VOLUME XCIII NUMBER THREE

THE NATIONAL GEOGRAPHIC MAGAZINE

MARCH, 1948

PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
WASHINGTON, D. C.

$5.00 A YEAR 50c THE COPY

VOL. XCIII, No. 3 WASHINGTON MARCH, 1948

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The Wonder City That Moves by Night

BY FRANCIS BEVERLY KELLEY

SPANGLED and big and red and gold, the circus smells of peanuts and cotton candy and pink lemonade and wild animals. It is as American as hot dogs.

It pops up some gray morning with its billowing tents and flags whipping the halyards on a horizon that wasn't there a few hours ago. With sights and sounds to quicken the heartbeat, it makes its visitors kin to Alice at the moment when she stepped through the looking glass into the realm of pure fantasy (Plates XII and XIII).

Here today and gone tomorrow, it is a state of restless American achievement, a pioneer peddler with magic in its pack and a timetable in its pocket—a spangled, sparkling girl with a date in a town a hundred miles away tomorrow morning.

Descendant of the Roman Circus

Patterns of this amusement colossus stem from ancient times, and yet reflect the format of the Roman Circus Maximus with its races and physical prowess and wild beasts, but the restless mobility and fabulous immensity of "the biggest thing on wheels" is American.

Circuses in other lands have excellent talent, but they lack the frantic schedule of a new-town-nearly-every-day and the energy to move a four-train, 100-car show over the map for seven or eight months.

There are only two days in circus business: today and tomorrow. Always the course of the show's bloodstream lies a hundred or so miles ahead where cheerfully and competently it will repeat today's routine. Only the name of the town, the weather, and the spectators will alter the mammoth animated mural which is circus day in America.

The people who see the huge presentation in Madison Square Garden in New York City, traditional opening stand of the Ringling Bros and Barnum & Bailey Circus, refuse to believe that the show can be taken on tour in its entirety, and the spectators in small cities are hard to convince that they are seeing the same performance that folk in Manhattan paid a higher price to see.

Disbelief in the magnitude and the mobility of the circus exists even among some of its own people—performers newly recruited from the European outdoor shows and music halls. Although they exhibit in the same tents in each successive town, they remain skeptical for the first few stands.

Every year millions of people watch the circus come in, some of them up at the first streak of dawn to see the big wagons rolled off the flatcars in the railroad yards, the tents spread and raised, and the vacant lot of a few hours ago transformed into a tented town.

The show is self-sufficient except for needing to attach hose and rent water from the city mains and to buy groceries from local supply houses for its hundreds of people and its animals. It carries its own light plants, medical department, postman, blacksmith shop, restaurant, barber shop, harness shop, metal shop. In a cold-storage wagon it even has an emergency supply of canned goods and meats to cope with a possible failure of local deliveries.

Change of Towns Fools Even the Dog

A circus can cover but about 150 towns a tour. The few communities not getting one of the big railroad shows see motorized or "mud" shows, so dubbed because they travel overland instead of on the railroad.

The fact that the circus looks much the same whether it is encamped on a muddy lot in Portland, Maine, or on a sandy flat in

Lawrence D. Thornton from Three Lions

Crawling under the Tent Is a Supreme Thrill of Childhood

Some youngsters would trade a seat in the center grandstand for a risky peep into the mysteries behind the canvas wall. Of course there is little chance of "sneaking in for free," but it is fun to try.

Florida fooled even the pet dog belonging to the circus treasurer. The dog hung around the office wagon, which always is spotted in the same position every day in relation to the other units on the midway—the side show, lunch and novelty stands, main entrance, etc.

Every day the little dog would find a delicious bone and bury it with true trouper frugality under the office wagon. Then in the next town he'd try to dig it up again!

During the war the circus never lost a stand, although it bowed to an order asking that it not venture into the far West with its four trains and thus add another railroad problem to that area. It sold through special performances more than $100,000,000 worth of war bonds, and it wore its war paint on the faces of its clowns, who visited hospitals and participated in patriotic drives in their spare moments.

The circus draws its people, as well as its animals, from all over the world. In 1947 John Ringling North went all-out for importation of acts, with the result that last year the show had more than 40 acts appearing in America for the first time. Many nationalities, creeds, and colors traveled with the "Greatest Show on Earth" and, except for occasional personal disputes, got along famously and made new friends.

Foreign Performers Taught English

Harry Dann, a St. Louis boy who ran away from his father's banking business to become a clown (Plate XX), taught English to the children who were traveling with their European and Asiatic parents. These new troupers saw a lot of the United States at first hand and in a hurry as the show moved along.

The circus is animals, wild and domestic, and all so acclimated to the ambulatory life that Dr. William M. Mann, Director of the National Zoological Park in Washington, D. C., has a theory that some traveling circus

animals are as easy to keep in good health as beasts limited to the sights and sounds of one place.

Diets of circus animals are important, and animal men argue interminably as to whether horse meat or beef is better for the big cats. The Ringling-Barnum-Bailey outfit always fed lean, second-cut beef until the advent of World War II when it switched to horse meat, and it never has gone back to beef.

Rationing Hit the Menagerie, Too

Rationing is difficult to explain to a gorilla. But the bride-in-name-only of Gargantua, Toto by name, raised in luxury and taught to eat filet mignons on the palatial Habana estate of Mrs. E. Kenneth Hoyt, had to forget all this and become used to a vegetarian diet again, the gorillas' natural food.

Zoologists who study comparative animal intelligence always start with the chimpanzee. They usually place the orangutan in second place, and follow with the elephant, but they reserve a flexible position for the gorilla because so few have lived to any considerable age in captivity or have been studied as intensively as chimpanzees. Their innate savagery also limits the chances of gaining more knowledge of them.

Until an air-conditioned cage was constructed by the master wagon craftsman, Bill Yeske, for Gargantua, the Ringlings lost three gorillas at an early age, soon after their circus career had begun. Gargantua has been a circus gorilla for a decade now and, except for illnesses which might be expected in that span of time, has thrived in captivity.*

There are several other gorillas in the United States, but Gargantua, one of the biggest and most savage, is a personality; he has captured the imagination of the public; he has had circus publicity men at his beck and call since 1938 (page 293).

Everything he does is news. In winter quarters in 1938 he tried to murder his keeper, Richard Kroener. This incident occurred when the man stood too near a temporary cage in which the gorilla had been placed while his air-conditioned cell-block-on-wheels was in construction.

Kroener knew the gorilla's arm reach was six feet, and he kept six feet from the cage. One day, however, as he reached up with his boat hook and opened the window near the roof of the little building that housed the gorilla cage, a hairy paw encircled his free arm and lifted him as if he had been a pygmy.

Gargantua had spread the bars of the temporary cage enough to permit his shoulder as well as his six-foot arm to go through. Pressed savagely against the steel bars, squeezed breathless, and painfully bitten, Kroener beat the gorilla on the head with the pole until the murderous ape dropped him to fight the weapon.

When Gargantua got pneumonia and nearly died during a New York City engagement, several tanks of oxygen released in his cage, large doses of sulfa drugs, and four bottles of citrate of magnesia (the medicine given in his food) saved him.

Gargy is strictly a wrong-side-of-the-track guy. He grew from babyhood in New York's back yard across the East River. Brought to a private zoo there as a tot, he finally became so big and so savage that his owner was glad to sell him to the circus. Promptly Henry Ringling North changed the gorilla's moniker from "Buddy" to "Gargantua."

Gargy eats seven or eight times a day. Beginning with a quart of milkshake into which has been mixed liver extract, he later devours a dozen apples, oranges, bananas, a basket of lettuce, carrots, and other vegetables, some dark bread, and a pound of broiled liver.

Sometimes the elephants beg for the lettuce and carrot scraps that are swept from his "table," but, once they get the scent of the gorilla, they refuse it and even stamp on the food. These are Asiatic elephants, strangers to African animals, including the gorilla.

The increasing savagery of this gorilla runs true to form in all the great apes as they grow older. Even chimpanzees and orangutans are dangerous as they add years and size, and most of the monkey family follow the same course of temperament.

Gargantua Is Hard on Blankets

At night, Gargantua rolls up in a cheap cotton blanket, which he rips to shreds next morning. The circus-blanket mortality is high, but there is no curing the gorilla of this habit. It seems deep-seated in his jungle ancestry, where these large apes of equatorial Africa make their nests usually at the base of vine-draped trees and quit them in the morning, apparently never sleeping twice in the same place.

Gargantua gives evidence that he hates mankind with a consuming passion, but he did learn to like his first keeper, Kroener, after a fashion. He still looks for Kroener, but he looks in vain, for the pleasant, warm-hearted little man who raised the "terror" died from natural causes several years ago.

People believe that sea lions are born

* See "Man's Closest Counterparts," by William M. Mann, National Geographic Magazine, August, 1940.

equilibrists; yet they require more patience and skill in educating than any other circus performer. In fact, these prima donnas of the big top are so temperamental that the trainer must be careful even not to scold them; they may pout for a week and refuse to do their tricks! But they like their work and are as applause-conscious as any Broadway actor.

Roland Tiebor, sea-lion authority, had a faithful performer named Sparky. Sparky got old and stiff, but insisted on keeping up his work in the ring. He would even gallop in and push aside newer sea lions which had been taught to do some of his old routine.

Sparky Was a True Trouper

While the Tiebor act was on tour in theaters during the winter months, Sparky could find his way from the dressing rooms to the stage unfailingly, often through labyrinthlike passages; yet Sparky was stone-blind.

Animals often are trained in foreign languages and have to learn almost literally to translate their instructions. If they have been trained in German cues, and then wind up with an American circus, their trainers must patiently say the English equivalent of each German command until the animal actor learns his new language.

Of course animals can be trained to respond to surreptitious movements of a trainer's hands or to some slight shift of his body as well as to spoken command, and the silent cue is the more mysterious, especially if used in an act which implies that a pony can perhaps count or read.

Circus keepers learn to love their animals, and often a man whose charge has died will be so lonely that he will leave the show.

Babies always cause excitement in the realm of the big top. When circus veterinarian J. Y. Henderson had to find a wet nurse for three baby leopards their mother refused to accept, a cat was the first choice; but after a few days the requirements of the young savages exceeded the capacity of tabby. A canine mongrel named Spot came to the rescue and raised the leopards until they could be weaned.

Elephants seldom are born in captivity, and not more than seven have been foaled in this country since the first "ponderous pachyderm" arrived at Salem, Massachusetts, in 1796. None lived a year, and the demise invariably was blamed on bad diet. The mothers didn't nurse them, and baby formulas had not then reached the standards which some animal men today believe might be the answer to the baby elephant problem.

Imported from Asia or Africa at an early age, circus elephants are as a rule strangers to peanuts until they learn to like the goobers of this country.*

Naturally healthy, circus elephants nevertheless are difficult patients when ill. They detect medicine in food and refuse it. They chill easily, having a slow circulation and a heartbeat of but 28 to the minute when standing and 35 when lying down.

The elephant's trunk is its nose. Into it water may be sucked part way and then squirted into the mouth. Water is not swallowed through the trunk, as many spectators conclude erroneously.

Elephants are shaved with a blowtorch. The flame does not burn their skins; it merely tickles and thus pleases them.

The skin is thick but sensitive, and insects bother the great beasts in hot weather. Dirt thrown on their backs helps keep off the pests.

While the wild-animal acts dealing with big cats, especially with mixtures of lions and tigers, will call out all the courage and perspicacity a man or woman can command, the playful-looking bear is the most dangerous.

"Never make a pet out of a bear; he'll be cute as a baby and a murderer when he grows up," is the admonition of the people who risk their lives in the steel arena.

All circus cubs are apt to be pampered and so completely familiarized with mankind that they lose all fear of the trainer and attack him confidently when grown. Jungle-bred cats are the preference of most trainers.

Ruth the Elephant Always "Cute"

On a lot in Atlanta in late October, one of the best of elephant troupers, Ruth, goes placidly about minding her own business. This consists of pushing wagons, hauling heavy equipment, and serving as the power for the block-and-tackle raising of the huge big-top center poles.

She wiggles and executes intricate little dance steps. She knows she's cute. She packs more interest wallop for the customers when she is working in harness with her glamour down than she does when she's dolled up for the grand entry. Here in the morning, hard at work, Ruth is the circus elephant equivalent of America's housewife at work in her kitchen, and she has innate showmanship enough to know that she is a pleasant sight to behold.

Between tasks she delights the crowd by nudging a little girl whose hand tightly clasps a bag of peanuts, pulling up little tufts of grass, getting herself a drink by turning the

* See "Nature's Most Amazing Mammal," by Edmund Heller, NATIONAL GEOGRAPHIC MAGAZINE, June, 1914.

spigot on a water truck. All this in the absence of her keeper, who is busy elsewhere at the moment. The behavior of the big show's elephant herd leader epitomizes the confidence and dispatch with which all members of the circus family go about their tasks.

The circus is color—a wild, kaleidoscopic whirl of color in the course of a two-and-a-half-hour performance, and color is an integral part of its whole existence.

Circus Signboards Signs of Spring

Bright ribbons in the coiffure of springtime are the brilliant pictures of snarling wild animals, tumbling acrobats, pretty circus girls, and laughing clowns that quicken the pulse of kids from eight to eighty. These are the trumpet notes of spring expressed in color; and yet the men who bring about this magic on barns and fences and in store windows act so inconspicuously that their "art work" seems to have been executed by sheer magic.

Bernell

Gargantua Hates the Human Race

Though the giant gorilla has been with the circus for ten years, he is still an untamed savage (page 291). In the opinion of "Bring-'em-back-alive" Frank Buck, the brute has the strength of 20 men; he demonstrated his prowess by jerking 17 off their feet with one hand in a tug of war.

They wear no spangles, the knights of the bucket and brush; yet some of the chances they take on the lashlines and lofty ladders while tacking banners to tall brick buildings are as hazardous as the work the acrobats and aerialists do under the big top.

They take a mouthful of big tacks, the kind that number less than 200 to the pound, and spit them at magnetized hammers. They drive them through their thumbs if they are careless and inevitably they swallow some big tacks. The remedy for such a gastronomical catastrophe is to eat the inside of a loaf of white bread and keep calm.

Circus billing has become increasingly difficult in recent years because of the decrease in locations and the reluctance of some property owners to have the hard-to-get-off posters on their buildings.

A favorite sales argument among billposters is to imply that they have miraculous "30-day paste" that disappears in a month and permits the posters to fall off by themselves, and that they use "chemically treated tacks" that disintegrate after a time.

Poster Fights Now Tame

There still are some opposition fights among billposters, but not on the grand scale that once made a circus season a series of near-lethal engagements between the rival billers.

Today, there are not so many circuses on

the road. Billposters battled it out with brushes, buckets, clubs, and whatever was handy in the "good old days" before the boys woke up one fine morning in 1929 to learn that John Ringling had bought out all his major competitors and that, henceforth, the billers would have much less reason to fight each other.

Tricks in Billposting

All was fair in circus war. A favorite sabotage was to sneak yeast into the paste barrels of the enemy billposter. Soap was even better, because its presence would not be detected. The posters would stick to the buildings and fences, but when they were dry, long after the men had gone, they would peel off.

Show owners usually took an opposition whipping good-naturedly, often taking the long, sagacious view and trying to hire the very men who had bested them.

But when two rival crews hit town together and tangled, no holds were barred. Men were taught to beat their antagonists on arms and shoulders with hickory-handled brushes. This was not so much to save their heads as to cripple their arms so that they couldn't post bills the next day.

During the war the Big Show's posters carried war-bond stickers. In response to requests by the USO for circus posters with which to brighten canteen huts of the Aleutians and the South Pacific and Africa, the circus put date strips on the posters so that they read: "COMING SOON . . . TO TOKYO AND BERLIN!"

Circus Folk Come from Everywhere

Circus people come from all countries and from all over the world. According to circus personnel boss, Pat Valdo, the best American circus girls come from farms. They are healthy, pretty; they like animals and are used to being out-of-doors and don't expect circus life to be easy.

Even in the best of the big shows, it's mud and rain and intense heat and cold and hardship in general. That part of outdoor show business hasn't changed much in a hundred years.

Some of the most interesting people are employed in the circus side shows (Plate XIV), and for many of them, deformed or otherwise misfitted for life in a so-called normal world, the existence of anything so bizarre as a circus museum for human curiosities is a fortunate haven.

There they belong; there they are not misfits; there they are paid and feel useful, and make their friends, and live in a gay, wonderful world where their very abnormalities are considered something of an asset.

Most circus freaks are married; a famous bearded lady had several husbands in her colorful career. Today, the circus world has no exponent of this branch of freakdom, so far as I know, although Fred Smythe, Ringling's side-show boss, says he gets letters from women (mostly in Los Angeles) who claim they can grow a good beard if he will guarantee employment.

Sword Swallowing Is Easy

Anybody can learn to swallow a sword—anybody, that is, with the patience and the inclination. It is a matter of tilting the head back so that the esophagus is in a straight line. The instruments are not very sharp.

Swallowing a lighted neon tube is the most spectacular trick in this category, but unusually dangerous. The glass tube is apt to shatter without warning and kill the performer, but the fact that spectators can see the lighted tube clearly inside the throat makes this demonstration what circus side-show entertainers call a "natural."

Long before the days of recorded music and radio broadcasts circus bands played the best music heard by people over large areas of the country. Circus costumes were sheer magic to the outlying districts and circus animals a firsthand zoology lesson. Its Ubangi savages with the saucer lips and the Burmese women with necks elongated by the application of brass rings from early childhood were anthropological oddities.

A recent disappointment occurred when one of circusdom's chief jungle scouts, Howard Y. Bary, discovered that the widely heralded Watussi savages used an anthill or a similar small mound for a take-off when accomplishing their seven-foot jumping feats.

Of course danger and appeal-to-customer go hand in hand under the big top. A present-day campaign to compel use of nets under all aerial presentations is not likely to get anywhere.

Traditionally, the only aerial acts that use nets are the flying trapeze or casting presentations, during which people actually leave all rigging and hands of partners and momentarily "fly" free of such protection. Frequently they drop into the "safety net," which is safe in name only unless the performer knows how to land in it. They try to hit the net on their backs or heels. Many a neck has been broken by a wrong fall, and falling safely is one of the first things a fledgling circus trapeze performer must learn.

One aerialist, Arthur Concello, bounced

from the net into ownership of a small circus and, presently, to the general manager's post of the Ringling show. Few performers ever become owners or managers.

In more than a decade only one death from an accident has befallen a performer in the case of the biggest circus. By the time a trouper has become skilled enough to appear in the "big time," he probably has reduced hazards to a minimum. The circus doctor has many more patients among the workingmen who handle wagons, seats, props, etc., and can get hurt in a great many ways every day, than among the actors.

Circus daredevils, when they do suffer accident, are apt to meet misfortune while doing an easy trick or maybe none at all. Circusdom's queen of the air, Lillian Leitzel, fell and died when an iron ring in her rigging became crystallized. Fritzi Bartoni fell out of a trapeze while just swinging, and lovely Victoria Torrence fell to her death after the hard part of the act was over.

The Alzanas Survived a Bad Fall

The inimitable Harold Alzana and his sister tumbled from the high-wire in Miami last November while doing what most circus people thought was a comparatively easy trick. Their father, ever present and standing under the rigging, broke their fall—and his neck—but all recovered.

Alzana had another fall, in Marion, Ohio, which illustrates the point of accident due to carelessness rather than to the extreme intrepidity of the act. He had gone aloft to test his cable before the matinee and grabbed a rope to descend hand-over-hand. The rope he grabbed without taking the trouble to examine was loose and not tied off, and it came down as fast as he did. He hit his back on a ring curb, went to a hospital, and was back at work a few days later.

Circus people work long past the age most spectators figure is the probable retirement time. Two years ago, 67-year-old Pop Otari went back into the family aerial act with his three sons and a daughter to replace the boy who had gone to war, as had the other boys in the act, and had been killed on the beaches of Normandy on D Day.

Circus disasters always are spectacular because they take place against a colorful background. The mass death of elephants from arsenic poison, burning of the wild animal menagerie tent, and the terrible fire at Hartford, Connecticut, in 1944, all attracted wide attention.

Yet the miraculous thing about the peripatetic world of red wagons and billowing big tents is that something of this nature doesn't happen more often.

Escape from disaster seldom attracts much attention. If the famed Wallenda troupe of high-wire performers had been injured when thrown from their high perch in Akron some years ago, the world would have known about it promptly, but their good fortune in escaping injury was not news by accepted standards.

The troupe was doing a three-high human pyramid with two men balanced on the slender cable, a pole across their shoulders, and on the pole a chair with a man standing on it and a girl atop his shoulders. It was 10 o'clock at night and outside the big top there was a lot of activity while the show was being loaded.

A four-horse hitch took a wagon past the mud block, an arrangement of stakes where the high-wire was anchored, and caught a spoke in it. It jiggled just enough to upset the Wallendas, and the pyramid collapsed, quietly and completely.

The understanders on the bottom of the group grabbed the wire with arms and legs and hung on. Karl managed to hold on with his hands and swung to grasp Helen, scissor-fashion, between his legs as she fell past him and headed for the ground 35 feet below. Nothing happened beyond this except that, once safely grounded, Helen fainted from strain.

Movie "Greats" from "Big Top"

A not inconsiderable number of movie great claim the land of the big tops for their alma mater, and numerous circus folk have taken "postgrad work" in Celluloid College. Wallace Beery was an elephant shepherd before the movies got him, and Fred Stone was a circus clown in the early days of his career. Will Rogers was a circus cowboy before he punctuated his rope spinning and gum chewing with monologue. Billie Burke was born to the Ringling show in which her daddy was Billy Burke, the clown.

Unlike its sister, the stage, the circus has no callboy to notify the actors when their turn is coming up. Instead, they simply keep one ear tuned to the circus band, which plays the same numbers for the same acts every performance, and thus get into the big top on cue.

Circus music, one of the hardiest of the elements of the big show, has resisted all attempts at fundamental alteration and seems to be going full-blast with brass wide open. True circus fans applaud appreciatively.

The high priest of circus music is the veteran bandmaster Merle Evans, for nearly 29 years leader of the RBB&B band. Evans

has not been off the stand during a two-and-a-half-hour performance year in and year out, always standing up and leading the band with his left hand while tooting a hot cornet in his right. He plays the music he caught hold of as a kid who ran away with a carnival in Columbus, Kansas, and built into a crescendo strong enough to carry him to the bandstand in 1919, the year the combined Barnum & Bailey and Ringling shows made their debut as the "Greatest Show on Earth."

Like the seafaring virtues of the Captain in HMS *Pinafore*, Evans's record of never having left the bandstand during a performance has to be amended to "well, hardly ever."

Once, when ptomaine poisoning struck the troupe in the Nation's Capital and had the circus personnel dropping like autumn leaves all over the lot, Evans did leave the band because of acute nausea. As he stumbled out into the circus backyard toward the dressing tents, he heard the band falter on a high note. He forgot his illness long enough to hurry back and finish the show, a damp towel wrapped around his neck.

Movies, especially talking, natural-color films, and radio entertainment have become great competitors of outdoor show business. They helped wreck vaudeville and Chautauqua entertainment, and almost no circus operators have kept pace with the pull which these present-day mediums have for children.

A lot of circus business has moved indoors, where operators with no physical property such as wagons, tents, and seats to cut down their profits, and no weather to fight firsthand, book a program of circus acts and sell them to organizations such as the Shrine, American Legion, lodges, and church societies.

The warning bell for outdoor shows has sounded in several large cities where the success of these winter auditorium circuses greatly cuts the profit which the traveling outdoor circus may expect in those cities the following summer.

Winter Quarters in Florida

When November paints the Carolina hills with red and gold and late autumn brings chill nights to Dixie, the Greatest Show on Earth packs itself upon its trains and heads for winter quarters in Sarasota, Florida.

It stays there for about four months, preparing for next year's eight-month tour.

Although thousands of Florida visitors are permitted to go through winter quarters, the circus gives no regular exhibitions while acts are rehearsed, new tents made, wagons and floats rebuilt, and the hundred railroad cars go through the shops.

New seats and other equipment are fashioned and everything is repaired. For all performers, animals included, a costly new wardrobe is created.

The circus is goods—76,000 yards of canvas in 1947 for the biggest show on the road. The canvas is new every year and, even though ragged, flameproof at the end of the tour. The flameproofing method was widely used by the United States Army and the Navy during the recent war. The flameproof canvas weighs more than the old canvas, which was merely weather-proofed, but it doesn't soak up so much water. The old canvas used to triple its weight when wet.

Costumes Costly

The circus wardrobe has become an increasingly important item of sales appeal in the last decade, during which the circus has dressed up to meet Broadway (Plate XI). A circus wardrobe boss has a task far and away tougher than the wardrobe mistress of a theatrical show, for the circus does twelve to fourteen performances a week and in all kinds of weather. Ringling's wardrobe chief is a man, Joe J. McCarthy, the first of his sex to do this work, and he has problems unlimited.

More than a thousand costumes for the circus performance—for people and for animals—present a special problem.

Circus styles have changed a great deal through the years, and the old leotards and tights of grandpappy's circus days are now marvels of brevity, but this was inevitable.

Not only in show business but in street clothes and evening attire women wear less and pay more for it. A wardrobe for the biggest circus has cost annually a quarter of a million dollars for at least the last seven years.

Circus women, despite the vagabond character of their lives, lean toward domesticity and they spend much time knitting and sewing. Antoinette Concello, one of the best flying trapeze girls who ever ascended into the vast dome of the big top, once made a costume that barely covered her trim figure but sparkled with 40,000 individual sequins which she had sewed on in her spare time.

As the circus moves over the map, the life of its people who are not engaged in the never-ending task of putting up the tents and other rough work approximates to a large extent that of other people in less spectacular pursuits. They shop uptown and go to the movies when possible, attend church on Sunday, and do a little cooking on the railroad trains after the night show.

The comic threads in the moving mosaic of the circus performance are the clowns. They

Kodachrome by Harold E. Edgerton

Like a Bolt of Lightning, a High-speed Flash Lights Up Action on the Trapeze

In this newest method of color photography, the brilliant flare reveals faces even in the farthest balcony peering down on the artialists, the Rose Sisters, of Ringling Bros and Barnum & Bailey Shows. When the camera was snapped, a magic wand of photoelectric cells set off five unconnected flash tubes to illuminate the scene.

Kodachrome by Edwin L. Wisherd

In This Aerial Cancan, 60 Girls Whirl on Ropes Swung by Top-hatted Partners. The Act Encircled Boston Garden Arena

A Wistful Pied Piper Watches Prince Charming

In bobo rags Emmett L. Kelly sees Cinderella's Prince Charming ride by.

While Nets Are Spread, Clown "Walkarounds" Fill In

Felix Adler sees through a buttonhole far below his false head and shoulders.

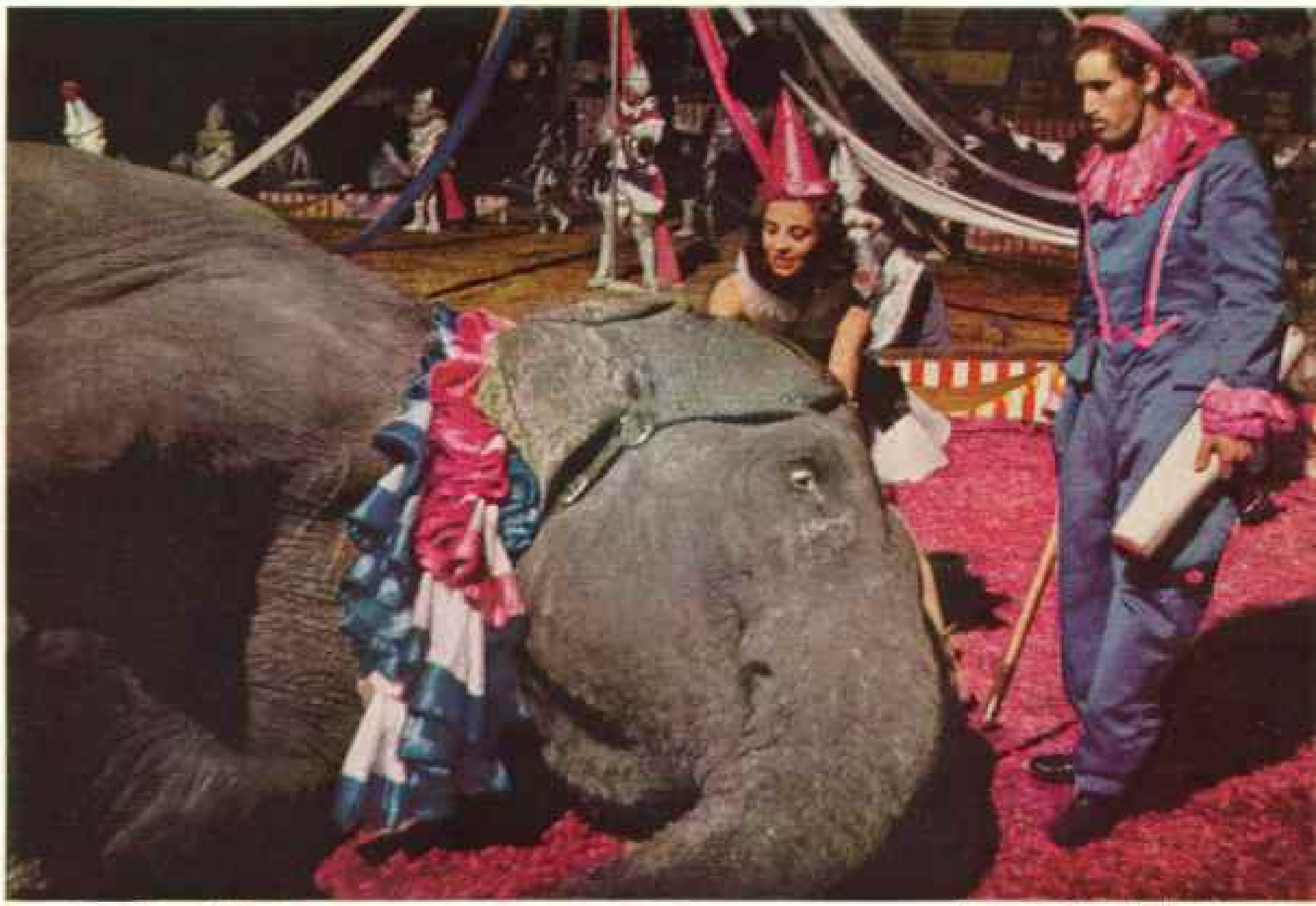
Kodachrome by Harold E. Edgerton

End of the Act: Unicyclists Dramatically Break Their Human Pyramid

Even anxiety is recorded on the faces of the acrobats as "understander," the bottom man, checks the cycle and tosses "topmounter" and middleman gracefully to the floor.

Minus Half a Hip Torn by a Tiger, Trainer Proske Still Works with Giant Bengals

"It was my fault for making the cat act when he had a headache," he explained after a near-fatal mauling.



Kodachromes by Harold E. Edgerton

Making an Elephant Lie Down on Cue Requires Tact and Patience

Mountainous prima donnas will do the stunt without objection at their convenience, but Laura May Petrello and the keeper use persuasion when her mount gets temperamental. Elephants remember old tricks for years.

Kodachrome by Harold E. Edgerton

Kodachrome by Edwin L. Wisherd

Banking Nicely, Adam Makes a Fast Turn—A Canine Clown Takes a High Hurdle

To a chimpanzee good balance and co-ordination come naturally. He is easily taught to skate and ride bicycles. Most funnymen have pets, usually dogs, ducks, pigs, and geese. Dogs are often vagabonds that joined the circus.

Kodachrome by Edwin L. Wisherd

A Hilarious Hit, the Water-squirting Camera Was Taken to a White House Party

Clown Paul Jung, who designed and built the spitting "birdie," has fashioned countless mirth-provoking props in the course of his long career. Fans always recognize clowns by their facial make-up; it never changes.

Kodachrome by Harold E. Edgerton

To the Tightwire Performer the Rigger Behind the Stand Is All-important

The man who controls the slender cable on which Lola Dobritch cycles is in constant danger of being slashed if the slender thread breaks and coils back. He controls the tension at the direction of the artiste.

Kodachrome by Harold E. Edgerton

Even the Sudden Light for a Speed Shot Does Not Disturb Dobbin

Broad-backed Percherons such as this reliable mount in the Bostock-Seibert routine are trained to gallop precisely the same number of paces each time around the ring. On their steady gait depends the safety of the performers.

are mostly underpaid, overworked, and underappreciated, but theirs is a rich heritage and they perform to the obligato of children's laughter. In this respect, at least, they consider themselves well paid.

