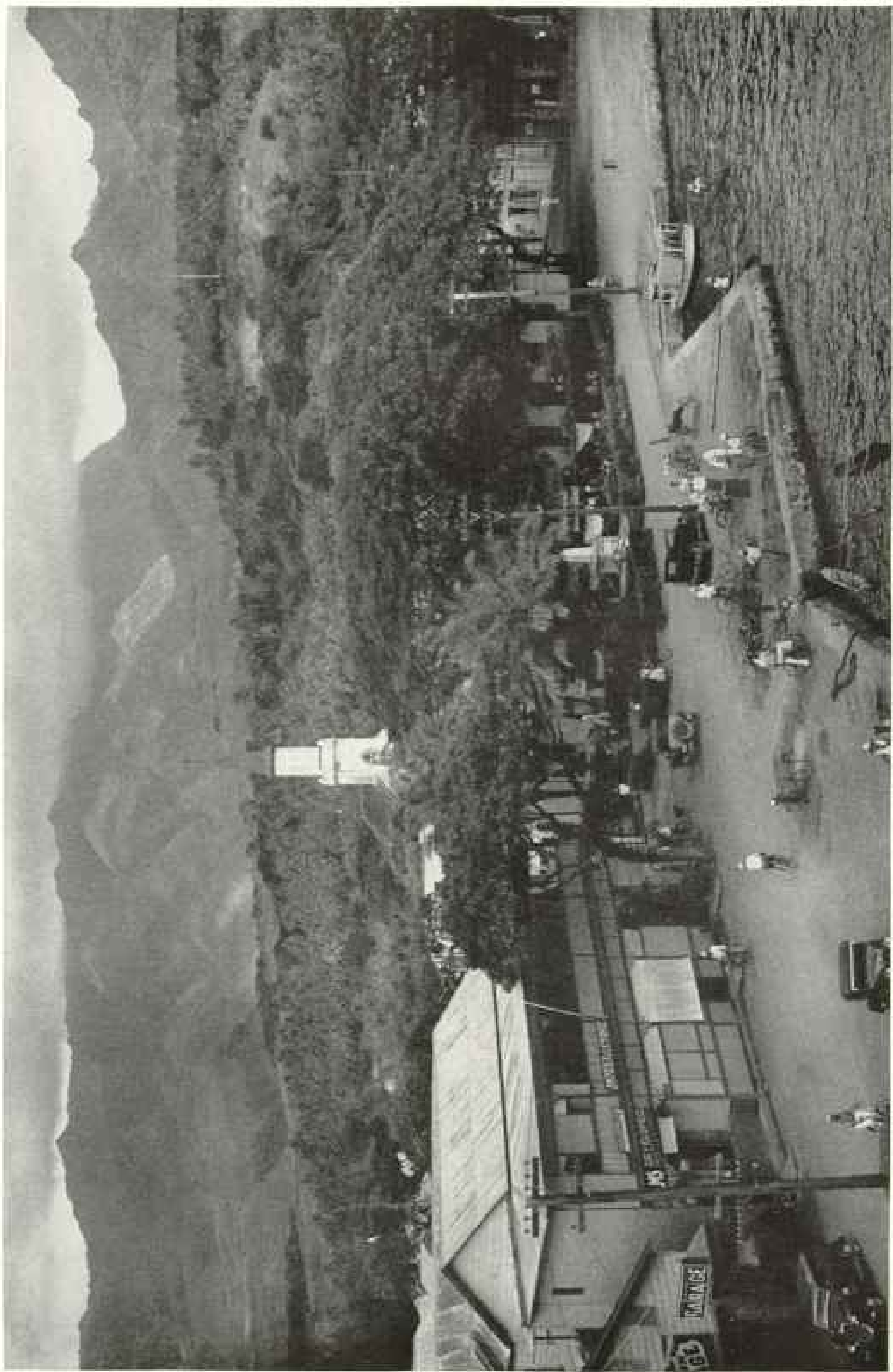
Lincoln Ellsworth with the National Geographic Flag He Carried 2,300 Miles Across Unknown Antarctica

The day after this picture was taken on Dundee Island, Herbert Hollick-Keryon (left) and Ellsworth took off on their epic flight which added a huge pie-shaped section of Antarctica to the territorial claims of the United States (see "My Flight Across Antarctica," by Lincoln Ellsworth, NATIONAL GEOGRAPHIC MAGAZINE, July, 1936).

almost 42,000 miles in the process. A man of great energy, determination, and daring, he was the first navigator to enter and sail up the Columbia River, naming it after the ship he commanded. This was in 1792.

The promoter or agent for more than 70 of these fur-hunting expeditions was Capt. Edmund Fanning, who went to sea at the age of 14. Like many other South Sea captains, he came from the little port of Stonington, Connecticut.

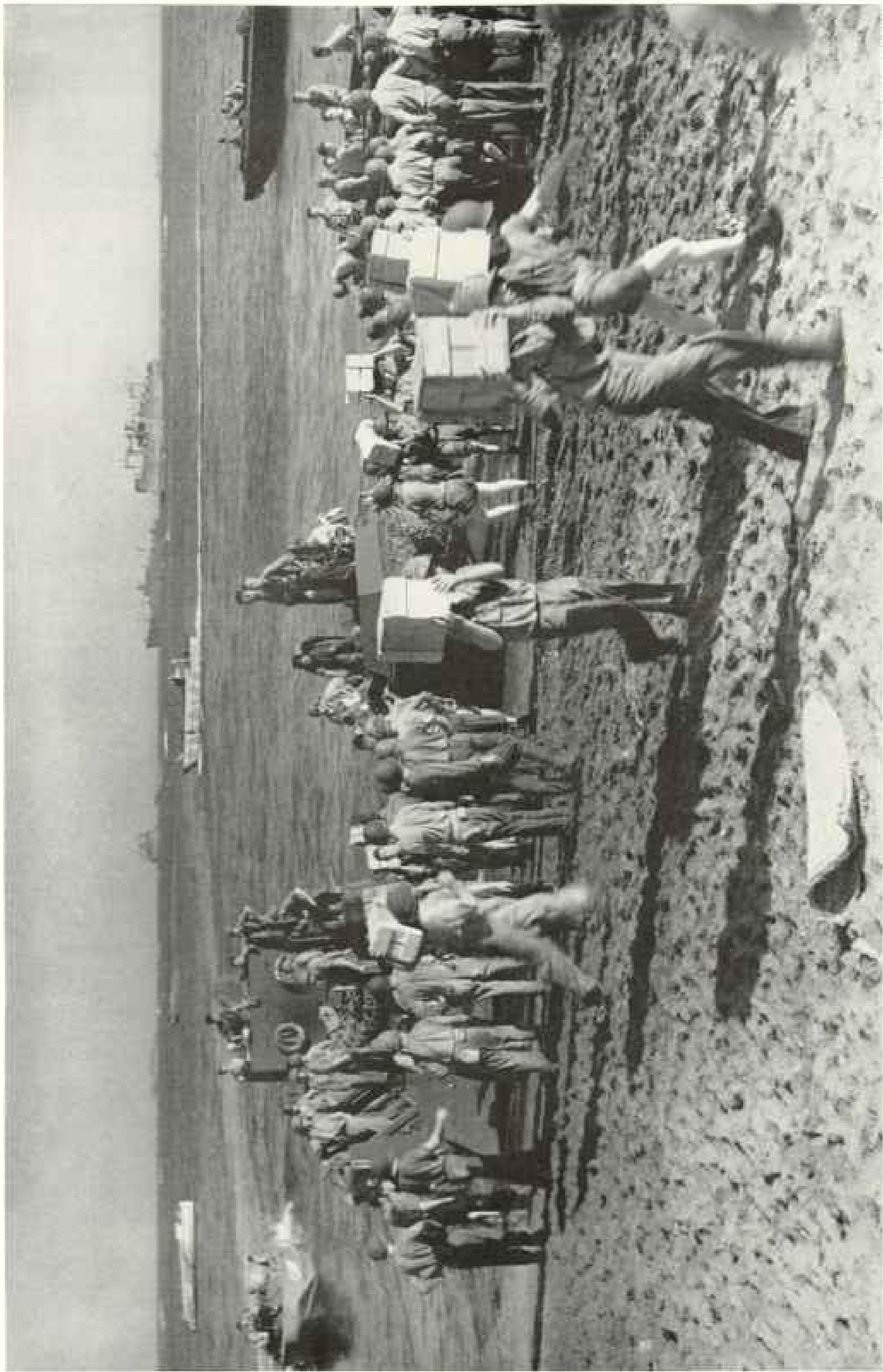
Fanning was always hunting for new seal rookeries, for ruthless slaughter cleaned them out rapidly. From one voyage the owners



From Duboussé from Papeete Harbour

Life Is Peaceful and Languorous in Papeete, Capital City of Tahiti and French Oceania

Behind hotels and church, bungalows lie hidden in tropical verdure. In the harbor a glass-bottomed boat is a reminder of peacetime's many visitors to coral gardens. In the evenings, island belles in bright frocks promenade along the water front. Early in the war Tahiti followed Free France.



U. S. Marine Corps. Official

Into the Surf at Guadalcanal, One of the Solomon Group, Go U. S. Marines to Unload Supplies from a Convoy

Japan sent transport after transport, warship after warship, to support its men here. One by one they were sunk by American guns and bombs. Finally the enemy evacuated the starving remnants of his army. With victory here, the United States acquired a ready-made airport and bases (pages 293, 296, 297).

made a net profit of \$53,118 on an investment of \$7,867, and Fanning received \$15,000. Not all voyages were so successful; one captain and crew fell victims to Fiji cannibals.

Fanning discovered the island that bears his name, also Washington Island, and he nearly ran aground on a shoal near the Palmyra group. The latter is important in modern air transport.

Capt. Nathaniel B. Palmer, also of Stonington, became a cabin boy on a coaster at 14, and in 1819 as second mate he helped bring back 10,000 skins from the newly discovered South Shetlands, south of Cape Horn.

Next year he was sent farther south in command of a small sloop and discovered the Antarctic Continent. The barren, mountainous section he saw became known first as Palmer Land, then as Palmer Peninsula.

Later in life, Captain Palmer designed clipper ships, was an early member of the New York Yacht Club, owned 17 different yachts, and helped design the early Fall River steamers.

The American whaling industry had suffered severely in the Revolution and War of 1812, but got a superb fresh start in the Pacific. Americans held practically a monopoly on it for a hundred years.

In the 1830's and 1840's the industry reached its peak, with some 730 vessels—more than 300 from New Bedford, Massachusetts, alone—scouring the vast ocean from Kamchatka to the Antarctic for new grounds and employing many thousands of men.

This led to increasing demands for better charts of the Pacific, for there had been many wrecks, massacres by natives, and long, grueling voyages in open boats.

The Epic of Charles Wilkes

In his first message to Congress in 1825, President John Quincy Adams vainly urged a naval expedition "for the exploration of the whole northwest coast of this continent." It remained for a promoter, one Jeremiah N. Reynolds, to stir Congress into action.

Reynolds had been secretary to a commodore, had accompanied one adventurous voyage to the Antarctic, and as a special agent of the Navy had interviewed many sea captains and owners on South Sea conditions.

For 20 years he had had an imperial dream of "national glory," and desired to participate therein.

Finally Congress, under a deluge of petitions and memorials from Reynolds, voted funds for an expedition, but Reynolds started a bitter controversy with the Secretary of the Navy over the details of the proposed

voyage and was not allowed to go along.

Because of bickering and delay, a considerable number of senior officers refused the command of the United States Exploring Expedition, and it was finally given to the youthful Lieut. (later Rear Admiral) Charles Wilkes.

Wilkes is one of the great figures of American history and exploration, but a strangely neglected one.

His expedition came at a time, 1838-1842, when westward expansion gripped the country. Gold was about to be discovered in California, and the slavery question was casting its shadow before; internal developments absorbed the people's attention.

But Wilkes' achievements constitute one of the proudest of American heritages.

Born in New York City, Wilkes was appointed a midshipman in the Navy. He studied under Ferdinand A. Hassler, the Swiss scientist who founded our Coast and Geodetic Survey.

Origin of the Naval Observatory and Hydrographic Office

With this training Wilkes was put in charge of the Depot of Charts and Instruments, out of which grew the Naval Observatory and the Hydrographic Office. Wilkes bought many astronomical instruments in Europe and built an observatory in this country.

During its four years in the Pacific, the Wilkes expedition made more than 100 charts, examined 280 islands, 800 miles of coast and inland waters in the Oregon Territory, and more than 1,500 miles of coast of the Antarctic Continent.

Wilkes was too late to discover many new islands in the Pacific, but he accurately fixed the position of a number of them for the first time. His charts continue to serve today as a basis for those of all nations.

Most of the islands which he surveyed were low coral reefs of Polynesia and Micronesia, in the central Pacific, not the great mountainous land masses of Melanesia in the western Pacific near Australia.

Upon arrival at an island, he would set up an astronomical station, and studies would also be made by his scientists of the geology, botany, history, government, commerce, and manners of the place.

Castaways and shipwrecked sailors were formally received, and trials held of native murderers of members of whaling crews.

Others had sighted a few short stretches of the Antarctic coastline before Wilkes, but he was the first to prove its continental character by observing more than 1,500 miles of coast.

In the Oregon Territory he made more extensive surveys than any previous explorer.

His scientific parties went up the Columbia River farther than Captain Gray (page 301), examined the Grand Coulee, surveyed the Sacramento River to the site of the present city of that name, surveyed the northern part of San Francisco Bay, and made extensive overland expeditions, including one from the Columbia River past "Shaste Peak" to San Francisco.

Wilkes and his men are credited with having held the first public observance of July 4 on the Pacific coast.

Wilkes contributed importantly to our knowledge of gravity, terrestrial magnetism, and meteorology. Much of what we know today about climate is due to his studies in the Pacific.

The scientists who went with Wilkes brought back numbers of drawings and natural-history specimens, as well as vocabularies of different languages. There were some 2,000 drawings alone.

These collections formed the basis of the present United States National Museum and also the United States Botanic Garden in Washington, D. C. The Wilkes expedition plainly marked America's scientific coming of age.

Wilkes was a man of fiery temper and rash impetuosity, which often got him into trouble. But he had perseverance, decision, and driving energy, as well as indomitable courage.

He was a martinet and stern disciplinarian, but withal a scholar and scientist, and, despite his defects of temperament, a very real leader. The same scientist who said he was conceited and overbearing remarks that with no other commander "should we have fared better or lived together more harmoniously."



Paul J. Nordman

Two Witnesses Show Why Tahiti Is Renowned for Romance

Wilkes had strong feelings on numerous subjects, ascribing the good health of his crew to the absence of spirituous liquor, which he said "does infinite harm to the service, destroying and sapping its morale."

Wilkes lived for many years in the Dolly Madison house in Washington, now part of the Cosmos Club, and is buried in Arlington National Cemetery.

The End of an Epoch

It is usual to say that Wilkes' expedition brought to an end the first great period of maritime discovery, with its emphasis upon finding new lands. Exploration today concerns itself more with climate and the ocean itself, with its depth, temperature, currents, and floor.

Perhaps there are no new islands to be dis-



K. W. P. CHERRY

Such New Britain Tribesmen in Nose Rings and War Paint Befriend U. S. Flyers

Forced down in Japanese territory after a raid on Rabaul, Army aviators have been fed and cared for by islanders until their rescue.

covered in the Pacific, but as recently as July, 1937, the Navy gained much fresh knowledge of that mighty ocean in its fruitless search for Amelia Earhart.

In 1938 Richard Archbold, flying over New Guinea, discovered a valley which contained, according to his estimate, a population of 60,000, although it had probably never been seen before by white men.*

The slow fighting in places like the Solomons and New Guinea testifies not only to the harsh and forbidding but also to the little-known character of the terrain.

No ocean as vast as the Pacific or with so many islands can fail to remain mysterious. The Philippines alone consist of 7,083 islands and islets, and much less important archipelagoes contain from 500 to 1,000 each.

Always the Pacific has been traversed by bold and brave men who dreamed great dreams, and often made them real. They are an illustrious company, these explorers of the Pacific, these men who have given us so much of the world as we know it today.

From Wilkes to Byrd

But to an American the inspiring coincidence is that it was 100 years later to the

very month that Rear Adm. Richard E. Byrd, on his third Antarctic expedition, and the second to that area sponsored by the United States Government, completed what Wilkes started. Either man could say, as Wilkes did after returning from his voyage:

"I shall always have the proud and conscientious feeling of having done my duty; and that I have carried the moral influence of our country wherever our flag has waved."

Wilkes demonstrated the continental character of the Antarctic in January and February, 1840. Byrd, after long experience in North Polar expeditions and two previous expeditions to the Antarctic,† in January and February of 1940 discovered five new mountain ranges, five new islands, a large peninsula, 700 miles of hitherto unknown coast, and explored 100,000 square miles in the Antarctic.

* See "Unknown New Guinea," by Richard Archbold, NATIONAL GEOGRAPHIC MAGAZINE, March, 1941.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Conquest of Antarctica by Air," August, 1930, and "Exploring the Ice Age in Antarctica," October, 1935, both by Admiral Byrd; also "Mapping the Antarctic from the Air," by Capt. Ashley C. McKinley, October, 1937.

Sicily Again in the Path of War

BY MAYNARD OWEN WILLIAMS

With Illustrations by Staff Photographer B. Anthony Stewart

DRAMATICALLY, on July 10, 1943, Allied forces landed on Sicily. More than 2,000 vessels transported troops and armament, by far the biggest invasion armada in history. In Washington, President Roosevelt called the surprise landing "the beginning of the end" for Italy and Germany.

Sicily lies just off the bomb-stubbed toe of the Italian boot, only two miles from the mainland of Europe. The Allies have repeatedly blasted this onetime island paradise, to isolate it as geologic forces did ages ago.

For the United Nations this mountainous remnant of a broken land bridge was an obvious stepping stone between emancipated North Africa and Axis-enslaved Europe (map, pages 312-13).

Last spring, six-engined Axis transport planes, each carrying 120 armed men, swarmed across from Sicily to Africa in a futile attempt to stave off Rommel's defeat.

Air Lanes over Historic Sea

Now modern miracles of the air, bearing such romantic names as Flying Fortress and Liberator, Lightning, Spitfire, Mitchell, Marauder, Wellington, Boston, and Baltimore, rule the air lanes above the sail-winged sea through which Phoenician mariners ventured forth on epoch-making voyages to Carthage, Marseille, and the Pillars of Hercules.

Bombs and gunfire brought the unconditional surrender of volcanic Pantelleria and outcropping Lampedusa before Allied landing forces touched their shores (page 308). The two-square-mile volcanic fragment of Linosa quickly followed suit.

Along with Sardinia, Sicily, and gallant Malta, these tiny islets command the Allied convoy route which follows the northern shore of Africa from Gibraltar to Egypt. In peacetime, few steamers used this open shipping lane south of Sicily. Ports and population centers lay to the north, and the main traffic route was through the Strait of Messina.

Since history began, triremes, sailing ships, and passenger liners, plying between Europe and the East, have used this maritime bottleneck. But there has been important traffic across, as well as along, the stormy Strait.

Much of Messina, which arose after the earthquake of 1908, has been leveled again.

"We made a mess of Messina," reported one of our flyers. The Maritime Station at

Messina is a tangle of wreckage (page 311). Ferryboats have been sunk at their piers.

Because through sleeping cars used to run between Rome and Palermo or Syracuse, peacetime passengers could ignore the Strait of Messina entirely. Neither troops nor civilians can do so now. Planes churn the historic bottleneck with their bombs and stop as much ferry traffic as they can.

Nor can the largest island in the Mediterranean hide its four million inhabitants in underground shelters as did Pantelleria, its hard-hit little neighbor to the southwest.

On my seventh visit to Sicily I did not land, as Melville Chater did, at Messina.* I came from Africa, as the Carthaginians and the Saracens did, centuries ago. Having breakfasted in Bengasi and lunched in Tripoli, I came to the Sicilian port nearest to Tunisia's Cap Bon—Marsala.

At the airport, where Axis transport planes in 1943 massed to resist the Allied blitzkrieg in Tunisia, we were herded past the barracks of the military pilots and quickly passed through Customs.

Surrounded by vineyards and famous for its wine, Marsala was once the strongest Carthaginian colony in all Sicily. It fell to the Romans after nearly ten years of siege.

The Harbor of Allah

The Saracens, coming across from Africa, gave Marsala its name of Mars-al-Allah, Harbor of Allah. They brought irrigation and fruitfulness to Sicily's smiling valleys. Fences of prickly pear, or Barbary figs, reminded me of Bible lands. Their fleshy leaves, edged with spines, are as good as barbed wire, and their fruit is a common food.

Unsuspecting visitors who have enjoyed this exotic delicacy, its flavor combining those of melon and pumpkin, may be so foolish as to help themselves to the growing fruit. Microscopic spines creep up their sleeves and a thousand tiny red spots appear on their arms. After that, they are content to let their hosts pry loose the juicy food from its prickly coat before touching it.

An Englishman, John Woodhouse, first produced Marsala's golden wine in 1773. Joseph Whitaker, a successor, owns and has excavated

* See "Zigzagging Across Sicily," by Melville Chater, NATIONAL GEOGRAPHIC MAGAZINE, September, 1924.



The Fall of Pantelleria Was the Prelude to the Allied Invasion of Sicily

At the Pentagon Building in Arlington, Virginia, American soldiers here study tiny Pantelleria, which fell to air and sea attack on June 11, 1943. When the Axis forces surrendered at Cap Bon, the well-fortified little island, with its hillside hangars carved in rock, stood in the way of Allied armies headed for Europe. Sicily is the island remnant of a land bridge which once joined Africa and Europe.

Motya (San Pantaleo), a remarkable little island to the north, where ancient Phoenician traders stopped on their way to Britain.

Phoenician Skyscrapers on Motya

Because of its tiny area, Motya developed a group of skyscrapers. When the Syracusan tyrant, Dionysius, stormed it, he had to design engines like modern fire towers to attack at high levels. From tall bridges, fighting men fell to their death. Some Greek renegades helped in its defense. These Dionysius crucified, more than four centuries before Christ died on Calvary.

The Phoenician walls can still be traced, but today, as seen from a plane, there is little to suggest this sky-thrust city where rich men had penthouses high above the harbor.

North of Marsala, a seemingly endless series of salt pans reaches along the western shore to Trapani, Sicily's more northern port

facing Africa. An almost constant breeze not only aids in the evaporation under a hot sun, but drives the windmills that grind the salt, which Scandinavian fishermen once bought to cure their catch in faraway waters.

Trapani takes its name from a sickle-shaped peninsula, as did early Messina. But this lesser port, almost surrounded by salt pans, lies outside the curve, while Messina's much-bombed harbor is within its sickle of sand. In the town of Trapani, a church with a beautiful rose window once belonged to the Templars.

Up a spectacular mountain road lies the little town of Monte San Giuliano (Erice), with an ivy-covered old castle. From this superb viewpoint I looked down on a cluster of islands where a Carthaginian fleet defeated the Romans in 249 B. C. Eight years later, Roman galleys impaled the richly laden Carthaginian ships on their pointed prows and ended the First Punic War.

From this historic shore of western Sicily, Axis "flying boxcars" only last spring trundled forth to destruction in Tunisia. Later, Monte San Giuliano, sacred to Astarte and Venus, Goddesses of Love, was a landmark for Allied bombers flying from Bizerte to shatter Palermo.

On my journey to Palermo, I rode in a swift but shaky Diesel-motored train with jolly wine merchants as fellow passengers. In the Central Station a metal plate reading "Palermo-Boulogne" marked a railway carriage, about to cross Europe to the English Channel. In prewar days through freight was shipped in sealed cars direct from Palermo to Norway or Switzerland.

"All Harbor" in the "Golden Shell"

The Sicilian metropolis, with a normal population of 400,000, has often been the island's capital. Exceptionally favored by climate, it occupies a site as fine as that of its sea neighbor, Naples. From the surrounding hills the Conca d'Oro, or Golden Shell, spills vegetables, oranges, and lemons into the city's lap from its fruitful cornucopia.

The Greek name for Palermo was Panormos (All Harbor), for small rivers adjoining the port carried primitive craft deep into the land. The old town, thus embraced with an intimacy long since forgotten, has been swallowed up by the widespread city.

The ancient mooring places now lie deep below city streets, and the bustling metropolis has shoved the sea out of its bed. But the harbor is larger than before, and the old port is almost lost in a corner of the mile-wide expanse where destroyers, steamers, and sea-planes found shelter.

In summer, the fashionable twilight promenade was held along the Marina, near the Porta Felice. This gateway was left open at the top so that the high-riding festival cars could pass.

After a day of sirocco, hot off the Libyan sands, which cracked my lips and burned my eyeballs, I watched the happy crowd walking back and forth. Then a group of Italian warships wheeled in from the east.

With showy skill the trim vessels swung to their berths and crowds of sailors were greeted by their friends, while the Naples night boat sailed amid a flutter of handkerchiefs.

Up in the old town, on time-mellowed walls, massed posters pictured heavy military sandals treading Africa, and announced an Overseas Exposition in Naples for 1940. But by then, Mussolini had stabbed both France and Italy in the back. Those very

walls of Palermo have echoed repeatedly to the burst of bombs.

Only six weeks before the invasion of Poland, I found Palermo a gay and pleasant place. With the thermometer at 104°, sitting in the sun, as winter visitors did, had no appeal, but Palermo's cool cafés were pleasant retreats.

From its palm-shaded squares I took the short ride to the bathing resort of Mondello. Here a dining-and-dancing pavilion was stilted in the sea, and the curve of beach was brightened by cabins as chromatic as peasant cart or fishing boat. GEOGRAPHIC photographer B. Anthony Stewart had just rolled in from a dusty motor survey of Calabria, and we shot film along the beach to our hearts' content.

Then we climbed the sharp hairpin turns of Monte Pellegrino and looked down from a breezy terrace on what resembled a Technicolor relief map of Palermo.

This terrace is nearly as high as the Empire State Building. Most of Palermo is closer to it than lower New York to our tall skyscraper, but in the slightly sloping and tree-shaded city only a few buildings stand out. One can easily identify the Teatro Massimo, one of the largest in Europe, and the campanile of the great Cathedral.

Sitting there, as in a motionless blimp, a thousand feet above the city, it was hard to believe that two-thirds of all Sicily lay at a higher altitude. In springtime many a Sicilian mountain has snow on its shoulders and orange blossoms in its lap. The population lives under its fruit trees or beside its fishing boats, close to sea level.

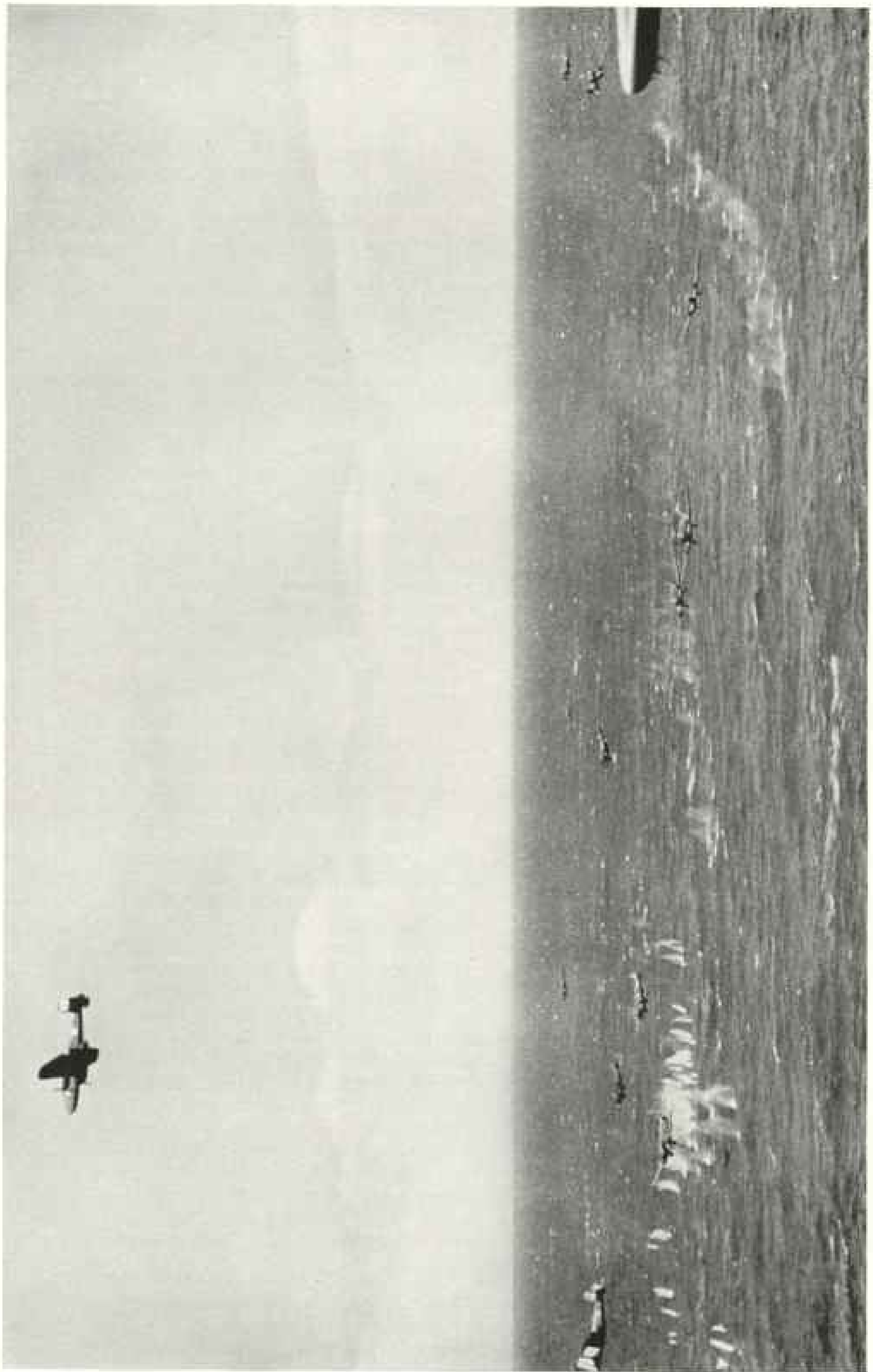
From our high perch above Palermo we could see how the golden horn of plenty empties its fruit at the very doors of the city.

Only recently has Sicily regained such a population as it had in classic times. When that ancient glory had passed, malaria weakened the population, and Barbary pirates laid waste the southern coast. Under the Spanish viceroys, famine swept the island and less than a million Sicilians survived.

When Victor Emmanuel II became King of Italy in 1861, centuries of mistrule had left their mark. There was only one road—from Palermo to Catania and Taormina—in all Sicily. Even in 1935 the island had more miles of railway than it had of highway.

Palermo Sent Many Emigrants to America

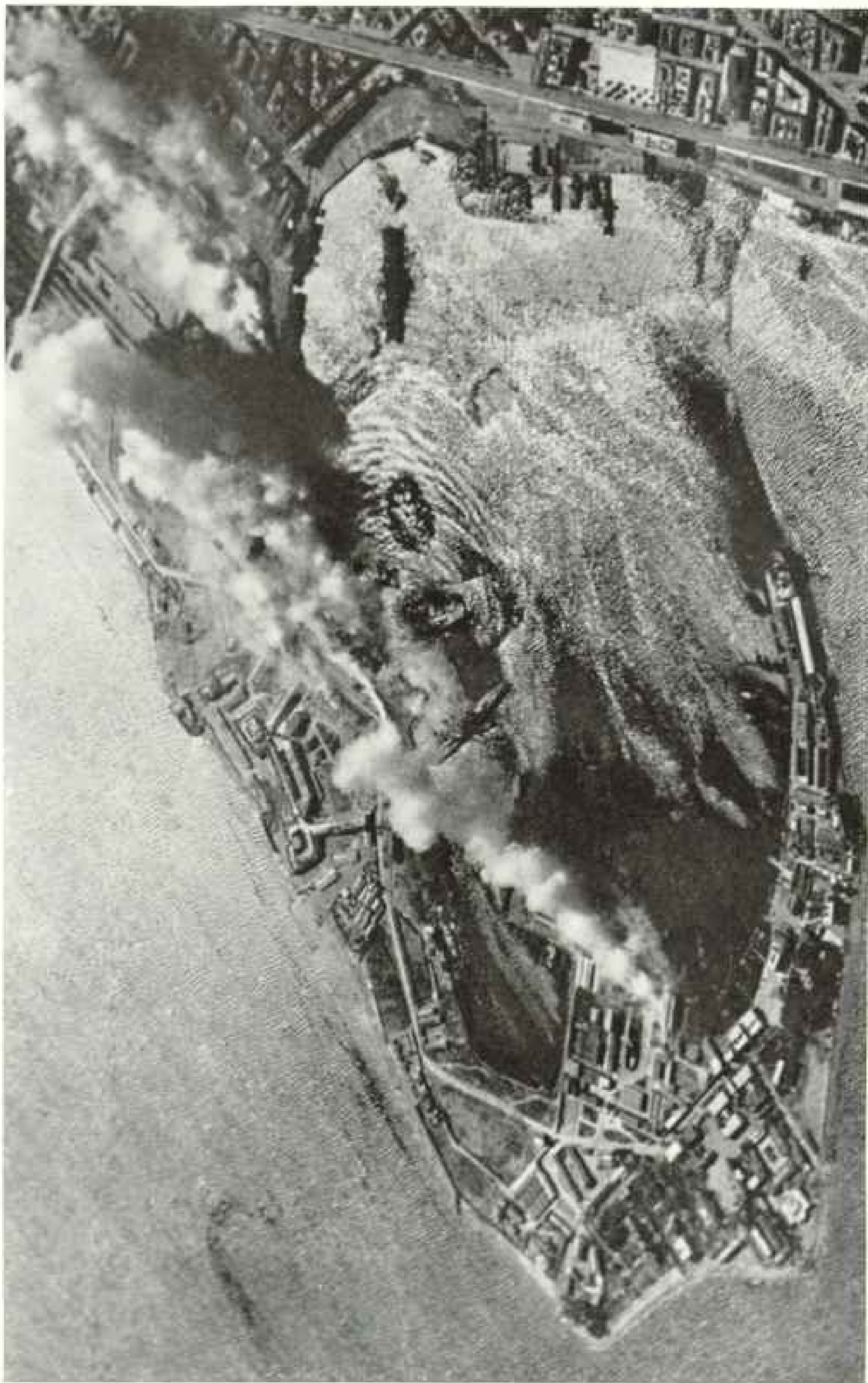
Early in the present century, the population had so increased that many Sicilians emigrated to North Africa or America. Shipping companies fostered the mass exodus



U. S. Army Air Corps, Official

Thirty-five of These Wave-skimming Axis Planes Started across the Sicilian Straits. Ten Survived the Hail of American Gunfire

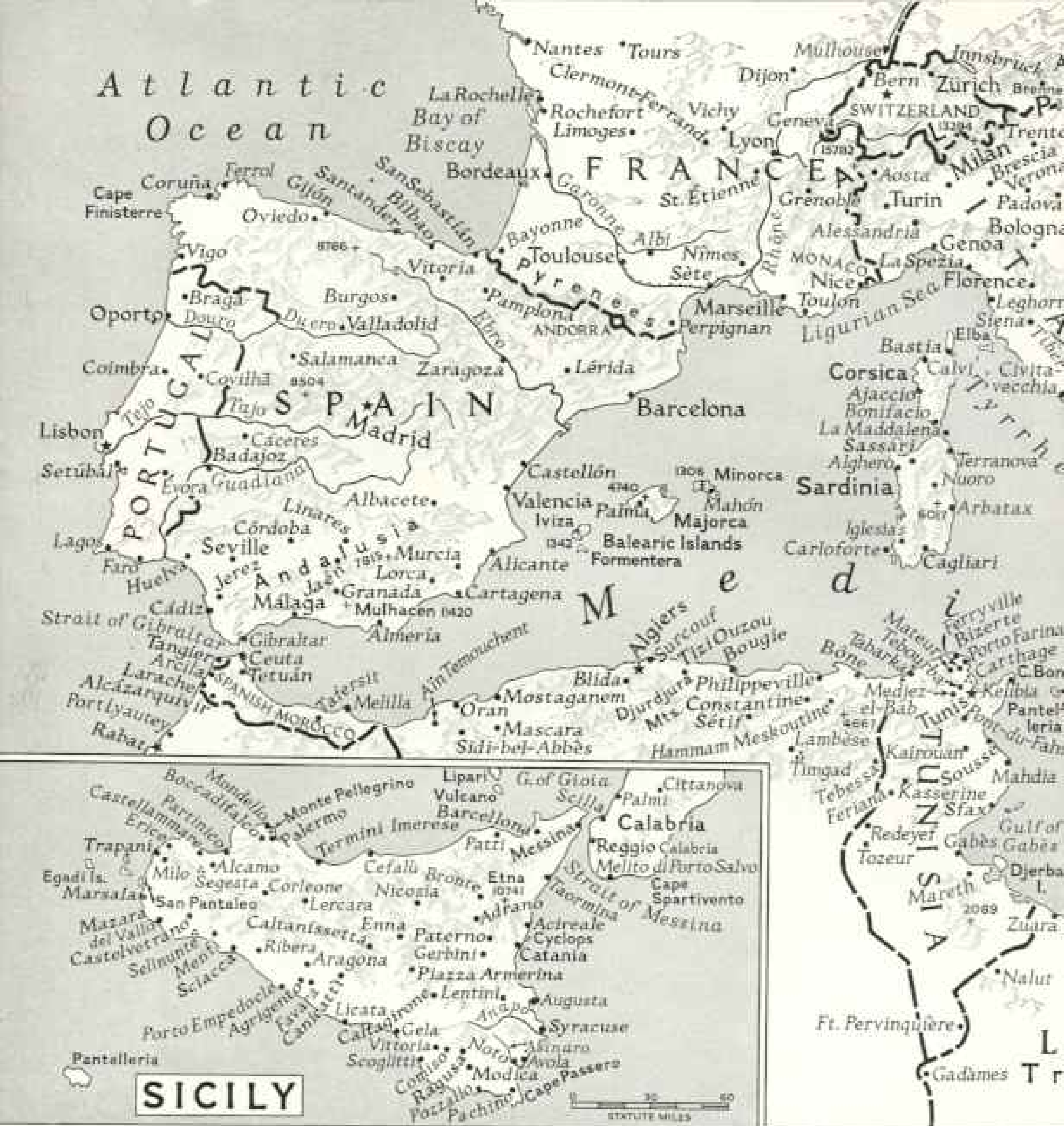
In this action-packed photograph, twelve Axis air transports scurry along toward Africa while three American planes spatter them with shells. Mitchell bombers, escorted by Lightnings, struck hard and fast, splashing the same sea through which Phoenician ships, ages ago, reached Carthage. One low-flying United States plane has just completed an attack (left). Another flies overhead, while a third shows to right.



