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Special Map Supplement of the Pacific

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FLYING THE PACIFIC

BY WILLIAM BURKE MILLER

THE trail-blazing Pan American Clipper, staked down in the open, undergoing general overhaul, was unnoticed by the crowd gathering at the water's edge at Alameda Airport. Even the triumphant China Clipper, back only three days from the first round trip to Manila, escaped attention.

For today the Philippine Clipper was due to hop off on the second airmail flight across the Pacific Ocean for Honolulu, Midway, Wake, Guam, and Manila.*

Apparently those who had crossed the bay from San Francisco this chill, gray December afternoon in 1935 had forgotten the achievements of these other two ships which had made such epochal flights as the one about to start a matter of routine (pages 668 and 678).

Standing alongside the gleaming Philippine Clipper, awaiting word to go aboard, Harold See and I, representing the National Broadcasting Company, could not readily forget the China Clipper and its crew. Originally scheduled to make the Pacific flight aboard her, we had flown in the China Clipper from Miami to San Francisco by way of Acapulco, Mexico.

LONDON TALKING—OVER CALIFORNIA

Flying between San Diego and San Francisco, we had participated in one of the most successful broadcast achievements thus far realized. Together with Captain Edwin C. Musick, we had chatted with Captains

* See The National Geographic Society's new map of The Pacific Ocean, with 73 border insets of important archipelagos and islands, sent to members as a supplement with this issue of their NATIONAL GEOGRAPHIC MAGAZINE.

Albert W. Stevens and Orvil A. Anderson while they, in the *Explorer II*, were establishing a new world balloon record—ascending nearly 14 miles into the stratosphere over South Dakota.*

The four of us had been interrupted by a newspaper correspondent in London, who asked how the National Geographic Society-Army Air Corps stratosphere flight still could be under way when London had received word the balloon was ripped!

At the last minute we had been compelled to give up the plan of flying the Pacific in the China Clipper, as her mail load was so heavy she could not take us.

But today all our waiting and disappointments were over. Aboard this sister ship, the Philippine Clipper, See and I were to make the transoceanic trip. We would be the first persons, not employed by Pan American Airways System, to fly across the Pacific in the Clipper ships.

Our mission was to test the long-range dependability of portable, lightweight short wave equipment recently developed.

With See and myself and Louis Harmantas, meteorologist for Pan American Airways, our flight personnel numbered twelve. Harmantas was being sent to Manila to establish weather bureaus at the far end of the run.

We entered through a hatch in the after section. Inside we found that most of the seats and the beautiful furnishings had been removed. Mail sacks and parcels were tied down in several compartments.

* See "Man's Farthest Aloft," by Capt. Albert W. Stevens, NATIONAL GEOGRAPHIC MAGAZINE, January, 1936.



Photograph by Harold See

NEWSREEL CAMERAS GRIND OUT A CLIPPER CLOSEUP

Some 25 tons of China Clipper head for the water at Alameda, California, slowly towed on a wheeled cradle. Though she limps along on land like a crippled bird, she is speed itself in her elements—sea and sky.

This was not a regular passenger flight, for it was only the second time that a ship weighing twenty-five and a half tons had flown the Pacific. Not until twenty or more flights had been made would Pan American carry passengers on this route.*

The Philippine Clipper had been lightened as much as possible to carry additional gasoline. Engineers had studied and estimated the maximum required, but almost a third more had been added—a typical precaution.

Trim blue uniforms were being stored away in lockers, and white coveralls and furlined flying suits were being donned.

OFF FOR 2,400 LANDLESS MILES

Outside we could hear the operations manager giving last-minute weather and other information to Captain John H. Tilton, who was on the bridge. S. P. Crago, Junior Flight Officer, went aft and clamped down the after hatch. We knelt on mail sacks and looked out. The Philip-

*On completion of these test flights, regular transpacific passenger service was begun by the Clipper ships on October 21, 1936.

pine Clipper was losing its moorings.

The outboard engine on the left wing coughed and came to life. A second later the outboard propeller on the right wing started spinning. It was just past 3 p.m. The crash launch sped ahead to the left of our course.

For a moment we seemed to be stationary, all four motors now idling. Then they opened up a bit and we were on our way. The corrugated surfaces of the sea wings left their pattern on the water, and the path slashed through the rough seas by our hull sent a white spume spraying fountain-like as our speed increased.

The whine of the motors rose to a higher pitch, the choppiness of the water was less noticeable. We were skimming along now on the step, only the tail surfaces in the water. The motors seemed to double in power and roar as they were steadily accelerated.

In the rear compartment, we were conscious of a slight twisting motion as though the choppy water refused to release the Clipper's hull and then, almost immediately, the splash of water against the windows stopped and we were in the air. Our



A "GOONEY" TAKES OFF LIKE A HEAVILY LOADED PLANE

Though it has a wing-spread of several feet, the heavy bird has to taxi along the beach on foot to pick up flying speed. At Midway two distinct species are called "goonies"—the black and white Laysan albatross, which is friendly, and the black-footed albatross, which may give a man a vicious peck (pages 686-7).*

take-off, fully loaded (51,000 pounds), had required 45 seconds.

Slowly we climbed in a widening circle and, as the land fell away, wispy clouds moved in to greet our ascending craft. The dull metal of the Clipper blended with the misty grayness of the sky. We were a part of the atmosphere.

THE SONG OF THE MOTORS

A low ground haze hid San Francisco from us as we straightened out several thousand feet up. The sun made an effort to smile in salute, but the gray clouds frowned him down.

The hum of the motors changed. For a moment they seemed out of synchronization and their voices died to a murmur. Then their song became a solo—strong, but with a softer tone. We were now flying with the motors at long range cruising speed and the change in the pitch of the propellers had reduced the roar.

Off Point Bonita, we passed out to sea.

* Photographs not otherwise accredited are reproduced by courtesy of the Pan American Airways System.

This was to be our last sight of land until we reached the Hawaiian Islands—some 2,400 miles off the nose of our Clipper. The sea was empty and, save for us, so was the sky. We were out in a dull void between sea and sky with only the song of our purring motors to comfort us.

Harmantas was studying cloud formations and checking them against weather reports, including data brought back from the flights of the Pan American and China Clippers. Watching him, we realized weather forecasting was no form of black magic or expert guessing, but a careful accumulation of a vast amount of information over long periods of time.

AN EMPTY SEA, AND THE NIGHT

Now we were flying at 8,000 feet and the atmosphere was clearer. The rays of the setting sun finally broke through the clouds and the wing tip of our silver Clipper was etched in red-gold against the sky.

The sun dropped rapidly after that brilliant moment, but our ship was still glossed in rich purples that dulled gradually to deeper tones; then came a last bright flash



Photograph by Clyde Sunderland

AVIATION HISTORY IS MADE AT ALAMEDA AIRPORT

With hundreds of cars parked on the flying field and spectators gathered at the water's edge, the China Clipper is about to take off on the first round trip to Manila by way of Honolulu, Midway, Wake, and Guam, November 22, 1935. This flight, on which a load of mail was carried, marked the beginning of commercial air service across the Pacific Ocean, though regular passenger flights did not start until October 21, 1936 (page 671).

from the sun as we climbed higher, and it was dark—night had come.

T. R. Runnels, Communications Officer, came aft. He was releasing the ship's antenna to Harold See for our first broadcast. The antenna was reeled in and out again to the length required by the wave length assigned to us.

See sent out his call—"WOEH aboard Philippine Clipper calling—hello RCAC, Point Reyes" (California). He was wearing earphones, but his smile told us that his call was answered.

We went forward and obtained our position and approximate speed from Judson

Ingram, First Navigation Officer. The microphone was brought out to the roomy lounge amidships where most of the seats had been left.

Captain Tilton was drinking coffee. He is a finely built man of normal height, with a slim trimness of bearing that suggests early and regular physical training. He does not like the idea of talking before the microphone and smilingly he declines.

Ingram and Harry Canaday, Second Navigation Officer, move from their chart table in the compartment just in front of the lounge. They too urge the Captain to speak.

From the rear, See is waving to us. He holds up his hand—the sign to stand by. We look out at the darkening night.

What words have we to describe what we feel, what we've experienced and seen? How can we adequately picture the sense of aloneness, of exhilaration, of awesomeness, of safety—now that we are flying the Pacific? See drops his hand and we are on the air.

Captain Tilton is watching, listening closely. Something we say pleases him and he nods approvingly. We sit down and talk to him and in a moment a question has been asked and he has answered it. Ingram and Canaday grin. The Captain's twinkling eyes wink, though he shakes a friendly fist, and our broadcast is under way.

We are 381 miles from Alameda and flying at 8,000 feet.

Captain Tilton, easier now, tells us his home is Washington, D. C.; that he served with the Navy during the war and has flown the Caribbean route of the P.A.A. for seven years. Yes, he flew the S-42, the Pan American Clipper, to Wake Island and to Guam. He is delighted to command one of the larger ships and to have Captain Dahlstrom along to give him the feel and lift of the new Clippers.

He declines to estimate the time of our arrival at Honolulu.

And so we talk on, looking out the windows as we fly, hoping to sight some light on the water. See comes forward, pointing to his watch. We've been on the air fourteen minutes. It's time to sign off.

Point Reyes reports excellent reception. Runnels hurries forward. He needs the antenna now to make a regular contact with Pan American bases. Our next broadcast is two hours away and we decide to visit the engineering officers' cabin.

NAVIGATING WITHOUT A LANDMARK

To reach this part of the ship, we must pass through the navigators' compartment. But this is no time to bother them. The hop between Alameda and Hawaii is the longest leg of the flight, 2,404 miles, and there is not a single landfall to check on between the United States mainland and the islands. Throughout the night, they will study the stars.

Runnels, at his radio, will obtain radio bearings from Alameda behind us and from Makapuu Point (Oahu, Hawaiian Islands) far ahead, as well as other points. Periodi-

cally he will pick up ships' signals and obtain their position, thus helping the navigation officers to determine our own. All in all this will be a busy night for the crew.

With nothing in sight but clouds, and, at times, dark water, it seems a bit incredible to see the navigators look at the chart, check the time, and quickly scribble down a position, giving latitude and longitude and translating the distance we have come from nautical to statute miles for our land-lubber minds.* But, somehow, we are confident that they know where we are.

The quiet roar of the motors is a comforting sensation. Hour upon hour their song is the same, though changing slightly in volume as the Philippine Clipper ascends or descends at the pilot's will, to take advantage of more favorable winds at various altitudes.

A door shuts off the flying bridge from the rest of the ship. Opening this, we come upon a short ladder and clamber up. The noise is higher in here; a side window is open. It is inky black, but the glow of many luminous dials on the instrument panel silhouettes two figures who sit there comfortably. Their eyes are alert, their heads turning occasionally to left or right, but in the dim light we see their hands are folded—neither has his hands on the controls.

A ROBOT FLIES THE SHIP

We recognize Captain Tilton in the left seat. He is on watch, in command. Captain Ralph Dahlstrom, First Officer, is flying the Philippine Clipper with his hands in his lap—and we are on a 2,400-mile flight across water!

Dahlstrom, sensing our questions, smiles at us and points to a replica of a plane on a dial. Its wings dip left or right ever so slightly to the motion of the Clipper.

We lean down to Dahlstrom. He shouts into our ear: "We're using the automatic pilot."

The Sperry mechanism that has won over even the most self-sufficient pilot was flying the Philippine Clipper across the Pacific, though a crew of nine men was aboard.

We move from our cramped position behind the bridge and, passing Runnels' radio desk, climb up and crawl back to the

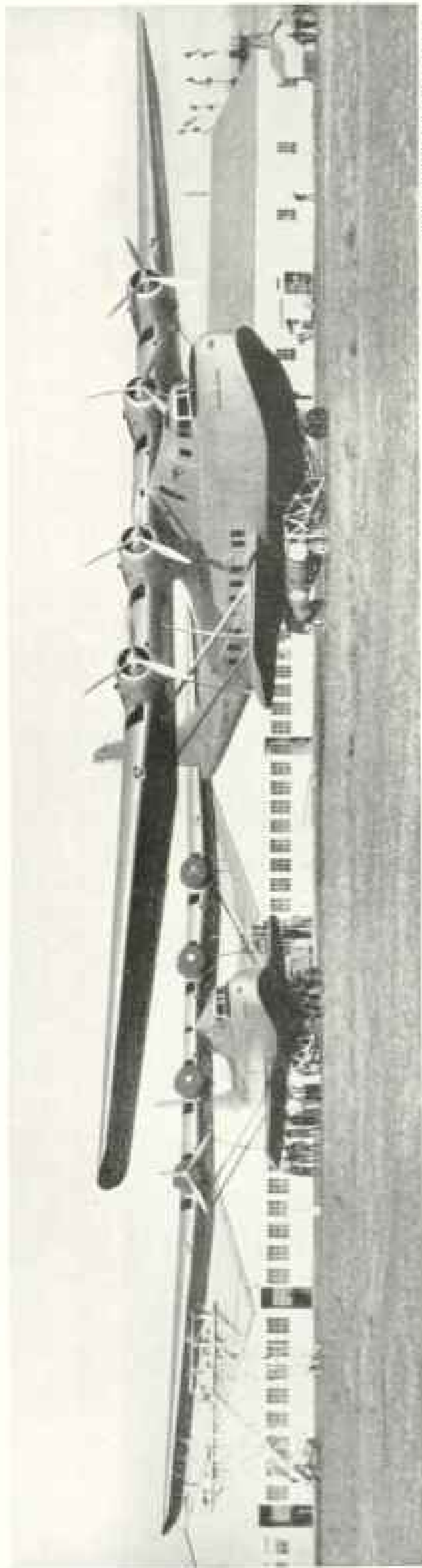
* All distances given in this article are in statute miles.



Photograph by Clyde Stedman

SAN FRANCISCO, END OF THE OLD FRONTIER AND BEGINNING OF THE NEW

Sky pioneers of the Pacific now wing their way over tall towers and bridges on their way out of the Golden Gate. Pan American's Alameda air base, home port of the sky-going Clipper ships, lies across the bay to the right. The new San Francisco-Oakland Bay Bridge, one of the world's mightiest over-water structures, links Oakland in the distance with San Francisco by way of Yerba Buena. At the left, toward the waterfront and the tower of the Ferry Building, runs Market Street.



Photograph from Keystone

SISTER SHIPS OF THE TRANSPACIFIC SKYWAY AT THEIR HOME PORT, ALAMEDA, CALIFORNIA

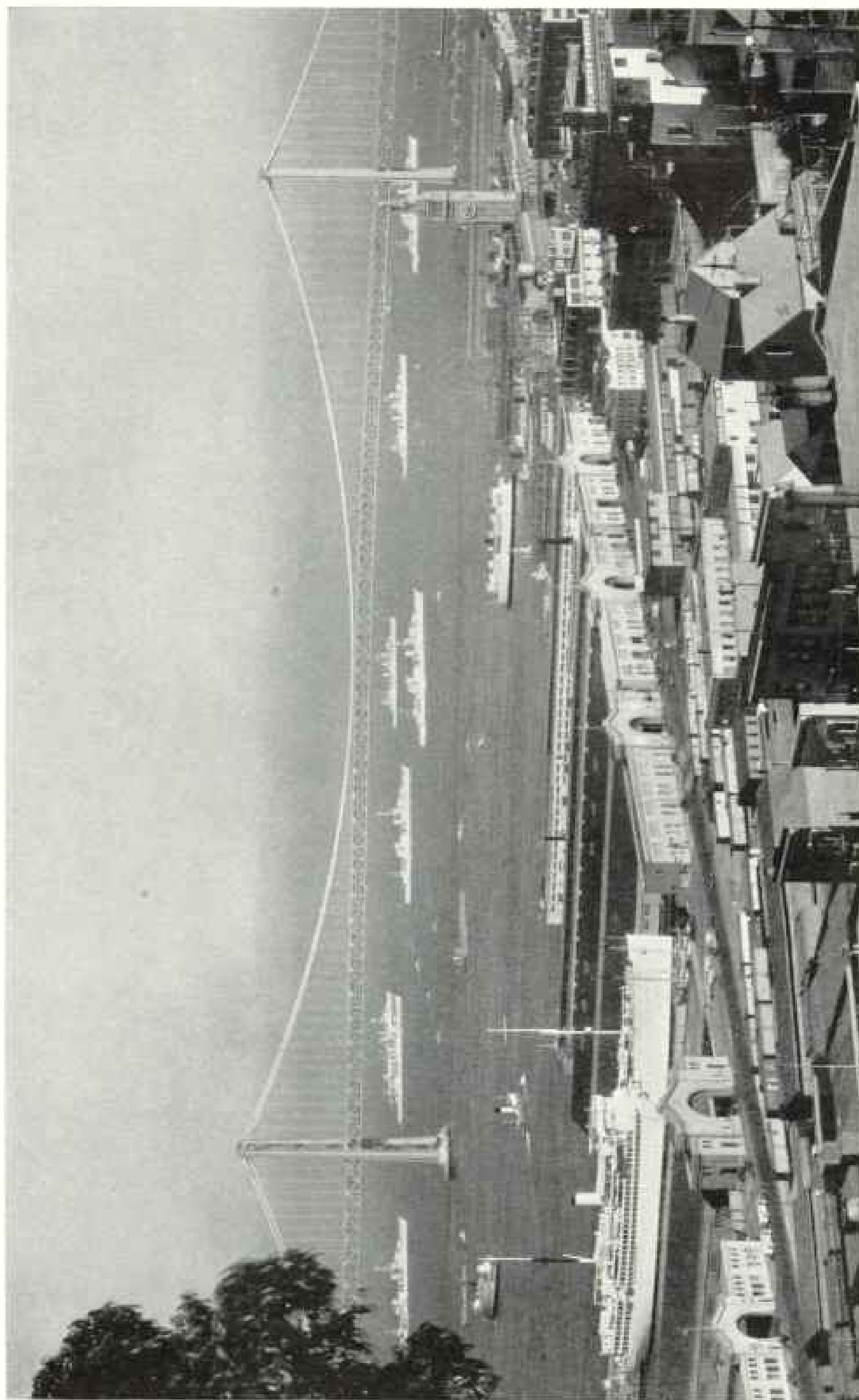
Aboard the Philippine Clipper (right) the author made the flight to Manila and back in December, 1935. At the left is the China Clipper.



Photograph from Wide World

"CAN SUCH A BIG MACHINE REALLY FLY?"

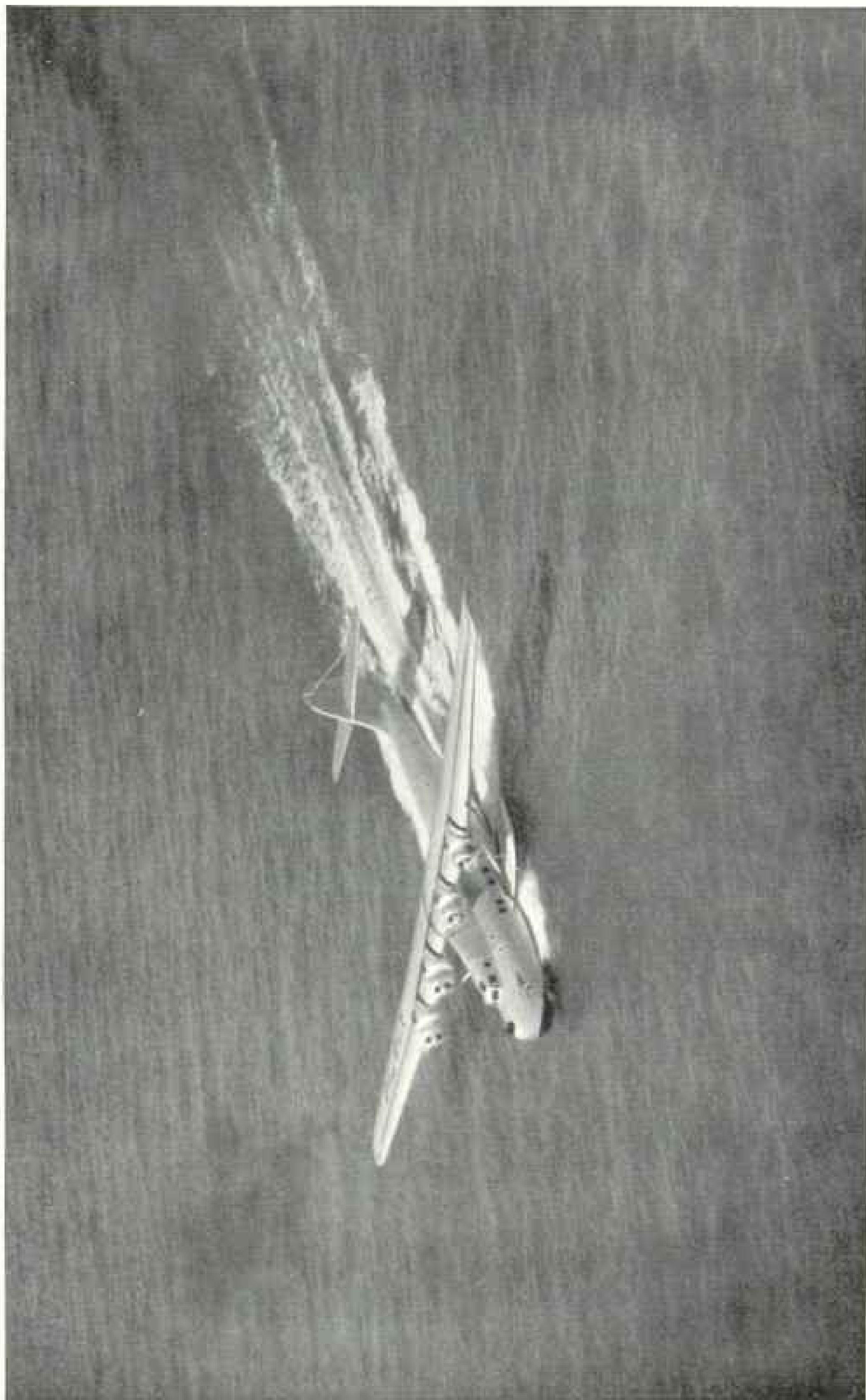
Bystanders exclaimed in wonderment as the China Clipper in its cradle was wheeled out on November 21, 1935, and poised to enter the water for the start of the first transpacific airmail flight the following day (page 608). Mechanics clamber over the plane, making final inspections.



Photograph by Gabriel Moulth

THE FLEET'S IN: WARSHIPS ANCHOR IN A GLISTENING FRAME PROVIDED BY THE NEW SAN FRANCISCO-OAKLAND BAY BRIDGE

Along the docks, where ships from Hong Kong, Melbourne, Hamburg, New York, and ports the world over put in, runs the Embarcadero, San Francisco's wide waterfront boulevard. At the right is the tower of the Ferry Building, and out in the bay are ferry boats plying like waterbugs to Oakland and other bay points.



OFF FOR THE ORIENT!

The China Clipper, here taking off, is one of three giant Martin flying boats capable of carrying 30 passengers—in addition to a crew of seven and a heavy mail load—on all except the 2,400-mile hop between San Francisco and Honolulu. Even on that long over-water jump it can take from six to a dozen passengers, depending upon their weight and the amount of mail.



Photograph from Pictures, Inc.

FOR 75 CENTS YOU CAN SEND A HALF-OUNCE LETTER TO
THE ORIENT BY AIR

This mail being stowed aboard the China Clipper will reach Manila in a week or less, instead of the three weeks required by fast steamer. Mail sacks were used as impromptu bunks by the author and two of his companions on their Philippine Clipper flight, when regular passenger service had not yet begun and berths were not available (page 677).

"throne room of the God of Gadgets," as the airport mechanics call the engineer's cabin. This triangular space is formed by the struts and framework where the huge wing and hull are blended (page 675).

Lanky John Fiske, First Engineering Officer, is lounging in a bucket seat, strapped in. A clip board is on his knees and he has difficulty finding a comfortable position for his long legs. The Junior Engineering Officer, E. B. Abarr, is sitting on the floor.

There is no room for us in these cramped quarters, but we kneel there a while, watching as Fiske reads dial after dial and makes notations on the sheets of his clip board. Any change in the operation of the Clipper is recorded here.

From time to time Fiske points a huge flashlight out the right and left portholes, playing the beam on each motor nacelle, on the propellers and wing surfaces. As the flashlight snaps off, we notice the dull red of exhaust pipes that add color to the night, and far out on the wing we see the red and green flying lights marking the right and left wing tips.

The "throne room" is the heart of the Clipper ships. The bridge forward is the brain.

As we crawl forward toward the bridge, we are

conscious of a brightness outside—not daylight, but a luminous brilliance.

We clamber down the ladder and return to the lounge. During our inspection the Clipper has been climbing. Now the clouds are below us. Directly astern, riding our tail, is a full moon. Its rays gleam on the cloud banks beneath and they give off a reflected silvery light. It seems as bright as day, but the light has a screened, softened effect.

We are at 11,000 feet and for more than

an hour this silvery brilliance illumines our course. Occasionally we see a "moon bow" encircling the shadow of our Clipper on the clouds below.

Then, almost as if someone had snapped off a bluish light, the silvery radiance has gone and we are looking down on black water, made oily by the rays of the brilliant new moon still riding high behind us.

A SHIP THAT PASSES IN THE NIGHT

It is 8:15 in the evening, Pacific Standard Time. We have been on our way five hours.

Runnels comes through the lounge and tells us we are due to overtake the SS. *Maunalea*, which is on our course. All press cheeks and noses against cold window panes as we look up and down the ocean, hoping to be the first to make out a light on the blackness below.

Small cloud banks pass beneath us, momentarily shutting out the water, but soon Runnels and Ingram sight the vessel just under our starboard wing and Ingram hurries forward to mark the time and to add this one visible check to other position reports.

The ship's passengers evidently are unaware of our passing, for no searchlight



"THRONE ROOM OF THE GOD OF GADGETS"

Thus the airport mechanics often refer to the engineer's cabin, the heart of a Clipper ship. In this small triangular space with its bewildering array of gauges and other mechanism sits the engineering officer, reading dial after dial, jotting notes on the sheets of his clip-board, and communicating with the bridge by telephone. Any change in the Clipper's 3,600-horsepower pulse beat is recorded here and from time to time the officer peers out the windows beside him to inspect the four huge motors (page 674).

beams pierce the sky. We feel a vague disappointment. Somehow we had expected to exchange greetings. Soon, however, we lose sight of the ship. It has days to go. We'll be in Honolulu tomorrow for lunch—or sooner. There is smug satisfaction in the thought and we forget the *Maunalea* in the beauty of the night.

Harry Canaday goes aft to take a celestial reading—shooting the stars. We follow him. Canaday opens the hatch through



HONOLULU CITIZENS FLOCK TO SEE THE CLIPPER NAMED FOR THEIR ISLANDS

The Hawaii Clipper is the ship on which H. R. Ekins flew home from Manila, beating two other reporters in a recent race around the world.



SUCH IS LIFE ON A DESERT ISLAND!

Instead of living like Robinson Crusoe, serial wayfarers spending the night at Wake find all the comforts of home in this hotel—plus a few additional ones. The nearest automobile horn and flat-wheeled streetcar are several thousand miles away. From faraway San Francisco by steamer came the sleek metal furnishings finished in walnut, the lamps, bedding, curtains—everything, in fact, from an electric generator to a pillow case (page 696).

which we had entered. It is open directly to the sky. A shield locks into place, but the wind sucks through the opening and it is bitterly cold. The full moon looks squarely down into our faces—as far away as ever, but surely seeming to follow us and keep us company.

We grow cold and with Harold See go forward to the galley for something to eat. But at this high altitude we are conscious of a chill that hot coffee and soup will not warm. Stripping the Philippine Clipper of all non-essentials for this experimental flight has included part of the heating apparatus, we learn. The crew have fur-lined flying suits, but we broadcasters and Harmantas are not so equipped.

ASLEEP ON THE DEEP—AMONG MAIL BAGS

We pile on sweaters and overcoats, but these do not help. We do not want to sleep our first night over the Pacific, but it is too cold to sit about. Going back through the compartments piled with mail sacks, all three of us suddenly get the same thought. Without a word, we begin burrowing down under the canvas mail sacks.

Paper in bulk is warm and, though none of us intended to sleep, daylight was not far off when we awoke. We had spent five hours sleeping under and on the packages and letters from all over the United States for loved ones throughout the Orient.

The sky was ugly, not dark but not yet light enough to be day. The moon was still in the sky, but no longer behind us. Over us the sky was hazy; below it was a solid overcast of clouds. The eastern horizon was reddening dully. The entire scene was depressing.

Stiffly we moved forward to the lounge. Runnels and Max Weber, Second Flight Officer, were sleeping now, hunched down in their flying suits. In the navigators' compartment Ingram was sitting, not asleep but with his eyes closed. Canaday was at the chart table, his eyes red-lidded and weary. Neither of them had slept during the night.

Captain Tilton was eating in the galley. He had cat-napped only a few hours, but his eyes were bright. His smile warmed us, dispelled the gloom. We joined him drinking coffee and asked how far we had come. He stepped to the chart table, looked over Canaday's shoulder and noted the last mark. We were 572 miles from Honolulu

and had flown 1,840 miles from Alameda during the night.

Outside it was clearer now; warm pink rays of the still invisible sun pierced the darker blood red at the horizon. The colors from the first rays were magnificent, hardly definable in their rapid and seemingly endless procession of change from pale pink pastels to deepening gold until the sun itself burst forth in blinding brilliance.

By our watch it was 8:15 o'clock, Pacific Standard Time.

A while later Runnels handed Captain Tilton a radio message from Honolulu, placing us 287 miles from Pearl Harbor.

The Clipper was in no mood to tarry. Her motors were not tired and their song was the same as it had been since our take-off. Billowy clouds were everywhere and the water was not visible often.

We flew on.

HAWAII THE FIRST LANDFALL

Captain Tilton came off the bridge again and said we should be sighting Mauna Kea, rearing up 13,825 feet on the island of Hawaii. All eyes were ahead. We could see nothing but clouds and more clouds. Captain Tilton was the first to speak. It was 10:08 Pacific Standard Time.

"There's Mauna Kea just west of south of us."

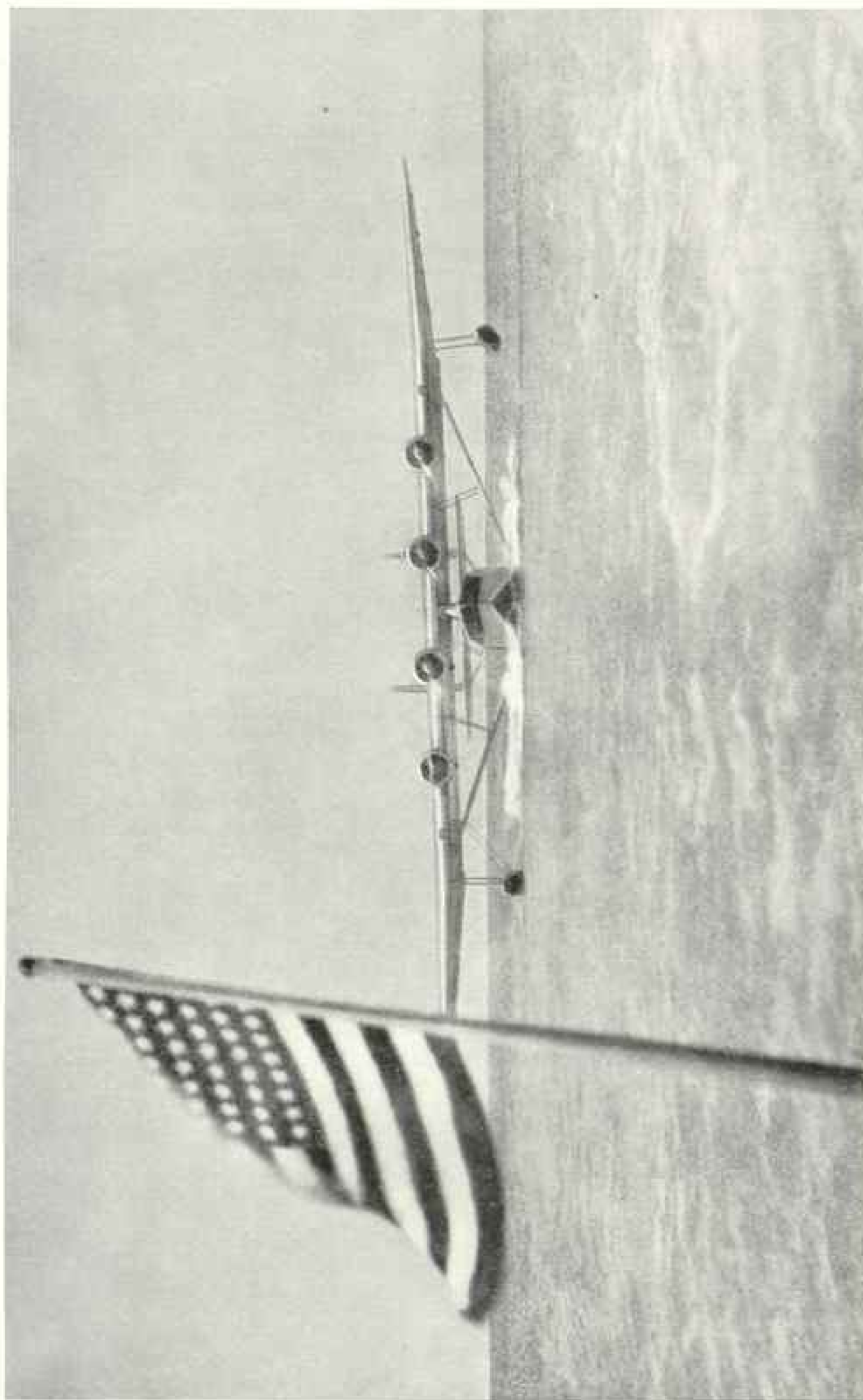
Ingram sighted it immediately. Canaday confirmed it and from the bridge there was a signal that a landfall had been made. We could see nothing.

Finally, with the Captain's finger making it out for us, we saw a slightly darker haze amidst billowy clouds. There was Mauna Kea, but a landlubber would have passed it by. Only the practised eyes of these air mariners would recognize it as land.

Our longest over-water jump was done, but Diamond Head lay nearly an hour away. This hour seemed endless. Those in the crew off duty were shaving and changing back to blue uniforms. We awaited our turn to freshen up.

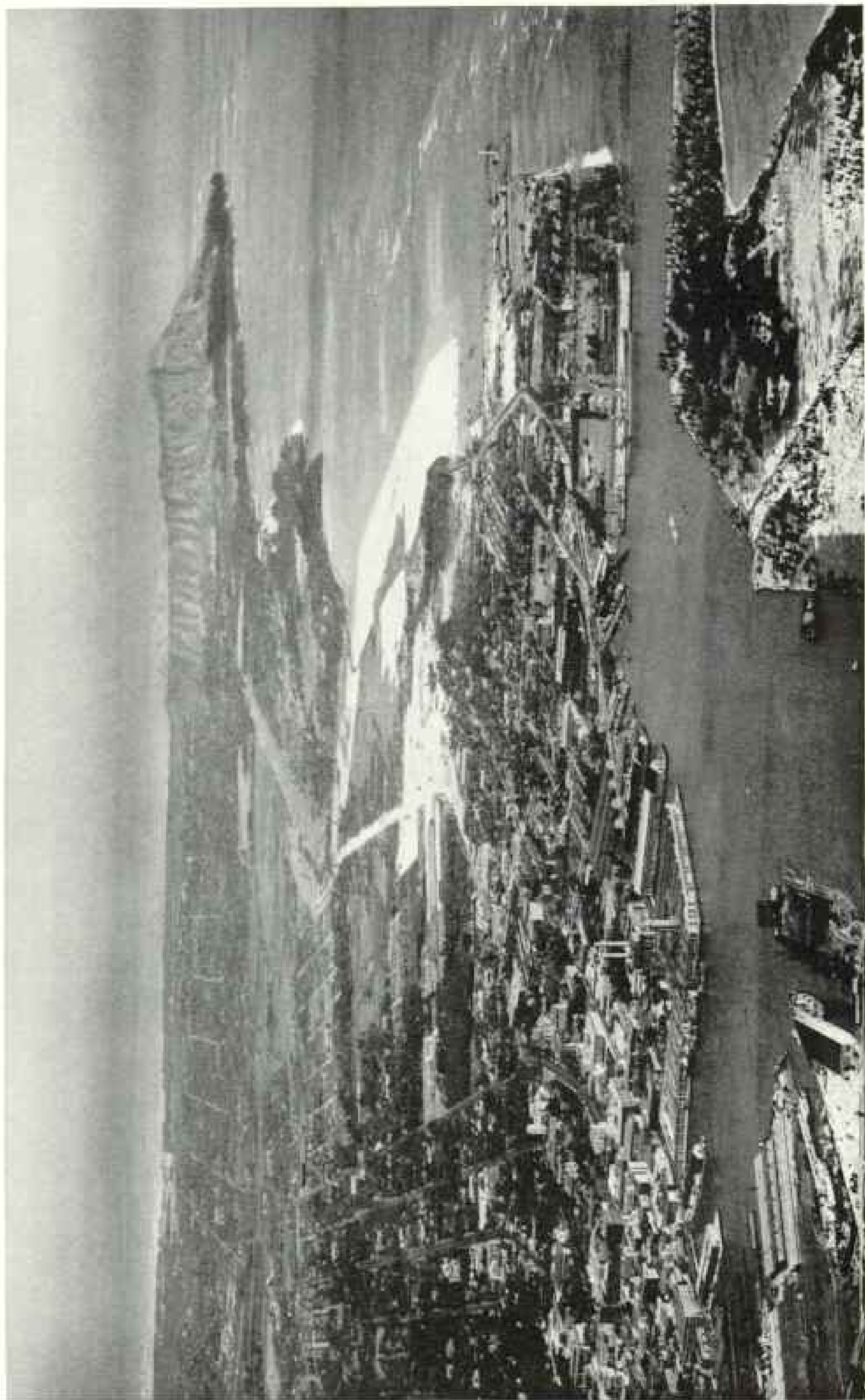
After a while we began to descend, slowly, not for a landing but to get below the cloud bank. Cautiously we let ourselves down and far ahead loomed lower peaks. Under the cloud bank it was dreary and moist.

As we came lower, it was noticeably warmer in the Clipper. The sudden change seemed oppressive. Then, just off our right



BLAZING AN ALL-AMERICAN TRAIL ACROSS THE PACIFIC OCEAN

Pioneer of the new route was the Pan American Clipper, called "The Flying Gas Tank" by those who knew her best. She made the first flight for so large a ship, 18,000 tons, from the mainland to Honolulu and back. Then she blazed the way to the island bases of Midway, Wake, and finally Guam, returning to San Francisco each time and taking different officers so that crews might be trained. This veteran Sikorsky with its pontoons can be distinguished at a glance from the much larger 25,000-ton Martin-built ships being used in regular service—the China, Philippine, and Hawaii Clippers (pages 671, 673, 676, and 682).



Official Photograph U. S. Army Air Corps

HONOLULU IS NOW ONLY A "SLEEPER JUMP" FROM SAN FRANCISCO, 2,400 MILES AWAY

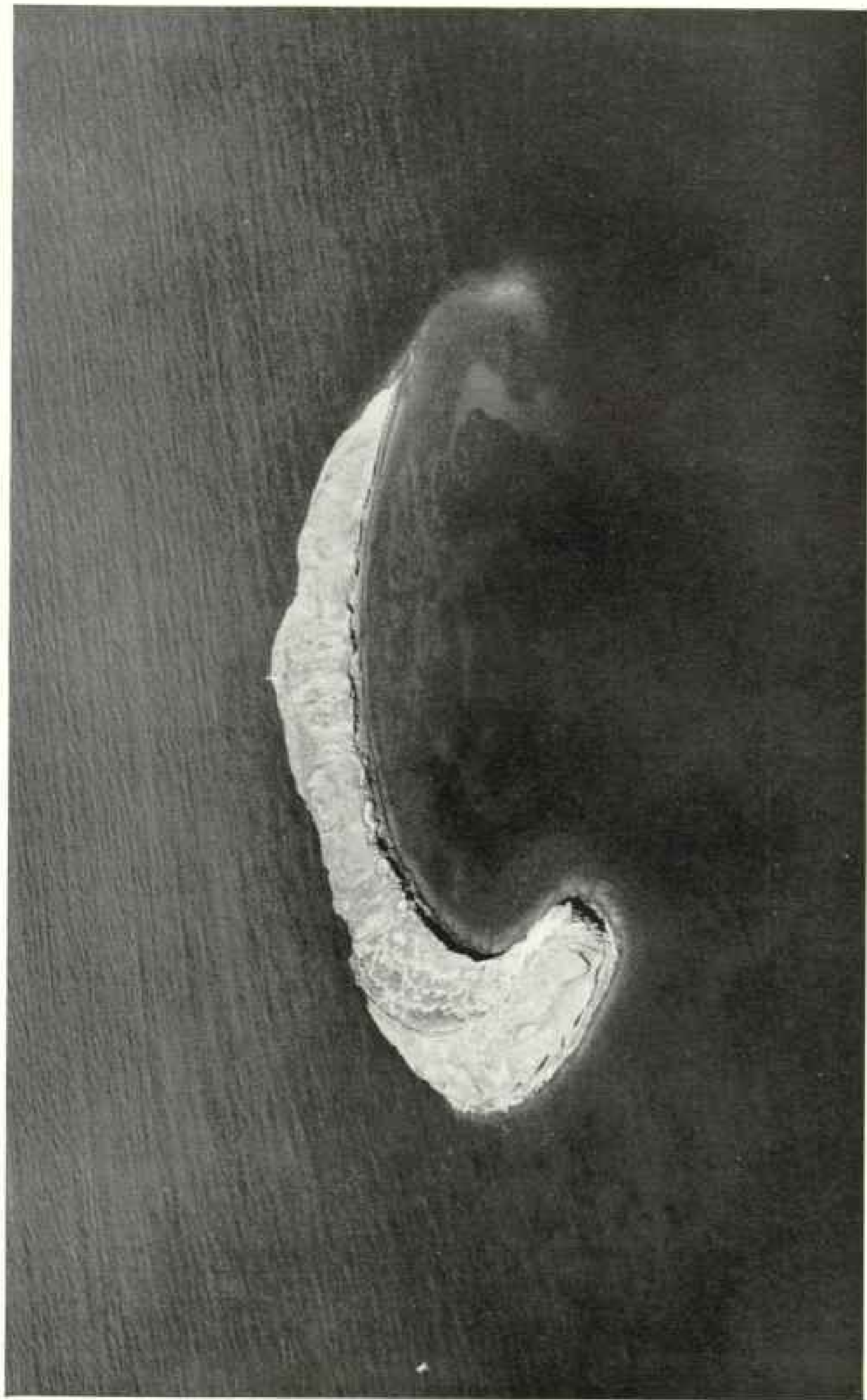
The author left Alameda Airport, California, by Clipper just after 3 o'clock one afternoon and reached Hawaii about breakfast time the next morning. On the longest over-water hop on any air route in the world he calmly slept amid mail bags (page 677). The docks and business section of Honolulu appear at the left, beyond the harbor. Like a crouching lion (upper right), lies the extinct crater of Diamond Head, where the homeward bound Clippers pass out to sea (page 706). In a curving indentation just this side of Diamond Head is the world-famed beach of Waikiki.



Official Photograph U. S. Army Air Corps

KAUAI, "THE GARDEN ISLAND," IS A PARADISE OF PINEAPPLES, SUGAR CANE, CANYONS, AND BEACHES

Fourth largest of the Hawaiian Islands, it lies athwart the Clipper route from Honolulu to Midway. Its ancient volcanic heights have been weathered into deep gorges which suggest miniature Grand Canyons (page 683). "The soil," observed the author, "is a deep, rich brown and where there is no foliage it has a reddish purple cast." The central parts of the island, seen from the air, seemed "chocolate-covered mounds of pistachio ice cream, melted down." One of the finest beaches in the Territory of Hawaii is here, in the curving sweep of Hanalei Bay.



Photograph by J. J. Todd

A RUINED AND HALF-DROWNED VOLCANO STILL BEARS A ROCKY CRESCENT ABOVE THE SEA

Between Maui and Kahoolawe in the Hawaiian Islands lies the barren, broken crater of Mohokini, like a writhing sea serpent turned to stone. Atop its curving, craggy spine stands a guardian lighthouse, a mere pin-point in this aerial picture.



130-FOOT WINGS OVER THE PACIFIC

The China Clipper races a phantom plane, as fleet and as huge as itself. Except for a shadow cast on water or clouds, the Clippers are usually alone in a lifeless void between sea and sky on their long flights over the largest of oceans, as ships are sighted only at rare intervals. Flying high in the light of the moon, passengers sometimes observe a "moon bow," a luminous ring encircling the shadow of the ship on the clouds below (page 675).

wing tip, was land—we were nearing Honolulu. The earth was rich brown, coppery, the foliage verdantly green.

We were surprised at the mountainous appearance of the islands. And the white foam at the water's edge as it broke against the shore told us it was a rocky coast below. As we dropped lower, wispy clouds swirled around us—and ahead was Honolulu (page 679).

We looked at our watch. It was just 20 hours and 14 minutes from the time we had taken off from Alameda Airport.

Captain Dahlstrom was dropping lower, scanning the scene below, then speeding the Clipper, surging us up into the sky as he sought more altitude. Both he and Captain Tilton were at the controls. Tilton, having landed here several times before, was showing Dahlstrom the course and pointing out obstacles.

We flew low over land and could make out people waving to us. The Clipper was out over the water again and a number of Navy planes from the base filled the sky to the right and left of us. One or two zoomed in closely, apparently taking pictures. Each pilot waved in salute as he dived under or above us. The Clipper maintained a steady course.

Just over the naval air station, we turned and started to come in. Lower and lower we flew. The motors were louder now, tuned to emergency or take-off position. These great ships must not be out of control at take-off or landing. Down we glided. Everyone was sitting in his place. We hovered for seconds over the water. Now that we were below the horizon we saw that we were moving swiftly.

Swoosh! Water splashed against the windows and our first leg was done. Alameda to Honolulu, after lunch and before breakfast. It was 9:15 a.m. locally—11:45 a.m. Pacific Standard Time.

As we taxied inshore and were towed to the dock there was scarcely a wave of a hand or a murmur from anyone. But the instant the crew, led by Captain Tilton, appeared through the after hatch there was a sharp, explosive round of applause as if a cue had been given.

Then all aboard were decorated with flower leis. The quietness and restraint, yet the lovely gesture, impressed us all.

It was a drive of several miles into Honolulu proper, over narrow, winding roads. The Captain suggested we get some rest and

we should have done so, but no one seemed anxious to sleep.

Visiting the more familiar landmarks in Honolulu occupied most of the afternoon, but everyone returned to the hotel for dinner and retired before ten o'clock. Stand-by was set for 4 a.m.

It was moist and dark when we were called. Breakfast was waiting, and lunches and vacuum bottles for our flight to Midway had been prepared. Without delay we ate and were on our way to Pearl Harbor. Arriving at the base, we found the Philippine Clipper moored offshore, her riding lights agleam. The water suggested a mill pond; it was without a ripple. Dawn was half an hour away.

THE SMART CLIPPER BECOMES A FLYING FREIGHTER

We found that all the attractive furnishings had been re-installed while we were at Honolulu, but onto these had been piled foodstuffs of all sorts for Midway and Wake. Fruit and vegetables, packing cases and other bundles, together with the combined odors, suggested the back room of a country general store. The smart Philippine Clipper was flying freight.

With difficulty we found a place to sit. Two more had been added to our personnel, bringing our total to fourteen. We were returning one man to Midway and taking another on to Wake.

Now all motors were warming and we skimmed along the water. Locally it was 6:22 a.m. Midway was 1,304 miles away. The breeze had freshened and the sky was lighter. The deeper growl of the motors caught our ears; we were starting the run for take-off. I checked my watch.

Faster and faster we raced—not much splash on the windows here; the water is too smooth. We were hurtling now and the motors were ascream. The land dropped away; we were off in 47 seconds.

We turn to our new flight companions. One is asleep, but the other is peering out the windows, his beady eyes glowing. He is a short Hawaiian, about forty-five years old. It is his first flight, he says, and his first trip to Wake Island. He is an expert dynamiter and is going out to blast coral heads from the lagoon there.

This leg of the flight is not so barren of interest as the others. There are several islands along the route. Soon, on the right, we are passing the island of Kauai. Several



A MIXED FOURSOME ON MIDWAY'S "GOONEY GOLF COURSE"

What the penguin is to Antarctica the gooney is to the Midway Islands. This comical bird, as big as a goose, is unafraid of man; often two or more follow the golfers, clacking their bills companionably and rubbing their heads against the men's legs. Players get plenty of practice with the niblick, as the impromptu links is one big sand trap.



"BE SURE YOU HIT THE RIGHT BALL, MISTER"

Will it be a good iron shot or a badly scrambled egg? The young gooney looks a bit worried. But players are careful not to harm the birds, which are assured sanctuary here at Midway by the United States Government. Cats and dogs are not allowed.

of the gorges suggest miniature Grand Canyons. The soil is a deep, rich brown and where there is no foliage it has a reddish purple cast (page 680).

Just beyond Kauai, to our left, we see Niuhau, but most of it is hidden by low-lying clouds. The sun is bright and the clouds below us resemble huge puffs of cotton.

RAIN OBSCURES THE SEA

Before we realize it we are in a squall and rain shuts out the sea from our sight. The air is rough, but except for an even rise and fall, there is no sign that we are being buffeted.

Still it is a different sensation from the steady, even riding we have experienced thus far and, recalling that it is the first flight for the little Hawaiian dynamiter, we look over at him to see how he is taking it. With a blanket drawn over his shoulders, he is sleeping, completely relaxed.

We were in the squall for more than two hours and did not see any of the other islands that were on our course.

A number of times Captain Tilton climbed the sky to 11,000 or 12,000 feet seeking more favorable winds, but finally we dropped to within 1,500 feet of the water where the air was smoother and we seemed to make better time.

Occasionally now we could see the water, the whitecaps, noticeable from this height, indicating the sea was running high.

Life on the Clipper was calm. At one time Captain Tilton was reading a newspaper in the lounge during his off-watch period. At another, Canaday and Crago were eating lunch and, despite the roughness outside, they had no difficulty drinking their coffee and soup. The size of the Clipper ship seemed to make it ride the rough air better than any other plane we had ever flown in.

We made three broadcasts during the morning and listeners heard how the Philippine Clipper was flying serenely out over the Pacific through a squall.

About 3 o'clock in the afternoon, we flew out of the squally weather into a hazy, overcast sky. The sun was shining, but its rays were foggy and blurred. Despite the rough weather we were more than half-way to our goal. The sun, high in the sky, cast the shadow of clouds on the water and we were fooled several times into thinking land was not far off.