Their ancestors are the comics of the Greek theater, the court jesters of the Middle Ages. Joe Grimaldi was so famous that his memoirs, edited by Charles Dickens and his father, in its first edition outsold the famous *Oliver Twist*.

Grimaldi, while a theatrical rather than a circus clown, nevertheless achieved a sort of immortality in the circus because his name is the sobriquet for clowns in general. They are called "Joeys" even now, after Joe Grimaldi.

Some clown routines are good forever and, like other standard ingredients of the circus, should not be tampered with lest people bringing children for their first circus attendance fail to show them some of the identical thrills which they had experienced long ago.

Surely nobody would want to discard the poignant pantomime of Charley Bell and his little fox terrier with its faked rabbit ears, and the hunting scene in which the "rabbit" pretends to be shot and then falls out of the clown hunter's bag and trots happily and secretly behind him.

Circus clowns never seem so happy as when they are entertaining shut-ins in a crippled children's ward or in some such place off the beaten path of the red wagons. For such excursions they have little time, but they seldom turn down a request for a hospital show. Clowns appear ten or more times in the course of a performance and do it every afternoon and night except some Sundays when the circus is traveling. They wear the same make-up throughout the show, but change costumes frequently.

A circus clown can get his intricate make-up on in ten minutes if rushed, but he likes to take half an hour. He can do it without a mirror if he has to when an emergency arises. He uses pounds of powder and cold cream and red paint and other cosmetics on a tour, yet his complexion seems to thrive.

I wrote a circus article for this Magazine 17 years ago, after I had trouped with the biggest circus in the world for one season.* Since then I have spent most of my years with this same attraction. Some of the pristine shine of the first experience has worn off, but still, when I watch the miracle of circus day, I feel like the awestruck rustic who beheld a giraffe for the first time in his life and remarked, "Heck! There ain't no such animal!"

* See "Land of Sawdust and Spangles," by Francis Beverly Kelley, NATIONAL GEOGRAPHIC MAGAZINE, October, 1931.

Circus Action in Color

By HAROLD E. EDGERTON

ABOUT nine years ago, photographers began to use special gas-filled tubes for motion-stopping flashlight photography. These lamps, entirely different from conventional photoflash lamps, produce a brilliant flash, brighter than sunlight, of extremely short duration. Photographs can be made in as little as one-millionth of a second.

The tubes, resembling coiled neon tubing, were originally developed in 1931 by associates and myself for study of moving machines. They have two big advantages over ordinary flashbulbs: They can be used over and over again, and the extremely high speed makes it possible to "freeze" motion of subjects, such as flying birds, hitherto usually recorded on film merely as blurs.*

For years Boston Garden, a huge indoor sports arena, has been a challenge in my photographic experiments. Its vast areas, affording little or no reflecting surface, absorb the light like a void, and ever-present dust and smoke add to the difficulties.

I attempted several times before the war to get color photographs at a Garden ice show by massing all the flash equipment at my command in a box at the edge of the ice. Although close-up pictures were recognizable, the over-all effect was poor because of the ill-defined background and limited coverage.

Night Aerial Photography

At the Massachusetts Institute of Technology my associates and I developed during the war a large, xenon-gas-filled quartz flashtube, the FT-617, for night aerial photography and reconnaissance work.

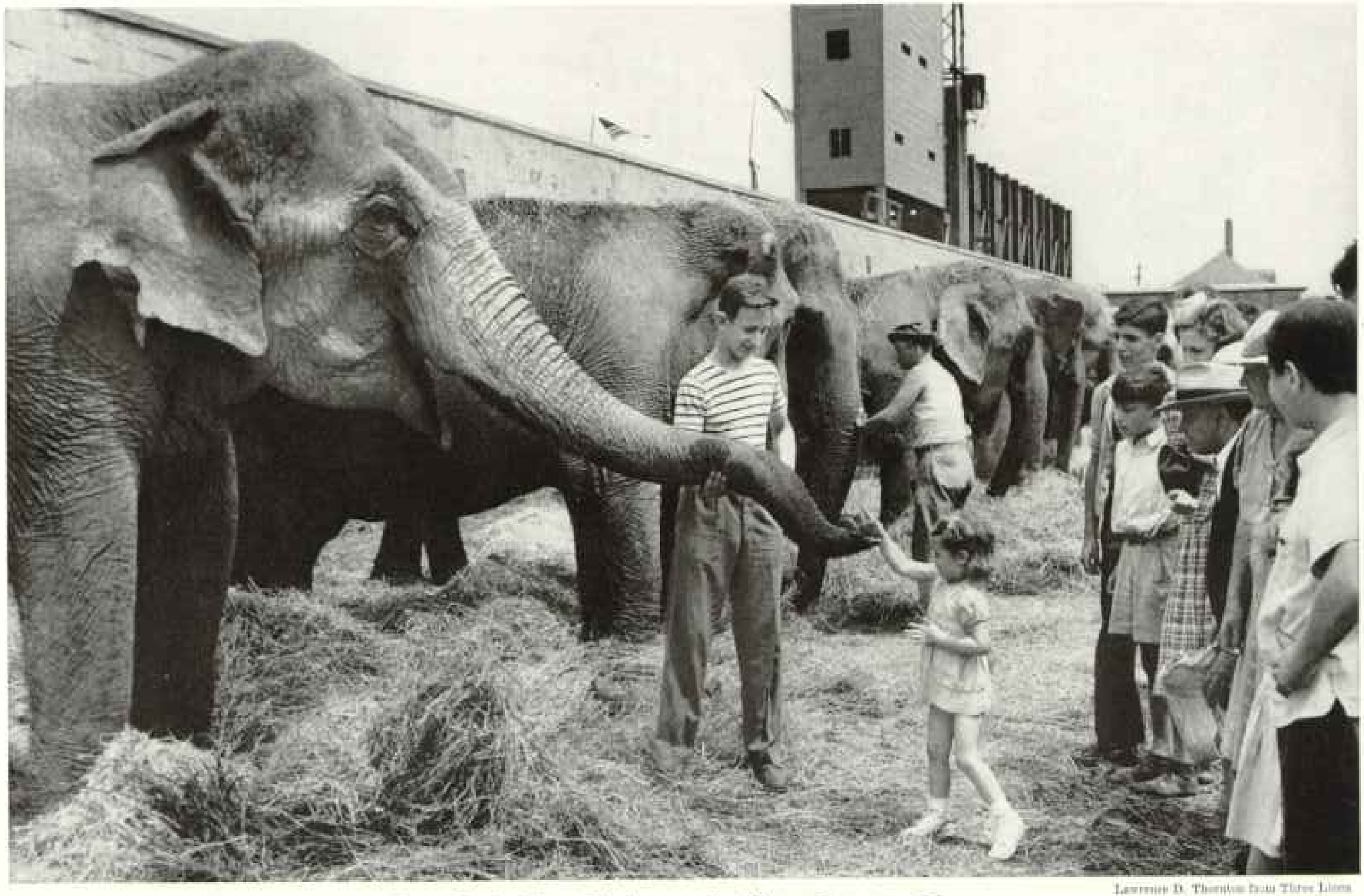
These tubes, carried by airplane, furnished

* See "Hummingbirds in Action," by Harold E. Edgerton, NATIONAL GEOGRAPHIC MAGAZINE, August, 1947.

Staff Photographer Edwin L. Wisherd

To Photograph the Circus in Color, Dr. Edgerton Assembled the Largest Set of Flash Equipment Ever Used at One Time

Beside Dr. Harold E. Edgerton (right) stand his associates, right to left: Fred Barstow, Bigelow Green, Irving Eastman, and George Bierer. Value of the ponderous one-and-one-half tons of equipment totals $20,000. Small flashtubes, in reflectors at upper center, flashed at a speed of 1/1000 of a second, the two larger lamps at 1/500.



Lawrence B. Thornton from Three Lions

Young Lady Meets Elephant as the Circus Comes to Town

Unloaded from the trains in the gray dawn, the "ponderous pachyderms" are first fed and then put to work setting up the tent city (page 292). In big-show parlance they are called "bulls," whether male or female. They are always looking for peanuts even in the back lot.

sufficient light for the taking of picture sequences from an altitude of half a mile or so. The technique was used extensively in the European theater of war and over Burma.

Shortly after the war I rigged two FT-617 flashtubes in the balcony of Boston Garden in an attempt to obtain color photographs of the circus.

The photographs proved encouraging, but even they lacked sufficient lighting in the background, because lights were not aimed from the camera position and because color film is much slower than black-and-white.

Last May, with the expert assistance of Edwin L. Wisherd, chief of the photographic laboratories of the National Geographic Society, I repeated the experiment with greater success.

The Raytheon Manufacturing Company had just completed some intermediate-size flash units which they made available for our use. Hanging the reflectors of these units about 60 feet above the spectators to insure satisfactory over-all background lighting, we succeeded in taking some of the accompanying pictures of scenes in the Ringling Bros and Barnum & Bailey Circus during its stand in Boston Garden (Plates I-VIII).

The light given off by a xenon tube has a color quality remarkably similar to that of daylight. For this reason, daylight-type color film can be used with xenon lighting by using a light filter that absorbs the slight excess of blue. Quartz is used instead of glass in these large flashtubes to withstand the violent heat shock which occurs when the energy is flashed momentarily in the tube.

Ton-and-a-half of Equipment

A few facts about the equipment used may be of interest to photographers. At the circus we used: 2 flashtubes, type FT-617, each of which flashed from 1200 microfarads at 4000 volts (9600 watt-seconds), and 6 flashtubes, type FT-503, each of which flashed from 350 microfarads at 4000 volts (2800 watt-seconds).

The total weight of the equipment, including the condenser banks which supplied the power, was about a ton and a half.

Each of the FT-617 tubes in a 30-inch reflector had a guide factor of 250, when used with daylight Kodachrome film and a CC15 filter. This means that a photograph at F 5.6 could be made with the light about 45 feet from the subject. Most of the pictures were made at F 4.5 to F 8. The total energy used for each flash was 36,000 watt-seconds.

For purposes of synchronization, the camera shutter was set at 1/400 of a second, though the flash itself lasted only about 1/500 of a second.

We did not light the entire circus group simultaneously. First, we worked on the center ring by locating the two large reflectors 55 feet above the ground on the edge of the balcony, some 75 feet from the center and about 50 feet apart. Three of the smaller reflectors were hung 60 feet above the crowd on the opposite side from the camera, and these were directed downward and backward to illuminate the spectators. Other reflectors were placed on the floor to give emphasis wherever needed.

Moving the Reflectors

Between performances we moved the reflectors so that we could cover additional subjects of interest. Since the circus was in Boston from May 13 to May 21, and with matinees for most of the time, we had ample opportunity to pick our shots. One or both of us attended virtually every performance.

One would think that the intense flash of the xenon tubes would bother performer and audience. This is not the case, for several reasons. First of all, the flash is of very short duration and of a blue color, which is not so visible as the harsh light created by the common flashbulbs. Second, the xenon flashtubes in this instance were located high in the Garden, so that they were not within the line of vision of any of the people. Actually, the arc spotlights cause more annoyance than the flashtubes.

The principal disadvantage of the electric-flash system is the trouble experienced in transporting the equipment and connecting it. However, once it is in position, any number of photographs can be taken at intervals depending upon the charging time of the condensers.

During the shooting of the performances, some 300 35-mm. Kodachromes were exposed, in addition to the many 4x5″ and 5x7″ films that were made.

Phototube synchronization (simultaneous tripping of lights by photoelectric cells) was employed, so that the camera could be used at any position in the Garden.

Circus workers were most cooperative about accommodating our equipment where space on the sawdust was at a premium. Only occasionally did we get tangled up with an animal cage or some other piece of weird equipment.

Nevertheless, when we take apart our flash equipment for overhaul, red sawdust still sifts out, to remind us of the time we photographed the circus.

Kodachromes by J. Baylor Roberts

"It Was Just Like in the Storybook, Almost," Says the Circus Cinderella (Plate XVII)

When Theresa DuHaime, from New York's Bronx, joined the circus, she had no dream of starring in the principal spectacle. She appears also in the aerial ballet and other fancy-dress acts. Elephants draw her golden chariot.

Kodachrome by Edwin L. Wisherd

Lying Under an Elephant Isn't So Dangerous, for It Is Supported by the Elbows and the Girl Can Prod It with Her Spiked Stick

Kkrachrome by J. Baylor Roberts

Circuses Give 12 to 14 Shows a Week, So Wardrobe Wagons Roll Right into Dressing Tents to Make Quick Changes Easy

The Midway Is a Magic Lane That Leads into the Realm of Make-believe

Always a set pattern is followed in placing the parts of the big show. The ticket wagons and refreshment and novelty stands are lined up on one side of the main entrance.

Reproduction by Willard R. Culver

Down Its Tanbark Path Walk Millions of Americans in the Course of a Circus Tour

On the other, the side-show tent displays its strange posters, and barkers harangue the crowds. The menagerie tent (background), where wild animals are displayed, will disappear completely before the last show is over.

Kodachrome by Willard R. Culver

"They Wiggle Like the Jelly on Your Dinner Table!" Side-show Hawaiian Dancers Perform 30 Times a Day

Clowns and Pageant Performers Await Their Cues in the Circus Yard

No fastidious housewife has a more difficult laundry problem than clowns, who must keep a white wardrobe fresh and spotless and who don't like to trust it to a laundry. Clowns take pride in the originality of their costumes and usually design their own.

Fred Hanlon and Charley Bell even look after the linen for their trick dog, Peanuts.

The wardrobe department takes care of circus-owned clothes worn by Vicki Bakken and Johnny Burnside (right).

Horses and elephants gain or lose weight quickly, and keeping their trappings in proper fit is a headache.

Kodachrome by Willard R. Culver

Aerial Aerobats Keep Their Nerve Up, Their Wrists Dry

The Bebees of the flying trapeze tape and powder their arms, for they catch wrists, not hands, to avoid falls.

Illustrations by J. Baylor Roberts

"Snow White" Watches While Her Dwarf, "Happy," Has His Lips Retouched

Paul Jung, creator of many circus-clown stunts, designed the papier-mâché heads for this storybook group. Each funnyman sticks to his own clown type—pathos, comedy, tramp, Pierrot, rustic, etc.

Photochrome by J. Horace Roberts

To the Baby Bengal, Foundling, Even by Cinderella, Is Distasteful

In another month the little tiger will be too big to handle. Trainers prefer to work with jungle-bred cats, for those born in captivity may have lost their natural fear of man.

Kodachrome by J. Baylor Roberts

To Mount Their Elephant Steeds, Circus Girls May Climb Ladders or Be Lifted and Swung Aboard by a Friendly Trunk

Elephants at the right are wearing butterfly wings and antennae for their role as part of a hitch of six that pulls Cinderella's chariot. A rogue, or bad elephant, appears occasionally, but is more apt to injure a keeper than a stranger. Most circuses employ only female elephants; they are more tractable than bulls.

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Clowns Are Kind to Animals—

In the wild-animal menagerie voiceless Edith, the giraffe, is Felix Adler's favorite.

Oil painting by J. Baylor Roberts

and to Pretty Circus Girls!

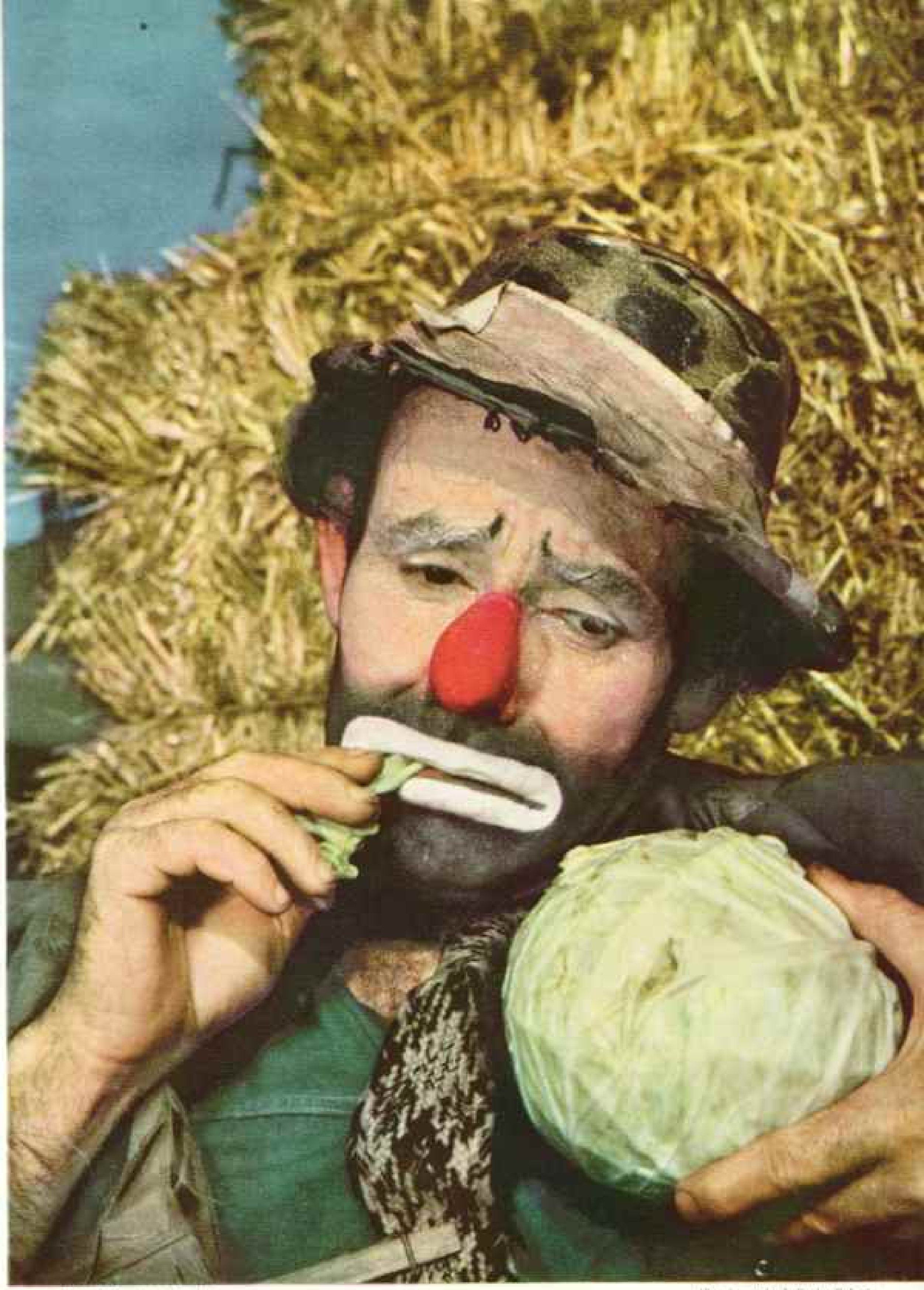
Paul Jerome and Lou Jacobs give Janie DeYoung a lift across a muddy lot.

© National Geographic Society

Ektachrome by J. Baylor Roberts

The Prospect of a Banking Career Never Made Hurry Dann Smile Like This

He ran away from his father's business in Missouri and became a typical chalk-face clown. In his spare moments he teaches school for circus children, especially those of newly imported troupes that speak no English.



Illustrations by J. Baylor Roberts

Melancholy Kelly Impersonates a Character He Created as a Comic-strip Cartoonist

Though he dresses in rags and his make-up seems smeared on, Emmett Kelly works meticulously to create a sad, wistful, and always hungry look. When the weather is hot, his putty nose begins to run.

Kodachrome by J. Baylor Roberts

A Priceless Relic of Bygone Circus Parades Is the Famous Ringling Chime Wagon

Its bells, cast in 1892, rang through the streets of America until 1920. It is used now only in the show's tented spectacles.

Chimp Mirrors His Trainer's Look

Fond of applause, chimpanzees love to imitate their human friends.

Photograph by J. Barber Roberts

Oldest Clown, Johnny Tripp, "Doubles in Brass"

In the spectacle he plays the carillon. Comics change costumes, make-up never.

Kodachrome by E. Baylor Roberts

"I Got in It When I Was a Little Boy," Lou Jacobs Explains

How he tucks himself inside the tiny vehicle mystifies both circus dwarf cops and Denver policemen.

Kodachrome by E. Baylor Roberts

The Circus Has Its Own Medical Department Headed by Dr. Robert P. Harris

As he tapes an ankle for pretty aerialist Mildred Keithly, he lends support to the argument of some of his fellow showfolk that work as pleasant as his ought to be done free.

Along the Yangtze, Main Street of China

By W. Robert Moore

With Illustrations from Photographs by the Author

WERE the Chinese to label their highroads of traffic, they might well stud the banks of the Yangtze River with signs reading "China National Route No. 1."

On the map face of China the river stands out like a bold blue artery. Fly over the land, and its wide-sweeping flood unfolds below like an endless khaki-yellow ribbon, a band that ties valley towns together or lies tangled among mountain ridges (map, pages 344-5).

Great River, Long River, and River of Golden Sands the Chinese variously call their watery Main Street. To millions of its people it is *The* River. The name Yangtze, by which it is known to Westerners, is applied locally only to its lower course.

Rising in the lands north of Tibet, it hurtles down from lofty uplands and surges through awesome canyons of its own carving. In the lonely fastness of inner Asia the river seeks close companionship with two other gorge-hewing torrents, the Mekong and Salween.*

Then, as if emboldened by its early mountain triumphs, it twists, brawls through rocky trenches, loops back upon itself, and turns eastward. After wriggling and hammering its way through more mountains and valleys, it etches a serpentine path across the flat plains of central China.

3,400 Crooked Miles

Some 3,400 crooked miles it flows, gathering up tributary waters and ponderous burdens of silt, and pours a staining flood into the East China Sea.

The storied Nile which fostered the ancient civilization of Egypt is longer. So, too, are the Amazon and our own Mississippi-Missouri system. But none of these streams, nor any other river, touches so many lives as does the Yangtze.

Two hundred million people, roughly a tenth of the human race, live within its basin. Here have grown some of the country's largest cities, and here are concentrated many of its intensively cultivated farms.

Farms? "Gardens" is a better term, for many districts have an agricultural population of more than 2,500 persons to a square mile!

Throughout the Yangtze plain the population averages 900 persons per square mile, three-fourths of them farmers.

Far back in the interior, 1,500 river miles from the sea, and with the Yangtze as almost its sole means of access, lies the rich Szechwan basin (Plate IV).† Here the land is only a little less crowded, for 43 million persons are packed into a 75,000-square-mile humid "greenhouse" of farms.

Even the mountains through which the river has hewn its way are not without people. Precipitous lands have been terraced with infinite patience and reveal an amazing jigsaw pattern of curves, angles, and odd-shaped garden patches.

For five of the eight bitter war years that China fought against Japanese invasion more than 1,000 miles of the Yangtze were held by the enemy.

Swiftly, Japanese forces had seized Shanghai, Soochow (Wuhsien), and the capital, Nanking, and then swept on to Hankow and beyond to gain control over the lower and middle sections of the river. Only at the gateway of the famous mountain gorges, near Ichang, was their upriver march stopped.

A Parade of Chinese Life

Again there is traffic along this vital arterial waterway. From planes, on river boats battling muddy torrents through spectacular gorges and coursing flat farm lands, and in cities from Shanghai to distant Chungking, I watched a parade of teeming Chinese life.

Clumsy junks, patched-sail sampans, fishing craft, rafts, and such river steamers as the Chinese still possess were plowing new furrows up and down the yellow silt-laden waters. People and supplies were on the move.

On this trip to China I came by air. Roaring over the lush Yangtze Delta with its myriad tiny farms, we saw Shanghai's temples of trade rush up out of what only a moment before had been a blob on the landscape.

Beneath us slipped factories, skyscrapers, Chinese pagodas, wide boulevards, and a maze of rooftops. Ships of all kinds filled the Hwang Pu River for miles.

From the air or from the ground Shanghai is a spectacular, contrasting city.‡ Neither

* See "Through the Great River Trenches of Asia (Yangtze, Mekong, and Salween)," by Joseph F. Rock, National Geographic Magazine, August, 1926.

† See "China Fights Erosion with U. S. Aid," by Walter C. Lowdermilk, National Geographic Magazine, June, 1945.

‡ See, in the National Geographic Magazine, "Cosmopolitan Shanghai, Key Seaport of China," by W. Robert Moore, September, 1932; "Changing Shanghai," by Amanda Boyden, October, 1937; and "Today on the China Coast," by John B. Powell, February, 1945.

No Escalators—Take the Steps!

With baskets of potatoes and other produce hung from poles across their shoulders, Chinese trot up and down the narrow stepped streets in Chungking. Wealthier persons ride up and down the steep flights in sedan chairs. These walls and paving blocks survived the Japanese bombing, but most of the houses in the distance are new (page 345).

Chinese nor yet European, it is a fantastic mixture of both. Here are modern offices and lofty edifices. Here, too, are congested districts threaded by banner-draped alleys.

From the 17-story Broadway Mansions, where we correspondents lived, I could look the length of Shanghai's skyscraper-lined Bund (Plate XV and pages 328-9). Still closer was Soochow Creek, where huddled tiny boats upon which thousands of families lived their cramped lives. On the decks women worked and babies played. Most of the toddlers were tied with cord leashes to keep them from toppling overboard. Laundry fluttered like flags from bamboo poles (Plates IX, XII, and XIII).

Out on the river, junks, lighters, and sculled sampans swarmed about ocean-going steamers, river boats, and naval craft.

Changes in Shanghai

Before the war the city had some 3,500,000 persons. Among them were peoples from almost every nation on earth. Over 1,000,000 lived in the International Settlement, the concession run jointly by several foreign powers. The others dwelt in the separate French Concession or in the ever-expanding Chinese sections of the city.

Today a Chinese mayor governs all Shanghai. Extraterritoriality in China was relinquished by the Allied nations during the war.

At the beginning of the Japanese invasion, and since, tens of thousands more people flocked to this already congested port. There are between 4,000,000 and 5,000,000 inhabitants here now, some officials say.

Always fantastic, Shanghai seems even more unreal in these months since the war. War-created shortages still exist, and the black-market operators know few bounds.

So unstable is Chinese currency that many stores quoted prices in U. S. dollars until the Government clamped down on the trade.

Most shop windows are filled with goods, but the cost is so high that many articles never leave the display racks.

For a time in 1946, when the official rate between C.N.C. (Chinese National Currency) and U. S. dollars was set at 2,000 to 1, I saw some nylon hose in a show window priced at C.N.C. $49,000

Shanghai Coolies Load a Shipment of Relief Flour on Waiting Trucks

Here bags of flour and bales of cotton are discharged onto the Bund from ships. UNRRA and CNRRA (China National Relief and Rehabilitation Administration) had charge of the distribution to the needy until the end of 1947. A new organization will continue to distribute food to China.

a pair. Nearly every time I passed the store later I found a new price tag, usually $1,000 or $2,000 higher!

Inflation has since beggared those figures (page 342).

Yet swank night clubs thrive. Under soft lights Chinese and a few foreigners dance with slim silk-clad hostesses to music of White Russian or Filipino orchestras.

"Big difference here today is the cry of the beggars," said one facetious old China hand. "Now they wail, 'No mamma, no papa, no flight pay, no per diem.' And you have to toss them a $1,000 bill instead of a copper."

Shanghai suffered no war damage such as I was to see later in Nanking, Hankow, Ichang, and in Chungking. Its problems are not reconstruction, but the resumption of normal world trade.

Against this future trade the Hwang Pu Conservancy Board has its pencils busy.

"Before the war nearly 38,000,000 tons of shipping entered and cleared the port annually," said one of the Board members. "About 25,000,000 tons were foreign-type ocean-going and coastal vessels. To keep the harbor in order, we had to dredge 3,000,000 tons of mud from the Hwang Pu every year.

"The Japanese did little dredging during their occupation, so we've considerable work to catch up before we extend improvements.

"Not only the Hwang Pu River but also the Yangtze bar comes under our jurisdiction," he continued. "To accommodate larger vessels, we were dredging a channel through the bar. At low tide there's only about 18 feet clearance. Big steamers had to wait for high water. We shall start working on that again as soon as we get the dredge the Japs took away."

"How much mud does the Yangtze dump in the ocean every year?" I asked.

"About 400,000,000 tons—but that is just an estimate." *

Rich Farms on River Soil

Rich farms spread over the alluvial Yangtze soil. As you ride from Shanghai to Nanking by rail, highway, or by plane you see a veritable garden of patiently groomed fields.

Here men and women toil endlessly with primitive hand tools to make their tiny plots

* See, in the National Geographic Magazine, "Taming the Outlaw Missouri River," November, 1945; and "Men Against the Rivers," June, 1937, both by Frederick Simpich.

Shanghai's Teeming Bund Faces a Wide Curve of the Hwang Pu River

Here, 15 miles from the Yangtze, is China's biggest city. Sampans, lighters, and small river steamers tie up along the water front. Big ships dock upriver or downriver. Anchored in midstream is the cruiser U.S.S. *Los Angeles*.

Tall Temples of Trade Crowd Its Busy Business District

Rectangular building facing the Bund is the Bank of China; clock tower marks Customs Building. Center tall structure (right) is the New Development Building, containing U. S. Consulate General.

U. S. Navy, Official

Steaming up the Yangtze on a Relief Mission, an American Landing Ship Passes Shihpaochai, or "Precious Stone Castle"

LSM 470, a veteran of Okinawa, was carrying 315 tons of rice from Hankow to a famine area around Chungking. Atop the vertical outcrop of rock the Chinese built a monastery. Legend says that rice once trickled from the rock to feed the priests, but stopped when they dug the hole larger to increase the flow (page 347).

Nanking, Again China's Capital, Seems about the Same after Eight Years' Japanese Occupancy

Some buildings were damaged, but destruction was not extensive. Dr. Sun Yat-sen, China's revolutionary hero, gazes from his pedestal in the circle. Banks, restaurants, offices, and shops rise around this busy center of the city. In the distance looms the ancient city wall, more than 20 miles in circumference (page 332).

produce rice and other crops to feed China's millions of hungry mouths. Continuously, winter and summer, this part of China's good earth nourishes wheat, beans, rape, barley, corn, and huge quantities of rice.

Not until I flew over the region did I realize how the land is laced with irrigation and transport canals. Up and down and across the plain, narrow waterways grid the countryside as streets segment a city.

Slender channels are the "roads" for small farm boats; the larger ones form busy trucking highways.

Through this region, too, threads the most famous of China's man-made water routes, the Grand Canal (Yun Ho). From Hangchow in the south it stretches all the way to Imperial Peking (Peiping), over 1,000 miles away.*

The section which links the Yangtze with the Hwang, or Yellow, River, has been serving as an inland waterway for nearly 2,500 years. The section extending southward to Hangchow from the Yangtze intersection at Chinkiang, however, is a mere stripling. It is only seven or eight centuries old!

Although some parts of the channel are badly silted now, day in and day out men still tread its towpaths pulling their boats. When favorable breezes blow, the canal blossoms with sails.

Sails on Tai Lake

One of my most memorable pictures of sails, however, was not on the Grand Canal but on near-by Tai Hu (lake). It was late afternoon and the sun was paying golden tribute to the west following a storm. Scores of craft had their white sails spread and were skimming across the orange-stained waters as if they were staging a huge regatta.

The lake is one of numerous large bodies of water which lie on either side of the Yangtze the whole length of the plain. Some of these lakes act as huge reservoirs and fill or discharge with the rise or fall of the river.

During the weeks I spent in Nanking I saw the city gradually being set in order again as capital. The Government was bringing personnel, files, and office equipment back from Chungking, the war capital (page 326).

Some of the people came by air; others had taken a circuitous route overland by road, rail, and river. But most came by boat down the Yangtze.

The water front at Hsiakuan, a short distance beyond Nanking's gray city wall, was crowded with large river craft that had brought loads of goods downstream. River steamers were packed with incoming passengers.

Despite high costs and scarcity of materials, some new building had been started, and many shops were being refurbished and painted.

Although Nanking, under various names, has figured prominently in Chinese history for 2,000 years, it has had many ups and downs.†

Several times through the centuries it has been the capital, only to lose its exalted position and suffer extensive destruction. During the Taiping Rebellion it was held by the insurgents from 1853 to 1864 and was almost completely razed.

Even today large areas within its 20-odd-mile circuit of thick, weathered walls are given over to farms and truck garden patches. The airport, too, is within the walls.

Nanking Had Its Face Lifted

When the capital was moved here from Peking in 1928, the town had no wide paved streets, no running water and sewer systems, no electricity. But the National Government set about converting the town into a modern capital. They slashed broad avenues through clusters of dingy dwellings; built new government departments, hospitals, schools; and provided the town with modern facilities of water, light, and transportation.