DETAIN OFFICIAL

Accurately Placed U. S. Bombs Burst on Military Objectives within the Sickle of Sand Which Forms Messina Harbor

Smoke of destruction hides strategic targets, from the coal dock (lower left) to the Central Station and roundhouse (above). The railway terminus, where trains were ferried across the Strait of Messina (left) to the Italian mainland, lies shattered. The wide, straight Corso and sunny Piazza Municipio (right) show no damage. Off the sickle end lies the wharfpool, Charybdis (page 314).



United Nations' Planes Based on Sicily Can Cover Most of Italy

to New York. When emigration was reduced, and plant lice cut down the profits on vineyards, money from relatives in America helped out in Sicily.

Louisiana and Texas mines broke up the virtual monopoly of sulphur held by Caltanissetta, whose primitive mines in central Sicily were recently bombed by Allied planes.

Up to 1917, Sicilian lemons had a fine market in America. Even as late as 1930, about 300 million Sicilian lemons helped flavor American foods and drinks. The import of Sicilian oranges has long been forbidden, since

they are hosts of the dread Mediterranean fruit fly.

After 1909, when American lemon groves attained large-scale production, Sicilian lemon boxes gradually disappeared from the American scene. But our Italian fruit vendors continued to make profits on citrus fruits from ever-expanding orchards in California, Florida, and along the Rio Grande.

Palermo still bears the marks of many masters. Greek and Roman relics are in the National Museum. The living city shows the influence of Byzantine and Arab con-



Axis Strongholds in Dalmatia, Albania, and Greece Lie Open to Allied Bombs

querors, their architectural styles combined and harmonized by the Normans, who brought its gayest and most prosperous days to their capital in Sicily. Through modern streets rattle gaily painted carts, some of whose scenes are as Norman as the Bayeux tapestry.

Around the world are scattered souvenir miniatures of the Sicilian peasant cart. They bring back gay memories of Sicily's bright skies and the silver glint on ancient olive trees; of colorful picnic parties, like moving bouquets, riding away to the hills; of honey-gold Grecian temples whose ruined majesty

dignifies the rolling hills. On the brightly painted panels of the carts is reflected an age of knightly Normans, skilled in chivalry.

After being schooled in the French language and manners in Normandy, Scandinavia's Northmen arrived in Sicily about the time when William the Conqueror was making 1066 a forward step in English history.

In Sicily the Norman task was not to improve a backward land, but to harmonize the cultures of Tyre and Sidon, Athens and Rome, Constantinople and Kairouan. Modern Palermo is a living monument to their success.



With Both Hands He Makes Contact with the Ancient World

Standing beside the Anapo, a modern Syracusan holds a papyrus stalk in one hand, a reproduction of the *Venus Anadyomene* in the other. The papyrus, whose stem the ancients made into a writing material, gave us our word for paper. Only beside this river can travelers in Europe see papyrus growing wild.

Palermo's prize gem is the *Capella Palatina*, reputedly the "most beautiful palace chapel in the world." When I was there, its splendid mosaics were being repaired.

A white-haired priest traced for me the choicest designs with a thin-fingered hand. He also introduced a modern note in this shadowy chapel of the Royal Palace.

Palermo Priest Proud of His American Nieces

From an old chest of time-blessed ecclesiastical brocades he took out some newspaper clippings and school papers from his two nieces in the United States. Our splendid schools had impressed him, and the good marks

the girls had earned made him justly proud.

On the hill behind Palermo is the Norman cathedral of Monreale, decorated with bits of mosaic more closely set than growing grain. More than an acre and a half of its wall space pictures sacred figures which dwarf mere man.

In semiprecious stones and marble cubes harmonized to pattern, *Eve is born*, Noah builds his Ark, Christ walks upon the sea, and Saints Peter and Paul extend their benediction. All were fashioned by Moslem workmen in to-them-forbidden Christian art, to glorify one of the finest medieval churches of all the world. In floor and altar rail are Saracenic designs from which divine or human forms are rigorously banned.

Catastrophe Again Strikes Messina

In Roman times, Messina was Sicily's most important city. In 1943 it became a key to Rome's defense.

On December 28, 1908, Messina was laid low by an earthquake in 35 seconds. Parts of

it were washed by a 15-foot sea wave. Gravel deposits which form the Italian and Sicilian coasts sank about two feet. More than half of Messina's 120,000 inhabitants were killed.

Immediately the American Red Cross gave its aid, and a geologist, Charles W. Wright, was sent by the National Geographic Society to study its cause and effects.*

As one crosses the Strait of Messina by ferry or flies above it in a plane, the two shores look alike. The light-toned cities on both banks seem to mirror each other, as do the neighboring hills (page 311).

* See "World's Most Cruel Earthquake" (Messina), by Charles W. Wright, NATIONAL GEOGRAPHIC MAGAZINE, April, 1909.

Between them, despite the treacherous currents of Messina's narrow strait, the busiest maritime traffic lane between Europe and the East ran between Scylla and Charybdis. With bombs adding a third-dimensional danger, the present facts surpass great Vergil's verse: "Where Scylla here, and there Charybdis lies, and death lurks double."

In mythology, these famous menaces to navigation were monsters, guarding a stormy strait. "Mad Scylla" is actually a castle-crowned promontory on the Italian mainland. Charybdis is a still-treacherous whirlpool off the end of the curved sandpit which gave Messina its first name, Zancle (sickle).

A Land of Fruits and Cereals

As one goes south from Messina to Syracuse along a coast once colonized by the ancient Greeks, lemon and orange orchards give way to gnarled old olive trees and, still farther south, to spring's bridal veil of almond blossoms.

It is hard to believe that Sicily was once a granary. Only in the lava ash of the Catania Plain is there now any considerable grain-growing. Until very recently, most of the cereal culture was on vast landed estates, often owned by absentee landlords.

Just before the war these estates were split up and thousands of small peasant homes scattered across the Catania Plain. On this only extensive level bit of the island, in regions long menaced and fertilized by Etna's fires, lie the large airfields of Catania and Gerbini, much-contested prizes of war.

Vine and olive, orange and lemon, all demand close personal care. Three-fourths of Italy's citrus trees are in Sicily. Skill with growing things, unceasing industry, and poverty have been the Sicilian's lot. He is more gardener and orchardist than farmer. On Etna's slope, each tree, like a classic statue, occupies a niche chiseled from the rock. Each terraced grove was walled by hand.

Barbary pirates and Mafia brigands are no longer feared, but the country still shows the results of their depredations. The south coast is still thinly populated, and the people of the interior still huddle together in towns, often miles away from their fields.

Sulphur-shipping Porto Empedocle and once-proud Gela, famous for its Greek vases, had long been obscure when Allied landings again highlighted them.

Some 40 years ago, while Sicily was exporting Sicilians, its pleasant climate and hospitable people attracted visitors from many lands. As on the Italian mainland, tourism became a major industry.

Classical students pushed on to Agrigento, Segesta, and Selinunte, where mighty ruins show to what an extent Hellenic culture templated Sicily's hills. But the sun worshipers' favorite haunt was Taormina, set on a sun-trap slope above the sparkling sea.

About halfway from Messina to Catania, the train came to a stop at a small station almost hidden by big men in long coats and enough hotel buses to serve a city. From January to April, only those with advance reservations could win the attention of these lordlike men.

On the southern slope above the station lay the loveliest town of this lovely isle, with a castle ruin on the heights. On a seaward shoulder stood the Greek theater, whose backdrop is not painted canvas but the smoky cone of Etna (page 317).

Tropical gardens draped Taormina's wind-break slope, which shielded the town from chilling north winds. What a place in which to loaf and read Homer or Thucydides when peace, like the warming sun, bathed this charming spot! No wonder this sun-kissed hillside haven, facing snowy Etna, ranked with the Venetian Lido and the much-sung isle of Capri as the traveler's favorite!

Standing alone at the town's southern edge was the old Dominican convent, transformed into a de luxe hotel which, as Axis headquarters, invited destruction by Allied bombers. After setting my mental alarm clock for dawn, I slept in what had been a monk's cell.

Quick-tempered Etna Serves the Land

When I awoke, broad-based Etna, crowned with snow, was blushing to the touch of rosy-fingered dawn. Quick-tempered and deadly Etna undoubtedly is. But between eruptions it offers beauty to its admirers and bread to those who till the rich volcanic soil which feeds eight times as many mouths per acre as does Sicily's clay and marl.

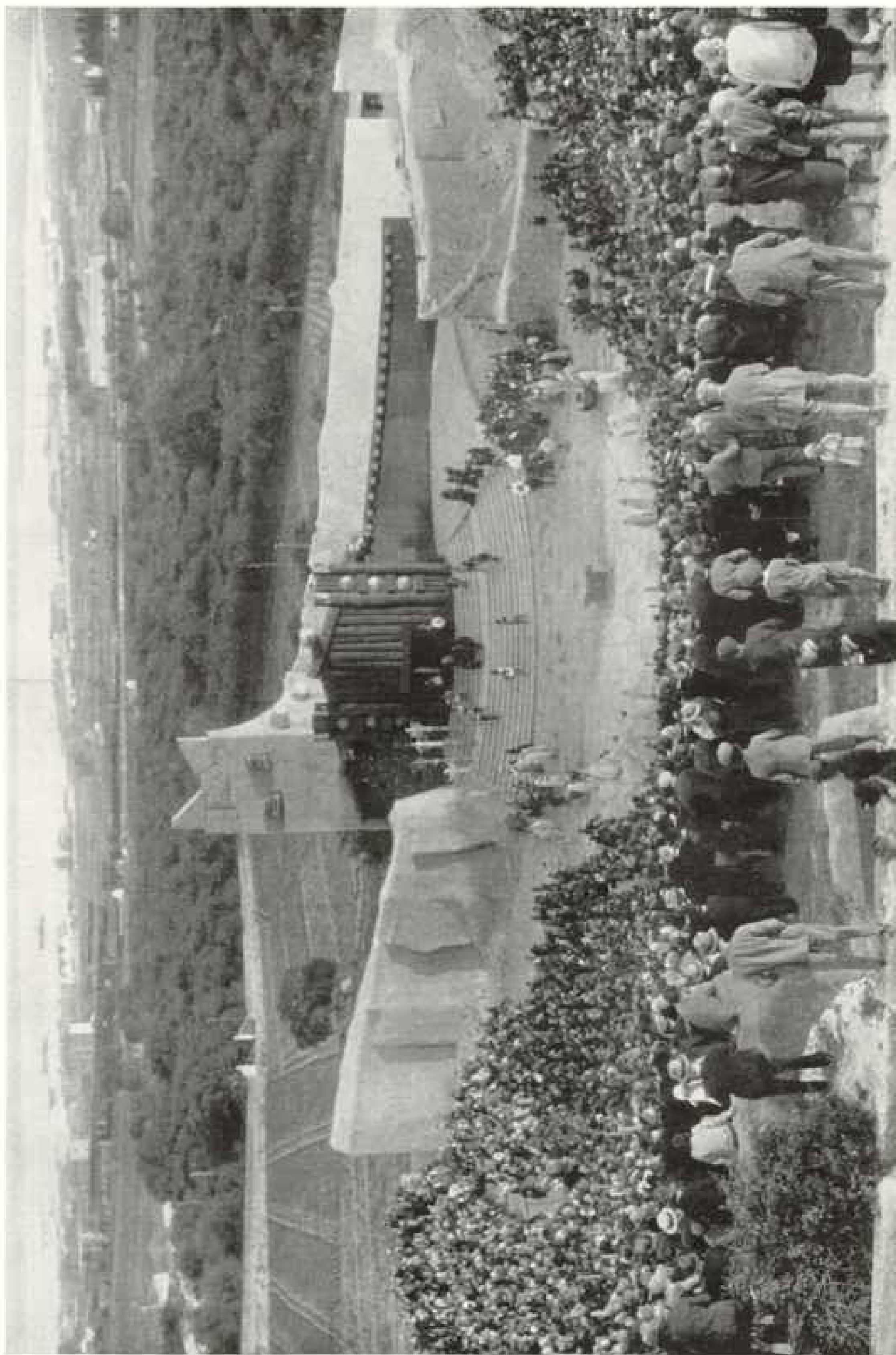
As the train turned toward Catania, I thrilled at the sight of seven rocky islets in the sea—the Islands of the Cyclops.

"So what?" asked a cynic.

"Why, those rocks gave us *The Odyssey*! They are the stones the giant Polyphemus hurled at Odysseus (Ulysses). Here the Ithacan leader's trip home from Troy became that classic 'run-around' described by Homer."

Trapped in Cyclops' cave, Odysseus gouged out the giant's only eye and escaped to his ship. Hearing his taunts, Polyphemus hurled those mountain fragments at the Greek.

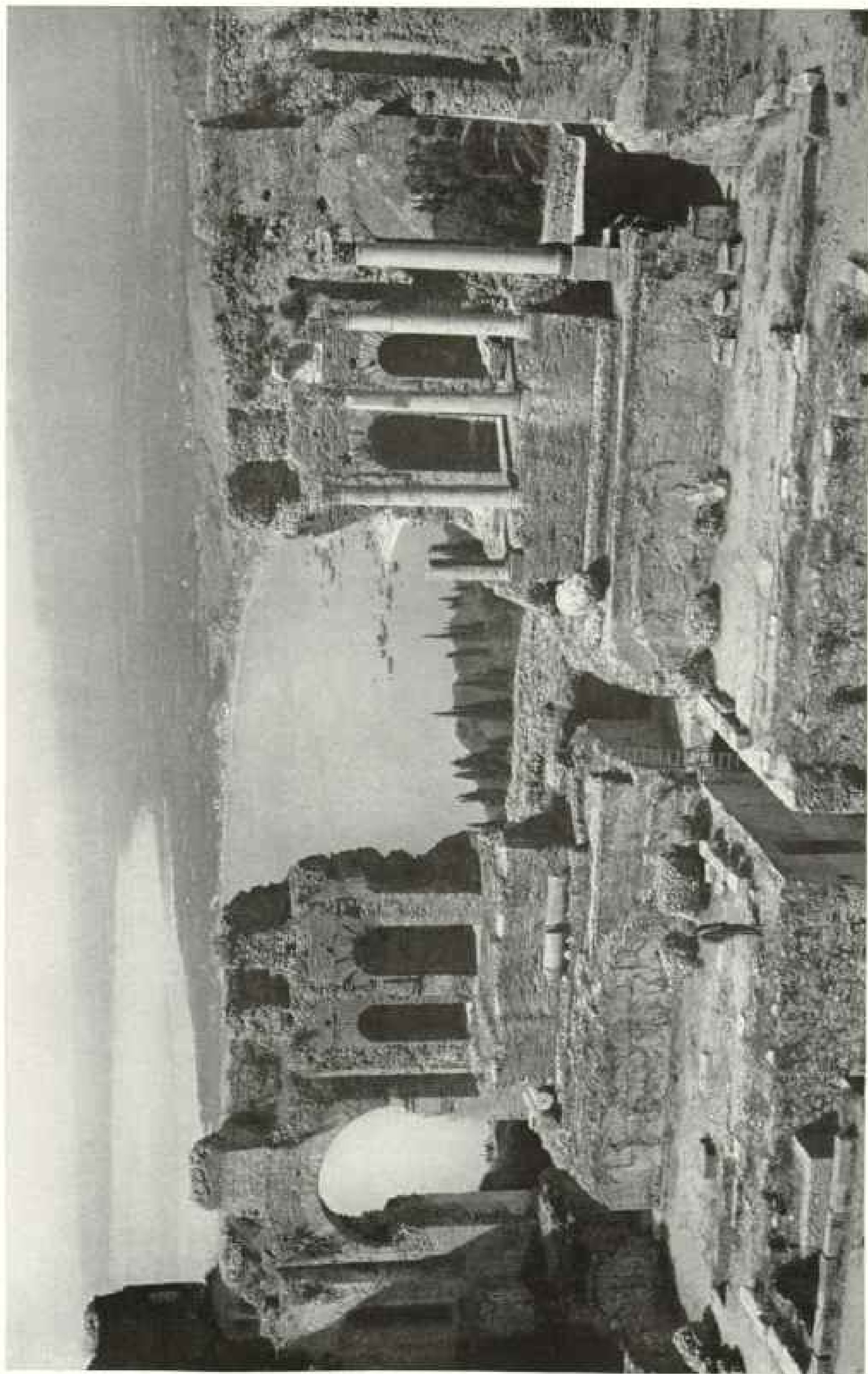
Angered by such treatment of his son, Poseidon, ruler of the sea, punished Odysseus by long wanderings. That is why patient



Prisoner of War from Bremer Bay

With an Ancient Battlefield for a Backdrop, Classic Drama Is Performed in the Greek Theater at Syracuse

Beyond lies the Great Harbor where the Syracusans utterly crushed Athenian invaders in 413 B.C. Allies captured Syracuse on the second day of their invasion.



Greek Pillars and Roman Arches at Taormina Frame the Site of Naxos, Earliest Greek Colony in Sicily

Seven hundred feet above the sea, the Greek theater commands a view so magnificent that one wonders how actors could draw attention from blue bay and smoke-plumed volcano. Below the brickwork which Romans added, green gardens flourish on Taormina's slope. In the distance a vast lemon grove covers ancient Naxos. Widespread skirts of Mount Etna descend from right. From Taormina to Messina there is scant space for road and rail between mountain and sea.

Penelope waited ten long years while other women tested her husband's fidelity.

Scoffers say that Mount Etna, not Polyphemus, tossed the islands there. Anyway, there they are, and any lover of *The Odyssey* must look on them with gratitude.

The coastal plain near Acireale is rich but dry. Not a trickle from Etna's snowfields is wasted. Canals lead to sweat-won terraces. Through irrigation gates, open only an hour a week, life-giving water flows to the thirsty trees.

In 1939 I did not follow this bit of coast by train, as I had before, but flew across the island from Palermo. On this hop we looked down on forests of cork oak and later, off our left wing, saw Etna's massy pyramid, flattened out beneath our gaze. Below our right wing, as we glided down to Sicily's fine airport at Catania, golden fields of grain were being harvested in the plain.

Within fighter radius of Catania's runways lies all of Italy south of Florence, most of the Dalmatian coast, Albania, the entrance to the Adriatic, and most of Greece, including Salonika and Athens.

Molten lava has repeatedly threatened Catania. As recently as 1928, it was cut off from the north. Now bombs, scarring the volcanic earth, have added their terror to that of Etna.

Mosquito Dreaded on South Coast

At the southeast corner of the Catania Plain, Italy has been waging such a war against the mosquito as brought health to the pestilential Pontine Marshes near Rome. Both here and along the Anapo at Syracuse the very name "mosquito," even for an Allied fighter-bomber, causes fear. In these swamps malaria-bearing mosquitoes have been a scourge for centuries. Mosquitoes, as well as Barbary pirates, drove the Sicilians inland.

On the way south to Syracuse one passes the military harbor of Augusta, for which forgotten fleets and ancient armies fought. In 1911 Augusta was the naval base for the Italian campaign which won Libya from the Turks. I saw military planes drone overhead, back and forth between Augusta and Syracuse.

On both of these bases Allied bombs were soon to fall. They were the first good ports captured during the current invasion. But when I saw them, the memorable battle was one which occurred 2,356 years ago, in the nineteenth year of a war made famous by Thucydides.

One of the greatest of war correspondents, Thucydides put endlessly eloquent speeches into the mouths of the Greek and Syracusan

leaders. Reported as faithfully as possible, these synthetic speeches, never surpassed, still make sense. In one of them democracy is clearly defined.

But for Thucydides, the tragic significance of the Sicilian expedition might be overlooked amid the many jealousies and commercial rivalries of the Greek city-states.

Pericles himself had said to his Athenians, "No nation on earth can hinder a navy like yours from penetrating whithersoever you choose to sail." But in the harbor at Syracuse those incomparable sailors had to turn a naval engagement into a land battle, fought on the decks of ships.

This whole fateful battle started as a mere squabble. To aid one obscure city-state called Segesta against equally obscure Selinus (Selinunte), Athenian triremes sailed on Syracuse.

Thucydides Wins Fame Through Defeat

Classic war correspondent Thucydides' description of the great battle has never been equaled. He tells how the Syracusan ships were strengthened to crush the Athenian triremes, and how the Athenians, seeking to fight a hand-to-hand battle on a field of ships, devised grappling irons to hold friend and enemy together. To avoid this, the Syracusans stretched hides on which the grappling irons would not hold.

Meanwhile, the armies on shore followed the conflict with shrieks and cheers. Athenian sailors mutinied. A fifth column whispered treachery. Trapped within a wall of Syracusan ships, the men of Athens met defeat. Their army disintegrated. The torch of Hellenic greatness passed into the hands of Syracuse.

Thucydides sums up the Athenian defeat at Syracuse in a memorable paragraph: "They were beaten at all points and altogether; all that they suffered was great; they were destroyed, as the saying is, with a total destruction, their fleet, their army—everything was destroyed, and few out of the many returned home."

At Syracuse 7,000 proud men of Athens were herded like sheep in miasmatic quarries throughout seventy hot days and cold nights, hungry, thirsty, and sick. Then they were sold as slaves.

Stewart and I watched and pictured ropemakers as they stretched their walks in the humid shade of the canyonlike quarries, saw orange trees growing in the depths, and noted how cleverly arranged colored lights could flood the torture hole with drama. Until the Nazis wreaked their vengeance on Greece itself, there was no more tragic spot in the



Staff Photographer Maxwell Gunn Williams

Thus Syracuse Harbor Enjoyed a Peaceful Interlude Between Wars

For 27 centuries war has provided Syracuse with its red-letter days. Most famous of all was that summer day in 413 B.C. when sweating Athenians here met defeat on land and sea. Local tyrants, Carthaginians, Romans, Arabs, Normans, Italians, now British and Americans have played a part in the life history of Syracuse (page 318).

classic world than the quarries of Syracuse, where languished the Golden Age of Athens.

A few years later the Carthaginians attacked, and the harbor again teemed with enemy ships. Mosquitoes decimated the invading army, and the ships of Carthage were burned. Syracuse became the queen city of the Greek world.

Then the Romans attacked, and Archimedes devised secret but ineffective weapons for the defense of Syracuse. Marcellus triumphed, Archimedes was killed by a common soldier, and Syracuse was robbed of its treasures. Even so, Cicero called it the most beautiful of all cities.

Next came the Byzantines, the Arabs, the Normans, and Bourbons. When Italy won Libia, Syracuse boomed.

When travelers from Egypt flocked back from Tutankhamen's tomb, Syracuse welcomed them to Europe. Some of these travelers may have aided in the capture of this Old World capital in July.

Grand Opera Amid the Sicilian Hills

One night we set out from Syracuse to attend an open-air performance of *La Tosca* in Noto, a surprisingly charming town. Set amid fruitful vineyards, it is memorable for its formal gardens, neatly clipped hedges, aristocratic dwellings, and baroque churches.

Southeastern Sicily is not volcanic. Its strata give a pleasing roundness to hillsides where the olive and almond are at home and perennial streams water fine vineyards.

From Noto a short road runs south to Pachino, near Cape Passero. The railway winds along to Ragusa, paratroop target where American and British forces joined, and Gela, founded by colonists from Rhodes and Crete.

The terra-cotta figurines of Gela traveled far and wide through the ancient world, but when Gelon moved his capital and half of its inhabitants to Syracuse, Gela dropped out of the headlines until July 10, 1943, when Allied landing barges touched the edge of its irrigated plain of cottonfields.

As our autobus entered Noto, the streets

were already crowded with visitors from far and wide. One of my fellow passengers was the prima donna.

"Think what it means to bring music to these little villages!" she said. "Only a few years ago there were no roads in this region. The big winegrowers who lived here had to go to Naples or Milan for their music, and perhaps the brigands attacked them on the road. Now we bring opera to the people and sing it under the stars."

In the Greek theater at Syracuse the *Ajax* of Sophocles and Euripides' *Hecuba* were played before 10,000 persons—some of them distinguished visitors from Athens—only a few months before Italy's three-hour ultimatum to Greece on October 28, 1940 (page 316).

From my hotel room in Syracuse I could look past the cooing doves and papyrus plants in the fountain of Arethusa to the seaplane port. There broad-winged sea birds rested on their way from Rome to Bengasi, Cairo, Khartoum, Addis Abeba, and Mogadiscio—Italy's air line of empire from the Tiber to the Equator.

Italian planes aren't flying that far-flung route of empire any more. Not even Bengasi or Tripoli's proud Castello remains in Italian hands.

It was through Libia and Tunisia, where Montgomery's tanks followed the footprints of 9th-century Arabian stallions, that the Saracens invaded Sicily, to beautify its buildings and irrigate its valleys.

Always open to foreign influences, Sicily has been a crossroad of cultures, profiting from the rule of overseas masters. Now Allied airmen rule the air over this springboard between Africa and Europe, and modern conquerors tread Sicilian soil.

When the tide of battle turned, some Sicilians scurried away toward Rome. Others awaited the day when they could toss Sicilian flowers under the wheels of our Liberators as their relatives did under the rumbling tanks that freed Tunis and Bizerte.

Sicily, ever in the path of war, has become a route of victory.

Notice of change of address for your NATIONAL GEOGRAPHIC MAGAZINE should be received in the offices of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your November number, The Society should be notified of your new address not later than October first. Be sure to include your new postal zone number.

La Venta's Green Stone Tigers

BY MATTHEW W. STIRLING

Leader of the National Geographic Society-Smithsonian Institution Expeditions to Southern Mexico

With Illustrations by Staff Photographer Richard H. Stewart

GREEN stone "tiger" masks and the New World's first precious jade of Burma quality were among the outstanding discoveries of the fifth expedition to southern Mexico jointly sponsored by the Smithsonian Institution and the National Geographic Society.

In the third exploration of ancient, buried La Venta, our shovels laid bare two room-size mosaic floors tiled with polished green stone to resemble a jaguar's face. Nothing like them, so far as we know, has been brought to light outside La Venta.

Newcomers to La Venta this year were Dr. Waldo Wedel, my fellow archeologist, and Walter A. Weber, ornithologist and artist, both from the Smithsonian Institution, and Miguel Baltazar, our Mexican assistant. They got a nice introduction to native living on dirt floors when our beds and mosquito nets burned in a warehouse fire.

An old hand around the place was Richard H. Stewart, National Geographic Society staff photographer, whose camera illustrated previous accounts of La Venta.*

Our local counselor was again Don Sebastián Torres, 86-year-old patriarch of a small clan speaking Aztec among themselves and Spanish to us. He saved us a tedious week of constructing headquarters by having kinsmen vacate two thatched houses for lease to the expedition.

Two Searches—for Oil and Ruins—3 Miles Apart

La Venta is an island, about four miles across, in the coastal mangrove swamps near tide-swept Tonalá River, State of Tabasco. Except for a petroleum test well, three miles distant from the ruins, it contained no activity of consequence when we arrived early in February, 1943 (map, page 325).

Anciently, La Venta was the shrine of a cultured people and burial place for some of their prominent citizens.

True name of this Indian people perished with their broken altars. For convenience, archeologists at first labeled their civilization "Olmec" and, more recently, "La Venta," after the site. Their culture developed side by side with that of the Old Empire Maya, but it differed widely in most aspects.

Tools and other belongings tell this much:

La Ventans were agriculturists, engineers, artists, and lapidaries.

Between 500 and 800 A.D., La Ventans abandoned their shrine to the jungle or, more probably, surrendered it to conquerors. Their successors tried to smash every object sacred to La Venta's gods. But colossal stone heads and ten-ton memorial posts were too sturdy for the vandals to shatter. And, entombed beneath burglar-proof pillars, precious offerings to La Venta's rulers remained undisturbed.

On two earlier expeditions we uncovered many of these treasures, including five monstrous stone heads (Plate III). Last year we uncovered a basalt-pillared tomb and a jaguar-faced sarcophagus.

There now remains above ground little to show what La Venta was like. It had no stone temples or palaces. Undoubtedly there were a few thatched dwellings which long ago decayed.

Following a "Lode" into History

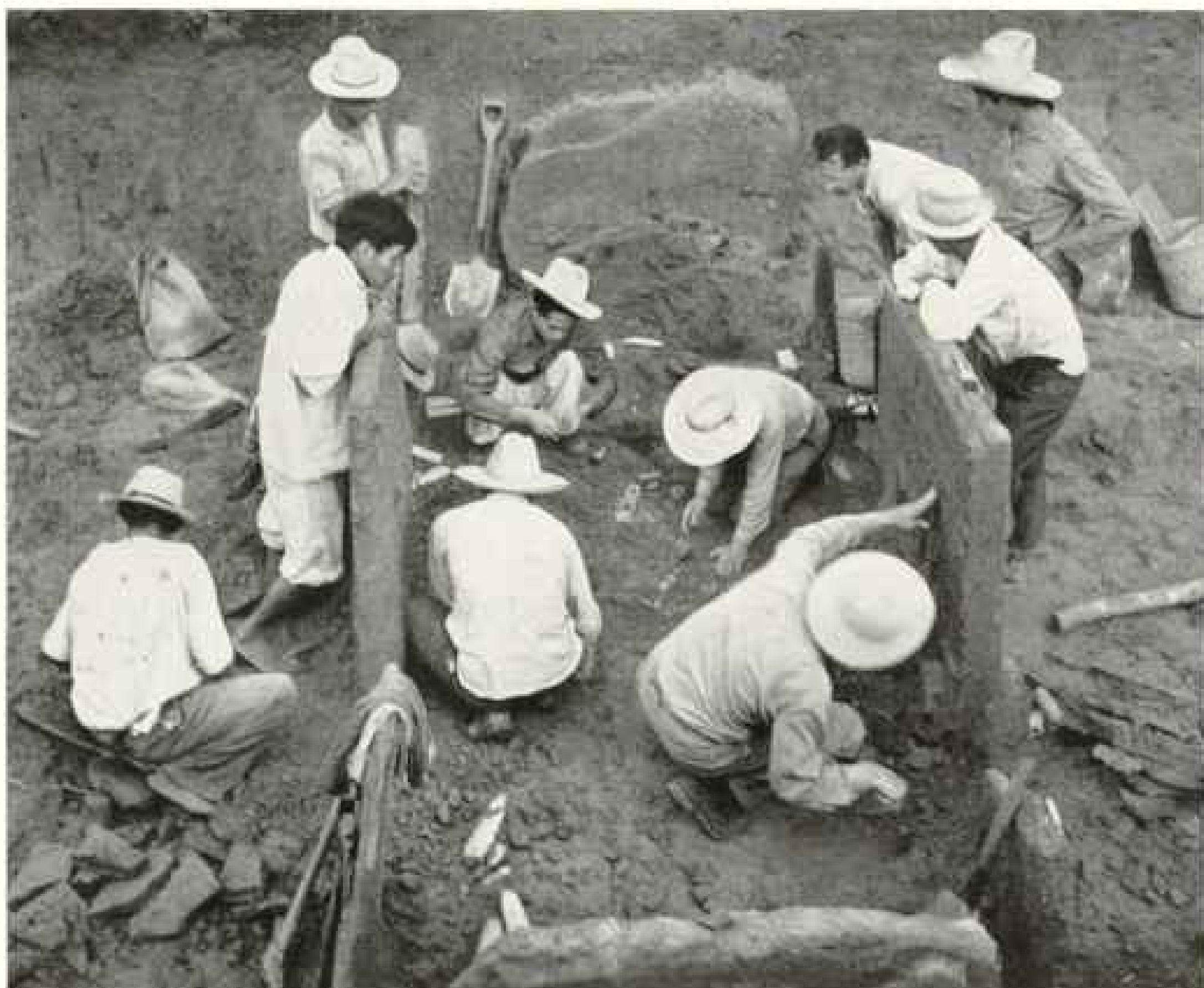
Most prominent feature of the site is a 105-foot mound topped with vegetation. In the jungle surrounding it is a rectangular plot of green we called the Corral because of its being fenced. The fence consisted of the exposed tips of ten-foot posts quarried from columnar basalt. Such stout construction hinted that here were buried secrets of importance.

La Venta's geometry-minded builders, we determined, oriented their constructions so that they were bisected by a line running almost due north through the Corral from the summit of the mound. To explore this imaginary line, we recruited 25 laborers and started digging a deep, wide trench.

Results gained from following the cross section fulfilled expectations. A few of the discoveries merit special attention.

One jaguar-mask mosaic was encountered to one side of the central trench at a depth of 23 feet. Those 23 feet cost a picked crew

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Finding Jewels of Jade in a Mexican Swamp," by Matthew W. and Marion Stirling, November, 1942; "Expedition Uncovers Buried Masterpieces of Carved Jade," September, 1941; "Great Stone Faces of the Mexican Jungle," September, 1940; and "Discovering the New World's Oldest Dated Work of Man," August, 1939, all by Matthew W. Stirling.



Treasure Hunt Keeps Laborers on Their Jobs Long after Quitting Time

On any quiet afternoon they dropped tools promptly at 3 o'clock. Not so today. Three hundred pieces of jade are being uncovered in the Cist; ten-inch axheads dot the soil (page 325). Now only darkness will drive the Mexican workers away. The three Americans are just as excited.

two months of digging through a fill of clay bricks and rubble. On its removal, guardian pillars caved into the pit. The task of hauling them out taught us respect for primitive mechanics, who floated and pulled the two-ton blocks here without wheels or beasts of burden.

Our reward was the handsome mosaic, set in asphalt on a stone platform. (Imagine our surprise on finding asphalt on a day when our neighbors, the drillers, were striking oil at 5,400 feet! Credit for the "discovery well" evidently must go to the ancients.)

La Venta's tilers had created a pleasing color combination. They laid green serpentine paving blocks in a border of yellow clay, and they tamped blue clay in the jaguar's eyes, mouth, and nose.

One border of the mask was decorated with four diamond-shaped elements terminating in a fringe intended, possibly, to represent tassels.

The second mosaic was similar in size and

design, but shallower, less substantial, and it lacked the "tassels."

The Face of the Big Green Cat

If the reader turns to page 323 and views the picture upside down, he will meet the New World tiger face to face. Seen right side up, the cat apparently has four eyes.

La Venta art, like Egyptian, became inflexible and conventionalized. In sophisticated tropical America a jaguar was not ordinarily portrayed realistically.

In early Middle America the jaguar was sacred. Natives today fear *el tigre*, lord of the forest just as he was centuries ago. Not a great deal of persuasion might be necessary to tinge that dread with mysticism.

Another sacred symbol was the ax. The profusion of jade and serpentine axheads made for ceremonial purposes testifies that this emblem meant as much to La Ventans as the Cross to Christians. One interesting jade



The Face on the Floor Is a Green Stone Jaguar's, Drawn by Indian Tilers

An expert, knowing the evolution of this mask, can point out the conventionalized nose, eyes, and fangs. The design bears only faint resemblance to the living jaguar. It should be viewed upside down. Centuries ago the mosaic was mysteriously hidden from view (p. 322). Supervising is Dr. Waldo Wedel.

specimen combines sacred jaguar and sacred ax (Plate IV).

New World Jade Matches the Orient's

We scarcely expected to match the jades found at Cerro de las Mesas in 1941 and at La Venta in 1942. But among the 1943 discoveries were translucent, emerald-green masterpieces of Oriental quality—first of their kind uncovered in this hemisphere.

Jade of this variety existed only in burials of very important personages. Evidently La Venta's jade standards were much the same as our own.

Montezuma, delivering ransom gold to the Spaniards, expressed Aztec values when he told them: "To this (gold) I will also add a few jades . . . each of these jades is worth two loads of gold."