Later, what a thrill we experienced when Captain Tilton, after a moment or two of steady gazing, leaned over to Captain Dahlstrom and pointed to what we thought was another cloud shadow!

"There's Midway," he shouted.

It's a long way off and so flat that we privately believe it is just another cloud shadow that will disappear when we approach. Nearer and nearer we fly and now there is no doubt—land is ahead!

We drop lower and a foamy reef is beneath us. Inside, in contrast to the darkness of the ocean, we see clear water, suggestive of an artificial swimming pool. Gleaming white sand is visible down through the clear, blue-green water for some distance from shore (page 690).

We are over the land now and, even so, how small a spot it is in all this great expanse of ocean! The main island (Sand Island) is a mere five miles in circumference.

BIRDS, AND A CABLE STATION

On the lagoon side, we make out twelve or fifteen yellow buildings topped by red roofs, radio antennae, two water towers, and a pier running out into the water. There is little sign of foliage. We swing down to the far end of the island and it seems alive with birds. Midway is a Government sanctuary for them, we are told (pages 667, 686, 692, and 693).

Turning back, we fly over an area thickly grown with trees on the other side of the island. There is located the Commercial Cable Company station, we learn, its representatives having occupied Midway for more than thirty years.

Captain Tilton signals that we are to land. Everyone takes a seat. Swiftly we come—gently we hover—splash, skip, splash—swoosh! Our second leg outbound is completed. The Philippine Clipper is at home on the waters of the sparkling blue and white lagoon at the Midway Islands, Pacific Ocean, 3,708 miles by Pan American route from the mainland of the U. S. A.

We taxi in and, as at Honolulu, a boat puts out to attach mooring lines. We are drawn in, our nose snubbed to the barge. Tanned, husky youths come aboard through the forward hatch and greet the crew. They are eager to get mail and news from home.

You look in wonder at these chaps who willingly maroon themselves out here for six months at a time. It is splendid ad-



A TOWN SPRINGS UP IN "GOONEYLAND"

Neat yellow houses sprouted overnight on the sands at Midway, previously occupied only by sea birds and a lonely cable station. Prefabricated buildings and furnishings—complete to the last ash tray and cake of soap—were unloaded from the capacious hold of the SS. *North Haven* and set up on Sand Island to form the mid-Pacific base of Pan American Airways. With a windmill and a solar heating system, sun and wind are harnessed to give hot running water.

venture—this building and maintaining a civilization on a small island in mid-ocean—but you question whether the isolation isn't boring and lonely. They all appear fit and rugged and when later you learn of their routine you come to understand there is little time for loneliness and none for idling.

CREW DOUBLES ISLAND POPULATION

The coming of the Philippine Clipper, with its personnel of 14, doubled the colony's population. The cable station on the far side of the island had a total of 23, but Pan American's Midway base was operated by 14 men.

Our broadcasting done for the day, we went ashore. Despite the wind, it was warm, and two of the officers, doffing their clothes and diving from the wing of the Clipper, splashed in the clear water. Fish swam all about and for twenty or thirty feet out from shore, the bottom was clearly visible.

The roar of the surf on the reef came faintly to us and we could not help visual-

izing that in no time at all this splendid beach would be a popular vacation spot.

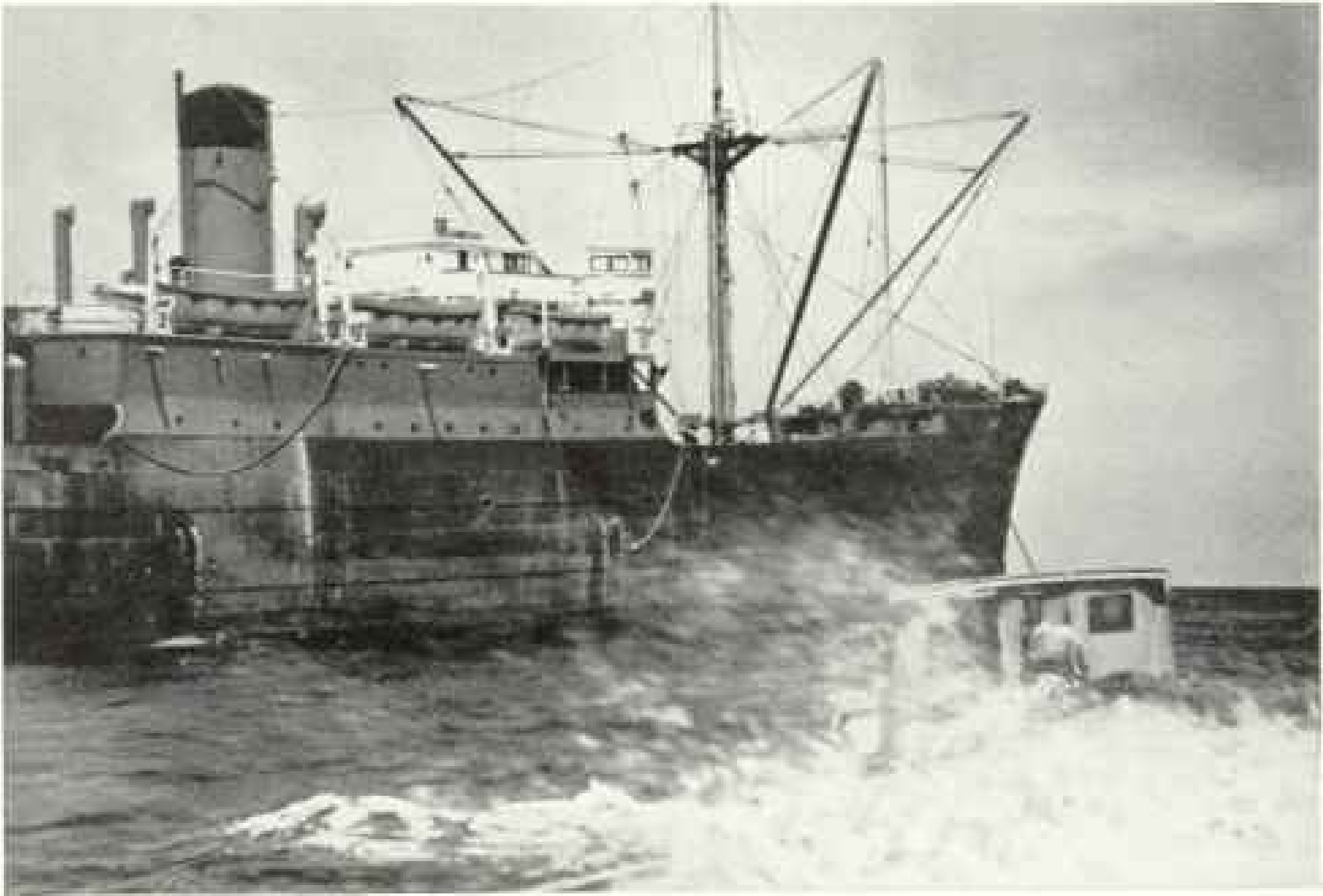
On shore we found the sand was deep and heavy. A boardwalk was to be the main street, but on our visit it was not yet constructed. A tractor drawing a sledge ploughed from the end of the pier to the group of buildings inland.

Entering the one to which we were assigned, we found small rooms equipped with all-metal furnishings finished in walnut. Down the central hall was a shower room and lavatory. All the comforts of home are at the disposal of these chaps housed at Midway.

BETTING ON THE "GOONIES'" MIGRATION

It was an hour or more before dinner and several of the boys offered to take us across the island to the Commercial Cable Company's compound.

As we walked through the sand, birds were everywhere, particularly "gooney birds"—the Laysan albatross. They are black and white, with a glossy coat and a wing spread of several feet (667). They



TOSSING IN THE SWELLS FOUR MILES OFF MIDWAY, THE "NORTH HAVEN"
UNLOADS A VILLAGE

A saga of modern pioneering is the story of this steamer's voyage in 1935 to transform tiny, desolate islands into up-to-date communities and way stations for transpacific air travel. Coral reefs made it necessary to anchor offshore and transfer cargo in a heavy swell, with constant danger that a ten-ton tractor or piece of machinery would crash through the deck of the lighter.

are web-footed and waddle, duck-fashion, when they walk. They have long beaks which they clack and, around their eyes, the marking suggests the use of make-up.

Each year they fly in from the sea, mate here, and hatch their eggs. When the young are grown they leave, not returning until the next year at the same time. The men at the Commercial Cable Company station have betting pools to determine the date the goonies will appear.

Wherever the goonies decide to nest in the sand they do so, even though it may be the path of the tractor or a walk leading to the houses. Should the tractor come along, they refuse to move. They apparently have no fear of man. Time and again as we walked toward the compound, our companions would stop and with a stick stroke the heads of some that clacked their bills as we passed.

At times, as we passed a group, their clacking would become an insistent chorus, and we could not determine whether this was a greeting or a jeer.

We also saw some all-black goonies and noticed that the Pan American boys did not attempt to pet them. Upon inquiry, we learned that the "black legs," as they called them, were the scavengers of the flock and usually appeared on the island first. These were the black-footed albatross, a distinct species. The men warned us that the birds would peck viciously if we went too near.

This was in contrast to the black and white ones, which occasionally would follow us, clacking in an old-womanish fashion and rubbing their heads against the legs of the Pan Americans.

We noticed many holes in the sand as we walked and several times all but stepped into them. Responsible for these is another sea bird, a shearwater, called the moaning bird by the island staff.

By day these birds and some of their petrel relatives dig themselves into the sand. By night they wheel through the air, apparently blind, flying into anyone who is abroad or smashing out their lives against the build-



AT WAKE ONE MAY FISH AND SWIM AT THE SAME TIME

One amphibious member of the Pan American base staff introduced a technique of diving under the water and shooting fish with a steel arrow propelled by rubber bands. This is a porcupine fish, studded with sharp spines. The aquatic hunter, wearing underwater goggles, is Hope Biggers (page 693).

ings and poles. The call of the wedge-tailed shearwater, most common among them, is given throughout the night; the sound is a moan like the cry of a fretful baby.

We passed through a grove of trees and the birds were thick. There were rails, canaries, boobies, frigate, and bosun birds, but the goonies and moaning birds were most numerous.

Arriving at the Commercial Cable Company's compound, we found sidewalks, concrete buildings, a vegetable garden, and tennis courts. On the advice of the United States Department of Agriculture, the cable company had imported soil, bringing in a quantity on each visit of the supply ship until they now had 2,500 tons of earth on the island.

They had also imported ironwood trees that grow in a small amount of soil and a bunch grass that was planted in clumps and spread, helping to keep the fine sifting coral dust and sand from blowing into everything when the wind was high.

From Laysan Island, 400 or more miles eastward, was brought here years ago the curious Laysan finch, like a yellow-breasted

sparrow, but belonging to a family of birds peculiar to the Hawaiian Islands. With these there were introduced also the Laysan rails. The rails are almost tailless and cannot fly. In some respects they suggest young chickens as they run swiftly around under foot, pecking at the ground.

Domesticated canaries also were introduced and have established a thriving colony in the wild.

It was growing dark when we started back across the island. In the dusk, we could understand and sympathize with the Pan American staff's distaste for the moaning birds. They do swirl into your face and the holes they dig are not easy on ankles when you stumble into one of them in the dark.

THE MATING DANCE OF THE GOONIES

As we walked back through the small grove of ironwood trees, only our flashlight beams saved us from stepping on the little birds resting in the path. On the other hand, the clack of the goonies' bills would usually warn us off if we came too near.

Reaching the other side of the woods, we



NOT THE EGGS OF SOME STRANGE BIRD, BUT GLASS NET FLOATS WHICH DRIFTED HALFWAY ACROSS THE PACIFIC FROM JAPAN

Hundreds of the shiny hollow balls lost by Japanese fishermen have been washed ashore at the Midway Islands where they are prized as souvenirs by the Pan American base crew. The glass spheres ride intact through heavy surf pounding on a coral reef. Caught in the currents of the wide Pacific, they wander thousands of miles, many even reaching the coast of the United States.

came upon several gatherings of goonies and a sight that was both beautiful and humorous—their mating dance. Two goonies stand face to face, wings partially spread. A huge circle of their fellows around them carry on an incessant chant and clacking.

As graceful in dance as they are clumsy in walk, the two partners rear their heads toward the sky, their necks arching swan-like, then duck to the ground and, raising, touch beak to beak (page 693).

Another movement of the head then begins, the pair ducking their beaks first under the left wing, then the right, rearing their heads again to the sky—two dancers matching step for step. This goes on for several minutes, the clacking of the circle reaching a crescendo as the dancing pair increase their rhythm and motion.

In one or two of these circles it was noticeable that one of the dancers would stop as the dance progressed and always—the eternal triangle—there was another fellow waiting on the sidelines to take up the dance and steal the partner.

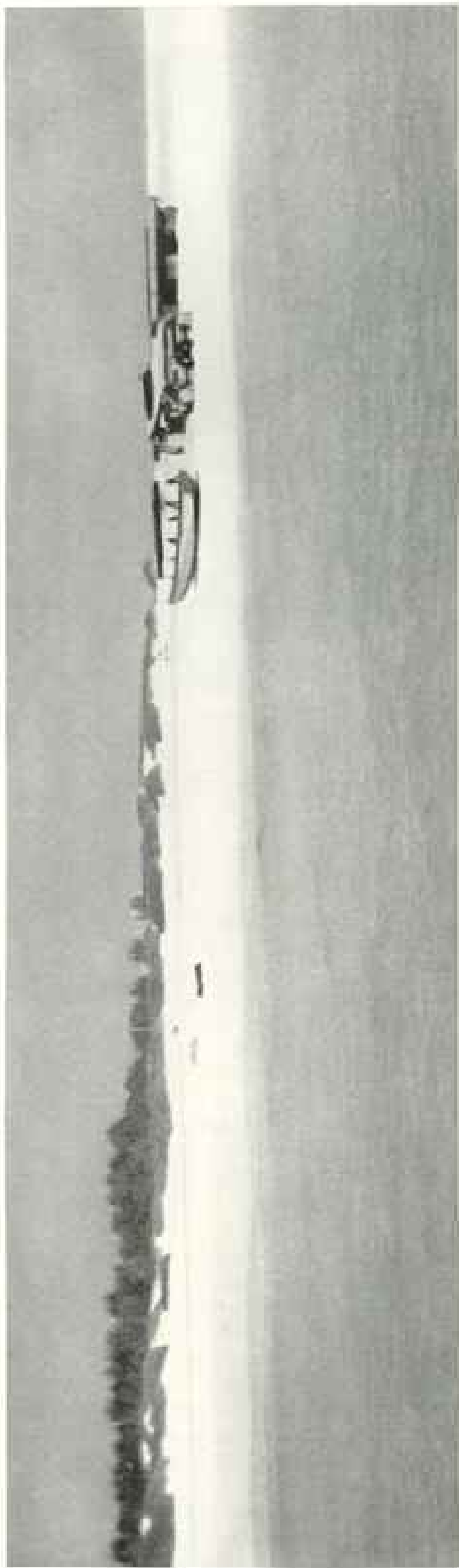
At the recreation house, most of the staff were sitting or standing around the radio, listening to a news period from a station in faraway Hollywood. The lights, the clean rugged faces, the easy conversation and furnishings suggested a club room most anywhere at home rather than on this out-of-the-way coral dot in mid-Pacific.

The meal was excellent and though no supply vessel had visited Midway for more than six weeks, we had everything we might have requested at home. In the modern refrigeration plant perishable foodstuffs can be kept fresh for months at a time.

After breakfast next morning, our luggage was put aboard the sledge. The tractor's motor made a noisy racket, but it is the pride of the Midway staff; without it, little could have been accomplished (691).

We got aboard and though it was not cold, the chill air and the whiteness of the sand suggested a northern climate rather than an island five degrees above the Tropic of Cancer.

All were on board after several boat loads, and the engines of the Clipper took

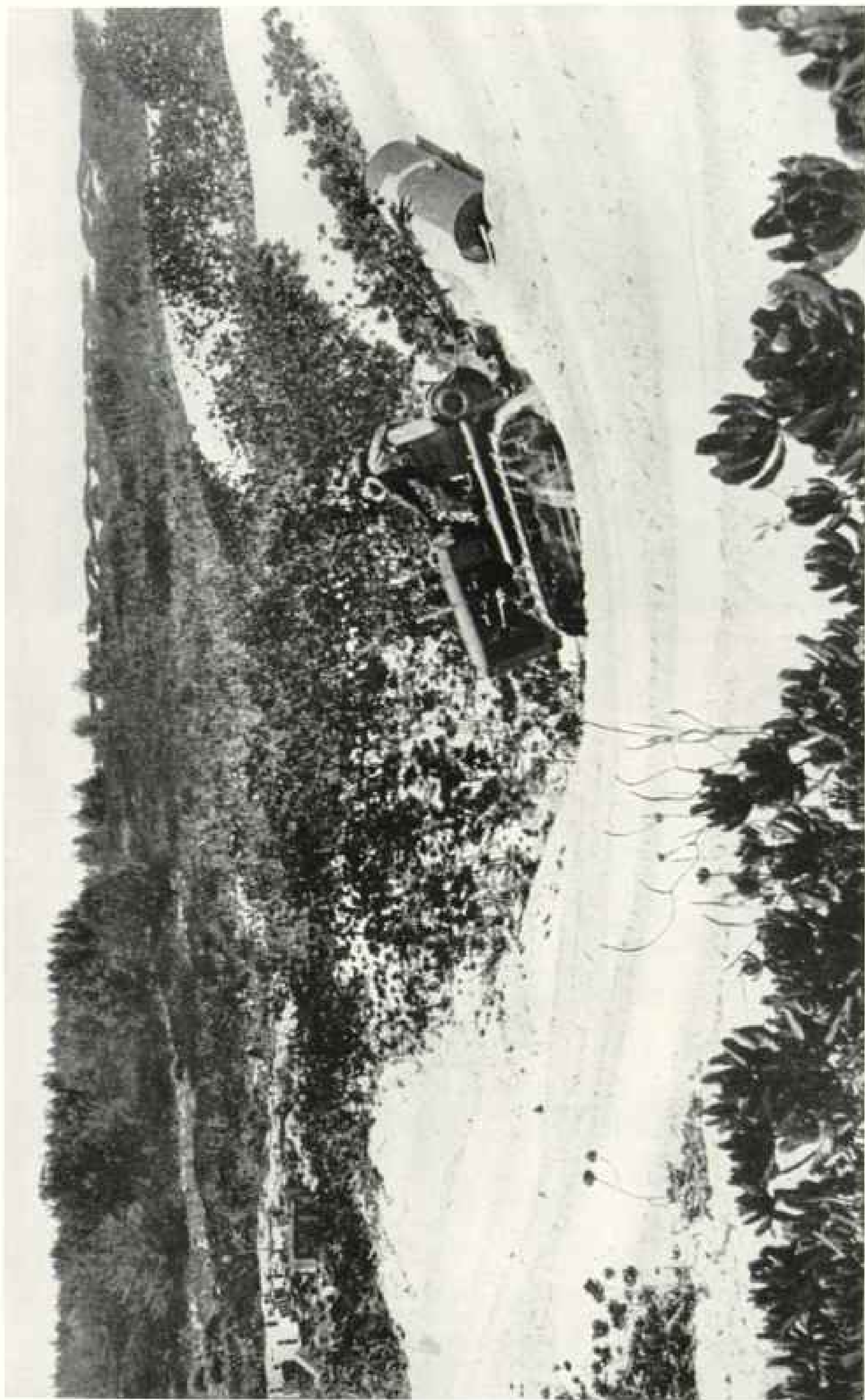


WITH GLEAMING WHITE CORAL SANDS AND BLUE-GREEN LAGOON, MIDWAY INVITES AIR-BORNE VACATIONISTS.



UNLOADING FUEL FOR THE CLIPPER SHIPS AT A MID-PACIFIC GASOLINE STATION, THE MIDWAY ISLANDS.

Though they lie in the midst of the Pacific, the islets comprising this coral atoll, with their excellent fishing and swimming, are only two days by air from San Francisco, now that the Clippers are maintaining a weekly schedule to and from the Orient.



SMOOTHING OUT THE WRINKLES IN THE FACE OF NATURE TO MAKE WAY FOR BUILDINGS AT THE MIDWAY BASE

Down one side and up the other a rough-riding "cat-skinner" drives his "cat" (as the crew called their caterpillar-type tractor). Leveling building sites, hauling heavy loads, serving as an all-around beast of burden, this big iron horse helped establish the Pan American base on aptly-named Sand Island.



THE GENTLE LOVE TERN MAY ALIGHT ON YOUR OUTSTRETCHED HAND

These graceful birds have a quiet curiosity which is particularly appealing in contrast to the screaming of the sooty terns, the noisy beak-clacking of the goonies, and the moaning of the wedge-tailed shearwaters. Snowy white, with jet-black bill and eyes, the love tern borrows beauty from the water when it flies over a coral lagoon; the under-wings seem a delicate blue or green, a reflection of the water's tint (page 693).

up their tune again. We taxied for fifteen minutes, waiting for the light to appear, then as brilliant colors splashed the gray background of the sky, the Philippine Clipper roared off the choppy water on the way to Wake Island, 1,182 miles away.

On this, the third leg of our flight, the weather was ideal. This portion of the course is out of the way of the regular ship lanes and there are no islands to be seen.

TALKING "OUT OF TODAY INTO
YESTERDAY"

Less than two hours out of Midway, we ran into difficulties on our broadcasting schedules. We had left Midway at dawn Thursday and when we were an hour and a quarter in flight, Ingram informed us we had crossed the International Date Line and it was now Friday. At one moment, it was 6:52 a.m., Thursday, and the next it was 6:53 a.m., Friday. From this point on, whenever we broadcast, we were talking out of today into yesterday.

Several times we explained the situation, but it must have confused casual listeners

to hear someone talking about Friday, December 13, when to them it was still December 12. Messages transmitted between us and NBC often proved confusing. Imagine, for example, receiving a radiogram Friday morning telling us to originate a program for Thursday afternoon!

This flight between Midway and Wake is the shortest hop crossing the Pacific. The sun was still high eight hours after our take-off when, from 8,000 feet, we saw the white foam of a semi-circular reef and Captain Tilton told us Wake was ahead.

Before the coming of the SS. *North Haven* in May, 1935, Wake had been an uninhabited coral atoll described as barren and overrun by Polynesian rats, birds, and hermit crabs. Accordingly, we expected a night at Wake would be most uncomfortable (page 687).

With such thoughts in mind, we were totally unprepared for the model community that had blossomed there in seven short months. As the Philippine Clipper crossed the reef and flew over the lagoon,



"PARDON ME, BUT MAY I CUT IN?"

Even among the gannets of Midway Islands the eternal triangle appears! While two touch beaks in solemn bliss in the mincing measures of the mating dance, another fellow awaits his chance to steal the partner (page 689).

we could see an American flag floating lazily from a pole in the center of the buildings. White lines, apparently paths, could be seen amidst the foliage (page 695).

The water in the lagoon was as clear as that at Midway and moored offshore were a sailboat and sea sled.

A long ramp led from the shore out over the water to a landing barge. At the end of the walk on a pole was a wind sock, gently swaying in an indifferent breeze.

From the sky Wake suggested a finished community—not a frontier town in the making. Was our mid-Pacific resort already an accomplished fact? Lower and slower we flew over the lagoon and now the little Hawaiian dynamiter was peering out the lounge windows intently.

The Philippine Clipper turned, then slowly descended, slipping into the lagoon waters. We clambered out the afterhatch and, looking down into the clear blue-green water, could see the coral heads which were soon to be removed, mottled green and ugly. But our landing point had been carefully selected and not one of them was directly in our path as we taxied in.

The air was that of the tropics—warm and pleasant. The sun was hot. White terns flew over the water and we could not help but call out at the beauty of their under-wings, a delicate blue and green.

But the crew laughed at us. Terns, they said, are pure white or sooty. The blue under-wings and breasts we saw were a reflection of the waters of the lagoon (page 692).

A FINISHED COMMUNITY OF SEVEN MONTHS

We were nearing the barge now and a large man was standing talking to a smaller man dressed in uniform blue. He waved across the water to Captain Tilton and his big ruddy face creased into a smile. He was George W. Bicknell, in charge of Wake Island for Pan American Airways. He had come to the island with the SS. *North Haven* and was to return to the United States with us. The smaller chap was Hope Biggers, who had arrived at Wake on the China Clipper to relieve him.

As we left the ship, greetings and introductions were made. Halfway down the

ramp, a Chinese boy held a tray of cigarettes. Smoking is not allowed on the Clipper ships and this thoughtful preparation by George Bicknell is typical of our stay.

Heavy sand is no problem here and everywhere we turned Wake seemed an established settlement.

Wake Island rails, larger than those of Midway, ran about here and there, but not underfoot. Here at Wake, they give a definite impression of barnyard fowl.

RAT SHOOTING AN EVENING PASTIME

Now and then we saw furry, short-tailed rats, but with the coming of Pan Americans their numbers had been greatly reduced. Each night, we learned, there were forays on them. Air rifles were popular and, after dinner, members of the colony shot them by the score.

The Chinese houseboys, lacking rifles, had become expert in stoning the rats, felling them on the run. This ceaseless warfare, plus chemicals and poisons brought in at the suggestion of Government departments, is cutting short the reign of Polynesian rats on Wake Island.

Our host suggested a swim before dinner and off we went to the beach (page 704). Underwater goggles were produced and for more than an hour the Clipper's personnel swam about, peering down into the clear water and studying the beautiful coral formations. Small fish were all about, apparently fearless of man (page 688).

As we returned, the flag was being lowered. Instinctively we paused. No bugle was sounded and there was no ceremony. But the picture of the setting sun, Old Glory, and the Philippine Clipper at rest on the water, caused a hot surge of pride as we realized that here, under the protection of that flag, an island, worthless to mankind until a short time ago, had been made over into an aviation way station to serve ships of the air and offer a comfortable resting place in mid-ocean for travelers on their way to the Orient and beyond (pages 695-7).

After showers we were called to the recreation hall for dinner by means of a whistle. Imagine our astonishment at finding place cards, showing a sunset scene at Wake which George Bicknell had photographed. We could not help but look in wonderment at a man whose leadership had helped wrest this community from desolation, yet who found time to photograph

sunsets and make place cards for a dinner.

After dinner, we joined for a time in a rat shooting expedition. Honors for the largest number bagged were divided that night between Runnels and Harmantas. Between them they accounted for sixty.

Later Bicknell led us to a spot behind the laundry house. In the moonlight we could see chickens at roost on high perches and off to one side we heard a curious scratching, scraping sound.

Some lengths of corrugated metal roofing were moved and we saw hundreds of hermit crabs of all sizes continually crawling over one another in the damp earth. These crabs change their shells as they grow, usually taking over one vacated by an older crab. They are scavengers and are sometimes pests.

On Wake Island, Nature is truly in the raw. Bicknell explained, there being a never-ending battle between the flightless rails, the rats, and the hermit crabs. Constantly they prey upon one another. It was a pleasant relief when we returned to the recreation house.

We turned in early and slept later than usual since we were to spend the day on Wake. After breakfast, the two Captains went fishing with Biggers, the rest of us electing to tour the islands with Bicknell.

"DON'T STEP ON THE BIRDS"

Near the southern end of Peale Island, one of three composing the Wake Island group and site of the Pan American base, we came into a swarm of birds nesting in a grove of the trees called beach magnolias and sitting in the warm sand.

They were sooty terns and one had to walk with care to avoid stepping on them. They made no effort to move out of the way, nor would they squirm much if one sought to stroke them or pick them up. There were thousands of them all around, either in the air or resting on the ground. Some, more inquisitive than others, would flutter up in the air almost level with our eyes and study us as we walked. Several times these terns fluttered down and all but alighted on the extended barrel of a gun.

High in the air, wheeling to and fro, were the frigate and bosun birds. The frigates were beautiful in flight, their wings appearing to be notched. The bosuns give a curious impression of apparently flying backward. Heading into the wind, they



OLD GLORY FLIES ABOVE A PATCH OF UNITED STATES TERRITORY SEVERAL THOUSAND MILES OUT IN THE PACIFIC

Once thought worthless, Wake Island, 4,890 miles by air Clipper route from San Francisco, has become valuable as a way station on the Pan American Airways' route to the Orient. The flagpole stands beside the administration building on Peale Island, one of three coral islets comprising Wake. Until the coming of the SS. *North Haven* less than two years ago, these islands were inhabited only by hordes of rats, birds, and hermit crabs (page 692).

cut down their flying speed until they are actually borne in the opposite direction.

BOOBIES WILLING TO POSE

We came upon two red-footed boobies perched on a low limb. They are comical in appearance, having over-sized beaks and red webbed feet. Harold See, opening his motion picture camera, walked toward them. As if sensing what he was doing, the two began turning from side to side, preening and posing.

When he advanced right up to the tree, one of them leisurely spread its wings, posed for a second, and flew toward the camera and over Harold's head, as if it wished to provide a proper fade-out. The other, apparently miffed that its mate had stolen the spotlight, turned its back on the camera and finally fluttered off a short distance.

Continuing around the island, we saw rocks and shells of many hues. Once or twice we came upon tiny hermit crabs in shells as small and as pink as a baby's fingernail. It was hard to connect these

delicate shells with the monstrosities we had seen earlier.

We had been clambering over some gray rock for a short time when Bicknell stopped. "Want to climb Wake's highest mountain?" he inquired. Hot, but anxious to see everything, we assented. He turned inland, See and I following.

Our guide had taken no more than ten steps when he stopped. "Here we are," said he. "This is the highest point on the Wake Island group—twenty-one feet above sea level."

We pressed on and, rounding a turn, saw the Philippine Clipper resting in the calm waters. We had circled the island.

Our day was done and we were weary, yet eager somehow to move on. Dinner was a repetition of the night before, though the menu was varied. Soon all were in bed and before we quite realized it someone was shaking us.

"Four-thirty," said a voice. It was pitch dark but we knew that the sun was not far away. Breakfast was leisurely.



A 45-ROOM HOTEL APPEARS ON A HITHERTO UNINHABITED ISLE

This low, rambling inn on Peale Island in the Wake group is one of three complete hotels shipped from San Francisco on the *SS. North Haven* and set up at Midway, Wake, and Guam. All three places are overnight stops for the Clipper ships, both eastbound and westbound. Transpacific travelers spend only one night in the comfortable berths of the Clippers—on the 2,400-mile hop between Honolulu and San Francisco. Rooms in this hostelry have all conveniences (page 676).

During the night the Philippine Clipper had been moored offshore and it was a few minutes before the launch brought us alongside. After a little time the sun was visible and we were under way—sailing off the water and out over the reef within a minute after our run was begun.

It was Sunday morning on our side of the world—and Guam lay some 1,500 miles ahead.

SEEING THE CLIPPER IN COMPANY DRESS

For the first time on the flight we had an opportunity to see the Philippine Clipper in company dress, as those who follow us will always see it. The balance of our freight had been left at Wake.

We had been nine hours in flight when, far ahead, we saw Guam. Unlike Midway and Wake, it stands high out of the water, some 1,300 feet on the southern end which is the approach from Wake. It is surprising how far off it is visible, for after we saw it from 9,000 feet, it was thirty-five minutes before we were near enough to look down and study the terrain.

Here and there we could make out groups of buildings among the trees and fields, but it was not until we had flown for ten miles up the western coast that we saw any sort of settlement. We were over the Marine Barracks near Sumay where we were to land for the night.

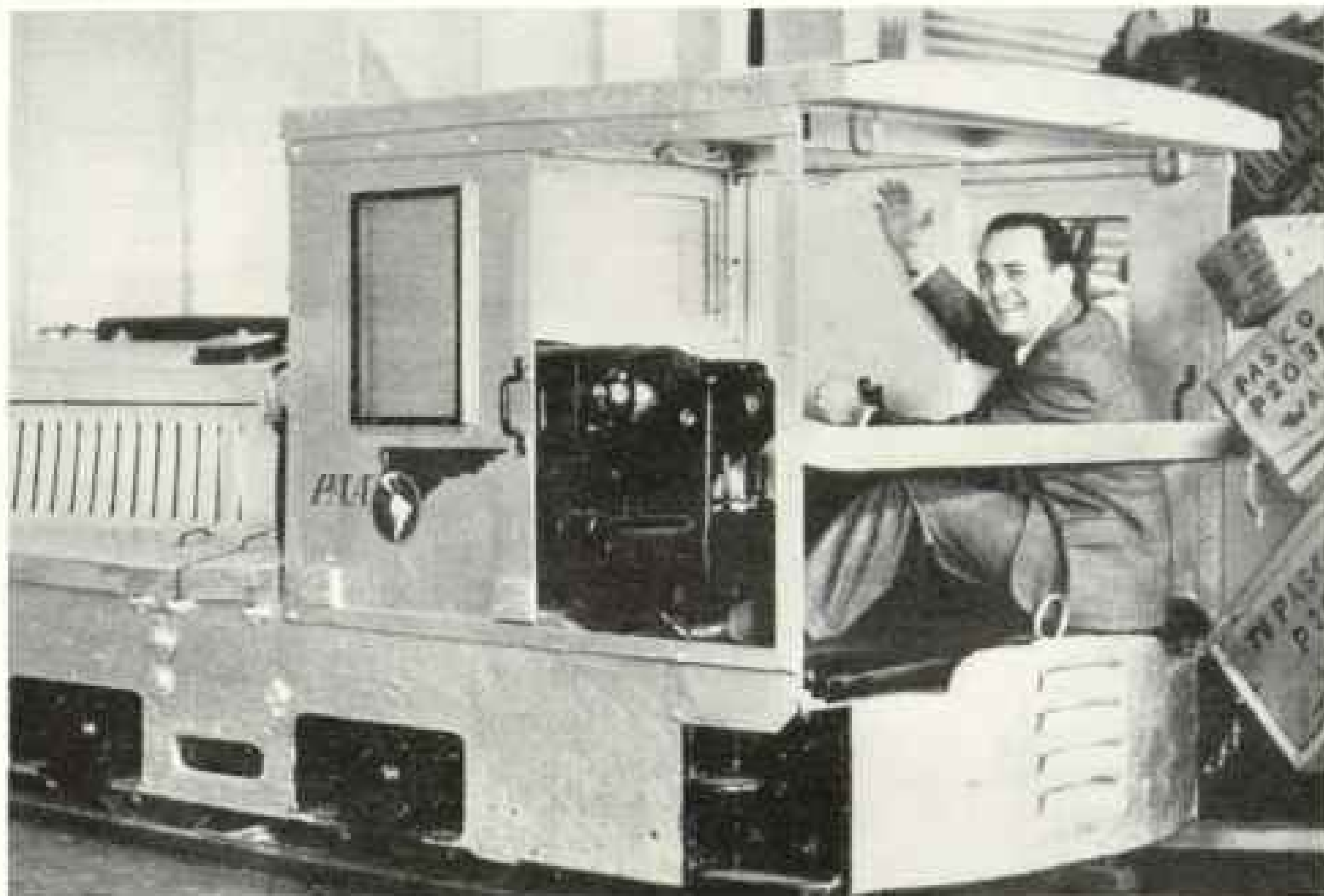
Before coming in, however, Captain Tilton continued flying north, following the coast line and turning slightly east until we were over the principal city, Agaña.

Having heard Guam described as small and isolated and having landed on two small dots in the Pacific, we were not prepared for an island so large. Guam is 30 miles long and four to eight and a half miles wide. Its total area is a little more than two hundred square miles. Agaña is a city of six thousand persons.

ASHORE AT "SPACIOUS" GUAM

At Sumay a crowd lined the sides of a mooring slip and waved as we flew lower. The water was choppy and we braced ourselves for a bumpy landing, but none came.

The Philippine Clipper entered the water



Photograph from Pictures, Inc.

WAKE MAY BE LITTLE, BUT IT HAS A RAILROAD

When a base was first established on this coral atoll, track was laid immediately for hauling supplies across Wilkes Island on the way to Peale Island, the most desirable site. A small but effective engine was provided and the transport has become a white-collar job.

as cleanly as an expert diver. It had taken us 9 hours and 52 minutes to fly from Wake.

Brown natives smiled and waved at us from the walls of the slip. Navy and Marine officers in dress whites were standing about. This was the third time a huge flying boat had come over the seas to Guam, but already such an apparition seemed as calmly accepted as the arrivals and departures at a metropolitan airport.

Until the coming of the Clipper ships, mail from the United States took weeks to reach Guam. Much of it came by way of Manila, 1,750 miles beyond by boat. We were told the average time for fast ships between the United States and Manila was three weeks, after which the mail had to be brought back from Manila on one of the three transports due to visit Guam that particular month. Now Guam and San Francisco are only five or six days apart.

Visiting Agaña, we found a main street with bank buildings, two motion picture theaters, automobile supply stores, a garage or two, and all the other shops and services necessary to a small modern com-

munity. Agaña was ten or twelve miles from Sumay, and motoring over the narrow roads we could not make much time.

Captain Tilton had advised we would have to stand by for another early take-off, so no one tarried long in Agaña.

Before dawn next day, the Philippine Clipper was lifting off the water for our last port of call, Manila. In our part of the world it was Monday. In the United States it was Sunday. As we climbed, the sun was still below the horizon, but its rays could be seen lightening the gray clouds from above.

THE HOP TO THE 7,000 ISLANDS

Although a longer hop than the one between Wake and Guam, this flight toward Manila did not seem to drag. Just after noon See called us back to the tail. He was listening to a station in Manila. KZRM there was advising that the Minister of Communications and other officials desired to greet Captain Tilton.

Here we were aboard the Philippine Clipper, 350 miles from Manila, and voices from the studios of KZRM were almost as

audible in our earphones as though we had direct telephone communication. KZRM reported the signal from our transmitter, WOEH, was strong and clear.

Two hours later we sighted land south of west of our course. We thought we were in sight of our goal, but the Philippine Clipper continued on its course.

A short time later more land loomed up ahead, but still we held our altitude and speed. Referring to our notes, we began to appreciate the statement that the Philippine Islands are made up of more than 7,000 individual islands.

Our goal was the island of Luzon and Manila Bay. On we flew and after another hour we began to drop down through puffy white clouds. We were over a large expanse of land, Luzon.

Lower we settled and soon buildings, massive white buildings, set in parked lands and along drives, were visible. Hundreds of cars could be seen on the streets below. We were flying over Manila (page 705). Descending still lower, we could see thousands of people lining the bay and boats were everywhere.

THE PHILIPPINES GREET NAMESAKE PLANE

Word came to us over KZRM. Would we remain aloft a short time and give the populace an opportunity to see the Clipper named for these islands?

We checked Captain Tilton. Obliging, he turned in a wide circle, settling lower and lower toward the housetops. Everywhere below was excitement. Automobiles stopped on the streets as their occupants stood and waved. The crowd along the bay front was a field of waving arms, white handkerchiefs, and umbrellas.

Out over the bay we turned again and began the gradual glide toward the water. Flattening out just above the surface, we hovered for a moment and then water splashed along the windows. The Philippine Clipper had landed on Manila Bay.

We had flown from Guam in eleven hours and ten minutes. Our total flying time from Alameda was 58 hours and 37 minutes.

We taxied in toward shore and boats closed in around us from everywhere. Smart motor launches alongside native sampans; snarling outboard motors bumping into paddled dugouts; tugs growling their way through the mass of small boats; police boats blasting a path through all of them.

On shore the crowd appeared to be tremendous. Eager smiling faces were everywhere, waving and shouting greetings.

Landing, we made our way through a cheering, jostling crowd and, with police attempting to clear a path, entered automobiles and were driven to the Manila Hotel. In Manila, automobiles drive to the left—English fashion.

Our schedule called for only two days in Manila, so we were glad that formal receptions had been dispensed with to let us see something of the island.

Harmantas, the meteorologist, visited the Jesuit priests in charge of the Observatory. This now is the central office of the Philippine Weather Bureau, although it was founded by the Jesuits in 1865. It is still run by them, supported by an arrangement with the Philippine Government.

The priests have gained much renown for their work in connection with the prediction of earthquakes and typhoons.

It was not a pleasing report that Harmantas gave Captain Tilton. Somewhere over the Pacific, in the vicinity of Guam, a typhoon was moving.

Lacking as yet the meteorological stations which Harmantas had been sent out to establish, there was no definite way to check the intensity or direction of the storm. Harmantas told us that, until he had more definite reports, he could not approve a take-off. We were not too depressed, however, for there is much to see in Manila.

Visiting the Clipper for tests of equipment, we would come upon people who were inspecting the ship. Always their comment was, "Think of it; they will be back in the States before Christmas!"

"The States" were twenty-one days by fast boat from Manila, but here they were aboard a craft that could return them within a week.

But we were not destined to return home for Christmas. Our stay in Manila lengthened to five days, and on our side of the world it was now December 22.

A COLD STORAGE CHRISTMAS TREE

Realizing we were to spend Christmas Day somewhere over the Pacific, the crew decided to decorate the Philippine Clipper. Guests in the hotel, hearing of the plan, took up the idea. We went shopping for a Christmas tree and found the only ones available had been shipped in cold storage



Photograph by P. Simpson

FRESH FISH FOR DINNER TONIGHT!

A fisherman with a "wind-up" like that of a baseball pitcher casts fine-meshed hand nets for small fry along the shore at Guam. Fish abound at Pan American's Pacific stations and members of the base staffs quickly became proficient at catching them (page 688).

from Oregon. Selecting one three feet high and finding ornaments and wreaths, we stored them aboard the Clipper.

That afternoon the rain ceased and Harmantas advised it was safe to take off; the typhoon had been located and was no longer directly in our path. In fact, we might make excellent time by taking advantage of the swirling winds on the outer edge of the typhoon that should be on our tail from Guam east.

We were ordered to bed at 6 p.m. and were called at 12:30 a.m. A Saturday night dance, inaugurating the Christmas season, was in progress in the ballroom of the hotel.

Breakfast was served to us in a side room and many deserted the dance floor to come in and wish good luck to the crew.

On the barge we waited, studying the black water, smooth and oily looking, until Harmantas came out from shore with the final weather report. For the three-day

delay, the crew had dubbed Harmantas "Double Zero." Now, as we were bidding him goodbye, he was frankly lonely at being left behind.

The wind sock on the barge was lifeless when, just after 2 a.m., the engines were started. We cast off quickly and, for thirty minutes, Captain Tilton taxied over the water while Captain Dahlstrom and Second Officer Weber peered through the blackness.

Brilliant lights in the leading edge of the wing pierced the darkness and Weber, with a huge handflash, sought out objects in the bay, darting the beam this way and that as we moved slowly over the water. A mist hovered just above the surface and the rays did not seem to penetrate it sufficiently for the Clipper to make a run for take-off.

Overhead the sky was clear and starry. Outside the breakwater we encountered freshening breezes and passed several heavy destroyers and light cruisers of the Asiatic Fleet. Code messages were being sent from



Photograph by P. Simpson

IN GUAM IT'S WINGS OVER WATER BUFFALO CARTS WHEN THE CLIPPERS PASS

Beside the farmer's wife, with her sun-umbrella, is a lantern to be lighted when night overtakes their slow-moving vehicle.

their tall masts and these blinking lights seemed to discuss our preparations for take-off. Several of the destroyers pointed their tremendous searchlight beams along our course, helping to pierce the haze.

Here and there buoys blinked and once or twice we all but ran onto some markers not illuminated. Moving up the course, our own lights picked up a native sailboat, unlighted, tacking back and forth in the light breeze.

We had reached one end of our course now and, turning about, idled the engines for a moment. Then far down the dark lane of water a green Very shell momentarily lighted the scene. It was from the Pan American crash launch, telling Captain Tilton his course was clear and that he was to take off in the direction of the light.

A SAILBOAT CROSSES CLIPPER'S PATH

The four engines roared and we were up on the step. Faster we moved over the water, cruisers and destroyers whisking by as we gathered speed. Once our motors slackened and we swerved to one side. The unlighted native sailboat, still seeking a

breeze, had unwittingly recrossed the path of the Clipper. Fortunately, the wing lights picked up the outline of its sail in time.

But now the engines resumed their pull. Faster and faster we skipped over the water, and at 2:43 a.m. Manila time, Sunday, December 23, we were in the air and on the way home.

As the lights of Manila dropped from us, we looked up into the sky. A quarter moon, lying on its back and giving the appearance of a huge saucer, rose to greet us, mockingly climbing higher as we sought altitude. At 10,000 feet we leveled off above the clouds and under the star-studded canopy of the night.

Harmantas had not been able to advise us exactly about wind direction and our flight was not a fast one. It was 13 hours and 57 minutes later when we came to rest on the waters of Port Apra at Guam.

We knew that the China Clipper was supposed to be en route from Alameda and the thought that these two air liners would pass in flight somewhere over the Pacific seemed to cheer everyone. It was estimated this meeting would take place between Wake and Midway, or that the two



Photograph by P. Singam

"RAISING THE ROOF" IN GUAM

Chamorros, as the natives are called, thatch a house with the leaves of the ever-useful coconut palm, the tree that produces the island's most valuable export product—copra. The leaves, hauled up from the ground, are laid in place by the men along the ridgepole.

Clippers might spend the night on the waters at Midway.

LOCATING AN ISLAND SPECK

Early the next morning we were off again, eager to arrive first. We were in the air at 6:29 a.m., but soon found we were flying directly into a 38-mile head wind. After eight and a half hours of flying, we still had 489 miles to go to reach Wake. This meant a night landing at Wake, the smallest base of all and therefore the most difficult to locate.

But the thought of finding this tiny island in the dark gave us no concern. Radio bearings would bring us in if we did not sight it at all, and actually, in the clear night air, if visibility was good, we should sight Wake more readily than by day when the sun casts deceptive cloud shadows on the water.

One thing did concern us, however, and that was the coral heads in the lagoon at Wake. But radio messages already were being exchanged with the base and George Bicknell was advising Captain Tilton of

lighted marker buoys that would guide us safely onto the water.

On we flew, and as night came on, the stars made the heavens bright but cheerless. After several hours flying in the dark, the bridge informed all they had sighted Wake. We looked off to starboard and to the horizon. There was a light, but to us it was just another star.

SUPPER ANNOUNCED BY SIGNAL LIGHT

We flew on for fifteen minutes. Now we were closer to the "star" and the single gleam had separated into several lights—we were nearing Wake!

Soon we were over the reef, a white arch in the black water below. A row of lighted marker buoys indicated the channel. One brilliant light atop the flagpole began to blink. See and Runnels watched for a moment, then read aloud a message: "Welcome back to Wake—supper is ready."

We were low over the reef now. A green light flashed by the port wing and the next second—"swoosh"—a perfect landing on the coral studded lagoon, touching the

water exactly at the point the marker buoys indicated. Involuntarily, we all applauded. Dahlstrom had gauged the landing exactly and with the first contact the Philippine Clipper was in the water slowing down.

While terns swirled above, chirping shrilly, in harsh contrast to their beauty, flashlights revealed the white sand bottom and fish appeared to be momentarily paralyzed when caught in their beams.

Dinner was ready, as the blinking light had promised—and what a dinner! It was Bicknell's last night on the island and the Chinese kitchen staff had outdone themselves in his honor. There were turtle soup and turtle steak (from a big fellow that had eluded all the Wake Island fishermen for more than two weeks), corn, potatoes, hot rolls, and chocolate ice cream.

After dinner we were all disappointed to learn, through radio messages from Alameda, that the China Clipper had been forced to turn back after flying seven hours toward Honolulu. This was a genuine disappointment for the personnel at Wake and Midway, as the China Clipper was due to bring the Christmas turkeys, plum puddings, and other holiday fixings.

Within the hearts of the Philippine Clipper personnel, however, a new hope was stirring. Why could not we make better time home, carried on by these same winds that had turned back the sister ship?

We were eager to be off again and no one had to be called a second time the next morning when 4:30 arrived. After breakfast, everyone who could followed us down to the ramp. While the launch was being loaded they stood around, attempting to joke. All hands were rather quiet. They were losing the leader who had landed here with them seven months before.

As Bicknell had never seen the island from the air we circled slowly over Wake several times before heading out across the water for Midway.

HIGH WINDS SPEED FLIGHT

Climbing higher, we encountered high winds and, carried along by one 22 miles strong, flew to Midway in eight hours. We had gained a day on Christmas, and while it was the afternoon of Christmas Eve now at Wake, at Midway it was the afternoon of December 23.

Some of the flight crew, with families and sweethearts waiting on the West Coast to

spend Christmas with them, were anxious to fly on with the favoring wind. But Captain Tilton ignored their veiled suggestions, although he too had a wife, and a baby just old enough to enjoy her first Christmas, waiting in San Francisco.

The strong winds continued throughout the night. At the base of the flagpole, and near some of the electric light poles, we found several dead birds, their lives dashed out as the strong wind drove them against these obstacles.

Next morning the air was clear and the sun bright. Strong winds drove us as our engines pulled us through the sky and we soon were aware that we would make record time in the 1,304-mile flight to Honolulu.

HOMeward BOUND, ON CHRISTMAS DAY

It was Christmas Eve, so we opened the packages we had obtained in Manila and decorated the three-foot Christmas tree which had been set up in the lounge. We hung holly wreaths at the windows, strung tinsel and red and green streamers across the ceilings, and hung small stockings on the light fixtures. Here and there were hung sprigs of holly—one of these sprouting on the instrument board on the bridge.

Seven hours and thirty-three minutes after leaving Midway, we settled on the waters of Pearl Harbor. As the Philippine Clipper was drawn inshore, Weber hung a huge holly wreath on the bowsprit and the small group on the shoreline cheered.

Here it was, after we landed, that the customs and immigration authorities put into practice their first experience at receiving air passengers at Honolulu. Bicknell and Karl Lueder, retiring manager at Midway, were passed as employees of Pan American Airways, but Harold See and I were carefully put through a routine—required to show our passports, etc. Obviously the customs officials were enjoying this first experience, for they were meticulous in each detail.

On Christmas morning the clouds were low, the weather rainy, so we thought there was little hope of getting off. Shortly after noon, however, the sun broke through and orders were telephoned for all to assemble at Pearl Harbor.

By the time we had reached the Philippine Clipper, the sun was brilliant and all evidence of the rain of the night and morning had disappeared.



Photograph by Capt. George W. Goddard

ON A HILLTOP NEAR MANILA STANDS THIS ANCIENT ROOFLESS RUIN

The massive Spanish convent of Guadalupe, founded by Antonio Herrera in 1601, was once the finest in the Philippines. It was set afire by shells during fighting in 1899 and virtually destroyed. In the background flows the Pasig River.

After a short delay, we went aboard the Clipper, once more stripped of all interior furnishings, since this was to be the long hop back across 2,400 miles of water. Mail sacks were high in the compartments and See and I pushed some of them into place to provide "bunks" during the long night flight.

Our take-off was brief and we climbed rapidly, circling as we gained altitude. We had not been in flight ten minutes, however, when No. 4 engine, the right outboard, began to miss fire. It was a faint sound and difficult to detect, as the four engines total fifty-six cylinders.