War gave it a serious setback, but comparatively few of its new structures were damaged beyond repair.

Beyond the meandering city wall rises Purple Mountain, Nanking's most prominent landmark.

One could almost say "sacred," for high on its side stands the imposing mausoleum of the revered Sun Yat-sen, Republican China's "George Washington." It remained undamaged, despite battles fought beside it.

From the hill roadway where cars park you pass through an imposing ornamental archway and then ascend a broad walk and flights of 500 granite steps to the massive Memorial Hall and tomb, high on the side of the mountain. White walls and deep-blue tiles gleam in the sun against a green backdrop of trees (Plate XIV).

The last resting place of the first Ming monarch is less favored. It lies farther down the hillside, nearer the city. Parts of the buildings were destroyed years ago by the Taipings; time is gradually leveling the rest.

The stone camels, elephants, horses, mythical beasts, and men which lined the avenue to the tomb remain largely intact. Cattle graze

* See "Grand Canal Panorama," by Willard Price, National Geographic Magazine, April, 1937, and "Glory That Was Imperial Peking," by W. Robert Moore, June, 1933.

† See "Rise and Fall of Nanking," by Julius Eigner, National Geographic Magazine, February, 1938.

 Kodachrome by W. Robert Moore

Riding the Favoring Wind, a Big Freight Junk Glides up the Muddy Yangtze

It has just emerged from Wind Box Gorge. The crew tow the craft up swift rapids with bamboo ropes.

Kodachrome by W. Robert Moore

Bold Walls Hem Wushan Gorge and Dwarf the Junks That Sail the Yangtze

Against the towering cliffs even river steamers seem tiny. Native craft, some with spinnakers set to gain added boost, ride a favorable upstream wind. Along the narrow footpath at left trackers haul the boats against the treacherous currents when the winds are adverse (Plate VII).

Kodachrome by W. Robert Moore

Crowds Toil Up and Down Long Flights of Steps That Mount Chungking's Steep Hillsides

Small ferry sampans mill about, loading and unloading passengers who cross between this large Szechwan city and its suburb on the opposite bank of the Kialing. The wartime capital of China perches on a series of rugged cliffs at the junction of that river with the mighty Yangtze.

With Infinite Toil Szechwan Farmers Cultivate the Mountains

Here they raise rice, corn, and other cereals. Some fields are green with growing crops; others have already been harvested. Flying over, the author saw piles of yellow grain in courtyards of homes.

Kodachrome by W. Robert Moore

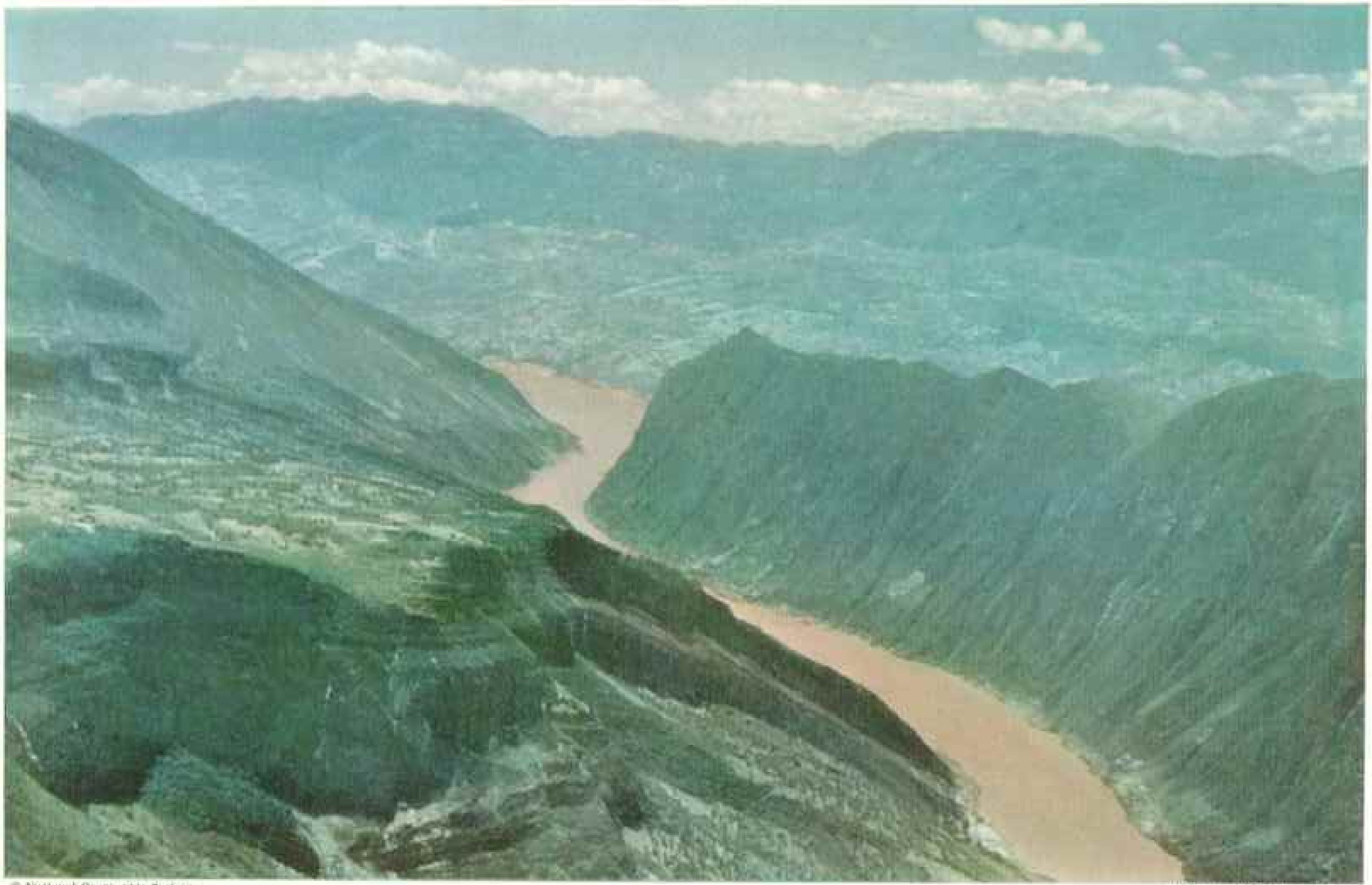
Steep Slopes Are Terraced with an Amazing Jigsaw Pattern of Farms

Small irrigation ditches and paths also thread the region. These farms lie near the sweeping loop of the Yangtze between Yunyang and Wanhsien. Fogs, rain, and summer heat afford excellent growing conditions.

Kodachrome by W. Robert Moore

With Huge White Sails Set, a Fleet of Junks Parades Past Fengkieh on an Upriver Journey

Other craft are moored almost solidly along the steep bank, atop which stands the medieval walled town. When the river is low, a shingle beach lies exposed just below here. Natural brine bubbles up in the uncovered beach. Men boil the spring water in iron kettles to extract its salt.



Kodachrome by W. Robert Moore

Steep Cliffs Form a Spectacular Gateway at the Western End of 30-mile Wushan, or Witches, Gorge

Here, in this upstream view, the Yangtze twists around Wen Shan (Mountain of Learning) and enters the constricted mountain trench (Plate II). Atop the peak are shrines to the spirits of mountain and air. On the bend of the river, but concealed by the rocky spur, lies the walled town of Wushan.

Chinese Soldiers, Riding a River Steamer, While Away Their Leisure Playing Cards

Others sleep under parasols and sheet tents on the hot upper deck (Plate XI). Scattered about them are rifles, small bedding rolls, and sausagelike cloth bags of rice. Most men are barefoot.

 Kodachromes by W. Robert Moore

Coolies Trudge up Chungking's Steps with Baskets of Produce on Shoulder Poles

One carries long bitter gourds used as a vegetable; the other has potatoes. Long flights of steps lead up from the river to hill streets and homes. Szechwan is noted for the abundance and variety of its foodstuffs.

on the green grass that covers the roadway between the stone figures.

One day as I rode across to Pukow, the railway terminal on the opposite bank of the Yangtze from Nanking, I saw hundreds of ducks along the edge of the river.

"They're 'walkee-walkee' ducks," announced my companion.

"You mean 'walkie-talkie,'" I retorted, as the entire flock seemed to be quacking all at once.

"No, they gain the name from their novel handling. When the ducklings are young, they are started downriver in large groups. They feed as they go. Eventually they land in market fully grown and fattened. Feeding and transportation hasn't cost anything beyond the time of men who keep the flock together. Nothing could be simpler."

Back in 1931, when I had come down to Pukow by train from Peiping, the Yangtze was in flood. We traveled for miles with only the rail embankment and a few field dikes showing above a sea of water. People rode into Nanking by boat.

Yangtze Diked Against Floods

I recalled that experience when I talked with engineers of the Yangtze River Commission.

"The flood you saw in 1931 was the highest on record," said one of the directors. "That year more than 31,300 square miles was flooded. In 1935 there was a smaller flood, mainly above Hankow, which covered 9,660 square miles. As a whole, the Yangtze is a comparatively peaceful river,* not a demon like the Yellow River."

"How much diking is done along the Yangtze?" I queried.

"Practically the whole way to Ichang. In many places the dikes are about 25 feet high, but in most places only from 10 to 15 feet."

"What about irrigation?"

"Along the Yangtze, it's mainly a problem of drainage, not irrigation," he explained. "In high water the Yangtze rises well above the plain."

Later, when I went to Hankow, I saw the high water-front wall that was built some years ago to protect that city against flood.

In my hotel the high-water mark of the 1931 flood had been painted on the wall. It was 53.8 feet above the normal low-water level of the river!

War, not floods, has caused recent destruction in Hankow. Particularly along the water front and in the former concessions many buildings and installations have been bombed and demolished. Some damage came at the time of its capture by the Japanese, but more was done when American bombing teams crippled Japanese activity there.

The "Chicago of China"

"Chicago of China" some people have dubbed this central China city. Although 700 miles from the sea, it had a spectacular rise. One should not refer to it as a city, for there are three separate centers here—Hankow, Wuchang, and Hanyang.

Among these three "Wuhan Cities" Hankow is the largest and most modern. It gained much of its prosperity from foreign enterprise, and here were located extensive foreign concessions, now turned back to Chinese control.

Wuchang, capital of Hupeh Province, sprawls on the hills and plain on the opposite bank of the Yangtze. On the same bank as Hankow, but separated from it by the Han River, is Hanyang, where there were large iron and steel plants, a government arsenal, and powder works.

At the moment much industry of the Wuhan Cities is at a standstill. Only Chinese ships come and go. Foreign steamers are stopped by new regulations against coastal and inland waterway trade.

Along the Bund I watched scores of native junks loading for the upriver trip to Tung Ting Hu (lake) and thence to war-torn Changsha, over which the Chinese and Japanese repeatedly fought. Other craft moved in white-winged processions down both the Yangtze and the Han.

Huge log rafts also floated downstream. With thatched huts perched atop them, they appeared like village blocks broken loose and drifting in the current.

The Gorges from the Air

From Hankow I flew to Chungking. Out at the Hankow airport I fell into conversation with the American pilot of the Chinese commercial plane.

"When we level off, come up front and have a look," he suggested.

I needed no second invitation.

"Ever seen the Yangtze gorges from the air?" he asked.

I had not.

"Neither have I," he rejoined. "Let's do it; it's only a few minutes farther than the regular course we fly."

He flicked the controls slightly and set the course for Ichang.

* See "Taming 'Flood Dragons' Along China's Hwang Ho (River)," by Oliver J. Todd, National Geographic Magazine, February, 1942, and "Raft Life on the Hwang Ho," by W. Robert Moore, June, 1932.

Paul Guillumette

Prosperity Brings Smiles to the Faces of Li Shin and His Wife

A few years ago, with money saved as a press messenger, he set up a tobacco shop in Chungking. Now he has a large stock and does a thriving business. Because of inflation, his original investment now would not buy a package of the cheapest cigarettes. In mid-December, 1947, official value for Chinese National Currency was $12,000 for one U. S. dollar; open rate was 72,500 to 1; the black market offered 160,000 to 1.

Below us sprawled numerous lakes, some large, some small. From heavy rains and the summer rise of the rivers many dry-season farmlands were covered with water.

For half the way toward Ichang we could see the long, lazy loops of the Han, largest tributary of the mighty Yangtze.

Nearer Ichang we again spotted the Yangtze off to our left. As we sped over the town, we saw its yellow waters, fringed with junk masts and dotted with several river steamers.

Close to the town the plain ends abruptly. The Yangtze becomes only a gash in the mountains. From here on we rode above its twisting path, cut through the bold hills.

Swinging first one way and then the other, we passed awesome gorges in rapid succession. Only minor breaks in the mountain walls separated one gorge from the other.

First came the Ichang Gorge with its towering cliffs of bluish-white limestone. Next were two rocky constrictions known as the Ox Liver and Horse Lungs Gorge and the Soldier's Book and Sword Gorge.

A few moments later we were flying along the almost uniform mountain V which is the 30-mile-long Wushan, or Witches, Gorge (Plates II and VII). Shortly thereafter we kinked around a sharp zigzag turn where lofty vertical-walled peaks squeeze the river into a narrow trough to form the Wind Box Gorge. Just beyond, on a low widened bank, clustered the rooftops of Fengkieh (Plates I and VI).

Through some of the gorges and in boulder-strewn stretches we could see swift waters eddying and frothing. Against them scores of tow men hauled their boats. Others sailed the brown band of the river. The upstream junk voyage from Ichang to Chungking takes anywhere from one to two months.

Above Fengkieh the Yangtze trench is less restricted. Lower hills bracket the river and

the high, craggy ridges rear a short distance away.

Much of the rest of the way to Chungking we flew above contorted hills, over whose slopes spread an amazing patchwork of farms (Plates IV-V).

Fog over Chungking

The afternoon sun shone in our eyes as we slipped over a mountain ridge and saw the black smudge of Chungking sprawled beneath a layer of haze.

Sunshine over the city is the exception, rather than the rule. For months of the year fog and clouds hang over the rivers and hills. That, plus the fact that the Chinese painted the town black, kept the Japanese from bombing it more than they did.

"We often have to do some fancy flying to get in," commented the pilot. "See that island down there in the Yangtze? That's where we usually land."

I saw only a tiny bare patch just above the water level. My expression must have asked the question.

"No, we're not landing there today. Two weeks ago the island was under 50 feet of water," he added. "Buildings we had there were carried away. In summer flood season the river sometimes rises 100 feet here."

We taxied down on a field farther upriver.

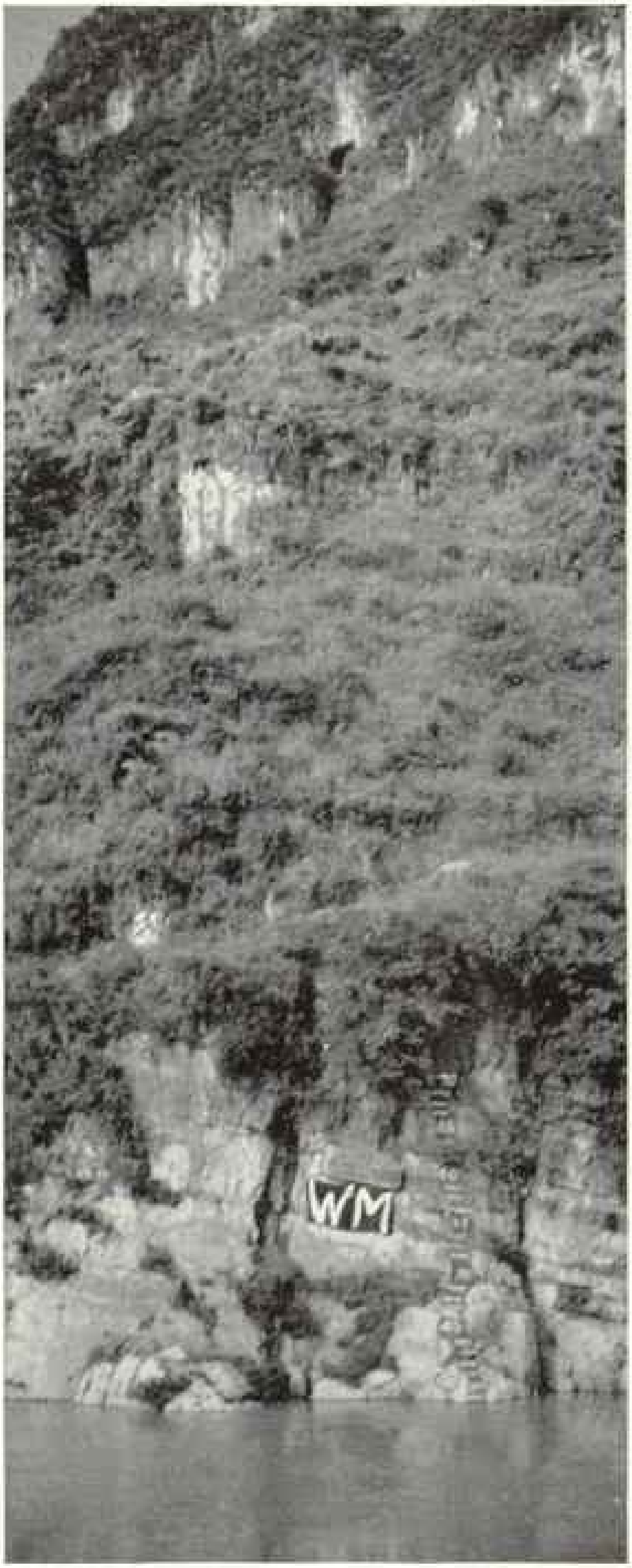
To keep its feet dry, Chungking perches at impossible angles on the high hill spur between the Yangtze and Kialing Rivers at their junction. Its satellite town, Kiangpeh, and other suburbs cling to the slopes on the opposite banks of the two rivers.

Unlike Shanghai, Hankow, or even Nanking, this historic trading center is Chinese, body and soul. Here are remnants of ancient Chinese walls, venerable pagodas, and a clustered confusion of mud and bamboo homes clinging to the sharp hills.

The Chant of the River Men

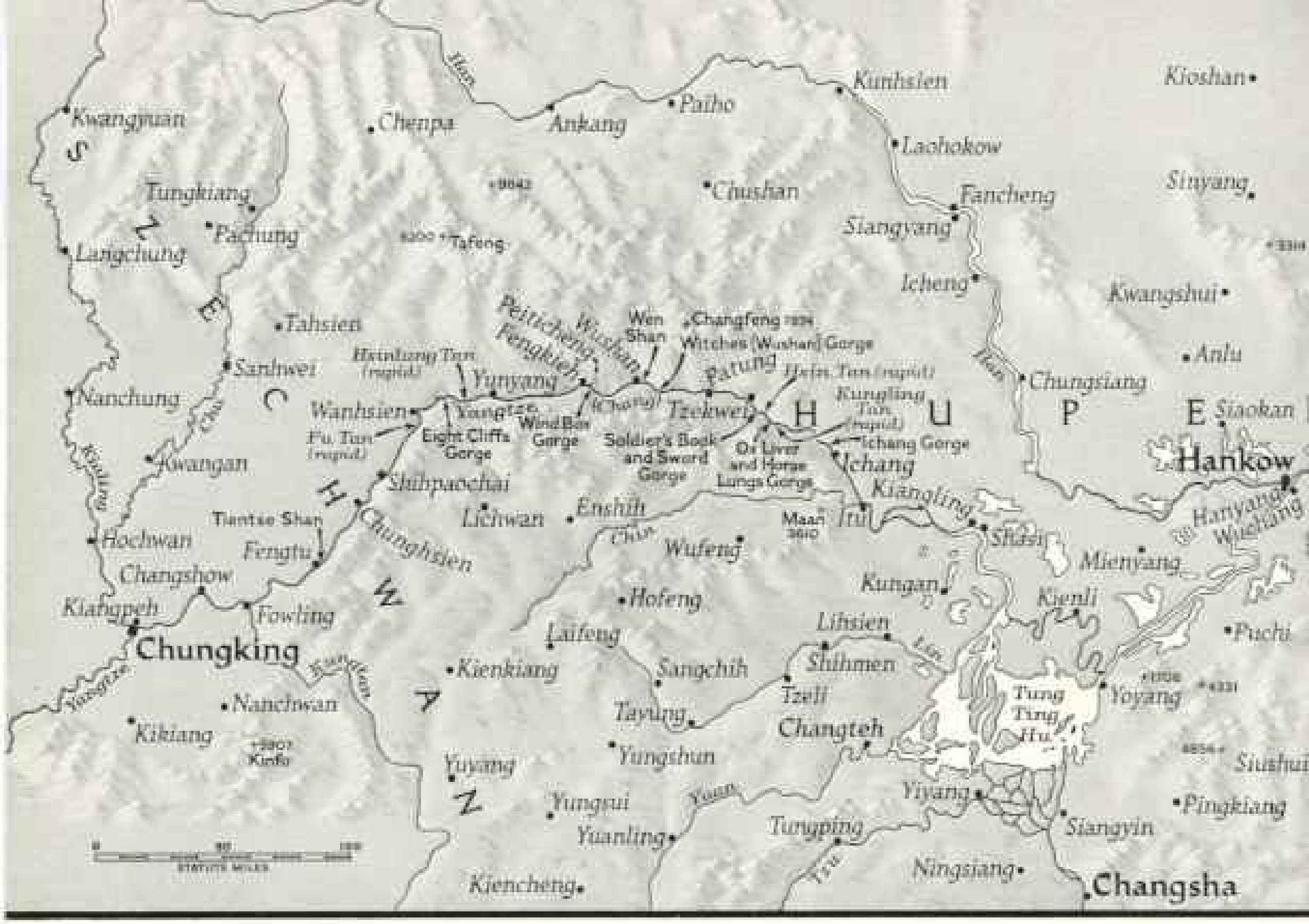
Prior to 1927 there was not a single wheeled vehicle inside the city wall and few streets wide enough to accommodate them.

But gradually new roads were cut, though some are still unbelievably steep for the rickshas, buses, and few private cars. The city also got electricity and water.



Nearly 40 Feet of Water Today!

A quick glance at this high-water mark painted on the white limestone cliffs tells the Yangtze pilot the depth of the river in Ichang Gorge. He can then judge the clearance over rocks, strength of rapids, and choose the safest channels for his vessel.



For 1,500 Miles, from Chungking to Shanghai, the Author Followed the Yangtze

High mountains, spectacular gorges, and seething rapids lie between Chungking and Ichang. River junks and sampans often take one or two months to negotiate the hazardous upstream trip. Dozens of men haul their craft by brute force up turbulent stretches. River steamers are specially powered to breast the flood.

As I puffed up and down its pathways, however, I saw hundreds of people climbing the seemingly unending flights of steps with their heavy wooden buckets of muddy Yangtze water slung on carrying poles (Plates III, VIII, and page 326). With good reason, too, I paused to listen to the chants of the tow men hauling loaded junks along the river.

During the war countless homes were burned or demolished by bombs. Many were quickly rebuilt. I saw others under construction. A framework of poles was raised and the sides covered with bamboo. Laborers smeared plaster over the walls and the structure soon had the appearance of solidity and durability.

"In prewar days Chungking had a population of perhaps 600,000," said my companion. "It grew to more than 1,000,000; so you can guess what a job it has been to get people out once the war was over.

"Planes and steamers have been packed, and one of the biggest industries here now is building river junks to carry more people and goods back downriver" (Plate X).

Thanks to kindly officials, I got passage on the S. S. *Ming Lien*, one of the larger upper-river steamers, designed to carry 200 passengers and crew.

We went aboard at the foot of one of Chungking's eternal flights of steps. It was a good ship, but why so few passengers, I wondered, as the lines were cast off. Only about 50 persons had come aboard.

I hadn't long to wait. We dropped anchor near the opposite shore and soon were surrounded by swarms of boats loaded with soldiers. Late that afternoon and until after dark they came with full gear—some 1,800 men in all, and 50 head of horses!

Aboard a River Steamer

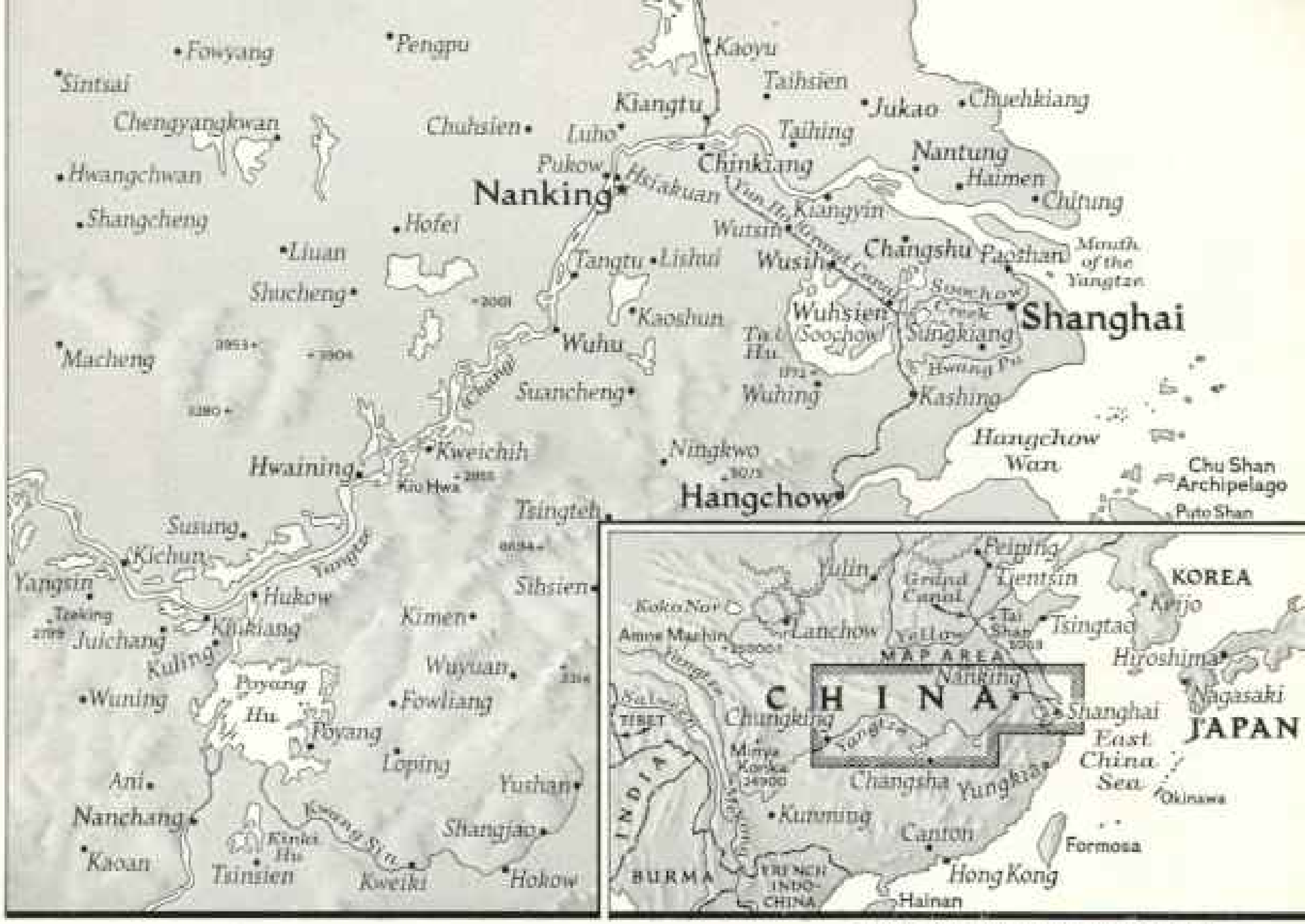
No sardine can was ever packed tighter than the *Ming Lien* when we weighed anchor and slipped downstream at dawn.

Mist lay over the river, but the hot summer sun soon burned it off. I climbed a ladder to the roof above the bridge deck to gain a more unobstructed view.

Bowling along on the swift waters, we passed many river junks and large sampans under sail or being towed upstream.

Only when I saw some boats standing seemingly immobile in the water, even though dozens of bare-backed men bent and strained at the towlines, did I realize the tremendous sweep of the rapids.

Some spots in the Yangtze form treacherous rapids at low water; other stretches become



Drawn by H. R. Eastwood and Irvin R. Alleman

200,000,000 People—Nearly a Tenth of the Human Race—Live Within the Yangtze Basin

Source of this busy "Main Street" of central China is in the lands north of Tibet (inset), more than 3,400 crooked miles from Shanghai. During the war the Chinese Government retreated from Nanking and Hankow upriver beyond the mountain barrier to Chungking. The capital has been re-established at Nanking.

hazardous during middle or high-water levels. In these whirlpools and seething waters navigation becomes ticklish business.

Graveyard of Junks

Roughly, one out of every ten junks is badly damaged on the trip between Ichang and Chungking. One in twenty is totally wrecked. Occasionally even a steamer piles up on the rocks.

Along the banks and on several rocky spits we saw damaged boats being rebuilt. In some places, too, new ones were under construction.

A glorious panorama of lofty blue-green mountains, uptilted farmlands, and river villages unfolded before us as the steamer sped along on the yellow flood at a good 15 knots. Within little more than two hours we had come abreast of ancient Changshow.

An hour and a half later we picked up Fowling, at the mouth of the Kungtan tributary. Along the water front I saw a number of *wai-pi-ko*, or crooked-stern junks, for which the Kungtan River is famous.

These boats look as if they had been caught between rocks and some freak whirlpool and had their hulls twisted. One side bulges more than the other, and the stern leans heavily to starboard. So lopsided are they that a sort of "flying bridge" is added for the steersman, who handles the long heavy sweep attached to the high corner of the stern.

One explanation for their twisted shape is that it helps negotiate the turbulent rapids on downstream voyages.

Tobogganing over waters that raced between dangerous reefs and looped around wide river curves, we cruised on to Fengtu.

Passports to Heaven

I should have liked to stop and climb its Mount of Heaven, for atop its wooded hill of Tientse Shan stands a weathered temple. It is dedicated to the god of Hades, but here devout pilgrims may secure passports to Heaven!

The documents, it seems, are highly prized, but the catch to them is that, to be really valid, they must also bear difficult-to-get signatures and be marked with the imprint of the seven stars of the Great Bear.

As we coasted past prosperous-looking farms toward Chunghsien, the cabin boy who had taken me as his personal charge sought me out and announced happily, "Master, I catch you chow now."

Where he had "caught" it I didn't know—perhaps from the crew, or it may have been

In Chinese, English, and in Pictures This Nanking Dairy Advertises Its Business

Here, say the characters, is sold fresh milk from thoroughbred cows and Swiss goats. Such dairies are still rare in China, and pasteurization plants almost unknown. Efforts are being made to improve herds and to provide customers with a sanitary milk supply.

his own. I crawled down the ladder and elbowed my way to my cabin.

Many soldiers looked on hungrily as I chopsticked my way through a big bowl of rice, a dish of vegetables and meat, and topped it off with a soup. I clambered back to my roof perch.

In midafternoon we came to Shihpaochai, or "Precious Stone Castle," a striking landmark on the Yangtze. In a sharp kink in the river a vertical-walled column of rock towers some 200 feet above the village that sprawls at its base (page 330).

Later in the afternoon we cascaded over several races and turbulent rapids in gorge-like hills as we neared Wanhsien. Just after shooting Fu Tan (rapid), where the heavy volume of the Yangtze is squeezed in between huge reefs and boulder promontories, I saw a graceful humpbacked bridge arching like a rainbow over a side stream.

A still more spectacular one once linked Wanhsien with its suburb across a rocky ravine. It had a building atop its almost semicircular arch. Apparently it had grown weak with the ages. A modern bridge now spans the gorge.

Wanhsien, the Myriad City, is beautifully set on a hillside. Beyond the notch formed by the gorge and the vale which extends back of the town rise high green hills and a series of craggy peaks (Plates IV-V).

We rode on another 20 miles and tied up for the night beside a steep sandbank beyond Eight Cliffs Gorge.

Once the ship was warped in close to shore, sampans appeared out of nowhere and took scores of soldiers ashore. In young moonlight many stripped and bathed in the river. Others kindled fires and began cooking caldrons of rice.

Through a Risky Rapid

When we cast off next morning just after dawn I soon learned why we had halted where we did. Only a short distance beyond was the Hsinlung Tan (rapid). There the river swirled, eddied, and rushed as if through a giant sluice. Several junks lay just below the rapids, some already with their towlines out, making preparations for mounting this tough upstream step.