It should be emphasized that the exact source of these precious stones is unknown. Mexico has no known jade quarries. Water-

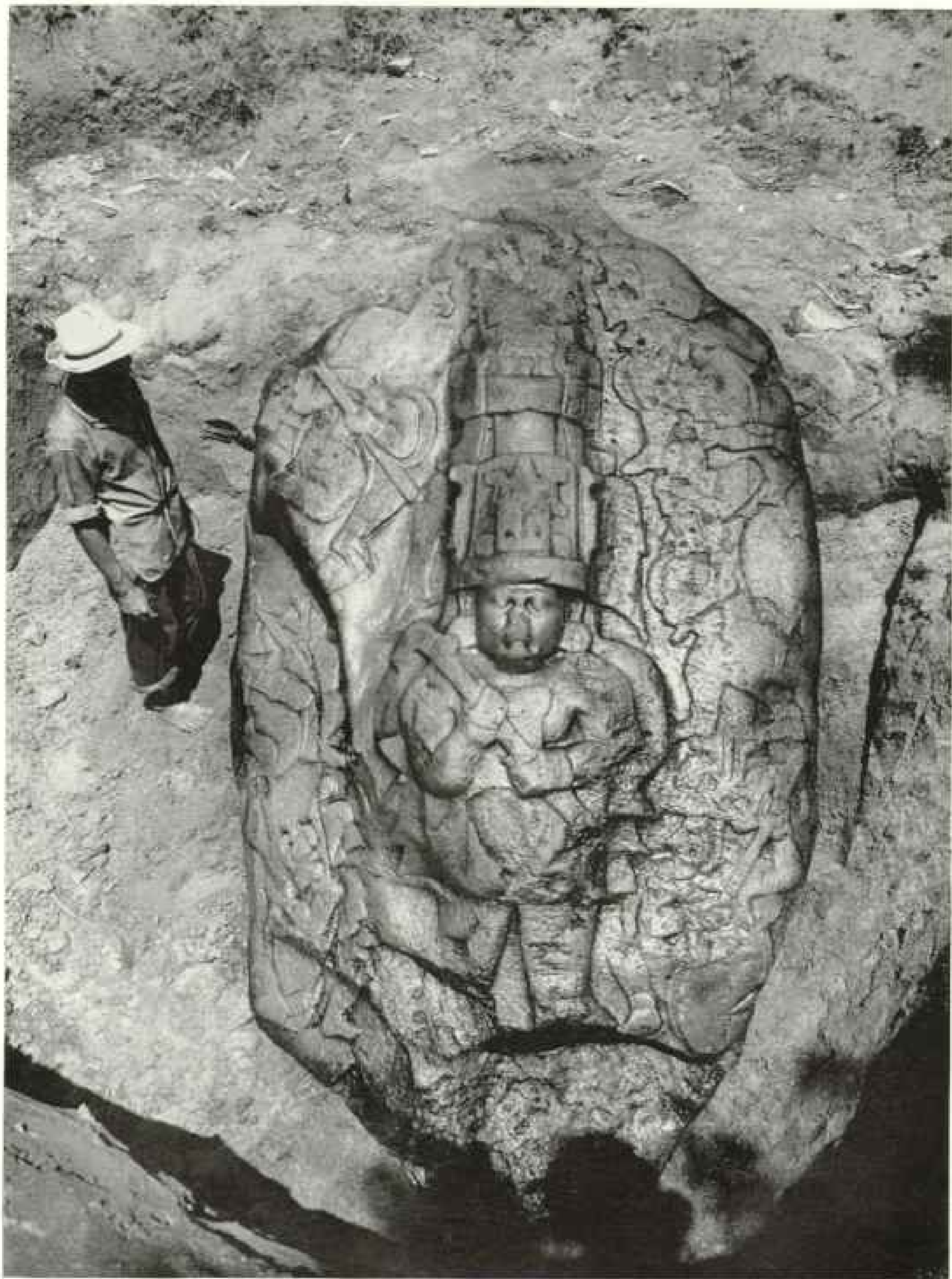
worn jade pebbles in archeological sites indicate they came from stream beds.

To the student of bygone America, jade represents only a fraction of the art objects. Fabrics placed in ceremonial burials are lost forever. If only we could find preserved just one of the high, elaborate headdresses portrayed on stelae, those ponderous stone memorial posts! (Page 324.)

A Strong Box Yields Its Treasures

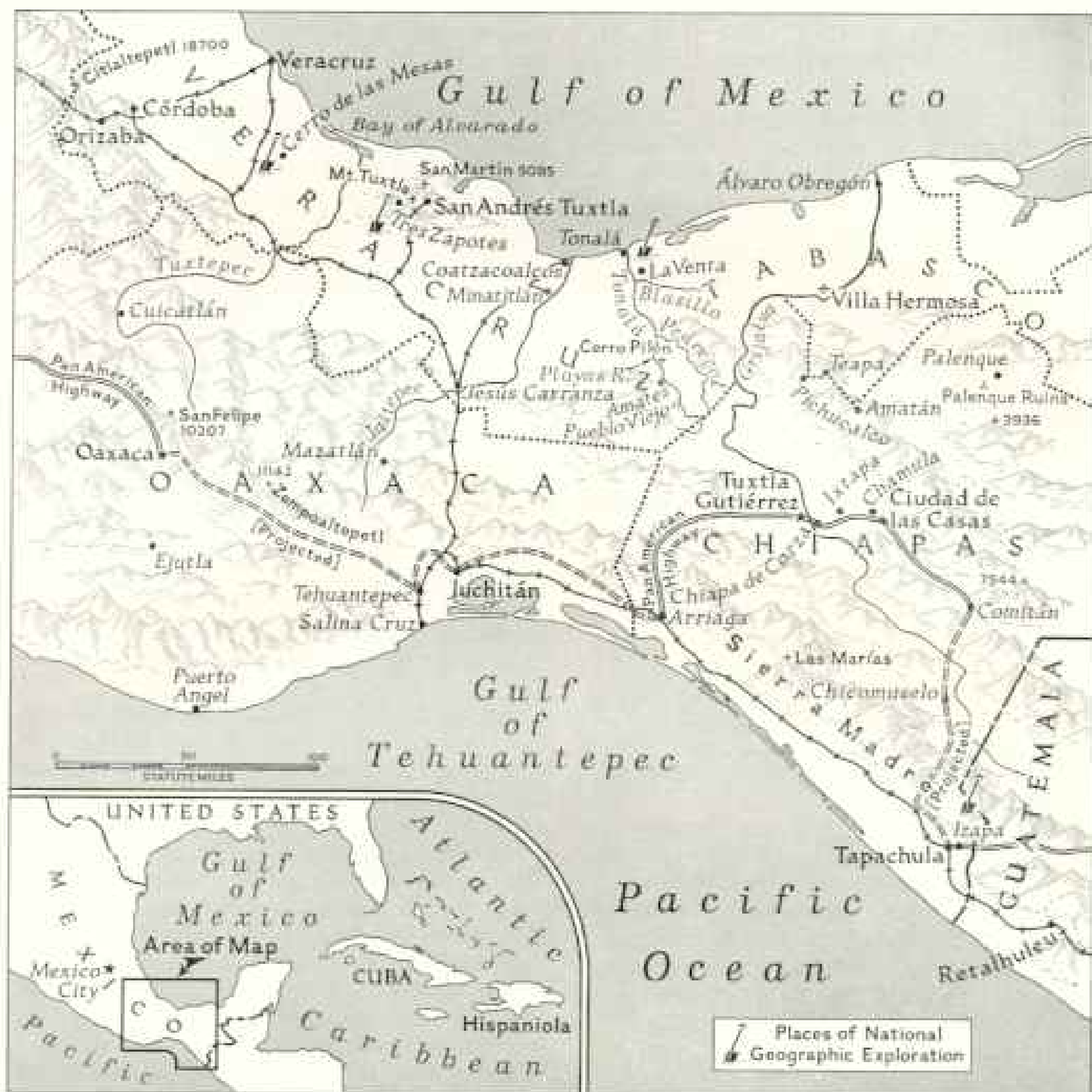
The bejeweled outline of such a headcovering was found in the massive Cist.

The occupant of this stone box, undoubtedly a chieftain or priest of highest rank, was laid away with an ornate headdress. Like his bones, the materials comprising it disintegrated long ago. But its form was roughly traced by scores of jade, crystal, and turquoise ornaments, all beautifully polished and engraved. There were duck heads, pendants, spoons, and a dozen other shapes.



Scrubbed and Polished until He Shines, a Stone Priest Stands for His New Portrait

For centuries he lay on his back in La Venta jungle, as photographed for the September, 1940, NATIONAL GEOGRAPHIC. That picture was not satisfactory. For better lighting, a hole was dug at the priest's feet and his ten tons of basalt were tipped into it. Erect now, as his makers intended, he is surrounded by grotesque gods.



From La Venta, Geographic-Smithsonian Explorers Hunted the Lost City of Pueblo Viejo

The relative position of the earplugs revealed the head had been placed to the east. Two green jade disks lay where the ears had been. Each was engraved with conventionalized profiles.

Laid across the waist was a long double necklace of 62 green, pumpkin-shaped jade beads. At each end was a jade turtle. Bordering the burial were 37 axheads—28 in jade—of seven to ten inches in length (page 322).

A low mound, cross-sectioned by the main trench, covered the Cist. Investigating, we struck a box 17 feet long, 6 wide, 5 deep. Top, sides, and bottom were lined with sandstone slabs. Some of them had collapsed.

Cataloguing the contents, we counted 340 specimens. Some 300 were high-quality jade.

A pear-shaped pendant of dark amber was

uncovered outside the Cist. Thus to our collection—jade, amethyst, turquoise, crystal, obsidian, hematite, and pyrites—La Venta now added amber, the fossil resin.

Green "Monkey Man" Has No Feet

A particularly fine sculpture was yielded by the central trench. It was a four-foot monkey carved from the same type of green serpentine as the jaguar mosaics. This figure is represented as standing. His feet and most of one leg are broken off.

Until he was shipped with our collection to Mexico's National Museum, he stood guard outside our quarters. Our workmen called him "Monkey Man"—not an inaccurate description. His makers carved a semihuman face on their monkey god (page 327).

Anthropomorphism, the practice of combining human and animal characteristics, is world-wide.

Mutilated like the monkey was a flat table altar surfaced with carved jaguar-mask panels. Ancient vandals apparently had smashed it. We found but two of the four squat legs.

Another flat-top altar bore the carved head of a man wearing a duck-bill mask, or false beard, like that of the famous Tuxtla statuette. Elsewhere on this altar, owls' heads are carved in relief.

Human figures represented on the altar wear sandals. This footwear is reminiscent of the high-backed Maya sandal still worn by Indians not far away.

A carved footprint, of which we discovered an example on another altar, was a common Central American ideograph denoting travel.

Found in a cache of 256 axes was a fine, polished hematite mirror. Like other La Venta mirrors, its reflecting surface was concave, magnifying the image.

An Adventure in Eating Jungle Fare

While shovel and trowel men explored the ruins, our ornithologist roamed the jungle with gun to complete a museum collection of bird and animal skins.

Thrifty realist, Walter Weber did not waste carcasses. In our thatched kitchen the dinner table groaned beneath his trophies, and later, in a tossing canoe, we juggled a stewpot bubbling with his version of wild turkey.

Weber was not concerned about rationing; the jungle did not charge red points. We were blissfully unaware of high prices at black markets; our meat was free.

Weber's unwilling accomplice was Florinda, a cheerful, industrious Tehuana Indian who did our laundry, marketing, and cooking. Delicacy forbids quotation of her opinions about Weber's strange offerings. But cook them she did on two iron hoops in a box of sand, along with more familiar dishes, all served piping hot.

Florinda tested her skill on such birds as tinamous, chachalacas, pigeons, doves, ducks, toucans, and trogons. She mastered the seasoning of animals such as agouti, a large black rodent; paca, another rodent; javelina (pecary), deer, and squirrel. Armadillo was her specialty. She made it taste like tenderest pork.

Our cook attempted to draw the line at ocelot, a junior-sized member of the cat tribe, but we overruled her. The natives scorn ocelot. We found it superior to the local beef.

On a day when La Venta had been mapped and only hard digging remained, a party of

us digressed to scout an archeological prospect which had beckoned for years.

On our first visit here we heard rumors of Pueblo Viejo (Old Town), a ruin on the headwaters of the Playas (River of the Beaches). It is a tributary of the Tonalá.

Pueblo Viejo—Lost City or a Myth?

Pueblo Viejo, certainly long dead if indeed it ever existed, was entered on maps of the region as a flourishing community. Inquiry, however, failed to reveal anyone who had seen it. But many were willing to repeat hearsay about paved streets and stone houses.

Legends of fictitious lost cities are current throughout tropical America. It seemed possible that Pueblo Viejo existed only in imaginations.

However, its supposed location—a remote corner bordering on Tabasco, Veracruz, Chiapas, and Oaxaca, all rich in archeological sites—was strong bait. We decided to investigate. Even failure would leave the satisfaction of our having seen one of Mexico's least-known sections.

Leaving Dr. Wedel and Baltazar to continue work, Weber, Stewart, and I set out in a comfortable little launch powered with an outboard motor. Our guide and mechanic was Gabriel Pérez Ortiz.

Two days' travel took us to the fork where the Tonalá splits into the Pedregal and the Playas. The latter, on which the ruins were reputed to exist, seemed much the smaller.

That night we stopped at a thatched farmhouse adjoining the river. Our venerable, bearded host, whose name I have forgotten, was as garrulous as he was hospitable. He plied us with conversation and offered homemade aguardiente (rum).

Yes, he had heard of Pueblo Viejo but had not seen it. Only one man on the river had been to the ruins. That was Don Vicente J. B. Aguilar, who lived at Amates, last settlement upstream. He, surely, would guide us, our host said.

Late that evening we turned into somewhat overcrowded sleeping quarters. Thirteen beds were made on the earthen floor. Three were occupied by family members suffering from dysentery. They kept the night from becoming too monotonous by threading their anxious way in the dark among our blankets.

Leaving medicine for the patients, we set out early next morning. Steering through snags and shoals, we reached a place called Cerro Pílon (Sugar Loaf). Here the river emerges from the mountains. Our launch could go no farther.

To the rescue came two brothers, riverbank

farmers, who agreed to take us as far as Don Vicente's. Obligingly, they borrowed a dug-out canoe large enough to hold all our equipment.

Beauty—and Danger—in a Gorge

Pushing and poling the heavy dugout in shallows was hot work for our guides, but relief eventually appeared in the deep water of a limestone gorge. This canyon was cool, shady, and beautiful. Its vertical walls were topped with ferns, orchids, and flowering trees. Orioles nested in swinging, woven pouches. Monkeys and parrots chattered at us. Evening, with sky overcast and moon obscured, made the scene more bewitching.

We camped in the gorge, as the guides considered rapids ahead too treacherous for night travel. After spreading tarpaulins and rubber mattress on a gravel bar, we surveyed the vertical walls hemming us in. Forty feet above us, driftwood clung to crevices! Our canoe-men cheerfully volunteered that heavy rain quickly flooded the narrow corridor.

With that comforting thought we turned in. At midnight sleep was interrupted by the patter of rain and by thunder echoing ominously between the cliffs. Within five minutes clouds seemed to burst; rain descended in sheets.

Vainly we covered bedding with tarpaulins; in a few minutes everything was soaked. The intervals between lightning flashes were so dark we could not see one another. With the aid of flashlights, we put on clothing and boots.

In two hours the downpour turned to drizzle. The storm must have been local, for the river rose but little.

Still wet and awake at 3 a.m., we heard canoe-men approaching. We shouted and flashed lights, and nine soaked occupants of three canoes landed on the gravel bar. Entire male adult population of Amates, they were going downstream to a landholder's meeting. Among them was their headman, Don Vicente, one and only visitor to Pueblo Viejo.

As spokesman for his group, Don Vicente could not turn back. But he drew a verbal map and detached two men to guide us. They were Elias and Stanislao Palma, another pair of brothers. The Cerro Pilón pair now turned homeward, leaving the big canoe.

Packing soggy bedding, we also departed. After quitting the gorge and its rapids, we entered more shallows. Any ideas of sitting in comfort while Gabriel and the brothers poled the canoe were soon dispelled. Weber, Stewart, and I, treading boulders and gravel, pushed, pulled, and groaned.



Sentinel at Headquarters Was
"Monkey Man"

This four-foot statue represents an ancient people's endowment of their animal gods with human features. His feet are missing. Hands, raised above the head, join the tail curving up the back. He wears a curved collar on the chest and a wide, engraved belt.

That night we camped beside a whirlpool from whose seething waters we fished our supper. Boatbill heron fluttered around the eddy.

An Ornithologist Finds His Paradise

In this wilderness unspoiled by the hunter's gun there was an abundance of game—fish, beast, and bird—and most of it was unafraid. Weber was in his element.

Before the sun was well up, we shot from their treetop perches three 8-pound crested curassows, as handsome a game bird as North America can boast.

Called "wild turkey" in most of tropical America, their meat tastes much the same. Cooked to a creamy brown, it is a beautiful sight to a hungry voyager.

Stewing curassow on a gasoline stove in a canoe while passing up a series of rapids is, incidentally, more of a juggler's task than a cook's. In one rapid the stove upset with a potful of meat.

While Stewart did the cooking, Weber prepared the skins. We chaffed Weber for eating the prizes whose gorgeous greenish-black plumage he preserved for science.

"Isn't this ornithologically unethical?" we asked.

"No," replied the realist. "This is a case of eating your bird and having it, too."

As we ate curassow, their smaller cousins, known as guans, surveyed our canoe without fear. Feeding on a tree's yellow flowers, they seemed as tame as domestic turkeys. We passed within easy gunshot but did not fire.

"Back There" the Storied City

After three days of canoe travel our helmsman turned and, pointing to the jungle, announced, "It's back there." He meant the ruins.

Under a still-bright sun, we spread damp bedding to dry on a hot gravel bar. Cutting poles, we made tents of our tarpaulins.

Perched on a limb 15 feet above us, a black hawk watched proceedings for 15 minutes. As we prepared supper, a flock of curassows lit on a tree near by. Its limbs bent under their weight.

We three Americans enjoyed a good sleep. Not so Gabriel, who, nervous about jaguars, kept the lantern burning. Quoting textbooks, we assured our Mexican helpers that jaguars never molested sleeping men. Unconvinced, they recited hair-raising tales of narrow escapes.

Some natives, we learned, were so fearful of jaguars they refused to camp overnight in the open. At settlements we visited, the parting injunction was, "Don't let the tigers get you!"

Weber Lost in the Jungles

With morning we eagerly started the search. Don Vicente had told us to look for an area devoid of trees. There, he said, we would find the ruins.

Our guides were excellent woodsmen, but it was soon evident they did not know this region.

"Which way do we go now?" one of the brothers asked.

I assured them they would have to answer that question themselves.

Stewart, Gabriel, and I, more handicap than help, returned to camp at noon. We spurred Elias and Stanislao onward with the promise of a reward for success.

Weber, with visions of new species, went out alone on a bird hunt.

Five o'clock brought our guides, still unsuccessful, to camp, but Weber was missing. We knew he was lost.

Taking the canoe, we poled upstream and fired occasional shots. From the forest came a distant reply. Following the sound, the guides started inland. Through the barrels of their shotguns, they blew signals like bugle notes.

It was dark before we all were back in camp. Weber, having lost sight of the river, had hopefully followed creeks. Instead of leading him to the main stream, they took him to swampy, impenetrable tapir wallows. Preparing camp for the night, he lit a fire and roasted his day's bird collection.

Further search revealed no ruins. In Don Vicente lay our only hope of locating them. Perhaps he was home by now.

Embarking, we found the river perceptibly lower. The extra push given by a favorable current finally carried us to Don Vicente's home.

Eight Miles Short of the Pyramids

This interesting man has a pioneer's flair for locating and developing frontier farm lands. Alone in the wilderness in 1938, he told us, he discovered the ruins, and in 1941 he revisited them. This site, he said, was not the mapmakers' Pueblo Viejo. He described the latter as a small, structureless heap of rubble.

Don Vicente pictured his discovery as a ruin about a half-mile square. There, he said, rows of low, flat-topped pyramids were divided by streets. In the center was a plaza or platform covered with cement. We had stopped, it seems, about eight miles short of this site. Weber was lost only two miles from it.

Don Vicente did not recall having seen carved or decorated stones. His concise description, showing no sign of exaggeration, was convincing. He volunteered to guide us immediately.

Regretfully, we took an option on his offer until another season should have raised the river. Already it was so low we feared it might maroon us between shoals. So back we went to La Venta, still deprived of a view of Pueblo Viejo, but finally convinced of its reality.

La Venta's Green Stone Tigers



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Reproduction by Michael H. Stewart

The Author Brushes the Dust of a Dozen Centuries from a Treasure House of Jade

Axheads, earplugs, pendants, and necklace, embedded in red cinnabar, were uncovered by the 1943 expedition. Resting on the 1942 excavation level, the sarcophagus represents an earlier discovery. Despite weathering, its front reveals the eyebrows of a jaguar carving. Jungle leaves serve as jewel tray.



Dirt Flies, Revealing Stone Columns Set Like a Jaw of Giant's Teeth

Nature cooled these pillars of basalt five-sided from molten lava; La Venta's builders smoothed them round. Below this platform, workmen uncovered a mosaic floor designed like a tiger mask.



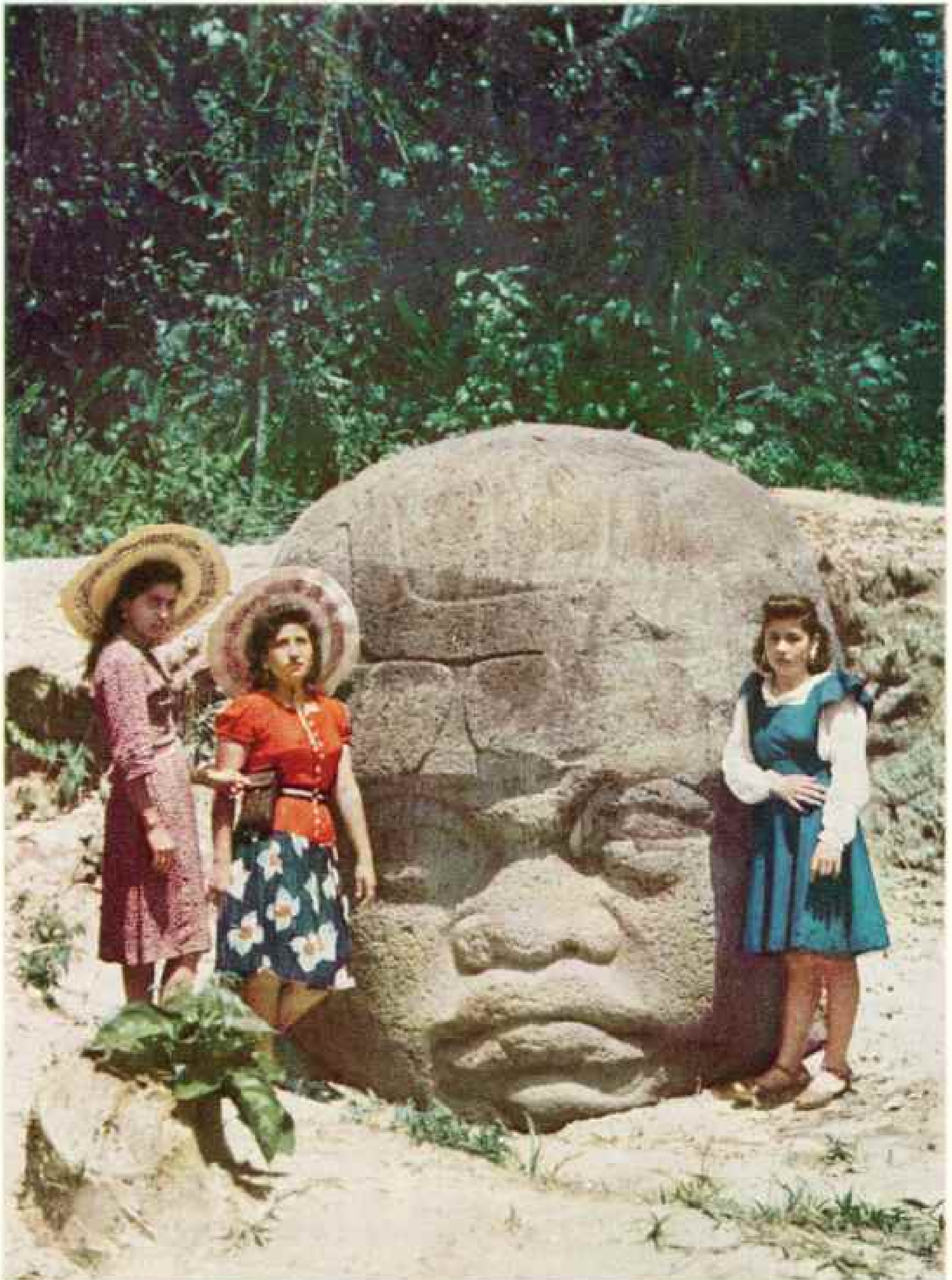
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Collaboration by Richard H. Stewart

Five Slabs Roofed This Stone Box, Vault of a Nobleman of Early Mexico

Time preserved his jade axes, earplugs, awl, and necklaces. Archeologists refer to a boxed-in container of this type as a "cist." Webster's Dictionary defines the word as "a sepulchral stone chest."

La Venta's Green Stone Tigers



© National Geographic Society

Redaction by Richard H. Sewall

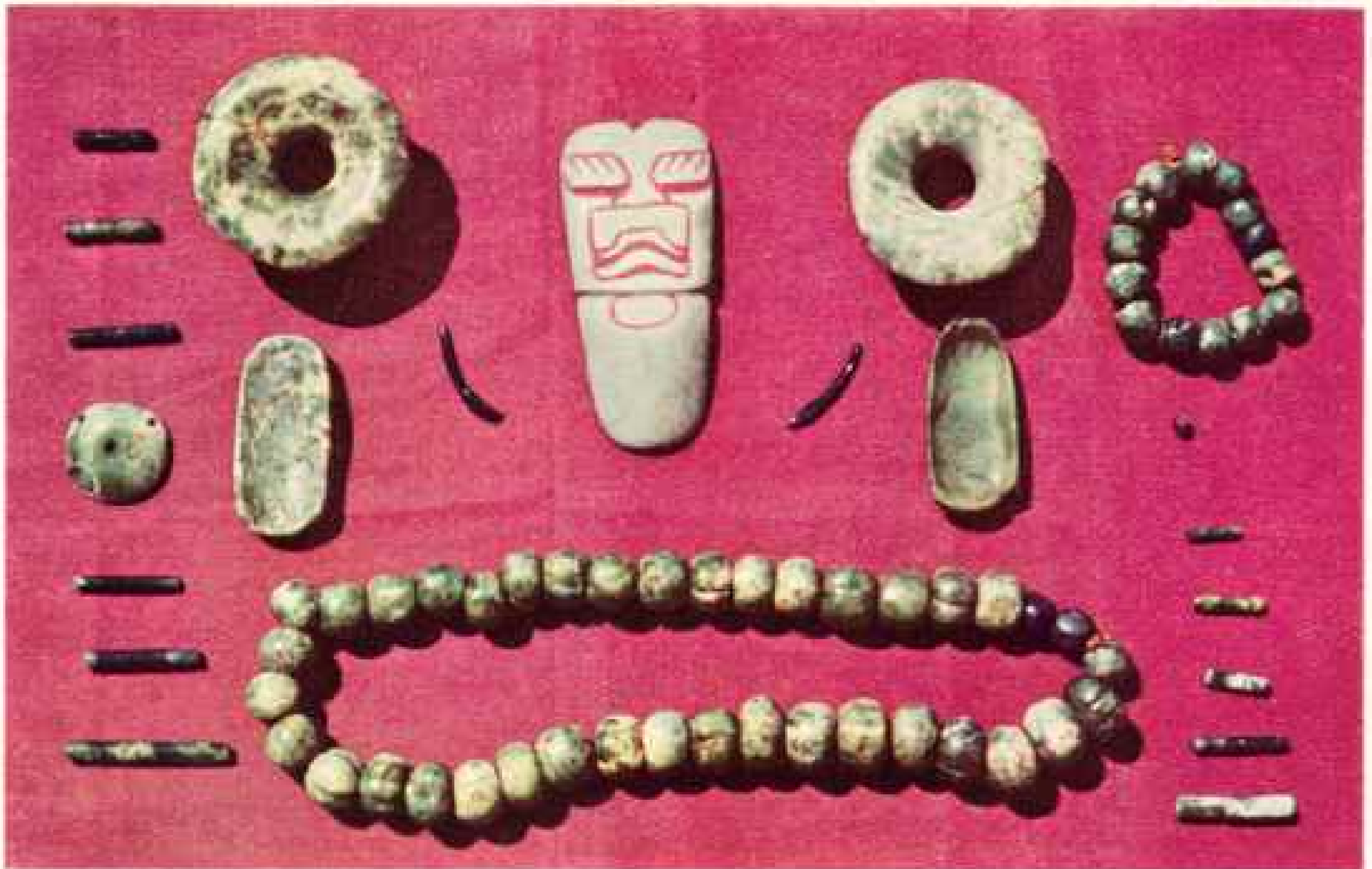
"Señor, You Have a Big Head, but Where Is the Rest of You?" Three Fair Visitors Ask

Typical of La Venta's great stone faces is this image. Jaguar's teeth are carved across his brow. His broad nose, a feature of the sculptors themselves, may be seen in less exaggerated form on some of their descendants. A cast of the eight-foot idol has been made for National Geographic Society exhibits.



Stone Figurines and Jade Jewelry Are Pathetic Artifacts from a Child's Tomb

Hollow plugs of child-size were worn in the ears. Pendants (below) were attached to them. Two statuettes have eyes of fool's gold (iron pyrites). A third (left) has lost one of its black obsidian eyes.



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Reproduced by Richard W. Searcy

This New World Jade, Matching Burma's Most Precious, Is Worth a Small Fortune

Each of the cylindrical emerald-green beads is valued at \$300 to \$400. The carved stone face combines two sacred symbols, ax and jaguar. Where La Venta mined or bought this jade is a secret of the dead.

They Sustain the Wings

BY FREDERICK SIMPICH

YOUR horse can be fast, with a good jockey up, and still lose the race—unless he's been carefully fed and shod, and fitted with the right bit, bridle, and saddle.

It is so with Army planes. No matter how fast, well-armed, or skillfully piloted, they must be kept in top condition, refueled, repaired, and all guns loaded, to outfly and outfight the enemy.

To train crews for this critical task, Uncle Sam established one of the world's largest systems of education.

AAFTTC they called these schools, short for Army Air Forces Technical Training Command. Its motto is *Sustineo Alas*—"I sustain the wings."*

Though one man can pilot a plane, it takes from 5 to 20 skilled men on the ground—depending on the size and type of the plane—to keep it flying. Such trained ground crews are taught to:

Predict weather.

Detect distant craft with magic radar.

Write and read secret codes.

Use and repair bombsights.

Make aerial photographic reconnaissance and mosaic maps.

Send and receive by radio, and repair radio and radar sets, radio compasses, teletype machines, and two-way radio telephones.

Run a big, busy airport control room, keeping scores of planes landing and taking off safely and flying at assigned heights on now crowded airways.

Repair and service machine guns, aerial cannon, and power gun turrets; or, in a pinch, grab a gun and get into the fight.

In fact, repair and maintain any kind of Army plane from tail to propeller, from bomb rack to de-icer.

Dynamic, far-flying Maj. Gen. Walter R. Weaver commands this vast educational system from headquarters at Knollwood Field, North Carolina. Gen. H. H. Arnold, commanding U. S. Army Air Forces, chose General Weaver to set up and operate these schools.

Sometimes Weaver looks hard and grim as he bites his pipestem and ponders some knotty problem in the infinite tasks that face him; but underneath that rigid military mask beats a kindly heart. To him the welfare of his humblest student mechanic, whether from farmyard or city street, is also important, along with the trials of all the generals,

colonels, majors, and others who help him run the many technical training schools scattered across the country.

As Army's invited guest, we flew thousands of miles, piloted by Col. John P. McConnell, chief of staff to General Weaver, to visit and inspect these big, busy schools.

Making New Planes from Scraps of Wrecks

Every day 94 green-clad Air Force mechanics graduate from Keesler Field, Mississippi, built in one year from pine woods and swamps outside the town of Biloxi.

Pins on their caps or collars carry that firm phrase, *Sustineo Alas*. These men are the despair of Jap and German air fighters! No sooner is one of our ships shot down than these trained ground crews rush to the wreck—if they can get to it. If that particular ship can't be quickly repaired on the spot, they salvage what they can and reassemble another ship, with the propeller from one wreck, an engine from another, a tail, radio, or landing gear from a third.

On the Australian, Chinese, and African fronts ground crews scour the hills, deserts, and beaches for hundreds of miles, seeking needed extra parts!

Crippled planes returning from battle—planes with one engine "conked out," holes in wings and body, landing wheels shot off, or instruments shattered by bullets—are quickly repaired and again "put up."

By daily news flashed from battle fronts we know how furiously these grim ground crews are working. Day and night, in rain, dust, heat, or snow, even with enemy bombs falling on their improvised field shops, these men struggle to repair our planes and get them back into action. Often 20 or 30 repairmen will work at once on one ship.

Planes must be kept clean outside as well as in. Poor paint will cut down air speed; mud splashes left on a fuselage may mean the loss of two or three miles an hour.

B-24, Consolidated Liberator bomber, is the prize pet at Keesler Field. Here you see battered bomber veterans, whimsically labeled "Old Gray Mare" or "Sitting Bull." They'll never fly again—they're simply guinea pigs on which students learn by practice.

* The War Department has announced a consolidation of the Technical Training and the Flying Training Commands of the U. S. Army Air Forces, with Maj. Gen. Barton K. Yount as Commanding General. The new designation is Army Air Forces Training Command.



Staff Photographer Luis Marín

Maj. Gen. Walter R. Weaver, Commander of Army Air Forces Technical Training

Chosen by Gen. H. H. Arnold, commanding U. S. Army Air Forces, to organize and direct the giant educational system of AAFTTC, this serene pipe smoker is known affectionately to his staff simply as "The Man." But if you blunder, or flunk your job, don't be fooled, for there's lightning behind that grin.

"Like small boys with Meccanos," said the commanding officer, Col. Robert E. M. Goolrick, "our students build these up, then tear them down again. That quickly gives them the 'feel' of tools.

"A plane that crashes 1,000 miles or more from Keesler Field is scraped up, loaded on a long circuslike truck, and brought here for students to repair.

"As aerial war spreads and more of our planes get crippled, we need more and more of what we call 'first and second echelon repair gangs,'" he continued.

"They move right into fighting areas to patch bullet and cannon holes, weld broken or twisted parts, replace broken wheels or instruments—in fact, make all repairs possible with the parts and tools available on the front lines. More seriously damaged planes are repaired by specialists."

"Every man here is doing something with his hands!" I exclaimed, as we jeeped past thousands of busy workers.

"Exactly, and with his mind. They learn by doing," grinned tall, lanky Goolrick.

For mass output of skilled mechanics, no school on earth equals this. On battlefields and here at home, its ground crews help repair and service 100,000 planes. And remember, it takes 5 to 20 men on the ground to put one plane up and keep it up.

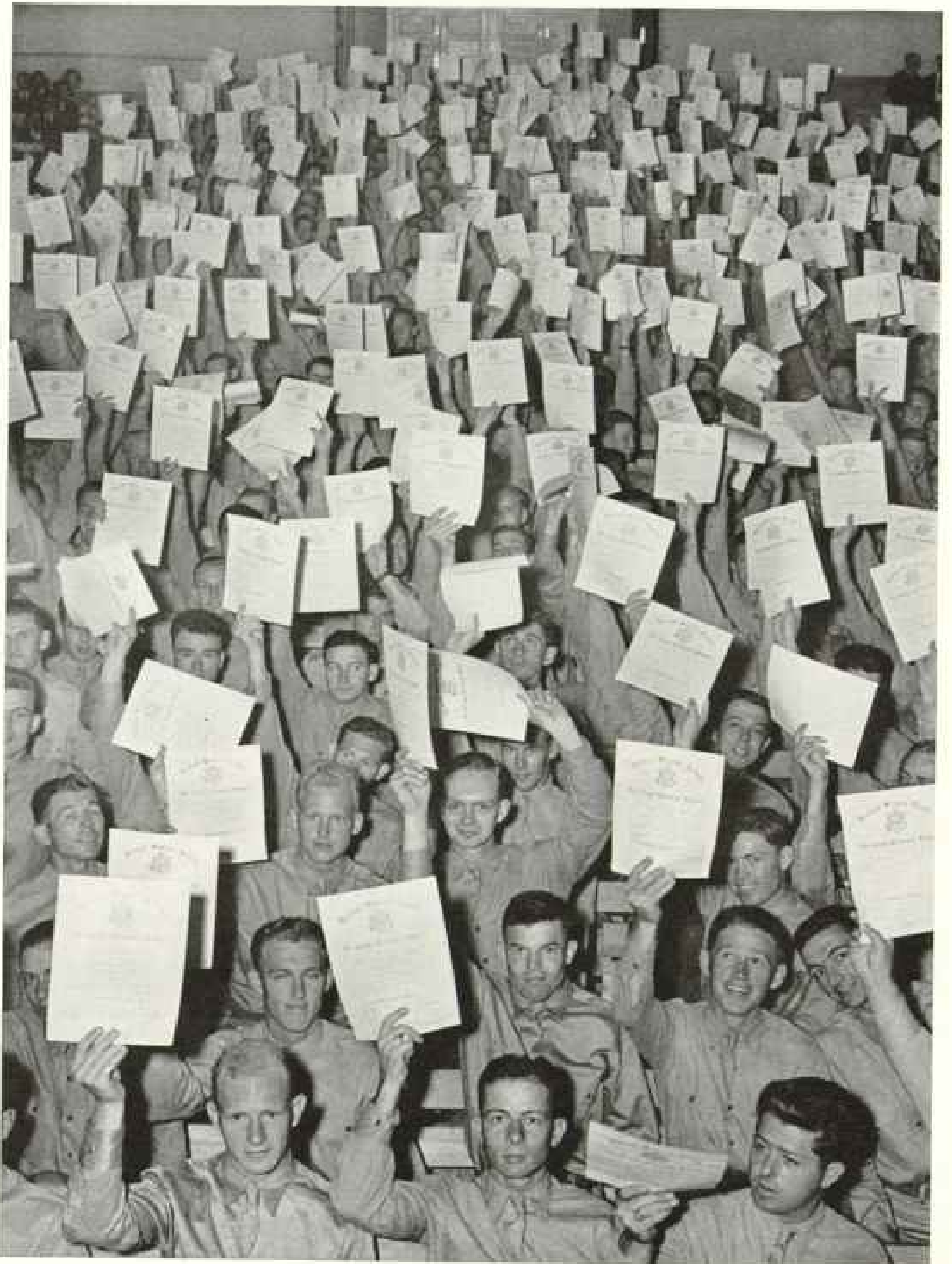
"Figure it yourself," added Colonel Goolrick, "and you'll see why we must take in more than 10,000 recruits each month and run this school night and day, training each man 17 weeks."