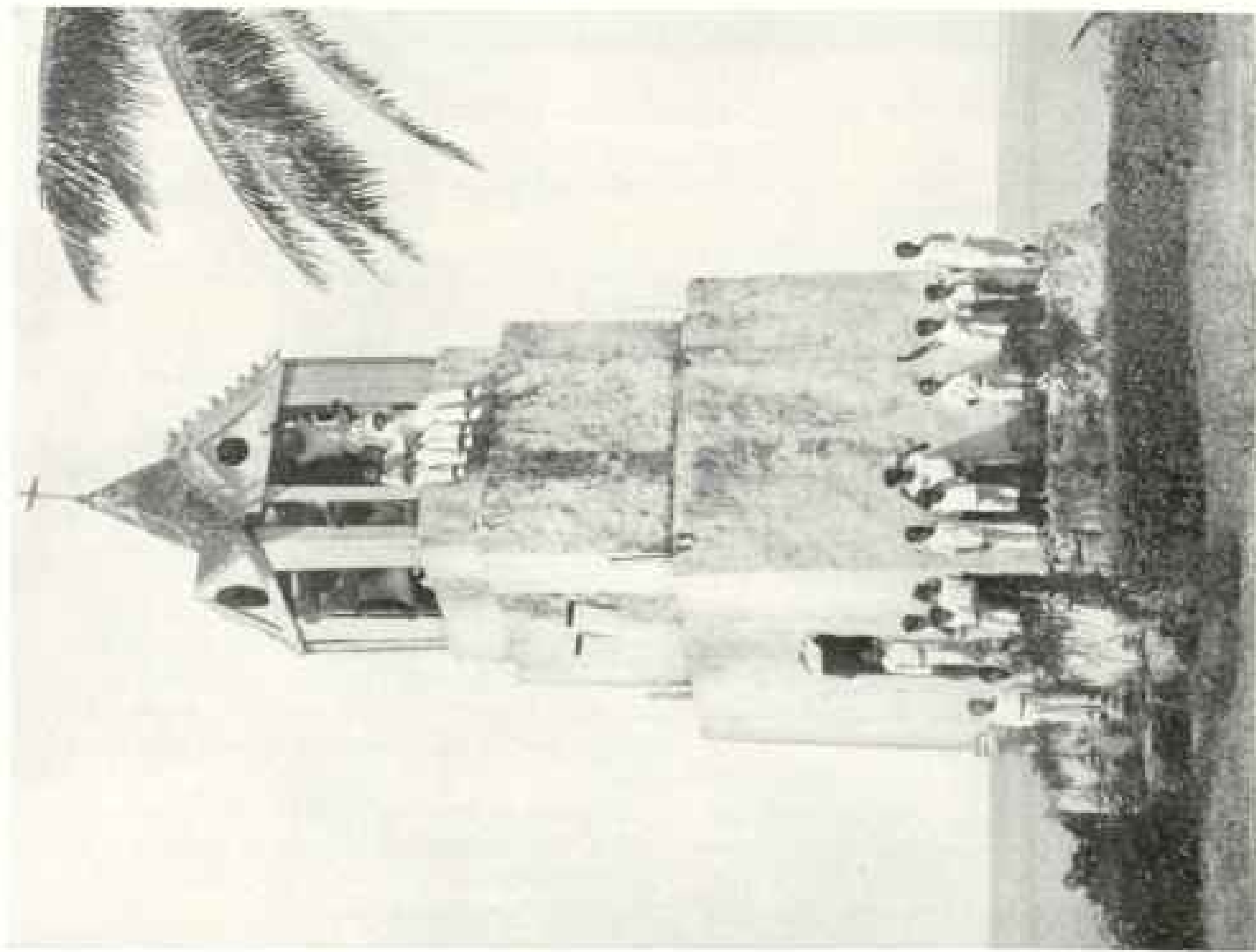
Captain Tilton came down from the bridge and for once—the only time in the entire flight—his smile and friendly expression were gone. We might fly the entire route and have no more trouble with this

engine, yet it was a risk that he chose not to take.

Department of Commerce orders are mandatory that, in a landing so soon after take-off with a heavily laden ship, an appreciable amount of the gasoline load must be dropped to insure a safe landing. With a muttered exclamation, he ordered the sea wings—each containing 790 gallons of gasoline—to be drained.

For more than twenty minutes we flew in a circle, all of Honolulu wondering at our delay. The falling gasoline vaporized as it hit the air and created a wide plume like smoke below us. Some believed we were afire.

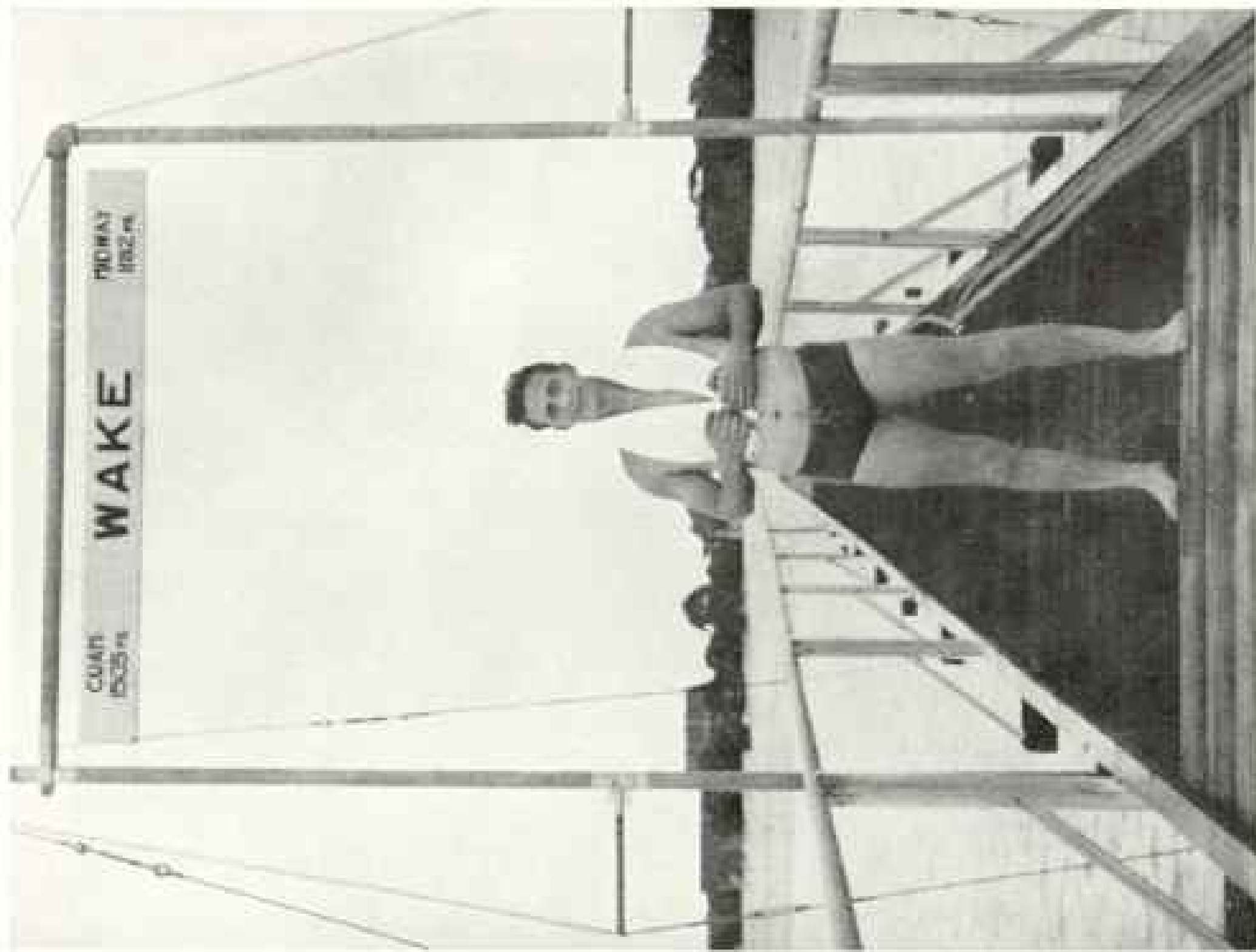
Captain Tilton reassured the base, by radio, and asked if they were prepared to refill our tanks as we must come in for repair of No. 4 engine.



Photograph by P. Siroquin

GLAMOUR SURROUNDS THIS OLD BELL TOWER IN GUAM

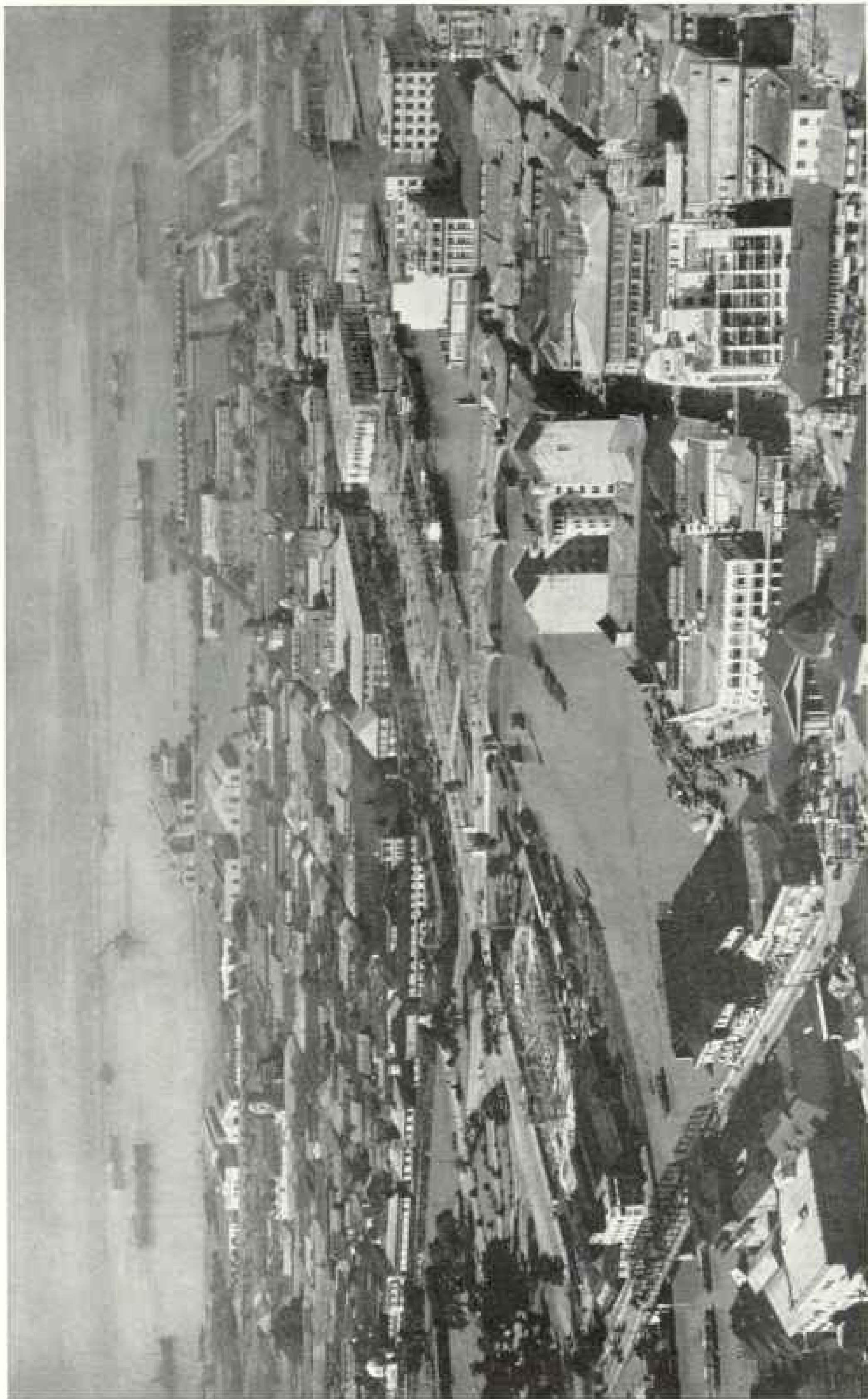
Generations of Chamorros have heeded the sound of the bell, assembling the populace of Merizo for a mass meeting or sounding a fire alarm.



Photograph from William Burke Miller

IT'S A LONG WAY BETWEEN TRAFFIC SIGNS IN MID-PACIFIC

Harold See, National Broadcasting Company engineer and companion of the author on his flight, takes a dip in Wake's blue-green lagoon.



Photograph by Capt. George W. Goddard

MANTLA, "VENICE OF THE EAST," IS THE WESTERN TERMINUS OF THE CLIPPER ROUTE

From here the giant transpacific planes head back across the ocean for Guam, Wake, Honolulu, and San Francisco (Alameda), while passengers bound for the mainland of Asia go on by boat or connecting plane. Conspicuous from the air at Manila are the Pasig River, arched by bridges, and the numerous intersecting canals. This view of the low-lying city includes part of the business section and busy docks. The Clippers now land near the Cavite naval station, a few miles away.



© Clyde Sunderland

BEFORE THE CHINA CLIPPER SEES OAKLAND AGAIN SHE WILL HAVE FLOWN
16,000 MILES

Every flight to Manila and back means a journey of nearly two-thirds the distance around the earth. The Clippers usually fly high above the clouds, as they cruise most efficiently in the thin air at an altitude of about two miles.

With the tanks emptied we settled again on the water and taxied in to anchorage. A quick inspection revealed that a blown spark plug was our trouble and it was immediately repaired. Within forty-five minutes the sea wings had been filled again and we were ordered aboard.

A GLEE CLUB OF THE SKIES

It was dusk as we mounted the sky and flew out over Diamond Head. Low clouds drifting in over the city and lights twinkling on here and there made a weird, eerie picture as we passed out to sea. The sun was low in the west behind us and ahead the east was dark and ominous. Winds were favorable though, and as darkness took command of the heavens stars twinkled and the moon appeared, clear and cold.

During our stay on Wake Island, we had discovered that several of the crew were singers and that Harry Canaday had been a glee club leader while he was studying at Annapolis.

Three hours out of Honolulu, we went on the air and induced the members of the crew not immediately engaged in flying the Clipper to sing Christmas carols, standing around the tiny tree in the lounge, and to send personal greetings to their families and loved ones.

It was a homesick and disappointed group. Captain Tilton arranged the schedule so that each member of the flight left his position long enough to hurry to the microphone.

The night grew cold and we flew on, our speed increasing as the winds bore more

favorably on our tail. Having no more broadcast schedules for the night, See and I sought out our berths on top of the mail bags. Protected by additional clothing we had borrowed in Honolulu, we were snug and warm and soon asleep.

SPARKS, AND BAD NEWS!

The quiet purr of the motors was broken shortly after 3 a.m. and we were awakened by a blinding streak of sparks whisking past the windows on the left side. So close were they that the brilliance of the stars was dimmed. There was an unsteadiness in the Clipper and as we made our way forward through the lounge, several ornaments on the tree crashed to the floor.

We learned that No. 1 engine—left out-board—was out of order, but no one forward was dismayed.

For a little while, the revolutions of the propeller were lessened and the back-firing and stream of sparks were less noticeable. Each man now was standing at his post, but there was no strain and no concern was visible in the faces of the crew.

We looked out on the dark water, ten thousand feet below, through cloud banks, and wondered whether we would have to land. We had been in flight eleven hours and were 1,625 miles from Honolulu. San Francisco was still about 780 miles ahead.

Now No. 1 engine was "revved" up again and there was considerable vibration in the ship. A stream of sparks slashed the blackness of the night. Crago came down from the bridge.

"Move about as little as possible," he called out. "The automatic pilot is cut off now and we are flying manually."

We tip-toed to a seat in the navigation cabin, looking out directly on No. 1 engine. For forty minutes or more, it was alternately spitting fire, gasping, and dying to a whisper.

We learned from the Captain, who came down from the bridge momentarily, that No. 1 engine was being used to pump gasoline to the other three motors and it would be cut off as soon as the pumping was completed.

"Can we fly on three motors?" I asked. The Captain's twinkling eyes and grin answered us. "With a little less gasoline load, we could fly on two," he declared. "We are all right; don't worry; but we won't make a record into Alameda."

We looked out on the black water below and wondered, but the Captain's smile was reassuring.

It was cold sitting around, so we slipped back to a rear compartment and burrowed down under the mail sacks again. We did not intend to sleep but to listen and watch the sparks fly past our window.

The next thing we knew, dawn was breaking and the ship was steady once more. Getting up stiffly, we walked forward. Peering out a window in the lounge, we saw the propeller of No. 1 engine was still, its nacelle streaked with oil, black and grimy.

FLYING WITH A DEAD "PROP"

What a queer sensation you feel the first time you look out at a dead "prop" and realize that somehow you are still flying. But it was simple.

Three motors were now carrying us, aided by a forty-mile tail wind. It required more exact operation of the other three motors and more skillful piloting to keep on the course, but this crew of the Pan American Airways was equal to the emergency and our flight continued, retarded but not interrupted.

We began to hope again that the tail winds might bring us in with a new record, but it was not until 16 hours after our departure from Honolulu that, through the fog, we saw the California coast.

We were south of San Francisco and, turning, we flew on, skirting the shoreline.

In another hour, we picked out in the mist the skyline of San Francisco. Circling lower and lower, the Philippine Clipper settled, a little wearily it seemed to us, on the water just outside the breakwater.

We taxied inshore to a throng gathered in the grayness of the afternoon. They were there—not to welcome us—but to watch a trial flight of the China Clipper, which was even then on the ramp, the crew motioning for us to stand off so that they might get under way.

And thus our flight was done—17 hours and 17 minutes after our take-off from Honolulu, and 58 hours, 43 minutes actual flying time since leaving Manila.

A sigh escaped us as the China Clipper roared off over the water. Our adventure was over. To Pan American Airways their new route was established and operating.



Photograph from Wide World

THREE 'ROOS "FLOAT THROUGH THE AIR WITH THE GREATEST OF EASE"

This remarkable photograph was made during a kangaroo roundup on a sheep ranch, where the animals sometimes encroach on the pasturage. In giving chase, horsemen run them parallel to the fences; otherwise they would jump the wire barriers as easily as they leap this wide gully. Some kangaroos can cover 30 feet in a single bound, and may outstrip a horse for a short distance (page 712 and Plate III).

BEYOND AUSTRALIA'S CITIES

BY W. ROBERT MOORE

With Illustrations from Photographs by the Author

"AUSTRALIA'S vast lands have been colonized by sheep and cattle, but not by people," commented my Australian companion as we lingered over breakfast aboard the Melbourne Express.

Although not receptive to epigrams so early in the morning, I still could appreciate his summary of the development of this southern Commonwealth in Britain's globe-girdling Empire. There are nearly 17 times as many sheep and twice as many cattle as people in the country. Thriving cities have grown beside harbors and coastal rivers,* but spacious portions of the continent are largely empty. There is a reason.

Australia is almost as big as the United States, but its vast face presents a striking contrast to the American landscape. This ancient eroded land mass has no extensive mountain ranges, no great river systems. The granite ridge of Mount Kosciusko, 7,530 feet above sea level, in the southeastern corner of New South Wales, is the highest point on the continent (page 740).

For 900 miles along the southern coast there flows not a single river. Many other miles are little better served, as existing stream beds are often dry for many months.

The Murray-Darling is the one large river system of the continent. From its source in the Queensland highlands, less than a hundred miles from the coast, to its mouth at the sand reef of The Coorong, southeast of Adelaide, the stream travels 2,310 miles. Except for length, however, it is no Mississippi. Its drainage area is much smaller, and much of the water is lost before it reaches the main channel.

PIONEERS—HERE AND THERE

Where American pioneers in their westward march from the Alleghenies progressively found well-watered fertile lands awaiting their plows, Australian pioneers were baffled by sterile inland areas where they could find not even water to drink.

Lakes that were only colossal salt pans; rivers that were dry or stagnant with brine; and vast rocky and sandy wastes—such were the reports that Sturt, Eyre, Stuart,

* See "Capital Cities of Australia," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, December, 1935.

and other Australian explorers brought back from the interior where their parties had suffered untold privations and harrowing hardships. Leichhardt marched inland and vanished. Burke and Wills perished of starvation on Cooper's Creek.

But Australia is by no means entirely desiccated. Indeed, along the coastal belts and extending for several hundred miles inland the land is flushed with fertility. A broad band of vegetation extends along the north, east, and southeast edges of the continent, covers a wide triangle in the southwest corner of Western Australia, and blankets most of Tasmania.

FERTILE LANDS AWAIT MORE SETTLERS

Its development is a fascinating story. Here, within the short span of a century, resourceful Australian settlers have carved out farms and pasture lands so big and productive that they help to fix the price of the world's bread and meat and clothing. Here they have reared bustling commercial marts with world-wide interests and growing population—Sydney and Melbourne claim more than a million people each.

Frontiers move farther inland, but even the most conservative authorities estimate that, in already developed lands, the present population could be quadrupled without congestion.

A striking feature of Australia today is the concentration of more than 62 per cent of her entire population in the six capital cities and the urban centers. Yet, paradoxically, beyond the cities and extending to the far horizons of "way out back" are found the Commonwealth's chief resources.

Mobs of sheep are grazing across endless plains; cattle are bawling beside water holes and kicking up long banners of dust as they move on muster; seas of golden wheat ripple beneath sunny skies; in eucalypt forests axes ring; and from molelike burrowings in the earth men are bringing up minerals to feed factories and gold to be stacked in the world's treasure vaults.

"An improbable dream of a visionary enthusiast"—such was the libel that Australia's first settlers attached to the idea that the country might become a prosperous sheep land. Some were positive that



© D. Durian Smith

HOMES ON BIG PASTORAL STATIONS OFTEN SUGGEST ENGLISH MANOR HOUSES

This estate is about 60 miles north of Adelaide, in a region where ample rainfall usually insures rich pasturage. Droughts, which sometimes menace large areas in Australia, seldom affect this locality. When they do, the damage is minimized by an extensive water system (page 733).

the flocks could not thrive on Australian grasses, which are dry during the summer months, and, even if they did, the wool would deteriorate to scraggly hair in the hotter climate of the continent.

THE ROMANCE OF WOOL

But Captain John Macarthur, one-time of the New South Wales Corps and somewhat of a political firebrand in the infant period of Australia's settlement, thought otherwise. Therein lies the romance of an industry that has few parallels in commercial history.

Wool has been to Australia what cotton has been to the American South. Today a fifth of the country's productive wealth is carried on the backs of her sheep. From the meager flocks with which Macarthur and other pioneers began their systematic breeding, there has grown the amazing total of more than 114 million animals, which supply between a fourth and a third of

the world's wool requirements (page 724).

It is not surprising that the Australian merino is often called "the uncrowned King of Australia." If ever an animal could claim such a royal title, it is this sheep. Not only has he been of paramount importance to the financial well-being of the Commonwealth, but his forbears came from the Spanish merino by way of Good Hope and also from the private flocks of King George III.

PORTRAIT OF ANCESTRAL RAM

At one station home I visited, a large photograph hangs, like an ancestral portrait, above the mantelpiece in the study. It is of old David, an Australian merino ram, whose purchase price was more than \$25,000!

The generations of sheep breeders that followed Macarthur's footsteps have taken their flocks over wide areas of the continent. Through increased watering facil-



MAN-MADE MOUNTAINS RISE BESIDE KALGOORLIE'S "GOLDEN MILE"

To pile up the tailings of finely pulverized rock that are flooded on the dump from the gold extraction mills, workmen shovel up an outer retaining wall, which hardens almost like concrete. Countless spade marks line the face of the huge mound. Some dumps are 250 feet high and contain two million tons of refuse (page 742). Much of the water is used again, as Kalgoorlie's supply has to be piped more than 300 miles.

ities, by means of artesian bores, millions of animals now are ranging in regions once considered useless.

As the world's wool-hungry mills have increased their demands, so station (ranch) owners also have increased the weight and quality of the fleeces.

Today the average clip (including lambs) has risen to eight-and-a-half pounds, twice that of pioneer days; but I saw some wrinkle-necked old merino rams that were carrying the equivalent of seven suits of men's clothing on their bodies. In length, fineness, and strength of its fiber Australian wool is unsurpassed.

So important has been this emphasis on careful breeding that some stations have devoted their efforts exclusively to producing high-class rams. Wanganella and Boonoke, near the Victorian border of New South Wales, are two of many famous studs.

All over Australia and even abroad their stock is known. From Boonoke's flocks alone, sheepmen have purchased two-and-a-quarter million rams in the past thirty-four years.

"Only two percent of our rams are selected for breeding purposes," remarked the youthful manager of Boonoke one day as we motored over the sheep runs. "Our flocks here haven't had any outside blood introduced into them for more than half a century."

A SHEEP RANCH IS A SELF-CONTAINED COMMUNITY

A sheep ranch is a complete community in itself. It usually has its own post office, telegraph station, and power plant. Although not on the sumptuous scale of some of the palatial residences of the Argentine pampa, many of these commodious station homes, surrounded by flowering gardens,

are perfect in every appointment and convenience (page 710). In some respects they are the Australian equivalent of old English manors.

Beyond each central residence is clustered a full complement of barracks and houses for the station hands and families; also stables, blacksmith and machine shops, laundry, butchery, and bakery. And outlying those are the long corrugated-iron woolsheds and stock pens.

Life is unhurried in these nerve centers of the country's chief industry. The manager seldom assigns more than one task a day to his men. Some days they do little, but they are always ready to work long fatiguing hours when the occasion demands.

By the sweat of their own brows most owners have built and managed their own estates. While there are some absentee owners, by far the majority know the meaning of work. Sons, too, grow up in the business. On many stations one finds these young "jackaroos" working to fit themselves to become station managers.

A SHEEP-COUNTRY GENTLEMAN'S LIFE

With perhaps forty men under his direction, a manager's life is a busy one. There are always inspection trips to see the condition of water and grass on the runs, repairs to be maintained, and a multitude of other tasks to keep the station going.

Every evening while I was at Boonoke, my host was at his telephone promptly at eight o'clock to carry on his share of the many-sided conversation among the several stations operated by his brothers and other relatives. With station business over, it was usual to prolong the conversation by friendly gossip and the usual "Stop me if you've heard this one!"

Here in the saddle most of Australia's polo players gain their training. The men also find recreation in hunting or tennis. Some even have their own golf courses and racecourses where horses are trained for the popular country or "picnic" race meeting.

The wives of the managers are cultured and many have traveled widely. In the outback it is rather surprising to find people so conversant with the latest books, music, and, of course, the races.

Before telephones and radios came, station life was more isolated. Motorcars and even airplanes in many places have brought distant towns next door. Gone now to many

are the long journeys by horseback and carriage.

One of the most remarkable things to me, as I traveled through the sheep districts, was the comparative absence of sheep on the landscape. When I once commented on it up in Queensland, one station man said that he had traveled a thousand miles through one region where there were a million sheep being pastured, yet on the whole trip he had not seen a single sheep!

SHEEP TO ACRE IS RAINFALL INDEX

At Boonoke, where there are about a hundred thousand animals, the plains seemed empty. The flocks are broken up into smaller groups and have their own separate runs, but even on the fertile grasslands of that station there is less than one sheep to the acre. In more arid regions the acreage is considerably greater.

As we sped across the rolling plains of one station in an American truck, we saw dozens of kangaroos rise up like posts above the grass and then take to their heels as we approached. Detouring from an inspection of subartesian wells, we gave them chase.

Propelling themselves with only their powerful hind legs, with their tiny undeveloped front legs held high, their running seems uncanny (page 708). But as our speedometer touched 45 miles an hour, one old kangaroo kept pace beside the car.

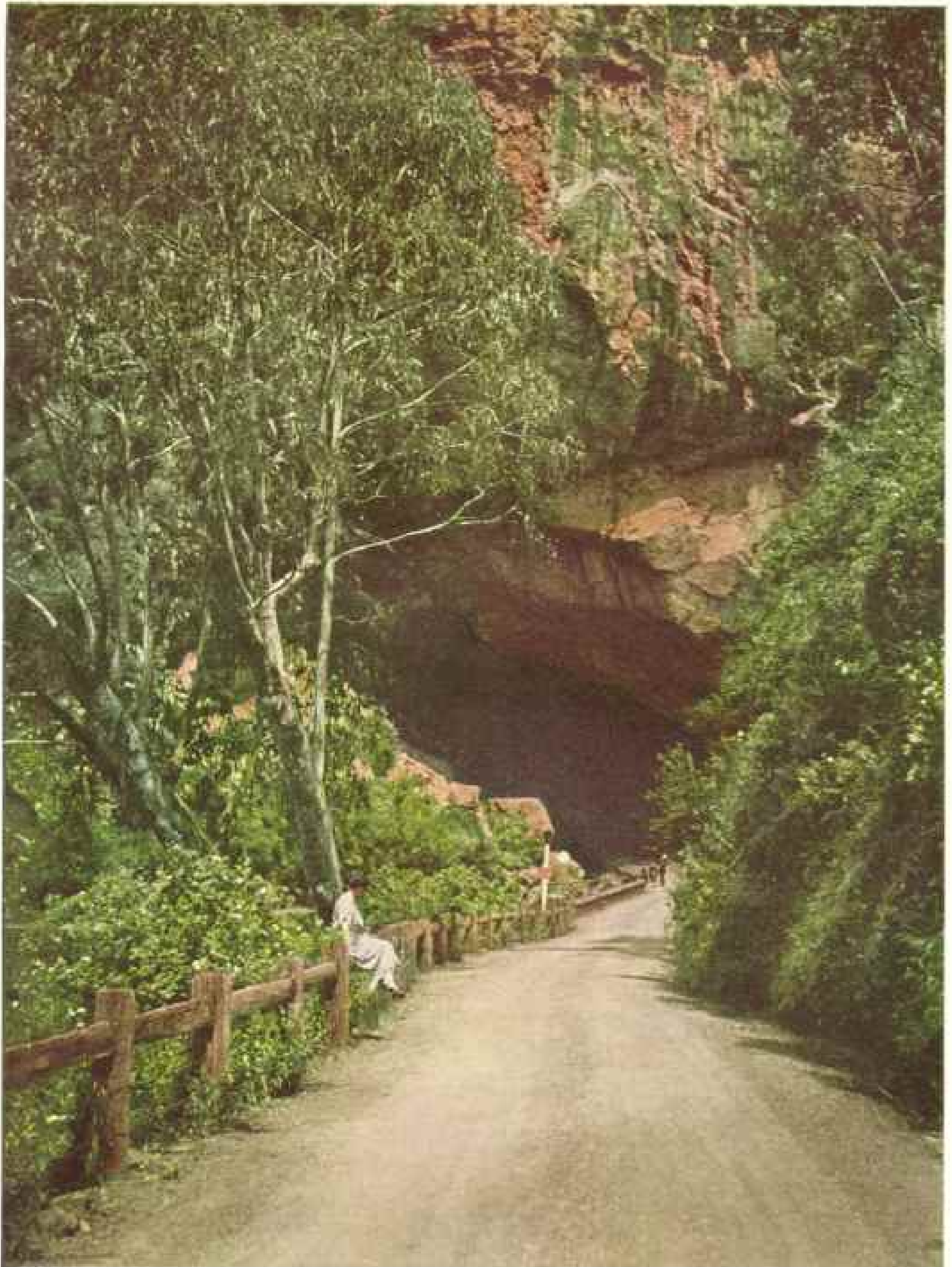
Dozens of others raced away and bounded with ease over the high fences that surrounded the paddock. A few emus, reminding one of bustled ladies trying to hurry, trotted off across the pasture lands.

SHEARING DONE WITH FACTORY RHYTHM

Shearing time is the station's busiest period. Then all of the sheep have to be mustered and brought to the sheds. The clock-like precision with which the whole routine is carried out is amazing; it moves with the rhythm of a great factory. A steady flow of sheep must be brought to the shearers, who clip a hundred to two hundred each daily; some have recorded the amazing tally of 245!

If the animals arrive faster than they can be handled, food in local corrals is soon exhausted or trampled underfoot. For that reason the flocks are handled in relays. Imagine the planning required to bring them to the paddock at the right time when some of the mustering camps are 50 to 100 miles from the shearing sheds!

SUNNY CORNERS OF KANGAROO LAND



© National Geographic Society

Finlay Photograph by W. Robert Moore

IN AGES PAST A RIVER CARVED GRAND ARCH AT JENOLAN CAVES

Entering this natural tunnel, the motor road passes through a barrier of soluble limestone spanning a valley. From the walls of the arch, narrow passages lead to the grottoes of this underground wonderland, about 115 miles from Sydney. Delicately colored pink, white, and brown limestone formations fill the caverns with fantastic castles, people, trees, and birds.



© National Geographic Society

Finlay Photograph by W. Robert Moore

NEW YEAR'S DAY VACATIONISTS SPRINKLE BRIGHT COLORS ON BONDI BEACH, NEAR SYDNEY

Here and at near-by Bronte, millions of people swim each year. Numerous other bathing places fringe the Pacific and spacious Port Jackson.



© National Geographic Society

"NO MORE TILL YOU FINISH WHAT YOU HAVE!"

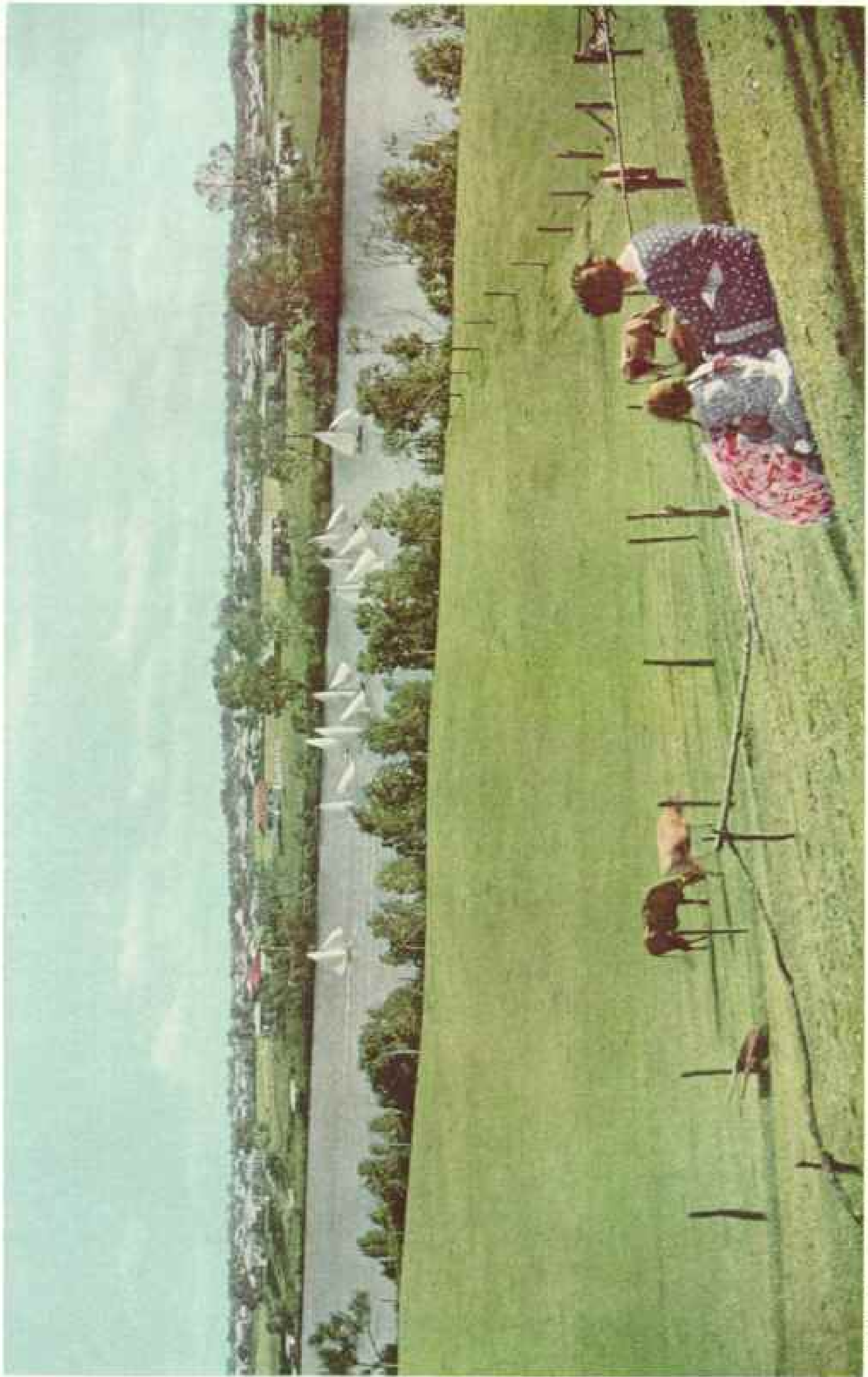
Just after this picture was taken, in a park near Sydney, the kangaroo cuffed the girl, demanding more food. When Captain Cook landed in Australia in 1770, his crew marveled at the strange creature "as large as a greyhound . . . and extremely sweet . . . called by the natives Kangaroo."



Finlay Photographs by W. Robert Moore

"TEDDY BEARS" MAKE FRIENDS WITH A PARK VISITOR

Roly-poly koalas, Australia's native bears, are marsupials, like kangaroos and opossums. Here a half-grown cub (below), too big for its mother's pouch, clings to her furry back. Above them a koala reaches for one of the eucalyptus leaves that form this tree-dwelling animal's staple diet.

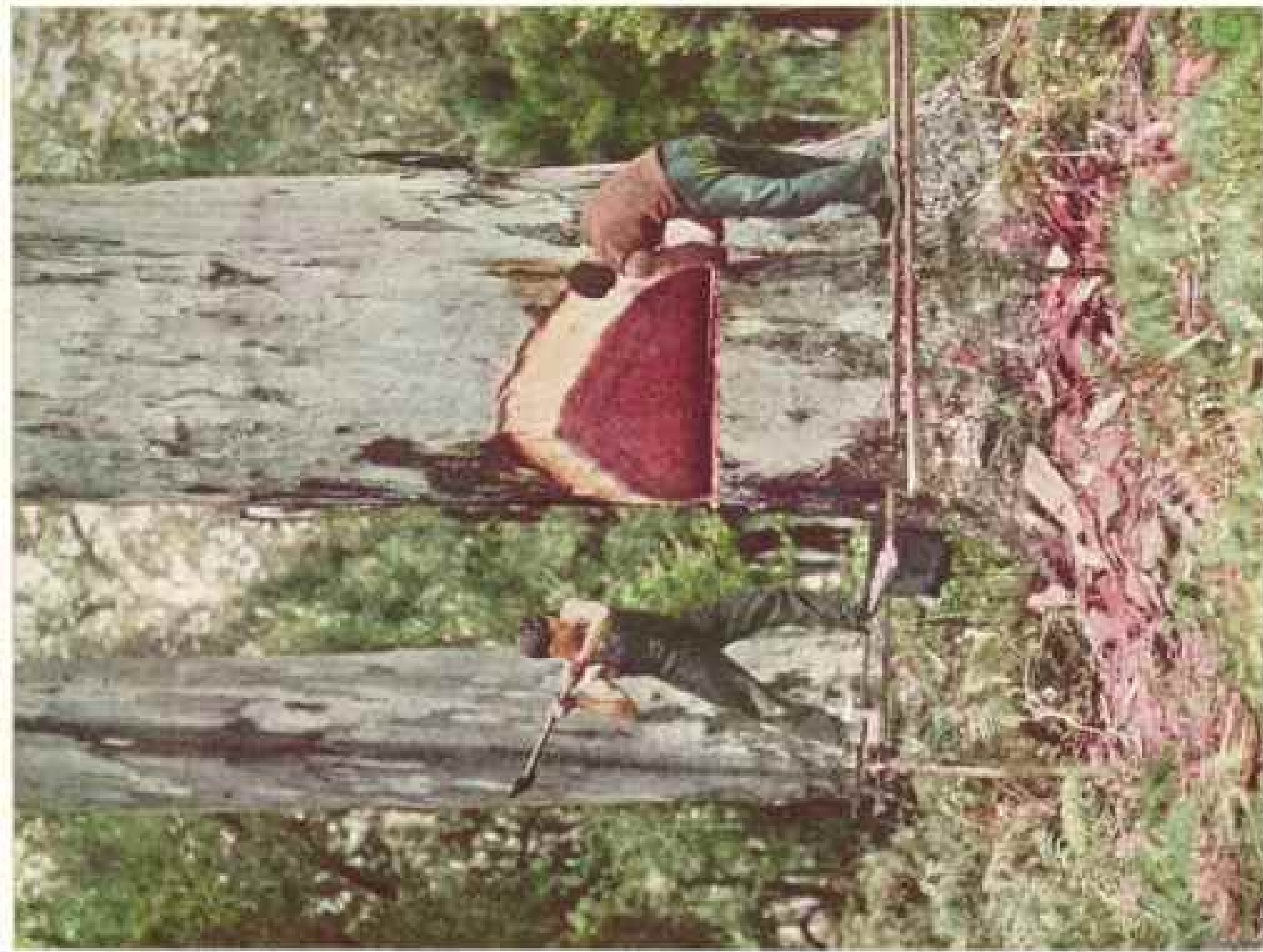


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Finlay Photograph by W. Robert Moore

WITH SPINNAKERS SET AND DRAWING, BRISBANE BOATS RACE BEFORE A TROPICAL BREEZE

Winding through green fields dotted with cottages, the Brisbane River is a favorite course for yachting enthusiasts of Queensland's capital. Along with cricket and horse racing, sailboating is a popular sport in all the coastal cities of Australia.



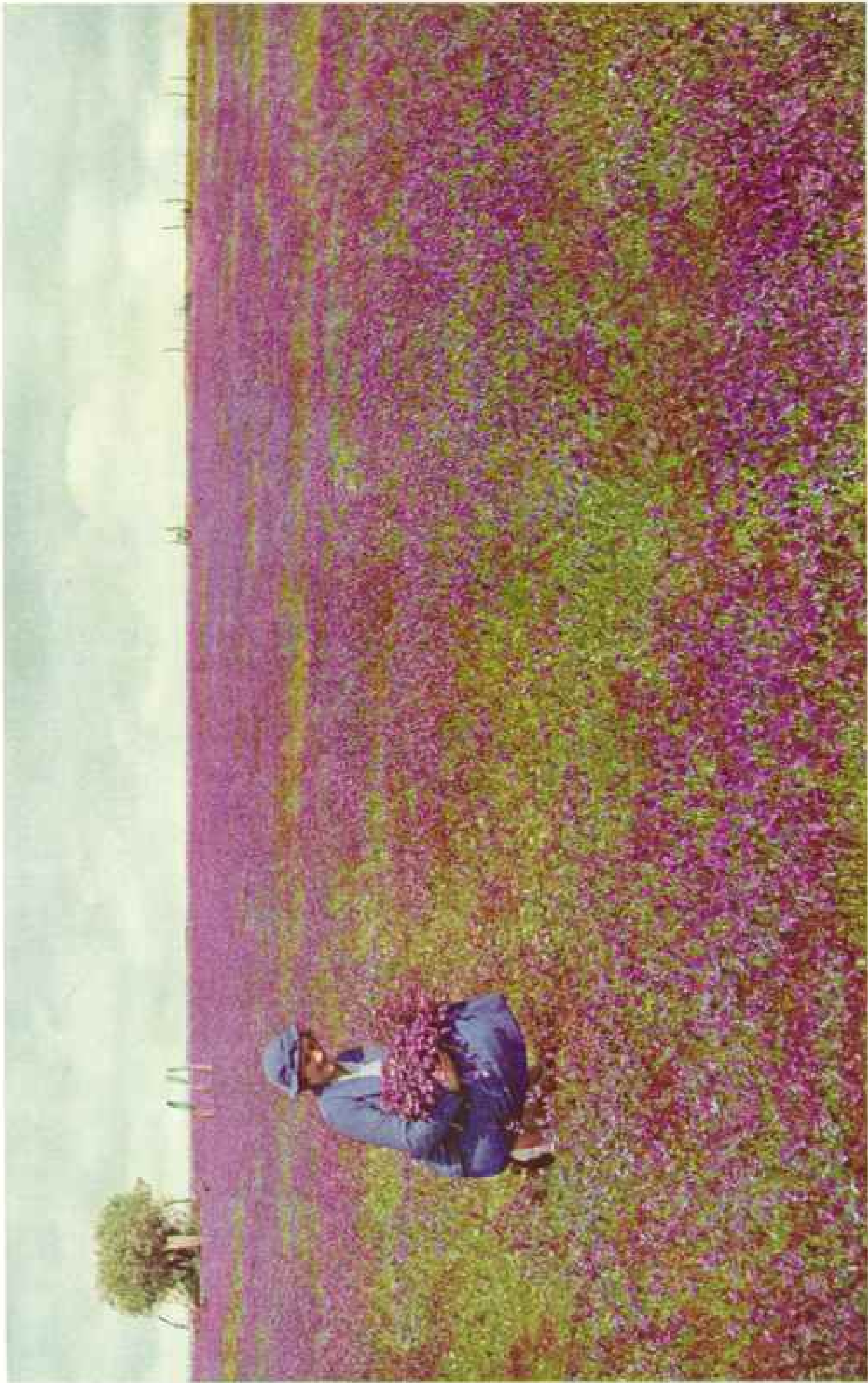
© National Geographic Society

MORE THAN 300 SPECIES OF EUCALYPTUS TREES ARE NATIVE TO THE AUSTRALIAN CONTINENT

Popularly termed "gums" or "eucalypts," they dominate the Commonwealth's landscape. Here two woodcutters hack away at a giant karrri (*Eucalyptus diversicolor*), whose hard wood is often used for paving streets. These trees sometimes shoot up 180 feet before branching. Forests of them in Western Australia cover an area about a third the size of Rhode Island. The red gum (right) stands in National Park, south of Sydney, where a large tract of native bushland is preserved.



Finlay Photographs by W. Robert Moore



© National Geographic Society

Finler Photograph by W. Robert Moore

"SALVATION JANE" IS A SOUTH AUSTRALIAN NICKNAME FOR THIS PURPLISH-BLUE WEED

Its blossoms resemble hooded bonnets worn by Salvation Army lasses. Another reason for the name is that, during a drought a few years ago, cattle survived by grazing on this nitrogenous pest, *Ecballium elaeagnifolium*, which blankets acres of many localities. Known in other parts of Australia as "Paterson's curse," the plant is akin to the bluesteed of the Shenandoah Valley of Virginia.



© National Geographic Society

Vast fields are often covered by a single variety. National Park, in the Darling Range near Perth, is paved with a flower mosaic in September and October. Blue *Leschenaultia* (left) is one of the State's most popular wild flowers. Behind the lilac-colored blooms (right) is a young grass tree, or "blackboy"; when grown, the short trunk is usually blackened by bush fires, and the plant roughly resembles a grass headdress.



Finlay Photographs by W. Robert Mohr

SPRINGTIME CARPETS WESTERN AUSTRALIA WITH BRILLIANT WILD FLOWERS



PALMS AND BOUGAINVILLEA SURROUND A BRISBANE HOME

Numerous other tropical and subtropical trees and flowers thrive in the warm, moist climate of the Queensland capital. Homes are often built off the ground, some on posts six feet high, to improve ventilation and to prevent the floors from getting damp during the rains.



© National Geographic Society

Finlay Photographs by W. Robert Moore

AUGUST SHOWERS BRING FORTH SEPTEMBER FLOWERS IN WESTERN AUSTRALIA

The little girl's yellow blossoms are from acacias, known as wattles in Australia, because early settlers used their branches as the framework or wattle for mud huts. The red blooms are *Walsonia tridifolia*.

Cartage of wool to market is likewise operated with precision. Railway timetables must be considered; freight cars have to be ordered in advance, and then dispatched on schedule. Delays anywhere along the line may mean appreciable losses at the salesrooms.

Many means of transport are utilized in getting the wool to its destination. Today motor trucks are in some measure replacing other conveyances, but during wet months on the black-soil plains of the Riverina, in New South Wales, they are at immediate disadvantage.

BULLOCKS AND CAMELS HELP TRANSPORT WOOL

Bullock teams, although painfully slow, are sure. They haul the heavy, high-wheeled wagons, piled with tons of wool, over boggy terrain and on zigzag hill tracks that seem almost insurmountable (page 725). But it is a sizable bog indeed that can stop 36 tugging bullocks!

Horse teams travel faster, but they require more attention than the bullocks. To see a 20-horse team strung out in tandem pairs or fours, straining at a miring wagon carrying ten tons of wool, is an unforgettable display of power.

Out by Broken Hill and in other semi-desert regions many camels are used. Some are ingloriously hitched to wagons like horses, except that their collars are turned upside down to fit their necks. Others carry bales slung pannierwise over their backs, and as they swing along to the command of their Afghan drivers, one almost feels that he is somewhere in the region of the Khyber Pass, rather than in outback Australia.

In a few places wool goes out by boat. But whatever may be its transport, out it goes with as great dispatch as possible.

From sheep's back through auction mart to ship's hold, the wool industry has many ramifications. It is considered that in one way or another at least a third of Australia's population is connected with the trade.

But just consider: there are about a *billion* pounds of this golden fleece (sometimes more) to be taken each year from the sheep, graded, baled, transported, sampled, catalogued, auctioned, rebaled, and carted to mills or shipped abroad!

Such is the industry that in recent years has poured an average of some \$250,000,-

000 into Australia's purse. In boom years its revenue has been nearly doubled.

STATIONS MEASURED IN SQUARE MILES—NOT ACRES

"How large a station do you have?" I asked a manager one day after we had traveled miles across rolling prairie lands and had opened a dozen rabbit gates.

"Oh, 155,000 acres—and a little more."

Later, when he gave me the actual figures, that "little more" proved to be about 600 acres—quite a sizable farm in itself!

Many are much larger. But the days of the "wool kings" are no more. Small owners with flocks numbering less than 5,000 predominate.

Out in the more remote regions of Queensland, Northern Territory, and Western Australia, and in the arid center of Australia, however, cattle properties are still measured in square miles, not acres.

Picture a single cattle station larger than Massachusetts and Connecticut. Look at it also as a band five miles wide extending all the way from New York to San Francisco; or, fantastic thought, a land path more than a mile wide all the way from the farthest side of Australia to Maine! For it is 15,000 *square miles!*

A RANCH OF MAGNIFICENT UNFENCED DISTANCES

One cattle man, whose station lies on the Queensland-Northern Territory border, told me quite casually that it was a 125-mile horseback journey from his back porch to the back line of his property.

Like many of the older holdings, none of his land is fenced, so the cattle often stray far afield.

During the summer months they move southward into the prevailing winds to rid themselves of the myriad flies that pester them. Consequently, the station hands often have the task of riding 250 miles to get their stock back to their own property. The herds also may wander forty or fifty miles in the direction of storms if they lack water.