In midmorning we anchored at the foot of the old walled town of Kweichow, or Fengkieh, popularly referred to as Kueifu. Here the soldiers gathered up their equipment and got off. One skittish horse caused a brief flurry of excitement when he protested walking the plank ramp. At last he leaped forward, sent the planks flying, and fell with a splash into the water. The lad at his bridle clung to him and both soon floundered ashore.

Thick gray walls encircle Kueifu, the old city of kings. In their weathered condition they bear the timeless flavor of ancient China. In the vicinity, however, are remains of the still earlier stronghold of Peiticheng, "White Emperor's City," whose roots were implanted in the rocky land 1,700 years ago.

Kings and feudal lords chose to settle here because it lies protectively just within the inner portal of the mountainous gorges that reach all the rest of the way to Ichang.

Just below the city the Yangtze squeezes between a vertical wall of rock and a majestic mountain, which soars 1,800 feet above the river.

Geologists may have one explanation as to how the river carved its path through the bold mountains that pile high in the region. Legend has another.

Wizard Wu-tze Blew Wind Box Gorge

Some 3,500 years ago Yu-wang, the god of the rivers, sat on a mountaintop directing the course of the waters. But here the mountains resisted him, until the wizard Wu-tze came to his aid. With a furious blast of wind from his nostrils Wu cleaved a path through the rocks and thus opened the Fenghsianghsia, or Wind Box Gorge!

Even Wu's mighty puff, however, failed to cut a straight path, for the river surges around sharp bends between the frowning cliffs. We rode its twisting chute of water at a dizzy pace.

A boat trackers' path has been carved along the rock wall high above the sweeping waters. It seemed a precarious, narrow footing indeed for the trackers, who haul their junks upstream with long, twisted bamboo hawsers.

We safely negotiated the five exciting miles of Wind Box Gorge in a few minutes. Beyond it the mountains broke away, but the river passage still was spectacular (Plate I).

Nowhere here did old Yu-wang, the river god, have an easy time carving the river route. Only a few miles downstream he again had to enlist the assistance of the Paul Bunyanlike wizard, Wu, when he hewed the awe-inspiring trench of Wushan (Witches) Gorge (Plates II and VII).

Just after passing Wushan, perched on the left bank (as, oddly enough, are most of the towns on the upper Yangtze), we plunged into the steep-walled canyon.

In backwashes and in the lee of reefs along the way junk crews awaited our passing before they began hauling their heavy craft over the rapids. Other boats, with big sails set, were riding calmer stretches on an upriver wind.

Water in the river was running at mid level;

we steamed through many races, whirlpools, and eddies. Here in the Wushan, when summer waters are at their height, the whole river becomes a gyrating torrent as its immense volume strikes one wall, then the other.

When "freshets" come, the waters in the gorges may rise as much as 50 or 60 feet in a single day. As these quick floods pile up in the bottleneck passes, not only junks but steamers as well have to tie up and wait for the torrent to subside.

In some of the gorges the high-water peaks have been measured at more than 200 feet above normal low-water level!

After leaving Wushan Gorge astern, we entered a more open region, but the river continued to brawl over numerous rapids. Only a few miles ahead more mountains closed in and seemed to choke off the river entirely.

Soldier's Book and Sword Gorge

Later we slid into the deep shadows of Soldier's Book and Sword Gorge. Perhaps it was the sudden gloom cast by the overpowering cliffs that made this defile seem more dramatic than the other gorges.

Just before we had entered the 3-mile-long mountain cleft I had seen scattered clouds rolling over the peaks. Hardly had we cleared the gorge and the dangerous Hsin Tan (rapid) just below it when a blinding downpour burst upon us with all its fury.

The skipper hove in toward shore and anchored. For half an hour the rain and wind roared through the mountain gap. Then as suddenly as it had begun the storm ended.

Another half hour was lost in freeing the anchor, which had lodged beneath a rock. Once clear again, we swung downstream in bright sunlight.

Almost immediately we cruised into the 4½-mile-long Ox Liver and Horse Lungs Gorge and then cascaded over the dreaded Kungling Tan (rapid), where a gigantic rock divides the river.

The next 16 miles of the river are beset by rapids, reefs, cross currents, and whirlpools. Yaochanho, meaning "Crooked River," Chinese rivermen call this boulder-strewn stretch of the Yangtze. At no season is navigation safe here.

The late-afternoon sun was already casting a golden light on the white and gray limestone peaks and fantastically eroded spires when we rode into Ichang Gorge. Dusk had gathered when we emerged from the 15-mile channel through the mountains and came to Ichang.

I found what remained of one of Ichang's two hotels in the blackness of night.

It was a sorry-looking town that I discovered next day when I roamed through the streets. The Japanese had first bombed it and then later had torn down many buildings for wood when they came to occupy it.

Many of the people who had lived there had retreated into the mountains or scattered in outlying villages during the Japanese occupation. Now they were coming back and were repairing battered structures or were building temporary homes.

Plans for a Mighty Dam

Some of the people here are talking about even greater days for the future. In their mind's eye they picture a thriving city, not just a river-port town where goods are transferred from deeper-draft steamers that ply the lower and middle Yangtze to shallow-draft upriver steamers or junks.

The transforming magic would be the erection of a mighty dam across the Yangtze. Nor is the possibility pure fantasy.

Already preliminary surveys and plans have been made for harnessing this largest river of China by building a dam in the Ichang Gorge. The services of Dr. John L. Savage, who drew the plans for Boulder, Grand Coulee, and other dams, have been enlisted for the project.

Says Dr. Savage: "The Yangtze Gorge Project is unquestionably the most important hydro project ever conceived, when considered in relation to the untold benefits that will accrue to ancient but undeveloped China from resources of the Yangtze and its tributaries.

"With a normal reservoir water surface at elevation 200 it will develop 10,560,000 kilowatts of power. The project will provide water for irrigation of 10,000,000 acres of good agricultural lands, and sufficient flood storage to control the largest flood on record.

"Also, the project when supplemented by navigational facilities will permit ocean-going vessels to ply inland at least to Chungking. It further will furnish clear domestic water for many cities and industries."

It is an ambitious scheme on a scale never before tackled. The dam presents unprecedented problems, and special means must also be used in lifting steamers over the dam. But, gigantic as the task is, Dr. Savage considers it entirely feasible.

While pondering such a grandiose plan for the future, I embarked on a crowded downriver steamer which towed two overflowing barges lashed on either side. Soon I was again drawn back to the teeming life along the Yangtze today.*

* For additional articles on the Yangtze and China, see the "Cumulative Index to the National Geographic Magazine, 1899 to 1947, Inclusive."

Nets and Strings Keep Packages from Going Astray

During war years millions of Chinese retreated before the advancing Japanese. Afterwards they started trying to get back home. Mother and youngsters stand on a Shanghai dock awaiting a river steamer sailing up the Yangtze.

Kodachromes by W. Robert Moore

A Young Chinese Philosopher Contemplates the Wide World about Him

The tot was helping his father spread out clothes and bedding to dry on the deck of their sampan home anchored in Soochow Creek. Everything had become damp and musty during days of rain at Shanghai (Plates XII-XIII).

Reduction by W. Robert Moore

A Crowded River Steamer, with Barges Lashed to Its Sides, Cruises Downstream from Chungking

After 1937, when Japan invaded the lower Yangtze, the Government withdrew to mountainous Szechwan Province. Now people and equipment are being returned. Small steamers shuttle between Ichang and Chungking most of the year; larger ones of 200-foot length halt during low-water months in winter.

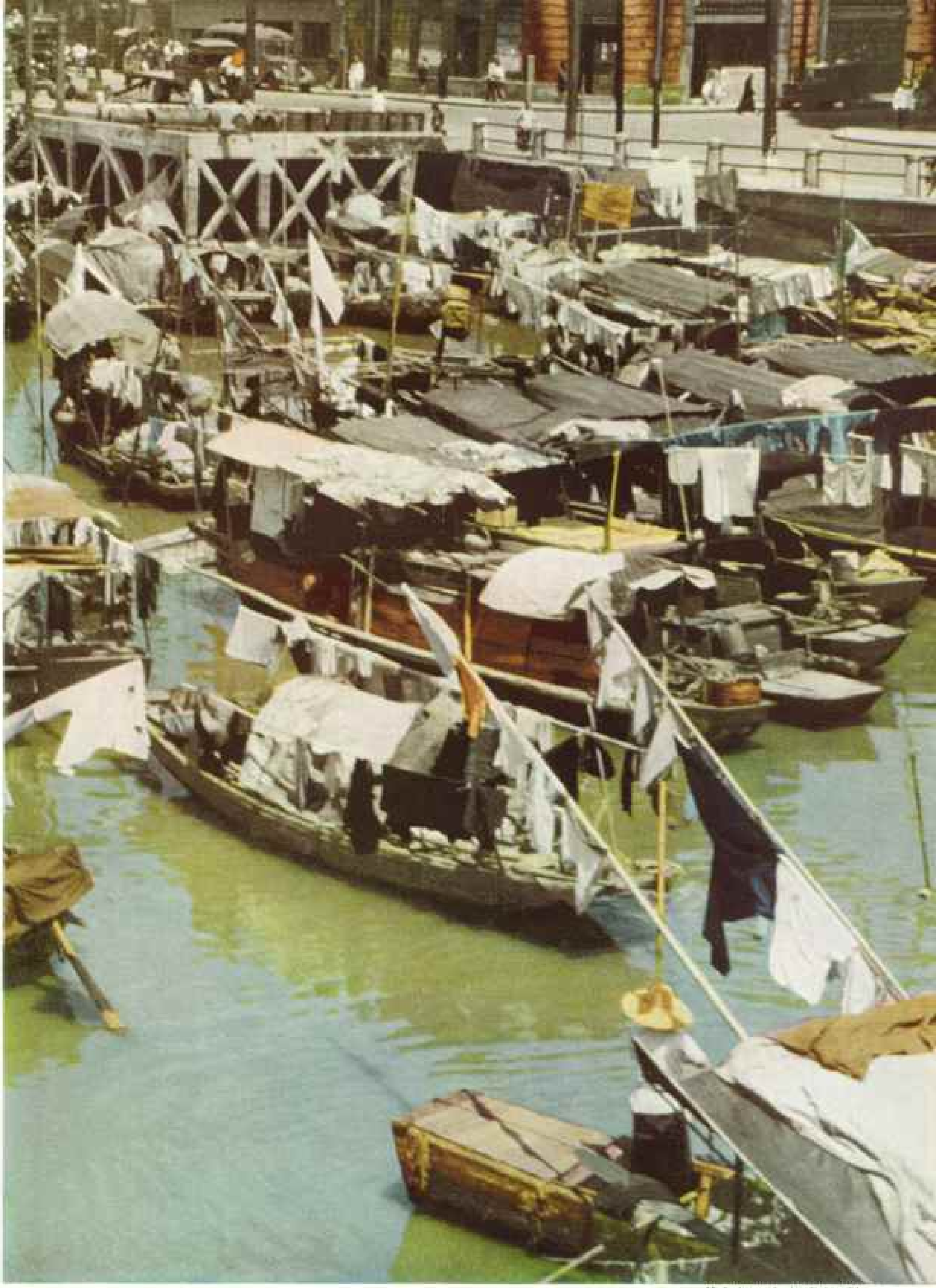
Kodachrome by W. Robert Moore

Nationalist Soldiers, En Route Between Chungking and Fengkieh, Crowd the "Sun Deck" of an Upper Yangtze Steamer

Holds and main decks of the ship, designed to carry 700 passengers and crew, overflow with 1,800 men, 50 horses, and their equipment. Following the Japanese defeat, the U. S. Navy made several trips through the gorges and rapids in LSMs. It turned over several landing craft to the Chinese Government.

A Floating Town Clusters in the Shadow of Shanghai's Skyscrapers

It is drying day after a week of rain. Boat women spread blankets on the roofs in the sun. Fluttering clothes are threaded on bamboo poles so they will not blow away.



Kodachrome by W. Robert Moore

Soochow Creek Cuts Through the Heart of the Port City, Gateway to the Yangtze

Lighters are poled into this busy canalized creek to discharge drums of oil, cotton, lumber, and other imports. Other craft unload farm produce to help feed the teeming city of more than 4,000,000 persons.

Re-lacquered by W. Robert Moore

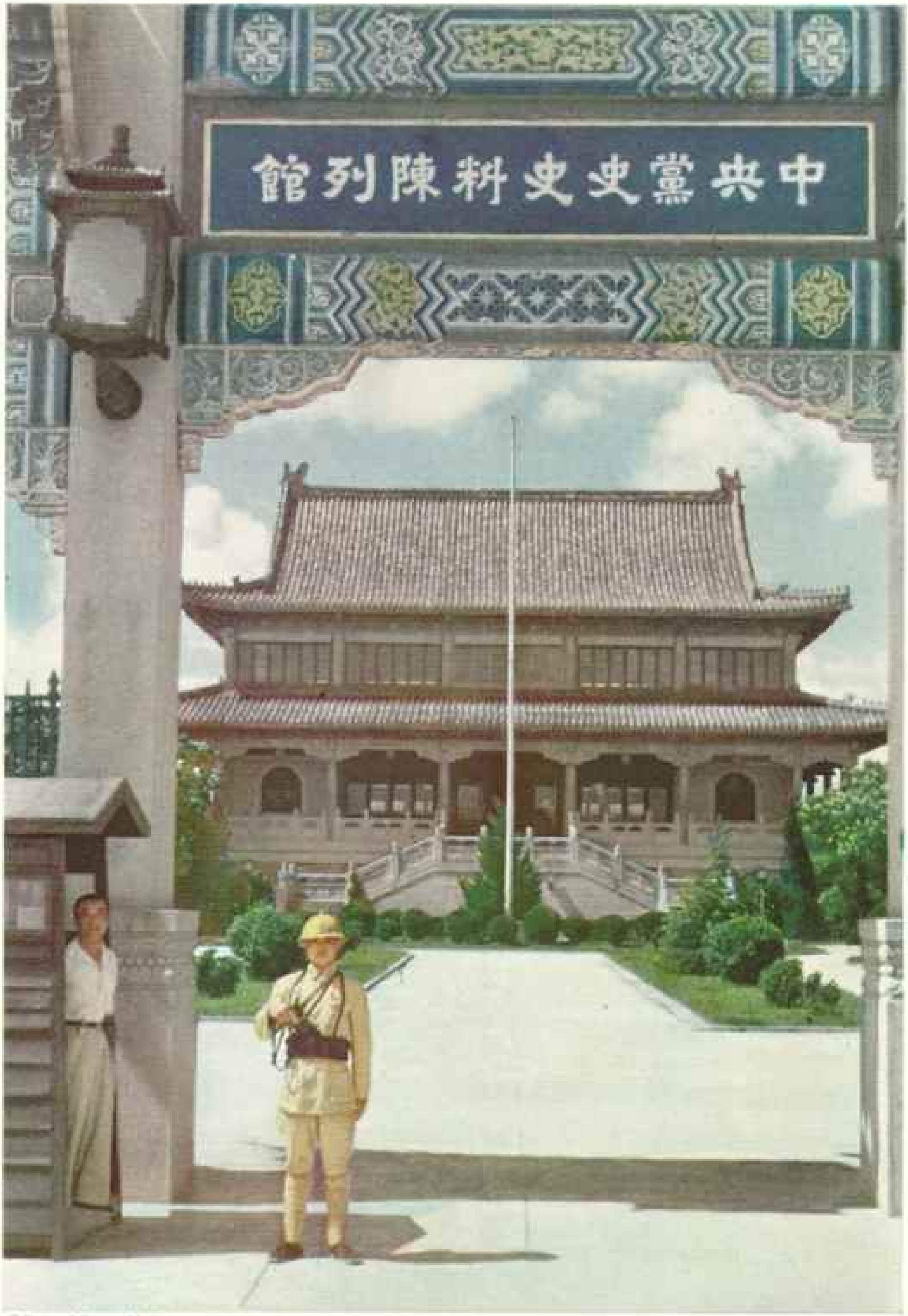
High on Purple Mountain, Outside Nanking, Stands the Mausoleum of China's Revolutionary Hero, Dr. Sun Yat-sen

Many Chinese tread the long pathway and 500 steps to the lofty terrace where stands the blue-roofed Memorial Hall and adjacent tomb. Dr. Sun died at Peiping March 12, 1925; his body was brought here four years later. The monument was designed by Lu Yen-shih, a Cornell graduate.

Kodachrome by W. Robert Moore

Workers, Steamer Passengers, and a Medley of Goods Congest Shanghai's Famous Bund

Automobiles, buses, streetcars, rickshas, and bicycles course the water-front thoroughfare. The large-domed office is the Hong Kong-Shanghai Bank; next to it stands the Customs Building. Farther right rise the sharp-towered Cathay Hotel and the tall Bank of China. In the distance (right) looms Broadway Mansions Hotel.



 Kodachrome by W. Robert Moore

With Hand on His Mauser, a Nanking Sentry Guards the Archives Building

In this modern structure of ancient design are housed the records of the Kuomintang Nationalist People's Party.

Patent Plants Enrich Our World

By Orville H. Kneen

ONE spring day Charles A. Martin was strolling through his apple orchard in the historic Natchitoches country of Louisiana when he noticed a sappy twig which had broken from an apple tree. This tree's rather tasteless green fruit was no better than any other local apple. Nature, in the Deep South, has always been inhospitable to standard, or Yankee, varieties of *Pyrus malus*.

Moved by impulse, Martin stuck the twig in a soggy hole. About a year later he noticed that it had taken root, so he transplanted it.

When the young tree came into bearing, Martin began picking, to his surprise, not the green, ill-flavored apples borne by its parent, but early fruit of excellent flavor and color, suitable for cooking and eating. Nature, in a generous moment, had supplied the very apple he and his neighbors had wanted for years.

Plant Patent Act Spurs Enterprise

Unlike many people in the United States, Martin knew about the Plant Patent Act, so he patented this new apple. Thus he acquired by law the right to be the sole proprietor of the new tree, and all cuttings from it, for 17 years. The law permitted him to license growers to propagate and sell cuttings, or grafted trees, and on every sale he could collect a royalty.

So Martin added his apple to a new and distinct class of "invention" which has taken its place among the millions of patents on file in the United States Patent Office.

Some of the inventions in this category are unique; some are extremely valuable, bringing as much as $10,000 for patent rights to a single plant. Such inventions are changing the aspects of our gardens. Others seem destined to alter some of our eating habits, and may extend fruit-growing areas by making trees more resistant to cold and disease.

Under patent law there always has been a "process" type of patent for use of fruit growers and farmers. As early as 1864 an Ohio man obtained a patent for his "process for retarding the bloom of fruit trees."

But the Plant Patent Act of 1930 was something new and different. It enabled Martin to obtain a 17-year patent on *the apple tree itself*. To obtain the patent, he had only to convince the patent examiner that his apple was a "new and distinct variety" and that it had been introduced to the public less than a year before his filing of the application.

The patent Martin received 13 months later included a four-color reproduction of a color photograph which his attorney had had made from a specimen apple (Plate VI).

Whether he was to make money on his patent, Martin realized, depended on how well he stood with the gods of business and good fortune. A new fruit variety must be tested, and often may require 20 years to determine its adaptability to various areas, its resistance to disease and insect attack, and its ability to produce good fruit regularly.

A Challenge to Growers and Amateurs

The truly unique law of 1930 provided a strong incentive to growers to be alert for Nature's "budsports," or chance seedlings, and also to develop their own hybrids. Any new variety, duly propagated, may be the basis for a valuable patent.

The widely known Delicious apple was a chance seedling. From a peach pit planted some 75 years ago originated the Elberta peach. The grapefruit is believed to be a natural mutation of the coarse-fruited shaddock.

Amateurs with sharp eyes have the opportunity to spot in their own gardens a sport worth patenting. Or they may find it growing wild in a field or in the woods.

Thus a picker in a Washington State apple orchard found a fine apple with four clearly marked segments, each different in color and flavor. But the grower never was able to locate the branch on which it grew. Perhaps he lost a fortune, because a "built-in" trademark like that would be observed and remembered by everyone.

At the Patent Office I learned that patentable characteristics may include: unusual habits of growth; relative immunity from disease and resistance to cold, drought, heat, wind, or soil conditions; color of flower, leaf, fruit, or stem; productivity, including everbearing qualities in fruits; storage ability of fruit; perfume, form, and other flower qualities; and ease of asexual reproduction.

I found a good explanation of the last-named term in the "case of the foreign heliotrope."

Growing a Blackish Heliotrope

In Guatemala, Quincy A. Shaw McKean found a heliotrope unlike any he had ever seen. He brought back to the United States several hundred seeds and planted them.

Three grew. Each seedling differed from its mates and from the mother plant. He

Staff Photographer Willard R. Culver

Is There "a Rose by Any Other Name" That Looks Like This?

Lawrence J. Blackmar, an examiner at the United States Patent Office, conducts a search to determine whether a new rose variety is patentable. Features which may be patented include unusual habits of growth; relative immunity to disease; resistance to climatic conditions; productivity; color of flower, leaf, or stem; keeping qualities; perfume and form; and ease of asexual reproduction (page 357).

never was able to induce seeds from these three seedlings to grow, but he did "asexually" (or vegetatively) reproduce the plants by slips or cuttings that quickly took root.

Selecting the best progeny, he destroyed all the others and applied for a patent, claiming the darkest-colored heliotrope known, a blackish violet outdoors. Other qualities included unique foliage, the large leaves having a peculiar suffusion of a violet-green shade.

McKean could not have patented one of his seeds. No patent is issued on seeds; or on vegetables (except one on a mushroom), or on any plants that grow only from seeds; or on tuber-propagated plants (potatoes or Jerusalem artichokes). A new variety propagated by layering (grounding and rooting a growing vine or runner, often done with berry bushes and strawberries), also is patentable.

Nor could he have patented merely an imported plant. Prior to his application he had to reproduce it asexually, thereby establishing its adherence to its mother type.

Plantsmen agree that this kind of plant creation is simple, even for the amateur, and that it often may be exciting. It is all too rare in our gardens.*

Of the more than 750 plant patents thus far granted, about half have been on roses.

Nearly 75 percent of some 175 patents on edible plants and products are on fruits that belong to the rose family—the Rosaceae—which includes apples, peaches, nectarines, plums, apricots, pears, cherries, and berries.

Farmer Yerkes's "Gift from Heaven"

Many of today's improved fruits—better-flavored, larger, better keepers, grown on more productive, hardier, or more resistant trees or bushes—originated as chance seed-

*See "The World in Your Garden," by W. H. Camp, National Geographic Magazine, July, 1947.

Staff Photographer Willard R. Culver

For a Plant Drawing, Her Grapes Must Be True to Color

A Washington, D. C., artist paints a water-color sketch of an improved variety of grape, to accompany the patent application. Since color often is one distinctive feature on which a patent claim is based, extreme accuracy is required. Use of standard color charts helps the patent examiner determine the exact shade.

lings, or sports, Nature's sudden, mysterious deviations from type.

"It could happen to anyone," said William F. Yerkes, a farmer who lives today near Rio Oso, in Sutter County, California. One day he found a peach seedling, origin unknown. It had sprung up near his kitchen door, a good place for a shade tree, at least. So he pruned and cared for it, and in its fourth summer it bore large yellow freestone peaches that reminded him of the Crawford, but were even better.

"I found it was an extra-fine peach, superior to anything I had known," he recalled. "So I decided to propagate it for a small trial orchard. There the vigorous young trees, with short stocky limbs, came so loaded with fruit that I had to thin them heavily. They never suffered from frost, while neighbors lost on other varieties."

His first 75 trees began bearing in 1930, the year the Plant Patent Act was signed by President Hoover.

In 1932 he made out his patent application, in which he recorded that the high-quality, well-colored fruit had a slightly spicy flavor, even when it was picked hard for shipping. Also, it matured at a time when no other good yellow freestone was on the market. He received his patent a year later.

What to do with what he called his "gift from Heaven"? He decided to let an agent market the trees. With no fanfare, his trees have gone all over the land, to the extent of several hundred thousand. His small royalty per tree enabled him to pay for a modest farm.

Now, almost 87, Mr. Yerkes still runs the farm his peach seedling bought him.

Dr. David Fairchild's long and varied activities in plant exploration and introduction included, 20 years ago, an experiment that has its lessons for anyone interested in patenting a plant (page 374). Although it was before the days of such patents, the observations of so famous a plantsman about plant

Staff Photographer Willard R. Culver

Ribbon Binder Joins Patent, Painting, and Description in a Single Document

After plant-patent applications are approved, this United States Patent Office employee assembles the three sheets and puts them together for sealing (opposite page). Often 12 to 18 months elapse between filing of an application and granting of a patent. The procedure is the same as for other types of patents.

inventors and inventions may well have promoted the idea of a law to protect them.

Dr. Fairchild had imported two varieties of Actinidia and had identified their family relationship. The Japanese *Actinidia arguta*, a hardy and vigorous vine, had borne in California a soft, sweetish fruit of low quality and small size. The Chinese *yang tau*, or *Actinidia chinensis*, of which seeds had been sent to him by Dr. Ernest H. Wilson,* had produced in California a few large fruits with the tart flavor and size of a giant gooseberry.

The two varieties were growing at Wild Acres, Maryland home of Dr. Gilbert Grosvenor, President of the National Geographic Society, of which Dr. Fairchild has long been a Trustee. When they both burst into bloom one spring day, Dr. Fairchild conceived the idea of crossbreeding them. A successful hybrid might provide an abundant and useful new fruit, excellent for jelly and sauces, growing on a vigorous arbor vine.

Crossbreeding was successfully accomplished, and in October the hybridizer gathered the fruits of his invention. He inspected and tasted the large, firm, tart product. Then he removed some seeds and sent them to friends for planting.

This was to be the real test of the hybrid: Would it produce plants true to the hybrid traits of the first-generation fruits that tasted so good?

A number of seedlings did grow, some in foreign lands. But the dream of a fruitful Actinidia hybrid was unfulfilled. Every one of the seedlings refused to bloom or to reproduce, a failing that hybrids exhibit only too often. So a successful Actinidia hybrid remains for someone else to achieve.

However, Dr. Fairchild's conception, and his detailed record of every step in the process, may well serve as a model for the amateur who "dreams up" a new variety of flower, fruit, or ornamental plant.

Opportunities for Amateurs

For the amateur the field is wide and open. There are about 280,000 species of plants, including fungi, now known in the world, of which perhaps a tenth are used by man today.

* See "The Kingdom of Flowers," by Ernest H. Wilson, National Geographic Magazine, November, 1911.

There are flowers of surpassing beauty but rankly odoriferous. David Burpee, no amateur, developed an odorless marigold by sniffing thousands of blossoms and selecting plants with little or no odor.

A breeder of Nashport, Ohio, Anna L. Miller, found a gladiolus, usually odorless, having the one element that its beauty required. She patented her fragrant gladiolus.

Large flower growers seek novelties adapted to large-scale marketing, and when an amateur develops a very good variety of flower a big firm may buy it outright for a substantial sum. If future sales appear uncertain, the firm may prefer to pay the cost of a patentee royalties, which often range from 5 to 20 cents a plant.

Today many growers and nurserymen pay for fruits that lengthen the marketing or canning season, or serve better for freezing or dehydrating.

Staff Photographer Willard R. Culver

Seal of the United States Patent Office Makes a New Plant Patent Official

The official seal is pressed over one end of the ribbon binder (opposite page). A final step in patent processing remains—the document must be signed by the United States Commissioner of Patents. The seal also is affixed to certified copies sent to courts in the event of litigation, or to foreign governments.

As a result of the arrival of spring and a study of the plant patent books of art, I have a dozen promising seedlings coming along in my peach nursery, a plot a few feet square to which I transplanted seedlings that came up from the residue of a year's canning.

I have also been told that my vigorous young black walnut tree, a chance seedling I brought home and stuck in a hole, will eventually grow me some good Persian walnuts (some call them "English") when I graft on the right stock. And I have a patented Blaze climbing rose coming along.

My rejuvenated apple tree last year had a nice crop. I'm looking it over carefully for anything resembling a sport.

It was the story of Lenton Newman that made me realize how generous a lady Mother Nature can be.

Nature Grows a Thornless Rose

This actually is the story of a tea rose, that ancient and universally loved Chinese immigrant that exudes the delicate fragrance of fresh, slightly crushed tea leaves.

One winter Lenton ("Spud") Newman, an east-Texas lad of 14, undertook with his father to grow roses on shares for a neighbor with a small business. The neighbor supplied them with several hundred rootstocks of hardy *Rosa multiflora japonica*, and the following summer he and his men aided the inexperienced

Staff Photographer Justin N. Locke

Golden-yellow, Pink-tipped "Peace" Was Born in France During World War II

Francis Meilland, famous hybridizer who developed this new variety abroad under the name of the Mme. A. Meilland Rose, is inspecting its successors growing in the gardens of the Conard-Pyle Company, West Grove, Pennsylvania. When Mr. Meilland visited the United States last year, he saw his new rose was progressing in this country. Patented by the Conard-Pyle Company, it was an All-America Rose Selection for 1946 (page 377).

Newmans by grafting on to each thrifty root a cutting from the fine and widely known E. G. Hill rose.

By this method the world's best roses are propagated, many of them on this same variety of rootstock.

One day the Newmans were harvesting their modest crop of roses. A bloom without a single thorn was noticed!

They transplanted it to their garden. Two years later they had taken off 26 cuttings and grown them into plants about a foot high. The original was by now some 30 inches tall. It and every one of its progeny were as smooth as lead pencils.

Spud told his high school principal, who wrote to his Congressman and learned that it was possible to protect the find with a patent. In September, 1940, the principal introduced the lanky young Texan to A. F. Watkins, one of the leading southern rose growers.

Watkins was skeptical. But he drove home with Spud and soon was feeling the long smooth stems with their magnificent bright-red blooms. The astounded Watkins was convinced and bought all plants and rights for $250.

Sudden Freeze Kills Tender Plants

Nurserymen removed the top and limbs of the little plants, the roots not being dormant for harvesting. As Watkins viewed the small bundle of sticks, which could have been squeezed into a handful less than three inches in diameter, he regretted his deal.

A month later his experts had obtained enough buds to graft about 700 rootstocks in the field. Then, in another month, the balmy Texas climate slipped a couple of cogs. The temperature dropped to below freezing!

The tender new tops of the young plants, which had been forced into vigorous new growth, turned black from the ground up. Though dug up and replanted, not one grew.

Fortunately for Watkins, he had previously budded some of the new buds on rootstock safely inside his Dixie Rose Nursery. These grew, and in December, 1941, Watkins applied for a patent. He received it in September, 1942.

The previous fall he had displayed thornless blooms at the Tyler (Texas) Rose Festival and honored the event by naming his new rose the "Festival."

His first lot of 70,000 thornless wonders—all had come true to type—he sold to a wholesaler, who passed them on to a mail-order house. Then 200,000 more were ordered.

On December 7, 1944, Watkins sold out to the Krider Nurseries, Inc., of Middlebury, Indiana. For his patent rights and all his stock he received $10,000. No higher price has been paid to date for any patented plant.

The Krider people also paid him $1,000 for a single sturdy plant—a climbing rose that likewise had lost its spikes.

Protected by the Plant Patent law, the Kriders' two thornless wonders can be sold for no more than any good rose, which is much less than fancy new roses brought in pre-patent days.

The only way a grower could make a profit on a new rose before 1930 was to build up, as secretly as possible, all the stock his capital permitted, then throw it all on the market at the top prices people would pay.

In a year or so, competitors would be building up their own stocks, grown from the no-longer-secret variety, now widely distributed.

Today buyers no longer have to pay $5 or $10 for a new rose, $10 for a new iris or gladiolus bulb, $20 for a fancy dahlia.

Each patented plant sold must carry a tag giving its patent number, which serves as a guarantee of its origin and assures fidelity to type.

Philadelphia Inquirer

Annual Rent for 5,000 Acres—One Red Rose!

Here little Amy Penn-Gaskell Hall, a descendant of William Penn, receives the payment from Miss Elizabeth Barbara Graves at West Grove, Pennsylvania, to satisfy terms of a title transfer from three sons of the founder of Pennsylvania to his grandson, William Penn. This traditional rental stipulation has been continued for 216 years. The Chester County Historical Society unveiled a marker at this presentation on September 6, 1947. The rose is a Mirandy, patented by the Armstrong Nurseries, Ontario, California (page 377). It was grown by the Conard-Pyle Company, of West Grove. Robert Pyle, president of the company, watches the ceremony.

Milton's Eden of *Paradise Lost*, with its "flowers of all hue, and without thorn the rose," might well have included some painless berry bushes (Plate VIII). Not till Luther Burbank's day did anyone set out to breed away the thorns, and it took the master breeder 30 years to grow a good-flavored blackberry on a thornless vine.