"What's the last test you give a crew here?"

"Oh, they love that! We send them into woods or fields with makeshift shops in tents—no more tools to work with than they might have under battle conditions. We even make them change engines. Instead of the crane or chain hoist they learned to use here in the hangars, we make them use a scissors hoist, two logs crossed like a big sawbuck."

Bombsights That Almost Think

You hear bombardiers say, in fun, "Bombsights have such keen brains, pretty soon



U. S. Army Air Force, Official

Diplomas at Last in Hand, They Sing "Hail, Hail, the Gang's All Here"

Airplane mechanics, just graduated from the school at Keesler Field, Mississippi, proudly wave their new "sheepskins." These diplomas, say the boys, are "tickets to the Pacific"—or to Africa, Europe, or wherever duty calls. In two years the AAFITC has trained hundreds of thousands of air-combat and ground-crew technicians.



Staff Photographer Lois Marston

Like Flies on a Chocolate Cake, Army Mechanics Swarm over a Crippled Bomber

"Sitting Bull," the soldiers nicknamed this B-24, which will never fly again. Student repairmen at Keesler Field use it now as a "guinea pig," tearing it down and putting it together again (page 333). From the rear seat of the jeep, Dr. John Oliver La Gorce, Associate Editor of the NATIONAL GEOGRAPHIC MAGAZINE, makes an inspection trip with Col. Harold L. Kreider, Director of Training.

Army will give the commissions to them and leave us humans at home!"

Care, repair, and operation of these delicate bombsights is one of the many difficult courses taught by the AAFTTC.

Fly over vast open plains of the Far West and look down. Here and there, on areas from which all cattle have been removed, you see bomb targets marked out on the ground. One may be a white circle; another, a life-sized silhouette of an enemy battleship, such as the *Tirpitz*. These are used in bombing practice, and the bombs are 100 pounds of sand and black powder, so that smoke shows where the bomb hits.

Norden Bombsight Makes Own Calculations

The Norden bombsight itself is, among other things, a calculating machine.

It stands in the bombardier's "greenhouse" up in the plane's nose. It costs several thou-

sand dollars, and thousands of tiny parts, from wires and wheels to lenses and prisms, go into its puzzling composition.

What you see chiefly is its gyroscope stabilizer, its telescope, and that black, boxlike structure fitted with knobs which the bombardier turns with his fingers as he squints through the telescopic sight. Two of these knobs bring the telescope, with its cross hairs, to bear on the target; the other two control the airplane's course.

To aim accurately, the two cross hairs in the telescope must intersect across the target. By turning his knobs the bombardier can hold his aim square on the target.

Once squarely on the target, the bombsight itself controls the plane's flight and drops the bombs. It does this either through a device attached to the plane's automatic pilot, or by a cockpit dial which shows the human pilot where to steer.

As the bombs fall, the bombardier yells through his interphone, "Bombs away!" This is the pilot's signal to turn tail and speed away from firing enemy guns below or from attacking planes.

To help teach students how to adjust these bombsights, the AAFTTC school at Lowry Field, near Denver, Colorado, uses an odd, three-wheeled, spiderlike vehicle called a "bombing trainer." It represents a bomber making a run for target, but with speed and altitude greatly reduced, of course.

Set high up on this vehicle before the student is a real bombsight; it controls the course of the vehicle just as if it were a real plane. Ahead of it, on the floor, is a spot which simulates the target (page 343).

On arrival over the "target," a "bomb" is dropped; not a real bomb, but in place of it a solenoid-controlled marker, which indicates by electric impulse the exact place where a real bomb would have fallen.

If the target is hit, that proves the bombsight is working accurately. If not, then the distance by which the target was missed shows, relatively, the amount of calibration, or deflection, to be corrected.

The task of this bombsight maintenance school at Lowry Field is to train enlisted mechanics in the care, calibration, repair, and operation of the Norden M-Series, Sperry S-Series, and D-8 type bombsights, and also to handle the C-1 and A-5 automatic flight-control equipment. These courses are intimately related and cover 20 weeks.

No student is sent here until his integrity and loyalty to America and its institutions have been thoroughly established by careful investigation.

Cameras Are Also Weapons of War

British and Germans say nearly 90 percent of all military intelligence is gained from photographs. After our planes bombed the Focke-Wulf factory at Bremen, we made air pictures showing that more than half the factory was destroyed or seriously damaged. Every day now, Army and Navy picture-making planes come back from reconnaissance flights with photographs showing results of bombs we dropped.

In making aerial maps, photographs are now in world-wide use.

Moving pictures of actual battles are also highly useful, especially to officers teaching tactics to troops who have not yet been under fire. You have only to look at such dramatic motion pictures as "Air Force" to feel the truth of this. They also form a pictorial history of the war.

How to help win this war with cameras is yet another task being studied by students at Lowry Field, under command of Brig. Gen. A. L. Sneed.

Few of these students fly; but they, too, "sustain the wings" by hard, skillful work in laboratories and map rooms on the ground. It may take seven men, working there, to develop, print, study, and interpret the films brought back by one daring "upstairs" cameraman.

Before a raid, we often send flying photographers to make pictures to show details of intended targets. Compare these with pre-war pictures of the same city if they're at hand, and you can see what recent defense works the enemy may have built. Often we make such pictures day after day or month after month, to show the trend of troop and matériel movements or progress on defense works. When enemy forces are concentrating to attack us, we may need hourly photographs.

The aerial camera also can be an effective weapon against the concealing arts of camouflage. Contests rage between cameramen and camouflage artists to see who can outwit the other.

Camouflage, the art of concealment from the enemy, is old. Warriors dressed in colors that merged with greenery even in Robin Hood's day when the King's sheriff hunted these legendary merrie men in Sherwood Forest.

In the AAFTTC Basic Training Center at Jefferson Barracks they said: "Now we're taking you into the woods. You can't see them, but, when a whistle blows, 50 armed men hiding within a few feet of you will jump from concealment and attack you with bayonets." They did, with realistic frightfulness!

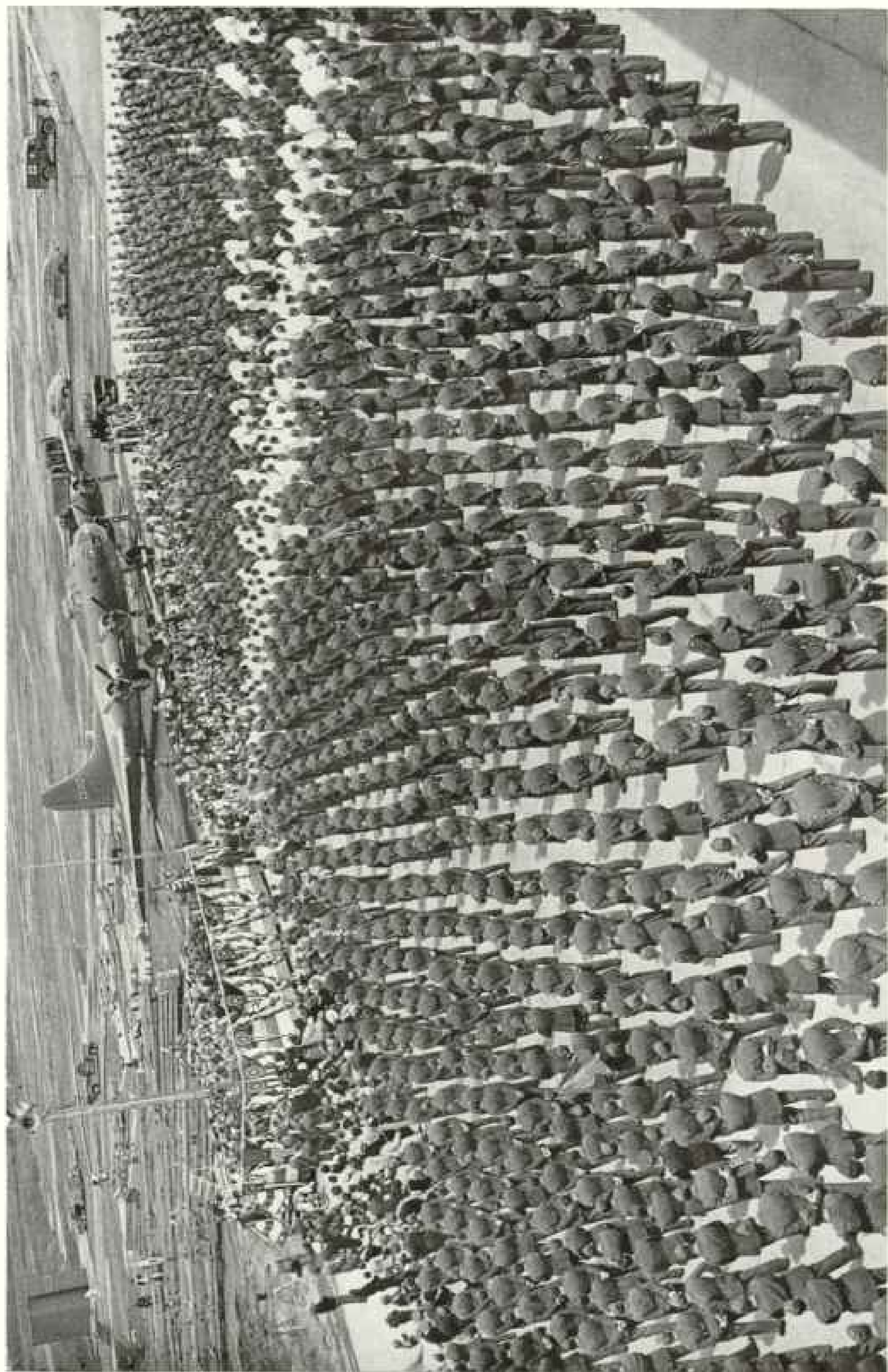
Facial make-up, as well as mottled suits, helps men to hide.

Our soldiers learn much about camouflage from the animal and insect worlds. New Guinea snipers wear tigerlike jungle suits that blend with the background.

At big airplane shops and war factories, trees, hills, and streets painted on the roofs and sides make the buildings blend with surrounding landscape.

Aerial photography reveals some kinds of camouflage, especially that which seeks to hide buildings, gun emplacements, airplanes, etc. Stereoscopic camera work, for example, easily shows up the third dimension of supposedly well-hidden railroad junctions, supply bases, and depots.

Camouflage artists, knowing that good concealment may mean the difference between



Polished Off by Postgraduate Work at a Flying Fortress School, Army Mechanics Receive Efficiency Awards at Boeing

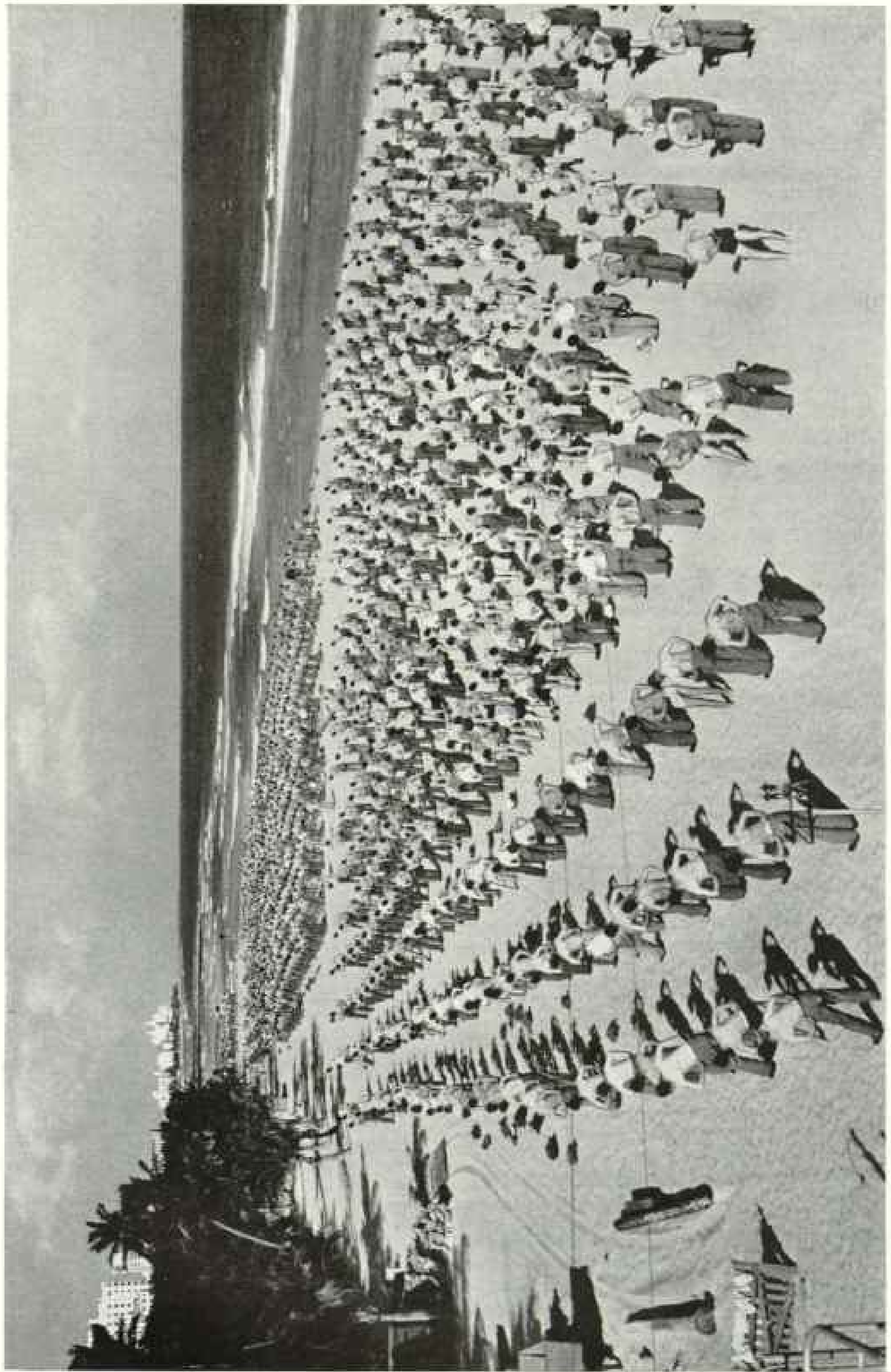
Graduates of AAFTC schools, they were sent to this Seattle factory for final training on bombers they will accompany overseas. Men in white, forming a V, are instructors supplied by the Boeing company to give last-minute instructions to the ground crews. The Flying Fortresses in the background is ready to go abroad.



Soldiers Punch Imitation Bullet Holes in a Plane and Repair Them for Practice

Here is a Curtiss Warhawk fighter, called "Flying Patch," complete but for engine and tail assembly. It is riddled with holes, as after a battle; student sheet-metal mechanics, patching these holes, learn how to repair a plane battered in real combat.

U. S. War Department, official



Sands and Sunshine of Miami Beach Afford Ideal Fields for Basic Training Activities

More than 300 large Miami Beach hotels were taken over by Maj. Gen. Walter R. Weaver when he organized his technical training school for the Army Air Forces. During 1947-48 thousands of hand-picked Air Force men got their first taste of strenuous Army life at this Florida resort.

Arms

life and death in combat areas, constantly seek to outwit the camera by changing design and technique. Photographers, learning to use infrared rays to reveal camouflage, make pictures even at night. One trick of camouflage is to paint out the real target, then erect a dummy reproduction near by, upon which it is hoped the deluded enemy will waste his bombs.

It takes 12 weeks for students to finish AAFTTC's photographic course.

But here, as said, there's no scheduled flying. Perhaps only one out of eight ever does aerial photography.

Shooting, But Not at Clay Pigeons

How to shoot Japs and Huns on the wing and pulverize their cities with bombs is another lesson taught by AAFTTC.

In nine weeks, at Lowry Field's bombardment armament course, future sky fighters get a liberal education in aerial cannon, machine guns, power turrets, bombs, and bomb fuses. They learn how to tell one "egg" from another by its color, and how to fix a bomb rack so it'll go off like a rattrap and release destruction on unseen enemies far below.

But if you're too tall, you can't be an aerial gunner. Look at that grinning boy there, curled up in his plastic gun-turret "blister" like a hatching chicken about to burst from its shell. Were he two inches taller, he couldn't squirm into that cage.

The fact that so many American heavy bombers return safely is due to aerial gunners in these turrets.

In early days of sky duels, gunners stood in wind-swept open cockpits, holding on to keep from being blown out, often so cold they could hardly press a trigger or keep the gun itself from being swung off the target.

In today's sheltered power turret, with all its mechanical refinements, the gunner has not only protection; with less effort and fatigue he manipulates light control handles, easily swinging heavy-caliber guns around against slip-stream wind pressures.

In high-altitude flying, where physical powers diminish and where breathing is difficult and mental reactions slow down, these electrically turned gun turrets are a godsend.

In some turrets computing gunsights even relieve the man of all "duck shooting" guesswork; to hit an enemy 1,000 yards off, he learns to frame that enemy as a target in his cross-hair sights and press his trigger.

Turrets stick out like warts on a wart hog on all our big bombers. Nose, tail, back, and belly are all protected.

Our turrets now usually mount two .50-caliber machine guns, fired electrically. Big cartridge boxes are stored handily in the turret itself. When a .50-caliber gun jams, it takes a lot of strength to load it manually; so now mechanical chargers come into use.

What Good Would an Airplane Be Minus a "Prop"?

It takes a specialist to repair today's controllable propellers. A "controlled" prop is one whose "pitch" can be changed to make it bite more or less into the resistant air, thus allowing the engine to run faster or slower. A governor controls the engine speed.

These propellers are very different from those used on aircraft during World War I, which were merely laminated wooden sticks.

When aircraft of all-metal construction replaced the original wood-and-fabric types, the all-metal propeller, with blades that could be adjusted on the ground, appeared. However, to obtain maximum engine efficiency at various altitudes and flight conditions, during take-off and landing, a propeller with blades that could be adjusted automatically during flight was essential. The present controllable propeller was the answer. But these controllable propellers are highly complicated and require careful adjustment and repair. They must be checked frequently.

Accurate balance and operation of the blade-control mechanism are essential. Specially designed testing machines are used for this purpose.

Nicks and bullet holes in aluminum blades are carefully inspected and repaired (page 347). All steel parts are subjected to a searching magnetic inspection. To perform it, the parts are magnetized by a strong electric current, and a solution containing black or red iron particles is poured on. Wherever a crack exists, north and south poles are formed and the iron particles are attracted, showing a sharp line when viewed through a magnifying glass. All damaged and worn parts are immediately replaced or repaired.

Specialists for this delicate work are taught in the advanced propeller course at Chamute Field, Illinois.

Control Tower Men Carefully Trained

Control of air traffic at an airport or Army air base is just as difficult as handling hundreds of trains in and out of a big union station. At airports you've all seen that operator, up in his glassed-in tower which overlooks the flying field. From here he watches and directs every plane that lands or takes off.



Staff Photographer Lutz Marden

Under Camouflage Nets Student Mechanics Repair a Plane on a Make-believe Front

No big cranes, no fancy lathes and full tool chests in combat zones! So men must improvise cranes from crossed logs, sometimes even make certain tools from metal scraps. At Keesler Field, Mississippi, this practice area is nicknamed "Guadalcanal."

So many lives depend on this operator's quick thinking that he must know his job. To standardize control-tower procedure throughout the Army Air Forces and have the assurance of well-qualified operators, the AAFTTC established a control tower operators course at Chanute Field.

Training here includes the correct use of all equipment necessary to direct landings or take-offs by either the contact or instrument method, civil aeronautics rules and regulations, interpretation of weather messages and reports, identification and recognition of aircraft, and other pertinent flying regulations. An important part of this course is proper enunciation and voice control, necessary in sending messages by radio.

Various synthetic training devices are used in connection with this instruction. One is a miniature model airport (page 349), which contains all the equipment used in a typical control tower.

Like a calf following a cow, you may see what looks like a small plane following a big one, keeping at fixed distance behind.

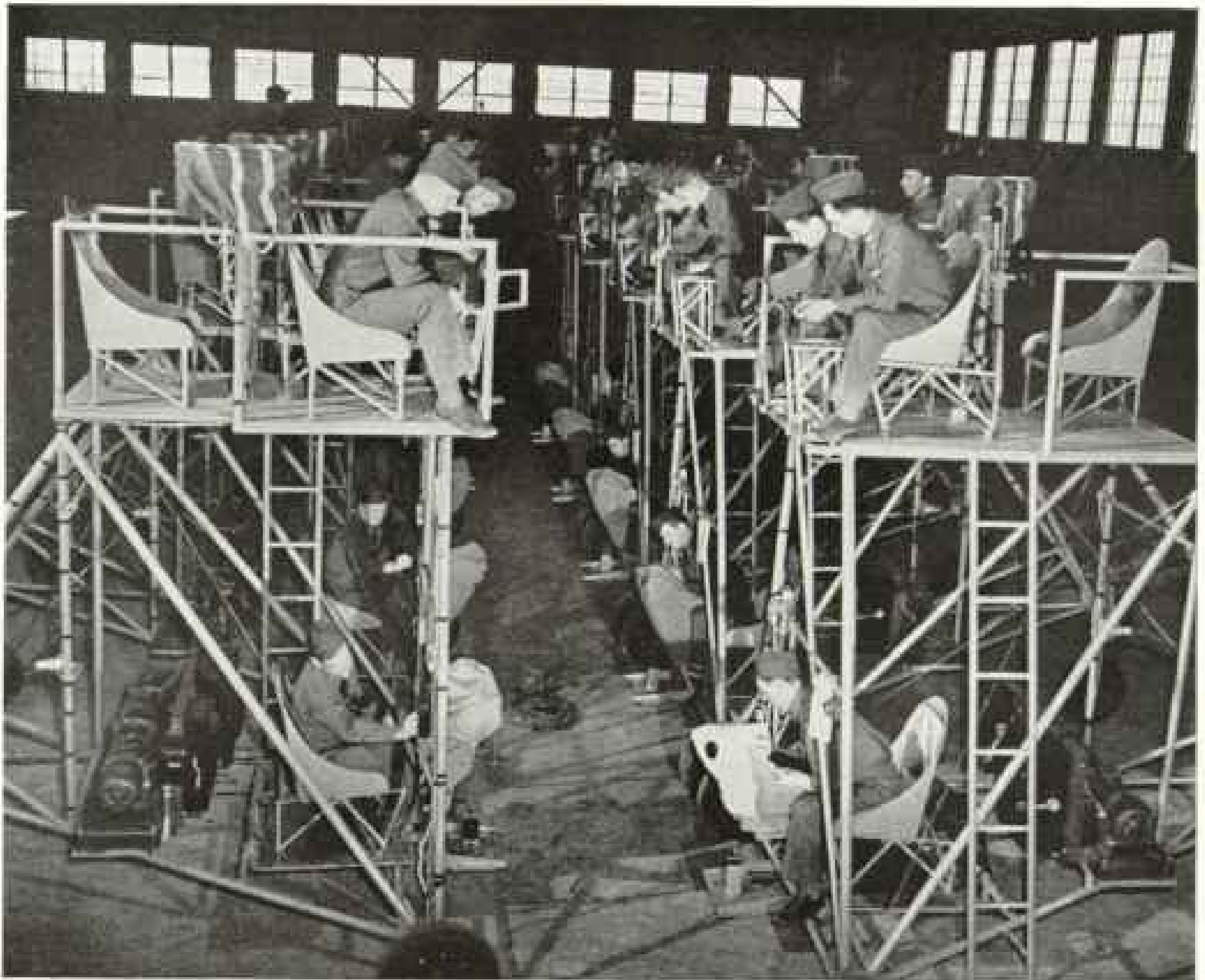
But that tail craft is not another plane; it is a motorless glider. Look closer when the lead plane comes in to land, and you'll see it is pulling the little fellow with a towline.

Over the field, the glider's pilot unhooks from the tow plane and brings his winged boxcar down to a smooth, silent landing.

Loaded Gliders Now Travel Airways

"I piloted a glider from Kansas to North Carolina," Maj. Ernest A. La Salle told me, "and it was an easy, quiet trip.

"A horse can *pull* more than he can carry," added the Major, who trains glider mechanics at Sheppard Field, Texas. "Man knew that even before wheels were invented. Just as trailers are used behind motorcars to carry extra passengers and freight, so gliders now are attached behind tow planes.



Wide World from Pyrex A.A.A.'s

From High Chairs on Wheels Students Learn to Drop Bombs Squarely on Targets

These odd vehicles are bombing trainers. Young men from 30 States ride the "buggies," at Midland Flying School, Texas. Bombsights are covered, since cameramen are present. When fairly over the target on the floor, the bombsight automatically "fires," by electric impulses. If it fails to hit the target, students must "calibrate," or correct the adjustment (page 337).

"In fact, a cargo plane by towing gliders can double its load with the loss of only 12 percent efficiency."

These glider mechanics take a tough 42-day course covering many problems, from plywood and fabrics to steering gear, wheels, and brakes.

Army's glider of today is as far from a sport sailplane as a modern bomber is from the clumsy war craft of 25 years ago.* It will carry any load from a jeep to 15 men. It differs from a plane in two ways: it has no engine and no propeller. But it has controls, radio sets, wheels, brakes, etc. "Air buses" the mechanics call these gliders.

Glider mechanics must not only know how to keep their kite-car going, but in emergency they must also be able to make a new

one from the wrecks of old ones. Every student realizes he must understand his glider from nose to rudder; lives of all people who ride it depend on his painstaking work.

All about Sheppard Field stand huge packing cases. Into these the new gliders are crated for shipment overseas.

"Why have all these big cases got doors in their ends?" I asked.

"Because glider crews live in them overseas," I was told. "These big boxes are so designed that, after the glider is unpacked, they make comfortable huts."

Big Planes Carry Flight Engineers

To its pilot-navigator teams Army now adds a flight engineer to help handle new super-bombers and giant cargo planes. Only the most brilliant students, graduating from AAFTTC's mechanics schools, are chosen for this course. First established by Maj.

* See "Men-Birds Soar on Boiling Air," by Frederick G. Vashburgh, NATIONAL GEOGRAPHIC MAGAZINE, July, 1938.



U. S. Army Air Forces, Official

"Now Look! The Oil Goes in Here, Is Pumped All Around, Like Hand-organ Music, and Comes Out There!"

This net of pipes shows just how oil circulates through the machinery of a Flying Fortress. To help students learn the oil-circulation system, this "mockup," sent out from the Boeing factory, is hauled from one AAFTTC mechanics school to another, as one exhibit in a mobile training unit. Similar ones are sent to stations all over the world.

Gen. James E. Chaney at Sheppard Field, Texas, it is now removed to Salina, Kansas.

No handling or maneuvering of the plane itself is done by these flight engineers. But in flight they have complete control of all engines, throttles, mixtures, propellers, superchargers, and electric and hydraulic installations.

Other jobs flight engineers perform are these: compilation of flight logs and charts; tests; trouble shooting; inspection in flight; maintenance advice to ground crewmen; pre-departure inspections; and supervision of fuel and cargo loading.

Director of the school while at Sheppard Field was Lt. Col. Bruce Von G. Scott. He says these flight engineers may become even more important than pilots and navigators after the war. "Highly skilled flight engineers will become keymen in round-the-world flights of huge freight and passenger aircraft."

Mother of all Army radio schools is the big one at Scott Field, Illinois. "Thru these gates,"

says a billboard, "pass the best damned radio operators in the world!" (Page 352.)

"Choosing men most capable of quickly learning radio work is full of surprises," said Maj. Gen. Frederick L. Martin, commanding the Second District, AAFTTC, which includes Scott Field. "Sometimes our code-aptitude test, to show whether a man can tell dots from dashes, may prove some bellboy preferable to a lawyer for radio work."

Learning the Miracles of Radio

Students sit at desks, equipped with hand key and earphones. In some classrooms the signals come from a central automatic code-sending machine. Its dots and dashes are fed to the whole class at once, and as student efficiency improves, the sending machine is speeded up.

Scott Field also trains combat operators. Each man learns the radio he will use when flying on a bombardment ship. He must be able to transmit and receive sixteen words



Learning To Give Our Enemies a Nasty Taste of Bitter Medicine

Gunnery students learn to aim and fire the .50-caliber machine guns which will later be installed in regulation bomber turrets. Here, for trial workouts, these deadly guns are mounted in Army trucks, from which they fire at targets carried by a driverless jeep running on a circular track.

AP/WIDE



Staff Photographer Lois Martin

With Three Wide-angle Cameras Army Maps Thousands of Square Miles Every Day

By the "tri-metrogon" method the Army, in the past 10 months, has mapped more than 1,600,000 square miles of African deserts, Asian wastes, South American jungles, and Alaskan wilds. Many such areas had been inadequately mapped, or not mapped at all. Some 300 Geological Survey men aid our Air Forces in making these flight charts.

a minute aurally, and visually, by blinker, eight words a minute.

Every student must also learn operating procedures, international signals, authentication and verification codes and ciphers. He must develop a "fist," or telegraphic touch, that lacks individuality in order not to betray movements of his group by virtue of any personal sending characteristics.

Basic principals of electricity are studied from the very first day. Electron flow, primary sources of power, voltage, currents, watts, magnetism, wave lengths, frequency, vacuum tubes, transformers, receivers, and

transmitters, all must be understood.

Poetic soldiers burst into verse over the mysteries of radio. Wrote Pvt. Bob McKnight, after pondering "Circuit Analysis":

I sometimes wonder
What I would do
If I had a cow
With a variable moo,
With a load-resistor
In her tail,
What manner of milk
Would fill my pail?

Would her productivity
Become intenser
If I recharged
This bovine's condenser?

At Scott Field school you see boys tearing down old radio sets and rebuilding them, for practice.

When, in later actual combat, a bullet or a piece of flak puts a bomber's radio set out of commission, a mechanic trained here will know exactly how to patch it up; even how to make his own emergency tools out of metal scraps.

"Do you know the names of all the pieces in that radio set?" I asked one of the students.

"Well, I know where they belong."

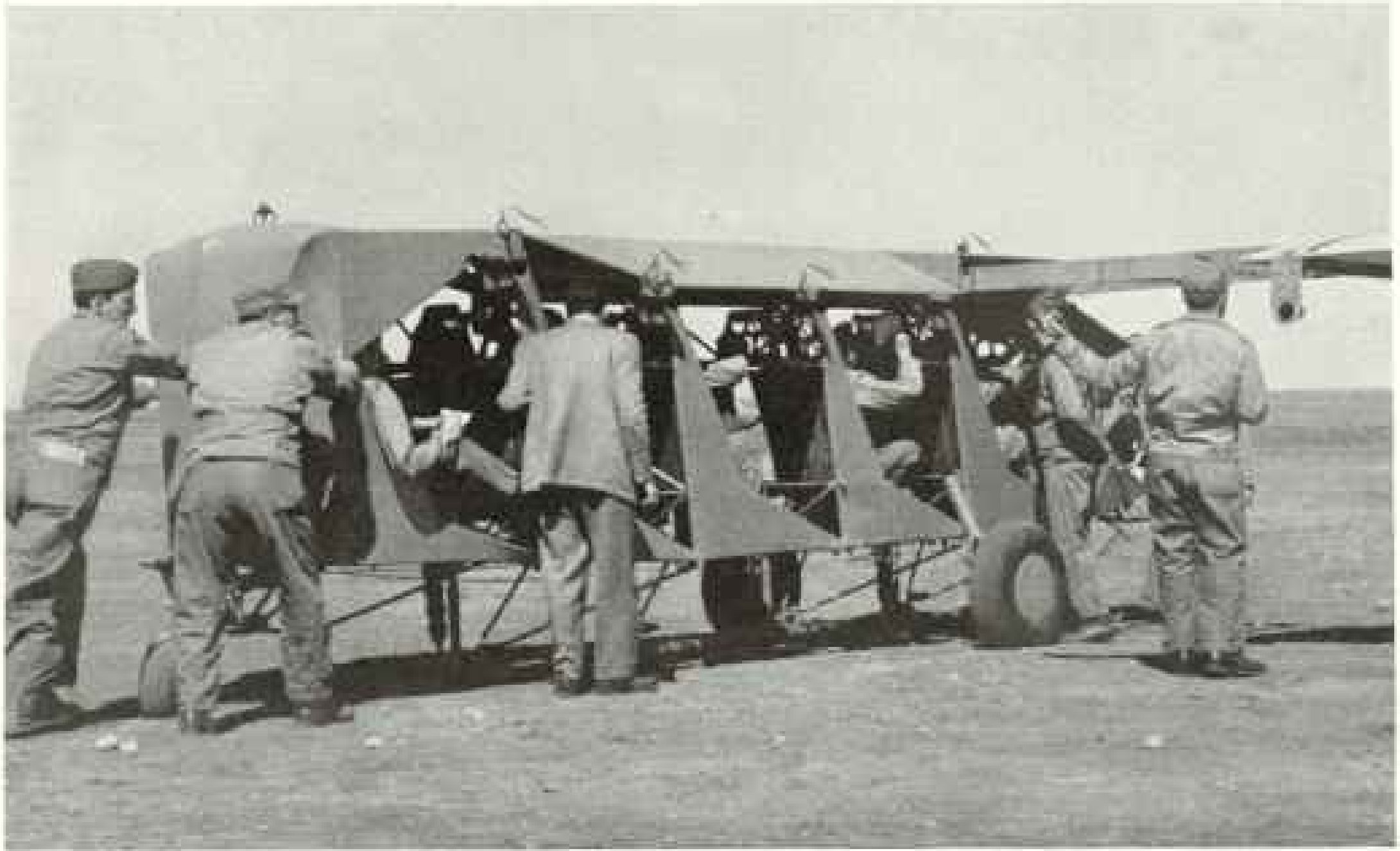
"Do you see them in your dreams?"

"No, but I hear the code in my sleep!"

All radio men joining bomber crews must also be qualified gunners. In a pinch, they get into the fight.

While the radio compass is primarily the navigator's instrument, the radio operator must also know how to use it, and thus make a "fix," which shows the whereabouts or position of the ship. Through dual controls he is able to share the unit with the navigator.

With dramatic realism, radio operators who must someday ride bombers into battle are here given a rough-and-tumble wintry workout. This cold, noisy adventure is staged in what the school calls a "mockup." This is a



U. S. Army Air Forces, Official

Ten Men at a Time Study Compass Work in a Classroom on Wheels

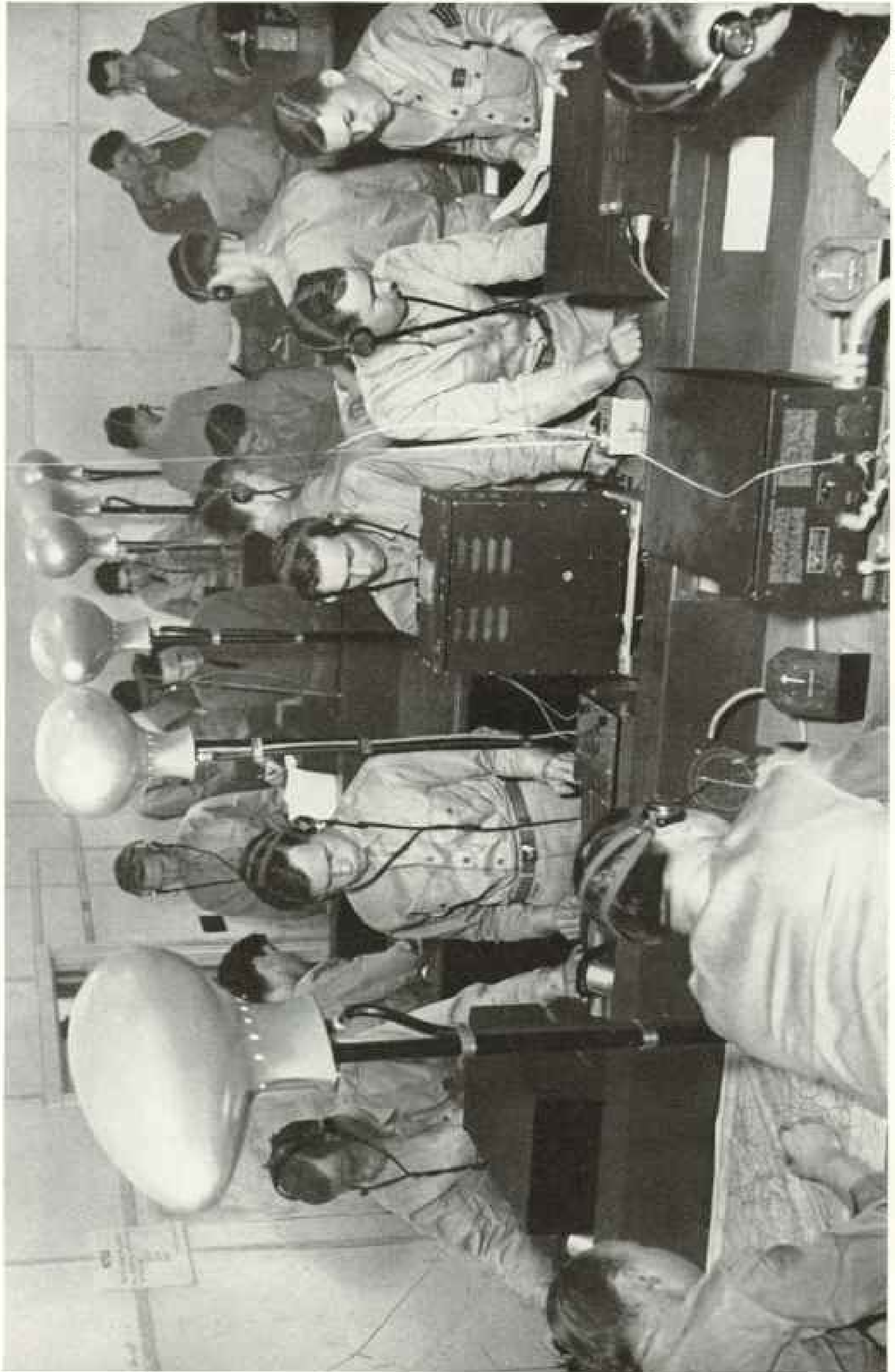
This contraption at Sheppard Field, Texas, never leaves the ground. In fact, minus an engine, it looks more like a stage plane of melodrama days. But to glider students it's highly useful, to show how flight-control instruments are installed. Also, with it they learn how to compensate for compass errors.