Early one morning I flew out to a cattle station, 300 miles into the Queensland interior, landed in a field near the house, and taxied up to the gateway.

The station is not large as many of the inland stations run, but it is a goodly block of land—1,200 square miles—pasturing 25,000 head of stock!



"FRUIT SALADS" GROW READY-MADE ON THIS QUEENSLAND PLANT

The fleshy, coblike spikes taste like a rich mixture of fruits. A member of the arum family, the *Monstera deliciosa* has perforations in its wide leaves, so sunshine reaches the base of the plant.

As we rode its ranges, I saw one herd of 1,500 steers that had just arrived from a four months' trek of a thousand miles down from the gulf country. From the fattening paddock where they grazed to market was still another 200-mile overland journey.

BRANDING AND SORTING THE HERDS

Upon food and water hinges success or failure. How many times tragedy has stalked beside dried-up water holes and parched pastures! Whole herds have perished in rigorous seasons and the strenuous labor of cattlemen has come to dramatic nought.

As shearing is the big event on sheep stations, so mustering for branding and sorting is the chief activity on cattle ranches.

Herds on this property are handled from 15 mustering camps and it usually takes four to six months to complete the work.

Here, where life is attuned to the ceaseless moan and bellow of cattle about water holes and in branding corrals, the American Wild West is reflected in ten-gallon Stetson hats that have come into fashion in the last few years.

But the swaggering cowhand with a handy lariat and a pair of six-shooters strapped on his thighs is unknown. Australian cattlemen, instead of roping their beasts for branding, in most

cases pen them and hold them in a system of gates (page 728).

"Do you have any cattle rustling?" I asked one day as a shower had temporarily halted branding operations.

"We call it 'duffing' here," replied the manager. "But it's very rare. Distances are too great; it doesn't pay."

One story that I heard later stands out as an excellent example.

It seems that two men desired to increase their stock, so when rains had filled water holes along the way, they rode 250 miles to a station and drove off about 300 cattle. The ranch owners and police

tracked the animals down and brought them back, together with the culprits.

The men were then committed to stand trial in Darwin, nearly a thousand miles away. Eventually one man pleaded guilty and was sentenced to five years' imprisonment. For lack of evidence the other man was released. But by the time he got home again he had traveled nearly 3,000 miles!

Far out in the interior, remote from railways and easy means of transport, station homes have fewer amenities. There are no electric lights, no refrigerators. Water in canvas sacks is cooled by evaporation on the shady verandas. Yet life is pleasant, and afternoon tea is an established custom. The radio, magic destroyer

of distances, brings the world's news and music to the family living room.

DOCTORS PRESCRIBE BY RADIO AND FLY TO PATIENTS

Across the vast region, popularly dubbed the "back of beyond," ether waves crackle in the evening with friendly chatter between neighbors perhaps fifty or a hundred miles apart, for many stations are equipped with hand-operated radio sending sets.

Doctors from many times that distance prescribe remedies to patients when these



Photograph by Otto Webb

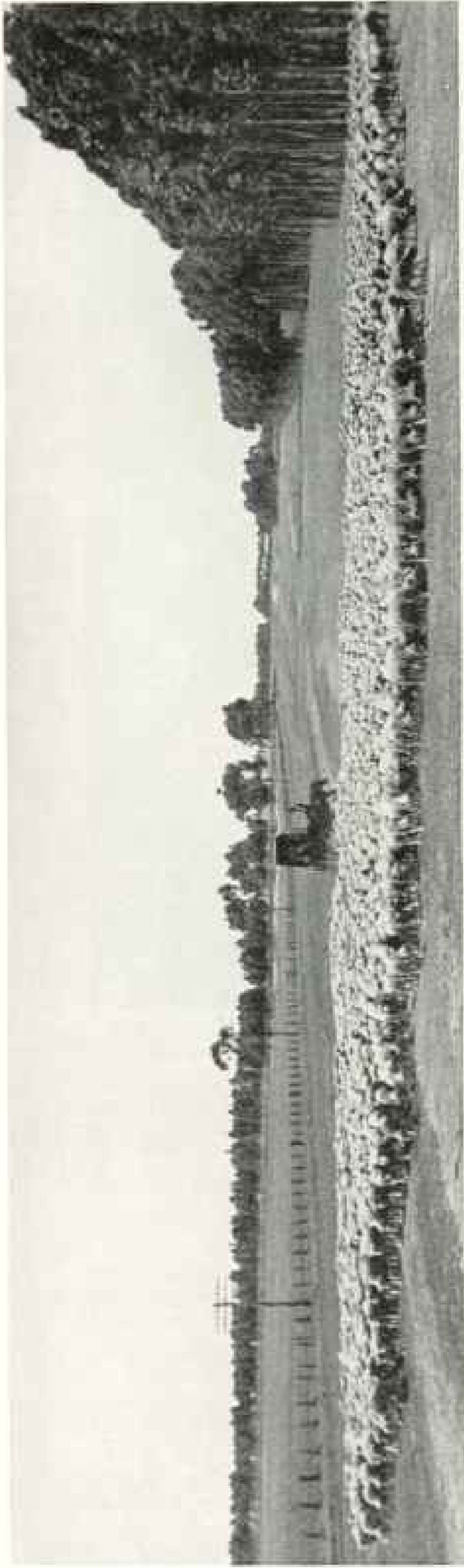
A PERT COCKATOO CHATTERS TO HIS ABORIGINAL OWNER

Like other parrots, these birds can be taught to enunciate words and phrases. Of the eleven species in Australia and Tasmania, this sulphur-crested white cockatoo is the best known. Galabs, or rose-breasted cockatoos, also appear in large flocks almost throughout the continent. They dig roots, seeds, and bulbs with their strong hooked beaks.

radios relay to them the symptoms of a case.

Out here the airplane has likewise proved its worth, for flying doctors now race hundreds of miles on their errands of mercy. Now and then, too, a flying parson may drop in on a station to hold a service.

The Government maintains a system of stock routes and tends them with religious care, for they are the arteries of a far-reaching enterprise. Across dry areas they wind and twist to touch every available spring, stream, and *billabong*. And where



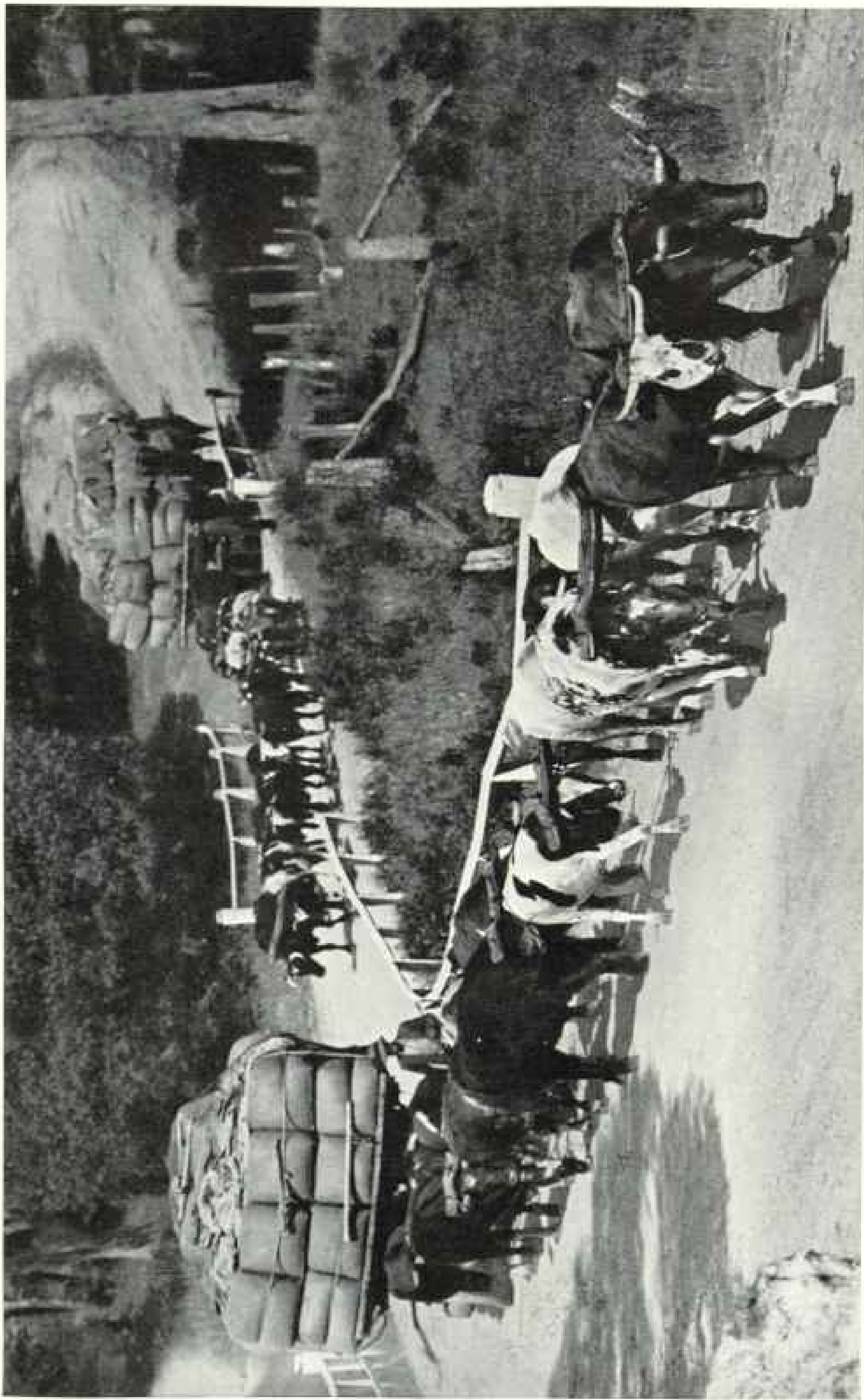
THE AUSTRALIAN BLEATING "MOB" WENDS SLOWLY OVER A BROAD ONE-WAY STOCK ROUTE. Accompanied by his cook wagon, the herder drives some 2,000 sheep and lambs to fresh pasture lands in western Victoria.



The Sydney Morning Herald

DRONING HARVESTERS CUT, THRESH, AND BAG WHEAT IN ONE CONTINUOUS OPERATION

Often grain is left on the stalk until ripe, then is quickly harvested by these large combines. Some of the strippers and harvesters are Australian inventions (page 732).



© The Sydney Sun

"BULLOCKIES" SHOUT TO THEIR TEAMS AND HEAVY YOKES CREAK AS WOOL WAGONS HEAD FOR THE RAILROAD

Bullocks are painfully slow, but require less attention than horses. Two wagons are usually dispatched together, so that if one gets bogged the teams can be doubled to extricate it. Since train schedules have to be considered and freight cars ordered in advance, wool transports must reach the railroad on time (page 711). Motor trucks have replaced wagons in many localities.



"MUSTERING" CATTLE IN A LITERAL CLOUD OF DUST.

Hundreds of hoofs clump, billowing plumes of dirt into the air, so that at a distance the roundup looks as if a grass fire were following in the wake of the boined "mob." For some of the herds on inland stations, a 1,000-mile journey is not an unusual trek (pages 721, 723).



© D. Durbin Smith

PLANE MEETS ROADSTER AND HORSE-CART OUTBACK IN CENTRAL AUSTRALIA

In this sparsely populated area of scanty rainfall, the appearance of an automobile is scarcely less an event than the sight of an airplane. Children of this district clambered into the two-wheeled cart and hurried out to see the ship, which had landed to refuel. Many stations have private airplanes so that owners may inspect their vast ranches; physicians prescribe by radio, and fly to patients' bedside (page 723).



HOOFS POUND AND DUST FLIES AS A QUEENSLAND COWHAND BRINGS IN A STEER

When cattle are driven in from the grazing lands on this 1,200-square-mile station, the horsemen cut out single animals from the "mob," or main herd. Some are run into pens for branding, others are separated into different lots to be fattened for sale. Lassos are seldom used, and ten-gallon hats are a comparatively recent innovation among Australian cattlemen.

these are inadequate, artificial water supplies have to be maintained either by wells or artesian bores, with their long strings of drinking troughs.

STOCK ROUTES LIKE CARAVAN TRAILS

Australia's land map is sketched with a number of these long snaky paths which radiate out to railways and seaboard cities.* One begins up in the tablelands of Northern Territory and reaches out to the railheads of Longreach, Winton, and Charleville to serve Townsville and Brisbane.

Another starts up in southwestern Queensland, swerves through the north-

eastern corner of South Australia, and follows down the western boundary of New South Wales until it contacts the railway at Cockburn, to find eventual outlet at Adelaide.

A third trail connects the Kimberley region of Western Australia with Wyndham, whose meatworks operate during the winter months. In Western Australia, too, another seemingly endless meandering line ties the railheads thrust out into the interior with the expanses of Northern Territory.

HERDS STOP OVER FOR FATTENING

On these tenuous channels, hundreds of miles in length, you see streams of steers moving out toward the ports, eventually perhaps to provide chilled beef for the Lon-

* See the National Geographic Society's new map of The Pacific with this issue of THE NATIONAL GEOGRAPHIC MAGAZINE.



© The Argon

HEADDRESSES BOB AS PAINTED FIGURES PERFORM THE "WILD DUCK" DANCE

A native song and dance festival may continue every evening for two or three weeks (page 737). Performers here wear head ornaments of grass and feathers as tall as barber poles, and have designs painted on their skin. Costumes and songs vary in the different symbolic corroborees.

don market or bully beef for British Tommies or jack-tars.

Bawling, clashing horns, and kicking up great billowing columns of dust in their wake, these armies may be several months on the march (page 726). The drovers, a carefree cheerful band, swing along on horseback singing, whistling, and eating the grime. At night camp they take turns riding around their resting beasts to prevent possible stampedes.

Not all of the herds are sent direct to market from the interior. Many are fattened on the better pasture lands near the coasts, where they can be sold quickly when the market is favorable. "Cattle farmers" Australians call the men who make a business of conditioning stock in this manner.

Unlike Argentina, where wild herds once roamed and men needed only to round them

up, the Australian cattle industry has been built up gradually from small beginnings of half a century ago. Frozen-meat contracts have provided the impetus.

In recent years, however, Australia has seen new handwriting on her economic wall. With improved refrigeration facilities and fast ships, fresh chilled meat has come to England from the Argentine. Against it frozen meat cannot compete.

So the Commonwealth has turned to its scientists to learn whether it, too, can deliver chilled beef to the London market, a distance handicap of 13,000 miles.

In the Brisbane abattoirs I talked with the experts who have tackled the problem. With test tubes and refrigeration chambers, and with bacterial, fungal, and yeast growths under their microscopes, they are learning the conditions necessary



THEIR LUNCH TEMPTS SHY ROCK WALLABIES—TRY TO FIND THEM!

Their dull-brown coats almost blend with the surroundings. Like their larger cousins of the kangaroo family, these animals are marsupials (page 737). They are remarkably agile among rocks, and when frightened bound away on their hind legs. Normally they leave their homes in crevices only at night to feed, and thus are seldom seen; but these inhabitants of the hills about Jenolan Caves (Plate I) have become fairly tame.

for meat to maintain its full freshness and color during the month-and-a-half that it must be on the high seas.

Romance is in their refrigerators, which are controlled to fractions of a degree, and their pipettes reflect future profits, because these quiet workers have been remarkably successful in their experiments.

Several trial shiploads of meat, sent in 1934, arrived in London without deterioration. When I was at the laboratories, the announcement came that another shipment had just reached its destination in perfect condition, even though a soupy London fog had caused an unanticipated five-day delay in the Thames.

To these heartening assurances, the operators of various meatworks have quickly reacted: plants are being altered to meet the new requirements.

BUTTER FOR BRITISH TABLES

Less spectacular, perhaps, but doubly more profitable than the herds that roam the interior, is the dairy stock pastured in the fertile coastal belt, mainly in New South Wales, Victoria, and Queensland. Approximately a sixth of the country's cattle are bred for their milk products.

To England, throughout the Far East, and even to Panama is sent the output of the busy churns of the Commonwealth. Years ago, while living in Siam, we used to buy Australian butter. To the tables of the United Kingdom, however, goes the bulk of the 226 million pounds of butter that is shipped abroad each year.

And what of Australia's agriculture? In a few decades it has had remarkable growth. Yet the total acreage now under crop is but little more than the area of Maine.

Stated thus, it seems unimpressive, but in terms of wheat its importance stands out. Today Australia is one of the three leading countries in the export of this grain.

In shape like a gigantic boomerang, vast wheat fields, some 12,000,000 acres in extent, sweep down across the plains from southern Queensland through New South Wales; bending westward in Victoria, they stretch out into South Australia. Another three million acres have recently been brought under cultivation in Western Australia.

Up in the arms of Sydney Harbor grain elevators form Babylonlike towers along the shore. But elevators are rather the ex-

ception in Australia; most of the wheat is handled in bags. Along sidings and at lonely tank towns beside the railways and at the South Australian ports sacks of grain are corded up in mountainous piles—sometimes 100,000 to 200,000 bags in one stack—awaiting shipment.

WINDJAMMERS AND STEAMSHIPS CARRY WHEAT

Through the stories of the sailing races written by A. J. Villiers,* *GEOGRAPHIC* readers are familiar with that portion of the grain shipments which is carried away in the picturesque old windjammers in their dramatic trips around the Horn on their way to England. On these and by prosaic steam transport, more than 150 million bushels of wheat are normally shipped from Australia's shores each year.

Back of these shiploads of grain lie indefatigable toil and no small amount of inventive genius, for Australia has presented many peculiar problems.

A striking example is the Mallee region in South Australia and northwestern Victoria. This territory gained its name from the mallee, a low eucalyptus scrub, which covered the brown soil in such a tangled mass that men could not clear it with axes.

For years these scrublands were looked upon as hopeless wastes. Then someone hitched his oxen to an old boiler filled with rocks and found that he could successfully roll the bush down so that it could be burned. With the aid also of an Australian-invented "stump-jumping" plow, which hopped over many hidden roots and other obstructions left from firing, the land was won to agriculture.

Today, mile after mile of waving grain blankets these former scrub wastes, as large areas of the Mallee have been redeemed by the roller method of clearing.

Through the belt of comparatively low rainfall, reaching in places to the very edge of the desert, vast districts have also been converted into profitable wheat lands by dry farming.

Here, with eight, ten, and twelve-horse teams on plows and harrows and with abundant energy and hope, the farmers fallow their field for a period of a year, in some places fifteen months, to conserve sufficient

* See "Cape Horn Grain-Ship Race," *NATIONAL GEOGRAPHIC MAGAZINE*, January, 1933, and "Rounding the Horn in a Windjammer," February, 1931.

moisture in the soil to produce their crops.

After each rain between plowing and planting, the land is harrowed to maintain a surface mulch that will check all possible evaporation.

ONE MACHINE TRANSFERS GRAIN FROM STEM TO SACK

Lacking sufficient laborers, the Australian farmers early turned to harvesting machinery that could be operated by few hands (page 724).

In 1843 John Ridley produced a "locomotive thresher," or "stripper," which would harvest the grain from the standing straw and discharge it ready to be winnowed, thus revolutionizing the industry.

Later (in 1884), Hugh Victor McKay, then a lad of nineteen, created from parts of old farm implements and many kerosene tins a machine that he called a "combined harvester."

When farmers smiled and took no interest in his claim that it would strip, thresh, and winnow the grain all in one operation, McKay got on his bicycle and toured Victoria, seeking to overcome their skepticism and conservatism.

Today, the busy factories of the Sunshine Harvester Works, near Melbourne, are the outcome of McKay's inventive genius, first demonstrated in that contraption of iron and tin. In countless fields these harvesters voice a steady rhythm as they transfer the grain from stem to sack.

In addition to wheat, Australia grows in varied quantities nearly every crop that thrives in temperate and tropical climates.

Fruitgrowing has claimed considerable attention. On tables of the Commonwealth appear an abundance of fruits in season: bananas, pineapples, pawpaws, and mangoes from Queensland; apples from Tasmania and Western Australia; oranges mainly from New South Wales and the Murray Valley; and stone fruits from several States. And there is wine. South Australia's vineyards produce four-fifths of the 16 million gallons that are made annually.

Besides supplying local needs, an export trade has also been built up in fresh and dried fruits, jams, jellies, and wine.

To see one of the Commonwealth's thriving crops you must travel far north into Queensland. By the time you have reached Townsville or Cairns, your shirt is clinging to your back and your collar feels like a wet towel around your neck. For

here is the heat of the Tropics; steamy and oppressive.

In these regions the Queenslanders are growing sugar cane. This industry, however, is more than the mere supplying of upwards of four or five million tons of cane annually to the mills that squeeze out 29 million dollars' worth of sugar. It is the testing ground of a national ideal.

Australia's cane fields are like those in other parts of the world, but with this difference: white laborers, not brown, are working them. Stripped often to the waist, these bronzed workers are demonstrating that white men not only can live but can produce effectively in the Tropics.

Previous to the federation of the States in 1901, Kanakas were employed to till the land and cut the cane. Their presence, however, was counter to the national principle of a "white Australia."

With sweeping changes, brought about by government guarantee, Queensland repatriated the Kanakas, and white laborers shouldered the task. It is hot work in the fields, but they are a healthy lot and efficiency is their pride. In addition to supplying the country's needs, nearly a third of the output of the mills is normally shipped to foreign marts.

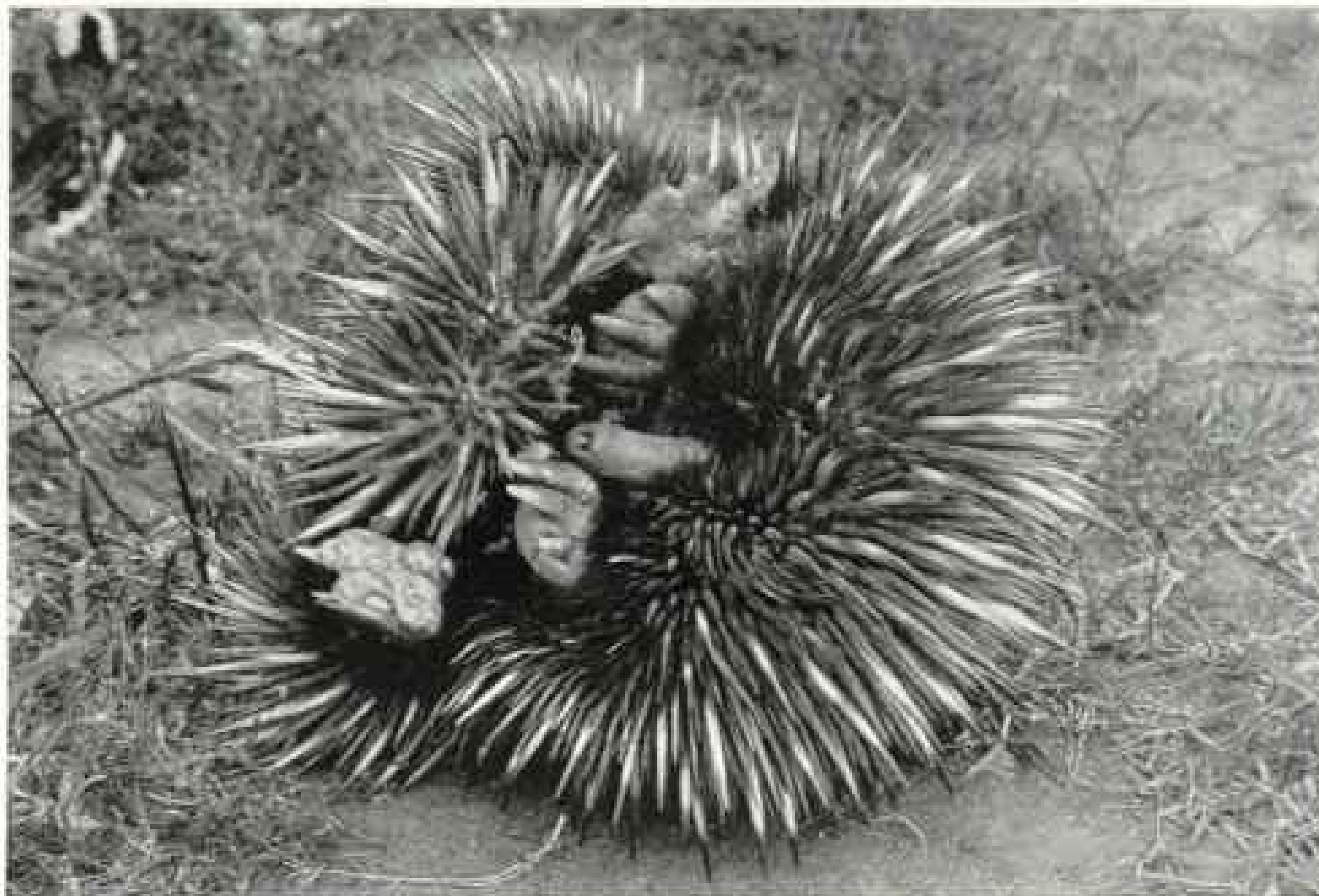
FORTUNES STAKED ON RAINFALL

In appraising Australia's economic strength, one has also to consider her weaknesses. Here, as in the land of the Pharaohs, lean years may follow the fat. And for the same reason—lack of water. The fortune of the outback pastoralist, and in some cases the wheat grower, is staked on rainfall.

I have heard of women growing hysterical and weeping with joy when a long-prayed-for rain began beating a welcome tattoo on corrugated iron roofs. Silently, with bared and bowed heads, men have stood out in their fields as breaking storms have brought salvation to withering crops.

Since 1880 there have been 14 droughts. Most of them, however, were confined largely to the interior. But not all. Climaxing a five-year period of unfavorable circumstances, the great drought of 1902-3 spread like a scourge from one end of the continent to the other.

In a single year 15,000,000 sheep and more than a million cattle died of starvation and thirst; but during the whole stricken period nearly four times that num-



Photograph by Otto Webb

WHEN AN ECHIDNA CURLS UP TO SLEEP, IT ERECTS ITS OWN "BARBED WIRE"

Assailants are discouraged by the sharp, black-tipped yellow spines. This "native porcupine," or "spiny anteater," is one of the most primitive mammals and belongs to the same order as the platypus. It produces a single egg, which is deposited in its pouch; there the young is hatched and suckled until it is nearly one-third the size of the mother.

ber had perished. The wheat crop fell to less than a third of its normal production. And many people left the country. Fortunately, such devastating droughts are rare.

While man cannot remake a continent, he can improve its conditions. And the Australians are doing so. In the Murray basin in southern New South Wales, Victoria, and the edge of South Australia, engineers are working on a huge water conservation scheme (p. 735). With the Burrinjuck (once known as Barren Jack) and Hume Dams and their allied weirs, tens of thousands of acres are being assured dependable water supplies. Smaller projects likewise have brought vigor to thirsty soil.

THE BOON OF ARTESIAN BASINS

Man, beast, and soil, too, are supplied by water through miles of open channels and pipe reticulation in northwest Victoria and in South Australia.

Fortunate the day when an Australian drilled down into the earth and water poured forth. For here was tapped an artesian basin, a source of water that has

since meant millions of dollars to the Commonwealth's pastoral industry.

It required the parched period of a drought, however, for the country to test fully the possibilities of this underground supply. In 1885 the Queensland Government sunk a bore to the depth of more than 1,600 feet, and from it gushed 291,000 gallons of water in a day!

Today, more than 6,400 artesian and subartesian bores have been exploited to provide water supplies. Most of it is impregnated to a greater or less degree with mineral salts, rendering it unsuitable for irrigation or domestic uses, but in most cases it is suitable for stock to drink.

Australia has nine known artesian basins. Remarkable is the Great Artesian Basin, which underlies much more than a half of Queensland and extends out into Northern Territory, South Australia, and New South Wales—covering 600,000 square miles!

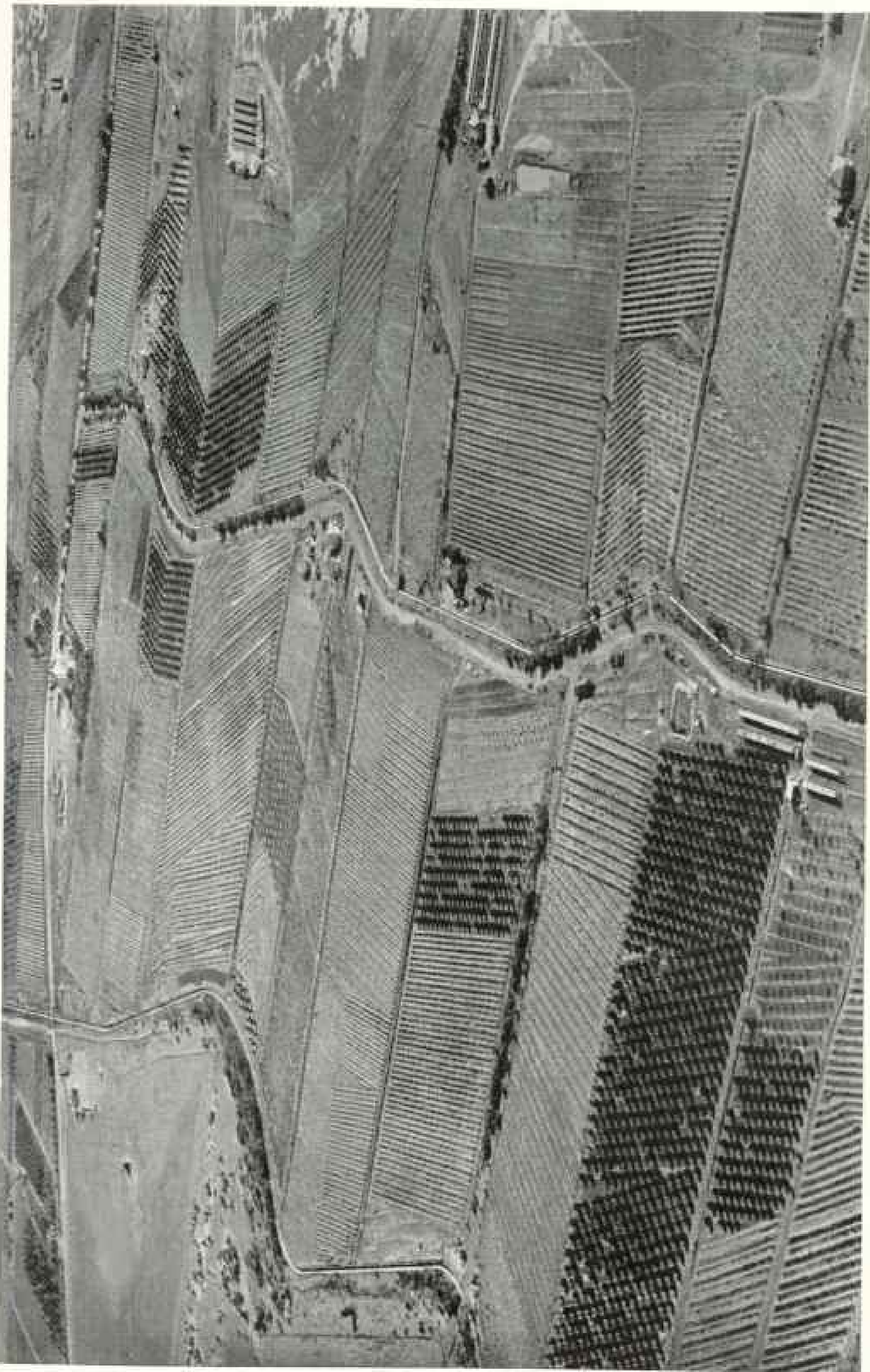
THE PLAGUE OF RABBITS

When Mrs. O'Leary's legendary cow kicked over the lamp that set Chicago in



DRIVES AND TRAILS THREAD THE FORESTS AND FIRN-BANKED GULLIES OF THE DANDENONG MOUNTAINS

Giant eucalypts tower nearly 300 feet above the thick foliage of tree ferns in these highlands near Melbourne. In winter, vacationists skate and ski in Victoria's evergreen mountains. Here, in more secluded places, live the lyrebirds (page 747).



© D. Dorian-Smith

A CRAZY QUILT OF IRRIGATED FRUIT FARMS BLANKETS MURRAY RIVER VALLEY

An extensive locking system installed on the river provides a regulated water supply for wide areas (page 753). Fruits for city tables, also milk, butter, and cheese, are produced in these irrigated regions. Average annual rainfall in well-defined belts dictated whether men should farm, raise cattle, or herd sheep, until human ingenuity and heavy expenditures created such oases.



Photograph by Orho Webb

THE BEARDED LIZARD LOOKS AS IF THE CANDID CAMERA HAD CAUGHT A
CROONER BEFORE THE MICROPHONE

The animal merits its nickname because of the bristles on its lower jaw. It strikes this ferocious attitude to protect its young. When at bay, the spiny reptile, *Amphibolurus barbatus*, distends the tissues around its throat into a rufflike "scare organ." More than 200 large and small species of lizards are found in Australia (page 738).

flames, the resultant disaster was less far-reaching than when another fire about that same time burned up the fence that enclosed a rabbit warren at Castlemaine, Victoria. The rabbits overran the country.

Not all of the countless millions of rabbits that have bred to ravage the continent came from this one source. Some arrived with the first settlers in Sydney. Others were left on islands and the mainland by crews of sailing ships to provide food.

Shortly after their introduction into Victoria, a man was fined £10 in the Colac police court because he shot one rabbit belonging to John Robertson. Within a few years Robertson himself spent £5,000 trying to exterminate them!

A FENCE 1,100 MILES LONG

Prodigious in their increase, the pests have covered most of Australia, causing tremendous havoc. During droughts millions of carcasses have been found beside dried-up water holes and streams. But

with the coming of rains they have reappeared as badly as ever.

With fencing, netting, poisoning, fumigating, trapping, and digging out, staggering amounts of money have been spent by the Government and private individuals, and yet the rabbit menace has not been stamped out. Not tons, but shiploads of wire fencing have been strung across the country. In Western Australia one fence alone is 1,100 miles long, extending north and south all the way across the continent!

Inestimable, too, have been the losses to the Commonwealth, because of the deterioration of pastures. It is asserted that if all the rodents were removed, the capacity of the land for livestock would be increased 25 percent!

In recent years some of these vermin have been converted into profit through the frozen meat and skins sent abroad. But as a friend in the Sydney Exchange remarked to me one day: "For the untold millions of pounds that rabbits have cost us, we've had only a million a year in return."



Photograph from A.N.T.A.

RIDING A GREEN TURTLE IS FUN IF YOU KEEP ITS HEAD UP

An agile person may even straddle its back in shallow water; but on reaching a deeper place, the turtle suddenly takes control by diving and forcing the rider to come up for air. These large edible reptiles are plentiful along the coast of Queensland.

Another pest that has spread rapidly in Queensland is the prickly pear. With the aid, however, of cochineal insects and pyralid moths, its spread is being checked.

From people who live in this area I learned that thousands of acres are now being utilized, which a few years ago were so densely covered with the pear that one could not ride through on a horse.

Dingoes, or wild dogs, which, before settlers came, lived on birds and such other prey as they could find, later turned to a diet of rabbits. Eventually they began to attack sheep. Increasing in numbers, they moved eastward into the sheep districts and became a serious menace.

West of the Darling their depredations were so bad in earlier years that many station owners were forced to substitute cattle for sheep on their pasture lands.

As in the combat against rabbits, constant warfare has in past years been maintained by means of fences and poisons to check their activities.

Bounty is also paid for their scalps. When I was in Queensland, the price was about a dollar, but before their numbers

began to decrease it was sometimes several times that amount.

THE LAND THAT TIME FORGOT

Until 1788, when white settlers made their first permanent encampment beside Sydney Harbor, from which has grown the energetic Commonwealth of today, Australia was a land that time had forgotten. In many respects, it was like a museum in which the specimens of the ancient past were not dead and card-indexed, but living.

Here "Stone Age" black men roamed, living by the skill of their spears; stone implements, boomerangs, and their knowledge of edible fruits and roots. Weird corroborees were their entertainment (page 729).

Perhaps 60,000 still wander in the outback, living as they have through countless ages. A few are employed on cattle and sheep stations. But they are a vanishing people; already the last of the primitive inhabitants of Tasmania has become a museum specimen.

The animals and birds, like the people, are living remnants of a bygone age. Here are kangaroos of many kinds, including

wallabies; also lovable koala bears, strange moles, wombats, Tasmanian devils, striped Tasmanian wolves, bandicoots, pouched mice, and native spotted cats—all marsupials (Plate III and pages 708, 730).

Here, too, is found that primitive link between mammals and fowls—the shy, water-loving platypus. When the first specimen arrived in Europe zoologists cried "Fake," for the strange creature possessed a duck's bill, furred body, and webbed feet.

Among its peculiarities, too, is the fact that it lays eggs, but suckles its young.

On the plains wander five-feet high emus, flightless now, for through the ages their wings have degenerated. Little wonder that the Australians have chosen this remarkable bird to appear with the equally remarkable and distinctive kangaroo on their national coat of arms!

In forest and bush are birds of gay plumage, sweet song, and eccentric habits. Among them are unique bowerbirds that build fancy halls of sticks, decorated with colored berries, bones, shells, and tufts of moss. In these they bow and dance and play, the males performing like ancient courtiers before their mates.

COCKATOOS AND KOOKABURRAS

Cockatoos are as familiar as crows in the Middle West (page 723). The lyrebird, famous for the beautiful lyre-shaped tail of the male, mimics any sound from the musical note of the bellbird to the noise of a buzz saw (page 747).

But of all Australia's birds none is more remembered than the kookaburra, which fills the bush with its idiotic peals of laughter. The mocking, hilarious outbursts of this stubby, silly-looking bird have won for him the name of "laughing jackass."

Weird-looking lizards and different kinds of snakes also inhabit this biological backwater (page 736). In the ground of the Gippsland district of Victoria, too, are some of the world's largest earthworms. *Megascolides*, scientists call these worms that make gurgling sounds as they propel themselves through their lubricated burrows. Imagine trying to use one of them to bait your fish hook, for they grow from 4 to 6 feet in length, and some reach 9 and 11 feet!

To the long list of things peculiar alone to Australia must be added thousands of species of plants and trees. They, too, are of ancient lineage. More than 300 species of eucalyptus trees and two-thirds of the

world's acacias are indigenous to the continent (page 734).

Everywhere the eucalypts dominate, and the forests are indeed an impressive sight. Some of these mighty gums are among the world's tallest trees, rivaling the sequoias. In the karri forests of Western Australia I saw men timbering among trees whose massive grey boles reared skyward to the height of 180 feet or more before they put out a branch.

In the Dandenong Range, near Melbourne, are other monarchs whose columns cause one to visualize them as belonging to some mighty cathedral (Plate V).

Lacking a satisfactory classification for the profusion of eucalypts, most people despair of calling them anything except "gums." Some, however, are distinguished by their color or by the peculiarity of their barks, which they shed regularly, though they do not lose their leaves. Thus one hears of red gums, blue gums, white gums, spotted gums, and cabbage gums; or of stringybarks, ironbarks, woollybutts, scalybarks, and smoothbarks.

Almost exclusively hardwoods, many of the trees provide timber of great strength and durability. Railroad sleepers of ironbark have a life of 25 or 30 years; girders from this wood, too, are remarkably resistant to fire.

Such a wood also is the jarrah, one of the two best known timber trees of Western Australia. In addition to being unusually durable, it is free from the ravages of white ants (termites) and marine borers. Western Australia's other timber tree is the karri, which may grow to a height of 300 feet. It flourishes in a 200,000-acre area in the southwest corner of the State.

From the lush forests of Queensland come beautifully grained woods of special value in the manufacture of furniture.

To see the beauty of many of Australia's woods, one need only walk through Parliament House in the new Federal Capital at Canberra, for here have been utilized a number of varieties of the country's choicest timber.

As with most pioneering peoples, the Australians have slashed down valuable forests to provide spaces for fields, orchards, and grazing lands. One of the most desolate sights to me was to see vast areas of once-beautiful forests ringbarked (girdled) and left standing, the dry white columns reminding one of some colossal cemetery.

Conservation and afforestation are now receiving greater attention.

In addition to their value as timber, various eucalypts have been utilized to some degree for their oils ever since a pioneer doctor found that essential oils extracted from the leaves were good for colicky complaints.

AUSTRALIA'S GOLD RUSH

In 1910, while experimenting at Broken Hill mines, Henry Lavers found that the addition of eucalyptus oil to finely ground minerals facilitated the separation of the metallic sulphides from the gangue in the flotation process. Since then, the trees have had increased use in Australia's important mining industry.

Mining! Here is yet another of the continent's many romances. As gold opened the American West, so also its discovery began a new era for Australia.

When news of the gold rush of '49 reached Sydney, Australians flocked to San Francisco. Among them was Edward Hargraves. When he saw the gold-bearing rock of California, he was struck by its resemblance to some of the rocks in his own land. So back he went; and in 1851 turned the country topsy-turvy with his discovery of gold in New South Wales.

Here, as in California, there was a frenzied stampede. And men began prospect-



Photograph by Otho Webb

"FLYING FOXES" SLEEP UPSIDE-DOWN

By day these gray-headed fruit bats hang in trees, but at night they raid orchards to eat peaches, plums, pears, and other soft crops. Much ripe fruit is damaged and knocked off by the marauders, which sometimes travel in huge flocks.

ing far and wide for other possible deposits. Nor was the excitement unfounded. In quick succession yellow magic was unearthed in Victoria at Ballarat, Bendigo, and Castlemaine.

Public service was threatened with complete disruption. Farms, shops, and ships were deserted. For what able-bodied person was willing to remain at some ordinary job while others were panning \$100 to \$200 a day and finding nuggets of incredible size, worth thousands of dollars?

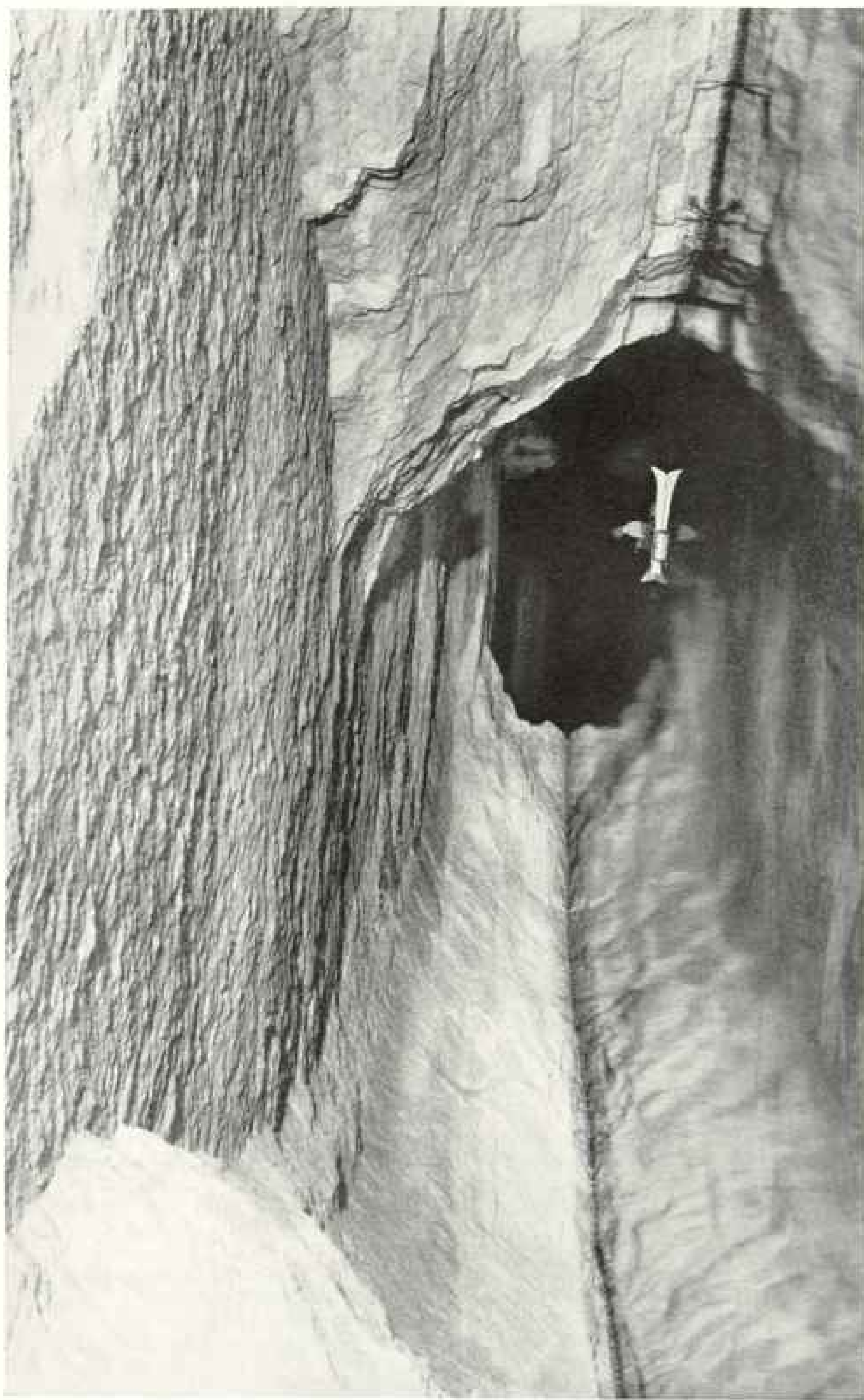
No part of the world has been so prolific in large individual finds as the Victoria



Photograph from N.S.W. Government Printer

STORM GODS GATHER ON THE LOW ROOF OF THE CONTINENT

Mount Kosciuszko, loftiest peak in Australia, is only 7,330 feet high, and snow stays on it only part of the year. Below the Equator, Whittier's "Snow-Bound" would have to read, "The sun that brief August day." Lacking an extensive high mountain system to halt moisture-laden clouds or to provide snow fields, the country is irregularly watered and is partly arid desert land.



Photograph by H. G. Watson

NATURE BUILT SUBWAYS FOR CANOES 300 FEET BENEATH NULLARBOR PLAIN

Dissolving the limestone of the treeless, streamless plateau, rainwater sinks into a network of subterranean caverns and channels. To reach this lake near Eucla, Western Australia, the photographer's party carried their canoe 1,500 feet along a sloping gallery. A former explorer was at first driven out by a pocket of foul air, but returned next day to find the atmosphere purified. So clear is the still, deep water that every pebble on the bottom is visible by lamplight.

fields. Twelve nuggets of more than 1,000 ounces each were unearthed there. The famous Ballarat nugget, the "Welcome," was 2,217 ounces. The "Welcome Stranger" was even larger, and was worth more than \$50,000. Greatest of all Australia's nuggets, however, was the "Holtermann," found in New South Wales, which weighed 630 pounds!

In 1850 Australia had a population of only 406,356 people; within nine years it had grown to more than a million! Melbourne in that time grew from a tiny town on the banks of the Yarra into a metropolis of the Southern Hemisphere.

Nor did the gold discoveries end with New South Wales and Victoria. One by one fields were developed in Queensland. Not until 1882, however, did miners find that old Mount Morgan, almost at Rockhampton's back door, was "a mountain of copper capped with gold." Among the stories that cluster around this mine, which has yielded fabulous returns, is that it was originally purchased from a grazier for about five dollars!

Western Australia, last to unlock her wealth, turned out to be a Croesus. Coolgardie and Kalgoorlie became famous throughout the mining world.

What changes came to the sparsely populated State when Bayley and Ford camped by chance at a native well at Coolgardie! There they picked up a little nugget that led to their collecting \$300 worth of gold between breakfast and lunch, then later to stumbling onto the fabulous reef that paid out millions!

DISCOVERY OF THE "GOLDEN MILE"

Loss of their horses caused two miners, Flannigan and Hannan, temporarily to take their eyes off far horizons for a little time one June day in 1893, and thus came the discovery of the famous "Golden Mile" of Kalgoorlie, where they had camped two days waiting for water teams.

While most of the prodigious bulk of gold of earlier years was won by pick and shovel from surface workings, the main yields today are from deep shafts and the treating of poorer-grade ores.

In the Bendigo district shafts have been sunk to more than 4,600 feet. In Kalgoorlie I saw men gouging out the rocks with explosives and air drills at the 3,850-foot level.

A few years ago Australia's gold mines

were in serious decline, but with the recent soaring prices many are taking a new lease on life. In 1934 the gold yield, because of increased prices, was valued at nearly half the amount that was produced in 1903, when production reached the record amount of 3,830,000 ounces.

With renewed energy "swagmen" are again wandering over sun-scorched wastes, prospecting for new El Dorados. Kalgoorlie is again showing renewed prosperity, although on a much more ordered scale than in the good old days when the unsavory "Devil's Acre" supported 15 "pubs." For there is still much gold in the old Golden Mile, especially at the present premium gold commands in world markets.

Along with the new ore that is being brought to the surface, the mines are also re-treating the dumps that are heaped in mountainous piles from the early roasting methods, as improved flotation processes redeem sufficient quantities of gold to make the operation profitable. Every waste, however, has to be reduced to the minimum.

"We're trapping more and more of the gold carried off with the sulphur fumes," said one engineer as we looked up at the pungent haze that drifted away from the stack of one of the mines. "But even with our present condensers, about 400 dollars' worth unfortunately goes up the flue every day!"

How different is the present Kalgoorlie from what it was when "Paddy" Hannan chased his horses and picked up gold pebbles from the ground!

For gold has built a town and brought a railway. On one of the main corners is a statue of Paddy sitting on a rock with his pick by his side and a canteen in his hand (page 744). His own canteen was often empty, for water in this desert land was scarcer than gold. But turn a valve and water spurts from the bronze replica; its source is more than 300 miles away!

The Mundaring Weir, entrapping water in the mountains near Perth, and the pipe line through which it is pumped by means of eight stations to supply the desert town and mines, is one of the remarkable achievements accomplished in Australia's quest of gold.

Of necessity, mines use it with great economy, as water bills run high.

"In the wintertime we recover about 50 or 55 percent of the water from the operations and put it to use again; in the sum-



Photograph by B. H. South, Ltd.

LIKE A MAMMOTH SMOKE SCREEN DUST CLOUDS ADVANCE UPON BROKEN HILL

The rainbow-hued curtains of dirt resemble those that have swept over thirty western plains of the United States. Broken Hill, in New South Wales, is a wealthy mining area (page 746).

mer it amounts to about 45 percent," explained my engineer guide.

GOLD "A PAIN IN THE ARMS"

I could not leave Kalgoorlie until I had seen a few bars of the precious metal that has enriched the country by 150,848,000 fine ounces of gold, (more than \$5,279,680,000 at the present rate of gold) and has been of such importance to its growth. So Alec Fraser, a genial Scotsman who has handled all of the \$80,000,000 that has been produced at Great Boulder, Kalgoorlie's richest mine, opened up the storage safe to show me some (page 744).