Only four and a half months after the Plant Patent law was passed, an application was made on a sport that had been found in a 10-acre patch of Young dewberries, or

youngberries. This was a vine that was entirely thornless and stayed so.

Later there was a thornless barberry; then a thornless Logan blackberry, or loganberry, found in a California garden; and a thornless hybrid, found in a thicket, that grew prolific crops of a new kind of berry.

But before a thornless variety can displace ordinary varieties, nurserymen say, it must be combined with prolific bearing, good flavor, and other qualities. Also, new strains must be adapted to growing in various areas. Superior thornless berries are still sought.

Golden Grow Some "Red" Apples

Chance selection has been improving the apple for thousands of years.

While Johnny Appleseed was spreading his cider-mill seeds all over Ohio, Indiana, and Illinois, young James Stark was riding west (in 1816) to Pike County, Missouri. His nursery, expanded by his sons and grandsons, soon began seeking and breeding hardier and more productive fruit trees. In 1894 the Starks discovered the famous Delicious apple, a product of a farmer's sport tree, and sold this variety by the million.

A Delicious apple tree limb that bore blood-red early fruit netted its New Jersey finder $6,000. A Golden Delicious, located on a West Virginia mountaineer's hill, was worth $5,000 to Paul Stark, fifth-generation seeker of new varieties.

Years later, after the Plant Patent law came into being (for which Mr. Stark is given much credit), the search for early reddeners brought the Starks a surprise—a red-skinned hybrid of Stark Golden Delicious. Frank A. Schell, Cashmere, Washington, hybridizer, who originated this new apple, received $7,500 for his patent rights, highest sum paid for any fruit up to that time.

Limbs or chance seedlings of apple trees accounted for 20 out of the first 26 apple patents. Improved types have been planted in Illinois, California, Virginia, Michigan, and Tennessee. One Delaware patent protects a cooking-eating apple that ripens two weeks earlier than Yellow Transparent, earliest on most markets.

By a combination of natural sports and careful breeding the fruit industry continues to let out its belt, extending the growing areas far into Canada, into parts of Alaska, and south to the Gulf.

Ever since Samuel H. Rumph planted a Chinese seed in his Georgia orchard and raised the first Elberta, this variety and others, like the yellow Crawford, have shown ambition to improve by means of natural sports.

More patents have been issued on peaches than on any other plant except the rose, and three out of every four are sports or chance seedlings.

Middle West growers have been seeking cold-resistant peaches for more than 40 years. Some varieties recently patented have withstood 20 degrees below zero, then have bloomed and borne fruit. In Queenston, Ontario, a small limb produced ripe peaches when all the rest were still green, beating Elbertas by six weeks. In British Columbia an early variety of Rochester was found and patented.

After 40 years of research, California in 1947 had varieties which enabled it to grow 40 percent of our commercial peach crop.

One variety (Plate IV), the patent on which was assigned to the Armstrong Nurseries, Ontario, California, has borne 50 to 100 peaches only 15 months after being planted as a knee-high switch. Another grows top-priced fruit ready for market before the first of June.

$10,000 for a Peach

Not long ago, J. Frank Smith, Arkansas orchardist, found a freak limb on his July Elberta (a Burbank creation patented after the master breeder's death). Smith's limb ripened three weeks early, and the Starks recently contracted to pay him $10,000 for his patent rights. To date, that is tops for a patented fruit tree.

A Virginia researcher, Dr. F. W. Hofman, after years of crossing and recrossing, bred a peach with winter hardiness and other qualities, including "plumlike, waxy, and smooth or non-fuzz skin." It may be classified as a true nectarine—a peach with a smooth skin.

We have had the fuzzless peach for many years, but its delicacy makes shipment difficult, and the tree is highly susceptible to diseases.

Of the eight nectarine patents, four are on sports. One is for a tree that grew from some peach pits thrown out of a garden. Several grew into peach trees, but one produced yellow-fleshed nectarines.

The patent was assigned to the Agricultural Experiment Station at New Brunswick, New Jersey, where a second generation of this tree grew much larger fruit than its parent.

Plums and the Patent Law

Harry C. Robb, Washington, D. C., attorney credited with conception and final achievement of the Plant Patent law, told me the idea

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Pale-yellow Petals, Carmine-blotched, Make This Spanish Rose Patentable (Plate I)—→

Sept. 29, 1936. P. DOT Plant Pat. 197

ROSE

Filed March 16, 1936

Inventor
Pedro Dot
By Robert Robb
Attorneys

Aug. 23, 1932. R. L. CATRON Plant Pat. 23

ROSE

Filed Jan. 16, 1932

ROBERT L CATRON
Inventor

Attorney

11

Oct. 13, 1942. G. JANSSEN Plant Pat. 550

ROSE PLANT

Filed April 13, 1942

WITNESS

Addison E. Avery

George Janssen,
Inventor,
by Lancaster Lancaster & Davis,
Attorneys.

From "Better Times" (Plate II) Came This Sport of Variegated Hues

March 28, 1944. W. E. LAMMERTS Plant Pat. 621

PEACH TREE

Filed Nov. 27, 1943

Inventor
Walter E. Lammerts
By Robb & Robb
Attorneys

A Babcock and "July Elberta" Cross Produced These Bigger, Tastier Peaches
Heavy Yield, Hard Fruit Are Strong Points of This Sweet Cherry Hybrid (Plate V)

Sept. 17, 1940. H. B. FABER ET AL **Plant Pat. 421**

CHERRY TREE

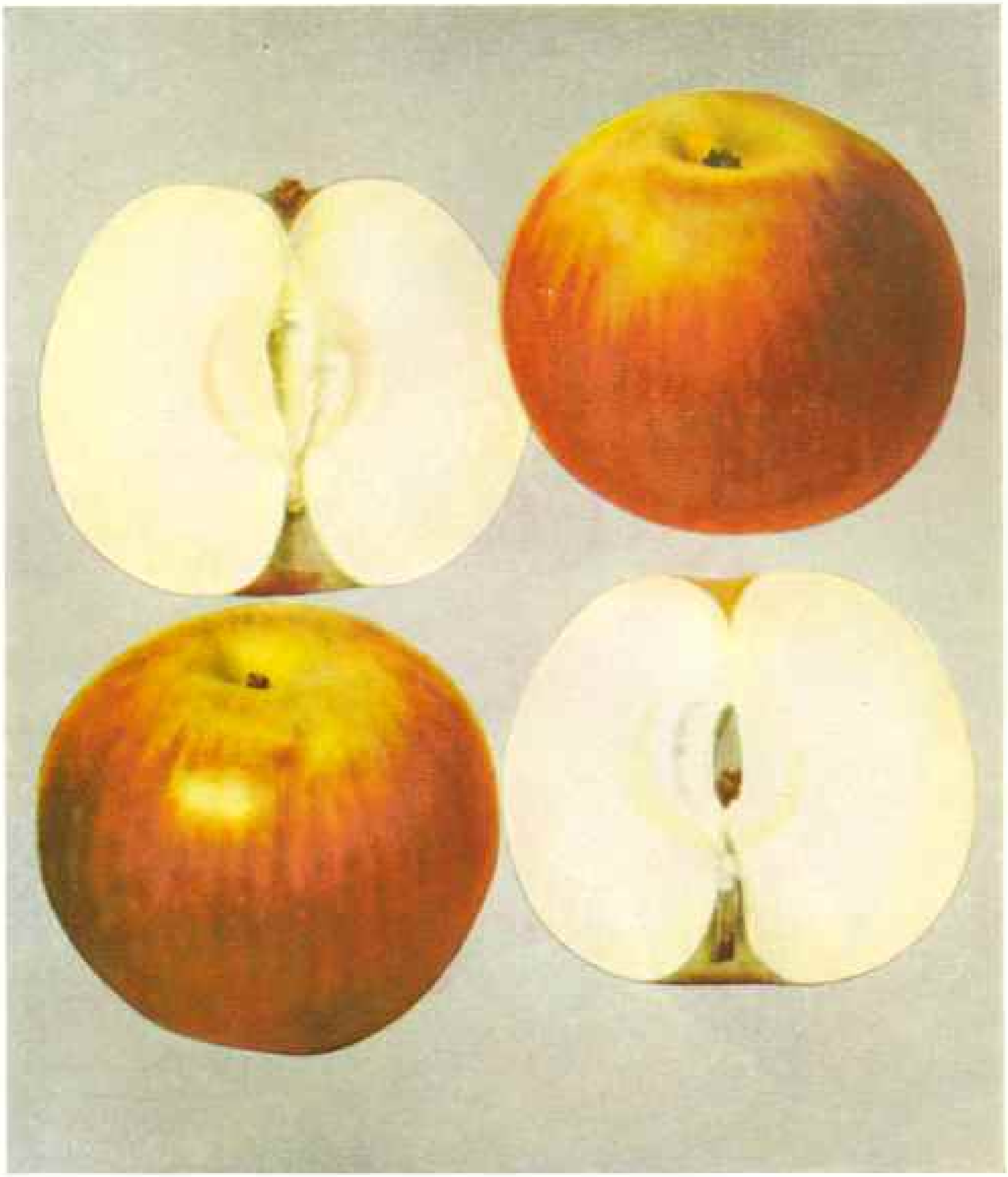
Filed April 18, 1940

Inventors
H. B. Faber
G. A. E. Zeigler Jr.
By Robb & Robb
Attorneys

Jan. 5, 1943. C. A. MARTIN Plant Pat. 564

APPLE TREE

Filed Dec. 2, 1941



Inventor
C. A. Martin
By Robert Pobb
Attorneys

By Chance an Orchardist Grew This High-quality Apple in Louisiana

VI

Dec. 10, 1946. A. CUMMING Plant Pat. 718

CHRYSANTHEMUM

Filed Jan. 2, 1946

INVENTOR
Alexander Cumming
By Orville M. Kile
plant pat. Agt.

From a Connecticut Nursery Comes the Scarlet Pompon Chrysanthemum

VII

March 9, 1943. M. B. CRANE Plant Pat. 571

BLACKBERRY PLANT

Filed Oct. 20, 1942

Inventor
M. B. Crane
by Robb & Robb
Attorneys

Boon to Pickers—a Thornless, Long-bearing Blackberry Plant

came to him some years before 1930, when he was denied even trade-mark protection on a plum evolved from years of hybridizing. He concluded that a special patent law was the only solution for the plant inventor's problems.

Burbank died four years before the patent law was passed, but his fame as a pioneer hybridizer doubtless helped to obtain passage of the law.

Perhaps nothing would have pleased the plant magician more than to know that five patents were issued in 1932 on some of his finest plums, fruit of more than 40 years of breeding that had seen creation of some 60 new varieties of plums.

Paul Stark, whose family firm is carrying on Burbank's research, told me that its aid to the famous hybridizer could have been greater had there been a patent law to protect its investment in developing new varieties. Royalties paid Mrs. Burbank, he added, total nearly $50,000 and will continue for years.

Burbank and other hybridizers made the plum a valuable fruit for California and later for Oregon and Washington. But in most States it is still a delicate tree and offers a luscious target for plant inventors.

Apricot Is a Delicate Immigrant

The apricot is not yet perfectly at home in this country, though it has been known for more than 4,000 years. Today it challenges our inventors by coming into bloom just as spring frosts are due.

Seeking a hardier apricot, Burbank crossed it with the plum; his "plumcot" was one of the early indications that crosses between different genera could be made.

Some 25 years ago began the importation of hardy types from northern Asia, Japan, and Europe in a systematic program to foster real hardihood. A Minnesota man has patented a variety which, grafted on a hardy hybrid plum root, withstood 47° below zero.

Another need is good keeping quality. California grows up to 90 percent of the Nation's supply; Washington most of the remainder. By far the greater part is canned. Improved varieties would greatly increase the consumption of this fruit, which is truly delicious when tree-ripened.

Mouth-watering but unacclimated, the Bartlett pear is a prey of fire blight and other enemies; so today most of this luscious fruit is grown on the Pacific coast, where cooler and dryer summers keep down the blight.

Hybrids with a Chinese pear as one parent are more resistant but not of top eating quality. Not long ago Nature lent a hand by hybridizing a highly resistant Anjou on an Illinois farm. Another of the four pear patents was on a hardy seedling of unknown parentage at St. Louis Park, Minnesota.

In California a sport limb produced pears of dark reddish-brown color instead of the green hardy color. Buds were grafted on quince seedlings, then limbs from these were grafted back onto hardy pear trees. These produced a new and more marketable pear. A seedling of unknown origin, in Fairport Harbor, Ohio, produced a round pear with pink flesh.

Wanted: Hardier Cherry Trees

When Henderson Luelling, or Lewelling (later to be joined by his brother Seth), trekked from Iowa to Oregon in 1847, he carried along some cherries, from which grew the industry that today supplies most of our "sweet" varieties, such as Bing and Royal Ann (Napoleon).

The three Pacific Coast States supplied 82 percent of our 1947 crop, and seven western States supply the greater part of all that are grown for market. Even today the big sweet cherry that floods into far-western markets is a luxury in eastern cities.

Growers still seek early, hardy, productive, and well-flavored varieties, both sweet and sour. But our trees, progeny of those from mild parts of the world, often are caught by spring frosts. The hot dry summer in parts of the South is bad for them, and the humid areas induce brown rot.

Michigan, great sour cherry State, has had three patents, all based on sports. Two are early ripeners, one a late ripener. The late bloomer may escape spring frosts.

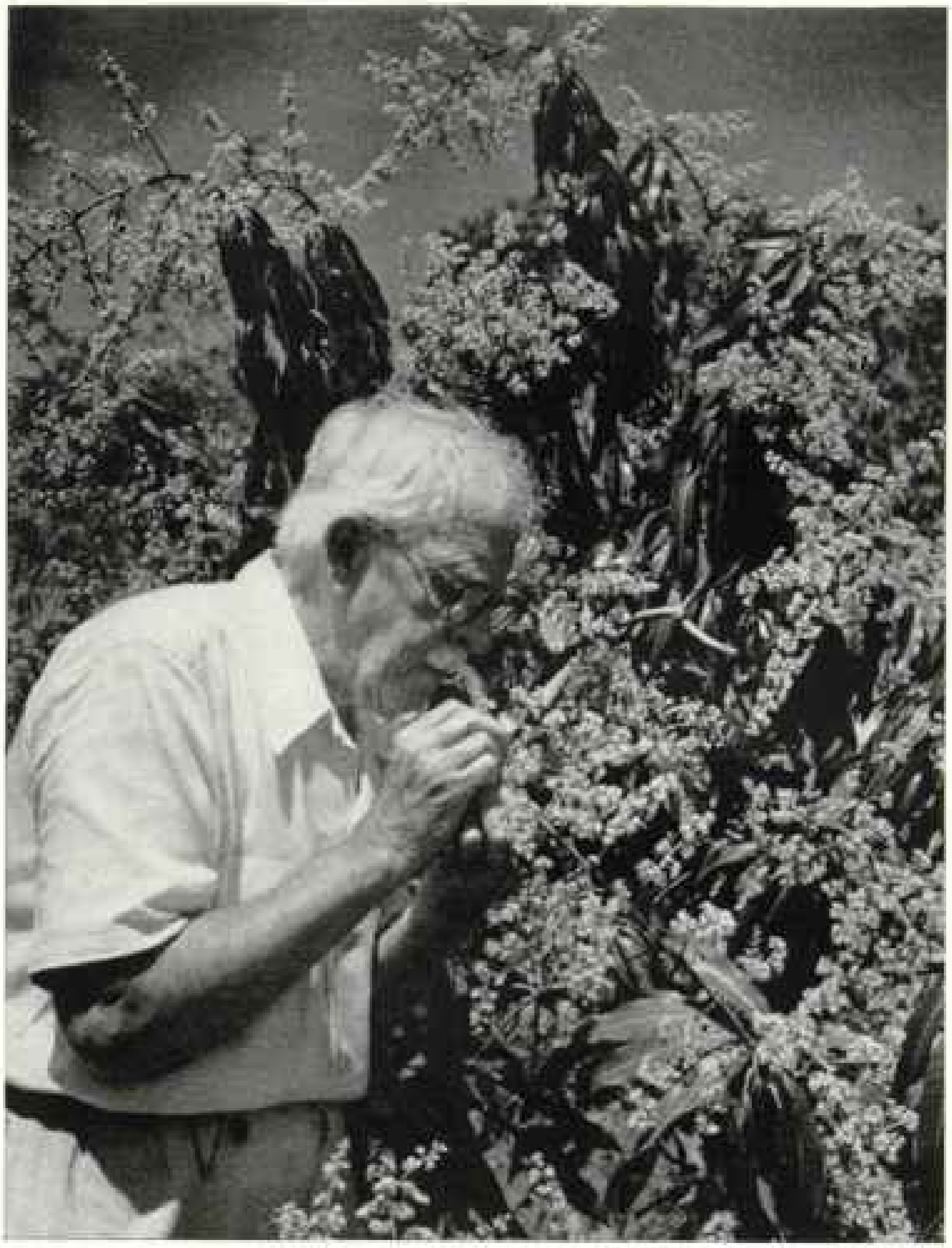
A hybrid sweet cherry developed in York, Pennsylvania (Plate V), is a prolific bearer of fruit that is hard even when fully ripe.

In all, eight patents, not counting an ornamental cherry with pendulous foliage, point to further extension of the cherry areas.

The Strawberry: Native American

The wild meadow strawberry of North America migrated to Europe about 1700 and there was wedded with the luscious Chilean beach berry. Our repatriated berry thrives from Florida to parts of Canada and Alaska. Literally tens of thousands of pure and hybrid strains are grown today. Experiment stations will test any new types that show promise.

Ten patents have been issued, to residents of States as far apart as Michigan, Maryland, Oregon, Massachusetts, Washington, Virginia, and Tennessee. Senator George D. Aiken, of Vermont, patented an everbearing berry that grew good crops both summer and fall.



Staff Photographer Willard R. Culver

In Jungle, Marsh, and Desert, Dr. David Fairchild Has Found New Plants

Here the distinguished botanist examines mango blossoms in his garden at Coconut Grove, Florida, where he constantly experiments with many useful plants he has collected on his world trips. In 1897 Dr. Fairchild was called upon by Secretary James Wilson to organize foreign seed and plant introduction for the U. S. Department of Agriculture. Fields, orchards, gardens, parks, and lawns all over the United States bear the impress of his work of more than 35 years. He has been a Life Trustee of the National Geographic Society since 1905.

All the citrus patents to date originated as sports. The first, in 1933, was for a seedless colored grapefruit, now grown widely in Texas and central Florida. This variety originated as a sport limb on a tree of Thompson pink, in Texas. Its colored rind is a natural "trade-mark." Red- or pink-fleshed citrus fruits are most common in the "desert" areas.

A seedless lemon was patented by a Californian in 1939. Another grower found a fruit combining the flavor of lemon and orange. In Florida a seedless pineapple orange was patented in 1941, and a seedless navel orange of unknown parentage but high quality was found in a small isolated grove. In 1930 a very early-maturing orange grew on a sport limb in the top of a Parson Brown orange near Dundee, Florida; it matured five to eight weeks early and was patented in 1945.

The Citrus Gold Rush

Today's citrus production has leaped to almost a third more than the 1935-44 average. In 1947 Florida, California, Texas, and Arizona produced 1⅓ boxes of citrus fruits for every man, woman, and child in this country. There is little doubt that the golden flood will rise steadily as more-productive varieties are planted.

Nine patented avocados, mostly based on chance seedlings, are available to improve our salads. Some have high oil content and nutty flavor. Oddly, this "alligator pear," though of high food value, cannot be cooked or canned. The avocado was one of the first fruits of the world-wide explorations begun by Dr. Fairchild and Barbour Lathrop in 1899.

More and Better Fruits and Nuts

Early-ripening grapes, others with high sugar content, still others that are seedless though they grew on a seed-bearing parent, give promise of increasing our huge crop of grapes. In 1947, 37 States grew grapes for market, and an improved variety might have wide appeal. Of last year's crop more than 43 pounds were marketed in some form for every person in this country.

Two patents have been granted on the fragrant and gorgeously colored mango, which is increasingly important as a crop. Dr. Fairchild grew scores of varieties, some of them chance seedlings. One patented mango produces fruit 11 inches long by 7 in diameter; the other produces a smaller but good-keeping and shipping fruit.

A Californian has patented a cherimoya. This tropical American fruit has been difficult to keep and ship, but the new variety is suitable for picking while immature, as it later ripens to its full flavor, a combination of pineapple and banana. Some of its fruits, weighing nearly a pound, have over 26 percent sugar content.

Sugar cane yielding up to 17 percent of the cane weight, and resistant to mosaic and leaf diseases, has been patented by Dr. Benjamin A. Bourne. With improved strains the Florida and Louisiana industry was saved from extinction and today averages more than 400,000 short tons of raw sugar per year.

Carpathian Walnut Thrives in U. S.

Usually, when we plant a walnut from one of our long-hybridized trees, it fails to produce a satisfactory tree. But when a walnut was brought from the Carpathian Mountain area of Romania's Bucovina (where a temperature of 50° below zero has been recorded) and planted in the Yakima Valley of Washington, it yielded annual crops of as much as 270 pounds of large, full-meated nuts.

The pecan, best of our native nuts, thrives naturally from Iowa to the Gulf. One patent was issued to a pecan specialist who spotted an unusual tree in a wild grove owned by an oil company. Permitted to take some buds, he grew a heavy-bearing variety. His tree blooms late, but its fruit matures early.

Nuts like these would add valuable crops to many a farm and garden.

Few plant discoverers have had more thrills than did a Tulsa, Oklahoma, man when he found the pendulous juniper. He had tried without success to breed a Rocky Mountain silver cedar with drooping branches. One day he saw a woodsman about to cut down a seedling that was "weeping" exactly as he desired. A limb was all he needed to propagate the graceful juniper he later patented.

Other finds and hybrids include an improved tobacco plant for Connecticut, a hybrid hop in Oregon, a hardy mock orange in Minneapolis. A sport dogwood found in Kentucky grows white flowers four to six inches across.

A Minneapolis man patented a grass which made a very tough, dense, and resilient turf. Traced to a probable sport on a strain of bent, it has proved to be a vigorous grower.

Some 30 years ago a chemistry professor, Dr. Ralph H. McKee, who was also chemist for the American Paper and Pulp Association, believed that some of our vacant lands should be growing lumber and pulpwood. But he found that the fastest grower of commercial pulp—the aspen, or quaking-leaf poplar—grew too slowly for a profitable crop.

Later, learning of the work of Dr. Augustin Henry, of Kew Gardens, England, he initiated and directed scientific research which evolved hybrid poplars, the best of which grew amazingly fast.

He reports that nearly half a million of his patented poplars now are growing more wood per year and per acre than any of Nature's varieties will produce outside of the South. With them owners of cutover land (one such owner has acquired half a million acres) can plant a crop that yields annual returns about as soon as does an apple orchard.

An Eden of patented flowers would be a riot of colorful and strange variegations, some bred by Nature, others by man. A blue African violet, when bred with a pink sport, produced a new pure-white variety. The same strange result came from crossing a pink geranium with a white-cream type.

A bright Castilian red carnation originated as a sport on a pink variety. But most of the 35 carnation patents are the result of careful breeding.

At the ornamental plant greenhouses of the Bureau of Plant Industry at Beltsville, Maryland, I saw hundreds of carnations of all colors being bred to obtain pure strains and to develop disease "tolerance" and other commercial qualities. Some grow to a diameter of five inches. The outdoor dianthus, a sister species, has been used in these hothouse hybridizations.

Giant Dahlias, 4-inch Pansies

Gigantic blooms, such as those of the freesia patented in 1946, have been the goal of some flower breeders. One dahlia bears 16-inch flowers, large enough for a sunshade, which grow on stems seven feet tall. Harold L. Ickes's patented dahlia grows blooms up to nine inches across.

Two greenhouse men in Westport, Connecticut, after years of breeding, obtained amazing pansy plants that grow three to five feet high. Each has from 10 to 15 stalks, bearing flowers four inches or more in diameter on stems 12 to 15 inches long.

These are used as cut flowers in season. They have been seen at the White House and at social functions in New York. A million

Staff Photographer Willard R. Culver

From This Graft an Apple Tree Will Produce a New Fruit

With a grafting tool the pomologist inserts in the limb a twig from a newly developed variety of apple. Taking life and strength from the growing stock, the twig will become a limb and will bear its new variety of fruit. Such grafting is done early in spring when growth has started in the stock to be grafted, but the twig is still dormant. Here at the Plant Industry Station of the U. S. Department of Agriculture, Beltsville, Maryland, improved types of apples are sought by careful selection.

blooms of this patented hybrid are sold each season. No seeds or plants are marketed.

Other unique flower patents include the widely sold pink delphinium and long-keeping gardenias. There are summer-blooming chrysanthemums, and varieties hardy enough for any winter.

The color of a new chrysanthemum (Plate VII) is claimed by the patentee to be "more brilliant and closer to scarlet than that of any other variety known to me."

A dwarf azaleamum grows only six to eight inches high. For window-box gardeners, two miniature roses from the Netherlands produce perfect blooms scarcely the size of a dime. One has a slight tea fragrance. A tiny peach tree that grows in a pot reaches only 30 inches when mature and grows real peaches. It first grew as a seedling in France.

To achieve long-lasting qualities in potted azaleas, the rhododendron, a closely related plant, has been bred with them.

Numerous and gorgeous are the new patented varieties of camellias, rhododendrons, hibiscus, water lilies, snapdragons, buddleias, poppies, geraniums, and poinsettias. There is a real need for flowers and ornamentals that thrive in the shade.

Roses Are Red—Why Never Blue?

Roses now come in every color and tint of the rainbow—save one. For her own private reasons, Nature has declined to give us a blue rose. The undesired bluish cast of a fading red rose is bred out by use of a slight yellow strain.

Nor has a "black" rose been found or bred, although long sought; a near approach is the deep-violet Nigrette, bred in Germany and assigned to the Conard-Pyle Company, patentees of numerous roses. In some lights Nigrette appears black.

Many of the 350 commercial varieties of the rose in use today are not patented.

The Better Times rose (Plate II), most propagated of all, gave rise to various sports later patented. Plate III is a highly variegated sport.

Better Times was a sport on a rose imported many years ago by E. Gurney Hill, founder of

the three extensive Hill concerns of New Richmond, Indiana. Hill, around 1900, found that hothouse roses—even the famed American Beauty created by George Bancroft, noted historian-diplomat—were becoming low in vigor and often were cut down by mildew. He began infusing the outdoor vigor of the wild rose into our indoor weaklings.

Finding a strong cerise-petaled sport, Hill hopefully named it Better Times, patented it in 1932, and then gambled everything on propagating 400,000 plants. With these and their innumerable progeny the country's florists shook off their depression blues and sold literally millions.

Henry A. Dreer, Inc., of Philadelphia, imported and patented Crimson Glory. Its blooms, with deep velvety crimson petals and carmine edges, are seen everywhere, and as a "dominating" male parent it is a favorite with breeders who desire rich coloring or red tints.

Staff Photographer Willard R. Culver

Waxy Compound Seals Air from a New Apple Tree Graft

H. H. Moon, associate pomologist, Plant Industry Station, Beltsville, Maryland, completes a grafting operation (opposite page) by painting the sawed and slit end of the limb. The sealing compound is not removed, and sometimes clings to the limb for three or four years until growth pushes it off.

Crimson Glory was one parent of a rose which became the most valuable plant patent of the Armstrong Nurseries. In 1935 they made a lucky cross of Crimson Glory with a yellow Sister Therese and obtained a beautiful seedling with cerise bloom.

As the Charlotte Armstrong, this variety won most of the national awards, and in 1941 scored the highest rating of All-America Rose Selections. This was after the usual two-year test in 18 test gardens of this country. The judges of this pre-introduction test are the most expert of rose fanciers. Anyone may submit a new variety for test under varied conditions.

The fragrant red Mirandy, which gained a similar award in 1945, is an offspring of Charlotte Armstrong. Both are steady "best sellers," and these two roses alone have earned more than half a million dollars for the firm.

In 1936 Francis Meilland, scion of generations of French rose breeders, began work on a hybrid seedling that by 1940 struck the Duke of Windsor as "the loveliest rose in the world."

Robert Pyle, who since 1907 has searched Europe for fine roses, brought this "Mme. A. Meilland" here in 1943 and patented it. Now known as the Peace, its unique "very double" bloom is a blend of delicate tints of yellow, pale gold, cream, and ivory, with a ruffled edge

Staff Photographer Willard R. Culver

A Dozen "Pink Bountifuls" Make Up This Dainty Wristpiece

Bunches of such patented midget roses often are displayed at flower shows in thimbles, or in tiny glass bottles. Several dozen make up a formal corsage.

of pink. Fully opened, it has a diameter of five inches or more (page 362).

Another Conard-Pyle importation (Plate I) is an oddly bicolored rose from Spain. The basic color is pale yellow, on which splotches of carmine may cover half a petal or even the entire petal. Rarely are two of these odd blooms alike, and the unique colors change as the blooms age.

Eugene S. Boerner, director of research for the world's largest rose growers, Jackson & Perkins Company, told me that patent control has given his company the chance to test its new creations, often for three years or more.

His latest, the scarlet-red New Yorker, has survived the tests of 80 "test station" growers from Florida to North Dakota.

Rose growing today is big business, for nearly 50 million are grown annually for florists and for garden use. Since the war's end, production has been tremendous. California sold $10,000,000 worth in 1947, while Oregon, Texas, Pennsylvania, and New Jersey together grew roses worth about twice as much more.

X-rays and Chemicals Cause Plant Mutations

Scientists foresee the day when increase of the human race may depend upon man's ability to develop food plants with maximum productivity and resistance to natural enemies. Equally necessary may be improved trees to produce our lumber, pulpwood, oils, and food products more rapidly.

Some hybridists and geneticists hope to cause new and beneficial changes in plants by solving present mysteries of the genes and chromosomes and their inheritance influence on living plants. These scientists are slowly mastering the use of "tools" for doubling or tripling the chromosomes, often producing mutations by heat and cold treatments, exposure to radiations such as X-rays, and application of chemicals like the powerful but poisonous colchicine.

Exposure of a regal-lily bulb to X-rays resulted in a mutation, a flower with peculiar anthers and other changes which persist in the bulbs that grow from the parent's bulblets.

No colchicine-treated plants have yet been patented, but experiments indicate that the doubling or tripling of chromosomes resulting from use of this drug, or from similar means, may lead to useful and desirable changes in plants. Such methods hasten Nature's processes and perhaps will lead toward plants far different from those of today.

The Romance of American Furs

By Wanda Burnett

IN 1947 in the United States retail fur dealers sold an estimated $450,000,000 worth of furs. The pelts which fed this huge industry poured into the markets from all the fur sources of the world. They were swamp- and forest-trapped, home-grown and ranch-raised. They arrived as raw pelts and emerged as silky-textured warm fur coats.

The man with the trap starts this tiny bit of fur rolling along one of the most involved and confused paths in all industry.

From animal to finished garment these skins, moving along the processing trail, are repeatedly scraped of fat, graded, dressed, dyed, blended, and bleached. The fur is cut, sliced, matched, patched, let out, let in, stretched, nailed, squared, and stitched. Each operation may be done at a different place. Some may be combined in one plant.

Cheap furs are snatched from bundles and expertly made to resemble costly ones. Muskrats thus become "mink," "sable," or "seal." Raccoon and some sheepskin, each by a different process, emerge either as "beaver" or "nutria." Common rabbits get their stenciled spots and come forth as "leopards."

Costly furs are made more costly by a "let out" process of slicing the skins into thousands of pencil-thin diagonal strips and stitching them together again in a manner which lends grace and beauty of line to the finished coat but adds hundreds of dollars to the price (page 391).

Pelts Pass Through Many Hands

But even before these pelts reach the cutter's table or the stitcher's bench, they pass through many hands. The collector receives them from trappers and fur farmers. He scrapes off the fat overlooked by the trapper, sorts for size, color, and quality, and waits for the big city merchant to pick up from here.

These merchants are located in St. Louis, Seattle, Minneapolis, and other cities. Many are concentrated in New York City. Their representatives visit the collector, paw through the mounds of pelts, and ship the selections back to their city warehouses. Here pelts are again sorted and bundled, this time to suit the needs of the smaller city dealer.

Then dressers and dyers, magicians of the fur trade, begin to come into the picture. Many manufacturers who buy their skins raw send them to their chosen experts in this field to be processed before actual making of a fur coat begins.

Manufacturers are as varied in their interests as are the furs they handle. Not all of them make coats. And those who do, don't all make the same kind of coats. Some are strictly "sportswear" makers. Others create "dress coats" only.