U. S. Army Air Forces, Official

For Maximum Efficiency Propellers Must Be Free of Dents and Scratches

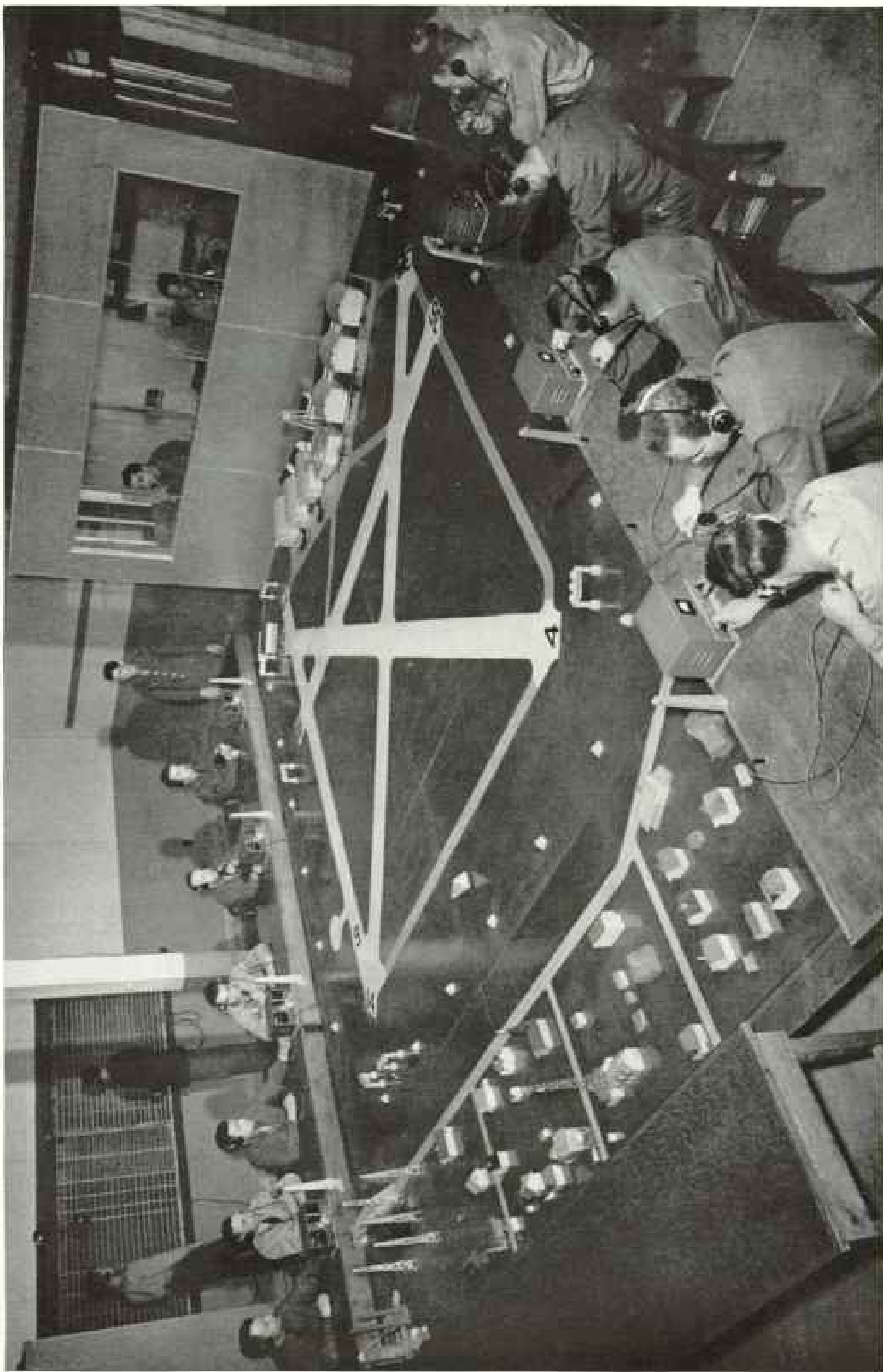
Aided by his magnifying glass, a corporal at Chanute Field, Illinois, inspects a "prop." Nicks and dents are etched out. Bullets fired through the propeller blades give the mechanic practice in smoothing off jagged edges. Besides microscopes, a magnetic method of finding invisible interior cracks is also used (page 341).



Wills World from Photo-Action

Those Teardrop Blimplike Objects Are the New Loop Antennas of Radio Compasses

Each student works with radio sending and receiving sets. His job, when later he's a radio man in a plane, is to assist the navigator. To do this, he calls a radio compass station on the ground, then another, perhaps yet another, and thus by triangulation "fixes" or determines on the map his plane's position.



U. S. Army Air Force, Official

Control Tower Students, Phones on Ears, Sit About a Model Airport Pretending They Are Incoming or Outgoing Pilots

In the "control tower" beyond, instructors tell them by radio which runway to use, when they may descend or take off, where the wind is, how high they may fly, etc. Then on the blackboard clerks enter the names of incoming and outgoing pilots, stating where from or bound, and when they started or arrived.



Wide World from Press Ass'n.

How Fascinating to Fly above the Clouds and Still Talk with Men Hidden Far Below!

These intent-looking boys, headphones on and notebooks in hand, are learning plane-with-ground communications in Scott Field's flying classroom. Pilots use two-way radio to identify themselves to the tower control operator, to ask if they may take off, to inquire which runway they should use, to get compass bearings, wind directions, weather data, and similar useful information from the ground.

life-size reproduction of the radio compartment of a B-17 Flying Fortress, with its complete radio equipment, and so mounted that it rolls and jumps to simulate actual rough-weather flying conditions.

Wearing high-altitude flying togs, oxygen mask, and chute, and entirely on his own, the student "flies" his first mission. Let him make a bad blunder now and he can crash the ship and kill everybody on board. Whether the big bomber can be guided safely back to base now depends wholly on the radio man.

Locked alone in this cabin, he can't raise his hand to ask any questions as to his next move; he's in the Air Force now—the man who'll bring the ship back! On him depend the lives of all his crew buddies.

"A trained radio man who leaves here is a deadly threat to the Axis," says Major General Martin.

"He's not only a radio operator, but a

skilled gunner. The pilot depends upon him for weather data, instructions from the home base, communications with other bombers, and manipulation of the all-important radio compass. When they plunge into battle, up there among the clouds, in that 'zone of radio silence,' the operator must drop his earphones and grab a gun. But remember always that the mechanics who are left on the ground face equally great responsibilities and are just as necessary to victory as pilots and gunners."

Radar, the All-seeing Magic Eye

If you think the age of miracles has passed, spend a day in a radar school! As with its cousin, television, knowledge of radar was once limited to a few scientists.

With this radio beam, targets obscured by fog, clouds, or darkness are instantly located. Radar also gives the target's range.

Now all warring nations use it widely.

First knockout blows with radar's aid were struck by the British in the Battle of Britain; before the Germans took counter measures, it helped spread death and destruction among enemy aircraft. At the same time, ocean supply lines were being protected against the stings of German U-boats by patrolling British aircraft using the magic eyes of radar.

Costly and complicated, the delicate radar sets now used by our Army and Navy are made by leading American manufacturers of radio and electrical instruments.

How to operate and repair these instruments is a vitally important subject taught by the AAFTTC, at Boca Raton Field, Florida.

Set near luxurious country club surroundings, its hard-working faculty and students find needed recreation close at hand. This radar student body is a carefully chosen group; with their instruments they work in secrecy behind high wire fences, their mysterious radar sets as closely guarded as that gold pile at Fort Knox. Nobody here talks to outsiders about his work; in fact, no officers or men on other duty at Boca Raton have ever even seen inside the wire barricades of the forbidden radar school.

Two student groups are here.

Hand-picked enlisted men, previously trained in radio communications, and with a passion for its technique, are trained as radar mechanics and operators.

The other group of students is comprised of officer graduates of the aviation cadet communications school at Yale. These officers also are specially selected for this 12-week course, which prepares them for supervising radar equipment in tactical organizations.

To detect planes or surface craft seeking to reach our shores, radar sets are installed in fixed positions on the ground around our coastlines and harbors. They are operated by the Army Signal Corps. I saw one, whose beam seemed to shoot through a solid cement wall—actually, the wall reflected the waves—and at every turn radar flashed to us the position of a steel factory building a few miles away, but invisible to us.

Over and over, visiting these many AAFTTC schools, you think of the significant impact all these trained men must have on our industrial world after the war.

"What good will radar do when peace comes?" I asked of Lt. Col. William M. Canterbury, Director of Training at this school.

"Since this ray shoots right through fog and darkness," said the Colonel, "you can see at once what it will mean both to commercial airlines and to merchant ships. Think how many collisions, especially in crowded harbors

on foggy nights, can be prevented when radar comes into general use.

"Icebergs, too, can be located. Radar might have saved the *Titanic*."

"The Coast Guard can use it in searching for smugglers, floating wrecks, or vessels in distress; and you can see how valuable it may be in finding any great transoceanic passenger Clipper or air freighter that might be left floating with its own radio set disabled.

"We honestly feel," added Colonel Canterbury, "that the large body of young radar experts being trained here by AAFTTC will later fill most useful positions in civilian life."

Hand-picked Men Work with Secret Codes

What a jump from patching gas tanks to mastering secret codes! Yet that's only another phase of AAFTTC's amazing educational work.

Tucked safely away in a certain hidden nook of the United States is a school of cryptography, which means the art of writing in such a way as to be understood only by those who have the key.

Smoke signals, jungle drums, heliographs, secret writing—they all date from ancient times. Even our Bible holds examples of cryptography.

Armies, navies, diplomats, kings, and merchants, through long centuries, have devised and used endless systems of secret writing. From just one modern commercial code in common use, more than 100 million word combinations are possible.

Further to confuse and delay our enemies when they intercept our code messages, we could, if need be, use a fresh system every morning.

Clever men have even invented cipher wheels, with letters and figures on their rims; string ciphers, circles, and the trellis or cardboard cipher, to say nothing of endless ways of grouping and transposing letters or giving them hidden meanings.

Using trained instructors, AAFTTC has taught hand-picked, quick-witted boys not only to handle existing cipher systems but to make up their own.

Cipher analysis, however, or the breaking down of the enemy's intercepted code messages, is more difficult. Yet expert cryptographers say that, given enough time, most secret writings can be "cracked."

I myself recall this interesting incident. In a certain turbulent land we once tapped the telegraph wires and soon caught a message going to the captain of a warship then at a near-by port. "What are your plans," asked the message, "if the enemy should approach?"



U. S. Army Air Forces, Official

Judging by the Billboard's Boast, These Newcomers Will Emerge Wise in the Ways of Radio

Established in the early days of Army aviation, historic Scott Field, Illinois, is famous now as the "Mother of Army Radio." Past this signboard thousands of graduates have marched off for overseas, to fly in combat bombers, to work in message centers, on radio compasses, or to service and repair radio sets shot to pieces by enemy fire (page 344).

Soon we intercepted the captain's reply. "Because of the accursed state of my boilers," answered the skipper, "I shall sink my ship." There ended the coded part of the message, followed by these words in plain language: "Sauve qui peut!" or "Let him save himself who can!"

Army Trains Its Own Weather Prophets

Rain, snow, wind direction, clouds, all are factors in war. History of many decisive battles proves this. To aircraft, particularly, advance weather information is vital.

Today no army or fleet makes a move—not even a lone reconnaissance plane takes off—without first seeking data on weather conditions.

Training weather forecasters is one of the Training Command's big jobs. Observers, forecasters, radiosonde operators, teletype men, train under its careful scrutiny. Most important of all, however, is the Class A course for aviation meteorological cadets. They learn to analyze weather conditions and from them make reliable forecasts.

Flight planning and navigation are also taught, so that these weather men may talk

intelligently with pilots about weather problems to be met on any given flight.

These cadets must have had two years of college, including a year of college physics and mathematics through differential and integral calculus.

Besides common weather instruments used in classroom work, visual aids to instruction include slides and motion pictures. Aviation weather cadets, after some 33 weeks' work, may be commissioned second lieutenants.

In its colossal task, AAFTTC also made contracts with many civilian schools. Embry-Riddle school at Miami, Florida, is a typical example.

Then come factory training schools. These are conspicuous in the Los Angeles area. Here, under direction of Maj. Gen. John F. Curry, was set up a system of schools, organized by Col. R. C. Wriston, which now stretches all up and down the Pacific coast.

These schools are planned to give post-graduate work to aircraft mechanics, fitting them better to work with the particular type of plane which they later will have to care for in combat areas. Instructors are drawn from the plane factories.



U. S. Army Air Force, Official

Moving Their Cots in, Soldiers Set Up Housekeeping in a "Glider Inn"

Hen house? Boxcar that's lost its wheels? No, just a big crate in which gliders are shipped overseas. Glider mechanics at Sheppard Field, Texas, find them more comfortable than tents and plan to live in these big insulated boxes when crate, glider, and ground crew reach foreign shores (page 343).

West-coast aircraft firms active in this work include Consolidated, Douglas, Lockheed, Boeing, and Northrup. Started in the West, this plan soon spread across the Nation.

On new planes fresh from assembly lines Army mechanics now get last-minute instruction.

When that new plane starts for the fighting line, new-made mechanics fly away with it.

Air Force for June, 1943, tells this tale of one good job by mechanics overseas:

"One of the many interesting maintenance stories to come out of the South Pacific is about the salvaging of four P-40's by the men of an AAF Service Squadron.

"The P-40's had run out of gas and crash-landed on an out-of-the-way, hard-to-get-to island. The pilots were safe.

"In order to salvage the valuable plane parts, so difficult to replace in remote areas of the South Pacific, a ramp lighter, a jeep, and other supplies, including machine guns, were loaded on a small steamboat, and the picked crew set out for the island.

"There they found the planes on a jungle-covered 900-foot plateau almost directly off the beach. Natives, fascinated by their first sight of a truck of any kind, helped in the

salvage work just to get a ride in the jeep.

"Two of the planes had crash-landed in good shape, but the other two were damaged severely. Wings, fuselages, motors, guns, radios, and other parts were loaded on the jeep and carried to the beach.

"There, during the high tide, the heavy parts were put on the steamer by the ramp lighter, while the light parts were carried through the heavy seas in native outrigger canoes. The landing job took three days.

"Hats off to a tough job—well done by the mechs of the Air Forces!"

At Boeing's Seattle shop, W. C. Patterson, administrator of the school, says: "To assure top performance by Flying Fortresses in combat, final training for Air Force mechanics is given at our Mechanics School, adjacent to our Seattle plant. The men learn how to change engines, put on new wings, or dismantle and repair all parts of the big bombers, just as they will later do in combat areas."

Like others who live with planes, AAFTTC men also enrich our slang. What salty new words aviation has hatched!

To make a "Chinese landing" is to land *with* the wind, in the manner of that fictitious Chinese pilot, Won Wing Low.



Trained Air Force Mechanics Repair a Damaged Plane on the China Front

Our fighting planes in China must be repaired far from homeland's well-equipped machine shops. What a challenge, then, to this ground crew busy on a Curtiss P-40, and its Allison motor. These very men may originally have learned their trade in Buick's own Michigan shops.

An "erk" is a man who works around planes; so is a "grease monkey." To "lay an egg" is to drop a bomb.

"Roger" is a word used between pilot and tower man. It means "I understand," or "That is the end of my message." The word "over" is also similarly used.

A "kiwi" is a student pilot still without his wings. And to be "buttoned up" is to be ready to take off.

To "hit the silk" is to jump in a parachute. "Hedge-hopping" and "puddle-jumping" are self-explanatory. "Going upstairs" is gaining altitude.

"Gremlins" are mythical little elves which may jam a gun, knock out a radio, or make a plane's tail flutter. But there are good gremlins, too, who may get a distressed pilot out of trouble.

A "Mickey Mouse" is a bomb-release switch box. A "Mae West" is an inflatable jacket.

Such is the slang patter, born of war, used

now by AAFTTC boys, from homeland shops to battlefronts.

Here, briefly, is the story of this incomparable school program. It is leveling off now; after today, only those will be trained who are needed as replacements.

But consider here only the countless thousands already graduated. Few nations anywhere ever owned such a vast body of skilled workers. Even allowing for heavy casualties, think what a profound influence for social and economic good this army of technicians must have on our destiny after the war!

Britain we know as "Mistress of the Seas." Tomorrow America may be "Mistress of the Air." Under any circumstances, a vastly enlarged commercial aviation system will absorb thousands of these men. Whatever the shape of things to come, it is indisputable that all these strong minds and nimble hands trained by AAFTTC will have to be reckoned with in the world of tomorrow.

Timor a Key to the Indies

BY STUART ST. CLAIR

WHEN only a few years ago I decided to make a trip to the island of Timor for a survey of its oil resources, I knew virtually nothing about this little-known member of the Lesser Sunda group.

The few writings I found on the subject did not increase my enthusiasm for the journey. They contained reports of inland areas marked "Unknown," of head hunting, of unhealthy conditions, of sacrifices of native maidens to sacred crocodiles, of continuous warfare among the many tribes.

Nevertheless, I got together a party of eight carefully picked men, obtained paraphernalia and food supplies sufficient to enable us to live on the island if we could not live off it, and set out from New York on the adventure that was to take us halfway round the globe.

We made the last leg of the trip from Soerabaja, Java, on a Dutch coasting vessel of 1,500 tons which touched at the ports on the many Netherlands islands extending in an arc some thousand miles eastward from Java.

Timor Commands Routes to Java

Reference to the new map of the Pacific Ocean, published by the National Geographic Society in this issue of *The Magazine*, will show Timor located near the eastern end of the Malay Archipelago and about 600 miles east of Java (see also map, page 359).

Timor is approximately 300 miles long and 60 miles at its widest point, and tapers sharply to its eastern end. Settled by the Portuguese in the early 16th century, the island was later about equally divided between the Dutch on the west and the Portuguese on the east.

In February, 1942, the Japanese, after overrunning Borneo, Celebes, Amboina, and north and east New Guinea, occupied many of the strategic points in both Portuguese and Netherlands Timor.

For years both Australia and Japan had been endeavoring to obtain from Portugal exclusive rights to establish airplane bases in Timor and to develop the possible petroleum resources of the island. Portugal, however, persistently refused to grant exclusive concessions to any country.

With Timor in the hands of the Japanese, the lane of the Allies' transportation through Torres Strait north of Australia and across Timor Sea was broken. All supplies and troopships bound for southern Asia were compelled to pass to the south of Australia by a roundabout route which added 1,200 miles or more to the voyage.

We reached Dili the last of June before World War II and made ourselves comfortable in a little plaster house for which we paid the equivalent of \$25 gold a month, double the established rental.

Dili is a quaint little town strung out along a shallow bay, the western part of which serves as a harbor for small ships only. A coral reef one mile offshore acts as a barrier to the wind and waves of the Savu (Sawoe) Sea and affords partial protection to craft anchored within.

Steamer Ties up to a Banyan Tree

The boat on which we came was anchored just inside the reef, and passengers and cargo were brought to the dock by launch and scow.

Soon after our arrival, the monthly boat from Makassar, Celebes, steamed in past the coral reef and, much to our amusement, tied up to a large banyan tree within a hundred feet of the shore (pages 358 and 363).

The Makassar and Soerabaja boats were the only regular callers at Dili, although occasionally a boat from Singapore or Hong Kong bound for Australia would put in for fresh water.

Dili is enclosed on three sides by low ground which is swampy most of the year. Some of the swamps are below sea level and undrainable. Fever is prevalent.

Since the island is only about eight degrees south of the Equator, the heat is intense in the daytime, although there is usually a good breeze from the ocean. We found the nights warm until near morning, when a penetrating chill drove us under blankets.

Declining the proffered escort of a retinue of hungry soldiers, and taking only native porters, a few of us made a preliminary trip to establish a permanent base camp near the center of Portuguese territory.

We soon found that the so-called "Unknown" was merely a diversified country of hot lowland, cool tableland, and rugged mountains. Military posts scattered throughout the island were administrative centers of the provinces and adequate checks on the natives.

The base camp we selected was near the post of Viqueque on a hill 400 feet above the valley of the Coa River. With a 40-foot cliff on one side and a few acres of level ground, which we cleared, on the other sides, we had a tactical location for defense, should an emergency arise. The natives called the hill *Ca-Sesse*, and we gave this name to our camp.

We constructed a lodge with split bamboo sides extending four feet above the floor but



Stuart H. Clair

Timor Women Entertain Visitors with a Circle Dance

open from there to the roof, which was heavily thatched and overhanging.

Air, mosquitoes, lizards, and snakes, therefore, had free access to the living room. Sliding screens were made from bamboo to cover the open sides in the rainy season. An open-air dining pavilion, a small auxiliary building, and a supply tent completed comfortable quarters for our party of eight. The personal boys camped at the edge of the clearing.

To the north, the densely wooded low country slowly merges into the foothills of the central mountain range, the backbone of the island. To the south stretches the palm-covered coastal plain for about seven miles to the blue waters of the Timor Sea.

At night twinkling lights indicated a few native huts scattered scantily among the palm trees, and to the ear came the staccato sound made by the natives pounding sago pulp in wooden mortars. Oddly, these people do

most of their domestic work after dark. They have an inborn sense of rhythm, and their songs, although simple and hardly melodious to our ears, are strangely appealing (page 374)

Although the natives prefer small family clusters of huts to the village, they work community rice paddies. These are cultivated by groups of families and even by the inhabitants of a whole province, each party benefiting to the extent of individual labor. Much of the rice is sold to the Chinese merchants, who hang close to the military posts. Some of the coconut groves are handled in the same way.

Distances Measured in Time

Distances in Timor are measured by the time required to travel with equipment, carried either by pack horses or by native porters. Our base camp was three days from Dili by the shortest but probably the roughest route.

During the six months we made Ca-Sesse

our base camp, it was my lot to make regular horseback trips to Dili. There were no good roads and for the sake of speed I traveled light, taking a couple of extra riding horses for relays and enough pack horses to insure against overloading any for the hard climbs.

Native Timor horses are small but sturdy, and it is remarkable how they can get over the rough country with relatively heavy burdens. They have very tough hoofs and, fortunately, the shoeing problem is absent. As a result of being handled by the natives, they are usually mean little brutes. However, they respond to good treatment, and we soon became fond of our regular mounts (p. 365).

Scattered throughout the island are rest-houses built by the military as an aid to the traveler. During the dry season, I preferred to make camp in the open or at best on the porch of these thatched huts; but when the rainy season came, I made an effort to seek their shelter whenever the journey could be so planned. Usually there would be a few native huts in the vicinity where a chicken or fruit or coconuts might be purchased.

Portuguese Were Royal Hosts

Portuguese hospitality was delightful at the military posts, although the visitor had to furnish his own bed. The commandant would do all in his power to entertain a guest, providing excellent food with the best grade of Portuguese wine. Wine was one of the chief imports of the island and was admitted duty free from the mother country.

The natives designate the turbulent Timor Sea on the south *Tassi Mané* (Male Sea) and the quieter Savu Sea on the north *Tassi Feto* (Female Sea). My first trip across the island was from Baucau, on Tassi Feto, south to Beaco, the port of Viqueque on Tassi Mané.

A sloping plateau with a succession of coral terraces extends south from Baucau almost to Vinilale, where the surface elevation is 2,700 feet. In traveling southward we rode past the large spring of Fatu Maca and on to that of Bu Bui Cai, where the natives had dug a ditch to carry the water several miles to their rice paddy. These ingeniously constructed ditches or flumes follow the contour of the hill with just enough slope to make the water flow to the fields (page 364).

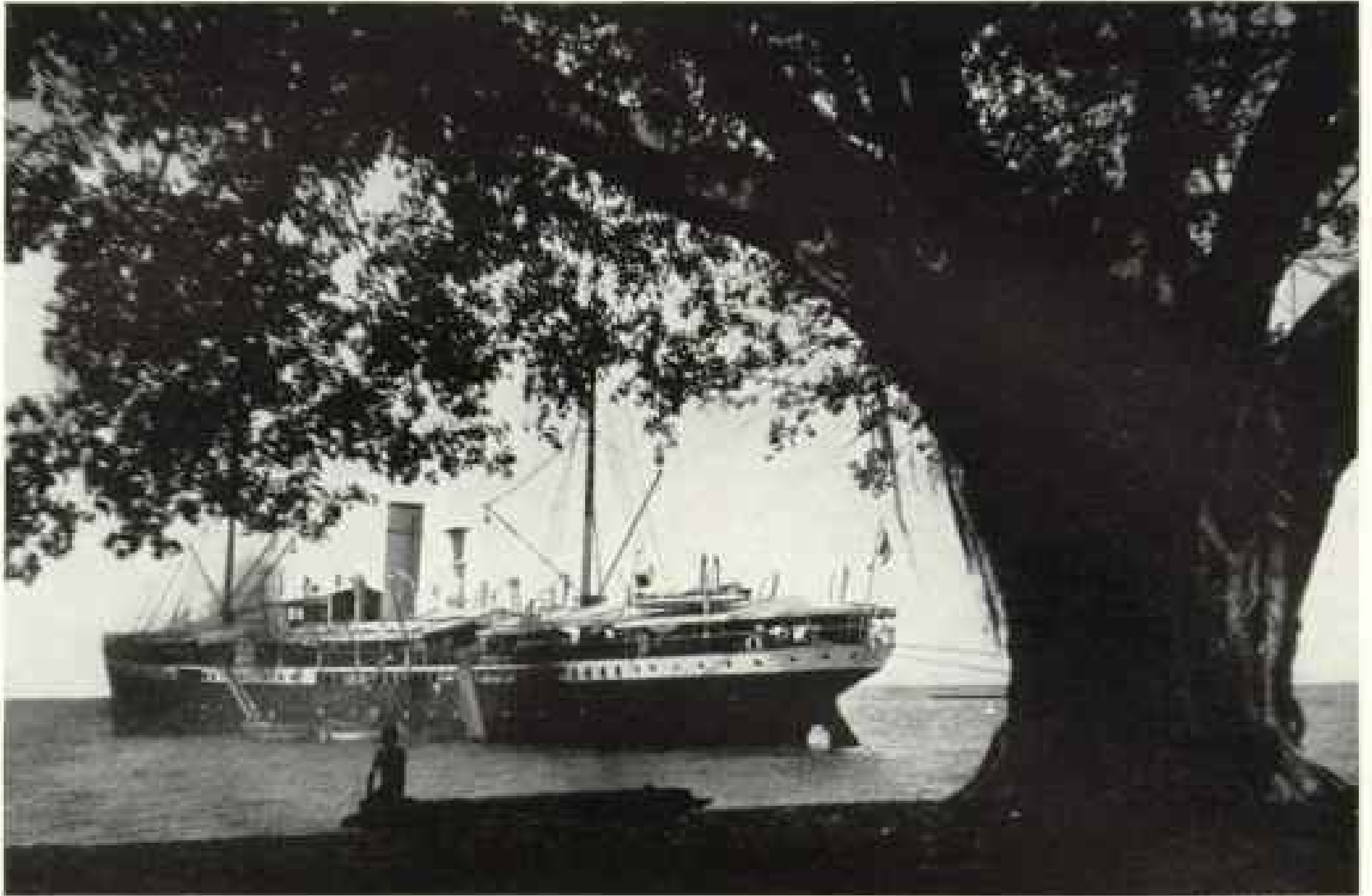
In the lowlands netting is needed for protection against malaria-infected mosquitoes. Not so in the highlands. There the water and air are better, and living conditions in general are more healthful, with the result that the natives are larger and more robust than the lowland dwellers. Since it was wintertime for the Southern Hemisphere, our day at Vinilale



C. K. Bonta.

Rat- and Thief-proof Granaries Are Built High Above Ground

With tight thatch to shed rain and wide platforms to haffle interlopers climbing the tree trunks, these caches, somewhat resembling those used by Alaska Indians, are safe storage places for foodstuffs.



J. P. McCulloch

The Monthly Steamer from Makassar Moored to a Banyan Tree on the Dili Water Front

Aside from the Soerabaja boat, it was the only regular caller, although occasionally a vessel bound from China to Australia put in here for fresh water. The harbor is not deep enough for large ships, and when they bring cargo to Timor they anchor far offshore and send their goods in by lighter.

was wonderfully invigorating and the night cold.

En route from Vinifale to Ossu we crossed the island divide from which we could see the seas to the north and to the south. East of the pass rises Mount Laitoma to an elevation of 4,640 feet, and to the west is Mount Mundo Perdido (Lost World), 5,740 feet above sea level. This great rock mass is aptly named, for the top is enshrouded with clouds most of the time.

Timor Is Still Rising from the Sea

To the geologist Timor is intensely interesting, for its history begins with some of the earliest periods of earth building. The most remarkable fact about it, however, is that the axis of the island has been elevated as much as 4,500 feet in the last half million years and is still rising (page 378).

The rapid erosion of the land as a result of this vertical uplift has produced some of the wildest scenery in Oceania.

We rode to the top of Mount Laitoma through luxuriant vegetation produced by a rich black soil of weathered limestone. As we picked our way through the trees and underbrush, scores of monkeys peered out from behind trees and scolded us.

The larger ones looked like little old men of the mountains. They were full of pranks and would steal anything we left around.

At the east end of Laitoma the mountain breaks off for a sheer drop of about 1,400 feet. Usually the wind is so strong on this point that one must lie flat on the rocks for safety. The view from here is wonderful.

To the south the foothills and the rolling country melt into the lowlands along the coast, with the Timor Sea in the distance. To the east, Mount Mata Bia, with its craggy pinnacles reaching nearly 8,000 feet into the clouds, towers over the surrounding heights.

On the west slope of Laitoma, a few hundred feet from the top, we found a thick deposit of coral rock, similar to that which occurs near the coast at much lower altitudes, containing shells of marine organisms which live today. The elevated position of this coral deposit is definite evidence of the recent uplift of the island.

We passed the night at Ossu, near which rises another of those rocky pinnacles known to the natives as the Sacred Mountain. We did not make any move to desecrate its sacredness, although there was an interesting-looking hut on the top. Drinking water was brought



Jap Planes Based on Timor, Even Neutral Portugal's Eastern Part, Have Forced Allied Ships to Make Long Detours

The western half belongs rightfully to the Netherlands, except wedge-shaped Okusi Ambeno. As long as the Japanese hold Timor, supply ships from America to India must be routed around south Australia, adding 1,200 miles to the voyage. Darwin, Australia, lies roughly 400 miles southeast.

to the military post through an aerial bamboo pipe line from a spring several miles away.

It took us a day to explore Mundo Perdido. We had to lead our horses up the steepest parts, but once on the ridge we had easy riding over a trail which wound along through the dense wood on the north slope of the mountain. Among the rock pinnacles were thousands of coffee trees two or three years old.

Timor Grows Fine Coffee

Timor produces, although in small quantity, some of the finest coffee in the world. Efforts have been made by the Portuguese to develop large plantations, and there are a few on which several hundred thousand trees were set out as early as 1921. The difficulty is transportation, for the coffee can be grown only in the limestone mountain areas and must be brought out from almost inaccessible places by the little pack horse, which can carry at most about one picul (136 pounds).

Many species of fern and orchid covered the ground and trees, and every turn in the wooded trail displayed new botanical delights. South from Ossu we rode for miles through a forest of casuarina (the beefwood of Australia). At a distance the casuarina looks like a short-leaf pine and reminds one of some of the great woods of North America (page 376).

As we descended from the highlands, bamboo trees appeared, and often the trail was arched by their graceful branches. Large

limestone boulders, carried by the rainy-season torrents from their source among the mountain crags, filled the stream beds and made crossings difficult.

Several parties of natives with their pack animals passed us, the women doing most of the driving and carrying. They wear *lepers*, or skirts, which they fasten either around the waist or above the breast (page 380).

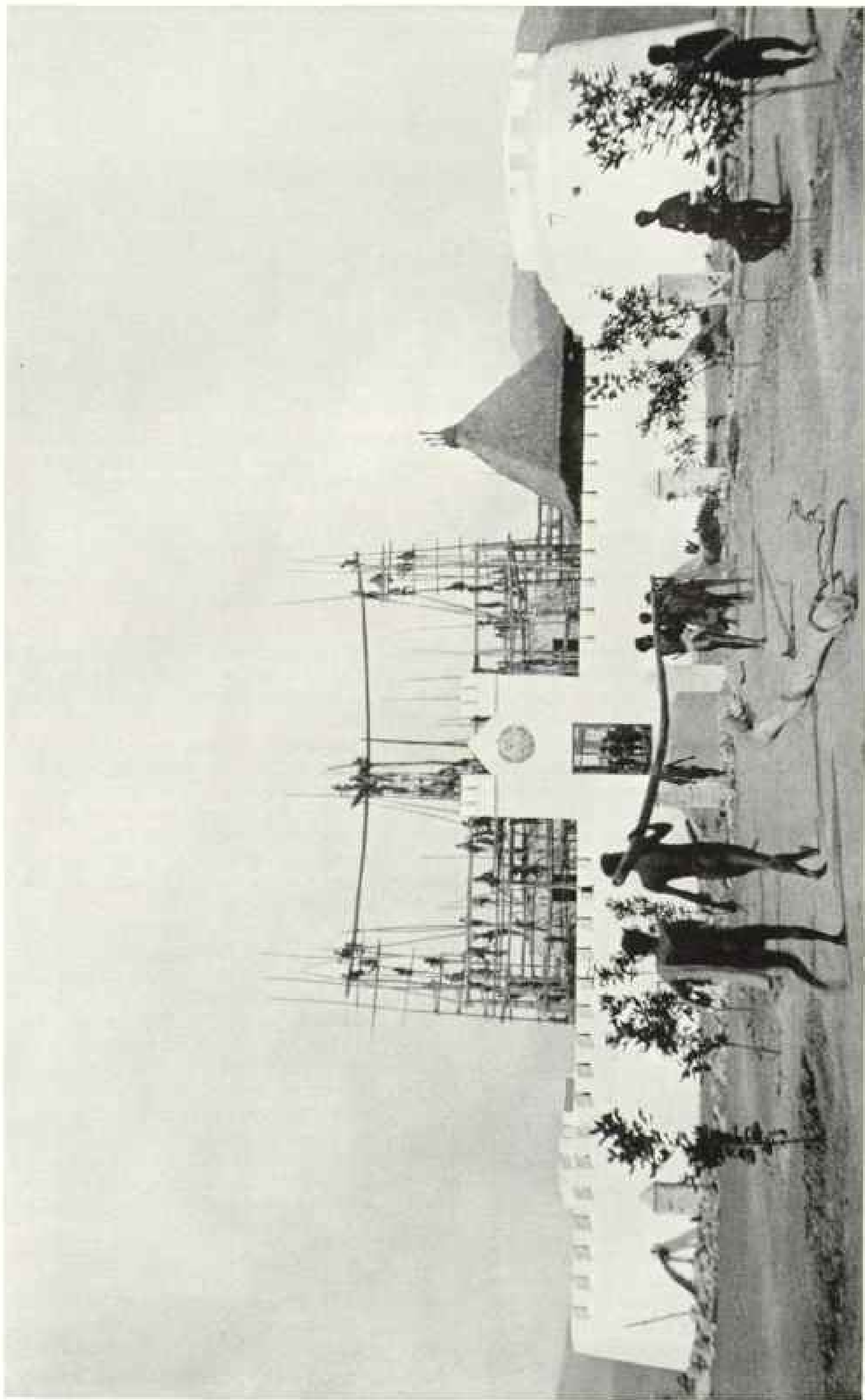
The men usually wear only a breechcloth. Both men and women carry woven cloths for protection against rain and cold.

Portugal's Navy maintained one ship in Timor waters, the *Dili*, formerly a U. S. Coast and Geodetic Survey boat used in Philippine work until it became obsolete.

The *Dili* made monthly trips around the Portuguese part of the island, carrying supplies to the so-called ports along the coast, whence they were carried back to interior military posts. In return she collected coffee, copra, rice, corn, and other products to be shipped to the town of Dili for consumption or export. Every time the ship departed on a trip, there was a gala send-off, and an equally warm reception awaited her return.