"What have been your thoughts while handling so much gold?" I asked, focusing my camera on him as he held up two brick-sized bars valued at about \$30,000.

"If you mean the £17,000,000 that we've produced so far, that's just my routine here.

If you mean these two, hurry up and get your picture; they are *heavy!*"

Not all of the mineral wealth of Australia has been in gold. Coal has been consistently mined. The New South Wales coal fields, forming a mighty saucer underlying the Sydney area, constitute the most important coal deposit in the Southern Hemisphere.

With uptilted edges, outcroppings of this basin come to the surface near Bulli, at Lithgow in the Blue Mountains, and in the region of the steel town of Newcastle. At each of these places extensive mining operations have been developed. The Sydney Harbor Colliery, situated directly above the deepest portion, has sunk its shafts to the depth of 3,000 feet.

Queensland, second richest region in coal, has as yet hardly more than sampled her colossal stores with her mines at Ipswich



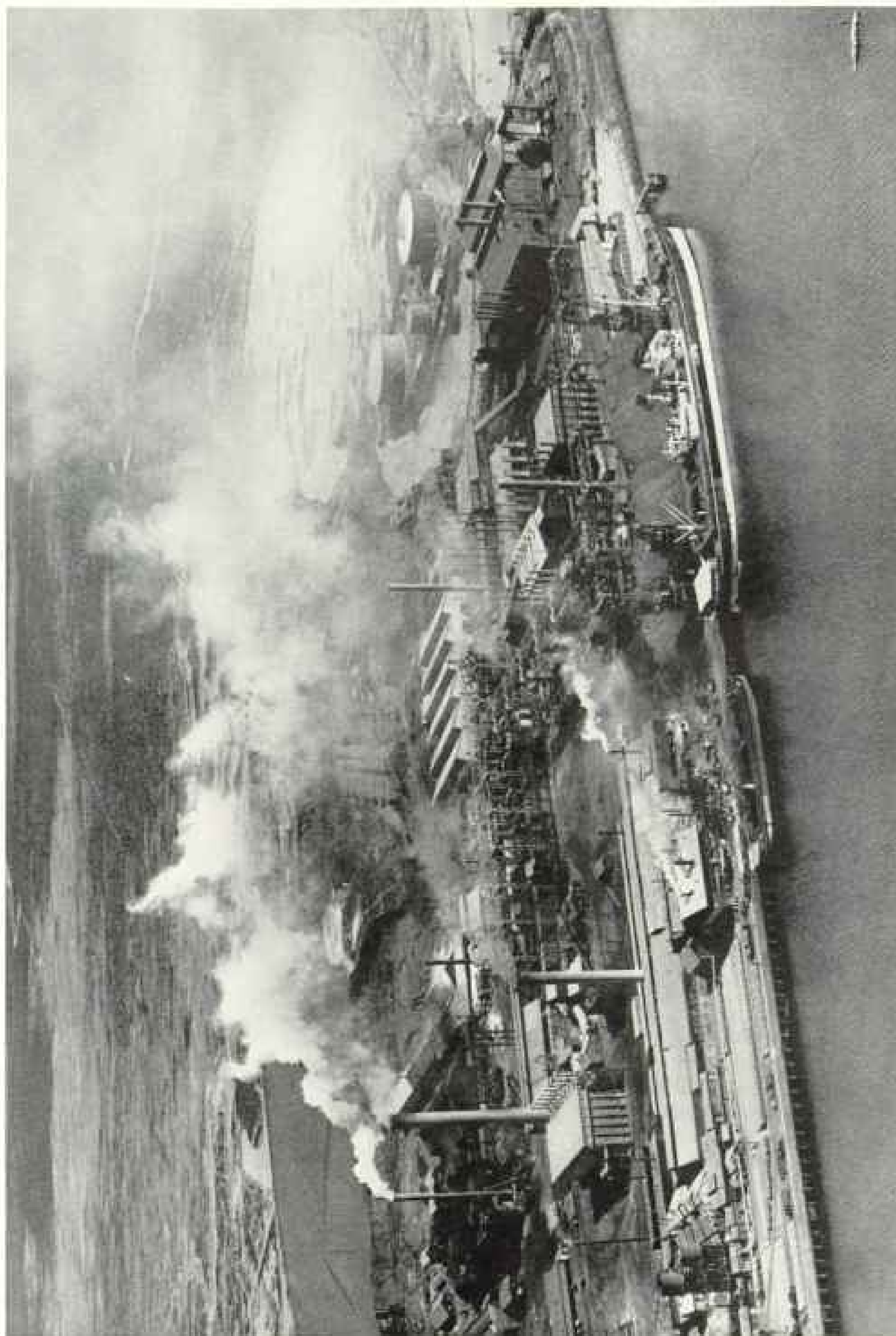
PADDY HANNAN'S CANTEN IS KALGOORLIE'S DRINKING FOUNTAIN

Because his container was empty, the prospector stopped here in June, 1891, to await water teams. During the halt he and a companion discovered the rich deposits of the "Golden Mile." (page 742).



\$40,000 IN GOLD IS ONLY TWO HEAVY HANDFULS

This genial Scot, Alec Fraser, has seen more than \$80,000,000 worth of gold come from the Great Boulder Mine, in Kalgoorlie. "No, it's not exciting; it's just something heavy to lug around," was his comment (page 743).



© H. Dorian Smith

PUNGENT VAPORS HANG OVER BUSY SMELTERS AT PORT PIRIE

A modern refinery smelts ores brought some 250 miles by rail from the rich mines of Broken Hill (page 746). The mineral deposits in neighboring New South Wales have thus proved a boon to this South Australia port, where ships from many countries load metallic cargoes.



Photograph by R. A. Bourne

THEY MIGHT NOT "PLAY HORSE" ON A DUGONG IF THEY KNEW THEY WERE RIDING DOSES OF "COD LIVER OIL"

Such a harpooned sea mammal, fully grown, yields 10 to 12 gallons of oil, used as a substitute for cod liver oil; about 200 pounds of hide for leather; and bones which make charcoal for sugar refining. Aborigines catch dugongs for food, the meat of the young tasting much like that of a suckling pig. The animals browse on the roots of marine plants in the tropical waters off Australia's northern coast.

and along the coast. In the future, however, they may grow to rival the workings in New South Wales. Flying out into the Queensland interior from Rockhampton, I looked down on Blair Athol, where there is an 85-foot coal seam free from any intrusions!

THE "BROWN GOLD" OF VICTORIA

Victoria, lacking an abundance of better coals, has one spectacular deposit of lignite. At Yallourn a vast, yawning hole is gradually growing daily as electric bucket dredges are shaving off the edges of an open cut of brown coal to feed a power plant that supplies most of Victoria's electric power.

Near by, too, clanking machinery and large presses are turning out countless tons of briquettes for fireplace and factory use. Six billion tons of this brown coal, engineers told me, are in the 180-foot layer that lies just beneath the surface.

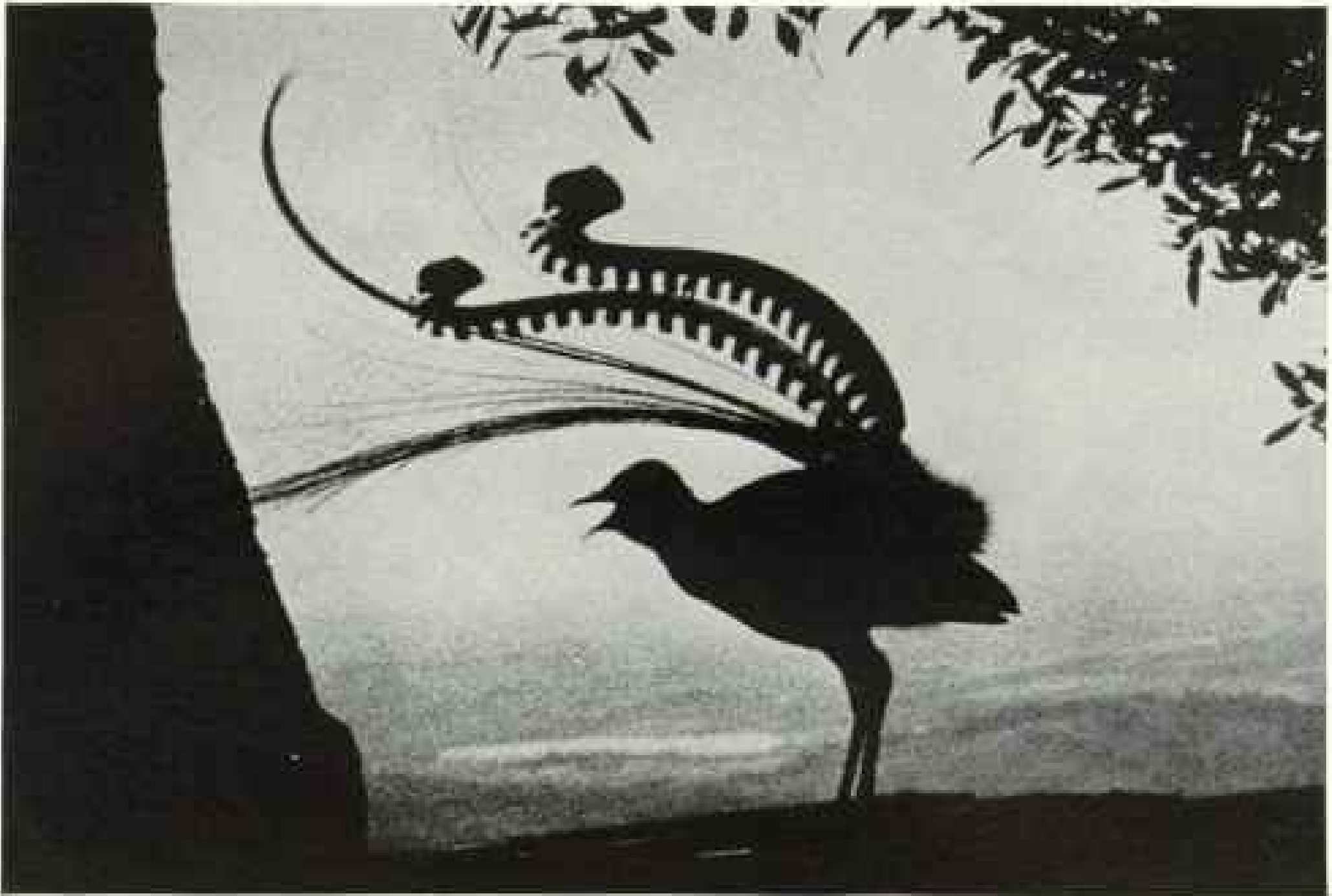
Lead, silver, copper, and zinc have like-

wise played important roles in the Australian pageant of progress. In many ways they are as amazing as the Ballarats and Bendigos, the Coolgardies and Kalgoorlies.

Consider old Broken Hill, out in the mulga scrub on the arid western edge of New South Wales (page 743). Sturt, in his explorations of 1845, called the place desolate and worthless. Yet how untrue. For here appeared an outcropping of iron that was staked out for tin, developed for its silver, and is now worked for lead and zinc!

A prosperous town has blossomed in the scrub, and the whole hill has been beheaded, torn asunder, and burrowed to produce a revenue that is now nearing a sum of ten figures. Its silver-lead concentrates keep busy the smoking smelters of Port Pirie, and its zinc concentrates are shipped off to Europe, Japan, and Risdon, Tasmania (page 745).

Mount Isa, a lonely outpost in far-western Queensland, bustles with activity as



Photograph from A.N.T.A.

A TALENTED SHOW-OFF BROADCASTS HIS ATTRactions

With an audience of one or more hem, the male lyrebird mounts a low pile of earth, spreads his gorgeous lyre-shaped tail, dances, and goes through an amazing repertoire of songs and "impersonations." A superb mimic, he seems to imitate the laugh of the kookaburra, the chatter of parakeets, a locomotive whistle, or the wail of a dingo (wild dog). Lyrebirds inhabit thick forests and fern gullies of southeastern Australia (pages 734, 738).

miners wrest lead, silver, and zinc from the earth.

Copper supplies much revenue to South Australia, compensating that State for its lack of gold. Mount Morgan, in Queensland, that romantic old auriferous hill which for years was worked only for its gold, also became a rich copper mine, but, like the copper mines in New South Wales, that phase of its industry has now been halted.

From the yawning open cuts and underground tunnels of the Mount Lyell mines, centered about Queenstown, in western Tasmania, now comes a major portion of Australia's copper output.

Iron deposits are distributed widely throughout the continent. Iron Knob, an amazing hill of almost pure iron, west of Spencer's Gulf in South Australia, supplies most of the ore used by the large ironworks at Newcastle.

In earlier years iron and steel wares were secured more cheaply and easily from Britain, but the Newcastle steelworks, which represent one of the largest and most

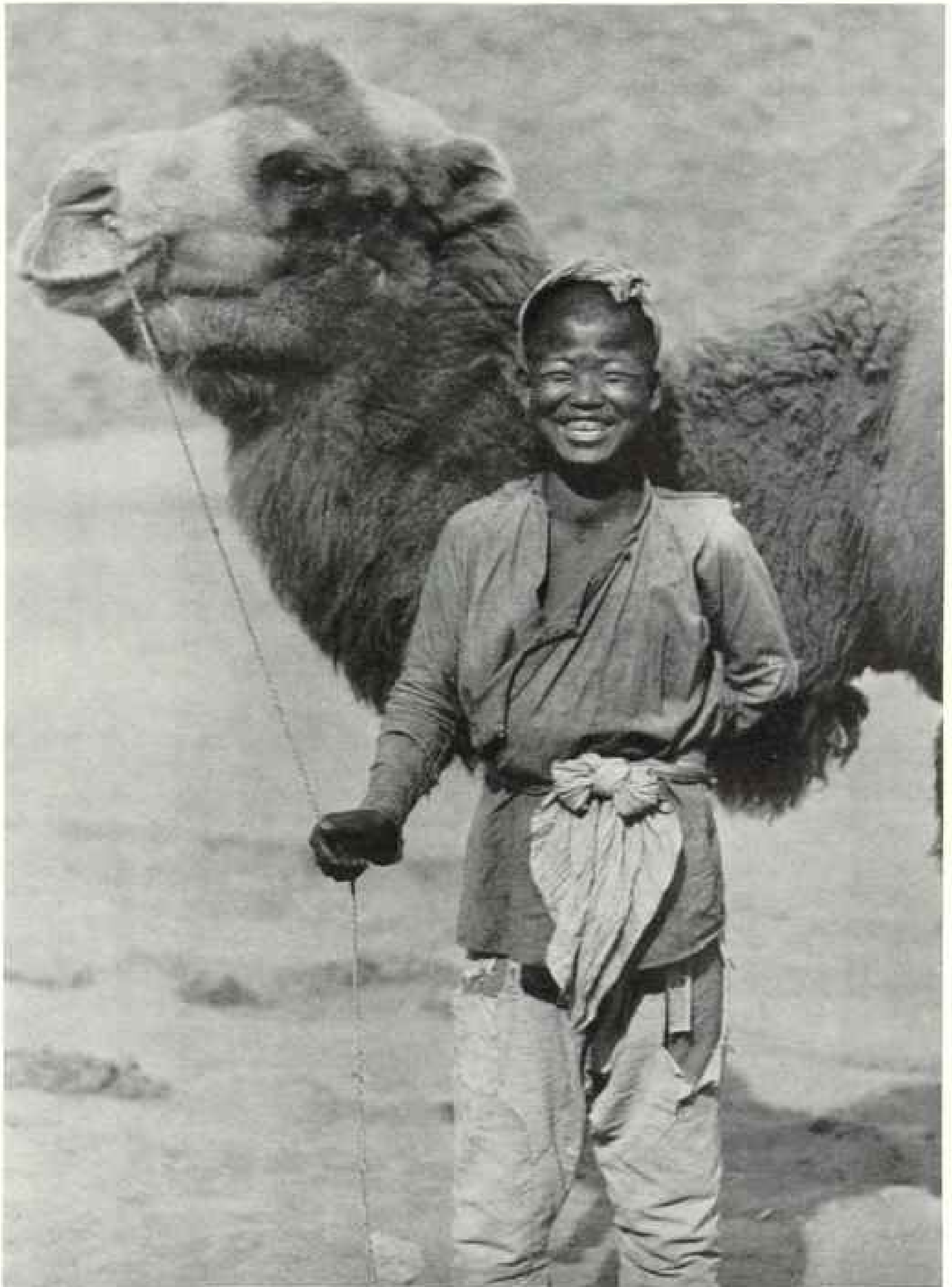
important industries in Australia, are now manufacturing increasing amounts of these products required by the Commonwealth.

Such, too, has been the history of many of the other manufactured necessities. Today, the hum of machines producing articles for local consumption is growing louder in the cities, and more and more people are regulating their lives by factory whistles, thus accounting in a measure for the increasing population of cities.

But to many the far horizons of outback Australia have persistent appeal.

One morning a bronzed stockman, still carrying his kit tied in a bundle, came to call on a Melbourne official. He had ridden 300 miles by horseback to Alice Springs, in the heart of Australia, and had then journeyed 1,500 miles by train to Melbourne to see about having another artesian bore drilled on his property.

Asked if he expected to be in town for a while, he replied: "Well, I reckon if I can get my business finished in time, I'll start back home on the afternoon train!"



© Heinz von Perckhammer

THE YOUTHFUL DRIVER'S MERRY LAUGH SEEMS TO MAKE THE CAMEL SMILE TOO.

The ungainly animals sometimes get tangled with automobiles in traffic jams in Peiping. A railroad speeds freight between the metropolis and Kulgan, in Inner Mongolia, but wheels have not displaced this primitive four-legged transport. Besides making long hauls, "ships of the desert" bring coal and vegetables to Peiping from near-by villages (Color Plate III).

PEIPING'S HAPPY NEW YEAR

Lunar Celebration Attracts Throngs to Temple Fairs, Motley Bazaars, and Age-old Festivities

BY GEORGE KIN LEUNG

FOR more than 4,000 years the Chinese people have used the Lunar Calendar. Peiping, until recently called Peking, the stronghold of conservatism in the North, observes with due respect the Government's desire that China "celebrate" with the modern world the New Year on January 1. But the former capital actually celebrates on the first day of the lunar first month, which in 1936 fell on January 24.*

This is not a case of stubborn clinging to old habits; the roots of the matter strike into deeper soil. The old calendar, having been used by man since time immemorial, follows the seasons, the times for planting the "good earth" that provides man with his food.

It is true to form that Peiping, with the innate polished courtesy of its citizenry, should bow affably and even low to the Gregorian New Year, but that the feasting, account settling, shop holidays, and all that sets the human heart in rhythm with the foremost holiday of the year should take place on the Lunar New Year.

Then winter is about to surrender its icy grip on the land. Farmers and city dwellers joyfully greet the first promises of spring-time warmth that soon will once more stir life into growing things.

CASTING OFF THE OLD LEAF

In the Western World, there is the quaint idea that on the first of the year one "turns over a new leaf." In Peiping "one casts off the old" with a rat-a-tat-tat of firecrackers, and looks into the coming year full of hope. Those who have been sorrow-ridden must completely change their feelings if they are to find real happiness that year.

During the half-month celebration of the Lunar New Year, tens of thousands attend the temple fairs and bazaars which are centers of prayer, of animated bargaining at

stalls, and of entertainment in the lavish variety that the Old Capital provides.*

Peiping citizens adore big crowds—"gatherings for people to see people."

Time is not the nerve-wracking, carefully treasured thing it is in the West. Therefore, in Peiping preparations, or the first stages of the celebration, begin on the eighth day of the Twelfth Moon, fully three weeks before the Lunar New Year.

On the night of the seventh day, a sweet pudding, consisting of many kinds of rice, beans, dates, chestnuts, and liberally garnished with red sugar, white sugar, melon seeds, pine nuts, and so on, is cooked. The simplest dish, however, must contain no less than eight ingredients.

Puddings are eaten by the family and presented to friends. Gifts should be made no later than the noon of the eighth. The custom dates back at least as far as the Sung Dynasty (960-1280). Pickled cabbage is sometimes eaten with the delicacy.

THE KITCHEN GOD ASCENDS TO HEAVEN

On the eve of the twenty-third, Tsao Wang Yeh, the Kitchen God, ascends to Heaven to report on the doings of the family for the year to the Jade Emperor.

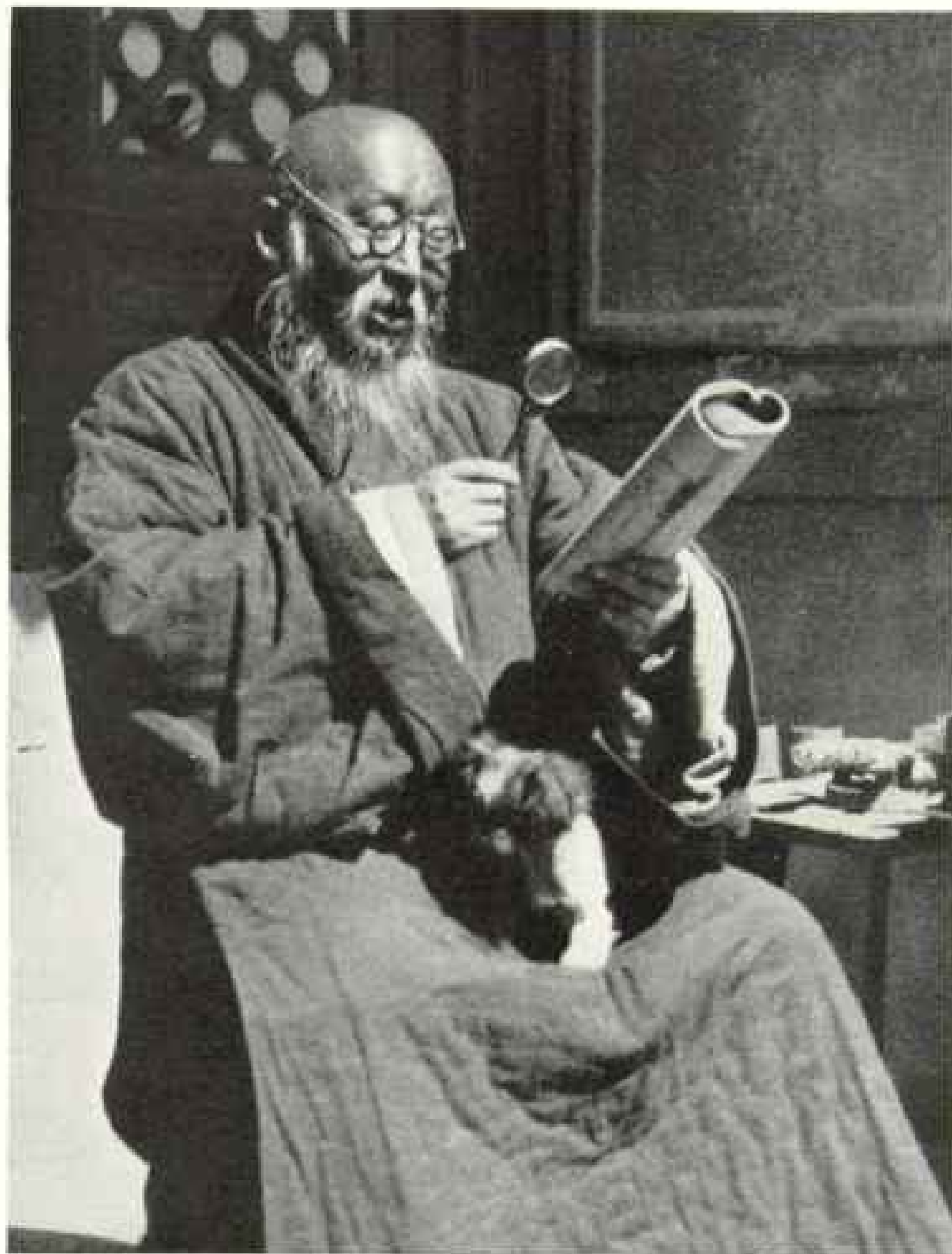
The family offers the deity huge pieces of molasses candy, so that, when he is about to make his report, he is unable to extricate his teeth from the jaw-locking mass. Hay and a bowl of water are offered on the stove to the Kitchen God's horse, which squats with neatly folded legs on the paper picture of the deity.

When the ceremony, including the offering of a miniature paper ladder to facilitate Tsao Wang Yeh's celestial climb, has been duly performed, the paper picture of the god and other paper objects are burned and so sent up to Heaven.

The Kitchen God is speeded on his journey with the following admonition: "Tsao Wang Yeh, when you go up to Heaven, favorable words say many; unfavorable

* The old Chinese calendar is based on both the moon and the sun. Each year has twelve months, with an intercalary month inserted 22 times in 60 years. New Year's Day falls on the second new moon after the day of the winter solstice. Thus it never comes before January 20 or after February 20.

* See "Glory That Was Imperial Peking," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, June, 1933, and "Approach to Peiping," by Maj. John W. Thomason, February, 1936.



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PEKINGESE BOTH—A LEARNED MONK AND HIS TINY DOG

Scholarship is traditionally China's most honored profession. Under imperial rule, examinations were held every third year and high government offices went to students writing the best classical essays on Confucian philosophy. Some of the compositions had to be written in poetic meter. Nowadays, Peiping's old Examination Halls have given place to modern schools.

words, few; protect us and let all good things come our way."

Then the greedy mouths of the children devour the candy that was to have been Tsao Wang Yeh's. Thus for seven days, until the thirtieth, when the god's return is marked by the pasting of a new paper picture in his shrine, the household is free of the watchful eyes of the deity.

On the night of the thirtieth elaborate preparations are made by the rich, and simpler ones by the poor, "to cast off the Old Year" and to welcome the New. The

courtyards are carpeted with sesame stalks, for their crackling sounds frighten off evil spirits. Illuminated lanterns of many forms are hung. The family enjoys a banquet, while women and children play dice and cards. All gods are worshiped at a fully decorated altar.

The auspicious hour is designated by the almanac. Firecrackers announce the departure of the Old Year and welcome the Gods of Wealth, Happiness, Longevity, and others.

THE PERIOD OF FESTIVITY

Then follows a period of unbroken festivity. In former times large shops closed for 15 days, but now three or five is the rule. Those who choose to do business conduct it behind shuttered windows and half-open

doors. When the shops reopen, they begin with a clean slate.

Children are given their school vacations, so that the whole family is free to call on relatives and friends. Gambling in infinite variety—mah-jongg, dice, cards, and dominoes—is encouraged, especially in the country, where there is less diversion than in cities.

The theater is a favorite attraction to many, especially to the shopworkers of old-fashioned firms. The wealthy see Yang Hsiao-lou, Mei Lan-fang, and other national

celebrities, while the poor content themselves with the humble theaters in the Bridge of Heaven district. Talking films draw the well-to-do moderns and the old silent pictures appeal to those of moderate means.

Temple fairs and bazaars, however, attract people from all walks of life and truly mirror the festive spirit.

NEW CLOTHES FOR THE NEW YEAR

On New Year's Day, everyone dons his new clothes. Little girls appear in their bright silk or patterned cotton gowns; small boys have on the top of their tiny black satin hats a single silken ball of scarlet fluff, that being the color for joy and good luck.

The family, having worshiped the ancestral tablets, next do obeisance to grandparents, parents, and elderly members of the household. They then are free to call on relatives and friends. A friend of mine complained that he had so many elders to kneel to that his legs were sore. Gifts of flowers, food, and so on, are exchanged, while children receive money, sometimes wrapped in red paper, as well as toys (page 762).

The second day of the First Moon in Peiping is set aside for the worship of the God of Wealth. Most families who have abstained from meat on the first may now resume it, balls of hashed meat wrapped in



Photograph by Iranson De Con from Gulloway

MOTHER AND SON SQUAT IN A ROUGH-RIDING COVERED WAGON

Despite innovations such as rickshas and automobiles, the springless, two-wheeled Peiping cart, pulled by a mule or donkey, still is used. Sitting on cushions, passengers are shaded by a canopy stretched forward to two poles attached to the wagon's shafts.

a thin layer of flour paste being favored.

The seventh is Peoples' Day. If the weather is bright, mankind will thrive for the year; there will be little illness.

Propitious Stars is the festival of the eighth day, when temples and some wealthy families light 128 tiny lamps, hoping in this way to gain good luck for the year. Only one lamp may be used in families of moderate means.

THE DAY OF THE LANTERNS

The fifteenth marks the great Lantern Festival's peak, when certain temples and

large shops regale the public with displays of lanterns made of glass, silk, horn, and fine paper. The prosperous silk shops exhibit huge gauze lanterns in the form of vases, peaches, "good-luck" bats, and series of rectangular panels, which may cover a wall. Their surfaces are painted with scenery, animals, beautiful ladies, or with characters from familiar novels and dramas.

Streets abound with examples of the art of the old-time lanternmaker, but the ingenuity of the craftsmen does not end here. I saw one lantern in the form of a modern locomotive. It had a light in its cylinder-like belly and was inscribed with the English "A15," preceded by the Chinese characters meaning "Special Express."

ITINERANT MERCHANTS AND WAYSIDE POETS

The fifteenth for most people marks the end of the active celebration of the New Year in Peiping, but the climax of temple celebrations falls on the eighteenth, when the Pai Yün Kuan (White Cloud), the richest temple of Taoist faith in the region (page 776), holds its intriguing festival, "Meeting the Genii."

Selling by an army of venders and itinerant merchants appears to be as important as the burning of incense at the altars of temples where most fairs are held. Hosts of these small merchants who move from fair to fair depend on the New Year income.

Early in the season, there may be found anywhere on a busy street or near a temple the table of a scholar who has fallen on evil days and seeks to earn a few coppers writing "spring couplets." These are composed with a brush in black ink on strips of red paper. A set is translated as follows:

"Precious yellow gold and green jade, who owns them?"

"White sun, blue heaven, our Nation's flag."

These are pasted on either side of the door. The second statement is a recent patriotic innovation, referring to the national flag. Above the door is placed the phrase, "Unity for all nations," yet another modern note. Shops prefer such pithy four-character phrases as "Opening business; great prosperity."

Even a servant who may earn only a bare living buys New Year pictures to put on his walls and windows. Peddlers cry these wares in the streets.

In the old days, gaudy, crude, but not unattractive pictures, done by wood block on large thin sheets of paper, were popular. They represented actors, fat infants ardently desired by all, or an entire family performing seasonal ceremonies, while the God of Wealth has his heavenly assistants roll into the house wheelbarrow loads of silver and gold ingots.

In addition, the God of Longevity and the celestial pantheon were shown, showering down upon the lucky human recipients all their heart's desires.

Now these are considered by many as "too old-fashioned." In their stead are foreign-style lithograph horrors whose colors rival the comic sheets that might easily have been their inspiration. Some of the fat Chinese babies have been retailed into wobbly male children in black tuxedos, cuddling dumplinglike infant brides attired in frilly pink European dresses and fluttering veils.

Flat paintings on scrolls, sometimes framed, are much desired for this season. They are sold in shops, on the street, and in mat sheds erected for the short holiday.

"DOOR GODS CHANGE SHIFTS"

Well known to the outside world are the door gods, who guard the household from intrusion by evil spirits. New Year is the time to renew the paper pictures of gods that are pasted on doors and walls.

Recently it has been urged that the personages of the Tang Dynasty (618-907), who later became deified as guardians of the door, be replaced by more worthy figures, national heroes such as Yo Fei, who valiantly fought the Chin Tatars, and Wen Tien-hsiang, who in the face of hardship remained true to the last Sung emperor during the flight to Kwangtung.

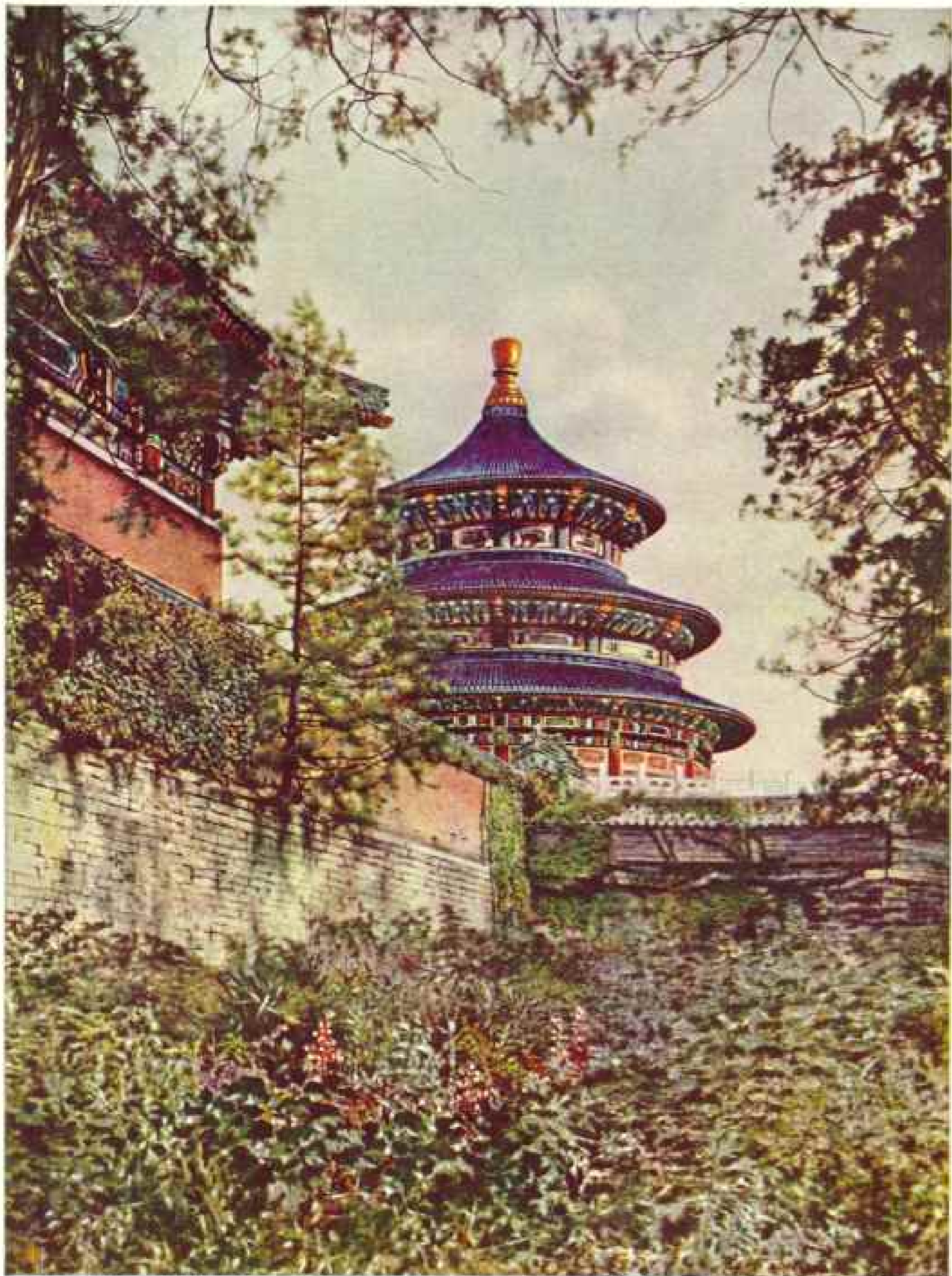
One newspaper reporting this change headed its article: "Door Gods Change Shifts."

Flowers and plants, which have been forced in hothouses to bloom at the Lunar New Year, are offered in profusion at market fairs.

Favorites are tree peonies, the narcissus, magnolia (or "jade-orchids"), "welcoming spring," and Buddha Hands, a yellow citrus fruit shaped somewhat like a hand.

Curio dealers spread their tempting wares on tables at bazaars and in some temples. The collector of jade, ivory, and carved semiprecious stones will find here paradise

A PEIPING PANORAMA IN VIVID PIGMENTS



© National Geographic Society

Camera Painting by H. C. and J. H. White and Hwang Yao-tso

EMPERORS PRAYED FOR PROSPERITY IN THE AZURE-TILED TEMPLE OF THE HAPPY YEAR

Annually at spring plowing time, China's rulers begged God for good harvests. Often called "Temple of Heaven" by foreigners, the circular, triple-rooted building, rising from a white marble terrace, is only a part of the vast walled shrine devoted to "Old Grandfather Heaven" (Plate IV). Huge Oregon pine logs were imported when the temple was rebuilt after a fire in 1889. These photographs of Peiping and vicinity were taken by the White Brothers and specially painted by the Chinese artists Deng Bao-ling and Hwang Yao-tso.

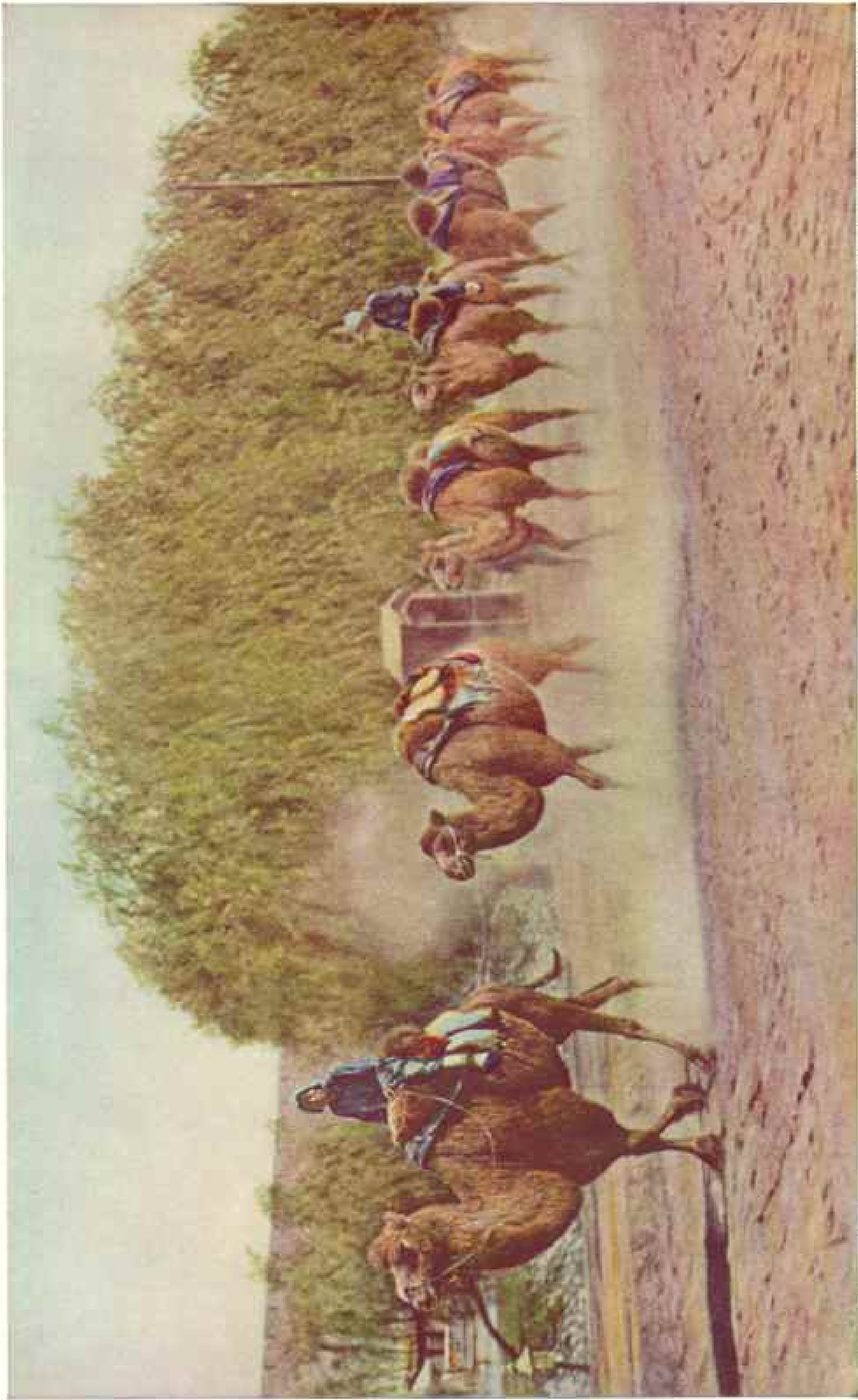


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Camera Painting by H. C. and J. H. White and Dent Bauling

FRONT DOOR OF PEIPING IS THE CHINESE MEN

Through this fortification in the Tatar City wall the Emperor used to pass from his palace to the Temple of Heaven (Plate I). The gate's emerald-glazed roof is 99 feet high to accommodate good spirits, which, according to necromancers, soar at 100 feet! A street sprinkler draws water from a stone-enclosed well on the avenue, where a blue-hooded Peiping cart, a wheelbarrow, and rickshaws contrast with a modern streetcar.

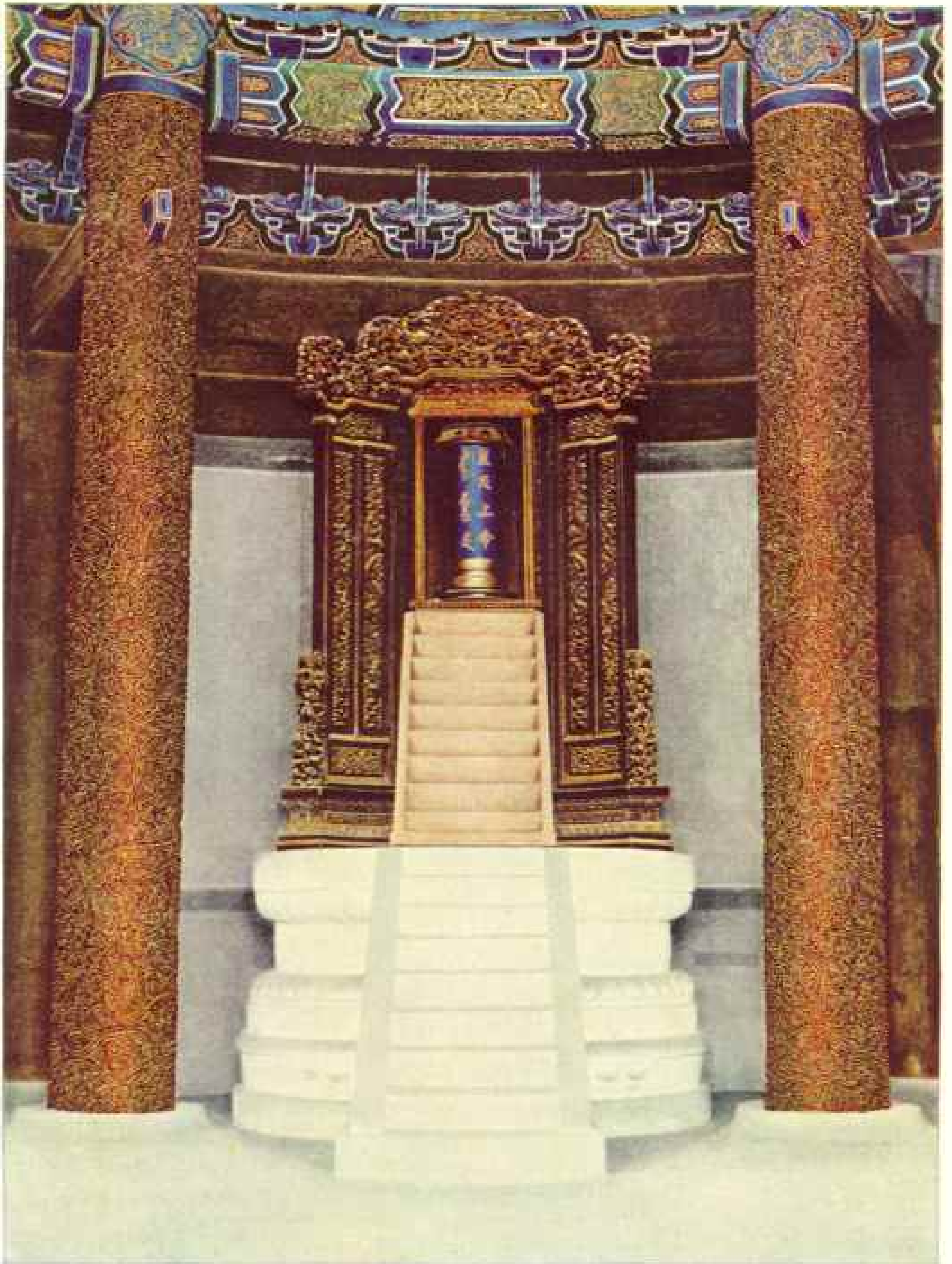


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MARCO POLO SAW SUCH CAMEL CARAVANS FLODDING FROM PEIPING MORE THAN 600 YEARS AGO

Camera Painting by H. C. and J. H. White and Howard Yao-tao

"To this city," wrote the Venetian traveler, "everything that is most rare and valuable in all parts of the world finds its way." Then, as now, two-humped Bactrians with bright saddles, roped in single file, lined highroads between Peiping and the lands beyond the Great Wall. Its coal or produce unloaded, this train, returning to the Western Hills, passes a sentry box near the city's battlements, partly hidden by weeping willows.



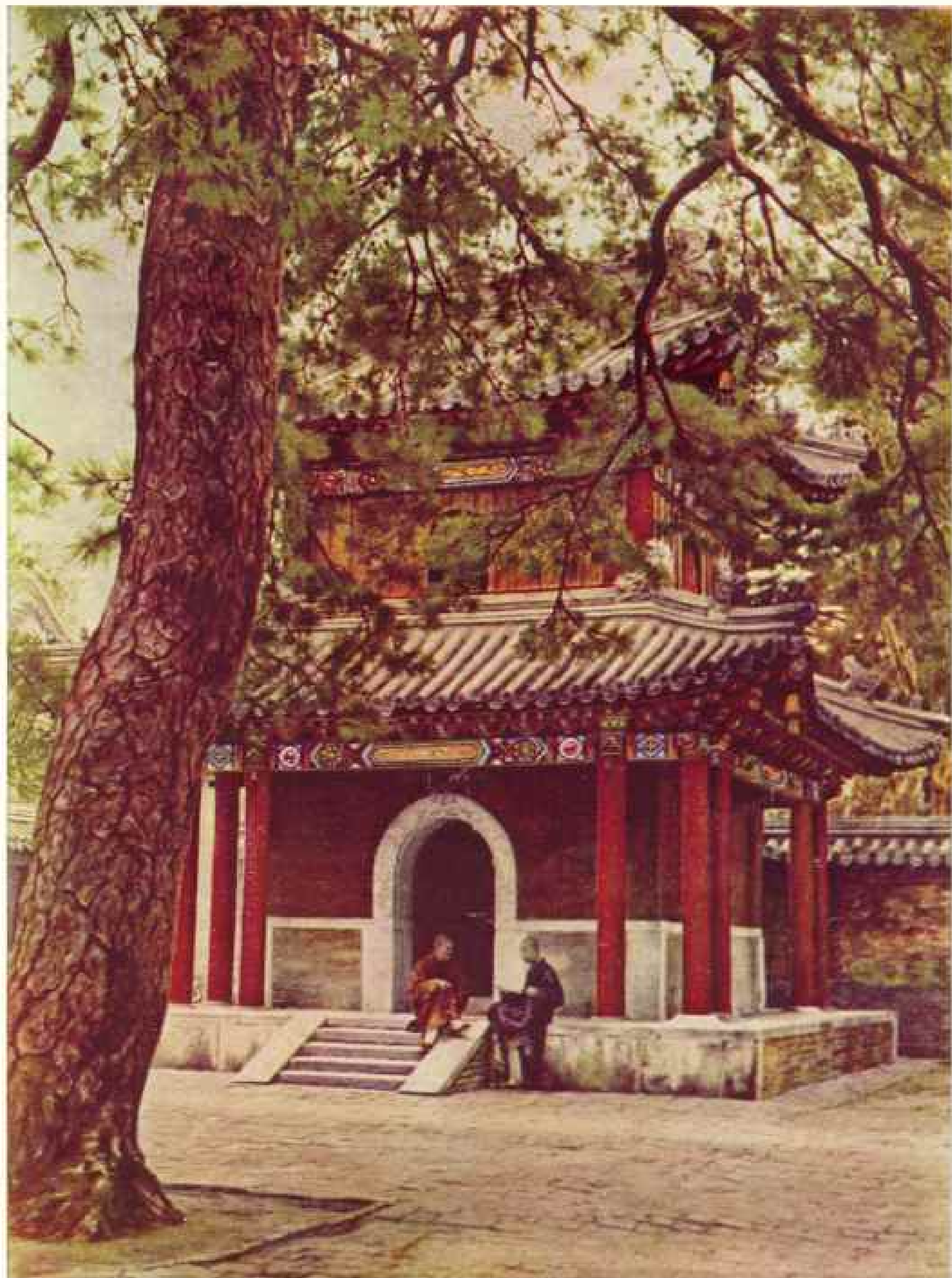
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Camera Painting by H. C. and J. H. White and Deng Bao-ling

SIMPLICITY MARKS THE SUPREME DEITY'S SHRINE

Enthroned in a jewellike rotunda within the walls of the Temple of Heaven, the cylindrical blue tablet bears four golden Chinese and three Manchu characters signifying "Shang Ti, Ruler of the Universe." Ancient Chinese believed in a single God, and even recent emperors sacrificed to Him at the Altar of Heaven. Today the people worship a host of divinities, mostly Buddhist and Taoist. China's Mohammedans number from 15 to 20 millions, Christians between three and four millions.