Some make trimmings—collars, cuffs, or both. And the trimming trade is again broken down to include those who merely stitch together tiny bits of fur pieces into long strips known as "yardage."

Retail houses bulge under the load of coats which pour into their salesrooms. But again the wholesale houses supplying them are divided.

The greatest volume comes from quantity houses, which produce on a lavish numerical scale but keep well within the low-priced range. They push their wares along the assembly line at a frantic pace, making magic with rabbit fur and inexpensive lambskins.

Popular-priced houses make both dress and sport coats, take furs slightly above those of the volume houses, but send their products into retail channels which also aim to please the lady with the slim pocketbook.

At the head of the class is the style house, working in fine furs only and catering to the "one of a kind" customer. To protect their buyers against duplication, they sell not only the coat but the pattern as well.

This is the usual course of a pelt, but occasionally there are slight deviations. If the collector, for instance, is in need of cash, or anxious to clear out his stock to make room for more incoming pelts, he by-passes the big city merchants and ships to auction companies.

When I arrived in Milwaukee, the American National Fur Breeders Association was scheduling a sale of ranch-raised "sundry furs." Pelts had been pouring into the warehouse by the hundreds of bundles. They represented the trappers' catch and those taken from numerous Midwest fur ranches.

Attending a Fur Auction

The American National Cooperative Fur Auction was to be at a local hotel, but furs were being shown at a warehouse a few blocks away. Pelt previewing had been going on for several days. Buyers from New York, Chicago, and other fur cities had been crowding in with their catalogues, pencils, and notebooks.

I saw these men, white coats or dusters worn over business suits, wandering around in the furry forest of pelts. They eyed the skins from every angle. There were few exclamations and very little conversation.

Staff Photographer Robert F. Sisson

A New York Fur Runner Is Wrapped Up in His Work

This is Seventh Avenue, the Nation's fur capital, a block from Pennsylvania Station (center). More than 3,000 fur firms are crammed into the district. At lunch hour their workers congest the streets and vie with the trade's four-wheeled pushcarts for sidewalk space. Furs worn by intershop delivery men are so common they seldom get a second glance (page 383).

Auction showroom helpers took the bundles from the racks, lugged them over to the north windows to give prospective buyers better light and closer inspection.

The skins, hanging tail down from the tight-packed steel rods, were all numbered and registered. Their lot numbers corresponded with the catalogue numbers and would serve as the only guide at the auction, since no furs are exhibited at the sale.

They ranged in grades from "Tops" to "Bottoms." Some of the least desirable and mangy-looking fox pelts were classed XYZ—the lowest possible grade. Some were NTs, or what fur men call "No Types."

With nose firmly in hand, I gasped my way from bundle to bundle. The odor was so strong it was almost visible. When I reached the rack of beaver "blankets" hanging like huge overdone flapjacks, I was reeling. The beaver is by no means the only offender. Many commercially important fur bearers, including the costly mink but excluding the priceless chinchilla, have scent glands.

Fur men relish the smell. They call it "that money smell."

The smell meant money to old-time beaver trappers, too. Before the days of synthetic perfumes, castoreum from the beaver's two scent glands was saved and sold to perfumers as a base for many flower scents.

Beaver Helped Shape History

As I fingered the huge raw beaver pelts—coarse, unplucked, and definitely unlovely—it was hard to believe that this unattractive fur could have played such a part in American history (page 402).

To supply a fashion-hungry European trade with beaver for felt hats and stoles, traders, trappers, and explorers pushed their way into the vast untapped wilderness of the North American Continent.

The promise of "lands full of beaver" lured them along the Mississippi, the St. Lawrence, and into the Great Lakes region.

The beaver laid the foundation for the Hudson's Bay Company. It was the basis for John Jacob Astor's fabulous fortune. The second Pilgrim ship dispatched to England from American shores carried two hogsheads of beaver pelts and otterskins.

In some sections of the continent the man with the trap went in advance of the ex-

plorers and missionaries. Threading his way through dense woods and treacherous swamps, he left trails which later became routes of travel.

The Indian, who had trapped only to satisfy his own meager food and clothing wants, became a professional hunter when these white men filtered into his territory with offerings of axes, blankets, and trinkets for furs.

Beaver pelts became the "coin" of the times. Debts were paid and goods purchased on the "beaver standard." Six prime pelts bought a single woolen blanket. A musket stood upright brought in exchange as many flat pelts as the musket was high.

At sites of some old centers of the fur trade many of America's greatest cities have since been built. Where the Wrigley and Tribune Towers lift their heads high above Chicago's jagged skyline, weary trappers once repaired their boats before setting out across Lake Michigan for Mackinac.

Today Mackinac is one of North America's finest island summer resorts. In the days of the fur traders it was the headquarters for Astor's American Fur Company and the clearing-house for furs and supplies of the Northwest.

St. Louis, too, was once a fur-trading post, expanding as it became the base for expeditions into the Far West. San Francisco, Detroit, and New York City, all had their days as fur-trading centers.

Wide World from Press Assn

Selling Two Muskrats, a New Jersey Boy Earns $3.50

Amateur trappers, mostly landowners and farm boys, do much of the muskrat hunting in the United States. When snow stops crop work, the farmer's marshes provide a small winter income. In the fur trade, sheared and dyed muskrat skin is known as seal-dyed muskrat.

Beaver in the Raw

One of the men in charge of the American National Cooperative Fur Auction warehouse showed me why beaver in the raw has little resemblance to beaver as a finished product.

With a knife he began ripping out the coarse guard hairs from one of the pelts to expose the soft, downy texture of the underfur. This unhairing is still a hand operation and a highly skilled one. It was only one of the ninety-odd steps through which a beaver pelt passes.

These same stiff guard hairs, which fur-bearing animals produce primarily as a protection against moisture, were once the only hairs left on the pelt. The soft fur fiber, so highly prized today, was at that time carefully "combed" from the pelt for the plain and fancy headgear of Europeans.

The demand for these skins soon became a serious threat to America's resources. Hundreds of thousands of beaver pelts were being shipped out of the country every year.

Fortunately, a timely whim of fashion snatched these hats from stylish heads and replaced them with silk ones. As styles changed and other furs began to lead the fashion parade, the value of beaver pelts tumbled. Trappers began setting their bait for other animals and Nature was allowed a breathing spell.

Nowadays, in practically all States where beavers are still found, the seasons for taking them are closed, and the State Game and Conservation Commissions manage the taking of beavers. The annual crop is about 100,000 to 125,000 pelts.

Back at the hotel, the auction was about to get under way. Long rows of tables covered with stiff white cloths ran the width of the room (page 384).

Bidding Tense, but Silent

The auctioneer, the master of fur ceremonies, stood like a judge at his bench. Spotters, those alert men who mysteriously snatch unspoken bids from the audience, were spaced on each side. Unlike most auctions, the bidding was started by the auctioneer and began high. It toppled from the peak bid downward until some interested buyer took the bait, a spotter shouted "Up," and the sale was on.

A lift of a finger, a raised eyebrow, or a nod from a buyer indicated he had "upped" the bid. Prices were for one pelt only, but set the price for each pelt in the bundle.

Within less than an hour 3,000 mink went under the hammer. The top price for the day was $36 a single pelt.

By taking an average of $25 per pelt times 80—the number of skins generally used in a full-length coat—I figured that coat would cost in raw pelts around $2,000. And a raw pelt is many costly steps removed from the finished garment.

The electric numbers behind the auctioneer corresponding with the furs being offered rolled by so fast that I was always a few bundle numbers behind the bidding.

Early-day auctions were tense, too. Sales were by "inch of candle." A pencil-thin candle, bristling with pins, was set up at the beginning of the sale. As the hurried flame licked its way from pin to pin, bids were received. The furs went to the man who shouted his bid as the flame reached the last pin and flickered out.

The first platinum fox pelt was started at a high bid of $200. It tumbled to $96 before it was sold. Full silvers, half silvers, and quarter silvers were put up. Some of these I had seen at the warehouse—bedraggled, "thin," or "rubbed" XYZ pelts. They sold for 50 cents each.

The once popular red fox now is bought chiefly to be bleached and dyed to imitate its aristocratic brother—the platinum fox.

Skunks and raccoons were quickly disposed of, some of the poorer grades bringing as little as 5 cents per pelt.

Seventeen hundred beaver skins were dropped in less than fifteen minutes. The highest price was $76 and the lowest $60.

These were today's prices. Tomorrow's might be different.

Fur auctions have a language of their own. Bidders who wade in too deep financially are said to have "got their noses wet." The gentleman with the checkbook who bails them out is known to the trade as a "factorer."

If an auctioneer isn't getting his price, he buys them back himself by "taking a bid from the chandelier." "Prompt day" is the day of reckoning when the fur farmer, trapper, or collector gets his pay from the auction.

America's New Place in Furs

Before World War I almost all American furs were sent to Europe either for dyeing and dressing or to be sold in London or at Leipzig "fairs."

America was little more than a trader in the world's fur business. Millions of skins were exported, but none were dyed or dressed in this country. Formulas, usually secret, were locked in the minds of the men who handled them in Europe. America exported, Germany dyed and dressed, and London ranked as the largest seller of raw peltries.

With shipping curtailed, the United States began looking into its own dye vats. Dressers and dyers from London, Leipzig, and Paris were imported. Furs which had previously crossed the Atlantic to be dyed, dressed, and returned now stayed at home. Kettles boiled and bubbled. Dyeing progressed.

Alaska seal, formerly dyed only in London, became an American product, fine as any dyed abroad. Muskrats, usually sent to Austria and Germany for dressing and manufacturing, also became a "made in America" product.

Furs soon began piling up. Not only domestic, but imports from Russia, Japan, and China. A slump in prices for Canadian furs sold in Paris and London sent these streaming hopefully into American markets also.

And when shipping through the Suez Canal was blocked to the millions of Australian rabbitskins which normally poured through this waterway into Europe, these, too, began riding the Pacific toward American shores.

In 1911, pelagic sealing—the indiscriminate killing at sea of male, female, and pups—

Staff Photographer Robert F. Sisson

"Fashion" Dictates a Fleece-lined Windbreaker for Work in Fur's Cold-storage Room

Lampson, Fraser & Huth, Inc., a New York auction house, receives many pelts untanned and therefore subject to spoiling. A temperature of 15° to 20° F. preserves them indefinitely. Moths are controlled in some plants by raising the temperature to 50°, then plunging it suddenly below freezing. Speculators, buying out-of-fashion pelts, store them in cold, often for years, until an urgent demand sets in. Profits sometimes are enormous, losses often heavy.

was stopped in Alaskan waters. The United States Government took control. The pelts—taken from the three-year-old "bachelor" seals only—were shipped under Government control to St. Louis for processing and selling.

The mounds of fur grew higher and higher. Auction centers seemed to be the answer.

The first fur auction held in the United States was in St. Louis in 1913. In 1916 New York City set itself up as an auction center. But when the war ended, London once again recovered its fur position.

Later, when World War II swept over Europe, the auction scene shifted again. New York City reached out for first place, and St. Louis, once a strong leader and a great fur city, took second place. Milwaukee became an ambitious newcomer because of its location in the heart of the fur-farming section.

New York's "Fur City"

Many of the Milwaukee-auctioned peltries are shipped to New York City, where, in about five square blocks, some 90 percent of all the new fur coats for the entire United States are manufactured.

From Franklin E. Bonn, Jr.

Not a Pelt Is Shown, Scarcely a Word Is Spoken; Yet This Fur Auction Throbs with Drama. Competition Is Keen

The American National Fur Breeders Association, a fur farmers' nonprofit cooperative, conducts the sale in Milwaukee. Its auctioneer, standing in the center of the sales block, starts the asking price arbitrarily high and proceeds downward until he gets a bid. On either side his spotters look for a nod or a lifted pencil. At the foodless banquet tables sit the buyers, watching their marked catalogues and the electric sign (right), which flashes lot numbers like a cash register. Before the sale they have inspected the actual furs, to decide how high to bid (pages 379, 382).

Staff Photographer J. Baylor Roberts

When It's Dinnertime on the Wisconsin Furring Range, Thousands of Phantoms Creep Out of the Forest and Haunt the Road

A moment ago a horse cart of the Fromm Bros. range delivered these silver foxes' daily pound and a half of meat apiece. Food pans, provided for sanitary purposes, are made secure lest they be dragged away. These fenced ranges near Hamburg hold 35,000 animals. Freedom is brief. November-December snows, which develop heavier, more valuable pelts, call the foxes to the last roundup (pages 393, 396-7).

© Genesee Mountain Fox & Mink Farms, Inc.

Why Shouldn't He Grin? His Pelt Is Worth $100

Various types of platinum fox originated at different times in Norway, Wyoming, Colorado, and eastern Canada. Colorado-Canada blend produced a sky-blue type called Geneseblu Platinum. This Genesee Farms specimen is two months old.

My introduction to New York's "fur city" came as I stepped out of the Pennsylvania Station one morning and turned south.

My entrance into the district was abruptly halted by a procession of dollies, or carrier carts, being pushed through the streets. Fox tails and whiskers, dangling from their metal rods, barely cleared the littered streets. Racks of gleaming black Persian lamb coats, silver fox jackets, moutons, and various others jolted past me.

Runners with rush jobs to deliver darted in and out of this fantastic parade (page 380). One held his prize—a choice beaver coat—high above the crowd and, to protect it further, he wore gloves.

Another ambled along carrying his "rush" and a greasy bag of doughnuts in the same hand.

Wearily came an old man, white coat crumpled over his suit, carelessly dragging his bundle of silver fox-skins.

My eye scanned the windows of the tall buildings shouldering each other along Seventh Avenue. Their ads, all about fur, read like a classified section of a telephone directory.

More than 3,000 separate companies wedge themselves into this congested area extending south from 31st to 26th Streets with its outermost boundaries barely touching Sixth and Eighth Avenues. Its pulse beats more rapidly along Seventh Avenue, and the narrow streets which stem east and west for the most part house the smaller shops and dealers.

Into this small city within a city pour the furs of the world. Muskrats from the swamps of Louisiana, Maryland, New Jersey, New York, and other States. Sealskins from Alaska, wild mink from Canada and ranch mink from the thousands of United States fur farms. Beaver from Canada, Montana, and the Northwest. Sable from Russia, kidskin from China, Persian lamb from South-West Africa; and so on.

Between noon and 1:30 o'clock it is almost impossible to walk through this section.

This is lunchtime, but conversation is strictly about fur. Jobs are exchanged, bargains sealed, prices set. Frequently a runner squeezing his way through the mob with an order is stopped while some cigar-chewing curbstander fingers the pelts and comments to his neighbor about the quality.

Every shop carries its own signs of want or sale. Cards stuck in windows read: "We Have Alaska Seal," and "Mink Cutter Wanted." In windows where men stand hour after hour smoothing, shaking, and blowing into the fur of various pelts and matching them for color a sign boasts, "We Match Any Fur in the World." Another proclaims more simply, "Furs Matched."

Seventh Avenue ground-floor shops do business behind bolted and padlocked iron-barred doors. To satisfy insurance companies and to protect against possible theft, they keep their furs and employees in sight, but in safety.

Dealers in Heads and Tails

On the side streets, nearest the fringe, are usually the open-door hole-in-the-wall places, numerous and often poorly lighted one-room shops. Some deal in tails only. Others sell heads. Some of them are strictly "paw" men whose business is counting, matching, and sorting Persian lamb paws for coats and trimmings.

One tail man told me he often counted as many as 75,000 tails in a month. A paw man very soberly said he must have counted at least four times that many, since his animals all had four feet and only one tail.

Some places deal in old furs only. Here men rip, sort, and match. Often they search through hundreds of bedraggled and worn fur coats for that microscopic "good spot" that could be used for patching.

Ten Million Muskrats for Coats

The hopefuls who are of the district, but not quite in the main current, cling like determined barnacles, dealing in neither hide nor hair but in such trade items as linings, muff beds, shoulder pads, and button forms.

A. Hollander and Son, Inc., has its business office tucked away in the fur district, but its big processing plant spreads over more than a block in Newark, New Jersey.

More than 10,000,000 muskrats alone are handled at this plant in a year's work—enough to make at least 150,000 full-length coats. The pelts are "dressed" (i.e., tanned), then returned to the manufacturer for assembly into "plates"—stitched-together fur pieces which make up the backs, fronts, sleeves, and collars of coats. The plates then come back to Hollander.

Almost a thousand local people work here

Staff Photographer J. Baylor Roberts

Raw Fleece and Finished "Beaver" Are Sisters Above the Skin

Master Industries, Inc., at St. Paul, will turn these hides into mouton beaver by the Calva process, a chemical formula for rearranging the structure of fibers (page 399). Plastic beaver is waterproof, mothproof, and almost wearproof, and it costs only a fraction of the real thing.

Fish and Wildlife Service

Each Year the Aleuts on St. Paul Island, Pribilofs, Salt Down 60,000 Sealskins

At roundup time excess males are driven on to the tundra, stunned, killed, and skinned. Carcasses and blubber are made into meal and oil on the island. Pelts are shipped to St. Louis, where the Fouke Fur Company, agent of the United States Government, processes and auctions them. An Alaska sealskin is so light and pliable that an entire pelt passes through a napkin ring. These Aleuts live on the Pribilofs. The Government feeds, clothes, doctors, and schools them (pages 391, 394).

in small groups. Some sort, stamp, and number the plates as they arrive, so that all the pieces of one garment can be easily identified.

Some brush in chemicals to condition the fur for dyes. Others operate the huge sawdust-filled drums and cages into which the furs are repeatedly introduced after each process for special cleaning, greasing, drying, or dampening.

A muskrat pelt which aspires to be a finished coat does much traveling. After the sorting, numbering, and chemical conditioning, the pelts are ready for the "ground blending," a process by which the muskrat receives its all-over basic coloring.

Then they are again returned to the manufacturer, who flips them over, fur side down, dampens the leather, and begins shaping and stretching them into a space determined by an outline traced on a board.

Once the "fit" has been achieved, he nails the skins to the board for drying. Before they are returned to the Hollander plant, they are "squared," or cut exactly for size.

With preliminaries completed, they are sent back to Hollander where the muskrat gets its "stripes" of distinction, those dark, finely made lines which make it "akin" to the costly mink.

The first stripe is made with the aid of a tapered ruler and a narrow brush dipped in dye. But each successive stripe—and there are many made over this original one—is strictly an "eye" job, done with a turkey feather and spray gun (page 393).

The feathers come from New England turkey farms and must be from the left wing for right-handed workers and from the right wing for left-handed workers, because of the direction in which the feather bends.

Staff Photographer John R. Fletcher

"Ladies," Says the Salesman, "Please Observe the Beautiful New Look"

This wild-mink coat, modeled in Saks Fifth Avenue, New York, falls within 13 inches of the floor. It is priced at $7,200, including tax. Prominent is the new dropped, rounded shoulder line. Skins on the back are worked in a sunburst effect, narrow at the shoulders and flared out at the hemline. Customers select style and matched pelts; their coats are made to measure.

Striping is done with dyes, but the term "dyed" is seldom applied to the muskrat. Because the dye is introduced from the tip of the hair to the pelt from the top side rather than by immersing the entire pelt in a dye bath, the term "blended" is preferred. Thus a processed muskrat becomes a mink-*blended* muskrat, a sable-*blended* muskrat, or some other fashionable *blend*.

In the basement men wearing knee-high rubber boots tossed muskrat plates into huge tanklike vats equipped with water-wheel paddles. I climbed the ladder and looked into one of the tanks. Hundreds of pelts were sloshing around and around for one of their many cleanings.

In another room small iron kettles bubbled away on tiny iron stoves.

A handful of dye boiled in these kettles was enough to dye all the furs that could be crowded into a single vat.

In still another room were stored these valuable dyes—the carefully guarded secret of the fur trade. Bottles, sealed cans, and glass jars stood on their shelves in nameless but numbered neatness.

We visited the drum room where furs receive their sawdust baths. The huge wooden cylinder-shaped drums were revolving with their loads. Some were filled with the type of sawdust which cleans, others with the types for greasing, dampening, or drying.

Each time a chemical or dye touches the coat pieces they are tossed into a drum. Each time they leave the drum they are "caged" in metal mesh-enclosed cylinders which spin at a furious pace to force the clinging sawdust from the fur.

Plates Handled a Hundred Times

I asked how many times each plate was handled before it was considered finished.

Staff Photographer Robert F. Sisson

Nailers Tack Down Furry "Ropes" for Shaping into a Masterpiece in Mink

Here some 65 skins, "let out" thrice their original length, lie face down on a paper pattern. Moistened, they have been stretched to uniform length. Nailed fast, they will dry for a day. Collar, if any, and sleeves will be added at the finishing. Hanging patterns look like white shirts on a line.

"Well, I should say at least a hundred," Mr. Paul Hollander answered. "You see, each time a coat gets a stripe, for instance, it has to be drummed. It may go into the drum with hundreds of other coat pieces. But before it can get its next stripe, it has to be sorted again according to its serial number so that the original striper gets the same coat back for all the striping" (page 393).

In one room hung hundreds of coats. I stepped in just long enough to read the thermometer. The temperature stood at a sizzling 110°. This was the drying room, thermostatically controlled, where coats spend a short period.

Standing at waist-high tables, glazers brushed in the secret formula which would make the muskrat a rich and lustrous fur. They brushed the fur flat with the solution, then in reverse with a glazing stick.

Elsewhere I found the versatile muskrat being kicked, plucked, sheared, and dyed to resemble Alaska seal. This time the term "dyed" is used rather than "blended," because the entire pelt gets a thorough dowsing.

Here one machine, equipped with power-driven paddles, or "feet," trampled and kicked the pelts into pliability by working oil into the leather. Indians achieved the same result centuries ago by walking barefoot on the skins.

Another machine plucked out the guard hairs. One sheared only the sides of the small pelt, while still another sheared the back. But their efforts, plus the dye job, all added up to the finished product—a good imitation of a genuine Alaska seal parading under the trade banner: Hollander seal-dyed muskrat.

The pelts I had seen here—and there were others in addition to the muskrat—were a mere handful compared with the hundred or so different kinds of animals which contribute to this expansive industry.

Armour

Starting a Coat, a Cutter Slices Minkskins into 6,000 to 7,000 Furry Ribbons

This is a preliminary step in the costly "letting out" process, which achieves beauty of line. Later the strips, fully severed, will be sewn in a different position, so that the skin becomes long and narrow, rather than wide and short. Casual examination shows no trace of these changes (page 379).

Some of these went through as many processes as did the muskrat. Others, expensive ones such as mink, sable, and chinchilla, were painstakingly worked by hand.

Wearing Qualities of Furs

I found numerous conflicting opinions about the durability of the muskrat as well as of various other furs. One furrier said that durability didn't depend on the fur bearer but on the fur wearer. Another said it wasn't a question of *what fur*, but *what for*.

Still others agreed that two skins of any two animals might look identical but wear differently. This, they explained, was because one animal was pelted when it was "prime"—fully furred. The other was taken too early and was "unprime."

Different parts of the same pelt have different wearing qualities. The backs of most animals wear better than the sides. The sides generally outwear either the bellies or the paws, but the fur trade uses them all.

I finally managed to extract from a maze of pros and cons—after taking many factors into consideration—the fact that otter is generally considered the most durable of furs. Mink, beaver, Alaska seal, raccoon, and Persian lamb also rate high on this chart.

Harem Life of the Fur Seals

In the Pribilofs, a small group of islands off the coast of Alaska, thousands of fur seals congregate each year. The males arrive in advance of the females, usually in May, to fight for the choicest rookeries.

When the females begin approaching the islands in June, the bulls start their battle all over again. Each male, with much bellowing and blowing, seeks to gain and hold as large a harem as possible. Those who are either too young or too weak to fight for family rights become "bachelors," segregate themselves from the main herd, and live in

solitary bliss on another island (page 394).

From these exclusive bachelor quarters three-year-old "idle bulls" are selected for pelting. The catch for 1947 was 61,447 pelts, having a raw pelt value of between $2,500,000 and $3,000,000.

Curiously, the pups, born on the rocky fog-bound islands within a few days after the females' arrival, have little natural inclination for the water life they are to lead. They receive their encouragement by sound "spankings" administered by the parents.

Conservation, killing, and shipping are under direct supervision of the Department of the Interior's Fish and Wildlife Service.

The skins are salted (page 388) and shipped to St. Louis where the Fouke Fur Company, under Government contract, dresses, dyes, and auctions the pelts. Processing each skin takes approximately three months; operations number well over a hundred.

Before the arts of dressing and dyeing were perfected, many of the pelts were shipped to England to be used for trunk linings.

English trunk makers lined trunks in the winter and laid bricks in summer. These versatile gentlemen of two trades boasted of their ability to outdrink any other tradesmen. One day, ignoring a rush order, they gathered round the forbidden pot of ale to prove their prowess.

An argument arose. A scuffle resulted. A barrel of water, and probably much ale, was accidentally sloshed over the pile of skins lying on the floor. Frantically the workmen attempted to dry the pelts. The fur was exposed to the intense heat of an open fire.

The skins dried, but some of the hairs fell out. One bright lad discovered they were only the stiff top, or guard hairs, and that the fur left had the softness of velvet. He suggested they pull out all the top hair and line the trunks with plucked pelts.

The proprietor was none the wiser until his customer ordered more trunks. This time there was no accident and the workmen filled the order with unplucked pelts. The customer refused the shipment. Only after much questioning did the puzzled proprietor extract the true story of those linings from his crew.

After this accidental discovery, sealskins were used for coats and trimmings, but they were still heavy and bulky and far removed in beauty from the velvety sealskin coats of today.

Evolution of Fur

The first covering used by man was the skin of an animal. The cave dweller who stalked his prey through vast forests and over wide plains became the world's first manufacturer and dresser of hides when he crudely cured his catch and wore the pelts.

The Bible relates, "Unto Adam also and to his wife did the Lord God make coats of skins, and clothed them."

Down through the ages furs have often been the prize of battle, the badge of royalty, and even money.

Their use has been restricted by laws which dictated what could be worn and by whom.

These laws made ermine and sable the sole property of kings and queens. They granted furs of lesser beauty to the nobility. The type allowed bishops was denied to other individuals still farther down the social scale. Some were forbidden the use of any fur in their meager wardrobes.

In the United States the evolution of fur from a luxury to a necessity of general use came with steam heat. As radiators began to sizzle, people became too warm indoors. Ladies began to shed their under woolens. Clothing was restyled. Indoor clothing became lighter in weight, while outdoor clothing became heavier and warmer.

Then the furriers, sensing fortunes to be made, stepped in. They began tossing out coats on a scale and in a price range which almost every woman could afford and few could resist.

The demand soon exceeded the supply. Nature could no longer fill the traps fast enough, and fur farming on a scientific basis began.

World's Largest Fur Farms

Although mink had been raised experimentally as early as 1866 in the United States, the fox sped ahead to take the honors.

On Canada's Prince Edward Island in 1894 Charles Dalton and Robert Oulton began experimenting with red and silver foxes in an effort to produce a true breeding strain.

The first publication of their sales figures in 1910 established the success of their venture. They received an average of $1,339 for 25 pelts.

The idea soon filtered through to American fur men. By 1913 the boom was on and breeding stock had skyrocketed to as high as $35,000 for a pair of proved breeders—almost 50 times the price of a single pelt. But this bubble popped. Pelt values toppled. Men who had sunk fortunes into silver foxes dropped out.

A few farseeing ranchers began buying foxes at rock bottom prices and, with normal profits in mind, began fox farming on a sounder basis.

Staff Photographer Robert F. Sisson

A Striper with Spray Gun Dyes Muskrat to Look Like Mink

The first of these dark lines is applied by yardstick and narrow brush; others are done "freehand" by eye, turkey feather, and gun. As each stripe is marked in, the coat is fluffed with sawdust in a revolving drum at the Hollander plant in Newark, New Jersey. For each additional stripe it is returned to this man, as another worker might alter his style (pages 388, 390).

There now are approximately 7,000 fur ranches in the United States. Wisconsin alone has more than 800. They range from the small one-pen backyard type to two of the largest fur farms in the world, Fromm Bros., Inc., and the Nieman and Co. ranches (pages 396-7).

A few animal experiment stations have been set up for research in feeding and general management under direction of the Department of Agriculture, and also in the College of Agriculture, University of Wisconsin.

Trappers who contribute millions of wild pelts to the market every year have been taken under the wing of the Government, too. The Fish and Wildlife Service of the Department of the Interior acts as "parent" for the man with the trap as well as supervisor for the seal catch in Alaska.

Fromm Bros. have their fox and mink pens scattered over more than 20,000 Wisconsin acres. This includes farms at Thiensville, north of Milwaukee, furring grounds at Hamburg, manufacturing plants at Merrill and New York City, and the huge laboratory at Grafton where animals may have their ailments treated.

A close runner-up, operating just a few miles from the Fromm farms at Thiensville, is one of the Nieman establishments. Nieman's combined ranches often exceed Fromm's in the number of fox pelts sent to market. As many as 40,000 prime foxskins have been taken in a year.

At one of the seven Nieman farms I found Ronald G. Stephenson, an energetic individual whose business is fur, but whose side interests range from fishing and photography to zipping around the country in his own plane. He runs his own commuter's service between his Cedarburg ranch and his furring range at Hermansville, Michigan.

My first introduction to Mr. Stephenson was rather abrupt. We shook hands. I was ushered into the farm's utility room. The Venetian blinds were pulled down. I was seated among the bottles and benches and various serums. A movie screen was tossed up at one end of the room. And the story of fur farming began to unfold in color.

The complete life of fox from pup to pelt was shown. Carefree days in pens from spring until early fall. The shipping of thousands of animals by truckloads to their winter

From the Rocky Pribilofs the Roar of 3,500,000 Alaska Fur Seals May Be Heard Miles Away in Bering Sea

Each June the cows settle down on two islands to drop their pups. In harems ranging up to 100 cows they are bossed by breeding bulls five times their size. For three months these bulls do not eat or drink but live off their blubber. Meeting all challengers, they wind up the season emaciated and exhausted. Government regulations allow only surplus three-year-old bachelor bulls, living on the fringe of the colony, to be taken for their furs (pages 388, 391).

furring grounds in the north. The few brief weeks of freedom when these ranch-raised foxes were allowed to roam over thousands of wooded acres just as their wild brothers before them had done.

The horse-drawn carts lumbering over miles of snow-covered roads to deliver fresh meat to the animals. The depositing of little mounds of red meat beside the road. The shadowy forms of foxes stealthily moving through the woods toward the food (page 385).

Mr. Stephenson explained that the animal, subjected to the extreme cold and freedom of the range, grows a thicker coat of fur. Under these conditions the prime pelt is glossier, the fur heavier, the skin more valuable.

Fox Heads for Last Roundup

Unknowingly, the fox heads for his last roundup in late November or December. Men trained for this tricky work close in on the animals from every part of the range, driving them toward wired enclosures.

The fox, by now, has tasted and approved of his freedom. He shows resentment and runs wild. The chase is on.

Once caught, the animal meets his death quickly and painlessly. A few whiffs of gas or chloroform are sometimes used, but most ranchers prefer electrocution.

The next reel showed the skinning room. With incredible speed the pelt was slipped from the carcass. The operation is quick, but not simple. About 20 separate steps and as many persons are involved in "peeling" the pelt.

Many workers were women. One was an expert at removing the tail bone. Another slit the tails. Some loosened the skin on the heads. Others concentrated on the area around the eyes. The job of loosening the skin around the toes, legs, and haunches fell to still others.

Each step was a move toward that quick final zip of the loosened skin when the pelt leaves the carcass as one fully furred skin.

Next we climbed to the top of one of the farm's lookout towers. From these vantage points a rancher can tell whether all is well with the little foxes.

Directly below us was a complete fox family—the father stalking along his well-worn paths through the tall grass, his offspring tumbling along at his heels, and the vixen, sitting calmly on her haunches.

I could see in every pen foxes following their trails—never taking shortcuts, never beating new tracks, but, like their untamed ancestors, following the well-worn, self-made, "safe" course.

The fox family suffered from no housing problems. They all had duplex establishments. Mr. Stephenson pointed out that one was for living in and the other was for hiding.

"Another hangover from the wild state," he explained.

To fool and elude her enemies, the wild vixen frequently moves her family from one den to another. Ranchers soon found that they must supply the domestic fox with means to satisfy this instinct.

From the tower we worked our way through deserted mink pens toward the southeast corner of the ranch. Stephenson began putting on heavy gloves. I was puzzled and decided this was all part of the show until he entered the pen of a golden-throated, weasel-like animal which screamed insults at him and called upon her offspring to do likewise.