Arrival of the Good Ship *Dili*

Since the *Dili* was due at Beaco, the port of Viqueque, that night, we rode on to the seashore. Camp had already been made there by order of the military commander. Timor Sea was running high when the lights of the



J. P. Spenkeloch

Material in the Walls of the New Post at Baguia Was Once Living Organisms.

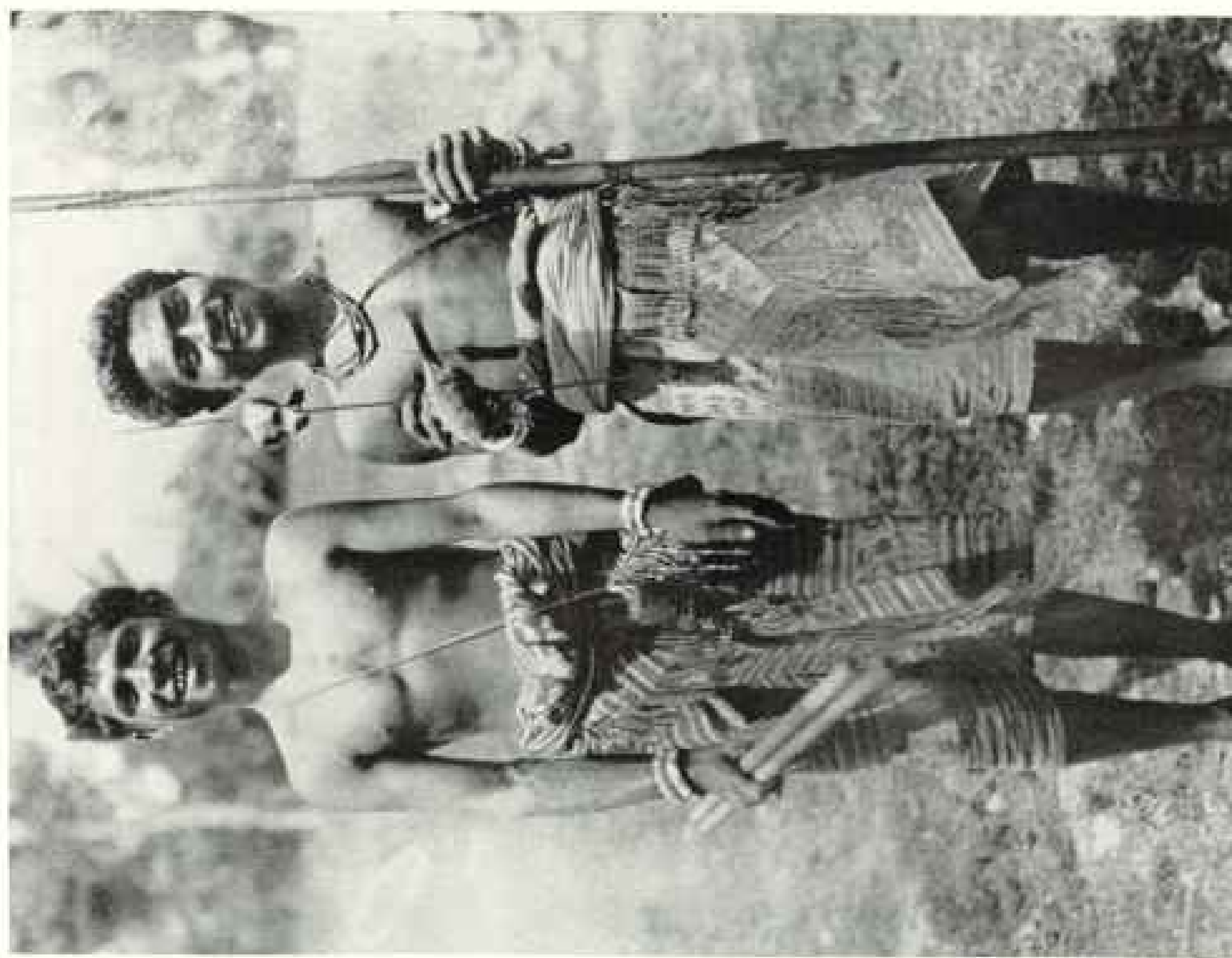
Timor has vast stores of coral rock, which produces lime for house construction (page 367). Even near the top of Mount Lalotoma (4,640 feet) the author found coral. "White anti," or termites, quickly destroy wood; therefore, permanent structures are of plaster.



J. P. MacCallister

For a Camp Pet, the Expedition Bought a Ten-cent Monkey

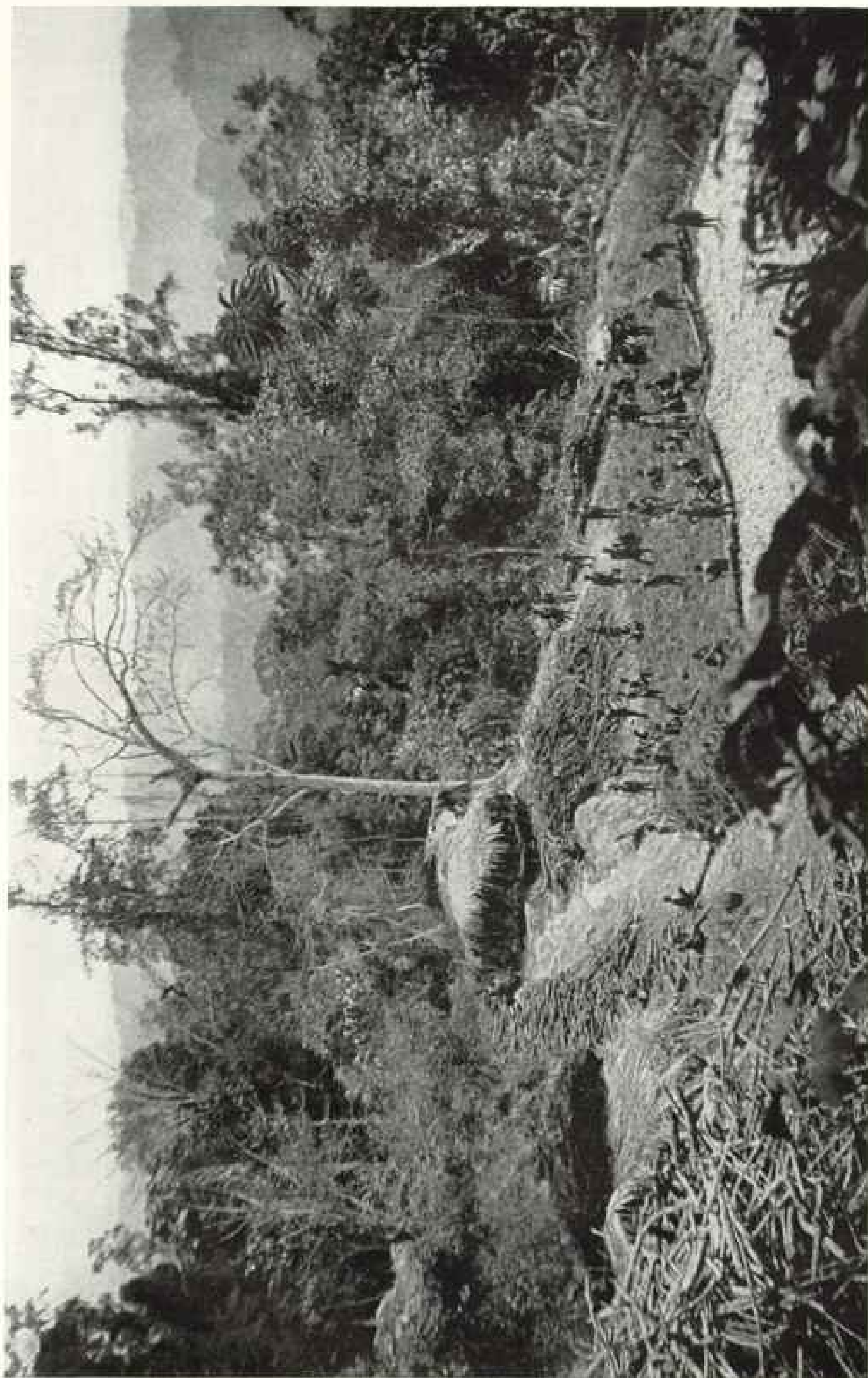
The little fellow quickly made friends with a Portuguese sergeant at Viqueque, perching on the soldier's arm to the amusement of the author (left).



Marion Harland

One Boy Displays Proof of His Marksmanship

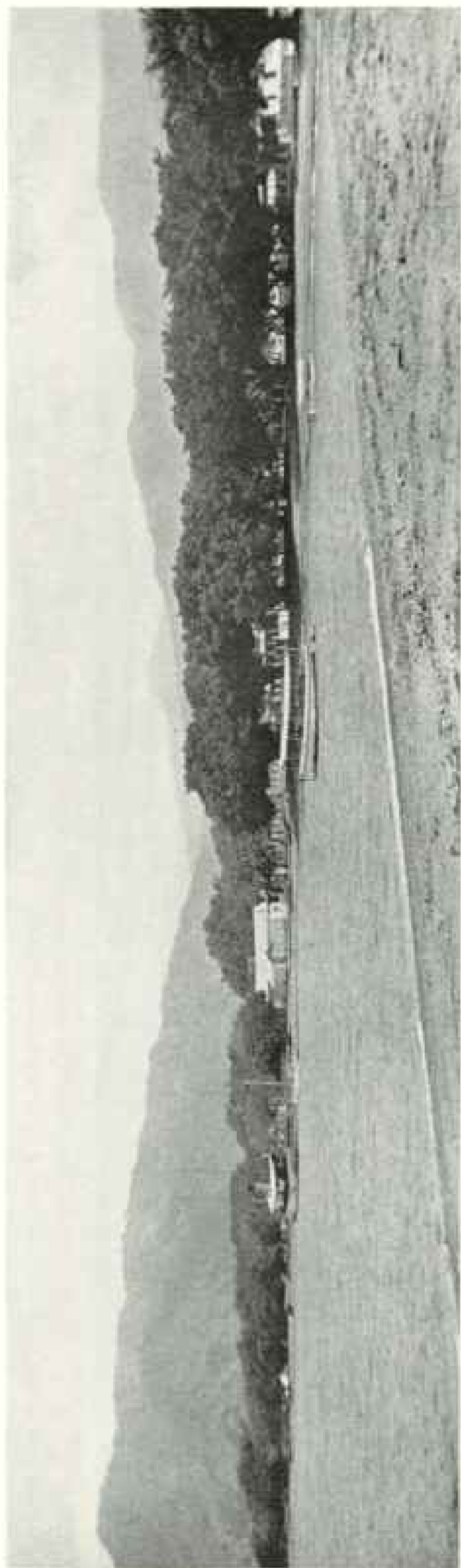
The smaller of the two hunters gleefully holds up two birds he has brought down with his blowgun (page 168). His companion was not so successful.



J. P. McCulloch

To Obtain Material for Building, the Timorese Construct Rude Kilns for Burning Coral

They first cover a cleared area with a network of logs and brush, over which they spread rock quarried from ledges that were once ocean reefs. A top layer of wood is added and set on fire. Heat calcines the coral rock and produces a powdered lime that makes excellent plaster. This pyre near Cosu spread over nearly an acre, and 200 natives were engaged in the work.



J. P. McCulloch

Dili Is Strung Along a Bay Too Shallow for Warships, but Affords a Possible Harbor for Submarines and Small Surface Warcraft

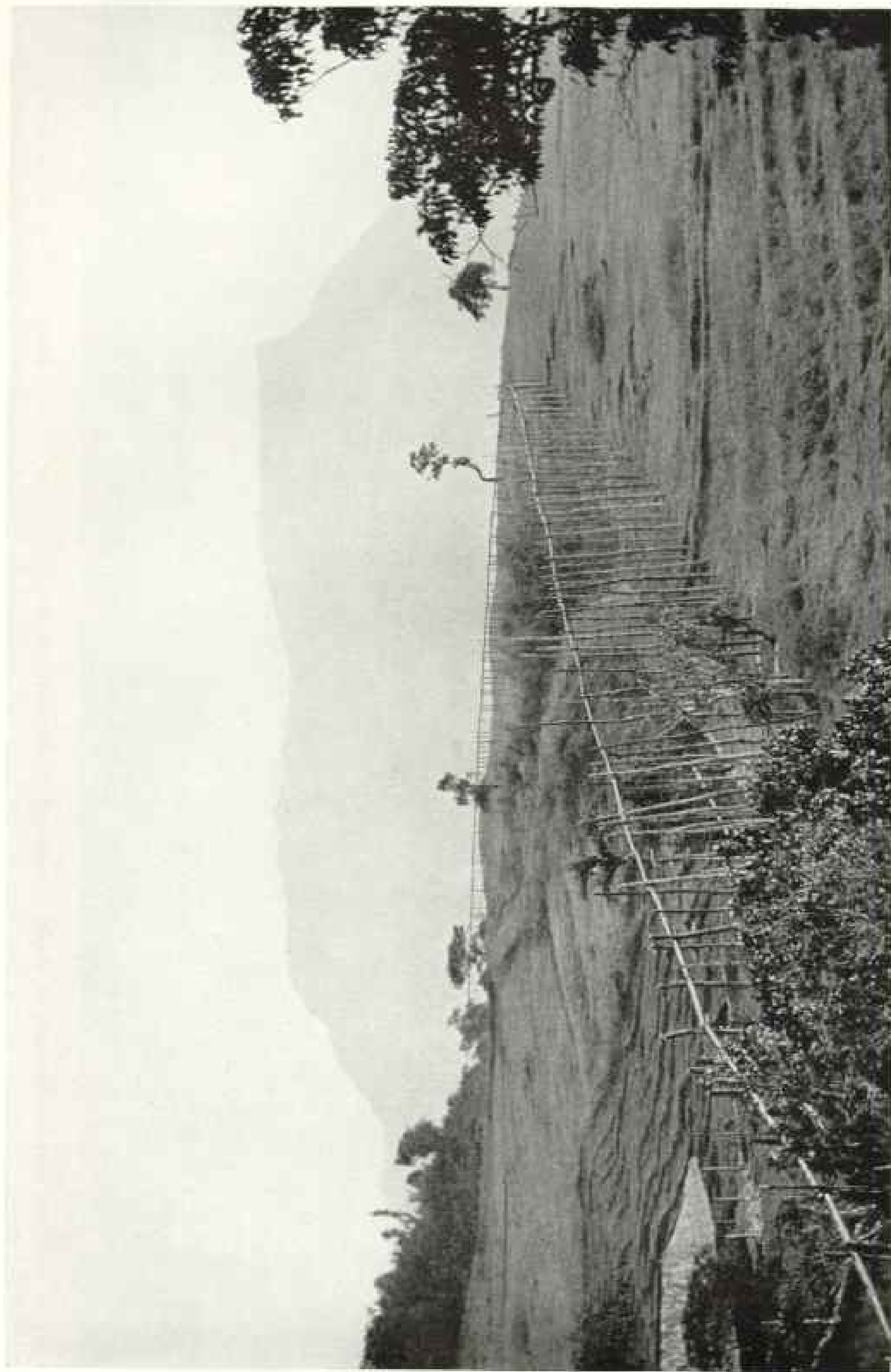
A mile out from the beach, a coral reef acts as a barrier to the wind and waves of the Sava Sea. The capital of Portuguese Timor has a population of about 5,000.



C. L. Nelson

In Numbers Lies the Strength of Weak, Undersized Timor Natives; the Author Had to Hire Twice as Many as He Wanted

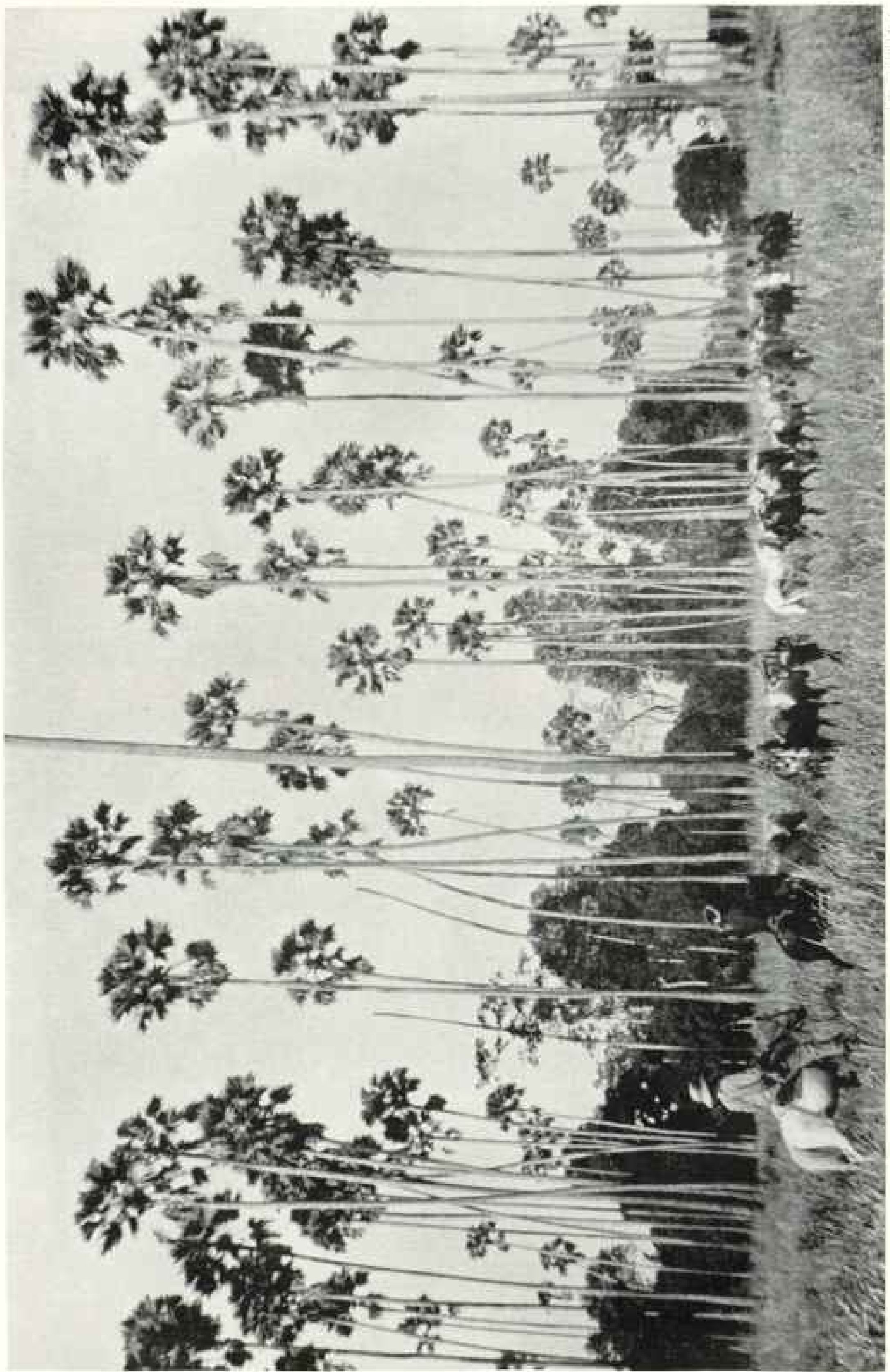
Authorities set wages at ten cents an hour. Hong Kong currency (five cents, U. S.), based on the time it took a man to carry 40 pounds a stipulated distance.



C. K. HONG

Tropical Forests Supply Pipe for an Efficient Water System at Ossu

From a gushing spring on Mount Laltoma, several miles away, drinking water is brought to the military post through hollow bamboo poles linked together and held aloft on slender posts. The natives are ingenious in irrigation engineering, setting up their crudely constructed flumes to take advantage of slopes (page 357).



Stuart H. Cole

Like Moving Through an Oriental Print Is a Trip along Timor Coastal Plains

Tall palms which seem etched upon the sky rise in slender beauty beside the trails. In some areas pythons swing from the trees. Pack trains are long because the Timor horses are small. A white man, who weighs far more than the average native, needs two or three extra mounts for long journeys.



C. E. Banta

A Mud Volcano South of Viqueque Blows Up Periodically

Its eruptions are the result of accumulation of gases under pressure and may not indicate real volcanism (page 375). On a first visit the author found a mud cone on a level-floored crater. There had been no disturbance for four years. Before he left, an explosion and a slight earthquake occurred, the central cone disappeared, inflammable gas issued from numerous vents, and trees within a radius of 1,000 feet were partly buried in mud.



C. L. Nelson

Palm Trees Supply Umbrellas as Well as Food and Income for the Natives

The fronds are used for numerous purposes, such as thatching and building temporary shelters. From the pulverized pulp of the sago palm, flour is made. Coconut palms provide copra, the principal money crop.

Dili came into sight down the coast. About nine o'clock the vessel anchored a half mile out from the moonlit coral reef.

Preparations were made to land the heavier part of our camp supplies, which we could not bring in overland. I have not yet decided which was the more remarkable: that the *Dili* didn't keep right on going when she rolled from side to side, or that all the 48 boxes, which were swung over the side, dropped into a dancing small boat, and brought through the surf to the beach, were safely landed.

Except for those living in the mountains, the Timor natives are small in stature and do not have much strength or stamina. For moving our supplies, therefore, we engaged twice as many carriers as would ordinarily be required and paid them each ten cents an hour Hong Kong money (then about five cents in our currency) for the scheduled time of the journey (page 363).

This schedule was determined by the military as the normal length of time required for a man to walk the distance with a load of about forty pounds. The time between posts is set and cannot be varied. However, we soon learned not to expect carriers to complete any journey on schedule. There is no hurry in tropical life.

No Wild Animals to Fear

Because the deep channel between Bali and Lombok Islands has served as a barrier to the eastward movement of large mammals, elephants, tigers, tapirs, rhinoceroses, and other Asiatic fauna do not exist in the archipelago east of Lombok Strait.

The absence of Australian mammals on Timor, the structure and depth of the Timor Sea, and the geologic formations of the island furnish evidence that Timor was probably not connected with the mainland of Australia within recent geological periods.

Water buffaloes, which we saw both wild and domesticated, were probably not indigenous to Timor. Even the wild ones are not dangerous unless wounded, or disturbed while with their young. The domestic animal is valuable to the native for its milk and meat and also, to a small extent, as a work animal.

There are wild horses and pigs which, like the buffaloes, may have come from domestic stock brought to the island by natives or by early white visitors. The presence of deer and monkeys, however, must be explained otherwise.

The prettiest fowl on Timor is the wild cock, which the natives catch and tame for their national sport of cockfighting. A native seldom makes a trip to a settlement without tak-



C. W. DODD

It Reddens the Teeth of the Indies

Thirty feet up the trunk of the areca palm hang long bunches of orange-colored aromatic drupes called betel nuts. They are the size of a small hen's egg, astringent, pungent, nutmeglike in flavor. Split, and treated with a pinch of quicklime, they are the natives' favorite chew. Betel-nut chewing imparts a red color to the saliva, so that the lips and teeth appear to be covered with blood. It injures the teeth and in time almost destroys them.



Morton Hartman

With 9-foot *Sumpitan* Netherlands Timorese Shoot Birds in Flight

The missiles blown at the prey are sharpened slivers of bamboo or leaf ribs; the tubes, hollow bamboo shoots. For large game, darts poisoned with the sap of certain trees, notably the *Anthus toxicaria*, are used. The weapons vary in size from pipes little larger than peashooters to these "long rifles." The greater the length the greater the power of the blowgun. To get air pressure on the load, the huntsman packs a wad of fiber behind it when he places it in the breech.

ing along his gamecock slung over his shoulder in the folds of a cloth.

Large flocks of cockatoos live in the woods of the foothill areas, and in the lowlands there is a small green parrotlike bird with red-tipped feathers, known locally as lorikeet. A kind of Australian cockatoo is found on Timor, but not the Celebes variety.

Wanting some camp pets, we paid ten cents for a diminutive specimen of monkey and had wished upon us a grave-faced, dirty-looking cockatoo and a lorikeet. The cockatoo soon became so friendly that he would take his place at the table and eat whatever we offered him; but when we tried to wash him, he became croupy and sulked for days, refusing to have anything to do with us.

Because Timor has much less rainfall and a lower humidity than Java, Sumatra, Borneo,

and the Moluccas, it has no true forests such as abound on Borneo. It has, however, many beautiful groves of casuarina and eucalyptus, with some sandalwood, acacia, tamarind, rosewood, and canaria.

There are large areas of grassland in the south coastal belt with palm groves here and there. The plains give way to dense bamboo thickets, tree ferns, palms, and other tropical vegetation as the highlands are approached. Dense mangrove swamps are found on tidal flats chiefly on the north coast.

Moonshining on Timor

Sago palm is plentiful, and the fibrous pulp of the heart of the tree, when pounded, furnishes flour (page 374). When the sago flowers, it puts out new branches at the top and begins to die. The Timorese draw the juice at this time and allow it to ferment.



C. K. BOUTA

For Double Protection the Tree Hut Is Fenced In

Native houses vary in type throughout Timor (pages 356, 372, and 379). In the eastern part of the island they are often built in trees to insure safety from marauders. In the western and central areas they are set on the ground or on short posts.

With a little sugar added, this makes a drink not unpleasant to the taste, though wickedly strong. Give a native a few sago and coconut palms, and he will never have to worry about the struggle for existence.

The graceful betel-nut palm grows in higher altitudes, and throughout the island the natives chew the nut from this tree with powdered lime (page 367). Their mouths are red from the juice. It is rare to see either a man or woman who does not have a wad tucked under the upper lip.

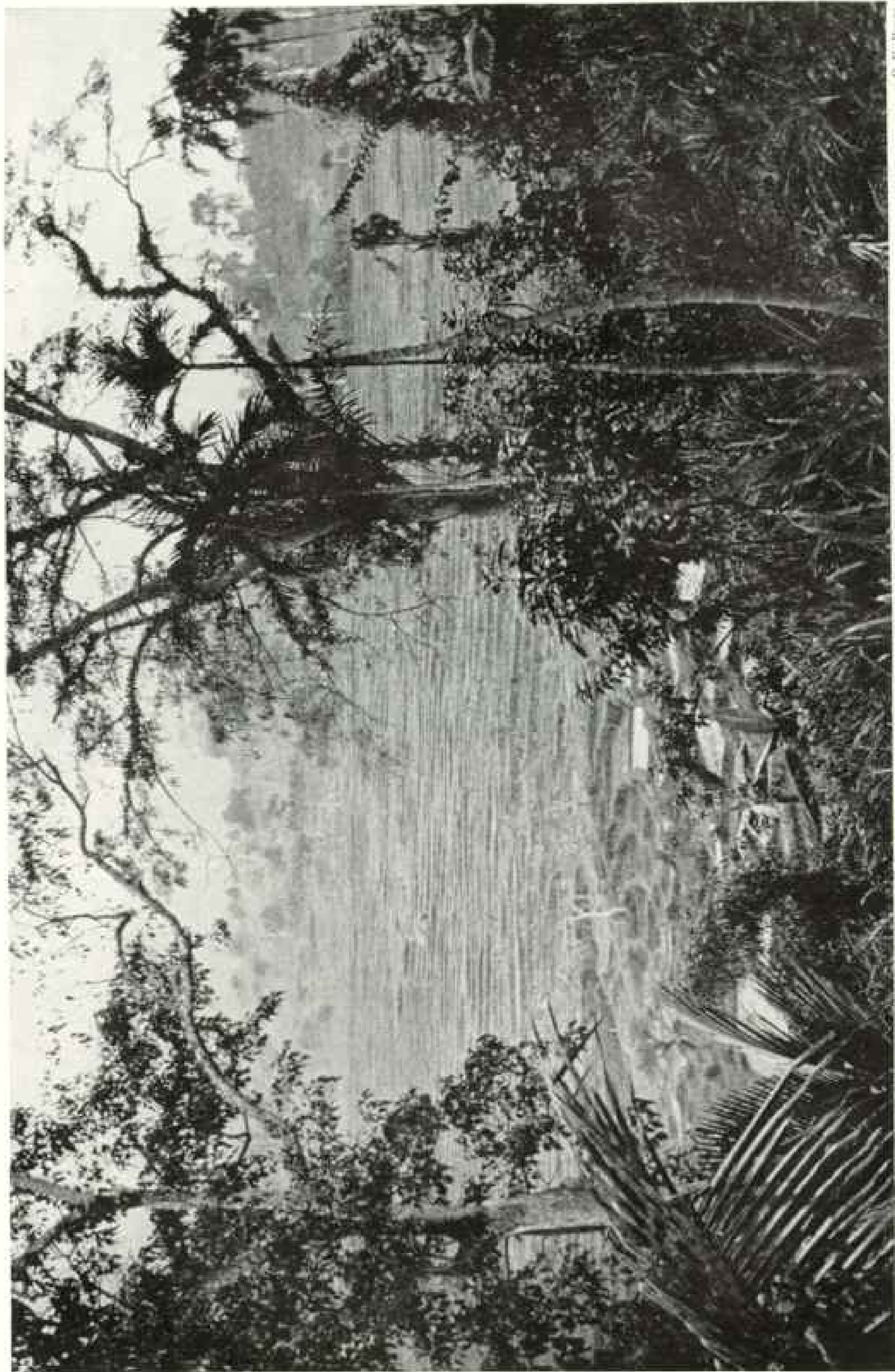
Other Timor products are buffalo (*karau*) meat, sheep (*hibi malai*, or white man's goat), chicken (*mano*), and eggs (*mano talon*), pig (*fahi*), Indian corn (*batar*), rice (*foz*), coconuts (*nu*), bananas (*hudi*), beans, sweet potatoes, breadfruit, mangoes, papayas, and a poor grade of orange.

From the Chinese merchants can be bought Portuguese wines and some Australian canned goods. We even found Quaker Oats in Dili.

The type of native hut varies somewhat throughout the island. In the western and central parts, the habitations are built either directly on the ground or on short posts. There are small individual family huts and larger ones which may house several families. Except in the mountains or in a community, some kind of protective fence is common.

Toward the eastern end of the island, many of the huts are not only built in trees but surrounded by fences. Granaries are frequently placed high up, with a protecting shelf below to keep out rats and thieves (page 357).

Thieving and other petty crimes are diminishing somewhat on account of the local methods of keeping law and order. Punishment by beating a culprit's tightly stretched palm with a heavy wooden mallet which has a small hole in the center may precede prison and the work gang. I have seen a malefactor given 50 blows on each palm. For serious



C. K. JINCA

Water Cascading Down the "Sacred Mountains" Is Diverted to Flood-terraced Rice Fields near Ossu

In Portuguese Timor native farmers show marked engineering ability, setting up bamboo pipelines to connect highland springs with their homes and digging ditches on slopes to irrigate their land. Scattered among the rock pinnacles at Mumbo Peridido are thousands of coffee trees.



C. H. Dornier

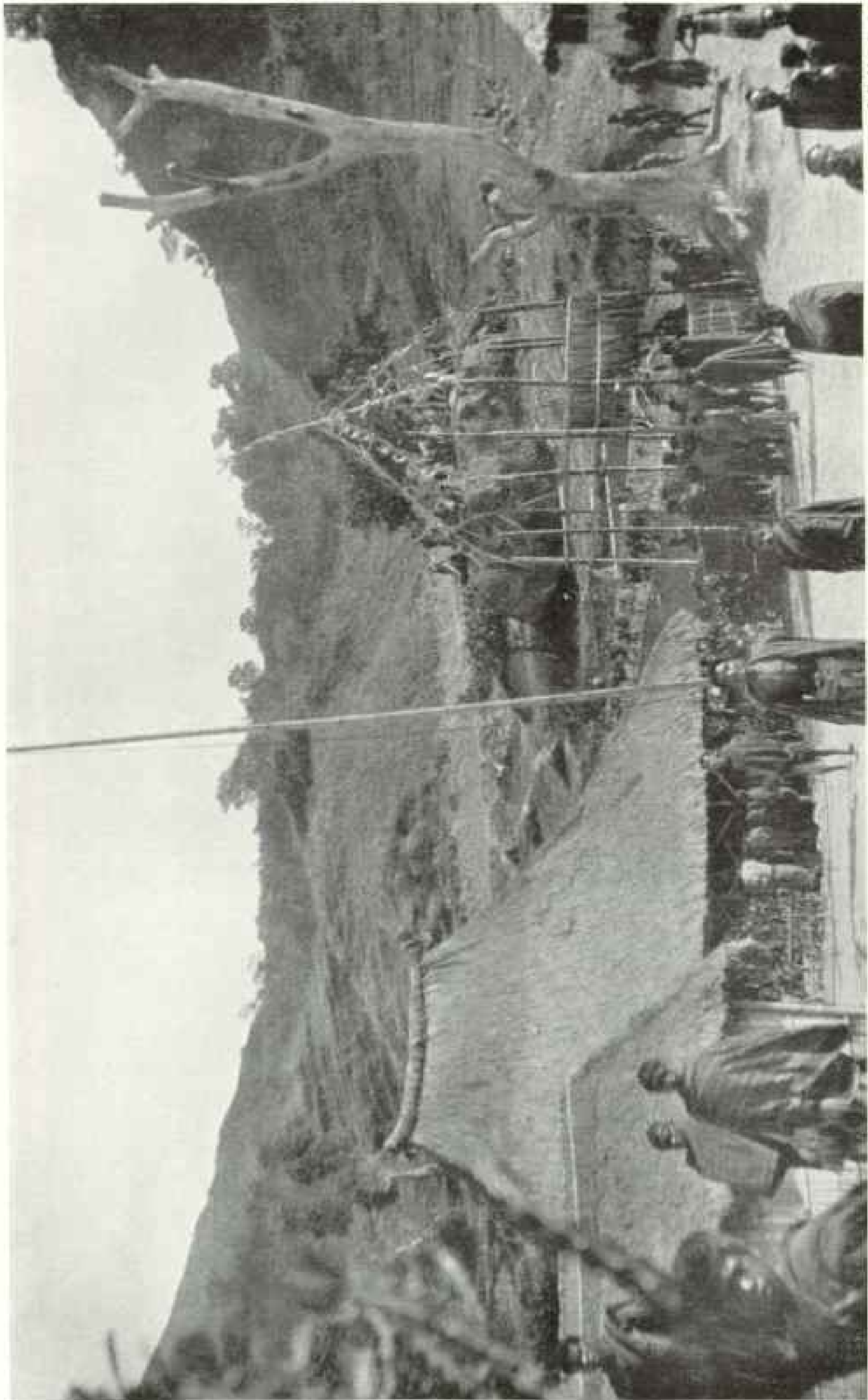
Ingenious Natives of Portuguese Timor Dam the Lacleo River to Divert Water to Their Rice Fields



W. G. Grey

In Netherlands Timor Corn Supplements the Meat Diet, Sago and Rice Being Virtually Unknown

In this southern half of the island, crops have many enemies, the worst being deer, parrots, crows, and dogs.



J. P. McCulloch

At Molocai, Natives Set Up a Palm Arch to Welcome the Tax Collector!

In this outpost the natives grow fine crops of vegetables, fruit, and grain. The food served the author and his companions was the best they had eaten in many days. Here, as elsewhere in Portuguese Timor, buildings are topped with peaked roofs. The architectural style in Netherlands territory features conical house-tops (page 379).



W. G. Bennett

In August Cold, Dry Winds Chill Riders on the Bleak Uplands near Soë, Netherlands Timor

Unlike their neighbors under the rule of Portugal, the natives, even women and children, go everywhere on horseback.



W. G. Bennett

Near Koepong, Netherlands Timor, Salt Is Obtained by Evaporating Sea Water in Giant Clamshells

Hidden by marine growths, the huge mollusks are powerful enough to catch a pearl diver's foot in viscidlike grip. Shells may weigh 150 pounds; a live clam 500.



J. P. McCulloch

Luliks Dangling from the Fig Tree Keep Superstitious Thieves Away

Weird contraptions of bones, sticks, and other objects are believed to have supernatural powers, and Timorese give the fruit a wide berth (page 377). This is the bo tree of India (*Ficus religiosa*), venerated by the Buddhists. It often grows 100 feet high, and its long-stemmed leaves rustle in the slightest breeze.



C. L. Nason

To the Rhythm of Tribal Songs Timorese Pound Sago Pulp in Wooden Mortars

They do most of their domestic work at night, when the tropic heat has abated. With only coconuts and sago palms they could still live fairly comfortably.

crimes the punishment may be given on both the hands and the soles of the feet.

The women of Timor have neither the pretty features nor the clean appearance of the Javanese women. However, some of them are not unattractive.

The chief of the Hato Lari district staged a special dance in our honor at a small village in the hills south of Mount Mata Bia. The women wore their best cloths of mingled colors, and each dancer had a small drum made of bamboo with the ends covered with tightly drawn skins. The drums were beaten with the fingers as the women slowly danced in a circle, keeping a certain shuffling cadence with their bare feet and at times singing out some tune in unison (page 356).

Festival Time When Head Tax Is Collected

Each male native must pay a yearly head tax (\$2.60, island currency, when I was there). Many worked this out on the roads. The head tax is due the latter part of the year, and the natives gather at the military posts at this time for a general celebration, including games, dancing, and cockfighting (page 372). The difficulty many of the natives have in paying is evidence of their general poverty.

The native game *afetu* (in Portuguese, *jogo do pé*) occupied the afternoons. This game is much like our boxing, except that blows are struck with the feet instead of the fists. A contestant who succeeds in kicking his opponent's head is the winner; but a man cannot be kicked if he is down (page 377).

During head tax collection there is always more or less unrest, since in many cases the native cannot pay. The Portuguese rules are inflexible and some hardship is experienced by delinquents. Close watch is kept on them and if in their dances it appears that they are working themselves up to a dangerous state, the authorities stop the performance.