A PEIPING PANORAMA IN VIVID PIGMENTS

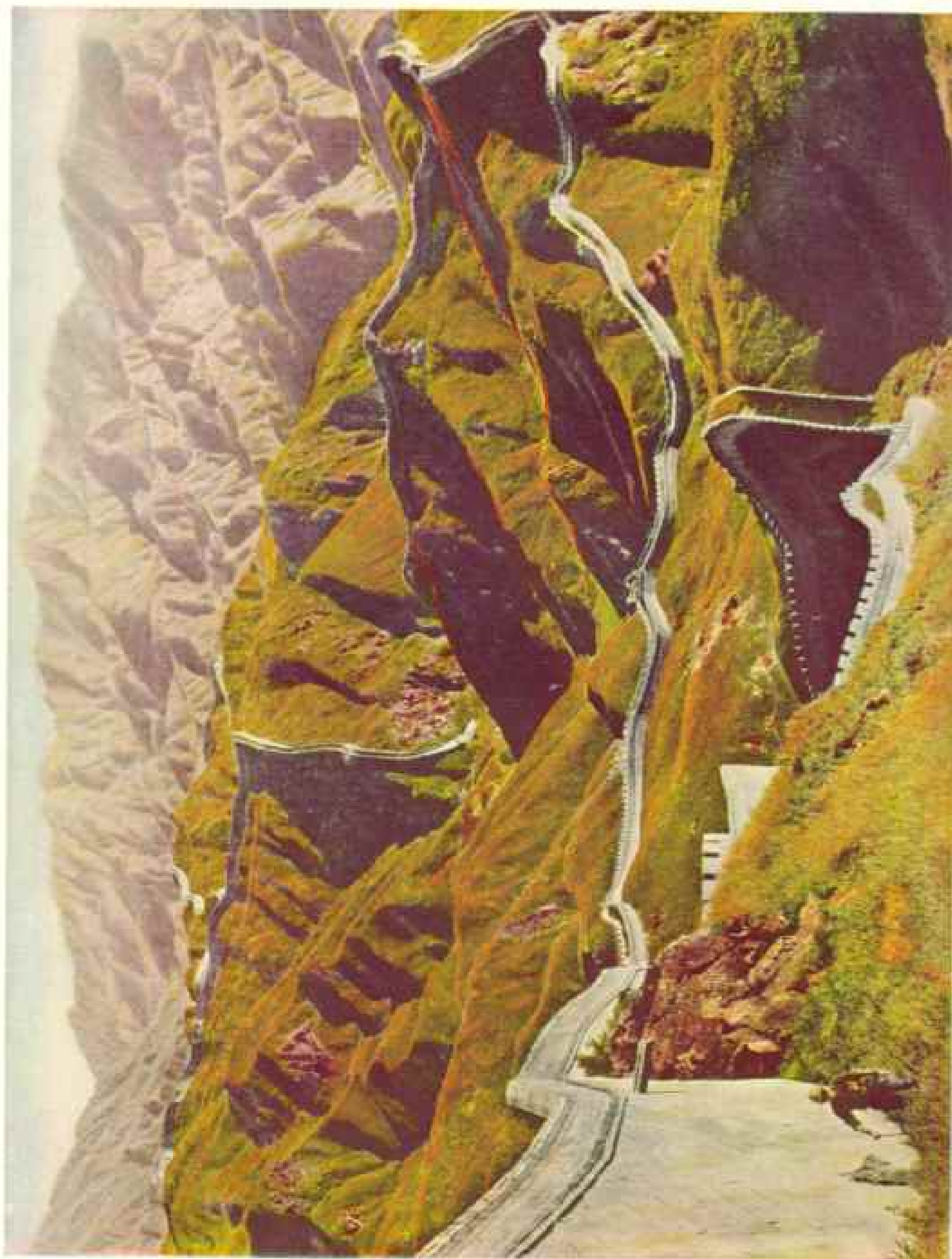


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Camera Painting by H. C. and J. H. White and Hwang Yuo-tao

VENERABLE PINE BOUGHS VEIL A BUDDHIST MONASTERY'S DRUM TOWER

At midnight, when boys take their vows at the seventh-century "Monastery of the Ordaining Terrace," in the Western Hills near Peiping, a priest's assistant beats the huge drum inside this red-pillared building. "He taps the ancient face and it sobs . . . it moans like the wind in a forest of pines; Again it roars . . . alternately crashing like thunder . . . or whispering like throbbing heart-beats." Two monks with rosaries chat beneath the eaves, whose upturned ends bear dragons and tinkling bells.

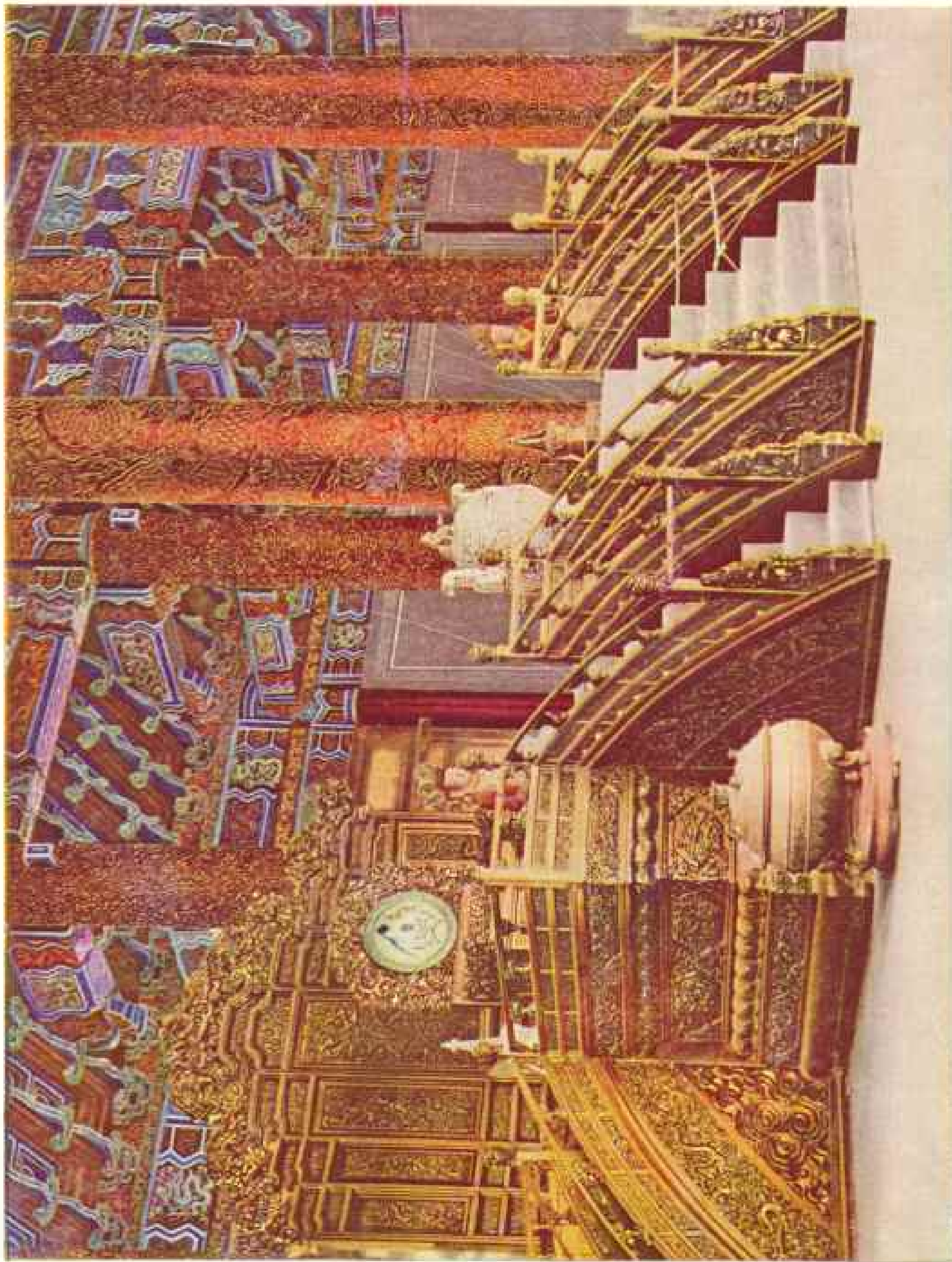


Camera Painting by H. C. and J. H. White and Deng Bao-ling

TRANSPLANTED TO AMERICA, CHINA'S GREAT WALL WOULD STRETCH FROM PHILADELPHIA BEYOND TOPEKA, KANSAS

Spurs would jut south into Virginia and Arkansas. More than two centuries before Christ, drafted laborers by hundreds of thousands built this giant fortification, seen here near Nankow Pass, northwest of Peiping. Watchtowers, often only 100 yards apart, guarded against surprise attack.

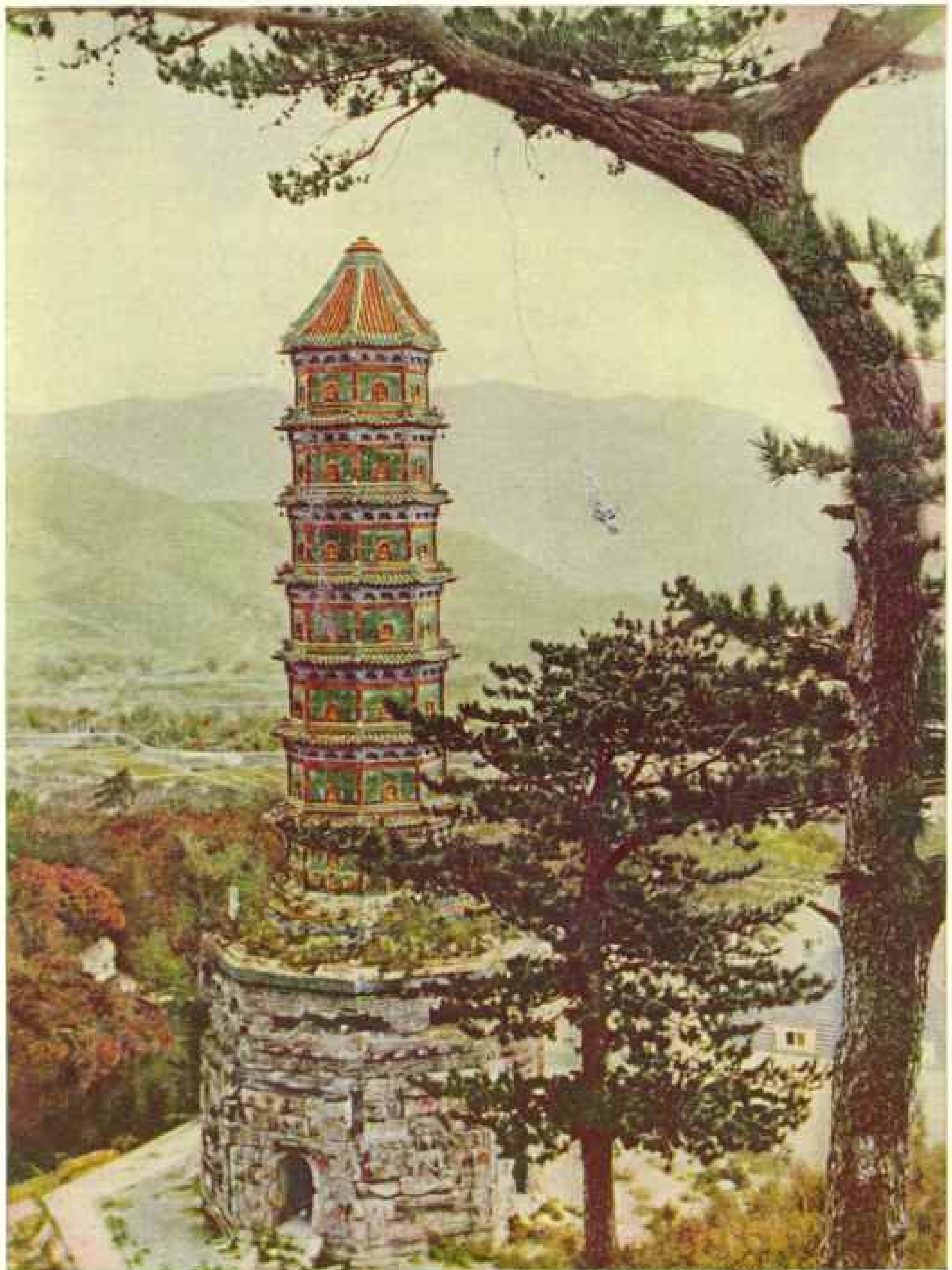
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Cabinet Painting by H. C. and J. H. White and Dong Bao-hing
IN THE "HALL OF SUPREME HARMONY," ENTHERONEMENTS, IMPERIAL BIRTHDAY CELEBRATIONS,
AND NEW YEAR'S RECEPTIONS WERE HELD.

Carved on the rails and screen are 99 five-clawed dragons. When the Emperor, the "Dragon's Person," took his seat in this palace of the Forbidden City, 100 dragons occupied China's throne! A Buddhist image sits on either side near the stairs.



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Camera Painting by H. C. and J. H. White and Deng Bao-ling

A "TOWER OF PORCELAIN, STRANGE AND OLD," STANDS WHERE EMPERORS HUNTED

Unharmful by time are the pagoda's green and gold encaustic tiles, with tiny bells dangling from the eaves; but the masonry base is crumbling. Beyond twists the wall of the former imperial hunting park in the Western Hills, where "Sons of Heaven," with brilliant retinues, chased deer and bear. No longer a game preserve, the park now contains an orphanage, a sanitarium, and many summer homes. Once forest-clad, most of the hills have been stripped for firewood.

or purgatory, depending on whether he obtains or fails to obtain what he wants at his price.

The "tea p'êng" men (*p'êng* being the temporary mat shed erected over the tables), who go from fair to fair, frequently remind you that you had your last pot of tea at their stall a few days ago at a temple several miles away.

VENDER CARRIES HIS STOVE ON A POLE

Everywhere are displayed vast quantities of food. There is the modest one-man restaurant, the vender carrying his stove on one end of a stout pole that rests on his shoulder, while his dishes, condiments, and utensils repose in a wooden box suspended from the other end. Luscious roasted sweet potatoes, little round cakes, steaming hot and incrustated with sesame seeds, vats of jellylike bean curds, bowls of noodles, and numerous other things are there.

The Mohammedan peddler with shining brass scales puts up a sign proclaiming that all his food and utensils are strictly orthodox; that is, they contain no lard or pork, and everything is extra clean.

At most fairs, one finds forestlike rows of brown or white rods from the ends of which flutter pink, green, or yellow triangular paper flags. On close inspection, the rods turn out to be lengths of small hawthorns, which are literally "haws on a rod." Some are coated with brown sugar, while others are plastered with a whitish sugary paste. These long, edible batons, or "great sugars," are the delight of children (page 789).

A GAME OF "NUMBERS"

Popular in the home and at temple fairs during the holiday are games of chance. The simplest outfit consists of a man reciting in a singsong voice what his game is about. On receipt of a large grimy copper coin, he thrusts into the hand of the donor a folded paper. When a number or symbol has been picked from a receptacle, the holder of the corresponding one is awarded, amid the gaping admiration of the crowd, a few packages of cheap cigarettes or a pair of imposing bottles of watery toilet water.

Many try their marksmanship with pop-gun, toy cannon, crossbow, or bow and arrow. Well patronized is the game wherein clay dogs, teacups, packages of cigarettes, and so on, are placed in a rectangular space on the ground. The aspirant pays a copper

coin or two for wire hoops having what seems to be a superanimated "spring" when they hit the ground. Standing at a specified distance, one must make the hoop lie perfectly flat about the object in order to win it.

In broad daylight, under the very golden sun, one may see movies. The lone spectator thrusts his head into a black cloth bag and sees what he can. There also are "listenees," antiquated cylinder gramophones, with rickety earphones reminding one of a physician's stethoscope. These diversions have a conspicuous place among the food stalls, merchandise booths, and acrobats who entertain the throng.

Everywhere are the toy sellers. Chinese playthings are brightly colored, cleverly made, reasonable in price, and, though fragile, remain intact at least as long as does the child's interest. The festival mood is never so complete as when one beholds mass upon mass of bright-colored windmills or "wind wagons," scores of little cardboard wheels on a bamboo rack that make fussy clattering noises in the wind.

KITES, GOURDS, AND DIABOLOS

Next in popularity are kites, noise-producing glass gourds (page 789), diabolos, and shuttlecocks. Kites may be in the form of a fantail goldfish with huge gyrating eyes, or a dragon whose head tugs at the cord while each segment of its long body and tail wags in a windy sky (pages 762, 766).

Diabolos, called "hollow bamboos," are so constructed that they produce a loud whirring noise when spun on a cord between two sticks.

Shuttlecocks vary from the stubby, green-feathered affairs, obtainable for a few coppers, to superb examples topped with long, sensitive feathers.

Popular with children are the men who knead from rice flour miniature figures of stage and legend. With lightning speed and a few dexterous rollings of the bits of colored rice paste, they bring the charming little people to life under one's very eyes.

On January 23-25, 1935, a leading merchant of the district north of the Teh Shing Gate, held a successful fair to boom the business of his neighborhood. He obtained the co-operation of the booth merchants and religious organizations which perform free at temple celebrations in staging a festival at the Black (Lama) Temple. He man-



Photograph by George Kiu Lung

A DRAGON KITE IS THEIR NEW YEAR'S PRESENT

Rouged, powdered, and attired in their holiday best, two little girls emerge beaming from a popular kite shop at the Liu Li Chang Fair (page 791). Behind them stare the enormous round eyes of a goldfish kite (page 766).

aged the time cleverly, in that the holiday spirit had already begun with the eating of *la pa chiu* pudding as early as January 12, though New Year's Day was not until February 4.

PROMOTING TEMPLE PATRONAGE

Thousands of people poured from city and countryside toward the dilapidated temple. Rickshas abounded, although many farmers came in the two-wheeled Peiping carts (page 751). The more active city dwellers often got off their rickshas at the gate and rode the rest of the distance to the temple on donkeys. So numerous were

bicycles that a temporary yard with a tiny office was erected for checking the vehicles.

There was a sprinkling of glass-windowed carriages drawn by Mongolian ponies. But the "tigers of the city streets," streamline motorcars, although in the minority, tore along the dusty road, scattering people left and right and leaving blinding clouds of brown dirt on those behind.

Soon the noble approach to the Black Temple was lined with hundreds of rickshas, two-wheeled carts, wheelbarrows, and shining motorcars, while closer to the entrance were arrayed the booths of toy peddlers, food vendors, and so on. In the courtyards were games of chance

and all manner of small merchandise.

For many who made the journey, the main drawing card was the societies who offered their stunts, some of high artistic quality, such as those of the "lion men" (pages 774-5 and 788).

Folk songs are sung by men in costumes, while others, garbed as intrepid warriors of old, display their prowess in wielding the "five tiger clubs."

On this occasion, a "mad" Taoist priest attracted such an enormous mob that the law stepped in. The priest, either stark mad or exceedingly clever, in that his antics drew a crowd from which he could beg alms,

strode lustily into the main hall. Garbed in a voluminous robe, carrying bundles of stringy rags, and having in his picturesque turban a single quivering feather, he presented a weird figure.

The climax of the episode came when he stood gesticulating in front of the sacred images and in highly musical cadences began to revile each and every god in the choicest Peiping profanity. To the intense regret of all, the police and one of the leading merchants escorted the priest out and thus dammed the flow of his versatile vocabulary.

Most temples hold their regular worship on the first and fifteenth day of each month of the Lunar Calendar. The first day of the First Moon, however, is a big occasion at the old Yüan

(Mongol) Dynasty (1280-1368) Taoist temple, the Tung Yüeh, situated outside Chao Yang Gate. A long line of emperors have been patrons of the place, Kang Hsi and Chien Lung being two of the rulers who made repairs on the buildings (page 764).

INCENSE HELPS "GODLY BREATH"

Apart from the bright-colored toys which greet the eye at the entrance, brisk trade goes on between religious visitors and incense peddlers, not to mention the famous



© Heinz von Petzhammer

"I RESPECTFULLY WISH YOU BLESSINGS OF JOY"

Thus two gentlemen of the old school, wearing queues, greet each other on New Year's. Instead of grasping one another's hand, each bows and shakes his own clasped hands in the time-honored manner. Queues, imposed on the Chinese by their Manchu conquerors, mostly disappeared after the Revolution in 1911. Silk or cotton gowns, such as these men wear, are the usual winter dress. They are thickly padded, or are lined with fur.

incense shop close at hand that swarms with buyers (page 787).

One writer remarks that as soon as one puts foot into the temple, he immediately feels a strong, "godly breath"; that is, religious atmosphere. The devout carry yellow or orange cloth bags which contain incense sticks and coppers for mendicants. Underlying the idea of giving is the belief that the donor will receive reward from the gods either in heavenly blessings or in earthly gain.



Photograph by Herbert C. and J. Henry White

STONE TORTOISES BEAR HUGE TABLETS PRESENTED BY BYGONE EMPERORS AND PILGRIMS TO TUNG YÜEH TEMPLE

A favorite symbol in Chinese art, the tortoise is the emblem of longevity, strength, and endurance. Visitors to temples often take home copies of famous tablet inscriptions. Reproductions of the indented surface are made by placing thin paper on the stone and rubbing the sheet with a substance like lampblack (page 763).



Photograph by Stanton De Cuir from Galloway

CHINESE FOOT TRAFFIC SEEMS TO HAVE THE RIGHTS OF ALL WAYS

Pedestrians often throng the middle of the street, just as they did for centuries before sidewalks were laid. Here a soldier, and citizens in long silk or cotton gowns, crowd past two rickshas. When first imported to Peiping, about 50 years ago, rickshas were denounced by the carters' guild, whose members asserted that the two-wheeled conveyances would relegate men to the status of beasts of burden.

The thickest clouds of incense smoke rise in front of the shrine to the God of Wealth. Who in Peiping and the whole world does not worship and court the favor and gifts of that popular potentate?

Decidedly sought after is the "Old Man under the Moon," who arranges marriages. There is a belief that a parent may find an ideal mate for his son or daughter by borrowing, unknown to either, a scarlet cord from this deity. If this is tied across the door on the eve of the New Year and is touched by the person, he or she will be married that year. That the god is very "efficacious" is known to all.

Great is the fame of the bronze mythical beast, popularly thought by Peiping worshippers to be a humble donkey, which may be found in a room at the rear of the temple. You have only to touch that part of its body corresponding to where you ail to have a speedy recovery (page 787).

The high flames from mountainous offerings of bundles of incense and the throngs pressing through the well-kept halls of worship transport one back some centuries to a peaceful world that knew nothing of the newfangled doubts that beset our times.

It is, nevertheless, a relief to step into the large paved courtyard where ancient evergreens let dappled sunlight fall upon the stone flooring and upon the innumerable rows of imperial tablets given by rulers of old. Here are games in which people try to hoop a clay dog or teacup (page 761), while long neat counters serve alfresco meals.

Surrounding the main courtyard is a series of small rooms, in which are installed the figures of 72 judges and the victims they are sentencing, not to mention the demons who stand by to see that everything will be carried out as commanded. The hapless souls are doomed to pay the penalties in purgatory (page 773).



Photograph by George Kiu Leung

HOLDING A BUTTERFLY KITE, THE GIRL SEEMS ALMOST PART OF THE TOY.

Above her looms a comical goldfish, whose huge goggle eyes roll fiercely in the wind. The butterfly, a dazzling blue with black dots and a pink center, is made of strong paper stretched over a light bamboo frame. Kiteflying is a favorite amusement for grownups as well as children (page 762).



Photograph by Brasseur De Cass from Galloway

ONE-MANPOWER TRUCKS CREAK AND BUMBLE AS COOLIES CHANT

The rhythmic clamor is a familiar sound in Chinese cities, not only by day but sometimes far into the night. Coolies frequently emit cries like "Ho!" and "Ha!" in time with their steps. Songs of Peking cartmen are a factor in making the former capital one of the world's noisiest cities.

The second day of the First Moon is in Peiping the great day for worshipping, or rather asking favors of, the images in the Temple of the Five Efficacious Gods of Wealth. These deities, according to one of the many tales associated with the little temple, were once real men, Chinese Robin Hoods, who took the money of the unrighteous rich and bestowed it upon the deserving poor.

"THE FIVE EFFICACIOUS GODS OF WEALTH"

The grateful populace buried them here, and in the reign of Chien Lung (1736-1796) the temple was built. It is known to be an especially efficacious shrine that stands among the farms a few miles outside the Chang Yi, a gate toward the southwest part of the city.

That a shrine or small temple stood on the spot at an earlier date is proved by an inconspicuous black tablet carved with Chinese characters and embedded in the bricks of the east wall of the main hall of worship. Important statements therein are translated as follows:

"The Temple of the Five Efficacious Gods of Wealth in Willow Lane Village was built during the Ming Dynasty, but there is no way to discover the exact date. From the Second to the Ninth Moon of this year (1786) donations have been collected, so that the main hall of worship and the two



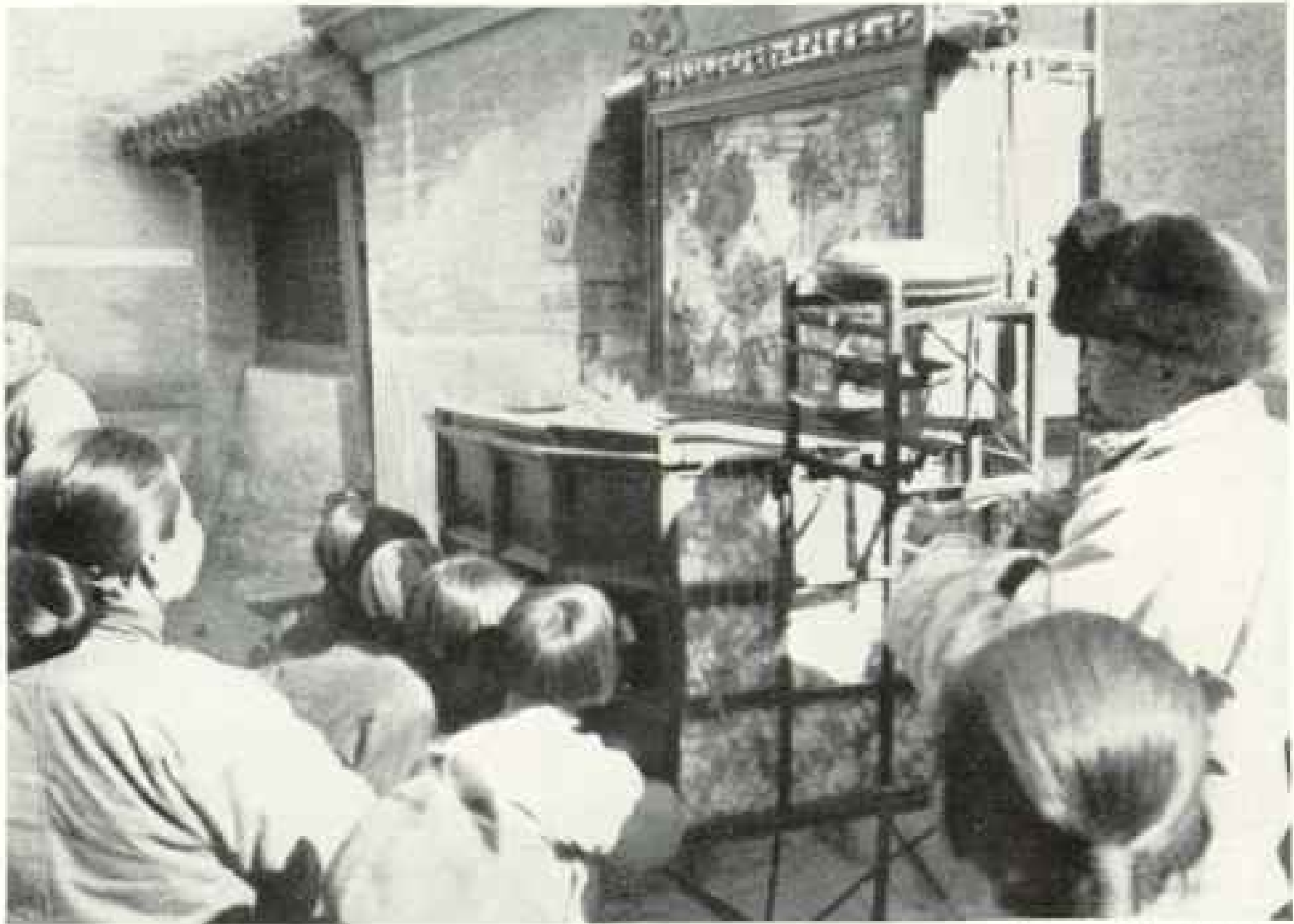
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"WHO GOES THERE?"

Through a moon gate peers a temple watchman, paper lantern in hand. In Peiping a doorway may be a gem of art. Many are vase-shaped, with exquisitely carved stone borders.

side buildings have been completed. Then to one side this tablet was erected. On the fourth day of the Tenth Moon, philanthropists (of this temple) met and reverently offered theatrical performances (to the Five Gods of Wealth).

"In the thirty-third year of Chien Lung (1768), donations were obtained by the priests to build the stage, the temple gate-door, guest rooms, monks' dormitories. Again contributions were gathered in public places to the extent of some hundreds of ounces of gold to put up a requisite building; namely, the three rooms of the west hall. Now it is the fifty-first year.



Photograph by Carl Lieb

FOUR TINY HEADS PEER INTO A PEEP SHOW

The children have paid a copper apiece to look into the box at a strip of "moving pictures," manipulated by the proprietor. Scenes include out-of-date singsong girls, American cowboys, and luxom Broadway chorus beauties of the gay nineties. On the wooden stand beside the box is a miniature orchestra, with leather drum, cymbals, and other instruments, all operated by one man.

"Fifty-first year (1786) of Chien Lung, the first to the tenth day of the Tenth Month."

A RACE TO BURN INCENSE

Long before dawn, crowds of people and swarms of vehicles move toward the gate, which has been closed for the night. As soon as the barrier is opened, the vast murmuring, rumbling tide of humanity, donkeys, rickshas, bicycles, and motorcars shoots out into the country in a dusty race to the temple, because "the one who gets there and first burns incense will certainly become wealthy during that year." This is called "snatching and burning the first incense."

From 4 a. m. on, crowds from the city and the surrounding villages continue to swell. Formerly an imperial highway, the new motor road between Chang Yi and the shrine becomes thronged with people "like carp swarming across a river." When the main hall no longer can accommodate the vast crowd, many go out to the

courtyard and do their obeisance. Even that is so crowded that if one does not take care when he kowtows toward the shrine, he may bump his head on the back of the person immediately in front of him.

A TROUGH OF FLAMING TRIBUTES

Although the censers in the hall are far from adequate for the endless stream of incense, the huge cement trough in the courtyard is piled high with flaming offerings. When even that overflows, bundles of incense are stacked into roaring heaps on the stone paving itself.

Ingots of gold and silver, made of cardboard and covered with silver or gilt foil, are offered to the gods, into whose inclosures they are tossed with the clear understanding that the worshiper will receive, in return, a large amount of wealth.

In the courtyard behind one may buy ingots which are said to bring riches to the owner. These are so keenly sought after that one must be an energetic elboweer to reach the counter and snatch one.

After mine had been in my pocket for some time, I noticed that the thin silver foil had rubbed off one of the ingots and I could see a bit of English newspaper that formed the base of the object. I could plainly make out the large Arabic numerals "89 cents"! Perhaps that was all that was coming to me in the Twenty-fourth Year of the Chinese Republic, 1935!

All day long the crowds besieged the small doors of the temple, much to the gratification of the peddlers of bright gewgaws, most of which had auspicious forms and names suggestive of good fortune. Fish, made of red paper, were inscribed with the characters for "Prosperity," "Have," and "Surplus."

PUNS AND PETITIONS

The sound for the character for "surplus" is the same as that for "fish," there being a pun on Peiping words which makes it lucky and efficacious in the extreme.

Scarlet chenille ornaments in the form of bats, the sound also being the same for "prosperity," are pinned into hats. When a peddler slyly says, "Take home a bat," he also means to take "good luck" home.

At the temple and far into the city, from dawn to twilight, one sees cyclists, motorists, and people in rickshas wearing hats encrusted with fluffy scarlet bats, phoenixes, and other symbols for a lucky year.

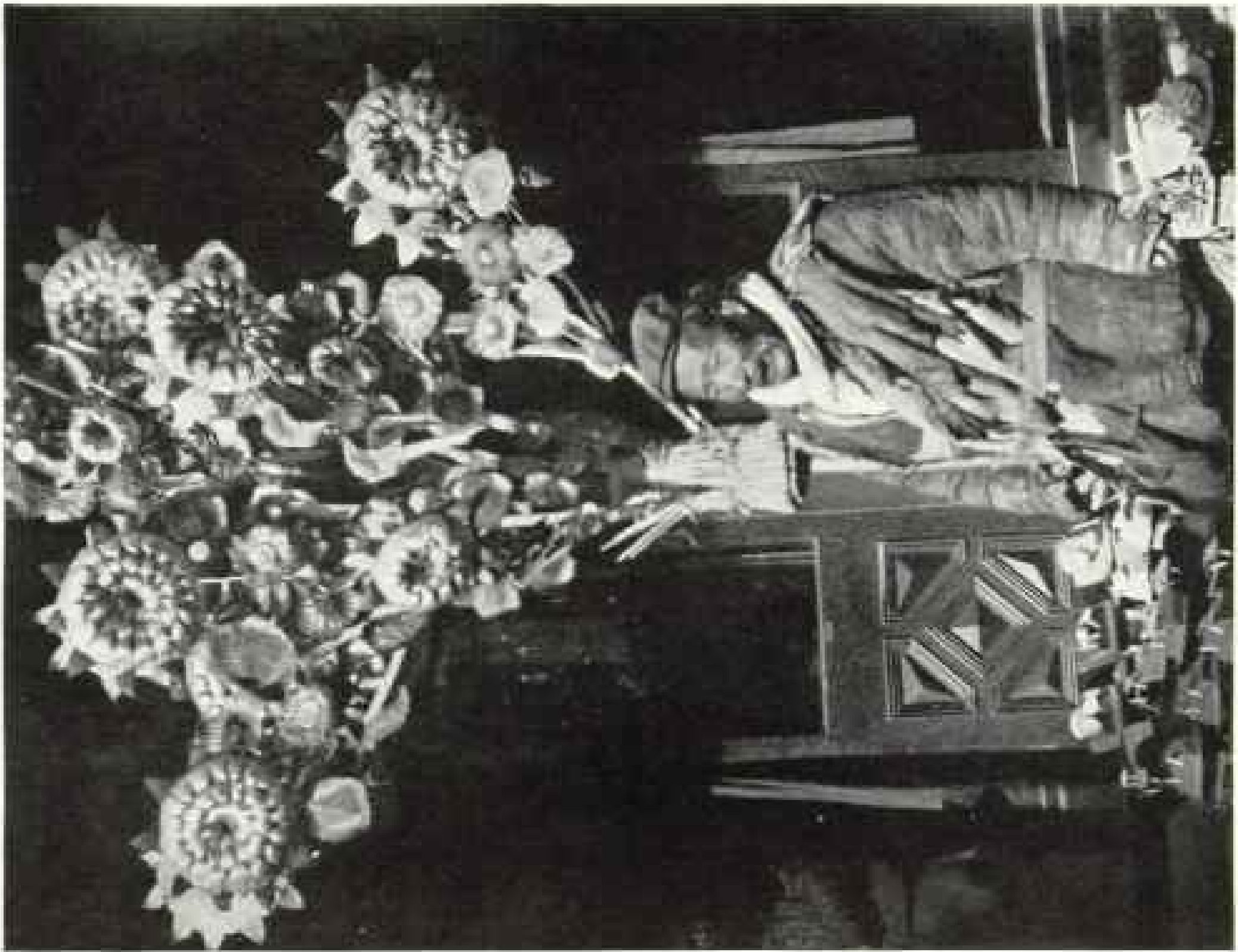
The Great Bell Temple, situated outside a gate at the northwest corner of the city, still holds its modest fair, consisting of a few stalls and entertainers that remind one of past glory. During the Ching Dynasty the place was much frequented in the New Year season for the racing of Mon-



Photograph by George Kin Leung

JUGGLING THE BAMBOO POLE

The performer balances it with effortless grace, first on one hand, then on a single thumb! He tosses it at wide angles, making the long banner and three umbrellalike canopies swing alarmingly over spectators' heads. An expert can balance the pole on his forehead and toss it onto the small of his back.



© Heine von Preckhammer

ARTIFICIAL FLOWERS "BLOOM" FOR NEW YEAR CELEBRATIONS

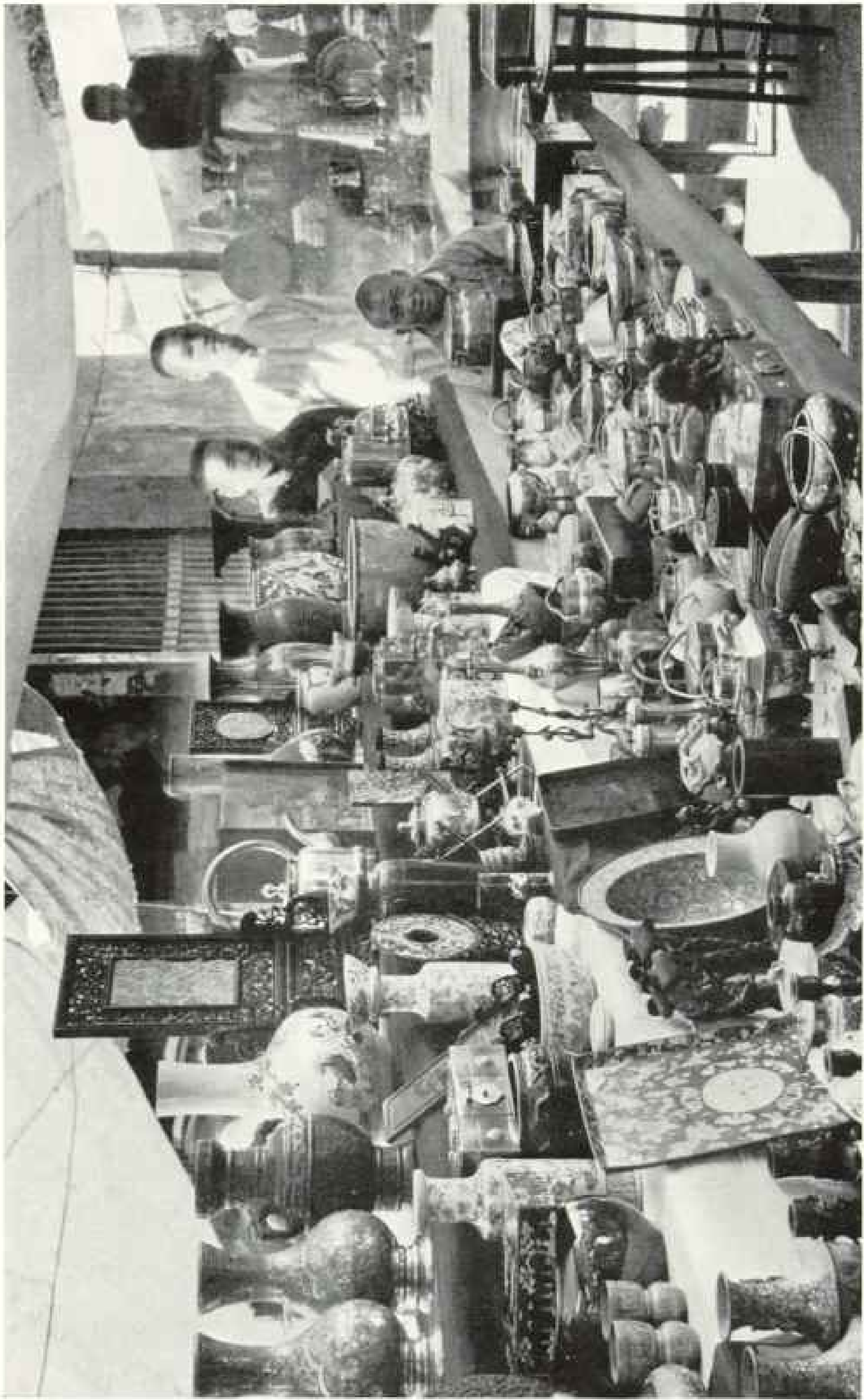
A street merchant hawk's his wares during the festival. These "blossoms" often deceive the eye; they are cleverly made of paper and fastened to real branches, the ends of which are stuck into a bundle of rice straw.



Photograph by Herbert C. and J. Henry White

ALERT TO FILL A PRESCRIPTION FOR DRIED SNAKESKINS

The wares on this Peiping pharmacist's table include fragrant herbs, tiger whiskers, or pulverized bones, and such cure-alls as the "Great Blessing Pill," the "Double Mystery Pill," or the "Pill of Ten Thousand Efficacies."



Photograph by Anthony C. and J. Henry White.

BARGAINS ARE HERE—IF YOU KNOW HOW TO DICKER WITH THE WILY DEALERS

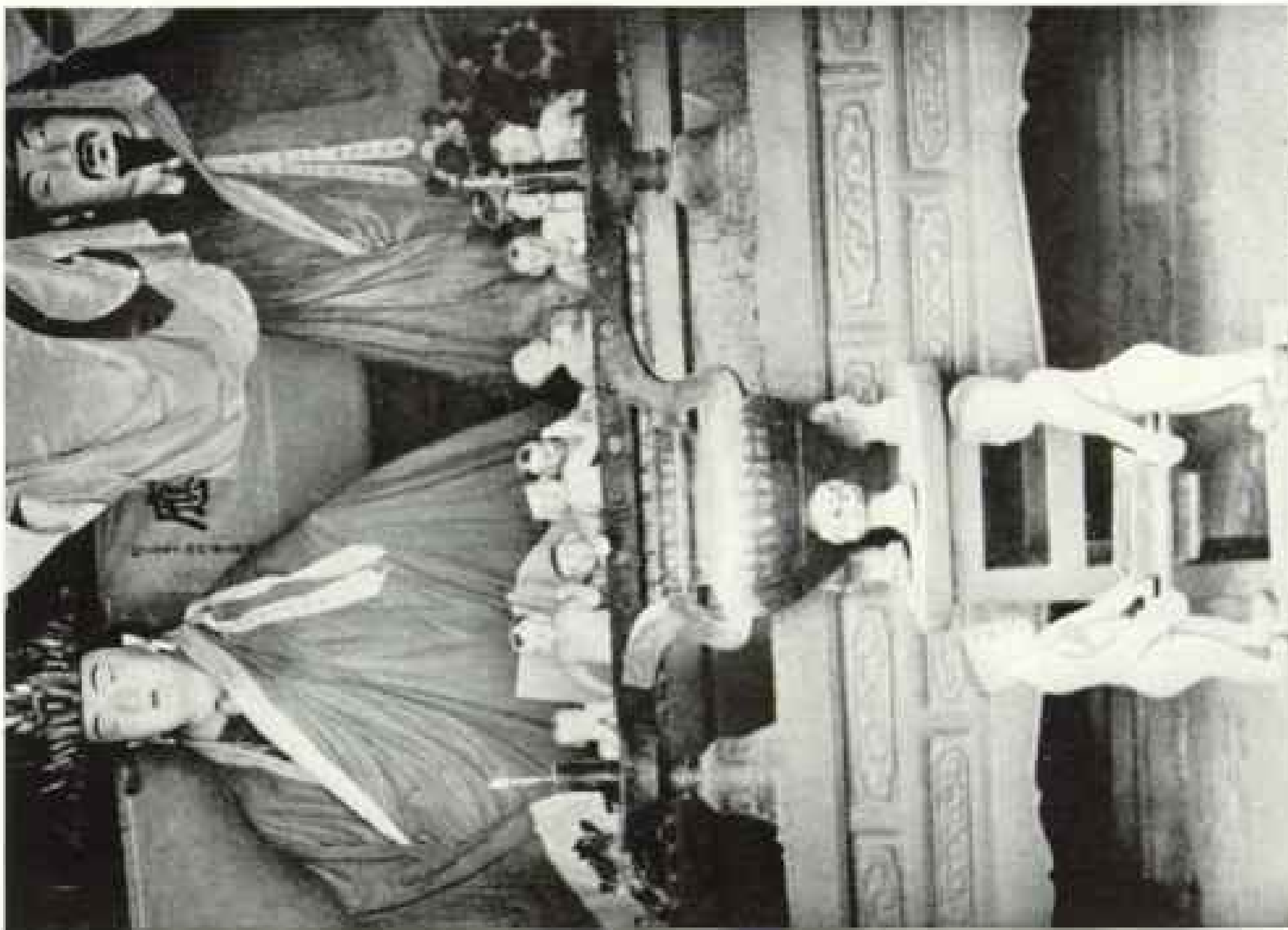
Peiping's Bureau of Social Welfare has prohibited bargaining, in an effort to improve business ethics, but few shopkeepers or customers can refrain from indulging in the age-old pastime (page 785). This display of wares at the Lung Fu Temple fair includes dishes and vases of porcelain, bronze, and cloisonné. The upright wooden screens with curved jade centers (two on top shelf) are typical ornaments in many Chinese homes.



Photograph by George Kih Leung

BEARDED TAOIST PRIESTS BEG FROM TEMPLE TO TEMPLE

These two mingle with the crowd at Pai Yun Kuan on the 18th of the First Moon, an important day of the New Year's festival (pages 775-6).



Photograph by M. M. D. Williams

CLAY BABIES ROMP BEFORE THE GIVER OF SONS AND GRANDSONS

Their nursery is the altar in the shrine of the beloved goddess and her bearded husband, in the Tung Yieh Temple (page 763).



Photograph by M. M. D. Williams

A DONKEY BEATER'S PUNISHMENT FITS THE CRIME

In purgatory this sinner, who in life had mistreated his faithful beast, is reincarnated in the animal's form. One leg already wears hide and hoof. The left arm is thrust into a donkey's foreleg by the fierce demon (page 765).



Photograph by George Kim-Loung

A TAOIST PATRIARCH KEEPS WARM IN A COAT OF MANY COLORES

The patchwork garment may be none too heavy for Peiping's rigorous winter weather. Stationed before a bronze incense burner at Pai Yün Kuan, the aged priest begs worshippers for copper coins (page 776).



A RAPT AUDIENCE WATCHES AN ACROBAT BALANCE ON ONE HAND

With shouts onlookers applaud a skillful performer. The elderly man on the left wears an old-fashioned, round Chinese hat. The individual in a light-colored gown, to the right of the acrobat, has a thick fur cap with earflaps turned up. Western-style felt hats are numerous.



Photographs by George Kin Leung

MEN IN FIERCE LION HEAD MASKS PERFORM FROM TEMPLE TO TEMPLE

One of the grotesque papier-mâché heads with shaggy ears is cobalt blue, the other old gold (opposite page). The lion's body is a long piece of cloth ridged with silky green or orange hair.

golian ponies. Now people go there to enjoy its charming rustic atmosphere.

Always of interest is its mammoth bronze bell, cast during the reign of the Ming emperor Yung Lo (1403 - 1424). The inside and outside are covered with thousands of beautifully written and cast characters of the Buddhist Hua Yen Sutra.

THE BELL THAT
MOANS LIKE A
MAIDEN

Often told is the legend that the caster of the bell, on finding that he could not obtain the desired tone, was in danger of his life from the emperor's displeasure.

His daughter, knowing that a virgin's blood only could perfect the alloy, leaped into the molten mass. Even to this day, the good country folk say, the mighty bell, when struck, moans like the sigh of a maiden.

On the fifteenth, which is the peak of the Lantern Festival, two small temples hold "open house." One is the temple of the district in which Peiping is situated.

The Temple to the City God is on the big street some distance to the west of the Hou (or Ti An) Gate and contains in its courtyard a massive figure said to be a fire god. It is apparently constructed of a brick base over which is plastered reddish clay.



Photograph by George Kin Leung

A LION MAN IS ALL SET TO DON HIS FIERCE HEAD AND GO INTO HIS ACT

The performers work in pairs, one manipulating the head and the other the tail. The long-bodied beast jumps about with lifelike antics, now standing on its hind legs, now scratching violently at a persistent flea; again it dashes down a hillock or scrambles up a steep incline. The "tail man" provides most of the comedy.

When incense is burned at night in its hollow interior, fire and smoke curl out of its navel, eyes, ears, nose, and mouth.

In the Eastern Large Market in the South City a modest celebration is conducted at the Temple of the God of Medicine. The thoroughfare is well known to foreign residents, for here all manner of old hardwood furniture, as well as more modern articles, may be purchased.

On the eighteenth and nineteenth of the First Moon is the climax of the 19-day fair

held in the *Pai Yün Kuan*, or White Cloud Temple (page 752), one of the oldest and certainly the largest and wealthiest Taoist temple in the neighborhood of Peiping. When Ghengis Khan acknowledged as his teacher the great sage *Chin Chu-chi*, the Tatar conquerer called the group of buildings here the Temple of Eternal Spring (*Chang Chun Kung*).

The sage-abbot is indeed referred to as *Chang Chun*, his tomb being in one of the great halls. Of all the vast throngs which attend temple fairs during the Lunar New Year, the greatest by far is that which gathers here on these two days.

Entering, one sees the long, yellow banner containing a black dragon, the fair symbol used in imperial days. To the sides are food and tea stalls, while in the great space in the center are multitudinous bright-colored windmills, rods of sugared haws, and glass fruits that sparkle in the crisp Peiping sunshine.

TOUCHING THE CURATIVE MONKEY

When you pass through the middle of the three arches leading to the second inclosure, you notice that everyone reverently touches a tiny carving at the right end of the white stone border. So black and smooth has the object become from years of rubbing that you may have to be told that it represents a monkey, a creature of supernatural quality. If rubbed on any part of its body, it will effect a miraculous and immediate cure of the corresponding part of the suppliant's anatomy.

Those who have no ailment finger the little animal all over to insure themselves good health for the coming year.

Crowds gather about the two pits on either side of the Bridge That Imprisons Winds, under the arch of which two old Taoist priests sit all day in deep meditation.

One legend concerned with this bridge is delightfully characteristic.

Long, long ago the present Temple of Heavenly Peace was called the Temple of the Autumnal Winds. The abbots of the two temples, quarreling over the division of land, became bitter adversaries.

The fact that the neighboring temple used "Autumn Winds" in its name was an intentional effort on the part of its abbot to do harm geomantically to White Cloud Temple, for everyone knows that "When the autumn winds rise, O! white clouds scatter."

But the old abbot of the endangered temple was not to be outdone! He at once built the Bridge That Imprisons Winds, under which was the cavern (arch) for confining winds so that as soon as the "autumnal winds" blew there, they were safely imprisoned within the cavern under the bridge and no harm came to the "white clouds."

With the geomantic danger completely overcome, White Cloud Temple has continued to prosper down through the centuries to the present day.

An entire half day may be pleasantly spent wandering through the labyrinthian courtyards, of which there are four main ones arranged on the central north and south axis. On either side are innumerable smaller shrines, courtyards, a kitchen with gigantic caldrons for feeding the priests, a handsome pagoda which marks the grave of one of the three famous holy men buried in the precincts, and a small artificial mound made of broken bits of chinaware.

Pigs here are allowed to live until a natural death overtakes them. This practice, according to Buddhist teaching, brings great merit to the donor of the animals. Usually there are to be found in one of the sunny courtyards one or two priests who claim an age over the century mark.

To the extreme north is a rockery, a garden, and an open-air stage.

Unlike many other temples, the White Cloud is well kept. Each shrine possesses a complete equipment of tapestry, altar ornaments, and handsome old horn lanterns, and every establishment is a delightful artistic unity.

On the side walls and at the rear of the great halls of worship in the central courtyards hang an infinite variety of lanterns, faced with gauze and often rectangular.

The lanterns on the walls of *Chi Chen Hall* tell, in pictures, of the life of the great sage, *Chang Chun*. Striking are the four large square lanterns, their points set in wooden stands and containing the characters *Wan Ku Chang Chun*—"Ten Thousand, Ancient, Eternal, Spring."

The last two refer to the abbot-sage. His huge food or alms bowl, which might comfortably accommodate several square feet of coppers, seems a product of the mind of the same genius who conceived the idea of hitting "the gold piece's eye" with coppers (page 789).