These were the hard-to-raise marten—American relative of the Russian sable. Only a few of these, I learned, had been successfully ranch-raised.

Stephenson finally shut the mother in her "second" house and took one of the protesting young. It looked like a miniature bear cub with a cuddly disposition. Its brother screamed and snarled at us from his safe perch inside the pen.

"They're funny little animals," Stephenson said. "They mate in the summer, but don't produce until the following March or April—if at all!"

It was the "if at all" that stumped me.

"It seems that the female just carries the fertilized egg around in a sort of undecided or dormant state until about December. At this critical period, a change in diet, weather, even a change in keepers, can affect the development or production of young," he explained.

The Temperamental Mink

Not all Wisconsin ranches are limited to fox raising. Some have mink and foxes. Some specialize in mink alone.

Fromm's ranches at Thiensville and Hamburg accommodate some 25,000 mink as well as the huge fox family.

The fur of this restless, and often vicious, cousin of the weasel fades, "rusts," and generally dulls in bright sunlight. So Fromm has his mink population tucked away in a dense grove of trees.

The grove was well leafed over when I visited the ranch.

The mink is a temperamental animal as well as an extremely valuable fur bearer. Its food requirements are very much the same as those of the fox—horsemeat plus mink mix.

An Airplane Passenger Above Wisconsin Would Never Guess What Grows on This Farm

Some 50,000 foxes and 50,000 minks live behind wire on the 15,000-acre checkerboard. Here Fromm Bros., Inc., and Nietman and Company maintain offices, cold-storage rooms, and a food-preparation plant near Thienville.

Vernon J. Kraft Studios

In Duplex Huts, Each with Private Lawn, Foxes and Vixens Raise Silver Furs for Man

Fenced-in protection does not destroy the foxes' instinct. Like their wild brothers, they want twin dens with dual escape hatches, one for living in and the other as a maternity ward (lower right) (page 393).

But if the frisky little mink gets a prolonged diet of raw fish he develops a strange disease—Chastek paralysis.

Mr. J. S. Chastek, a fur farmer of Minnesota, discovered this malady among his mink when he fed them raw fish for three weeks straight. Now fish, when fed, is either cooked or limited to Friday's menu or, at most, stepped up to two or three times a week.

I made a hurried trip north to Green Bay to visit Harley Wittig's ranch. Mr. Wittig devotes his time to raising fancy mutations—those Silverblus and Royal Kohinoors which bring fabulous prices (page 400).

Some of the kit mutations, squirming in their nests, still had their eyes tightly closed to the world.

As we went from nest to nest picking up these tiny mouselike creatures, he explained that the mink kit when born seldom weighs more than a fifth of an ounce and is about the size of a cigarette. Within six months they are fully grown and prime.

Visiting a Chinchilla Ranch

There are hundreds of chinchilla ranches in the United States, ranging from the happy "twosome" raised in a parrot cage to the thousands scientifically housed and fed on farms.

I visited Dr. M. R. Howard's Genesee Mountain Fox & Mink Farms, Inc., in the snow-capped mountains west of Denver. In three cinder-block houses several hundred adult chinchillas and their offspring had taken up housekeeping.

These tiny, rodentlike animals which contribute their small pearly-blue, gray-black, softer-than-down pelts to some of the most expensive fur garments made, originally had their home in the high reaches of the South American Andes (pages 400, 401).

Before the fleet little animals were almost completely wiped out of existence by persistent hunting of the Indian trappers and their dogs, an American mining engineer, M. F. Chapman, caught a few.

Chapman searched the Andes of Peru, Bolivia, and Chile for five years before he obtained the four females and seven males he brought back to California in 1923.

The descent from their mountain homes to sea level took almost three years. The trip down was made a few hundred feet at a time, with stopovers to allow the animals time to become adjusted to the difference in altitude.

On the 40-day jaunt from Chile to Los Angeles there were many weather shocks. While crossing the Equator the animals were kept on ice. Four days from their destination in the Northern Hemisphere where winter was in full swing—at which time, had the chinchilla been at home in the Southern Hemisphere he would have gone into a summer seasonal "molt"—Mr. Chapman's entire "catch" shed their fur.

Shivering, and almost nude, the animals made their spectacular entrance into California wrapped in woolen blankets and surrounded by hot-water bottles.

Ancestors of the alert animals I saw scampering around in their spotless cages on Dr. Howard's farm, as well as the stock of hundreds of other chinchilla ranches in the United States, were those eleven hardy fur bearers brought from the Andes to California.

These were the only animals so far encountered on my fur journey which were without offensive odor.

The chinchilla, I learned from their enthusiastic caretaker, makes an excellent pet (if you can afford one), is extremely fastidious, intelligent, and curious.

"Watch!" the caretaker said. "Want a raisin, Susy?"

Apparently Susy did. She practically turned somersaults of delight. When a sunflower seed or a peanut was substituted, she sniffed the edible bit and none too politely cast it out of her life.

A Model Chinchilla Home

Chinchillas are vegetarians, eat very little, and are inexpensive to raise. Their once-a-day rations consist of vegetables, fruit, grain, a little hay, and an occasional raisin for dessert.

"Even with high prices," I was told, "it seldom costs more than $4 a year to feed a chinchilla. Sometimes only $2."

There was a fountain at one side of Susy's cage which she could turn on and off by merely bumping her nose against the tiny tap. A "tub" filled with pure white sand stood invitingly in one corner.

Here Susy and her spouse took their baths by shuffling around in much the same fashion as a sparrow taking a dust bath. They also roll over like a horse. And fastened to the outside of the cage was an electrically warmed "nursery" where Susy's offspring snoozed.

At birth the baby chinchilla weighs only about an ounce and a quarter and is scarcely two inches long. The parent seldom measures more than ten inches in length. It takes more than a hundred of these carefully matched pelts to make a coat. A chinchilla coat may cost $35,000, even more.

There are fewer than 25,000 chinchillas in the United States at present. The earlier

Staff Photographer J. Baylor Roberts

An Escaping Prisoner Is Run Down by His Cousin, the Guard at a Wisconsin Fox Farm

This intelligent mongrel thinks nothing of bullying the aristocratic platinum fox. Not unlike a cow pony at the end of a taut lariat, he takes a grip on the tail and keeps his quarry off balance, lest it turn and bite him. Ranch hands complete the capture, seizing the fox by its tail and the scruff of its neck. Other dogs sniff out minks, but do not attempt to hold them.

enthusiast who, like Dr. Howard, ventured into chinchilla ranching, paid as much as $3,200 for a single pair. Breeding stock now sells for less than half that price.

The business isn't yet on a pelting basis. Most of the skins being auctioned today are "casualty" pelts taken from animals which have died or have been accidentally killed.

From a desk drawer Dr. Howard took one of these small pelts. I was told to close my eyes and touch the fur. It was like dipping my hand into a cloud. There seemed nothing to touch.

The extreme softness of the fur, Dr. Howard explained, is due to the fact that as many as 80 hairs sprout from a single hair follicle.

The Miracle of Plasticizing Furs

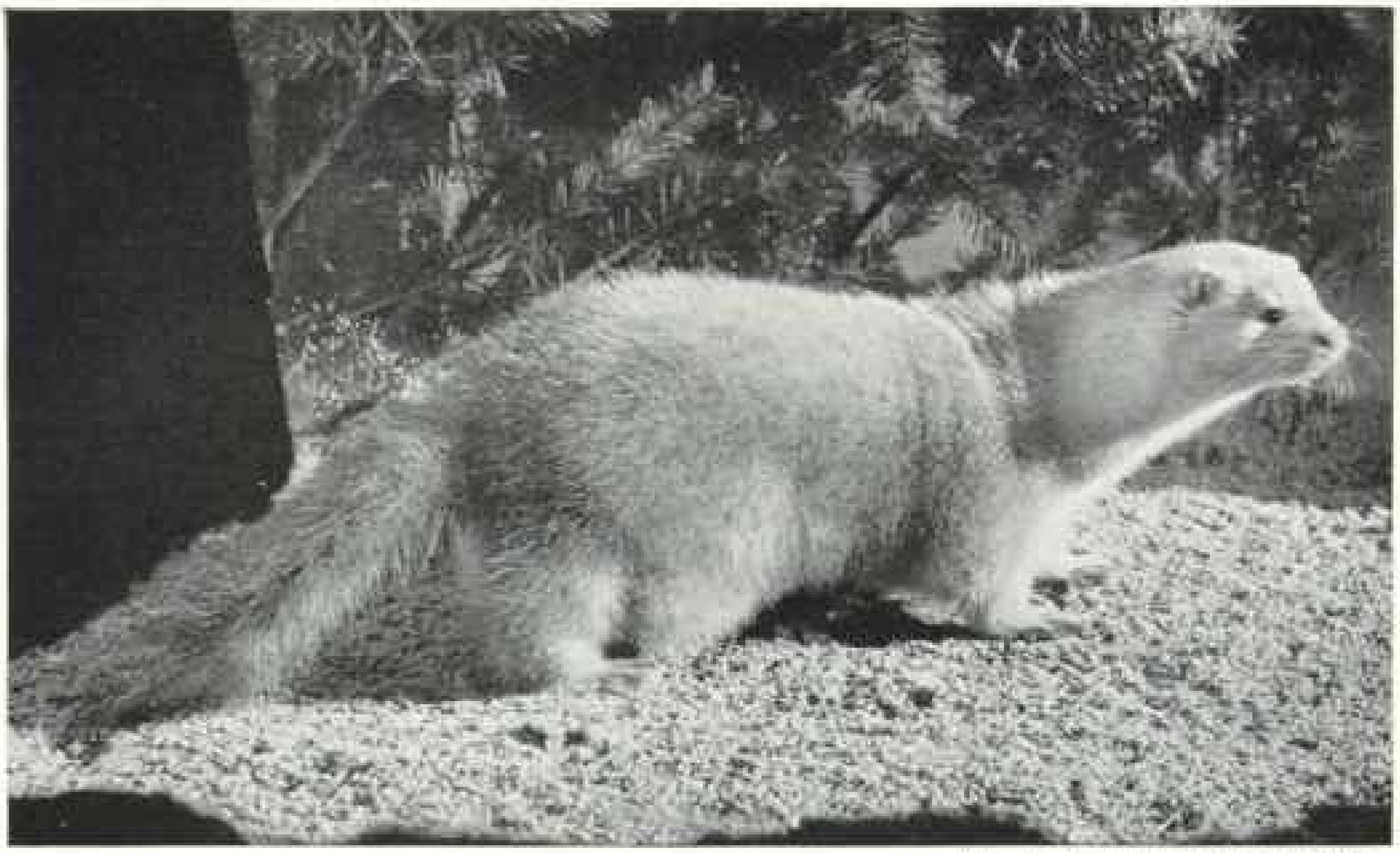
Amazing recent development in the fur field is the plasticizing of furs, especially sheepskins.

To me this process seemed like making something valuable out of something that didn't even exist. But to Dr. José B. Calva, a Mexican-born chemical engineer living in Minneapolis, it is just a matter of chemistry.

In Dr. Calva's model plant I saw huge bundles of ragged-looking sheep pelts awaiting a miracle treatment. As he fingered the matted woolly pelts, he explained:

"It's just a matter of changing the disposition of the molecules in these fibers. Each fiber has a series of loops or kinks which have to be straightened out permanently before the pelt has any marketable value as fur.

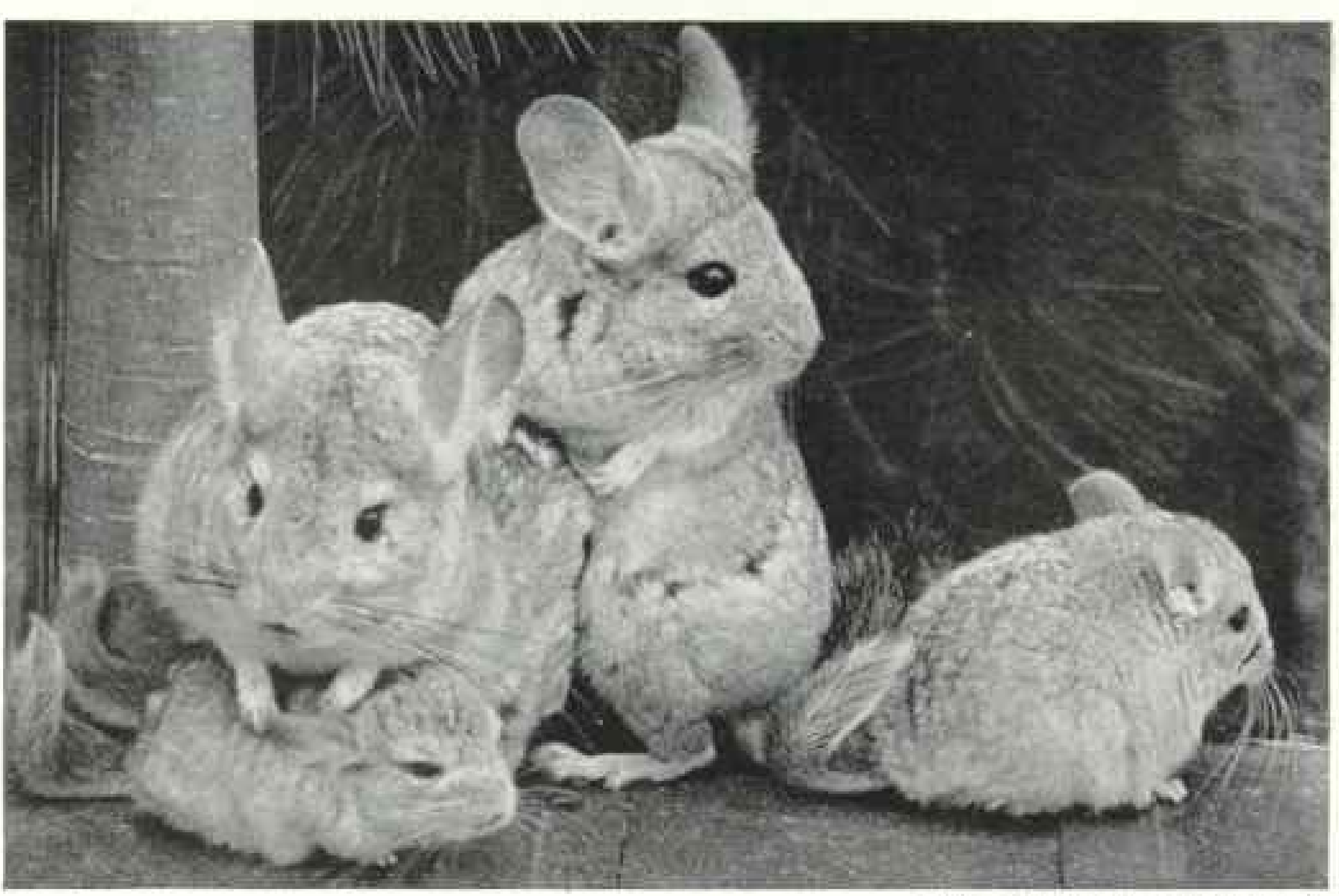
"Now, each fiber is composed of a family group of molecules—self-satisfied, self-sufficient—interested only in its own group and opposed to intruders. The next step is to shake this dull indifferent group into a state of so-called curiosity by supplying a chemical which arouses a desire in the molecule group to admit or join outsiders."



© Genesee Mountain Fox & Mink Farms, Inc.

Grand Champion of Mountain States Fox and Mink Show Was This Platinum Mink

A grayish-blue coat gives this mutation the coined name Silverblu, which originated in Wisconsin (page 398).



© Genesee Mountain Fox & Mink Farms, Inc.

They're High-class Rodents—a Chinchilla Wrap Would Cost Thousands of Dollars

Persistent hunting in the Andes, ancestral home of these downy animals, almost wiped out the species. After five years' work an American collected eleven chinchillas. With hot-water bottles and ice packs he nursed them to sea level, across the Equator, and into the Northern Hemisphere. United States chinchillas descend from those pioneers. This family, raised on grains and greens, dwells in comfort in the high Rockies.

With quick pencil sketches Dr. Calva further simplified the process by drawing a double-lined arc. The inside of the arc, he explained, was naturally shorter than the outside. Therefore, the molecules which made up the inside of the curve were either smaller, fewer, or more closely packed together.

To make this inside part of the arc equal to the outside—in other words, to make a straight line out of a curved one—it was necessary to open the molecule chain and either enlarge the existing molecules or add to the chain a sufficient number to equal those already existing in the outside line of the arc.

This is what Dr. Calva does to the fibers of the sheepskin. He takes the kinks out of the wool.

The finished product, resembling the finest of beaver pelts, belongs to the world of fur-coat buyers. The cost of "mouton" is only a fraction that of genuine beaver. It is waterproof, mothproof, and practically wearproof (page 587).

Green Male Chinchilla Ranch

Baby Chinchilla Converts Milk into Gorgeous Fur

A quiet extinction for fashion's sake is not the fate in store for this two-week-old native of New Market, Virginia. As chinchilla breeders' demands are still unsatisfied, only the skins resulting from natural deaths are marketed. Fur farms hope to get about $75 a pelt when they start sales a few years hence, but there is no assurance yet of such a price.

I asked Dr. Calva how long he thought a processed coat should last. He replied, "No one has lived that long!"

I saw a sheared and plasticized sheepskin when I was in the fur district in New York City. It served as a doormat in a busy office building. Thousands of people had trampled over it in the five years it had been used. Mr. Benjamin H. Weiss, president of the Calva Fur Patents Corporation, put the pelt through a blower to remove the surface dirt and to fluff up the fur. It looked almost new again. I could detect no visible sign of wear.

In Dr. Calva's Minneapolis office, laboratory, experimental station, and reception room, occupying almost one entire floor of a midtown office building, I was given a box of small pieces of fur—beaver and simulated beaver—and asked if I could pick out the real beaver.

I was certain I could. I thought I knew beaver well by this time. After pawing through the contents of the box I selected an especially fine square of plasticized sheep!

Rat into "Sable"

Dr. Calva's work is not limited to sheep or lambskins. He has turned the Chinese rice rat into a fine "sable." He has processed the Australian wallaby and made it "muskrat." Unshorn long-haired sheep, under his hand,

Pennsylvania Game Commission

Eager Beaver in Fur Pants Balances on Shovel Tail and Takes Nourishment

Master engineer as well as fur bearer is the beaver. Damming small streams, he stores life-giving water, controls floods, checks soil erosion, and creates fish and waterfowl havens. However, he'd as soon chop a farmer's apple tree as an aspen. Once all but extinct, the beaver is coming back. This kit, about one month old, was live-trapped. He'll be used in a beaver-resettlement program (page 380).

have assumed the beauty of lustrous, deep-furred fox. Even thin, rubbed, or otherwise valueless pelts discarded by trappers and ranchers have taken on new life, gloss, and fullness when Calva-processed.

In 1947 mouton was increasingly popular in the low-priced field. A large number of all the new fur coats made last year were moutons, but not all of them were Calva-processed.

Plastic furs lend themselves well to color, too. They have blossomed like gay flowers in all the colors of the rainbow. Bright reds, royal blues, canary yellows, purples, and burgundy are only a few shades in the mouton fashion parade.

Pelts for plastic furs come from Australia, South America, and from the millions of sheep and lambs slaughtered each year in the United States. New use for the lowly sheep pelt has placed this wool producer on a fur pedestal. In the fur trade it is pushing far ahead of the prolific rabbit. In time it may even displace the muskrat, long considered the barometer of the trade.

But whether your choice is mouton from the chemist's vat, fancy mutations from the fur farmer's pens, or the lustrous rich sable trapped in Siberia, fur is big business in the United States.

I traveled across many States, looked into hundreds of pens, talked with scores of ranchers, dealers, auctioneers, and manufacturers, but still there were hundreds of experts I hadn't seen.

Many of these I would never see, since fur is limited to no single region. Nor is it limited to a single country. It is a matter of world-wide geography, its tapped and untapped sources spreading over the entire globe.

INDEX FOR JULY-DECEMBER, 1947, VOLUME READY

Index for Volume XCII (July–December, 1947) of the NATIONAL GEOGRAPHIC MAGAZINE will be mailed upon request to members who bind their copies as works of reference.

An Arnhem Land Adventure

By Donald F. Thomson

With Illustrations from Photographs by the Author

SINCE its discovery in 1623, Arnhem Land, an untamed no-man's land in northern Australia, has remained unknown to the world and virtually unexplored. It is the home of the only Australian aborigines who have persistently dared to defend their way of life. Armed only with long wooden spears, these primitive nomads have battled white men and their rule.

In 1933 there was more than the usual amount of trouble. In Caledon Bay the aborigines raided bêche-de-mer boats and killed Japanese sailors. On Isle Woodah, in Blue Mud Bay, they massacred three white men that same year. Taking iron from ships' tanks, the raiders retipped their Stone Age flint spears (pages 416, 420, 429).

Though there was talk of a punitive expedition, the Australian Government decided first to send an investigator to inquire into the aborigines' grievances. I was selected for that expedition.

My commission amounted to an order to go native, make friends with the nomads, and bring about peace. For two and a half years I was the white man's envoy to the blackfellows. I persuaded these untutored people, I trust, that it was wrong to kill uninvited visitors.

"Open Season" on Japanese

Oddly enough, I had to reverse my teachings several years later. During World War II the Army sent me back to Arnhem Land with a band of Solomon Islands warriors. This time it was my duty to inform the blackfellow there was an open season on Japanese.

I recall the excitement attending arrangements for the first expedition. A newspaperman, confronting the anthropologist about to go into the bush, put the question, "Well, Dr. Thomson, what are you going to wear?"

"Wear?" I said, and then I realized that what he wanted to ask was, "How much are you going to leave off?"

And so, early one April, the beginning of the dry season, the time of the southeast winds, I sailed out of Cairns in north Queensland in the auxiliary ketch *St. Nicholas* on the 1,000-mile run to Caledon Bay.* The local citizens turned out in force and gave me a very kindly send-off. But a little austere. After all, they thought it was a funerary rite.

I got a real thrill at the sight of my name entered in the ship's manifest as "master." I had collected a scratch crew of local natives. We avoided the major complications about instruments by dispensing with them and carried only a lead line and a compass.

I had planned to revisit my old haunts on the coast of Cape York Peninsula en route to Thursday Island. At Lockhart River I found Tommy, the guide, philosopher, and friend of all my previous expeditions to Cape York Peninsula, waiting for me.

"More Better Me Die Home"

He was eager to accompany me, and we sailed northward to Thursday Island, where I had intended to "sign on" my crew of Queensland natives to serve with me in Arnhem Land. But after a few days they came under that spell that had been following us along the coast—the feeling that we were bound for that bourne whence no man returns.

And so at last Tommy, in capacity of spokesman, sidled up to me.

After two or three preliminary coughs, always a prelude with him to a momentous announcement, he said tentatively, in a sepulchral voice in tune with the gravity of his mission:

"Boss!"

"Yes, Tommy?"

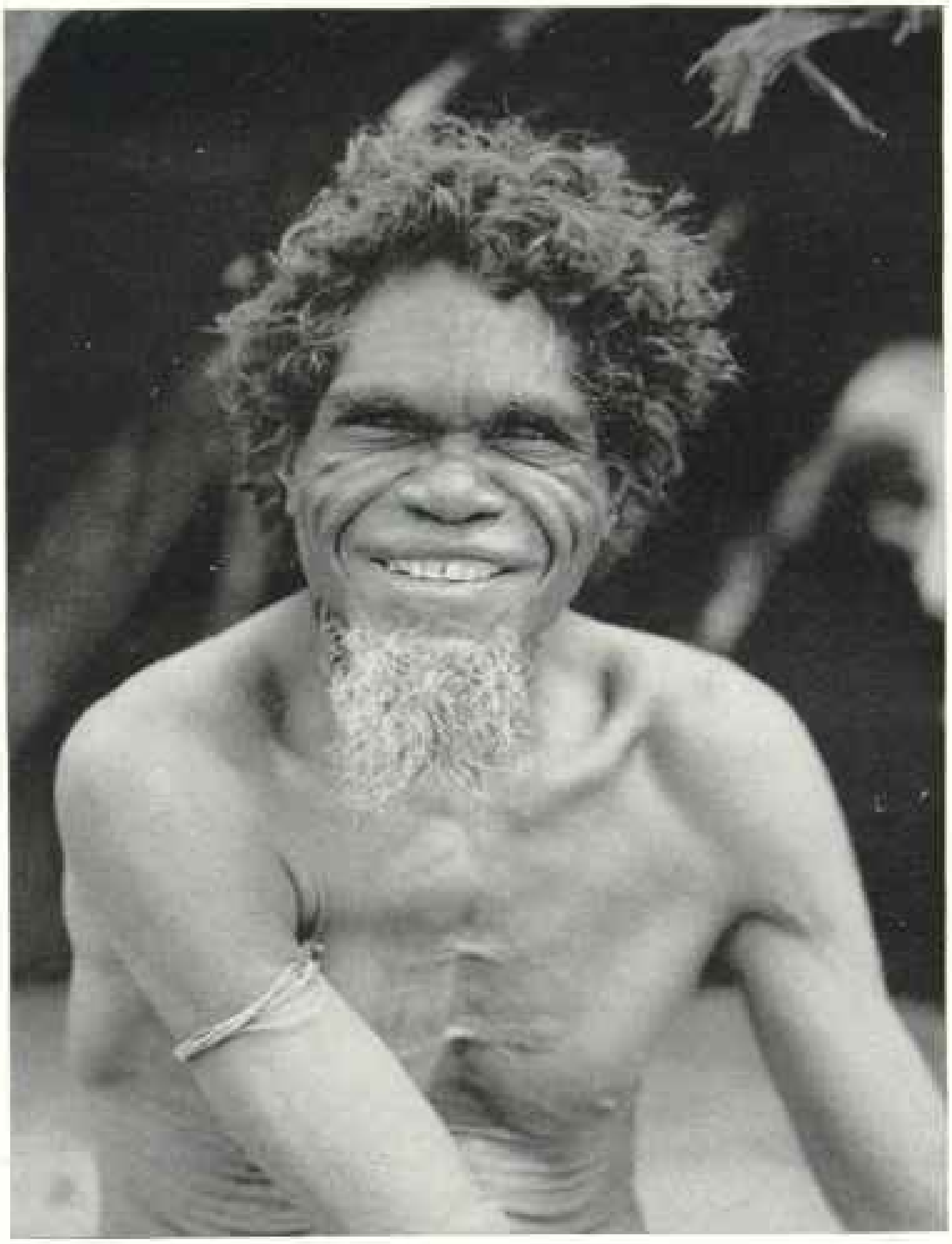
"Boss, more better me die home!" (It is better that I should die at home in my own native land.) The white man's magic was at work again.

I had known that Tommy had something on his mind. His preoccupation had been evident for days, but I had attributed it to his too-active imagination. His thoughts had obviously not been on his job. But this was a state of affairs that, from long experience, I knew was not altogether new with Tommy.

While I was busy with arrangements for departure, I had set the boys to scraping and painting a launch. The paint was a priming coat of red lead and raw oil to preserve the wood. A few hours later I returned to find the trim little vessel a sickly, sticky pink, which gave her a curiously naked appearance.

And there was about that paint a strange lumpiness. Hours elapsed and still it showed no signs of drying. Its stickiness claimed my

* See the National Geographic Society's new Map of Australia, a supplement to this issue.



In Arnhem Land "King" Wongo Is a Man of Distinction

Wongo trims his beard, plucking out each hair, in a style adopted long ago from Celebes voyagers (pages 406 and 409). The author won Wongo's gratitude by doctoring his people for yaws. Wherever he went, tribesmen thrust children at him, pleading "Jacksin!" (injection).

attention, and I smelled it. The boys had mixed the red lead with half a gallon of crude castor oil!

A few weeks later I started down the Roper River toward the Gulf of Carpentaria in a native dugout canoe on my way to Isle Woodah and Caledon Bay. I carried a "message stick" (page 410) that had been given me in Darwin by three Caledon Bay prisoners then serving long sentences in Fanny Bay gaol for killing Japanese.

This stick was to be delivered, with a verbal message, to their father, old Wongo, 500 miles away at Caledon Bay (page 406).

When we pushed out into midstream, I was sharing the canoe with two men, who plied the bow and stern paddles; an old woman, a young woman and her child; my own dog Tiger and two native dogs; our swags, or bedding rolls; and a quantity of stores. When the canoe was fully loaded, we had a freeboard of just four inches.

These wooden dugout canoes are of Malay origin. They are perfectly smooth below the water and without keel or outrigger. Much skill is required to trim them; yet the natives make voyages many miles out to sea in these craft.

When they capsize, the crew rolls the craft over, retrieves household gods, clambers in, and then proceeds to bail the water out until the canoe is floating high again.

A sudden movement, a difference of opinion among the dogs, a too-enthusiastic lunge by one of the crew, ever on the lookout for game, at a water "goanna," one of the monitor lizards (*Varanus*), on an overhanging branch of a mangrove, threatened at any moment to precipitate disaster. We cut sticks and boughs and laid them crosswise inside the canoe to keep the gear off the floor, and took turns bailing to keep the water from rising to the level of the cargo.

At frequent intervals we pulled into the bank, unloaded the cargo, and calked the cracks native fashion with wads of soft tea-tree (*Melaleuca*) bark, or paperbark. Then we loaded up again, mustered the dogs, and pushed off.

The Australian aborigine is a delightful traveling companion. Whatever befalls, he accepts it with the best grace. Nothing puts him out, and he does not fume and swear at delays. For him there is always tomorrow, or, in the phrase of my Arnhem Land friends,

"Yullulla" (by-and-by).

These people have a curiously logical habit of replying to questions that at first gives rise to many misunderstandings. When the canoes appeared to be making water, I would shout, "He no leak?"

"Yes!" would come the reply. Feverishly we would make for the bank and beach the canoe, only to find that the craft was not leaking at all. After many false alarms you see the logic of his reply; he has answered your question literally. "Is it not leaking?"—"Yes." (*I. e.*, "Yes, it is not leaking.")

From Her Tiara Dangle Six Crocodile Teeth

Though she is but 12 years old, this girl is a bride, for early marriage is normal in Arnhem Land. Like a white woman, she is her husband's partner, not his slave. As her lot is not unduly hard, her disposition is good.

Crocodiles on Roper River

The Roper River is wide and deep and is tidal for a very long distance from the mouth. Crocodiles were numerous, frequently basking on its mud banks or gliding to the edge of the water like great lizards. Here they were so numerous and so bold that, whenever I went to the water's edge to drink, a native would throw a branch or a log into the water in front of me to frighten away possible crocodiles.

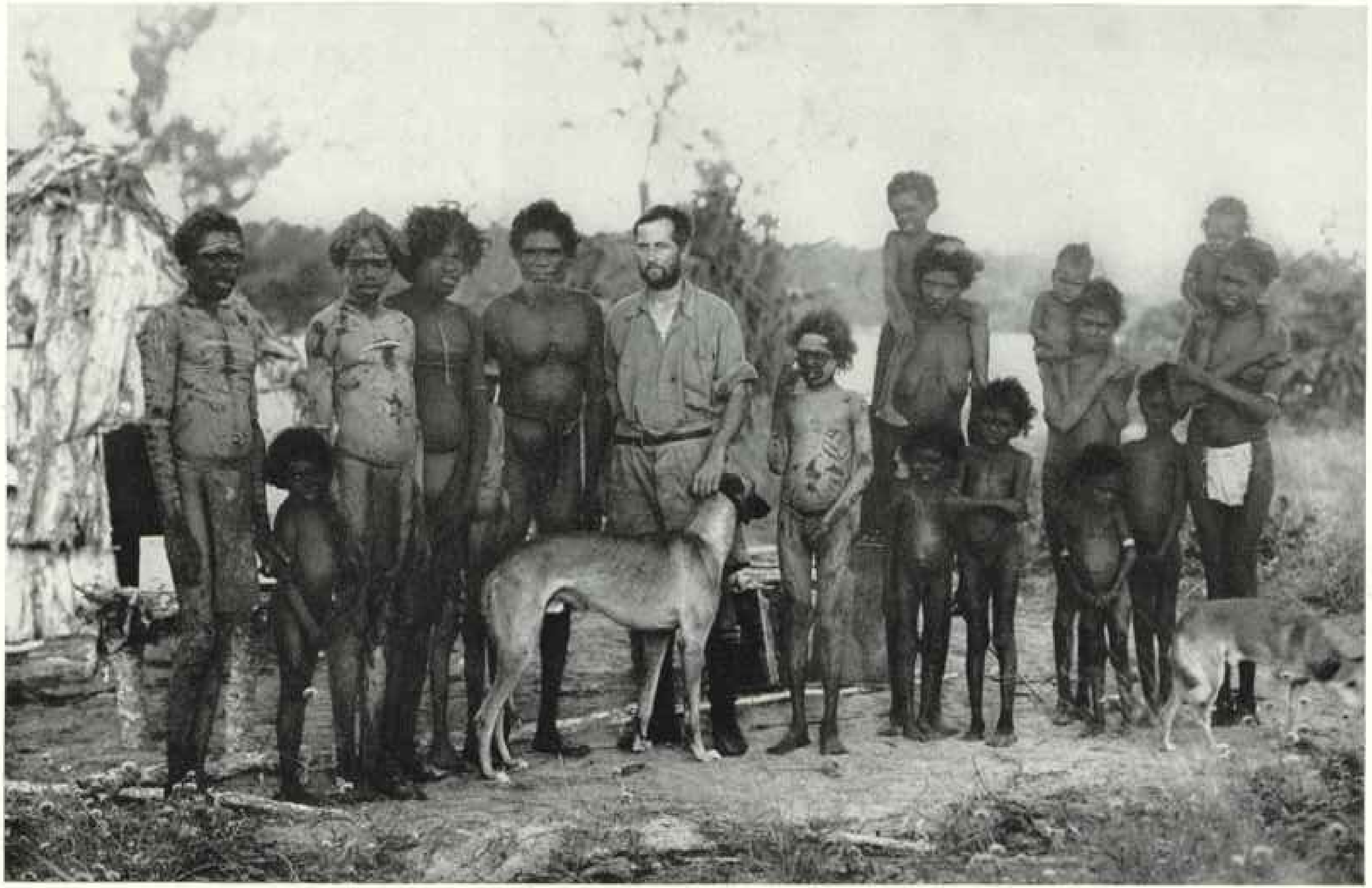
In the months ahead I never dwelled long on this precaution nor gained much satisfaction from contemplating it, for we had to swim many rivers and raft our gear across. The first question when we prepared to swim a river would be, "Baru-mirri?" (Crocodiles with? *I. e.*, "Are there crocodiles?") "Willirr!" came the reply cheerfully. (*Willirr*—little white shells on the shore; hence, "like the shells on the seashore.")