Many of the islands of the Sunda group have active volcanoes, but Timor has none. A Timor peak is reported to have blown up in 1638, but I was unable to find ash, cinder, or lava flows on any of the mountains of Portuguese Timor (page 366).

Earthquake at the Base Camp

There are, however, a number of hot springs, the water from which is about as hot as the body can comfortably stand. These hot springs are evidences of dying volcanism. The most easterly hot spring is near Viqueque and only a few miles from our base camp.

The worst earthquake we experienced was at the base camp. I was sitting at a table writing when the ground began to move, the



Morris Hartman

The "Necklace" Holds Five Eggs for Trading

To Nikiniki in Netherlands Timor, this strapping native has come to barter produce for beads to decorate the fancy betel-nut container he carries. He safeguards the hen eggs from breakage by wrapping them in corn husks.



C. H. BENT

The Trail to Saibada Winds through Eucalyptus and Casuarina

Because Timor has far less rainfall and a lower humidity than Borneo, it has no true forests such as abound on that island. Its timber is mostly in groves such as this. Besides the two species mentioned, there is some sandalwood, acacia, tamarind, rosewood, and canaria.



Elliott H. Clark

In a Championship Bout in Timor, Feet Are Used instead of Fists

The game of *adetu* is exceedingly rough; each contestant tries to kick his opponent's head (page 375). When a man is down, he may not be struck, but as long as he is standing his face is a fair target.

table rocked back and forth, the upright posts of the hut swayed, and a long rift was made in the thatched roof.

I made an extended trip eastward along the south coast, around the end of the island, westward along the north coast, then across the island through the rough Mata Bia section and back to camp Ca-Sesse. Our first night's camp was near Aliambata, where excellent water gushed from a hillside spring. Here after nightfall we shot a deer which gave us fresh meat for a day or two and a night's feast for the horse boys.

Beyond Aliambata we traveled for some distance under towering cliffs which rose close to the water's edge. Twenty to forty feet above the base were wave-cut caverns, evidence of a rising coast. I was startled when I peered through the cracks into the darkness of one of these caverns and saw eyes gleaming at me. A group of natives was either living or hiding in the recesses of the cavern.

In almost any part of Timor one can ride for miles without seeing any native life, but in the eastern section this loneliness seems accentuated. We passed a few well-kept coconut groves, but the greater part of the country appeared to be in its original wild state.

On each of the coconut trees there was a

lulik (a "hands-off" device of bones or other fantastic objects to which supernatural powers are attributed) to protect the nuts from thieving natives (page 374). *Lulik* to the Timorese means "holy." I tried several times to have my boys get me coconuts or fruit from a tree on which hung a *lulik*, but always in vain.

In one place we passed some posts which had been shaped from wreckage of ships. They were roughly carved with faces and other caricatures, and the whole surrounding area was *lulik* to the natives. There is a legend that this wreckage was from the ship of a great sailor who met disaster in a storm on Tassi Mané.

Just beyond, we came to a river. As we rode down a high bank into the stream bed, I was startled to see right by my side a tall native with a long spear. He was as surprised as I and stood undecided whether to hold his ground or retreat.

When I called to him, he evidently thought my tone threatening, for he immediately fled. Seeing the humor of the situation, I yelled louder, and he became a flying brown streak, never pausing to look around till he was a quarter of a mile away. At this safe distance he stood and watched us until we crossed the

river and entered the jungle on the other side.

A few miles farther on, we had to leave the coastal plain and climb a thousand feet to get around a limestone *latu* (raised rocky area, differing in contour from surrounding landscape) that extends from Ilomar right to the sea. We had hoped to reach Ilomar military post that day and had climbed high into the hills expecting at every turn to see it. When we finally located it, we saw that to reach it we still had a river to cross and a mountain to climb. All the military posts in the mountains seem to be located in virtually inaccessible spots.

Deciding not to visit the inhospitably located Ilomar, we descended next morning to the coast, which we followed many miles before we began the ascent to a coral terrace nearly a thousand feet above the Timor Sea. With numerous springs issuing from this level, the vegetation is luxuriant. An ocean deep of more than 10,000 feet separates this bit of land from the shelving, shallow Sahul Bank, the northern shelf of the Australian Continent.

Next day we worked our way along the coral terraces and seashore to a point below Mua Pitine, then climbed nearly two thousand feet to an upper bench of coral rock. To the south, almost straight down from our vantage, gleamed the Timor Sea. To the north, 600 feet below us, lay the grassy plain of Fuiloro, an inland basin of about 300 square miles encircled by a coral rim or reef. A lake at the eastern end of the basin, the only body of fresh water on the island, is drained by a subterranean stream which bursts out on the south side of the rim.

A Prehistoric Atoll

The Fuiloro district in Pleistocene time was a giant atoll. It had been under the ocean while the barrier reef, the present rimrock, was slowly building up through an accumulation of coral life. Later, with the whole eastern end of the island, it was uplifted nearly 2,000 feet. Ancestors of the crocodiles and sea turtles which abound in the basin lake evidently were caught within the encircling barrier reef when the island was being uplifted.

We camped that night beneath the coconut trees just inside the south wall of the basin and near a wonderful spring of cold water. While bathing in its overflow, I was surprised by several native women coming to fill their earthen jars. They were either too scared or too much interested to run. I gracefully retreated.

That night we had to keep close watch of our horses, for we were in a country where law and order were not far advanced. My boys

seemed to be especially fearful, and even after sharpening their spears and knives they wanted to sleep near me. For olfactory reasons I did not relish their proximity; there is nothing a Timorese hates worse than water on his body.

Early the next morning we descended to the floor of the basin and worked our way through the tall buffalo grass, following a thin trail. I was impressed with the possibility of cattle-raising on the plain, but the success of such an enterprise would depend upon protection against thieving by the natives, marketability of the products, and the amount of export tax to be levied by the Government.

We continued to the post at Fuiloro, thence eastward along a low, wooded coral ridge. The natives we were now encountering were taller, of stronger build, and darker than those we had seen before. Their long hair was done up high, and they resembled the Papuan more than the Malay.

While they stepped out of the trail for us to pass, they met our gaze fearlessly. They were all armed with spears and knives.

When we reached the eastern tip of Timor and looked east and north through a break in the morning haze, we could see numerous other islands. Kisar, from which come delicious oranges, lay almost below us; and Romang, with its single volcanic cone, some sixty miles away and at the edge of the Banda Sea, was visible for a few minutes.

We descended to the north coast and made our way westward over rough trails. The sharp coral rocks were hard on the feet of both horses and men. At Lautem we decided to rest the outfit for the day.

While we were at Lautem, a native was caught by a crocodile and dragged out to deep water. He was rescued half drowned and minus a leg, but died from loss of blood. Along the shore trail the following morning, we saw imprints of large crocodiles which had dragged themselves across the sand from the ocean to the swampy lagoons.

From Laivai we struck south for the mountains, camped for one night, paused at Baguia (page 360) to see the weekly bazaar and the drill of the native garrison, and continued westward along the base of 7,710-foot Mata Bia where natives had terraced the slopes and were raising corn, sweet potatoes, and beans. Some distance south we met the commandant and chief of the Hato Lari district, who had come to collect the yearly head tax from the natives of that section. Supper-time found us with our feet under the table enjoying the first real meal for several days.

The next day took us west to a large moun-



Martin Beaman

In Netherlands Timor House-tops Are Conical or Domed Instead of Peaked as on the Portuguese Side

This village near Nikiniki is typical of the Dutch territory. Although climate and soil of the island differ little, there is a marked difference in the customs and agricultural pursuits of the people. Here corn is the staple crop, and rice and sugo are seldom seen. Portugal has helped the natives develop diversified farming.



C. L. Nelson

A Timor Belle Comes for a Jug of Water

The girls are neither so comely nor so neat as Javanese women, and their mouths are stained red with betel-nut juice (page 369). Their *loppers*, or skirts, are hung about the waist for country wear, but usually above the breasts in more populous places.

tain around which we worked to the south and over a pass to the waters of Coa River and on to Ossu. Camp Ca-Sesse was reached in the early afternoon.

November was now well advanced, and the rains had started in the mountains. Soon the rainy season on the south coast would begin and there would be no let-up until April at the earliest. Although I had ridden to many parts of western Portuguese Timor, I felt that if I could collect certain additional data in that section before the rains made further work hazardous, I might then be able to move my camp paraphernalia in to Dili and get away from the inland. I therefore took fresh

pack horses and boys and started for the west.

On such trips the cook and the personal boys ride, but the horse boys walk. The Timorese do not weigh as much as white men, and one horse to each boy is sufficient. Pads with encircling rope are used as saddles, and stirrups are spools or buttons at the ends of a thin rope which is clasped between the toes.

Pythons Swing from the Trees

Luca, our first objective, is on the coastal plain. As we rode through the woods in the semi-swamps, we saw pythons in the trees. Evidently they were well fed, for they showed no desire to attack us. Natives said some snakes reached a length of 50 feet, though I saw none longer than 25.

There are only a few dangerous snakes on Timor. The one most feared is the *cobra verde*, or green cobra. Although not considered so poisonous as the hooded Indian cobra, it is, nevertheless, a danger to man, for it is hard to see in the woods or grass and strikes without warning. I tipped one out of my riding boot one morning when I was dressing.

One of my horse boys was bitten on the foot, and it was several days before I noticed his absence from the required daily visit to camp. When I went out to him, I found his whole leg badly swollen, but, from the application of certain herbs and from continual spitting of betel-nut saliva on the wound, he was well in about a week.

There was water now in most of the rivers as a result of the rains in the mountains. We left the grassy plain with its tall and graceful palms and turned up into the foothills, passing through dense bamboo thickets on the trail to Barique, about 18 miles west of Ossu.

The following day we spent in this wild and interesting locality, where there is an oil seepage from which the natives skim the oil to burn in crude lamps. Gas escaping from the earth here burns continually and is regarded as sacred.

We started for Saibada in the late afternoon on a good trail and rode through beautiful woodlands of casuarina and eucalyptus. In the semidarkness our passage through a bamboo thicket was challenged by a wild buffalo, but after a little coaxing at long range the old cow was induced to break ground.

A Mission School

Saibada was a Catholic mission where more than a hundred native boys were taught. The three priests were doing fine work for the natives. They appeared happy in their work, and I have never met more kind-hearted and companionable men.

At Fatu Berlio, where we had a bird's-eye view of unbroken coastal plain stretching for miles east and west along the Timor Sea, the vegetation looked withered; and the dry river beds had the appearance of branching, treelike chalk lines.

A precipitous descent to the valley brought us to a hot spring, the water of which is decidedly mineralized. We investigated talus deposits along the River Lacto of approximately the same age as those in which the skull of *Pithecanthropus erectus*, the ape man of Java, was found, but saw no traces of prehistoric man.

In the wild region near the important military post of Same we had difficulty crossing rivers swollen by rains in the mountains. Torrents provide ample water all the year for irrigation at Same. Mount Kablac, one of the highest and most rugged limestone peaks of the island, rises to the west to an elevation of about 9,000 feet, and its connected sister peak, Mount Ablai, is almost as high. To the south the rolling foothill country extends to the sea.

A few miles west of Same, at the base of Mount Kablac, is an experimental farm maintained by the Portuguese Department of Agriculture. Efforts were being made there to raise wheat and other grains and to breed fancy cattle.

From this garden spot of fruits and flowers we pushed southward, winding around the Sumulo hills, dipping into the casuarina-wooded valleys, and crossing the coral plateau to Hato Hudo, south-coast training post for the African troops, not far from the western boundary of Portuguese territory.

To the west we crossed Lulik River, which means "sacred water." No native can be induced to cross this river between sundown and sunup.

We hurried on to Beco and turned north



C. E. Davis

With an Ingenious Ripsaw the Timorese Cut Rosewood Planks

The blade is kept running straight by the side pieces of its adjustable frame. Because there is no great supply of this valuable timber on the island, the natives seldom use it for their own building but export most of what they find to Australia.

toward Mape. As we toiled through the rain and clouds, occasionally getting a glimpse of the white walls of the post, we could see that it was typically located on the highest and most inaccessible point in the immediate vicinity.

To the north across a deep ravine was a ridge even higher than our location, capped by a limestone cliff of several hundred feet. Next morning we clung to the mountain side opposite the cliff for some miles before we dipped into the deep canyon into whose mysteries the sun had not yet filtered. We slowly climbed the north ridge and worked our way up to a bench beneath the cliff and passed



Hertie Hartman

Yarn Is Spun on a Crude "Spinning Wheel" at Nikiniki

Among the domestic animals of Timor is the sheep, known to the natives as "the white man's goat." Women use the wool to weave heavy clothes of interesting designs. Here a housewife of Netherlands Timor is at work before the entrance of her thatched house.

around the east end of the mountain. We were traversing an area where geologic processes had run rampant over eons of time.

The objective of the day's journey was only twelve miles from Mape as the crow flies, but the up-and-down distance traveled by our horses was more than twice that. It was evening before we reached the post.

The following day we crossed the island divide. Part of the time we were above the clouds and thus escaped the rain. We skirted precipices hundreds of feet deep and looked almost straight down into the deep-cut canyons.

The Top of the Island

Our campsite was more than 6,000 feet above sea level, and the night we slept there was the coldest I experienced on the island. I had planned to give our horses a rest and make the ascent of Timor's highest mountain the

next day. Very early, in company with the commandant and astride one of his horses, I rode to the top of the island, where the elevation according to barometer is about 9,600 feet.

To the west the peaks in Netherlands Timor were piled one against the other in perspective. The little white objects on the intervening knobs were Portuguese and Dutch forts which served as watchdogs for suspicious moves on either side of the long-disputed boundary.

To the north the country was more open, and the Marobo, which was a running river at this time, could be traced to its junction with the Lois and on to the Savu Sea. The peaks on the several islands across the sea could be dimly seen in the haze.

To the east the eye could follow the central mountain chain through the fatu at Saibada and on to Mundo Perdido and to the faint outline of Mata Bia. To the south was Kablac,



W. Geunessilt

A Native Ruler's Gift of a Pig Goes in State to a Visitor

Besides the porker carried in a sort of catalaque on the shoulders of bearers, there are some fowls in cages decorated with roses. These treats are intended for a feast to honor the visitor in the northern part of Netherlands Timor.

and beyond were the lower hills bordering the Timor Sea.

The next day we crossed the intervening ridges and rode out on the rim of the great basin in which is located Maubisse.

One's first impression is that this basin, which has a diameter of about five miles from rim to rim, is a volcanic crater with an inner cone near the north center upon which the military post stands, 500 feet above the floor of the basin.

Strawberries for Supper

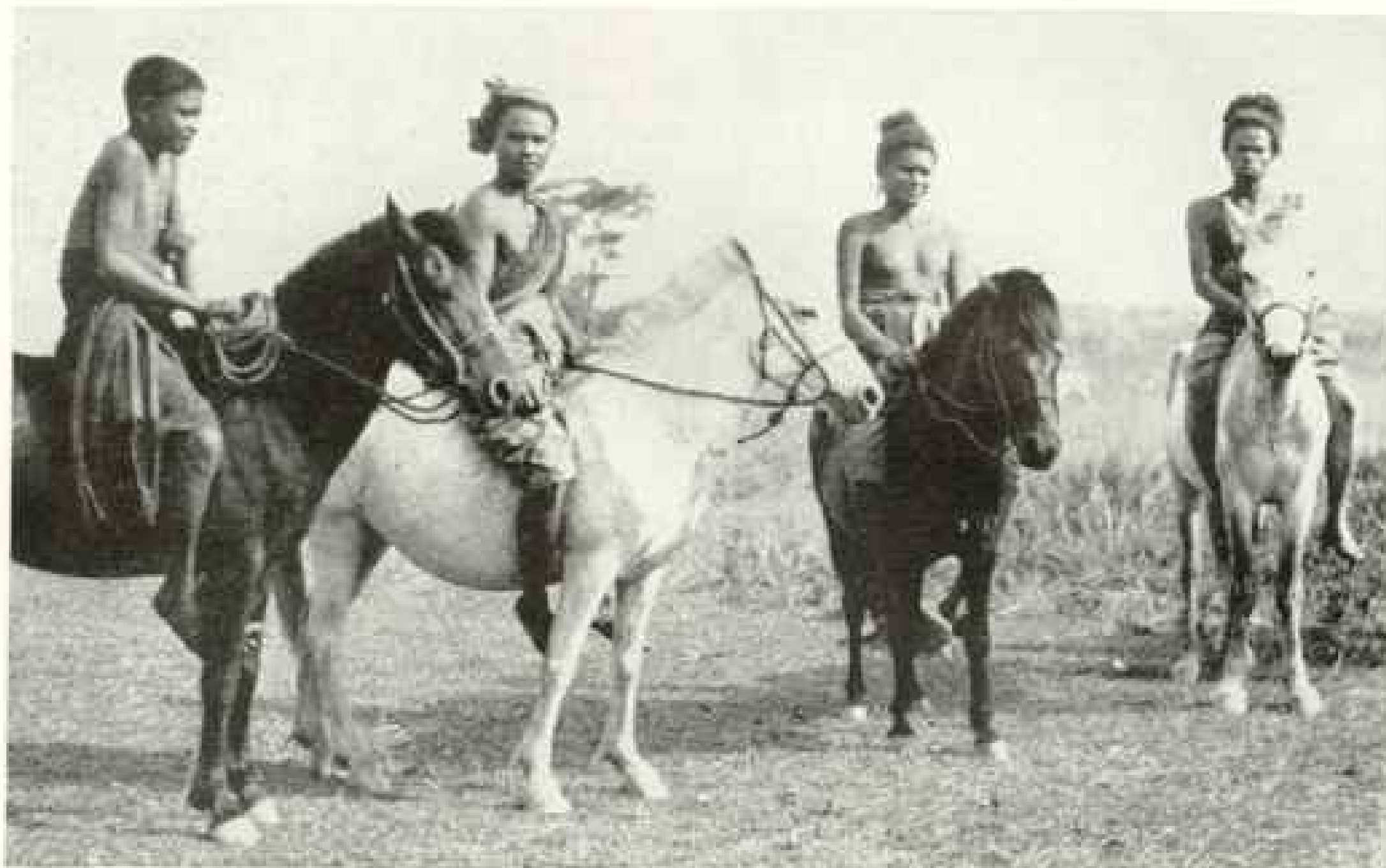
Examination, however, shows that sedimentary rocks form the structure of this depression. The rim is broken only on the east side by the canyon through which the drainage of the basin passes. The lower hill slopes are terraced and cultivated in rice, corn, and sweet potatoes.

As we climbed the knob to the post, we rode past a wheatfield, and that evening we were served with large, luscious strawberries. Many Temperate Zone farm products could be raised on Timor at elevations of 3,000 to 5,000 feet.

The next morning I started two pack horses for Dili and sent the remainder of the outfit south to meet me on the south coast the following week.

Returning from Dili, I chose to come through Railaco, where I was treated to some delicious grapes, and on to several large coffee plantations. From here south, I got back into the country of successive ups and downs.

Christmas was to be a big day at Ca-Sesse. The day itself didn't mean anything to most of the natives I had, but my personal boys were fully alive to the significance of our preparations.



Morris Hartman

Native Riders at Nikiniki Are Always Game for a Race

Though their sturdy little ponies are built more for pack work on steep mountain trails than for speed, the contests are close and exciting. Netherlands Timor natives are much better horsemen than their neighbors on the Portuguese side.

We killed a buffalo and got ample supplies of other things known to the Timorese epicure, added a few canned sweets from our larder, and prepared to give the boys a royal feast. There was plenty for dinners on Christmas Eve and Christmas Day.

In the morning I lined the boys up and had an interpreter translate into their respective tongues the simple story of why this celebration was tendered them. There was a chorus of grunts, which were either of understanding or of satisfaction at prospects of distended stomachs. Anyway, their Christmas was a huge success.

Christmas at Ca-Sesse

A party of fourteen gathered at the Viqueque post Christmas Eve as guests of the commandant; the fourteen-course dinner was, to my thinking, superior to the renowned seventeen courses served by some of the Java hotels. Our most serious difficulty was climbing the hill to our camp at midnight.

All were invited to Camp Ca-Sesse for Christmas dinner. The boys decorated the dining pavilion with arches of twisted palm leaves. With the services of four cooks, we also put out a many-course dinner. Two of the few turkeys on Timor were served, much to the surprise of all. This was a kind of

farewell dinner, for we were planning to break camp at the first favorable turn of the weather.

We got under way the morning of December 29 with a caravan of 180 native carriers, 30 pack horses, 20 saddle horses, 35 boys, and the eight men that made up my party. I had arranged beforehand with the chiefs through whose provinces we were to pass to have relief carriers at certain points so as to speed the journey. A schedule was maintained also which enabled us to cross the rivers at the most opportune times. The journey to Dili was completed in five days.

When we broke camp, naturally a quantity of our castoff clothing and personal effects went to our boys, all of which they were proud to wear. One little fat fellow donned a helmet and a khaki coat, with his leeper, or skirt, hanging below. Another had on a pair of long underdrawers which he had difficulty in keeping up under his leeper. Crowning his head was a battered straw hat that had first seen service on Broadway. Another boy was proud of a shirt which he wore with the tails flapping in the wind.

The recipients were the envy of the natives we passed on the road, and many a brown-skinned maiden cast coquettish glances as the boys rode by. I fear we were guilty of starting several Timor romances.

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To carry out the purposes for which it was founded fifty-five years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 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 a. 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.

Introducing the Navy's first land-based bomber

1. PV-1—That's the U. S. Navy's name for the Vega Ventura. It's a nautical version of the smashing new twin-engine bomber that is making a flaming Hell out of German industrial centers in almost daily R. A. F. raids. These deep-bellied Navy PV-1's strike at sea. They swoop in low from the sky with torpedoes for marauding surface craft or "ash can" depth charges for sub-busting.



2. Operating from land bases, the PV-1 is the first Navy bomber of its type to tackle the job of clearing Allied shipping lanes so that precious supplies may go through. Airfields on small island outposts

are big enough for PV-1's, and droppable fuel tanks give the planes effective range to blast the enemy. Military experts say it may be the answer to the United Nations' No. 1 war problem—licking the enemy's submarine wolf packs.



3. Like the Ventura it is versatile—capable of many jobs. Designed primarily for bombing, its 4000 h.p. also can be useful for towing targets for fighter-plane practice, or for hauling troop-laden gliders.

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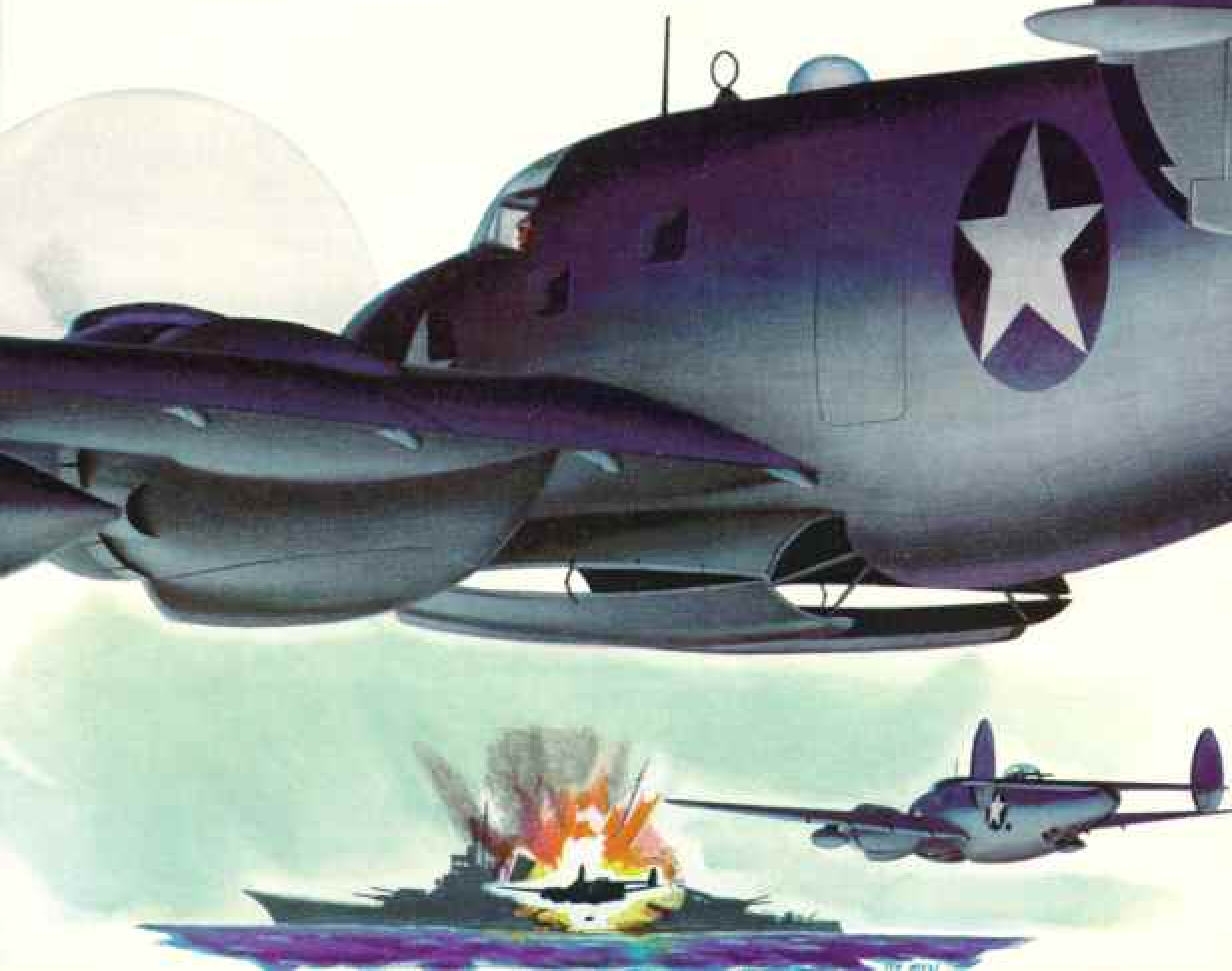


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MANON . . . BY ELECTRONICS

Paris in the eighteenth century. Chevalier Des Grieux and the gay young Manon, lovers met by chance. The clink of gold and soft laughter, and tragedy at the last. . . . So faithfully does the Musaphonic recreate the color and romance of the opera that you almost see the artists before you! This superb radio-phonograph, a product of General Electric electronic research, is endowed with a tone of surpassing beauty. The Musaphonic is now bringing rich musical rewards to owners, though General Electric production today is for war only. Tomorrow, through advances in electronics, the Musaphonic with FM (Frequency Modulation) will be an instrument even more magnificent.

*At the Metropolitan Opera:
Jarmila Novotna as Manon,
and Charles Kullman as Des Grieux
in Massenet's "Manon," Act IV.*



The Sheraton. Musaphonic prices, \$300 up. Send for free book, "Electronics - a New Science for a New World." Electronics Dept., General Electric, Schenectady, N. Y. Listen to General Electric's WORLD TODAY every night except Sun., C.B.S. and to G-E Mazda Lamp program, Sun. evening, N.B.C. G-E employees now purchase over \$1,000,000 in War Bonds weekly.

MUSAPHONIC
GENERAL ELECTRIC
Leader in radio, television, and electronic research



SCRATCH ANOTHER

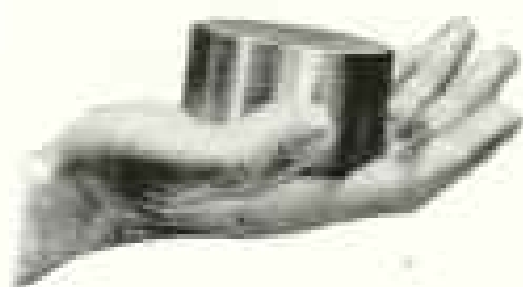
"Impossible"



The Army-Navy "E" proudly flies over Buick plants in both Flint, Mich., and McRose Park, Ill., having been awarded to Buick people for outstanding performance in the production of war goods.

ONE of the toughest assignments ever put up to the Ordnance Department of the U. S. Army had to do with this seemingly simple item shown here.

It is a shell case for a 75-mm gun. Ordinarily it is made of easily-worked brass. But brass was desperately scarce. The tough and urgent job was to make it instead from a billet of plain, ordinary, run-of-the-mill steel like this:



To work in our fast-firing 75's, this shell case must have certain definite and dependable characteristics, and no maybes about it.

It must be *exactly* right as to size.

It must not be one iota too hard at any point, lest it crack in firing, nor one iota too soft, lest it expand and jam the breech block.

It must stand repeated firings and remain reloadable.

The job of working out the method of

accomplishing this was a long and puzzling one that called for many minds and much experimenting.

But today these cases are coming from Buick plants at a rate that runs in the hundreds of thousands every month.

And they are coming out true in every respect to the rigid Army specifications which obviously must apply to such important materiel.

So you can scratch off another "impossible" as an accomplished fact.

You can chalk off millions of pounds of precious brass saved for other vital military jobs where no alternate material can be used.

And you can go ahead and buy more War Bonds confident that this and like forms of American industrial will-to-win are making each Bond buy the utmost for Victory.



BETTER BUY BONDS

BUICK DIVISION OF GENERAL MOTORS



THIS, TOO, IS AIR POWER!

TRANSPORT PLANES that serve the home front are a measure of U. S. air power, as surely as the bombers that blast the Axis.

Today, as for many years, the United States is the leading power in air transport.

Its Airlines knit hundreds of cities and foreign countries into a single airways system, with faster, more efficient service than ever attained by any other nation.

Consequently, when the Japs struck at Pearl Harbor, they asked for the greatest show of air transport the world has ever witnessed. Built during years of peace, the Airlines required no conversion for war. *They were ready to go!*

They promptly handled a sharp increase in tonnage — passengers, mail, express — despite the fact that half their planes were assigned to military duty.

The Airlines also helped the Army and Navy

establish air supply routes to every fighting zone — and are now operating a giant fleet of transport planes over this global system.

So wherever you see a transport plane, remember this: **IT, TOO, IS AIR POWER** — an integral part of our war machine.

And when the war is only a memory these same Airlines, with over a billion miles of experience behind them, will continue in friendly commerce. As **PRESIDENT ROOSEVELT** recently said: "With the dawn of peace, commercial aviation will have new and greater opportunities for which it will be all the better prepared by reason of the training and experience it is now getting."

When you travel by Air make reservations early; please cancel early if plans change. When you use Air Express speed delivery by dispatching shipments as soon as they're ready. Air Transport Association, 1525 Massachusetts Ave., N. W., Washington, D. C.

IF YOU'VE DONE YOUR BIT, NOW DO YOUR BEST... BUY BONDS!

THE AIRLINES OF THE UNITED STATES

AIR TRANSPORT GETS THERE FIRST... PASSENGERS... MAIL... AIR EXPRESS

"YES, SIR! THESE SYNTHETIC TIRES TOOK PART IN AN 80,000,000 MILE ROAD TEST"



"B. F. Goodrich beat 'em all to the draw on this one," said the man standing by the Brink's convoy car to the driver of the armored truck. "Before most folks had even heard of synthetic rubber, they were selling tires made with it to see how much mileage they'd give. See this one. It's more than 50% synthetic. And I got 26,892 miles. Imagine." Reports from Brink's and other companies show that these Ameripol tires rolled more than 80,000,000 miles. The world's greatest tire test proved that synthetic rubber could take it.



On the world's fighting fronts synthetic rubber is battling for America. Jeep tires are made from it by B. F. Goodrich. So are airplane Deicers, fuel tanks and fuel lines, just to name a few things. That's why everybody can't have synthetic tires now.



Your War Bonds may buy a new car after the war. The car's design will be different, and its tires may be partially or wholly synthetic rubber. So please keep in mind the tire that's backed by an 80,000,000-mile road test—Silverstown, made by B. F. Goodrich, first in rubber.



LISTEN TO JOSEPH C. HARSCH
in *"THE MEANING OF THE NEWS"*

Over the Columbia Broadcasting System every night, Monday through Friday

Inside information by a man who has lived where the news is being made



In war or peace
B.F. Goodrich
FIRST IN RUBBER



Westinghouse makes a pledge to a boy in a submarine . . .

. . . that if care and skill and conscience can insure it—every single piece of Westinghouse war equipment shall meet the test of battle with performance beyond expectation . . . that every Westinghouse war weapon shall prove worthy of its high trust.

Westinghouse makes a pledge to a girl at a milling machine . . .

. . . to Ann McCastland, whose husband is with the fighting Marines, and to thousands like her in Westinghouse factories who have loved ones at the fighting fronts—a pledge that in wartime our only business is Victory . . . that we are vitally concerned with anything our "know-how" can design or build to speed the winning of the war.



Westinghouse makes a pledge to a woman and her dreams . . .

. . . that some day, not too far distant, her life shall be richer and happier because of the tremendous progress now being born of research and experience in making war weapons . . . that new electric products, appliances, equipment, shall bring her greater comfort and leisure in the days of peace to come. Westinghouse Electric & Manufacturing Company, Pittsburgh, Pennsylvania. Plants in 25 cities—offices everywhere.





Copyright 1943, The Pullman Company

“Bet I come back hitched !”

Mother will bring him breakfast in bed. Dad will talk of Belleau Woods and how they did it in '18. Mary—well, she's half-way promised—there'll be a moon—and leave it to a Marine with two weeks' leave to get “the situation well in hand”!

So Pullman has *another* passenger tonight—this Lieutenant heading home—*another* reason wartime travel is at an all-time high. And besides the huge load on *regular* trains, an average of almost 30,000 troops a night ride *special* trains of sleeping cars.

So sometimes, it's a pretty tight squeeze to take care of *everyone*, especially in the customary Pullman manner. But most passengers realize the difficulties and are tolerant of shortcomings.

And it's not only that they say, “Troops come first with us, as they do with Pullman.” It's also that *wartime* travelers don't seem so concerned about the free choice of accommodations and the lavish services that made peacetime Pullman trips such memorable occasions. That's probably be-

cause what people want from Pullman *now* are the *fundamental* features rather than the frills.

The privacy and comfort that permit a few golden hours of utter relaxation. That present an opportunity to do some quiet thinking beyond the jangle of a telephone. That invite—gently but insistently—the deep, untroubled sleep that “knits up the ravell'd sleeve of care.”

These things may seem little in themselves, but they are of vast importance to those whom war drives hard because a good day's work depends a lot upon a good night's sleep. So ask yourself, “Is my trip necessary?” If it is, please:

Cancel promptly, when plans change, so someone else can use the bed reserved for you.

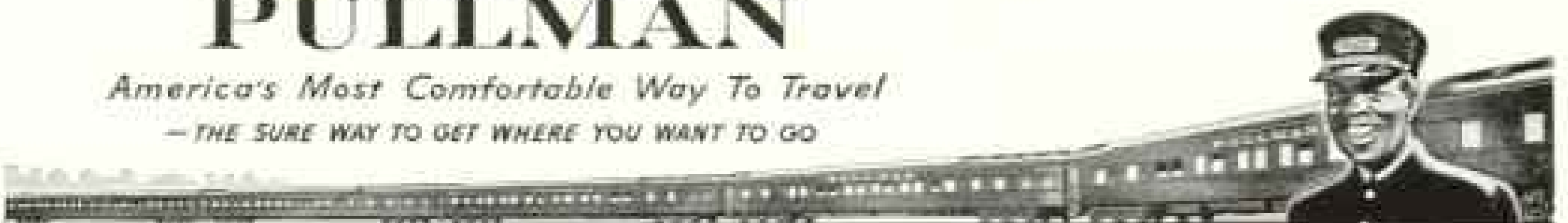
Travel light and give yourself and fellow passengers the room that excess luggage would take up.

Ask your Ticket Agent on which days trains may be least crowded on the route you want to take. Try to go on one of those days if you can.

PULLMAN

America's Most Comfortable Way To Travel

— THE SURE WAY TO GET WHERE YOU WANT TO GO





CLEAR TRACK AHEAD

From the cab of his locomotive, the engineer looks ahead at the long stretch of steel rail illuminated by the headlight's brilliant beam. Perhaps it hasn't occurred to you, but that beam symbolizes, in a sense, the light of Freedom pointing the way to a better future . . . a "clear track ahead."

That's what you want—a better world in which to live. Not so much for yourself but for all those young Americans who

must face the future whatever it may be. And the fulfillment of that desire depends *first* on our victory.

One Union Pacific engineer cannot win this war but he—his brother engineers—and many thousands of other railroad employes, men and women, are bringing victory nearer by exerting every effort to make certain that troops and war materials are efficiently and safely transported.