A PEIPING PANORAMA IN VIVID PIGMENTS



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Camera Painting by H. C. and J. H. White and Hwang Yao-ter

"TIME FOR MORNING PRAYERS!" BOOMS THE BIG BRONZE GONG

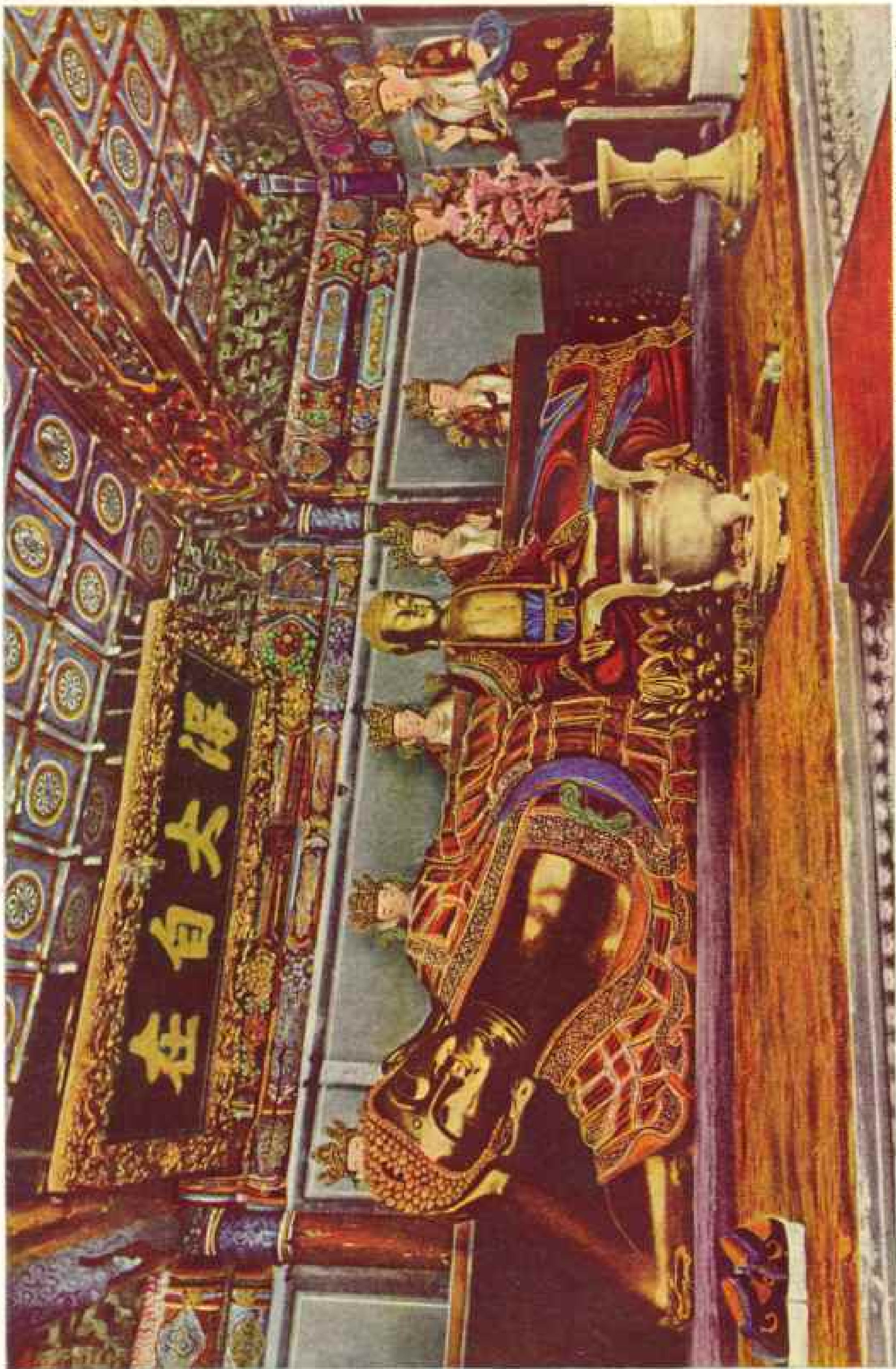
Striking it with a hammer, a young priest summons devotees at the "Monastery of the Ordaining Terrace" (Plate V). Each spring, thousands of pilgrims, or "incense-burning guests," flock to this and other famous shrines in the Western Hills. Upcurved roof corners, characteristic of Chinese architecture, may have been adapted from the tent or primitive thatched hut; and the guardian dogs of yellow porcelain may have originated in the weights placed on tent tops to keep them from blowing.



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MAGIC "FLOOD INSURANCE" IS THIS BRONZE COW, CONFRONTING THE SUMMER PALACE LAKE AND 17-ARCHED MARBLE BRIDGE. From the gaily painted tea pavillion, left the bridge leads to a rocky, temple-crowned island where a few years ago a hospital was established.



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Camera Painting by H. C. and J. H. White and Deng Hsueh-ling

SHOES FOR SLEEPING BUDDHA'S BARE FEET ARE LEFT BY WORSHIPERS ON THE ALTAR

Attending deities seem to watch over the wooden figure of the Beloved One as he slumbers in rich robes of state at the ancient Wo Fo Ssu monastery in the Western Hills. Incense sticks on the altar will be burned in the vase before the sitting image.



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Camera Painting by H. C. and J. H. White and Deng Bao-ling

"OLD BUDDHA'S" SUMMER HOME IS MIRRORED IN HER LILY-DOTTED LAKE

Empress Dowager Tzu Hsi used navy funds to build this "woman's \$50,000,000 whim," near Peiping. Subsequently the Celestial Empire was defeated in the Chino-Japanese War of 1894-5. A motor road now brings visitors here.

A PEIPING PANORAMA IN VIVID PIGMENTS

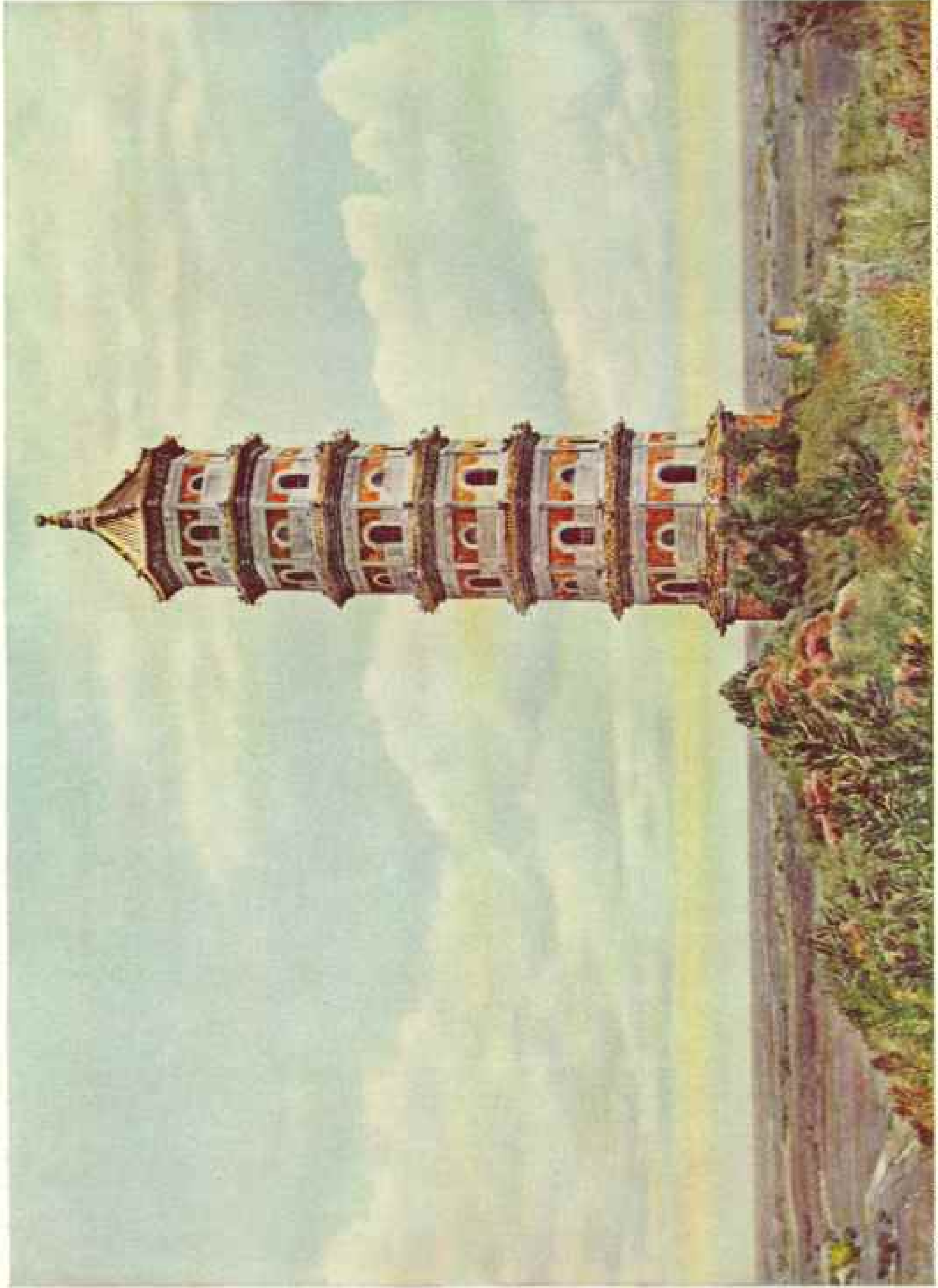


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THIS SCALY BRONZE DRAGON GUARDS PEIPING'S "STAR-GAZING PLATFORM"

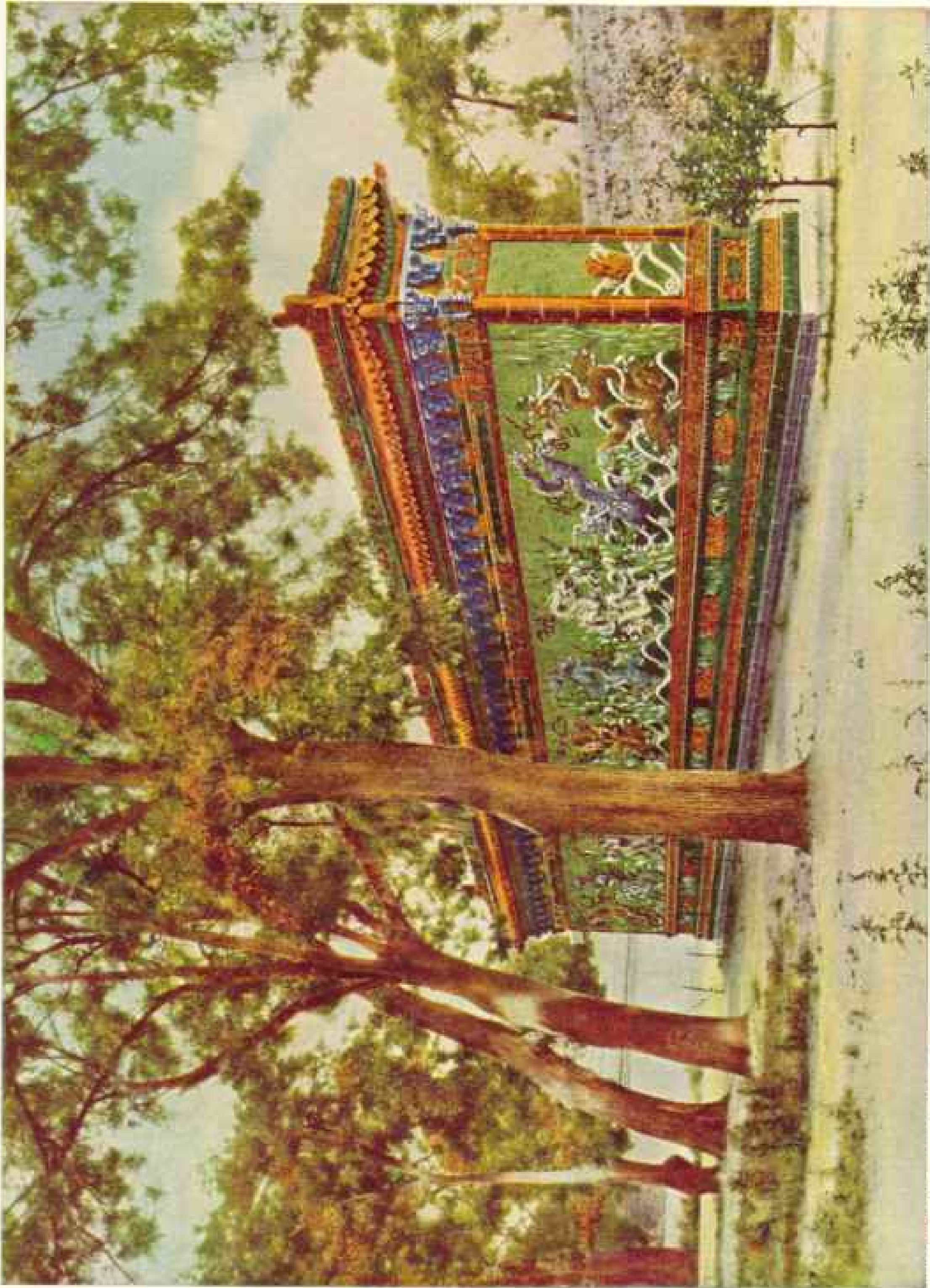
Marco Polo's patron, Kublai Khan, built an Observatory here on the east wall about 1280. The present dragon-wreathed instruments were cast under supervision of Jesuit priests some 400 years later.



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EMPEROR KANG HSI, CONTEMPORARY OF FRANCE'S LOUIS XIV, BUILT THIS PAGODA ON THE JADE FOUNTAIN HILL. Such buildings were often erected as memorials, as symbols of good luck, or as observation towers. Near the hunting park and the Summer Palace (Plates VIII and XII) is this centuries-old imperial pleasure ground with its sparkling spring, beloved of Chinese poets.

Camera Painting by H. C. and J. H. White and Hwang Yao-tai



© National Geographic Society

Camera Painting by H. C. and J. H. White and Deog Hoo-ling

"THE CURTAIN WALL OF NINE DRAGONS" SCARED AWAY EVIL SPIRITS FROM A NOW-VANISHED TEMPLE

Gorgeous in brilliant porcelain, the beneficent monsters play on green sea waves under tiles of imperial yellow. In this garden of the North Sea Palaces at Peiping, sovereigns enjoyed relief from the Forbidden City's formal life. Today the park is a public playground.



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Camera Painting by H. C. and J. H. White and Deng Bao-ling

A "YELLOW HAT" LAMA ADMIRES HIS TEMPLE'S HUGE BRONZE INCENSE BURNER

Brother monks jeer as he poses in ceremonial robes beside the casting, brought, tradition says, from Tibet. Several hundred priests live in Peiping's yellow-tiled Lama Temple, now a monastery, formerly an emperor's home. The crested headdress, suggesting a Greek warrior's helmet, distinguishes the so-called "yellow sect" of the Tibetan church. Because of devil dances and other fantastic rituals, Lamaism has been described as a mixture of black magic, Nature worship, and Buddhism.

The nineteenth, which is the birthday of the old sage, also coincides neatly with the festival called "Meeting the Genii." On the midnight of the eighteenth, and even until the noon of the nineteenth, the devout linger in the temple hoping for a glimpse of an immortal.

Legends vary regarding who descends from the heavenly spaces into Pai Yün Kuan, but most devotees expect to see one of the Eight Immortals, above all the most active of their number, Lü Tung-pin. Others believe that the sage himself or one of the gods may put in an appearance.

THE NIGHT OF THE ROAMING GENII

The genii, however, do not float down on a multicolored cloud. Nor do the Eight Immortals carry the fan, fish-drum, fly brush, castanets, crutch, flute, lotus, or flower basket, by which emblems they are known to all in paintings and carvings of ivory and coral. Instead, they assume mortal guise, favoring those of beggars and impoverished Taoist priests.

In the faint glow of the tinted gauze lanterns, the resident priests appear more sleek and well-fed in their robes of spotless blue denim and large hats of shining black satin. The head priests are garbed in rich silk robes of blue, olive, or apple green.

But the priests from the outside are not always well fed, and the garments of some reveal tatters and patches of many hues. Beggars swarm the precincts and know too well that this is their night. Who would refuse a copper to a ragged priest or a grimy beggar who might be no other than an Immortal in disguise? (Page 773.)

Some fairs continue throughout the year, but do an especially brisk trade during the Lunar New Year.

Their dates, however, now follow the modern calendar, as listed here: Temple of the God of Earth, situated in the Chang Yi Gate district, and offering flowers, trees and pigeons, on the 3d, 13th, 23d of each month; the Flower Market, south of Hata Men (Gate), offering various household articles, on the 4th, 14th, 24th; the White Pagoda Temple, west of the Four Western Archways, on the 5th, 6th, 15th, 16th, 25th, 26th; Hu Kuo Ssu, in the West City, on the 7th, 8th, 17th, 18th, 27th, 28th; Lung Fu Ssu, a short distance to the west of the Four Eastern Archways, on the 9th, 10th, 11th, 12th, 19th, 20th, 21st, 22d,

29th, 30th, 31st, 1st, and sometimes on the 2d.

Then the schedule returns once again to the 3d and the cycle repeats itself in the order just presented.

Of the five fairs listed, all except the Flower Market are temples. This is a continuation of the old custom of shopping on certain days at temple fairs.

Any servant can tell you offhand the dates and addresses of each fair.

Since the bazaars sell about the same kinds of wares, such as household utensils, clothing, curios, rat poison, hair ornaments, toys, and so on, a visit to the largest fair at Lung Fu Ssu, or the Temple of Prosperity and Blessing, will give a general picture of the fair as an institution.

BRISK BARGAINING AT THE TEMPLE OF PROSPERITY AND BLESSING

There is scarcely a visitor or foreign resident who does not go there. Most Chinese buy things for household use, while Westerners frequently haunt the curio stalls that border the paths close to the temple gate. Here you may pick up carved stone, porcelain, lacquer boxes, cunningly wrought objects of pewter, brass, bronze, jade, coral, and crystal (page 771).

The uninitiated may triumphantly strut off with an old lacquer box having a background of dull red and a scene done in gold, after having bargained the dealer down from \$10 to \$2.75. The merchant heightens the buyer's sense of superior cleverness by sighing realistically that, since times are unbearably hard, he has been obliged to let the treasure box go below cost.

Although he has long ago figured out a neat profit of \$2, he shows no sign of victorious satisfaction; he has merely handled competently another would-be bargain seeker.

A few steps to the north is a large variety of bamboo objects: baskets, rakes, sieves, little benches, and everything for kitchen and garden, as well as receptacles in which to wash rice, vegetables, and clothing.

Well-worn stone steps lead up to another level, the flooring of a temple hall that has vanished. The once-sacred precincts are dotted with wagons and stalls steaming with caldrons and sizzling with large iron frying pans of food. Vapors, aromatic and otherwise, assail your nostrils.

To the sides you see story tellers, acrobats, medicine men, and "wisecrackers,"



Photograph by George Kin Leung

ONE MAN'S NECK SUPPORTS THE OTHER'S FLYING
TRAPEZE

Grasping the woolen scarf, the lower acrobat swings in mid-air while the muscular partner throws his legs high to keep the equilibrium. After this fair at the Temple of Prosperity and Blessing, the performers will visit another shrine.

whose concessions are clearly marked out. It is customary to designate a rectangular space for the performance. More liberal patrons sit on long, backless benches; behind stands the crowd, sometimes ten deep.

"WISECRACKERS," WRESTLERS,
AND JUGGLERS

The storytellers have a stock of narratives from old novels, which they relate in spirited fashion, using facial expression, varied intonation, and gesture to delineate each character. Castanets and a drum may be used to punctuate the recitation and to add musical tempo to certain episodes. For instance, there is the rhythmic ride of the hero who, firmly seated in his saddle, lops off his adversary's head. It falls to the ground with a dull thud that is descriptively represented by a tap on the leather drum.

The "wisecrackers" have a line of patter which ranges from the literary subtleties of yore to the not infrequently bald and playful narration of risqué anecdotes.

From this courtyard to the rear, the spaces in the center of the temple are mostly occupied by outdoor entertainers, including acrobats, wrestlers, jugglers, magicians, and trick bicycle riders.

The long lanes to either side are thickly lined with stalls.

On your way out of a narrow passage in the rear, you may buy for a few coppers puppets and paper cutouts, for birds, flowers, and lucky symbols to be used for putting embroidery patterns on slippers or other objects.

The foregoing five fairs are held throughout the year, but outstanding are two which are open during the first part of the First Moon.

Popular among curio lovers



PRAYERS RISE WITH INCENSE AROMAS IN A BUSY TEMPLE COURTYARD

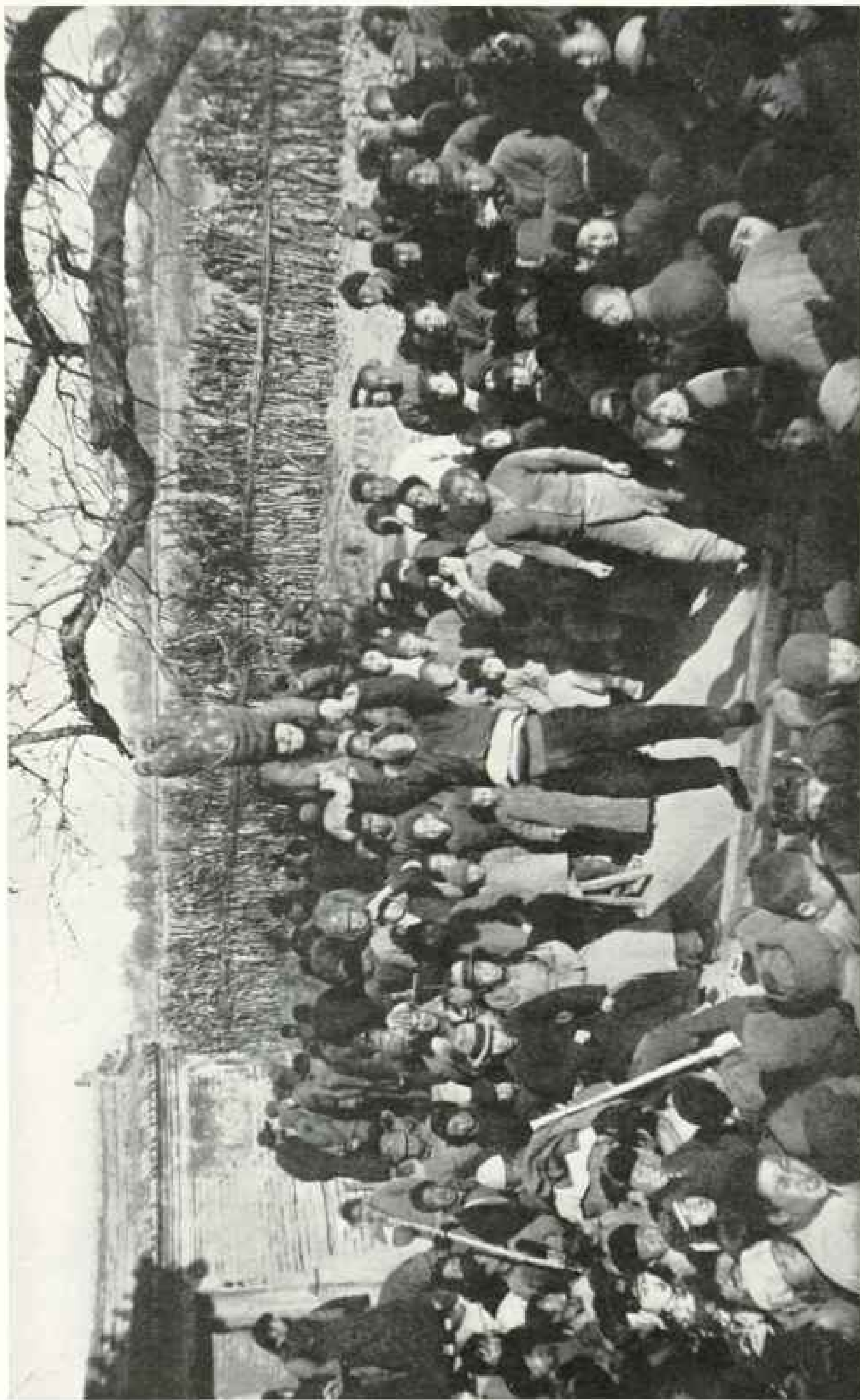
A devotee lights his bundle of incense sticks from flames on the altar, while another, holding his burning offering, kneels near a round prayer mat. A new arrival (right) buys incense at the table. Opposite are stone tablets presented by various emperors to Tung Yüeh Temple.



Photographs by M. M. D. Williams

PRESCRIPTION: TO CURE ANY BODILY AILMENT, TOUCH THE CORRESPONDING PART OF THIS DONKEY'S ANATOMY

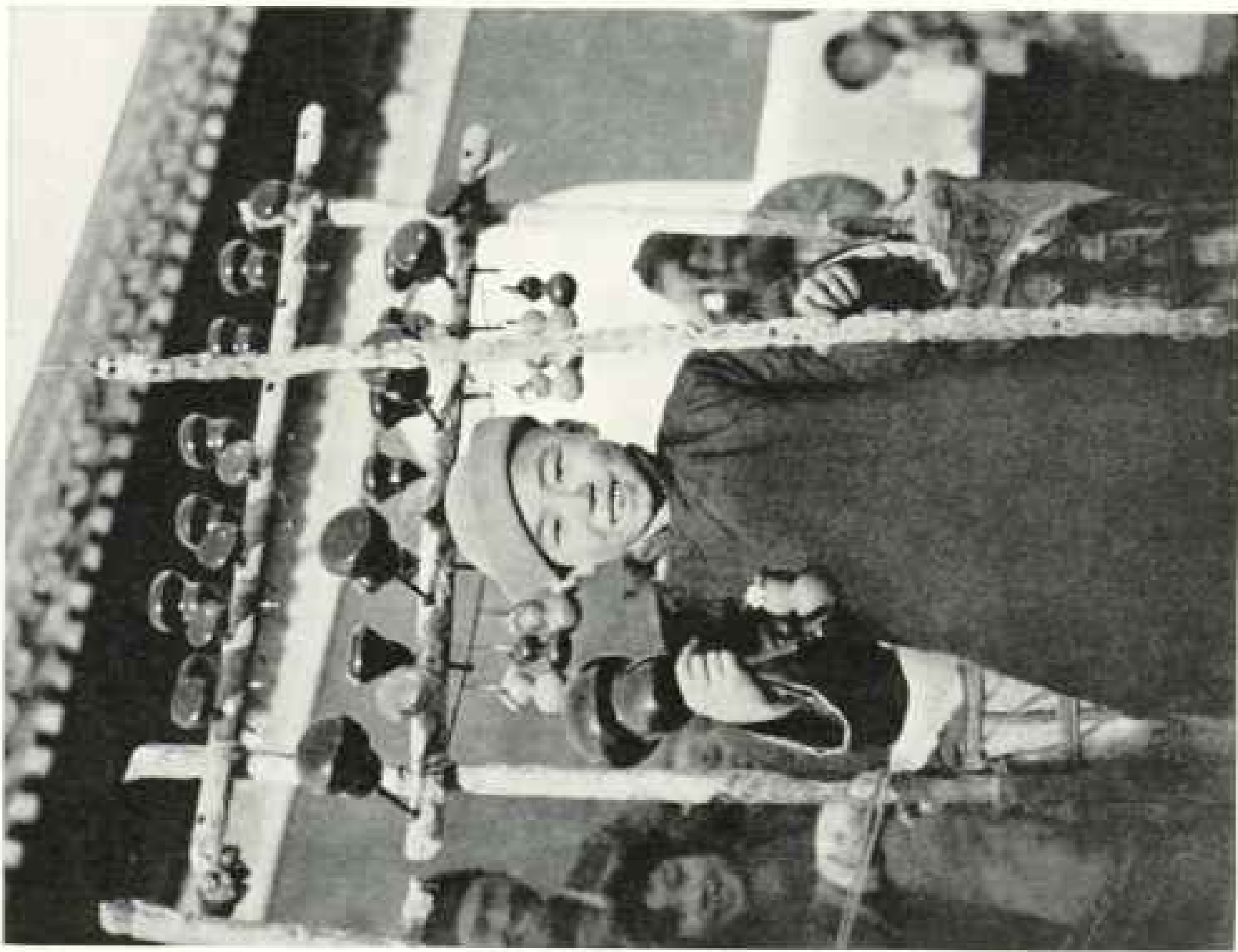
Endless pottings and caresses polish the miraculous bronze animal, in the Tung Yüeh Temple (page 765). Its eyeballs are nearly obliterated, for eye afflictions are prevalent in China. Testimonials of banners and plaques, inscribed with characters, proclaim the donkey's healing powers.



Photograph by George Kin Leung

"ALLEY OOP!"—A PERFORMER SWINGS HIGH HIS ACROBATIC CHILD AT THE BLACK TEMPLE FAIR

After the act, they cajole and sometimes bully the spectators into parting with their hard-earned coppers. Purse strings are not so tight as usual during the New Year holidays. These professional entertainers move with their children from fair to fair. The only stage they need is an open space marked off by a rectangle of backless benches (page 761).



Photograph by George Kih Leong

HERE'S WHY JOHNNY'S 50 LONG AT THE FAIR

In one hand is a tall rod of hawthorn berries, coated with sugar. The other holds a red glass gourd. The lad will blow through it to produce a sound like *pu pu teng*, hence the gourds are known by that name. Colored glass fruit hangs on the rack above. (page 791).



Photograph by Carl Lieb

PITCH A COIN, RING THE BELL, AND GET GOOD LUCK!

The shiny bell hangs in the center of the huge yellow disk called the "gold piece." Coins thrown at the "gold piece's eye" carpet the stone beneath a pit of the Bridge that Imprisons Winds (page 776). Possibly some provident priest devised this cash magnet to insure the upkeep of his beloved temple.



Photograph by George Kin Liming

"PAY NOW OR WE WON'T FINISH THE TRICK!"

With this threat, acrobats at temple fairs often extract spectators' money. Sometimes they refuse to complete a stunt unless a stipulated amount is given. The two child performers are billed as the leading man's daughters.

and those who admire hand-wrought objects is the annual bazaar held in the Temple of the God of Fire, near Liu Li Chang. It attracts large crowds from the 6th to the 15th of the First Moon.

A NOVEL PREMIUM DEVICE

The inconspicuous entrance off the narrow street is a dramatic arrangement. One hardly has stepped inside when his eyes are dazzled by displays of ivory, jades, crystal, coral, and other rarities. The courtyards within are crowded with hundreds of booths laden with curios and carvings.

The expert and veteran shopper alone may be certain of a good bargain. The experienced know that, just as there is silk *and* silk, there is jade *and* jade. Fine jade may bring thousands of dollars for a small piece, but a large chunk of low quality may fetch only a few dollars.

It is said that a few Mongol customers are never satisfied that they have a real bargain unless they succeed in pilfering a small object. Knowing this, the wily dealers place small inexpensive objects where the prospective buyer can easily slip them into his sleeve, with the result that the latter, highly delighted, may overpay for the article he wants.

Dealers in paintings are housed in the

many rooms of the temple, and a few have open-air booths at the rear.

White cloth banners bearing the following Chinese characters in black ink were hung at the temple entrance: "All merchants in this bazaar sell their wares at one price"; "Strictly one price; restore good business ethics" (page 771).

A FAIR FOR BOOKS AND PAINTINGS

It read very well, but in the course of purchasing two small jade figures, I had stood scarcely a moment before the dealers began the ancient national game of talking price.

Liu Li Chang, once the site of the imperial glazed terra-cotta kilns during the dynasties, is a gigantic fair that opens for the first fifteen days of the First Moon.

Its northern end begins a bit south of the gate connecting the Tatar and Chinese Cities. There huge temporary mat sheds sell paintings and scrolls of calligraphy, while street dealers offer the same wares, hanging them on the brick walls of the thoroughfare.

The street is littered with old paper-bound books arranged on rickety tables. The walls of a small lane running east of the main highway are covered with kites of all sizes and designs. A few steps to the south one sees vistas of gaily colored cardboard windmills that clatter fitfully in the gusts of an early spring breeze, not to mention yards of candied haws and deep-red glass gourds (page 789).

South of the crossroad are endless booths of curios and porcelains, while even the small temples and formerly empty houses that have a door on this street are rented out to book and painting merchants, ten to thirty of whom may be found in one establishment.

Doomed to disappointment are the naive old scholars who innocently believe that one still can pick up rare old books at a low price. Practically all the bookstalls have



Photograph by George Kin Leung

TIME OUT TO POSE

Heavy quilted trousers and jacket make the child, dressed for a holiday, seem much plumper than is really the case. The curious cap is made to resemble a cat's head, with pointed ears and grinning mouth.

been sent out by the big shops not far off.

The never-ending sea of shopworkers on vacation, students, women, children, with a sprinkling of country folk, scholars, Mongols and Tibetans in their bright, yellow or purple sheep-lined coats, high boots, and great fur hats, keeps the traffic officers extremely busy.

VAUDEVILLE IN THE BRIDGE OF HEAVEN DISTRICT

With the visits to temple fairs and bazaars from the first to the fifteenth of the First Moon completed, and the culmination of the festival at the Pai Yün Kuan



Photograph by George Kin Leung

A MEDICINE MAN "DRAWS A LONG BOW" AS A "COME-ON" FOR CUSTOMERS

Like an old-time American patent-potion salesman, he entertains the crowd before extolling his merchandise, stacked on the table. In common with most Chinese arts, the technique of drawing a bow has become highly specialized; each motion must be performed in a set way.

on the nineteenth, the active celebration of the great holiday might well end for most of us.

Yet, during the first week of the Lunar New Year, well worth visiting is the Bridge of Heaven district, just off the main road before you come to the Temples of Heaven and Agriculture.

Almost every afternoon the space to the west of the road is a lively stage for hundreds of entertainers: acrobats, jugglers, wrestlers, performing animals, singing girls, and troupes of actors (pages 786, 788, 790). Special stunts are offered to the public during the New Year season when purse strings are a bit looser than usual.

The sound of gay music and firecrackers of the Lunar Year festivities intensifies the grief of those who are hard pressed. Even the firecrackers are not an unmixed blessing, for they set shops afire every year. Those who cannot pay their debts not infrequently commit suicide rather than "lose face."

It will be interesting to observe the outcome of the Government's campaign to refashion ancient holidays, and sometimes

to create new ones. Because of the innate courtesy of the Chinese people, the battle, if any, will be silent. Presumably, a few deep bows of courtesy will be exchanged and everyone will go on doing quite as he pleases.

As in the old heroic novels, he who offers the most clever ruse, preferably tempered with a good laugh, and not force, will win popular support.

HOW DULL LIFE—WITHOUT WINDMILLS!

We Chinese realize that if China is to take her rightful place in the world of today, much of the older order may ruthlessly be swept away. Yet it is sincerely hoped that not too much will be trampled under the heavy, insensitive heels of transition. Can the human mind live on the prosaic alone?

How dull, even if orderly, life would be at the New Year season without the myriad brightly colored windmills and the forests of sugared haws!

May we not strive to combine the fragile beauty of the past with the metallic strength of the present?

THE SOCIETY'S NEW MAP OF THE PACIFIC

BY GILBERT GROSVENOR

President, National Geographic Society

WIDEST, deepest, largest of the oceans, the vast Pacific and the colorful lands around it are portrayed in a new wall map, issued to members of the National Geographic Society with this issue of their *MAGAZINE*.*

Today flying boats roar above aboriginal outrigger canoes in a spacious region, and 20th-century invention breaks down barriers of time, distance, and tradition.

The new ten-color map is ideal for *Geographic* readers who follow dramatic change and progress in the Pacific.

Seventy-three large-scale border insets around the central chart make this a unique "one-page atlas" supplementing The Society's recent maps of Asia, Canada, the United States, and South America to complete the picture of the Pacific hemisphere. Europe, Africa, both Polar regions, the Caribbean, and the World have already appeared in the notable series distributed to members in recent years with their *NATIONAL GEOGRAPHIC MAGAZINE*.

PACIFIC EXCEEDS WORLD'S LAND AREA

Stretching more than 10,000 miles from Panama to the Philippines and almost as far from Antarctica to Bering Strait, the Pacific, with twice the volume of the Atlantic, occupies about a third of the surface of the globe and more area than all its land.

Take a map of the world and imagine that the western edge of the tropical Pacific at Manila falls at San Francisco. Stretching eastward, thus transposed, the Pacific Ocean would span all the United States, the Atlantic Ocean, reach across Africa, and well into Arabia.

The Pacific is less saline than the Atlantic Ocean. It is ringed by higher and newer mountains than any other, it contains most of the world's islands, and it has a practical monopoly on earthquakes. Of all the world's volcanoes (more than 400 are listed), by far the larger number are scattered throughout the Pacific area or rumble in its "rim of fire."

The large central map, covering the Pacific area as a whole, is on the generous scale

of 1:35,000,000. On Mercator's Projection, 25 inches by 20 inches, it shows the continental areas around the Pacific, including Australia, most of North America, a broad coastal strip of South America, and most of Asia. Islands appear in proper relation to continents and to one another.

Political divisions, towns and surface features, chief air routes and steamship lanes—all are here. Significant depth contours tracing the ocean floor show extent and location of the Pacific's great deeps and submarine plateaus.

A row of miniature clocks along the lower border of the main map shows the time in various sections of the Pacific region when it is midnight in Greenwich, England. White lines, leading from these clocks, bound the time areas. Districts using intermediate time are shown, each with its clock giving the local hour. Short-wave radio fans will welcome this feature.

While New Year crowds in London are welcoming Friday, January 1, 1937, New Yorkers will be gathering for Thursday dinner, their last in 1936. At the same time, San Franciscans will be busy with the midafternoon year-end trade; in Honolulu swimmers and golfers will be playing out the old year; while in Sydney, Australia, late holiday risers will straggle in to the first breakfast of the new year.

A table on the central map lists various native equivalents of English words for natural features, such as "island," "mountain," or "cape."

73 INSETS SHOW ISLANDS IN DETAIL

In the 73 individual insets around the main chart, important archipelagoes and islands are "spotlighted" by accurate and detailed portrayal on enlarged scales. Tiny dots scattered over the immense ocean like stars in the heavens now are magnified to show their shape, topography, harbors, roads, and villages.

Here are Pearl Harbor and Pago Pago, United States naval bases, among the finest Pacific harbors. Insets contain tiny Wake and Midway, suddenly prominent stepping-stones on the new transpacific air route, which is indicated by a dashed red line.

Clearly portrayed are popular little islands which frequently emerge in the daily news—Nauru and Ocean, rich guano fields;

* Members wishing additional copies of the new Pacific Map may obtain them, by writing the National Geographic Society's Washington, D. C., headquarters, at 50 cents, paper (unfolded); 75 cents, mounted on linen; index, 25 cents additional.

Pitcairn, of recent movie fame; Truk, Yap, Ponape, and the other mandated islands which Japan now controls;* and South Sea isles of song and fiction, such as Tahiti, Rapa, Tongatabu, whose musical names have always been magnets to adventurers.

WHEN JAPAN WAS MEXICO'S "NEIGHBOR"

In 1513 Balboa stood "silent upon a peak in Darien," first of his race to gaze from the New World over the boundless waters of what he called the "Great South Sea." Years passed before European keel first furrowed the full breadth of the Pacific. Then Magellan, in 1520-1, fought through the stormy strait that now bears his name into the unknown "Mare Pacificum"—and heroically sailed on!

Library geographers made his maps. Drawn from reason and imagination, yet remarkable for some astute inferences, they contained other amazing surmises. They showed Japan approximately where Mexico should have been.

Drawn to this romantic sea in succeeding centuries was a glittering parade of explorers, buccaneers, whalers, and traders from every land. Captain James Cook's Pacific expeditions in the 18th century produced more knowledge than all that had gone before. He mapped the Society Islands, showed New Zealand to be two islands, and proved conclusively that Australia was not a mere peninsula of New Guinea. He sailed farther south than any previous explorer, he visited the Hawaiian group, and mapped the shores of what now is Oregon to northern Alaska. The first comprehensive map of the region was his.†

FESTOONS OF ISLANDS

The Pacific's multitudinous islands contrast strikingly with the Atlantic's insular poverty. Volcanic chains, clearly strung together in the Aleutians and along the western shores, run out in long streamers across open ocean. Diagonal deep-sea archipelagoes are strewn from the East Indies and Japan across most of the breadth of the Pacific.

Planet-shaping forces lifted the mountainous Samoas, Hawaiians, and Societies

* See "Mysterious Micronesia" (the Japanese mandated islands), by Willard Price, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for April, 1936.

† See "The Columbus of the Pacific (Capt. Cook)," in *THE NATIONAL GEOGRAPHIC MAGAZINE* for January, 1927, and "The Greatest Voyage in the Annals of the Sea (Magellan)," December, 1932, both by J. R. Hildebrand.

above the sea. Yet hundreds of peaks pushing up from the ocean floor just fail to reach the surface.

On submerged foundations, patient hordes of coral polyps have built the Caroline, Tuamotu, Marshall Islands—and countless more.

One of the most symmetrical volcanic islands, Niuafoō, in the Tongas, resembles a huge doughnut when seen from the air. Rising some 6,000 feet from the ocean bed to 800 feet above sea level, it is about five miles across. A large lake occupies the central crater of a still-active volcano that destroyed a village in 1929. Happy Polynesians live philosophically on their explosive patch of land, compelled, occasionally, to dodge outpouring lava.

Niuafoō lacks harbors. For years natives swam out with log floats to the mail boat, holding outgoing letters in brown paper packages tied to the tops of sticks. Mail from "outside," soldered in big biscuit tins, was dropped into the water and towed ashore. This postal service, now replaced by a tender system, has won for Niuafoō the nickname "Tin Can Island."*

Rich soil, formed from disintegrating volcanic lava, makes "verdant paradises" of Tahiti, the Samoas, and other islands of volcanic structure. Heavy rains carve jagged skylines in steep ridges. Deep-cut valleys roar with cascading streams.

The countless South Pacific coral atolls bear no resemblance to the battlements and spires of volcanic islands. Low and flat, they depend on waving coconut palms for skyline. Tiny, reef-building coral animals, living in relatively shallow water, leave myriad stony skeletons when they die. Descendants build on and upward, gradually adding their calcareous remnants to the growing pile. Ocean waves toss up coral rock and sand, which then is weathered into soil. Volcanic action often raises the coral cap of a subterranean peak far above the sea.‡

Northeast of the Solomon Islands, in the western Pacific, a cluster of islands around a blue lagoon forms one of the world's largest purely coral atolls. This is Ontong Java, an isolated source of copra, which it sends to Australia, and of trochus shell.

* See "Living On a Volcano," by Thomas A. Jaggar, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for July, 1935.

‡ See "Coral Castle Builders of Tropic Seas," by Roy Waldo Miner, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for June, 1934.

which is made into "pearl" buttons in Japan or Belgium.*

"Small" coral colonies form trivial atolls, like Rakahanga. Measureless are polyp populations which have built a wall around New Caledonia, 400 miles long on one side, and the Great Barrier Reef, stretching 1,200 miles along Australia's Queensland coast.†

Chief resource of coral islands is the amazing coconut palm, one of the most useful trees in existence. It supplies food and drink; ropes and rough fabrics; timber and fuel; and its dried nut meats (copra) yield valuable oil.

NOW YOU SEE THEM—NOW YOU DON'T:

Falcon Island, touch-and-go offspring of the Tonga group, has played hide-and-seek with navigators for decades. First reported in 1865 as a breaking reef, it was found twelve years later belching smoke and steam. In 1885 it was an island, rising high above the sea. After gradually wasting away, it disappeared almost entirely in 1900 and was virtually forgotten. Born again in tremendous eruptions of 1927-28, erratic Falcon reappeared 600 feet high and two miles long. Two years later it had shrunk again by a third.

Jack-in-the-box of the North Pacific, vagrant Bogoslof Island in the Aleutians not only alters shape but shifts from place to place. It has also appeared now as one island, then as two, in obedience to capricious undersea volcanic force.

Between A.D. 416 and 1867, Japan recorded more than 2,000 earthquakes. With invention of the seismograph, records skyrocketed. In 19 years, 27,485 were counted, an average of about four a day!

The world's greatest elevation differences occur in the Pacific. Within sixty miles, the slopes of the island of Hawaii rise from the ocean floor, 18,000 feet below the surface, to the cloud-capped peak of Mauna Kea, 13,825 feet above the sea, or almost 32,000 feet from the true base of the mountain. Mauna Kea is the highest island mountain in the world.‡

Within a somewhat greater lateral distance, about 240 miles, on the coast of

* See "Coconuts and Coral Islands," by H. Ian Hogbin, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for March, 1934.

† See "The Great Barrier Reef and Its Isles," by Charles Barrett, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for September, 1930.

‡ See "Hawaiian Islands," by Gilbert Grosvenor, in *THE NATIONAL GEOGRAPHIC*, February, 1924.

Chile, land rises from the 25,000-foot abyss of the Atacama Trench to the snowy summit of Luillailaco, 22,057 feet above sea level—a lift of nearly nine miles.

THE OCEAN'S GREATEST DEEP

The world's profoundest deep measures 35,400 feet from sunny surface to cold, lightless bottom east of Mindanao, in the Philippines. Mount Everest, removed to this pit, would form no island, for its peak would be under more than 5,000 feet of water. Other trenches from 23,000 to 31,000 feet lie in the western Pacific.

Contrasting with the western Pacific, broken up with abyssal deeps and high mountains, the ocean floor east of the Hawaiians is a vast, monotonous plain, with an average depth of about 16,000 feet.

Relics of ancient cultures abound in the Pacific. Tantalizing evidence exists of prodigious feats by vanished tribes in navigation, construction, and social organization. Puzzling it is that civilized societies perished while savage peoples lived on.

Best known Pacific monuments of prehistoric days are the more than 600 huge, expressionless, half-length human figures in stone, left standing and fallen on Easter Island, mysterious, unexplained.*

But the "Venice of the Pacific" at Nan-matal, on Ponape, the great ruins on Lele Island, the temple on Malden, New Caledonia's irrigation terraces, the megalithic monuments and curious stone carvings and other hundreds of less spectacular antiquities are all essential pieces in the Pacific's archeological jig-saw puzzle.

Courageous long-distance voyagers were the early Polynesians, masters of primitive navigation arts. Skillfully reading currents, winds, and stars, they visited distant islands, sailed safely home. Polynesians were guided to New Zealand, tradition says, by migrations of birds from those islands to Japan. The Marshall Islanders' charts of lashed reeds show prevailing winds, currents, and islands.

History's early Antarctic explorer, Hui-te-rangiara, returning from a long southward voyage in the seventh century, reported a foggy, dark place, far beyond Rapa, where sunless seas were frozen white like scraped arrowroot.

The natives of Yap use massive stone disks for money. The largest, twelve feet

* See "The Mystery of Easter Island," by Mrs. Scoresby Routledge, December, 1921.

across, weigh tons. Not all their currency is so cumbersome. Comparatively portable "small change" is only two or three feet in diameter! This cash was brought chiefly from Palau Island quarries, nearly 300 miles away over open seas.*

Solomon Islanders still build graceful canoes from light boards, carefully carved and matched. Holes through small knobs left inside the hand-hewn planks permit a boatbuilder to lace his whole craft together. Thirty or forty husky paddlers drive these 40- or 50-foot canoes at the speed of engined hulls. Even longer boats once were used.

Savages commute by boat from Auki Island to Malaita, in the Solomons. Auki is an artificial islet haven built by coastal natives fearful of interior savages. Here a mint is located, where the shell money of the Solomon Islands is made. In other larger Melanesian islands salt-water dwellers, semicivilized, still must thwart savage raids of backwoods cousins.

Last year the United States established Government stations at Baker, Howland, and Jarvis Islands. These lonely bits of land, pin-points on maps, have potential value as supply and fuel bases for a possible air route from the United States to Australia and New Zealand. None of the three coral humps is more than a mile or two square. Jarvis, the largest, is practically in the center of the Pacific.

Idyllic Lord Howe Island, a fragment of land in the Tasman Sea, supports a utopian life based on a practical monopoly of the native *Howea* palm. Most of the world's potted palms are grown from its exported seeds. The trade in palm seeds maintains about 150 permanent residents of British stock. Because kindly Nature tends the wild-growing trees, islanders need work an average of only two hours a week! †

On lonely Guadalupe Island, off Baja California, Mexican soldiers guard remnants of native elephant seal herds. Sought by hunters and collectors, the once plentiful animals face the extinction already meted out to the Guadalupe fur seal. Goats, cats,

and mice, introduced on this desert island, have almost stripped it of unique flora and fauna. Because the cats seem to prefer birds to mice, traditional barnyard enemies live side by side, watchfully but in peace.*

All the islands which will fall under the shadow of the eclipse of June 8, 1937, are shown: Nukufetau, Funafuti, Vaitupu, Gardner, Canton, Birnie, Enderbury, Fanning, and Christmas. Some of these will attain fleeting fame as bases for important astronomical expeditions.

Cocos Island, 300 miles off Costa Rica, has been the goal of treasure hunters for a century. Buccaneers, plundering along the Central and South American coasts in the 17th and 18th centuries, are alleged to have buried the spoils of their raids here.

Greatest lure is the "Loot of Lima." Fearing seizure of the fabulous wealth of gold, silver, and gems stored in Lima Cathedral, city fathers of the Peruvian capital placed the treasures on a ship, which was taken over by pirates. The crew was captured later, but not until the rich cargo had been buried, presumably on Cocos, and many "treasure hunts" are staged there.

OLD IN GEOLOGY, NEWEST IN HISTORY

Old geologically, the Pacific is newest historically, in world politics and commerce.

A century ago some statesmen ridiculed the idea that our Pacific coast would ever be of value to the United States.

In less than a hundred years a network of events, shuttling back and forth across its vast expanse, has brought it into the forefront of present-day affairs.

In 1848 gold was discovered in California. Three years later Australia experienced a gold rush. In 1854 Japan began to open her doors to the world. In 1869 our first transcontinental railway pushed through to the Pacific coast. In 1896 gold was discovered in the Klondike. The Philippines and Hawaii were acquired by the United States; the Philippines recently were relinquished. The Panama Canal was opened.

Steamships are plying many new paths with ever-increasing cargoes and passenger lists. Now airplanes fly scheduled routes. Thus the Pacific is a new world stage of naval strategy, statesmanship, and trade.

* See "A Cruise Among Desert Islands," by G. Dallas Hanna and A. W. Anthony, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for July, 1923.

* See, in *THE NATIONAL GEOGRAPHIC MAGAZINE*, "Romance of Science in Polynesia," by Robert Cushman Murphy, October, 1925; "Islands of the Pacific," by J. P. Thomson, and other articles on Nauru, Yap, etc., December, 1921.

† See "Paradise of the Tasman," by Hubert Lyman Clark, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for July, 1935.

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To carry out the purposes for which it was founded forty-eight years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

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Immediately after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

The Society cooperated with Dr. William Beebe in a deep-sea exploration of undersea life off Bermuda, during which a world record depth of 1,028 feet was attained August 15, 1934, enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

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.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

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 an officially recognized 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, which obtained results of extraordinary value.



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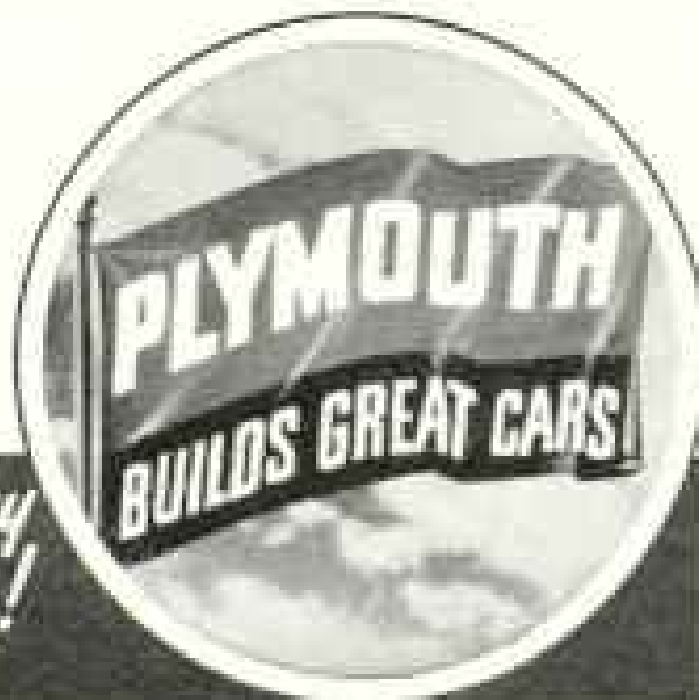
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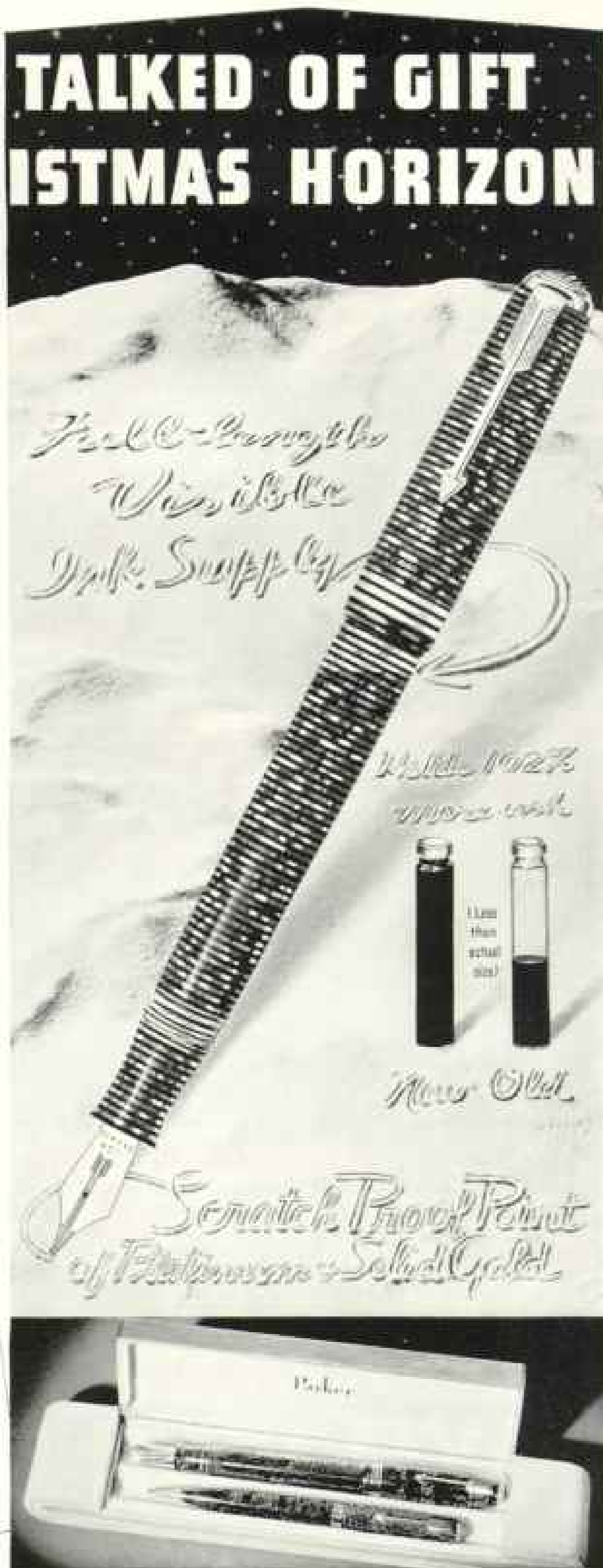
THE PRE-VIEWER says: "High fashion note! This long-distance writer is featured in the Christmas Gift issue of *Esquire*—the magazine for men."

PRESTON CARNES, of the *Yale Daily News*: "It's the answer to the gift shopper's prayer!"

KATHLEEN HOWARD, Fashion Editor of *Photoplay Magazine*, says: "Top line the Parker Laminated Pearl Vacuumatic Pen on your Gift List and reap a harvest of gratitude."

And the Recording and Statistical Corporation took a pen poll among magazine readers—found that Parker Vacuumatic is the national favorite by 9 to 4.

So don't lie awake nights wondering what to give your friends and dear ones. Simply go to the nearest pen counter and ask by name to see this revolutionary Parker Vacuumatic Pen, singly, or in Pen and Pencil Sets. And be sure to look for the smart **ARROW** clip. This distinguishes the genuine. The Parker Pen Company, Janesville, Wis.





A Gift THAT INCREASES IN VALUE...

a Gift for Today and Tomorrow

FOR ANYONE whose future is your immediate interest, United States Savings Bonds are an appropriate remembrance for every gift occasion. They are direct obligations of the United States Government. They steadily increase in value each year until they mature at the end of ten years. The maturity value is 33½ per cent greater than the original purchase price. They may be redeemed for cash at any time after 60 days from issue date. United States Savings Bonds will be registered on the books of the Treasury in the name of the person for whom you purchase them.

UNITED STATES SAVINGS BONDS

DIRECT OBLIGATIONS OF THE UNITED STATES GOVERNMENT

Savings Bonds issued in convenient denominations as shown below. Not more than \$10,000 maturity value, issued during any one calendar year (January 1st to December 31st), may be held by any one person.

**PURCHASE AT POST OFFICES OR,
IF YOU PREFER, ORDER BY MAIL**

TREASURER OF THE UNITED STATES, DEPT. OF THE TREASURY, WASHINGTON, D. C.
Please issue the following bonds for which I enclose check, draft, or money order.

.....	\$25 U. S. Savings Bonds at	\$18.75 \$.....
.....	\$50 U. S. Savings Bonds at	\$37.50 \$.....
.....	\$100 U. S. Savings Bonds at	\$75.00 \$.....
.....	\$500 U. S. Savings Bonds at	\$375.00 \$.....
.....	\$1000 U. S. Savings Bonds at	\$750.00 \$.....
		Total \$.....

Name ^{Miss} _{Mr.} _____ Issue in the name of:

Address _____

City _____ State _____

Check here if bonds are purchased for another person. Purchaser's name and address where bonds are to be sent:

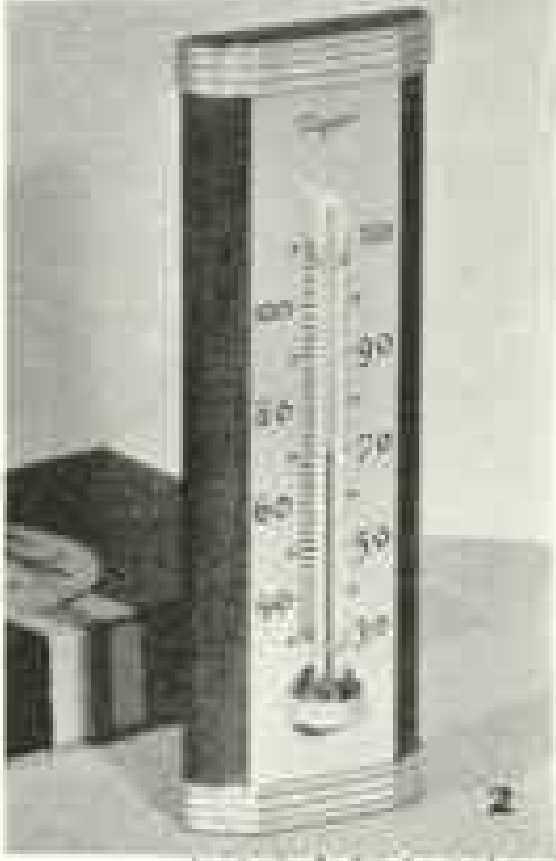
Name ^{Miss} _{Mr.} _____

Address _____

City _____ State _____

Make all remittances payable to Treasurer of the United States. To insure delivery before Christmas, mail orders should be received not later than December 15th.

Savings Bonds may be purchased at Post Offices at any time.



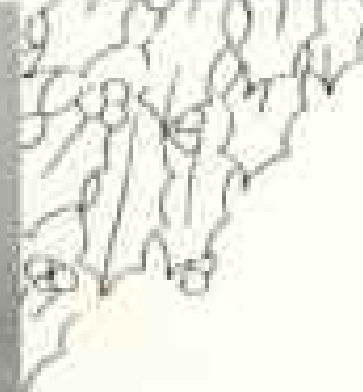
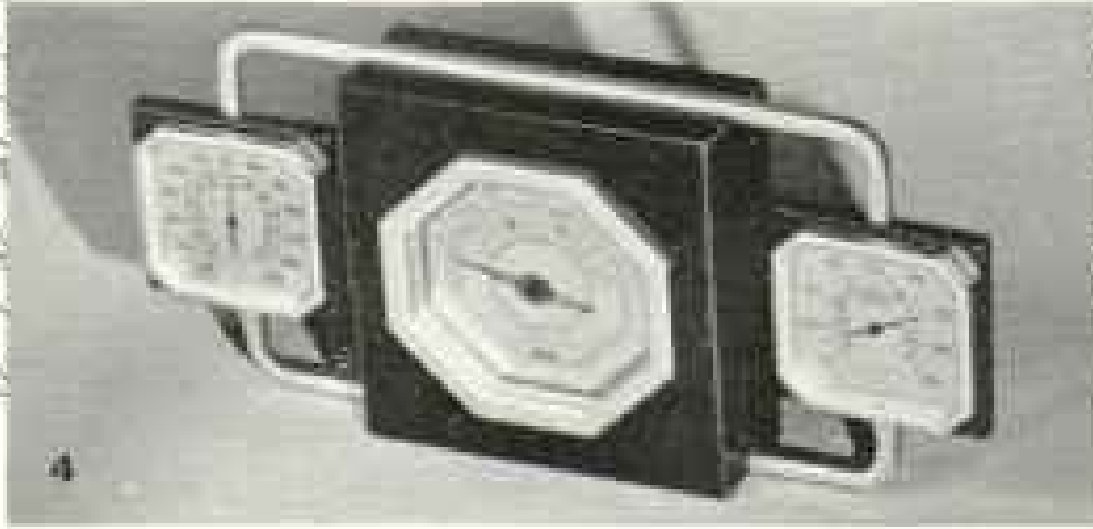
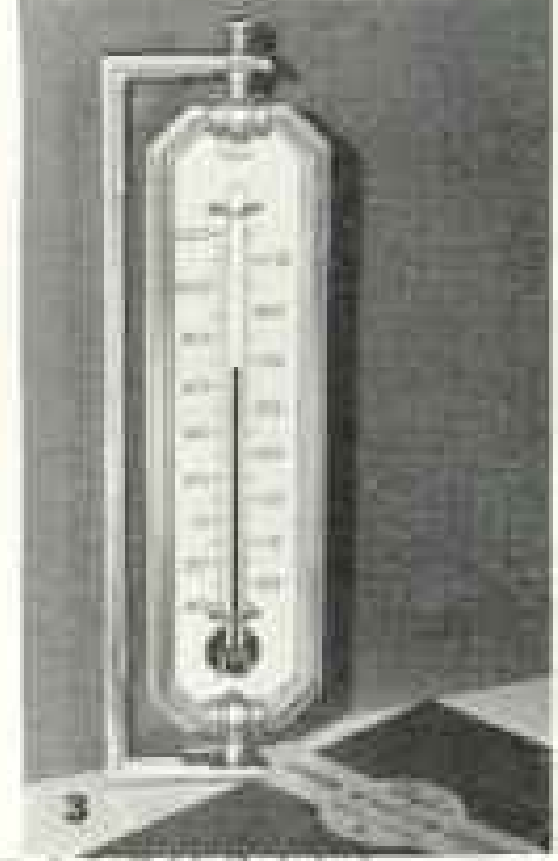
Taylor GIFTS DE LUXE

1. MAYMONT COMBINATION—first aids to health! A set containing the Mayfair Dial Indoor Thermometer and the Normont Humidiguide. Price of combination \$5.*

3. METAL FRAME OUT-DOOR THERMOMETER tells you when to wear your heavy coat. Adjustable mounting brackets for easy reading. \$13.50.*

2. INDOOR WALL THERMOMETER. Settles the "too hot—too cold" argument once and for all with the aid of this thermometer. Walnut base, dial gold trimming. \$2.*

4. TREMONT COMBINATION. A Stummiguide, Thermometer and Humidiguide in one piece. For walls, desk or wall. Solid walnut. Gold trim and gold finish bar frame. \$25.*



LOOK HERE FOR CHRISTMAS GIFTS that are used 365 days a year

BEFORE you begin to cudgel your brains and look frantically in stores for gift ideas, LOOK HERE. See practical, yet smart and different presents for every member of the family and for friends. And with each gift goes the Taylor Five-year Guarantee of Tested Accuracy.

Ask for a Taylor Thermometer or Weather Instrument, and get the finest and most accurate instruments of their type—and in their price class. Go to your department, hardware or drug store first. If they cannot supply you, write direct to Taylor

Instrument Companies, Rochester, N.Y., or Toronto, Canada.

Every Taylor Instrument bears the Taylor Name.

(right)

1. SILVER AND BLACK DESK THERMOMETER, to tell you when your room is too hot or too cold. \$1.*

2. VOGUE INDOOR THERMOMETER, with a smart blue glass dial and gleaming silver figures. \$2.*

3. FAIRMONT STORMGUIDE. Humidiguide and Indoor Thermometer in one. Tells all about the weather. \$15.*

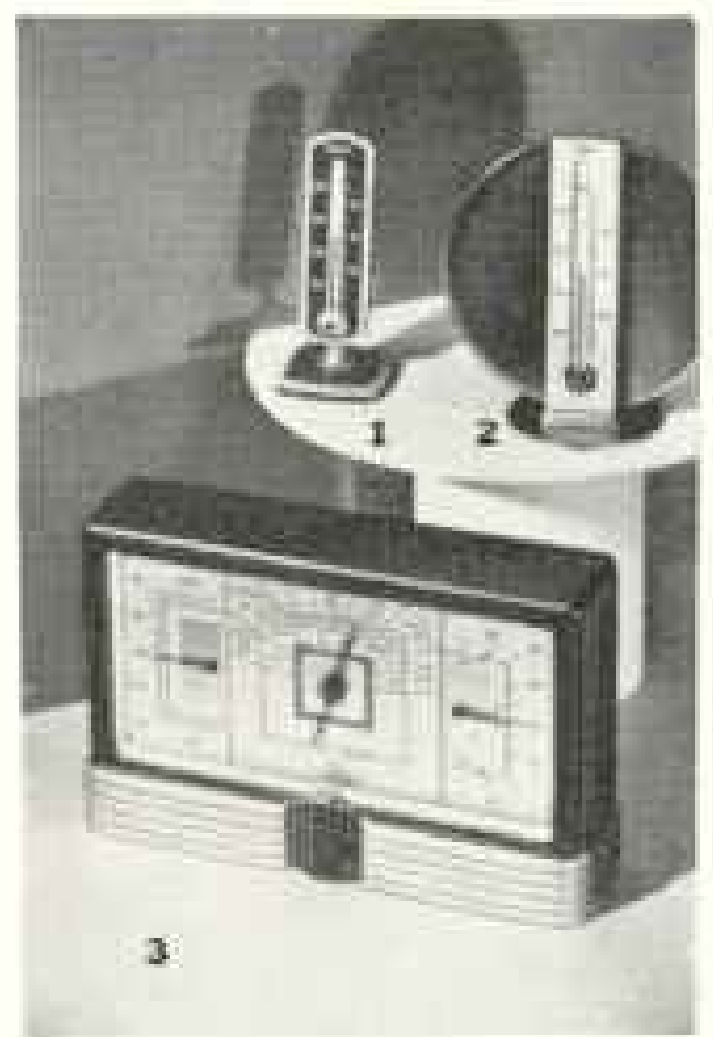
*Prices slightly higher west of the Rockies and in Canada.



Taylor

INSTRUMENTS

IN INDUSTRY, other types for indicating, recording and controlling temperature, pressure and humidity.



LOOK FOR THIS TAG

*"The Great Smokies are mountains to us
... but molehills to the Lincoln-Zephyr"*



A NEW kind of car is on the roads today. In appearance, construction, performance, it is years ahead. Eventually, other cars may approach its balanced excellence. . . . But why wait? Why not drive a LINCOLN-ZEPHYR today?

It is a new idea to put a Lincoln-designed-and-built twelve-cylinder engine in a car of medium price. Because of low ratio of car's weight to the engine's 110 horsepower, wheels have wings, even in climbing the Great Smokies. And, according to owners' reports, this twelve-cylinder engine runs from 14 to 18 miles on a gallon of gas. Streamlining, beautiful to the eye, has a deeper

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The LINCOLN-ZEPHYR is a big car. The wheelbase is 122 inches, springbase 133 inches. All passengers ride "amidships," . . . Inherent in the design of the car is the new and refreshing rhythm of motoring. If you are at all like other owners, you will go places more in this new kind of car.

Prices for 1937 are reduced. Designed by Lincoln, built with Lincoln care, the LINCOLN-ZEPHYR is priced well below its specifications! Lincoln Motor Company, builders of Lincoln and Lincoln-Zephyr motor cars.

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Salute

to morning

As refreshing as the first fragrant breeze of morning is Hawaii's favorite breakfast drink . . . fresh pineapple juice. And the same sprightliness and tang, the same tropical fragrance, come to you in Dole Pineapple Juice from Hawaii. Natural and unsweetened, the inimitable flavor of fresh, sun-ripened pineapples is brought to you by the exclusive Dole Fast-Seal Vacuum-Packing Process. Look for the name DOLE on the blue can.

DOLE PINEAPPLE JUICE *from* **HAWAII**

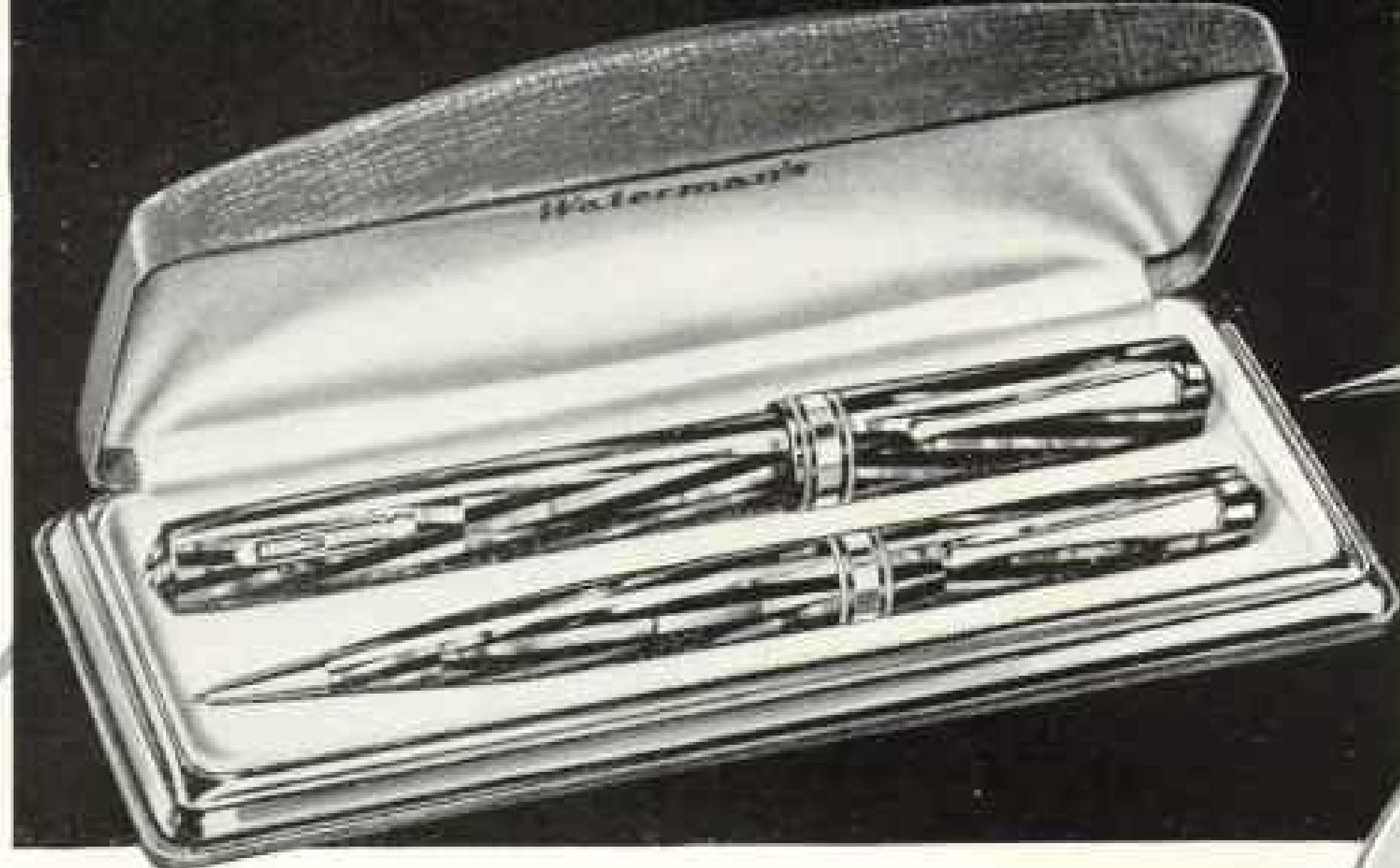
Produced by the Hawaiian Pineapple Company, Ltd., also packers of Dole Sliced Pineapple, Crushed, Tidbits, Gems, and the new Royal Spears.

Honolulu, Hawaii, U.S.A.—Sales Offices: San Francisco

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All the essentials of a perfect gift—
Quality
Beauty
Long Life
Usefulness



DE LOAT "Ink-Vue," in beautiful red-and-gold gift case, \$12.50. Emerald Ray (shown), Copper Ray, Jet. Pen, \$8.50. Pencil to match, \$4.

No better Gifts than Pens No better Pens than Waterman's

INK-VUE

*The Perfected Visible-Ink Pen
That Tells When to Refill*

A new, modern gift! . . . bearing the most famous name in pens. Many exclusive features and simplicity of construction make INK-VUE a reliable and superior gift value.

SIMPLEST FILLING with patented "Double Action Lever." Also, easily emptied for cleaning.

LARGEST INK CAPACITY of all visible ink pens.

STRIKING BEAUTY—New, modern streamline "ray" design in a variety of colors.

Features of All Waterman's Pens—

TIP-FILLING—Patented feature assures clean filling; no ink on barrel or fingers.
SELF-STARTING—No shaking or coaxing.
PERFECT POINTS as shown by microscope tests. 7 DIFFERENT POINTS for special uses and every style of handwriting.

At Dealers Everywhere—Sets, \$3.50, \$4.25, \$5, \$8, \$9, \$10, \$12.50, \$15.
Pens, \$2.50 to \$10. Pencils, \$1 to \$5.

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DESK SETS—with Waterman's fountain pens, for home and office. Variety of styles and colors, from . . . \$5

No. 7—Man's-size pen, handsome in design. Standard self-filling style. Jet (shown), Emerald Ray, \$7. Pencil, \$3.

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No. 84—Visible-ink style, with all "Ink-Vue" features. Jet (shown), Silver Ray, \$5. Copper Ray, Emerald Ray, \$6. Pencil, \$3.

No. 2—Excellent value. Standard self-filling style. Steel Quartz (shown), Black Pearl, Green Pearl, Jet, \$3. Pencil, \$1.25.

Lady Patricia
Visible-ink style, with all "Ink-Vue" features. Dainty design, exquisite colors—Mist (shown), Sunset, Black Lace, \$5. Pencil, \$3.

Two styles especially designed for women and girls
Standard self-filling style. Moss Agate (shown), Persian, Onyx, Jet, \$5. Pencil, \$3.

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Announcing the gift of gifts: the world's smallest fine movie camera! No larger than the palm of your hand, it takes the finest, most brilliant color movies you have ever seen—and *at snapshot cost!* Never before has there been such a camera at such low cost—only \$49.50!

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Largest liner ever to sail below the Equator! Share the glory that will greet this famous star on her first appearance in glamorous Rio de Janeiro and Montevideo . . . enjoy the fiestas of Buenos Aires at the peak of its summer season. Nine days in these three capitals alone . . . river steamer to and from 'B. A.' included in cruise rate. And you visit, too, Nassau and Panama, La Guaira, Barbados, Bahia, Trinidad.

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40 DAYS . . . \$495 UP

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Britannic Christmas Cruise sails Dec. 18 to St. Thomas, La Guaira, Curaçao, Cartagena, Panama, Havana. 15 days, \$187.50 up.

Berengaria New Year's Cruise sails Dec. 29. New Year's Eve in Nassau! 5 days, \$77.50 up.

Britannic to West Indies. 6-day cruise to Nassau Jan. 8, \$75 up; 8 days to Nassau, Havana, sailing Jan. 16, \$100 up.

Weekly Nassau Cruise . . . Corinthia every Saturday Jan. 23 through Mar. 6-day round trip (day and evening in Nassau), \$70 up. With stop-over privilege, \$95 up. One way, \$65 up.

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Book through your local agent or Cunard White Star Line, 25 Broadway, and 638 Fifth Ave., N. Y.

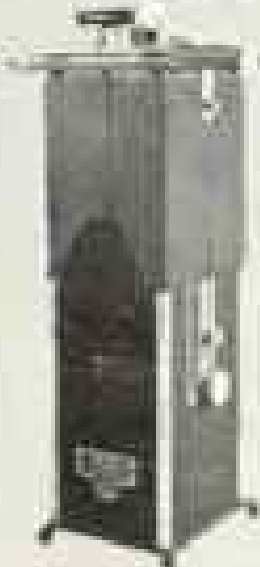
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A MILLION DOLLARS'
WORTH OF FUN



**AND OUR BUDGET'S DOING
NICELY. THANK YOU . . ."**

Created by and for America's business and social leaders . . . Miami Beach with its superb climate, its brilliant attractions, is within the reach of modest budgets, too! Of prime importance to busy men, Miami Beach is only a few hours from northern interests. You can, as many do, give your family a season's priceless dividends of health and pleasure, commuting from the north to join them for sun-splashed week-ends!

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Gar Wood Executive, inventor, champion of speed on the water, says: "I have a home in Miami Beach and have lived here during the winter season for the past fifteen years . . . I expect to spend the rest of my winters at Miami Beach."

Miami BEACH Florida

WRITE to the Miami Beach Chamber of Commerce, Miami Beach, Fla., for illustrated "Booklet A" and complete information.

WHEN BETTER AUTOMOBILES ARE BUILT, BUICK WILL BUILD THEM

Every good quality that this year swept the Buick car gloriously to new levels of success and popularity is preserved and enhanced in the brilliantly beautiful new Buick for 1937. See and ride in this marvelously sound and able car and you'll know instantly why the world is saying

"It's Buick again!"



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NOTE ALL THESE FEATURES, FOUND ON NO OTHER CAR IN THE WORLD: *Valve-in-Head Straight-Eight Engine . . . Aerobut Carburetor . . . Sealed Chassis . . . Torque-Tube Drive . . . Unsteel Body by Fisher . . . Tigose Hydraulic Brakes . . . Knee-Action Comfort and Safety . . . "High Output" Generator . . . Jumbo Luggage Compartments . . . Double Stabilization . . . Safety Glass*

\$765 to \$1995 are list prices of the new Buicks at Flint, Mich. Standard and special accessories groups at extra cost. Model shown, Roadmaster Six-Passenger Sedan, \$1275 at Flint, fenderwells extra.

"Where shall we stay?"

NATIONAL GEOGRAPHIC MAGAZINE'S HOTEL SECTION

ARIZONA

Litchfield Park

The Wigwam. Distinguished Inn and attractive bungalows in glorious desert setting near Phoenix. Golf, ride, relax. Rates from \$6. Amer. Plan \$10.

Tucson



El Conquistador

Modern landscaped resort hotel surrounded by spacious bungalows. In midst of desert grandeur, circled by picturesque mountain ranges. Distinguished clientele. Finest winter climate in North America. Riding, tennis, golf and other sports. Write for illustrated folder.

Pioneer Hotel. Southern Arizona's Finest. 250 Rooms with bath. Lobby. Coffee Shop. Dining Room. Roof Garden. Sun Deck. Scenic Views. Booklet.

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The Raleigh Hotel. Annapolis Ave. from New Govt. Bldg. Dining rooms air conditioned. Rooms with tub and shower, \$3-41 one, \$4.50-42 two. E. F.

Willard Hotel, adv. elsewhere in this issue.

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Beverly Hills

Beverly Hills Hotel and Bungalows. Mid the quiet and beauty of Beverly, twenty minutes from Los Angeles. Featuring a One, Two and Three Meal Plan.

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Hollywood Knickerbocker. Hollywood's smartest height-limit hotel. Deluxe appointments. Hotel rooms, suites, apartments. National tariff.

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Yosemite National Park



The Ahwahnee

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Hollywood Beach Hotel

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The Vinoy Park Hotel

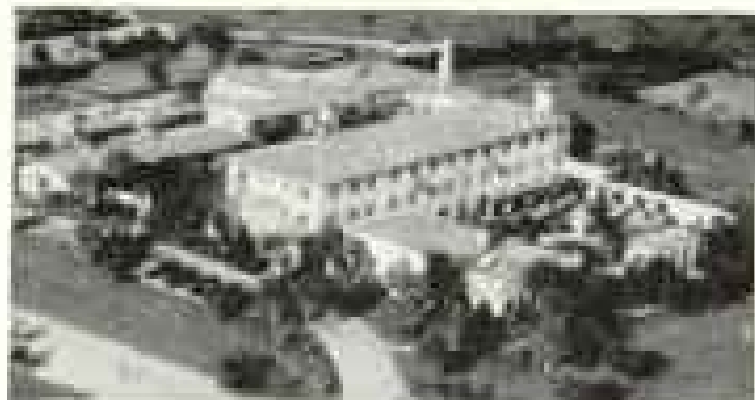
Facing glorious Tampa Bay . . . The largest fireproof hotel on Florida's West Coast . . . Sun bathing . . . Every recreational feature . . . The best in service and cuisine . . . Luxurious and comfortable accommodations . . . Open from December 12 until April . . . Rates considerate . . . Booklet, Clement Kennedy, Managing Director.

"Where shall we stay?"

NATIONAL GEOGRAPHIC MAGAZINE'S HOTEL SECTION

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Sea Island



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Zestful sports at Sea Island vie with the lure of restful laziness. Finest golf, sweet, tennis, riding, fishing, hunting, sailing, cycling, surf and pool bathing, dancing—at The Cloister indulge your flair for good living. Easily accessible. Early season rates until February. N. Y. Office, 500 5th Ave. (Penn. 0-2900). Chl. Office, 232 S. Mich. Ave. (Wa. 5381).

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St. Charles. South's Most Modern Hotel, accommodating 1,000 guests. Spacious rooms, lofty ceilings. Center of New Orleans historical points.

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The Belvedere. Outside the business district, yet convenient to all the city's activities. Every modern comfort and luxury. Rates begin at \$4.00.

MASSACHUSETTS

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The Copley Plaza from beautiful Copley Square. Single rooms from \$4.00; Double from \$6.00; Suites from \$14.00. Arthur L. Rice, Managing Director.

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The Princeton Inn. Facing golf course and Graduate College. Amer. plan, 100 rms. Fireproof. "Hospitality as in days of old." J. Howard Sisson, Mgr.

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Multnomah. Oregon's largest, 600 rooms. From \$2.00. Three to four blocks to leading stores and banks. Three cafes. Famous food.

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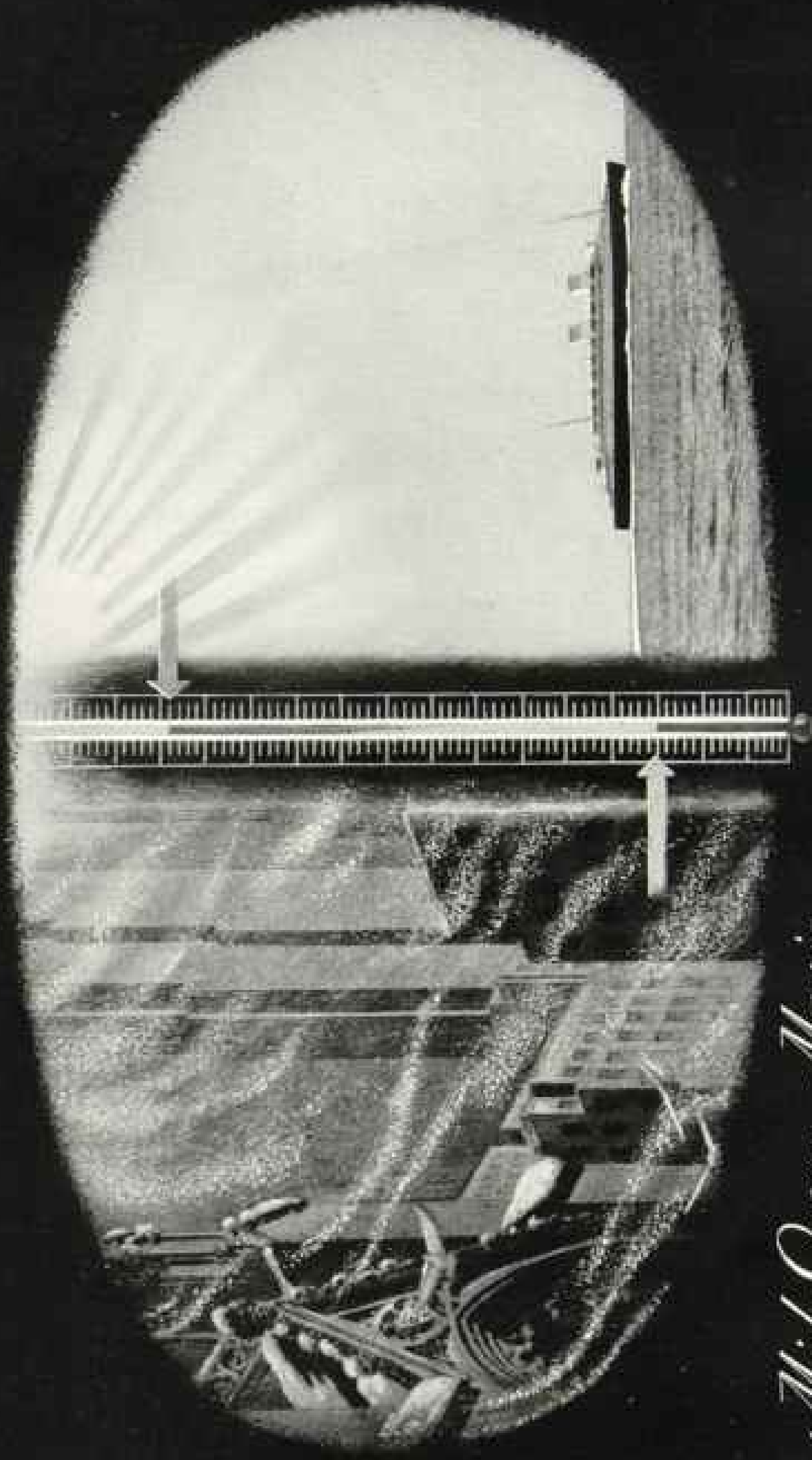
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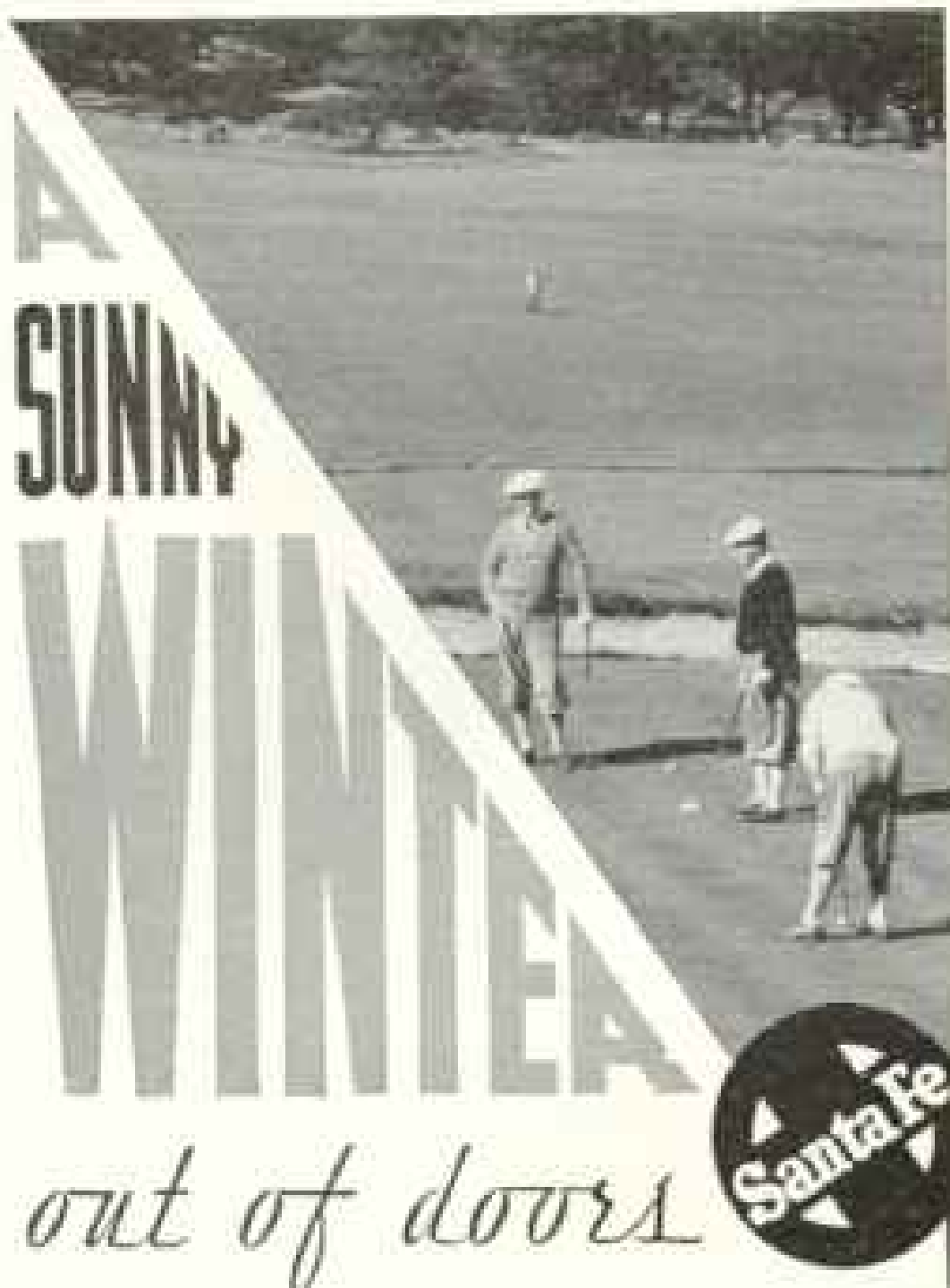


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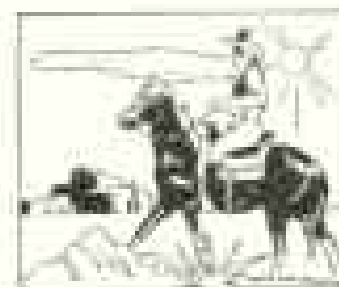


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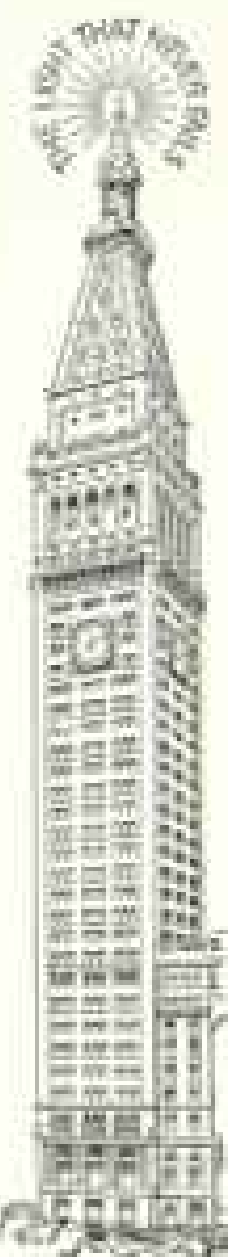
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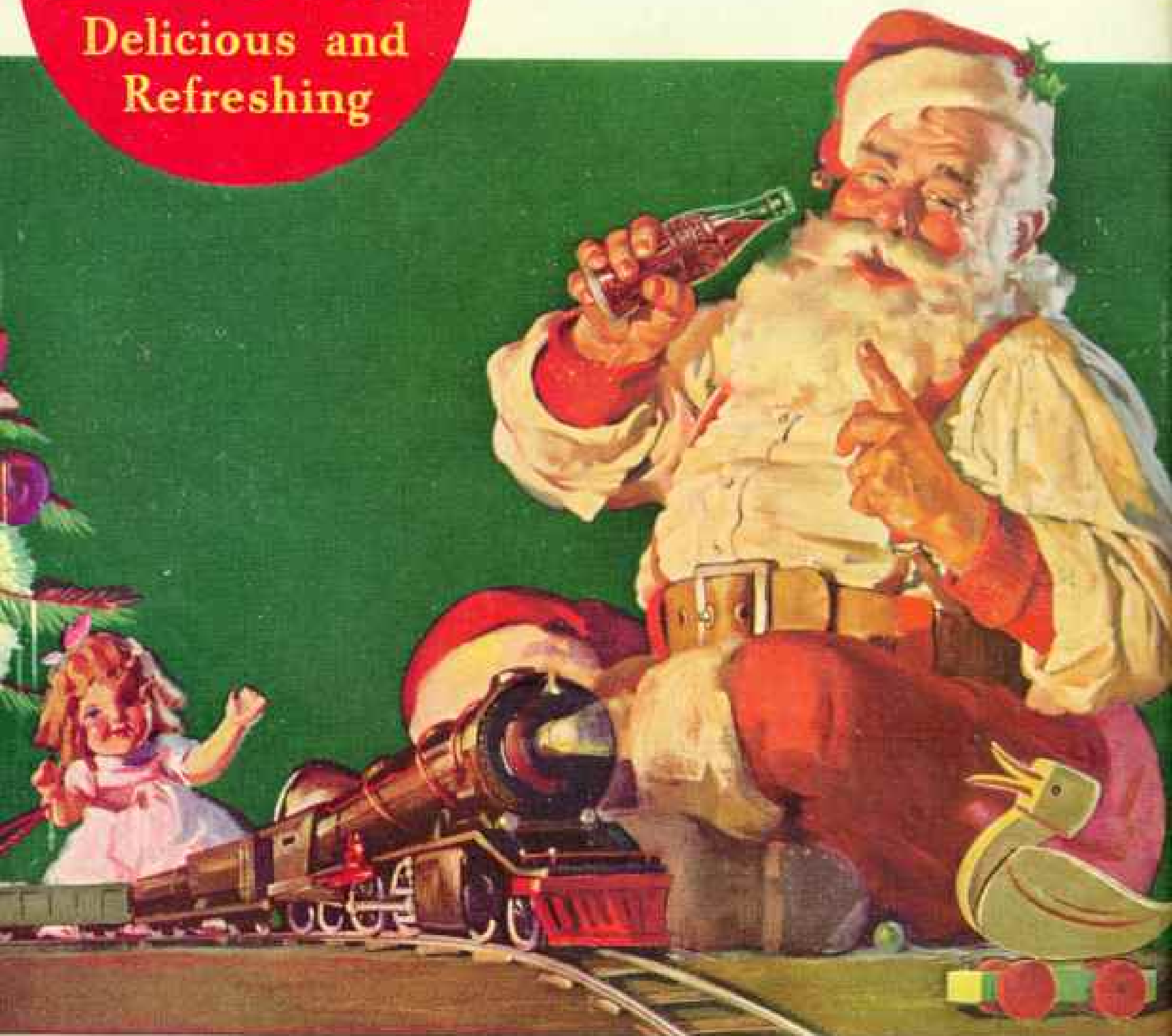
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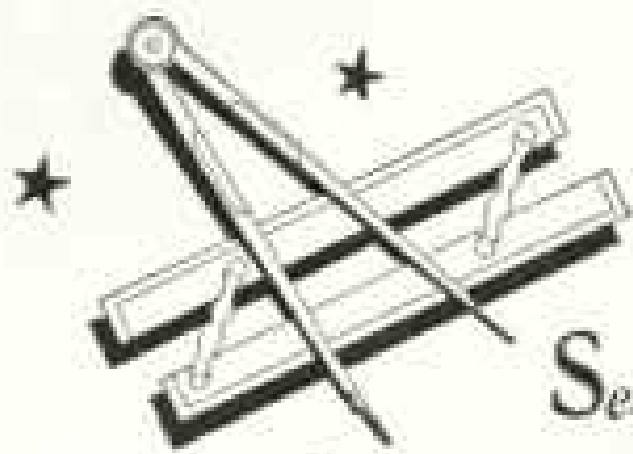


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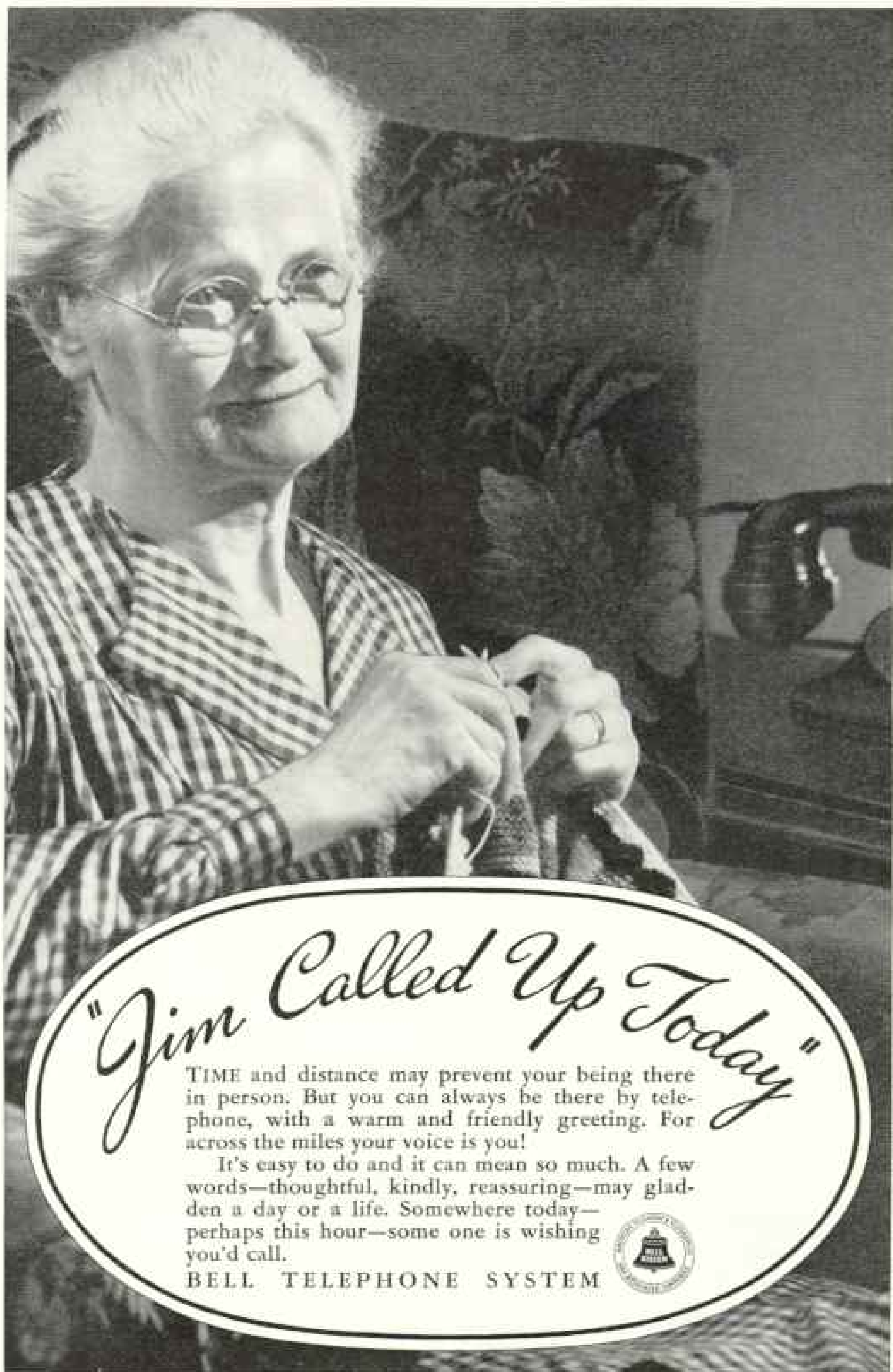
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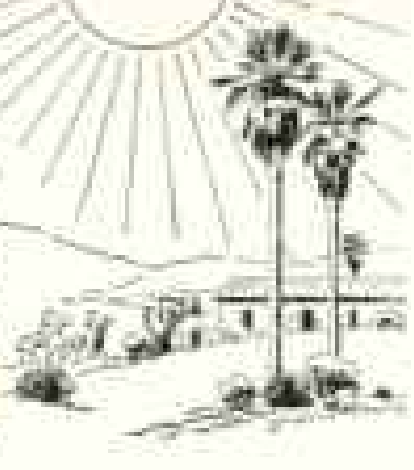
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