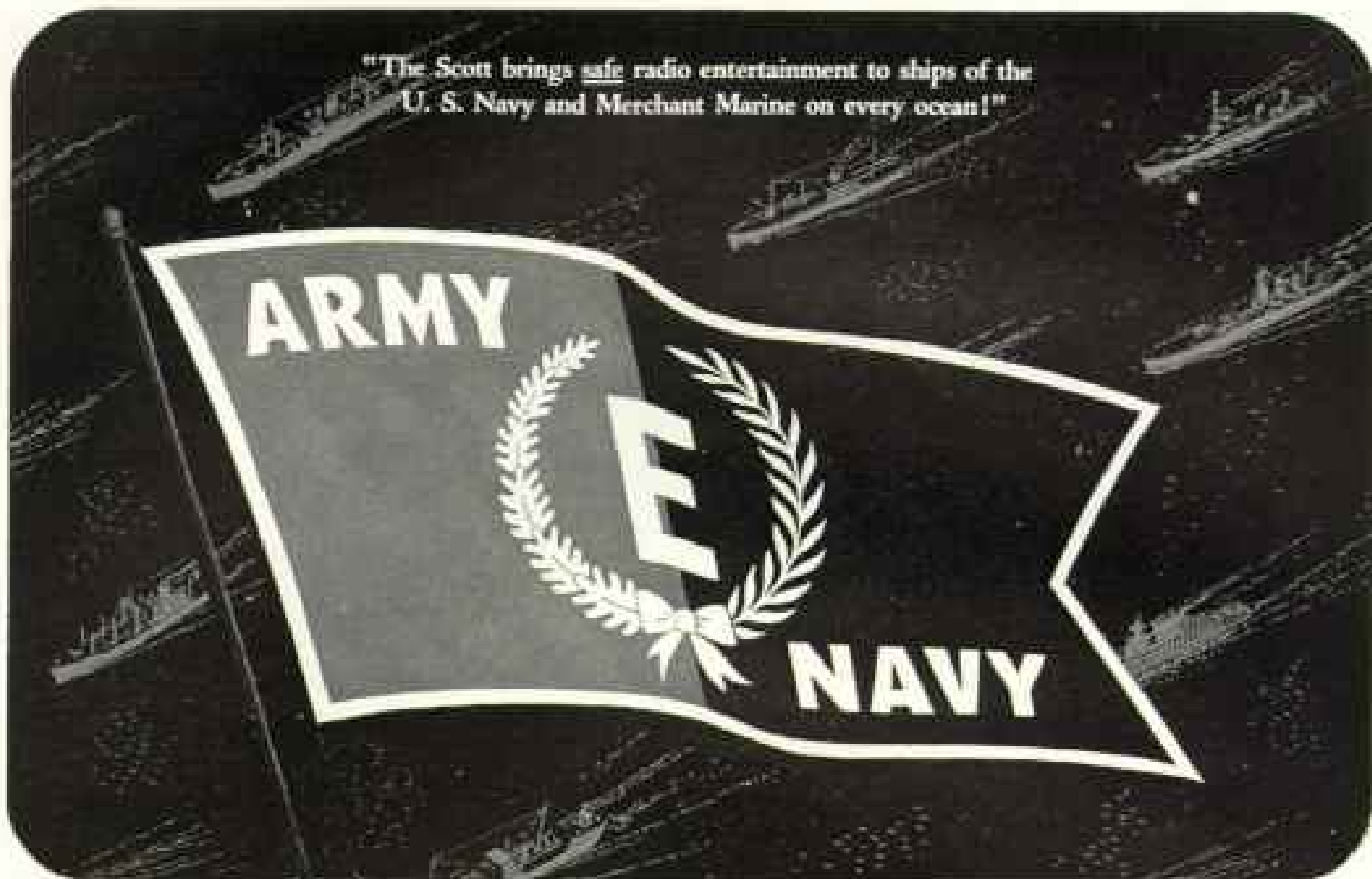


The Progressive

UNION PACIFIC RAILROAD

ROAD OF THE STREAMLINERS AND THE CHALLENGERS

"The Scott brings safe radio entertainment to ships of the U. S. Navy and Merchant Marine on every ocean!"



This banner shall be star-spangled!

Until this war is won . . . our efforts shall earn a brighter star at each six-month renewal period!

Only the few who have received this Army-Navy "E" Award will know how proud we are today. But we are prouder still of the heartfelt thanks of men-at-sea who listen throughout the world to the Scott Low-Radiation Receiver. Now, on ships of the U. S. Navy and Merchant Marine, they hear news and entertainment from home . . . *safe from detection by enemy subs and ships.* And we are humbly grateful that we were able to design this unique radio . . . to build vital Radar detecting devices . . . and to produce these instruments faster and faster for service in America's rapidly growing fleets.

To all of us—the technicians of the Scott Radio Laboratories—this flag is no mere symbol of past accomplishments. Instead, it is an inspiring battle standard now unfurled to lead us on to even greater achievements. And we shall build Scott Receivers and Radar equipment more swiftly still . . . so that as each renewal period arrives, "This 'E' Banner shall be Star-Spangled!"



SCOTT
Marine Model
LOW-RADIATION
RECEIVER

We regret that, due to present restrictions, the Scott Marine Model cannot be offered to individual purchasers.



E. H. SCOTT RADIO LABORATORIES, INC.
4430 RAVENSWOOD AVENUE, CHICAGO



YES! A NEW TIRE IS BORN

No wonder they're thrilled! Because it's built with American-Made rubber . . . bears the name GENERAL . . . and is the tire everyone knew American engineering ingenuity would produce.

In this new General Tire . . . from American-Made rubber . . . you see the result of the relentless effort by General's corps of research engineers to help solve America's rubber problem.

All the knowledge gained by General's production specialists in 25 years of building quality tires . . . all their methods for getting *the most* out of rubber . . . have contributed to the development of this new-day General.

It has General's famous Silent-Grip tread design. It has General's same extra strong cord body, as always. And, it has American-Made rubber processed by the same craftsmen who gave you General's quality in the past.

You are invited by your local General Tire dealer now to see this new General that someday, when the rubber crisis is over, will be available to all without restriction.

THE GENERAL TIRE & RUBBER COMPANY • AKRON, OHIO



The
**GENERAL
TIRE**



The best shot in the world would be helpless without it!

● Imagine trying to aim a huge gun at a tiny dot miles up and traveling across the sky at 300 miles an hour!

In many cases, it would be well-nigh impossible if it weren't for an electrical brain that actually makes lightning calculations and aims the gun automatically.

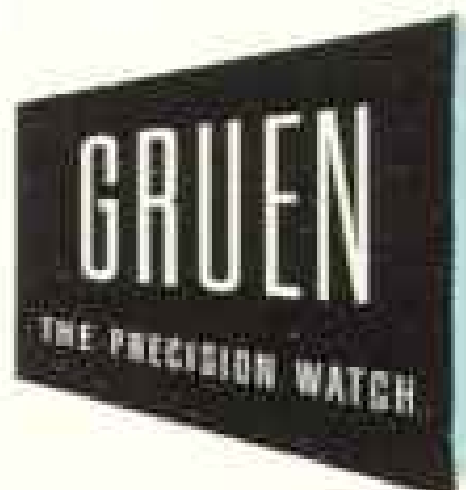
All the gunners do is keep two sights centered on the plane . . . one for elevation . . . the other for direction. The electric brain does the rest.

It is vitally important at all times to know the exact condition of the system that operates the electric brain . . . and that's the job of electrical indicating instruments.

Today Gruen is proud to be making precision instruments of this type for all services . . . proud to turn out 69 years' experience with *Precision* watches to this new and vital job.

Please remember this . . . when your Gruen dealer has to say, "Sorry, but we no longer have the particular model you want." The Gruen Watch Company, Time Hill, Cincinnati, Ohio, U.S.A. In Canada, Toronto, Ont.

BUY A GRUEN WATCH...BUT
BUY A WAR BOND FIRST!



AMERICA'S CHOICE SINCE 1874

GRUEN...MAKERS OF THE PRECISION WATCH...AND PRECISION INSTRUMENTS FOR WAR

"PRECISION" AND "THE PRECISION WATCH" ARE THE REGISTERED TRADE MARKS OF THE GRUEN WATCH COMPANY. . . COPYRIGHT 1946, THE GRUEN WATCH COMPANY.



Buy War Bonds and Stamps

Maybe he's your boy

He had waited anxiously for this moment. Then, early one morning, his instructor hopped out of the Boeing PT-17 Kaydet and casually waved this youngster off on his first solo.

He felt a chill, a sinking wave of uncertainty, and then excitement . . . the exultant climactic realization that "This is it!" He shoved the throttle ahead and for the first time in his life lifted up into the sky . . . on his own!

When he climbed out of the sturdy trainer, he glowed with expansive pride. He was a flier now, and gloriously happy.

If you had been there, you'd have seen him give his Boeing Kaydet a friendly pat. For, like all fliers, he feels a real affection for the primary trainer that first lent him wings.

If your son, or brother, or that boy down the street, is now in the Army or Navy flying services, chances are that he, too, received his first flight instruction in a Boeing designed and built airplane. For more Army and Navy pilots have gotten their initial training in Boeing primary trainers than in any other primary training planes. Boeing has delivered,

all told, more than 7000 expertly engineered, soundly constructed Boeing Kaydets to the United Nations.

Kaydets are built at Boeing's plant in Wichita, Kansas. Not as spectacular as their big brothers, the Flying Fortresses,* they are, nonetheless, built to the same unyielding standards of design, engineering and manufacture.

Boeing products have always exceeded the claims advanced for them. True today, it will be equally true of any product tomorrow . . . if it's "Built by Boeing" it's bound to be good.

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS

BOEING

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADEMARKS



Power for **WAR** Power for **PEACE**

INDUSTRIES in the great Northwest, now supplying the United Nations' war machines, can swing swiftly to peacetime production.

After-the-war necessities for the new world will roll from these plants because power is and will be abundantly available.

Supplementing production of electric energy by private enterprise, an increasing supply of power is being generated at public-owned dams. Great Northern Railway's transportation services were an important factor in the construction of hydroelectric plants at Grand Coulee and Bonneville on the Columbia, Fort Peck on the Missouri, and others in the vast region between the Great Lakes and the Pacific.

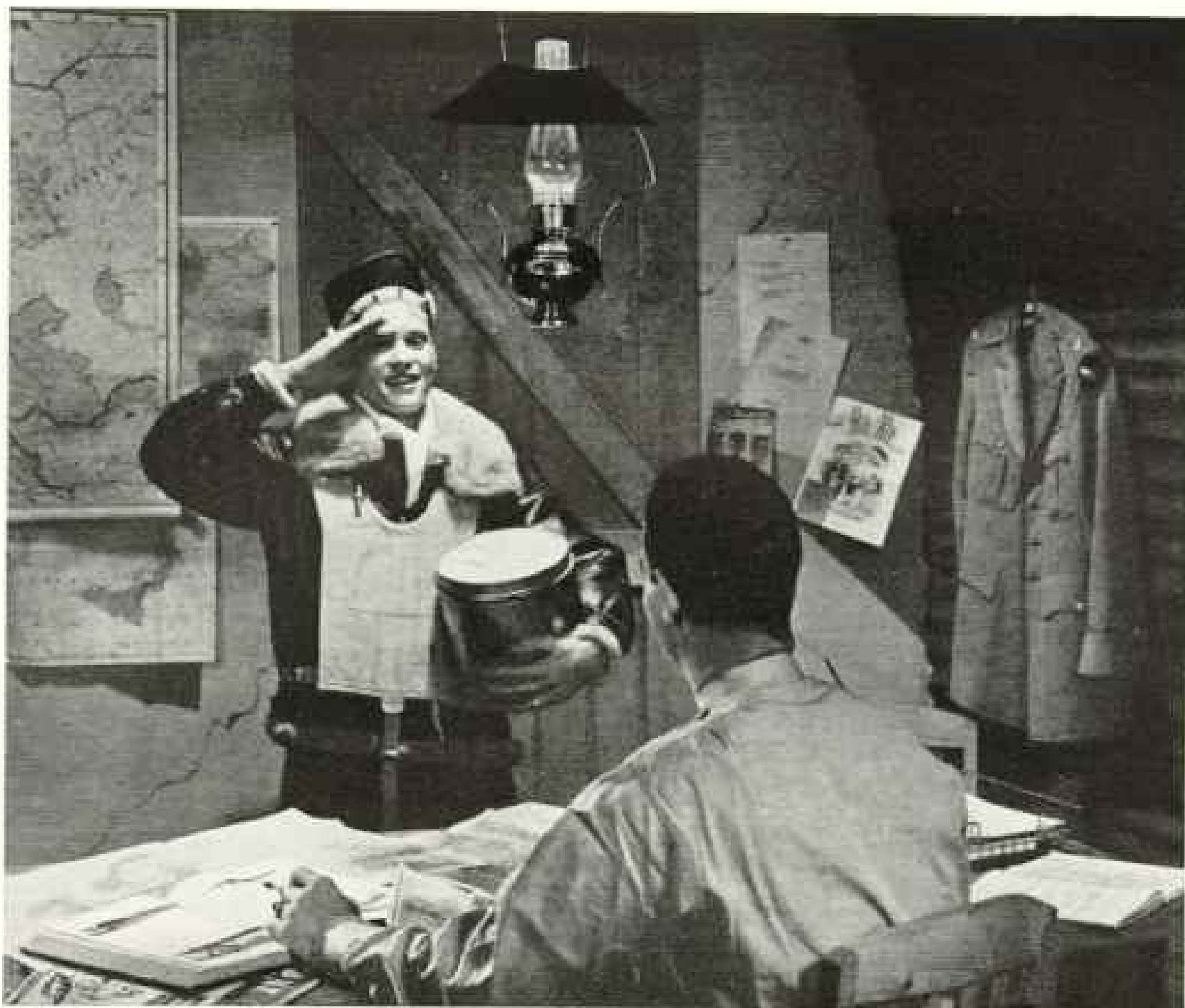
This is **power for war**, because it is helping America to tremendous emergency production; it is **power for peace**, too, for it is attracting important new industries to the fast-developing commonwealth served by Great Northern.

The by-products of hydroelectric power will be equally valuable—foodstuffs raised on millions of acres made productive through the magic of irrigation.

GREAT NORTHERN RAILWAY

ROUTE OF THE EMPIRE BUILDER
BETWEEN THE GREAT LAKES AND THE PACIFIC





BUT WAR BONDS AND STAMPS

"3 direct hits, sir — and 10 quarts of vanilla!"

"How're we doin'?" asked the pilot of the Boeing Flying Fortress high over Germany.

"Nazi factory—right on the nose!" said the tail gunner. "And the ice cream's ready to eat!"

They had anchored a can full of ice cream mix in the gunner's compartment. Now, after dodging flak and fighters, 6 miles up at 60° below, it was well shaken and well frozen.*

Safe back at base they celebrated the raid—with their favorite food treat. That's an American way of celebrating. Ice cream—as American as baseball or the Fourth of July.

But not just because it's homelike and delicious does ice cream appear so often on service menus. It's there because *it's a valuable food*, rich in vitamins and calcium.

In the spirit of American good sportsmanship, your family has reconciled itself to having less ice cream than before the war.

For our part, we'll continue to make as much ice cream as possible. We'll keep it pure and good.

And we'll continue—through war and peace—the constant research that is producing notable new dairy products and other nutritious foods.

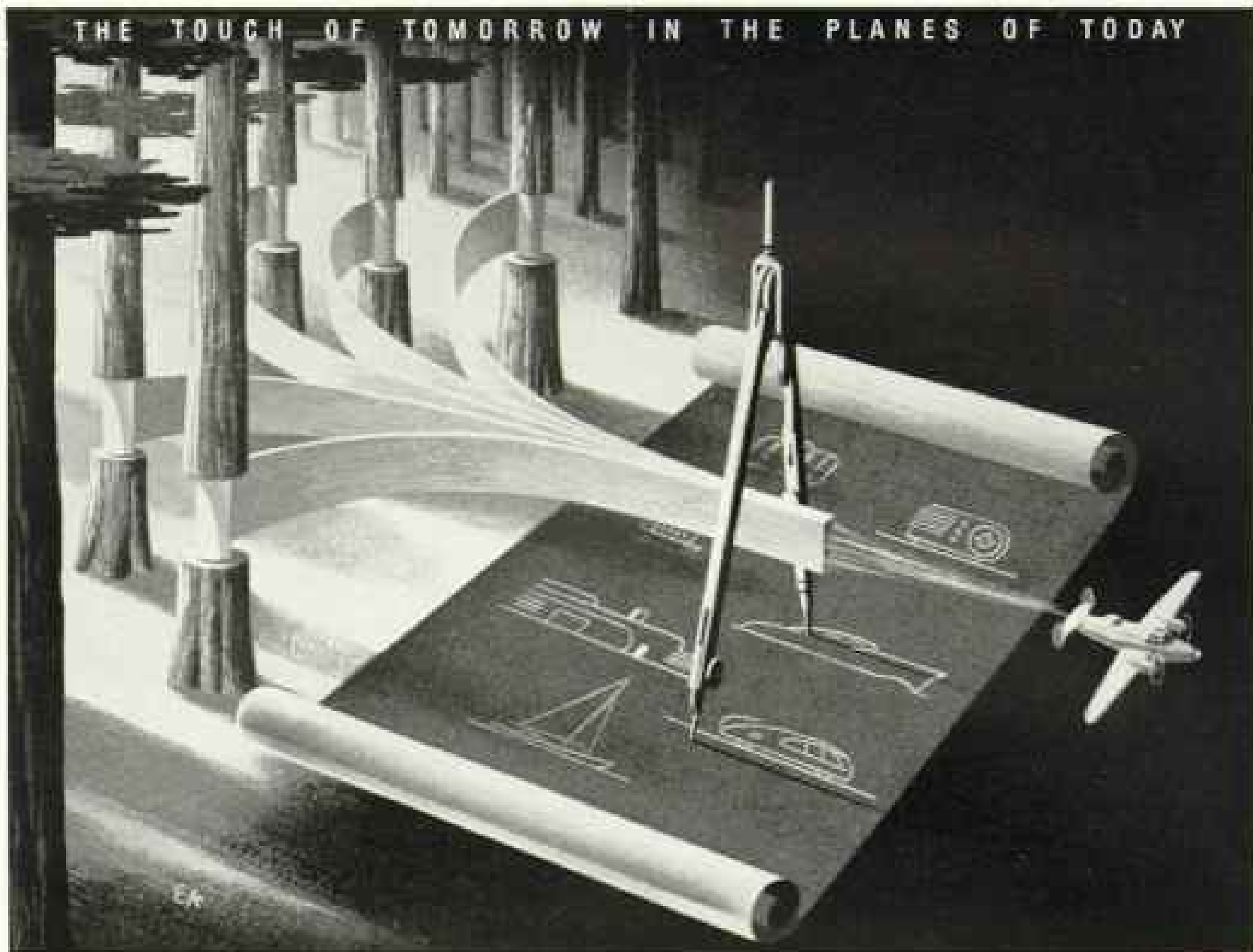
*Based on an actual incident, reported by *The New York Times*

Dedicated to the wider use and better understanding of dairy products as human food . . . as a base for the development of new products and materials . . . as a source of health and enduring progress on the farms and in the towns and cities of America.



**NATIONAL DAIRY
PRODUCTS CORPORATION**
AND AFFILIATED COMPANIES

THE TOUCH OF TOMORROW IN THE PLANES OF TODAY



A New Industry Comes Out of the Woods

Plywood, the structural material of the future, takes to the skies today. Planes of many types are now being made of plywood, superior in certain characteristics even to fine steel or aluminum.

With war-time expansion of plane production, Fairchild foresaw shortages in the light metals. Research and engineering development of plywood at Fairchild were given a great stimulus. New data and new techniques were developed, made possible by recently perfected adhesives. Plywood craftsmanship jumped ahead many years in a few short months.

By a patented Fairchild process, known as DURAMOLD, layer-on-layer of wood, laid cross-grain and permanently joined with special resins under heat and pressure, may now be molded into single and multi-curved structural surfaces of consistently high quality.

DURAMOLD possesses many distinct advantages over metal aircraft surfaces. It is more fire-resistant. It makes lighter, stronger planes; the rigid

DURAMOLD shell is its own support, eliminating the need for a great clutter of internal stiffeners, bulkheads, and other reinforcing members necessary in thin metal construction. It does not wrinkle nor buckle in the airstream, as does a metal surface. There are no non-flush rivets, as no rivets are required. Thus, it is *smoother* in the air . . . horsepower is not handicapped by increased "drag." The plane can fly faster, is more maneuverable and has greater lift and range in the field of high-speed performance.

Production of DURAMOLD structures in spars, flat pieces, and complex curved surfaces is now concentrated within the aviation industry. Its purposes are 100% the purposes of war. But, when victory is won, the techniques, facilities and craftsmanship of a new industry can and will be applied to a multitude of peace-time products.

DURAMOLD, another example of those Fairchild achievements which put the "touch of tomorrow in the planes of today," is available to all "priority" manufacturers.

BUY U. S. WAR BONDS AND STAMPS

 **FAIRCHILD**

ENGINE AND AIRPLANE CORPORATION
30 ROCKEFELLER PLAZA, NEW YORK

Engine Aircraft Division
Farmington, Conn.

Fairchild Aircraft Division
Hagerstown, Md. . . . Burlington, N. C.

Duramold Division
New York, N. Y.



Lily Pons and Andre Kostelanetz, painted for Magnavox by Boris Chaliapin

First family of music . . .

A RECORD audience of 300,000 crowded into a joint summer concert in Chicago to pay tribute to the genius of Lily Pons and Andre Kostelanetz. The unique talents of this great coloratura soprano and her celebrated conductor-husband have brought the appreciation of good music within the ken of grateful millions.

Miss Pons has the admirable faculty of projecting her warm personality to audiences through her glorious voice and charming presentation of the classics.

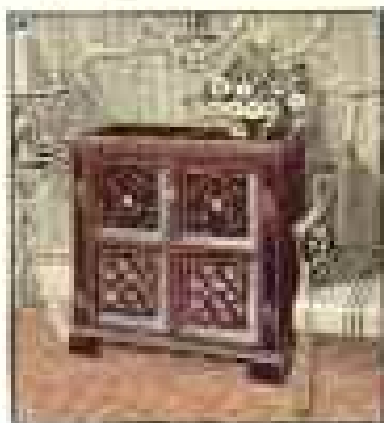
Andre Kostelanetz has created a distinct symphonic style, and a new interpretation of the works of the old masters as well as the popular music of the day. This has brought to him a vast following of music lovers of all tastes.

Today these great musicians are bringing relaxation

and comfort to men in our armed forces as well as those of us on the home front through their recordings and broadcasts.

Like other great artists Mr. and Mrs. Kostelanetz have chosen a Magnavox radio-phonograph for their home. For in Magnavox they find an incomparable clarity and trueness of tone which alone can do justice to the great music of the world.

Today no more Magnavox instruments are being made because the talent and craftsmanship which created these superb radio-phonographs are devoted to the production of electronic and communication equipment for the armed forces and music-distribution systems for warships. In the postwar era Magnavox will again take its place as the pre-eminent radio-phonograph combination. The Magnavox Co., Fort Wayne, Ind.



Magnavox
RADIO PHONOGRAPH



Buy War Bonds For Fighting
Power Today—Buying Power
Tomorrow

THE CHOICE OF GREAT ARTISTS



PICTURE OF A MAN LOOKING INTO THE FUTURE

Row upon row of bassinets—and a nurse holding up a baby. *The baby!*

But Dad sees much more than a newborn son. He sees a long future stretching ahead . . . a future of good companionship and fun . . . of kite flying . . . of camping trips . . . of electric trains . . . a thousand confidences to be shared.

Yes, being a father is a job—with a future. And that future is the most important thing in the world. In years to come, that little tot in the nurse's arms will look toward you, depend on you—don't let him down, Dad.

Today, just as it has been since the year 1875, The Prudential's business is with the future—*your* family's future, and that of some 8,000,000 other American families. Our job is to help make those

tomorrows safe and secure—and to make *today* happier by giving you the peace of mind that wisely bought life insurance can bring.

Now, as always, your friendly Prudential agent is ready to help you. He is one of your neighbors you ought to know well.

Buy War Savings Stamps from your Prudential agent.

The PRUDENTIAL

INSURANCE COMPANY OF AMERICA



A Mutual Company

HOME OFFICE: NEWARK, NEW JERSEY

What life is like on a troop train...

speeding over the Water Level Route

This is "Main 100" . . . identified on New York Central orders only by its code number. Speeding toward a secret destination, it's one of the vast fleet of trains that now move 2,000,000 troops a month over the rails of America. Picture the thousands of Pullmans and coaches this task requires. You'll see then why car space for civilian travel is limited . . . why Americans are urged to make only essential trips. "Main 100" must have the right of way!



FIELD KITCHEN. Mess Sergeant sets up kitchen in baggage car to serve 3 or 4 troop cars. That's what many baggage cars are doing. So please travel light!

MESS CALL. Men eat at their seats. On some trains they file up to kitchen to be served; on others, food is brought to them. Meals are tops . . . one ration your home and our diners are rationed.

FIRST AID. Army Surgeon installs his "field hospital" in a wash-room. His prompt care for minor ills keeps our fighters fit.

G.H.Q. ON WHEELS. From his drawing room "headquarters," Train Commander orders all details of this traveling Army camp . . . of which he alone knows the destination.

RAILROAD LIAISON. New York Central "Train Escort" goes along to aid Train Commander with transportation, extra supplies, mail, special stops and other matters.

PREPARING FOR TAPS. At time set by Train Commander (later than in camp) Porter makes up berths . . . as carefully as he would for the most generous Pullman passenger.



V MAIL. Men write many letters, hoping for answers. To guard secrecy, none may be mailed except through the Train Escort at points designated by the Train Commander.

39 MEN TO A CAR. Two men deep in lower berth, one in upper. Even so, troop moves now use half the Pullmans, a third of the coaches . . . one reason you may find space hard to get.

SEEING AMERICA. Troops spend much time at windows. Averaging six miles during training, they see the Hudson River and Great Lakes this trip . . . perhaps California next.

New York Central

NEW YORK
CENTRAL
SYSTEM



BUY
MORE WAR
BONDS

ONE OF AMERICA'S RAILROADS—ALL UNITED FOR VICTORY



Don't laugh at old Diogenes!

EVEN if Diogenes did spend his days, lantern in hand, looking for an honest man, it wasn't such a joke as one might think. For there is no certain method of determining whether an individual will remain honest through the years. Take case No. 167014 from U. S. F. & G. files. Credit manager and treasurer of a manufacturing company, he was 36 years old, father of two children, and a model of propriety. Yet he embezzled \$26,608.21 from his employers. Fortunately they were insured against employee dishonesty and suffered no loss.

Illustrated on this page are other cases showing some of the hazards that demand insurance protection. Your local U. S. F. & G. agent will be glad to make a wartime audit of your insurance program to help protect you from loss. He is one of thousands serving communities throughout the U. S., its possessions, and Canada. Consult him today.

Branch Offices in 43 Cities • Agents Everywhere

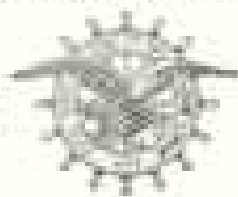
U. S. F. & G.

UNITED STATES FIDELITY & GUARANTY CO.

affiliates:

FIDELITY & GUARANTY FIRE CORPORATION

HOME OFFICES:



BALTIMORE, MD.

Consult your insurance agent or broker



as you would your doctor or lawyer

Try laughing these off

(Cases from U. S. F. & G. files)



Case No. 11-A-684

Coffee Scalds Yachtsman

Precious as coffee is, the pot held too much to suit the mid-west executive . . . for when the boat rolled, the coffee spilled, severely burning him. Fortunately he carried accident insurance with U.S.F.&G. and received \$737.00 for medical expenses and time lost. Would you be so compensated?



Case No. 35-B-198

Hard-Working Burglars

Determined indeed were the burglars who climbed to the winery's roof, forced a window, cracked the safe, and ripped out the "burglar-proof" chest inside. Their loot . . . over \$600. But thanks to burglary insurance with U.S.F.&G., the owners were spared this loss. What about your place of business, your home?

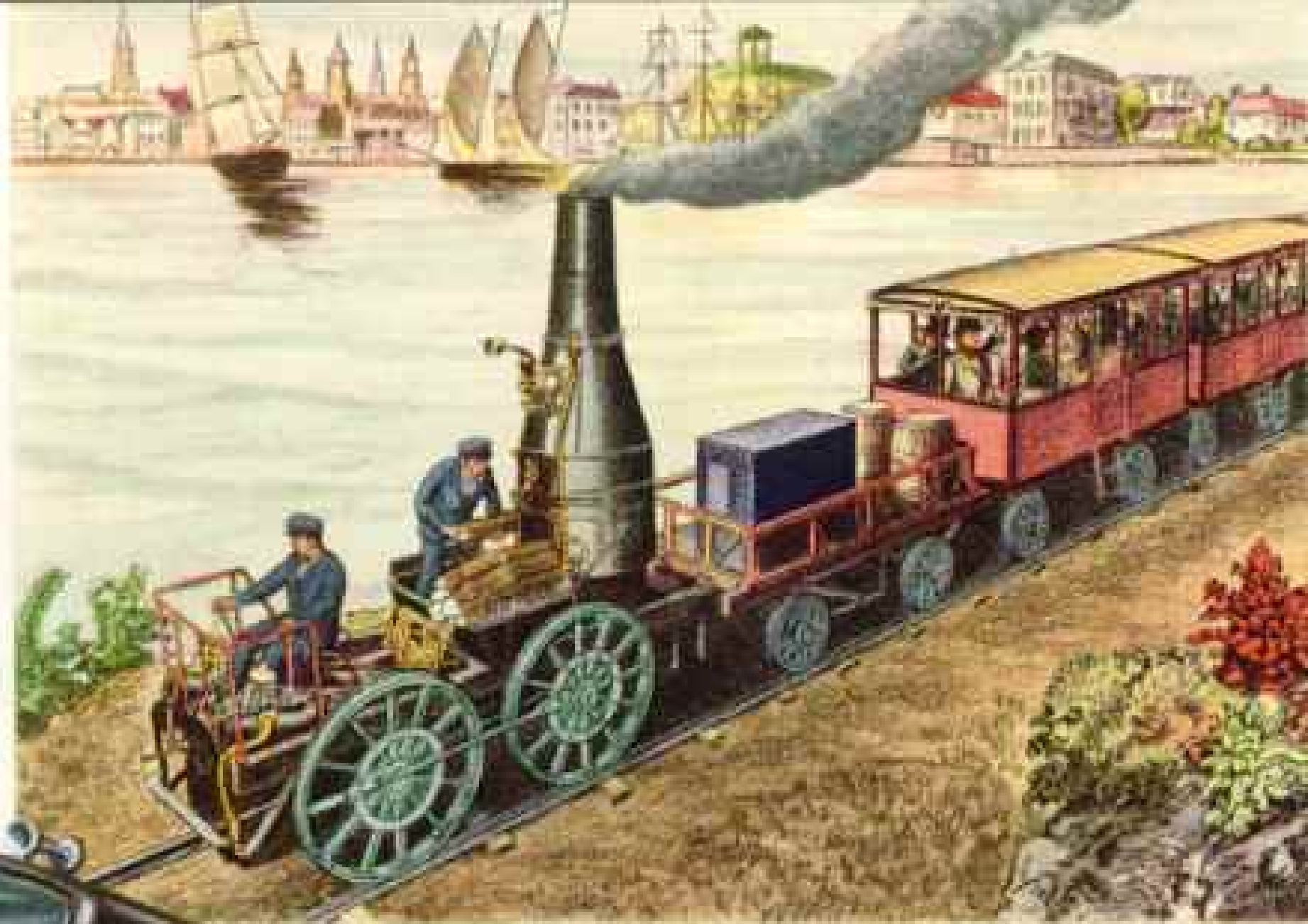


Case No. 21-G-1257

Wind Shatters Glass

The big blow in the Pennsylvania town might have been a severe financial blow to the main street shopkeeper . . . for it shattered his plate glass display window. But the shopkeeper had wisely insured his window through U.S.F.&G. and so was spared any loss. Are your glass windows and doors insured?

THERE'S SOMETHING NEW IN THE PICTURE



THE "BEST FRIEND OF CHARLESTON" WAS THE FIRST LOCOMOTIVE ENTIRELY BUILT IN THIS COUNTRY—FOR THE SOUTH CAROLINA RAILROAD, NOW PART OF THE SOUTHERN RAILWAY SYSTEM.

The "Best Friend of Charleston" was the first locomotive entirely built in this country—for the South Carolina Railroad, now part of the Southern Railway System.

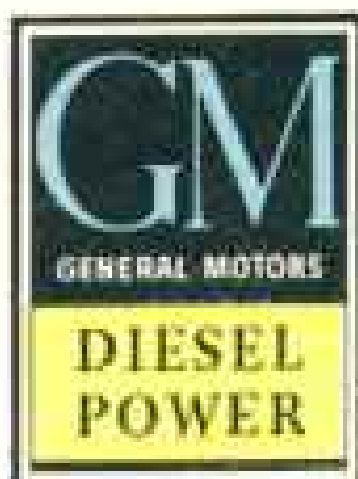


Daily movement of a staggering quantity of oil from New Orleans to the Eastern States is the No. 1 war job of the Southern Railway. The Southern assigns its fleet of General Motors Diesel freight locomotives as the key motive power to expedite this important flow.

OUT of every war has grown a new era in transportation. This one is no exception. The pattern of that new era had been set, even before this war, by the General Motors Diesel Locomotive. And its Leadership in the Peace to come is forecast in the way this locomotive is today meeting the challenges of war.



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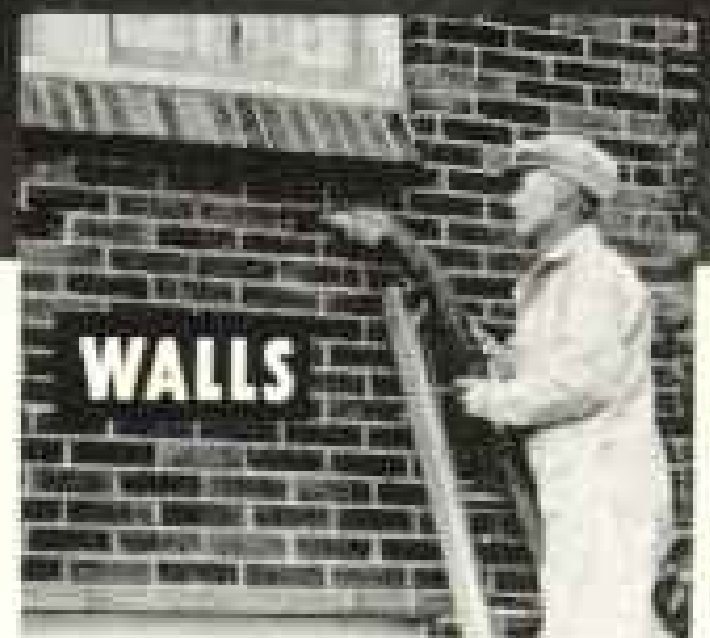
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IN THE PICTURE ABOVE, you can readily see that the soldier is carrying a substantial burden—equipment which weighs some 40 pounds. What you may not realize is that the civilian carries an equally heavy burden—a burden of overweight which he carries around day and night, in contrast with the soldier who can put aside his pack and rifle when he rests.

It's an unfortunate fact that excessive fat places a great deal of extra work on the heart, kidneys, and lungs—work from which there is no relief. That is why overweight can be a threat to health. Figures show that people over 45 who are 20% overweight have a death rate 50% above the average.

What causes excessive weight? Sometimes it is due to glandular disturbances. The most common causes are too much food, and not enough exercise.

When the body gets more food than it needs for its work, the excess is stored as fat. If less is eaten than is required, the body loses weight by burning some of its reserve fatty tissue. Exercise hastens the process, but by itself is seldom effective. This gives us the principle often used in planning programs to reduce weight.

If you are overweight and want to reduce to

your "fighting" weight, you will be wise to start by having your doctor examine you thoroughly. With his advice, a diet can be planned which in normal cases will cause a moderate, steady loss in weight and at the same time adequately protect your health. Exercise, fitted to your age, condition, and occupation, will round out the program.

Avoid the use of reducing drugs except on the doctor's advice. Girls in their teens should especially avoid "fad" diets or the risk of reducing on their own responsibility.

To help those interested in watching their weight, Metropolitan offers a free booklet, 93-N, entitled, "Overweight and Underweight." Among other things it contains information about low-calorie diets and helpful exercises.

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The bird that uses insect police

HANGING FROM the great ceiba trees in Central America are strange, sack-like objects about six feet long. Often, there are fifty or more on a single branch, swaying in the wind. They are the colony nests of the cacique, or tropical oriole.

The eggs in these nests are looked upon as choice food by many of the cacique's enemies. In addition to the ocelots or forest cats, there are giant lizards and raccoon-like animals which are expert nest raiders. And, being adept at tree climbing, they can easily reach the eggs even at a great height.

If it were not for the ingenious way in which the caciques provide themselves with a municipal police force, their chances of survival would be poor indeed.

To secure this unusual protection, the caciques build their colony on the same branch that holds a large nest of tropical wasps. Although these insects do not seem to be annoyed by the activities of the birds, they are aroused to fury if any intruder tries to push past them. And no animal, however fearless, would twice risk their vicious attack.

As the cacique always makes sure that his police guard is between the nesting colony and the tree trunk, his home is safe. Only if the wasp nest should be destroyed or abandoned, would this

police protection fail him. But, then his loss would be complete.

Man also has police protection for his home against unwelcome intruders. But, in wartime, especially, with dimouts and a reduced police force, this, too, may prove inadequate.

There is, however, one other protection man can have for his home, that will not fail him. This protection is burglary insurance which will enable him to replace the loss and to repair any damage done to his home when a burglary does occur.

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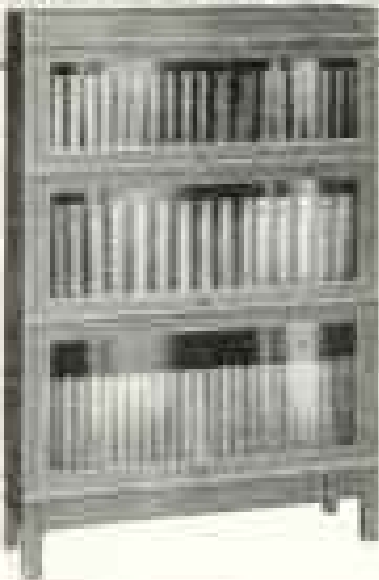
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