Some distance from the estuary I picked up the *St. Nicholas* again. We transferred the cargo, not without a sigh of relief on my part, to the vessel and sailed down the river. Near the mouth I met a large group of natives who were engaged in hunting dugong, which they harpoon from dugout canoes in the shallow waters of the Gulf.

We spent a day with these people, enlisted two or three of them to act as guides, and on the following morning sailed for Isle Woodah.

A southeast gale was blowing right into the estuary as we beat out across the shallow bar. For several hours we drove into a heavy sea in the teeth of the gale.

When we cleared the bar and the sandbanks off the mouth of the river and swung northward, we had the sea on our beam, and at length I ran for shelter behind Edward Island, off the mouth of the Phelp River. The waters



With a Dog, His Sole Companion, the Author Meets "King" Wongo and His Ghostly Hunters

Caledon Bay huntsmen smear bodies with gray mud, hoping to deceive the red kangaroo's eyes and nose. They admired Tiger, Dr. Thomson's kangaroo dog, a deerhound-greyhound cross, for his speed and prowess. The group poses in front of the author's crude darkroom (pages 404 and 409).

Draining the Goose Swamps, the Uncharted Glyde River Meanders Across a Dismal Landscape and Empties into Arafura Sea

Sluggish at high tide, the Glyde becomes a torrent at low water. One night the author anchored his ketch between the gray mud banks. Ebbing tide, thick with fallen trees and debris, almost swept the boat away (page 425). Smokes on the right show that grasslands are being burned by men hunting small game.

A Dormitory Six Feet above a Log Fire Roasts Sleepers but Discourages Mosquitoes

This platform, sustained by stakes, is occupied only in the wet season. In the swamps, egg hunters build beds in tree forks. They use sticks for mattresses and bark for covers (page 428).

here are uncharted, and the island was surrounded by shoals, with dirty, yellow, discolored water breaking as we felt our way in with the sounding line.

All through the night the wind continued to blow with the force of a gale, and the vessel rolled heavily, shipping water across the decks. We spent a cold, miserable night. On the following day the wind seemed only to have increased, and it looked as if we should be weather-bound for some days.

Planning to make a quick journey overland, I took with me only two natives and barely enough food for four days. Eight days later, without food, barefooted, our clothes torn to ribbons, our blankets either torn up to make bandages to protect our bleeding and lacerated feet or abandoned because we were too weak to carry them farther, we reached Bennet Bay, the southern part of Blue Mud Bay, and the *St. Nicholas* just in time.

Hermit Crabs and Sea Gulls for Food

We were in a bad way. The existing maps gave little idea of the country and were merely deceptive, and we did not meet a single native. Day after day we had fought our way through dense undergrowth, our way barred by wide estuaries, and had been obliged to make long detours or to swim.

Sometimes we had to wait hours for the tide to fall so that we could cross at low

water; sometimes we walked for 18 hours at a stretch, traveling far into the night and leaving again before dawn on the following day. Hermit crabs and a sea gull or two helped to keep us alive.

At length, when our strength was far gone, we found a nest of turtles' eggs. Later I was glad to eat shipworms (*Teredo*), snakes, and lizards.

From Bennet Bay we sailed northward toward Woodah, a little island in Blue Mud Bay. It has no permanent resident population, but is visited at regular intervals by the various groups of the Blue Mud Bay peoples on their seasonal wanderings.

It has long been a place of ill repute. As early as 1803 the English navigator Matthew Flinders reported that the natives of Blue Mud Bay had speared one Whitewood, master's mate of the *Investigator*. Flinders named Morgan Isle, close to Woodah, after a Marine who died of sunstroke there.

It is the home of a number of small groups, each with a slightly different dialect. By their neighbors the people of Blue Mud Bay are generally referred to as Dai'i. To the northward the Caledon Bay natives are known popularly as the "Balamumu tribe." This is not really the name of a tribe, but is applied loosely by natives to the westward to a number of distinct groups of which the Caledon Bay peoples form a unit.

Old Wongo, of Caledon Bay

Wongo and his sons—for these people are patrilineal and trace descent, and membership of most groups, through the father—belong to a clan known as Arrawiya, made famous through the prowess at arms of one man and his strong sons.

At the time of my first visit, Wongo and his group were at Trial Bay, just to the south of Caledon. We approached this camp overland on foot, and the journey was a memorable experience. Only then did I realize how great is old Wongo's influence and how much he was feared by his neighbors.

Some miles to the south of the bay we picked up the tracks of some natives which members of my party recognized at once as those of some of Wongo's group, including the tracks of a woman named Clara (page 410). To the south of Trial Bay is a belt of dry but dense tropical jungle intersected by native pads, or paths, that wind in and out of its dark thickets.

While we were negotiating this jungle, the natives with me were expecting an ambush at each moment. They could not be induced to speak aloud, but would communicate with one another only by sign language or in whispers. Fortunately the camp proved to be on the other side of the bay.

That night was an anxious one, and I was the only one of the party who slept well. The natives squatted by the fire on watch, and on this journey they began a practice that they employ only in hostile country when they expect to be attacked by avenging expeditions.

At intervals one of the party would stand up and cry out in a loud voice, addressing one of Wongo's group by name:

"Wuluwirrir, you are walking about, come out, do not hide yourself. A big man *(bungauwa)* is here, traveling about, looking for you to make good you people, to make quiet this country. We all come without spears, without spear throwers [not strictly true]. We come for a good thing."

The object of this was to stay the hand of the enemy who might be prowling about, ready to fall on our camp. For it is the practice of these people, who carry out organized raids, to send an advance guard to spy out the land—to locate the camp.

These *milngo*, or scouts, return for the main body, who, after painting themselves with white paint, grotesque and hideous in the dark, surround and fall upon the sleeping camp.

"I Bin Jump Beef"

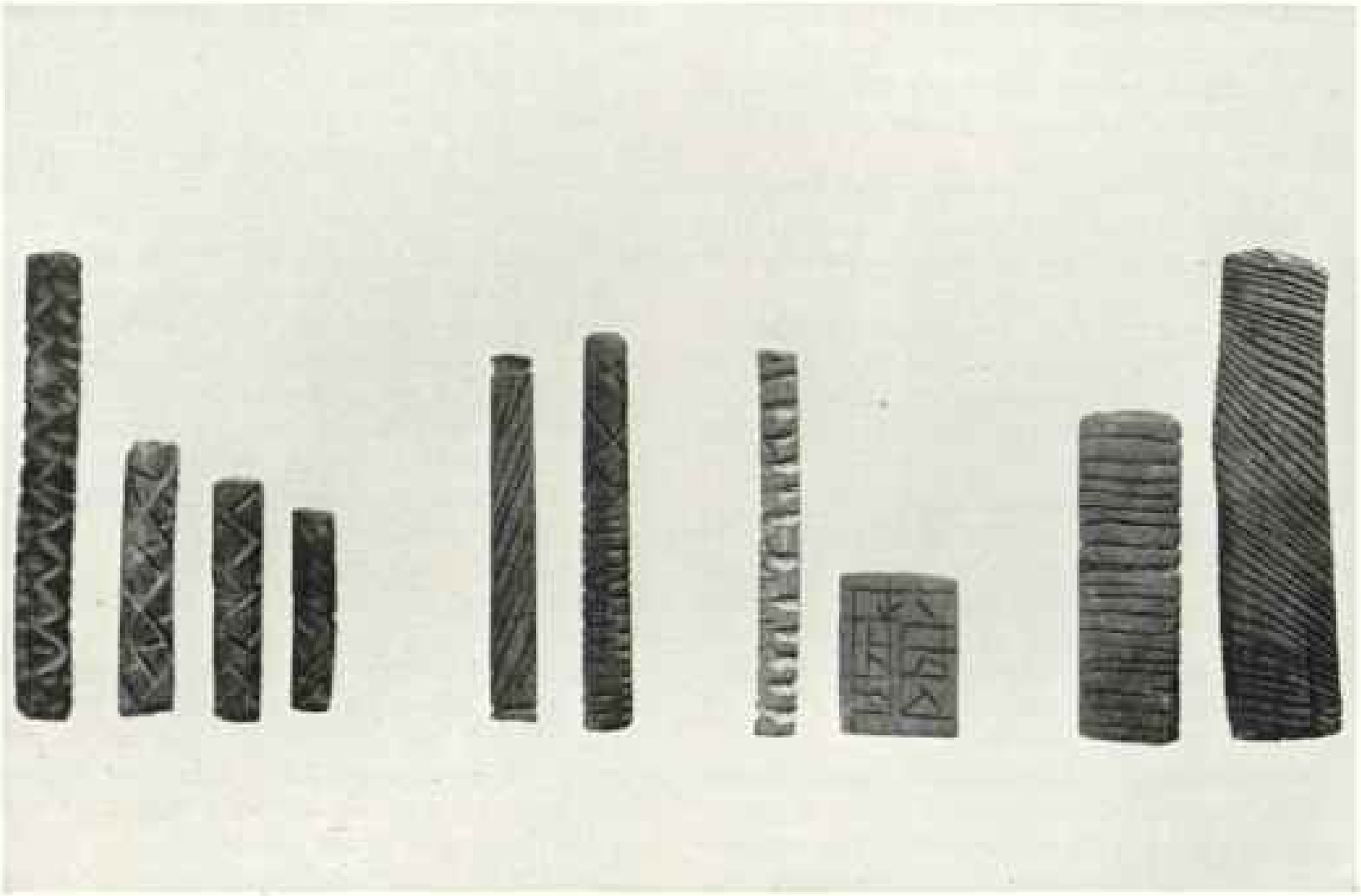
A number of omens are believed to portend the approach of strangers or visitors.

Therefore, when Raiwalla (page 415) came up to me in a state of excitement and declared solemnly, "I bin jump beef," I knew that he was not inferring that he had been emulating the renowned Welshman "Taffy," but merely that he was expecting a visitor. He was informing me in correct idiom that he had had a muscular twitching, indicating, according to the part of the body in which it occurs, the relationship of the stranger.

The next day was a memorable one—the day of the meeting with Wongo, grand old man of Caledon Bay, the most renowned warrior in the history of the Australian aborigines (pages 404, 406).

I can say fairly that I approached this man without any sentimental bias, with an open mind, and that I left him, after spending about two weeks with his group, with respect and admiration.

I am not going to paint him with a halo. He has been a great fighter, and he has won for himself among black man and white a renown that I do not think has been equaled by any other Australian aboriginal. When I saw him, he was about 55 or 60 years of age, not a big man but well built and strong. He



A Message Stick Like These Was Honored as the Author's Passport to Arnhem Land

Popular belief credits the aborigines with ability to write messages. Actually, their carved sticks carry no words, but identify a messenger and remind him of his verbal message. Handicraft, however, is recognizable.

had a strong face, with some cunning and not without guile; a man of no mean intelligence.

I knew that, as we met, he was a little afraid of me. Two of his sons were already in Fanny Bay gaol, and I do not think that he expected ever to see them again.

There had been more trouble at Caledon Bay, and he knew that the Government was not pleased with his people. I was probably the first white man whom he had met who represented himself as being a Government man and who had come to him with an assumption of authority.

We got on very well together at this meeting. I rarely saw him after that except with a mischievous twinkle in his eye. A few days later, when he was sick, he sent for me, and I knew that we would be friends.

Probably the most remarkable feature of this old man's face was his eyes, which were direct and penetrating. His face was clean-shaven except for a long beard, confined to the tip of his chin, which gave him some distinction.

This type of beard is much affected by the old men of Arnhem Land. They rub the black wax of the "sugar bag," or wild bee, into their faces and then pluck out the hairs singly—a laborious and rather painful proceeding.

Wongo is the most remarkable aboriginal and the strongest character that I have met among these people. Popularly, he is spoken of as "King" Wongo, "Chief" of the Balamumu tribe, but it must be remembered that anything approaching kingship or chieftainship is quite foreign to Australia. Nevertheless, Wongo has a tremendous influence, not only on this coast but for a considerable distance over neighboring territories, chiefly by reason of his remarkable personality.

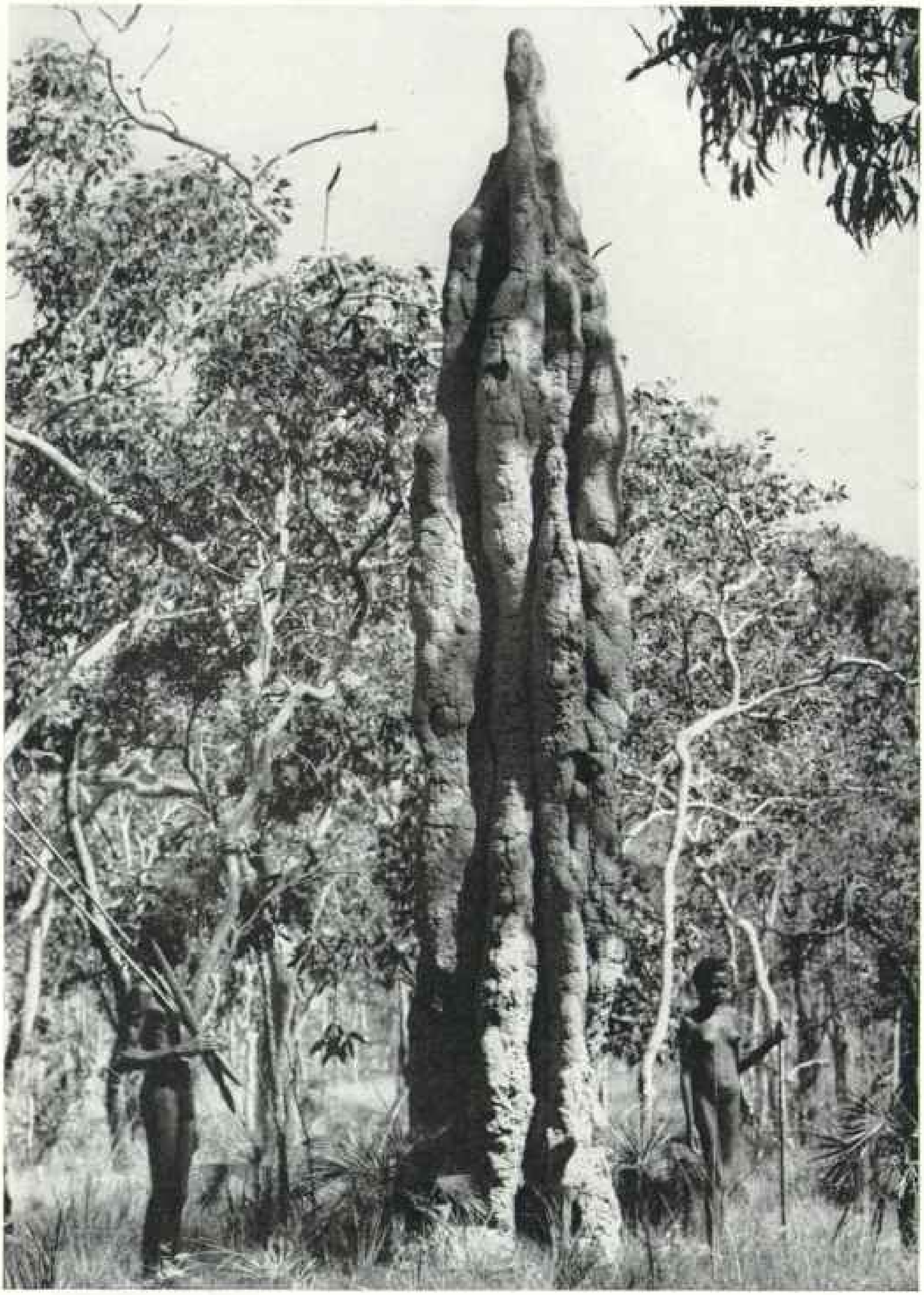
Wongo is a marrying man, and the number of his wives is legion. The genealogy that I have collected shows no fewer than 22, most of whom still survive, with numerous children.

I delivered to the old man a message stick, together with the verbal message, from his sons in Fanny Bay gaol. That night there was a great cry in camp, a ceremonial crying for the dead, or the ritual lament for those long absent.

Clara, a Native Woman

In the old man's camp I met still another remarkable native, a woman this time, whose name is only less renowned than that of Wongo himself. She is known even at Caledon Bay by her white name of "Clara."

In the many misleading rumors that have



A 20-foot "Magnetic Anthill" Is Neither a Compass Nor the Home of Ants

Termites, working by night, erect the mud spires, a dominant feature of northern Australia. Their thin sides face north and south so that, according to one theory, the broad walls may dry more quickly in the east-west sun. These nomads cut lumps of termite mud for use as stones in their overnight fireplaces.

A Lonely Shore of the Crocodile Islands Appears Unfruitful; Yet It Abounds in Food and Useful Fibers

When the tide is out, natives comb the reef for shellfish. In places they trap fish in stone weirs fringed with woven rushes. By night they catch sea turtles laying eggs in the sand. The seeming palms are screw pines, or pandanus trees. Their nuts yield a rich oil; leaves go into baskets and canoe sails.

Members of the Men's Club Squat Around a Make-believe Water Hole and Chant about Mythical Ancestors' Herculean Deeds

Women, who share the clan's hunting rights, are taboo at its sacred "sings." Such corroborees re-enact in pantomime the exploits of heroes who supposedly chartered the clan's way of life. By settling down with the aborigines, the author learned their language, customs, and beliefs.

Packaged for a Cannibal Ritual—Human Flesh

On his forehead a Glyde River man bears a parcel of dried blood; on his back he carries flesh. Both were taken from a victim overcome by a medicine man's magic. Eaten ceremonially, they are supposed to make hunters fearless and lucky. Cannibalism to satisfy the appetite is taboo in Arnhem Land.

come from this coast she has frequently been reported to be a half-caste, and to her has been wrongly attributed much of the trouble that has occurred. It was said that she was a woman of great cunning and wide influence, an Amazon who laid the plots and directed their carrying out.

In reality, I found her to be just a harmless old woman. She was a widow who, after a hard and eventful life, was struggling bravely to bring up her two children in a difficult country.

Clara is a woman of the Mara tribe of the Roper River district. She was taken with her husband on a trepang lugger to the Caledon Bay area many years ago. Trouble brewed, and the boat was attacked. The crew got aboard and escaped, but Clara and a child were taken, and she was made the wife of her captor. This must have happened about 20 years before my visit.

She had lost her own language, for she could not understand a word of Mara when one of my boys from the Roper spoke to her; but she remembered him and his personal history. She knew some English, too. But this was not remarkable, for she would have had the opportunity of speaking from time to time to bêche-de-mer fishermen.

Clara is regarded, quite wrongly, as a half-caste. It is probable that the presence of this woman, who spoke some English and who had been taken captive by Caledon Bay natives, gave rise to a legend. Still firmly believed in certain quarters, it concerns the existence in this country of white women survivors of the ill-fated steamer *Douglas Mawson* (lost in the Gulf of Carpentaria in 1923), who are said to be held prisoner by the natives.

The country between the Gulf of Carpentaria and Arnhem Bay is among the roughest in Arnhem Land. During 1936 it fell to my lot to carry out another long and severe patrol among the rocky hills and ravines of this region in pursuit of a native known as "Slippery" and his horde. They were a little band of semi-outlaws inhabiting that area, following an outbreak of fighting and the killing of several natives.

"By-and-By Snake Bite Me"

The first night on this patrol was a remarkable initiation into the supernatural beliefs of these people. I had been carrying out work

on social organization just before setting out on this journey, and during the collection of data on a kinship system one of the natives was confronted with the name of his sister.

The brother-sister taboo is strongly developed among these people. A man may not even pronounce the name of a sister. If the name of his sister should be spoken before him, it is *mirriri*.

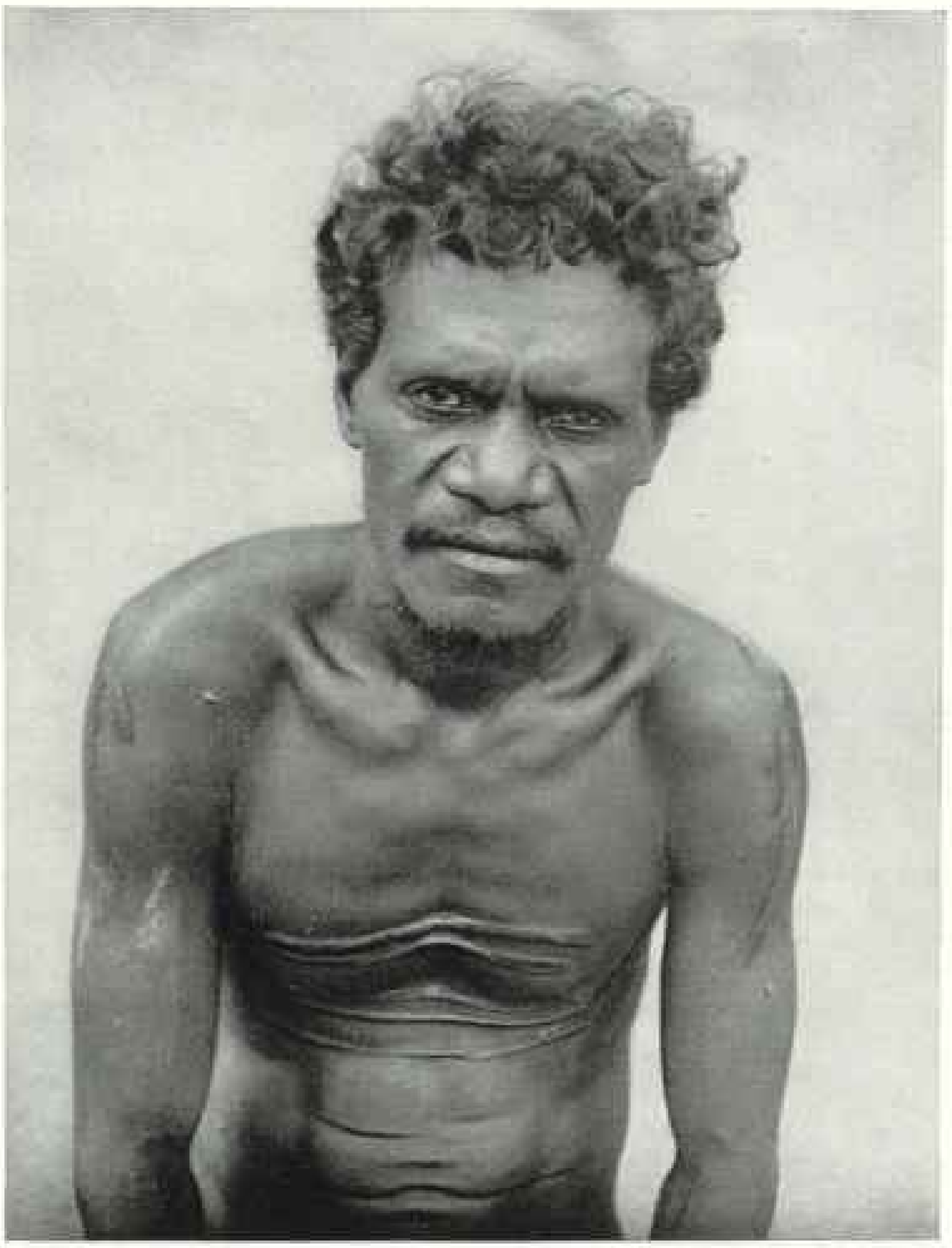
And if he should hear an indelicate or obscene reference to a woman who stands in the relation of sister, as may occur in an altercation between women or a domestic difference, it is again *mirriri* and frequently leads to a fight, unless ritual expiation is made. It was generally the custom, when the name of a sister cropped up in these kinship discussions, for the people to get a bystander to speak the name for them, which was done in a whisper or undertone.

This time my informant looked about him in vain, and at length, as nobody was present, he reluctantly pronounced the name. As he stood in relation to me of classificatory brother, the woman whose name was spoken was sister to both of us. It was a ritual offense that required an act of expiation or ritual purification to avert a supernatural visitation.

"By-and-by snake bite you and me!" he exclaimed uneasily.

I forgot the incident.

A day or two later we set out on a long patrol in quest of the fugitive Slippery and his group. It was the first day out; we camped, after a hard stage, at dusk, close to the southeast corner of Melville Bay. The natives had made their camp and were squatting about their little fires in the bush.



Raiwalla, the Author's Faithful Guide in the Bush

In World War II, Raiwalla followed Dr. Thomson into the Australian Army and became a corporal. Now he is back in Arnhem Land, his birthplace, where he is renowned as a fighter in single combat. His scars, worn as a sign of maturity, were produced by cutting flesh and rubbing mud into the wounds.

I had unrolled my own swag and was lying stretched out luxuriously on the canvas sheet. It was about dark. Suddenly I had a sensation of something very cold and clammy on my bare legs.

Looking down, I could just discern a snake, attenuated as he moved and showing around the upper part of his body a series of light rings which stood out clearly in the gloom.

Mentally reviewing the nocturnal snakes I knew with such vividly defined bands, I thought at once of the brown tree snake *(Boiga fusca)*.

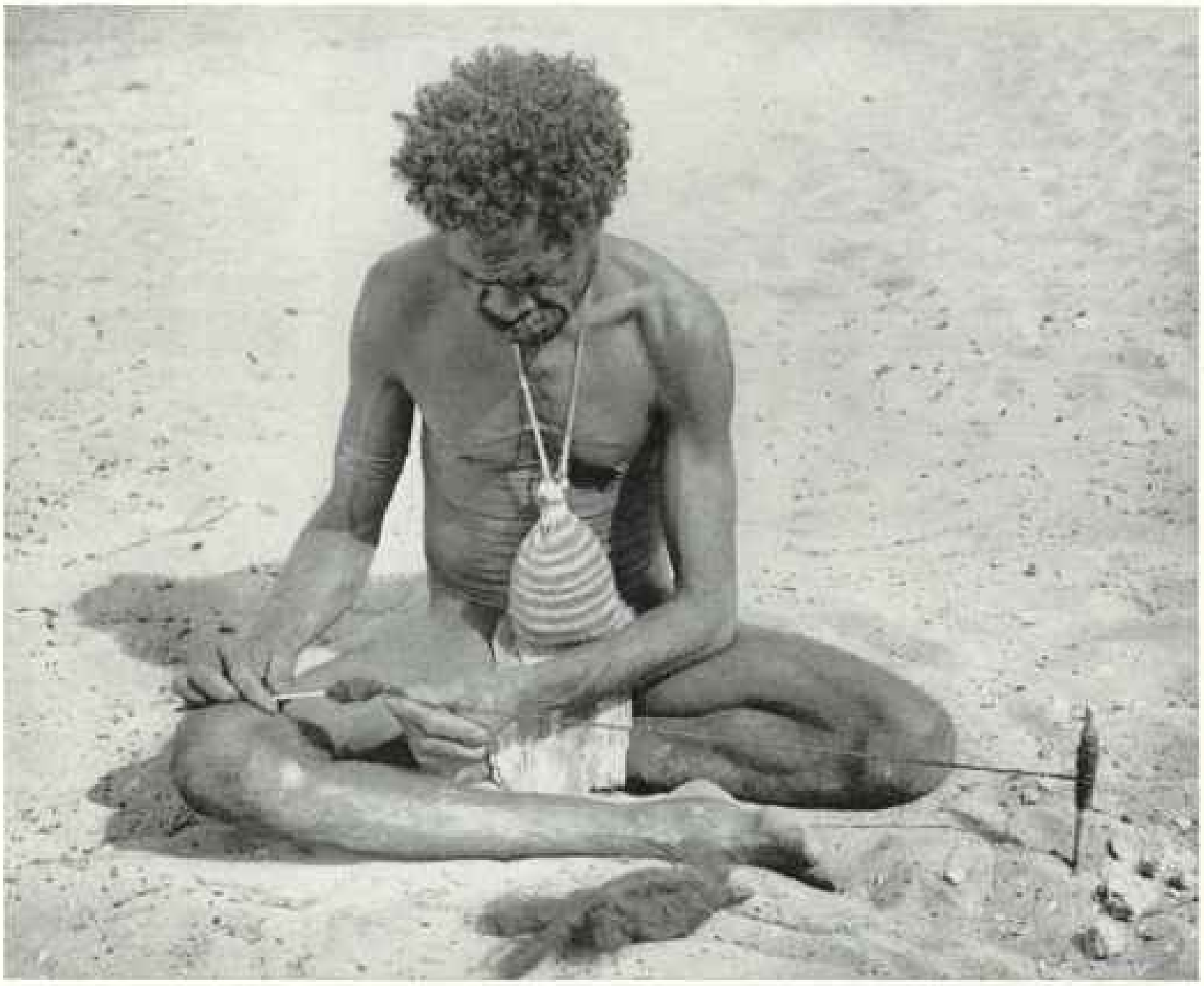
I had not seen one so far north in Arnhem Land, but the previous year I had secured a single fine specimen on the Roper River. It

To Indulge a Taste for Eggs, a Canoeman Runs the Goose Swamps' Gantlet of Horrors

Grass edges cut like knife blades. Every movement precipitates a shower of ants and spiders. Mosquitoes bayonet the arms; leeches torpedo the legs. The author accompanied this hunter on an unforgettable adventure (page 424). Two goose eggs rest on the large grass nest.

Aboriginal Spearmaker in His Munitions Factory Chips Flint as the Red Men Did

This artisan uses a flaking technique now known to only a few old men. Ngilipidgi quarry, lying in a range back of Blue Mud Bay, contains an inexhaustible supply of raw materials (page 429).



He Spins His Wife's Hair to Make a Belt for a Men-only Ceremonial

Other woven strands of human hair whirl bull-roarers, the narrow wooden slats used for making roaring noises at aboriginal religious rites. A dilly bag, catchall for personal possessions, hangs like a purse from the spinner's neck.

was only slightly venomous—one of the so-called "back-fanged" snakes—not likely to bite unless aroused and by no means dangerous, and I wanted more like it.

I determined to capture this specimen for my collection. It was very cold, and I could just see it in the dim light.

In a leisurely way it negotiated my left leg, glided onto the canvas, and began unhurriedly to cross the other leg. The slightest movement might alarm it and lose me a coveted specimen.

A Deadly Snake

I lay quite still, calling to one of the boys to bring a fish spear with which I could pin it down without injury and capture it alive. No use to ask a native to capture it, for they are very much afraid of snakes. Meanwhile, it had crossed my legs, and just as it was making for cover we pinned it down.

When the natives brought torches to enable me to secure him, their light revealed a thick, sinister-looking, broad-headed snake, splendidly marked with transverse bands. But it was not a brown tree snake. Instead, it was a death adder (*Acanthophis antarcticus*), one of the deadliest snakes found in Australia!

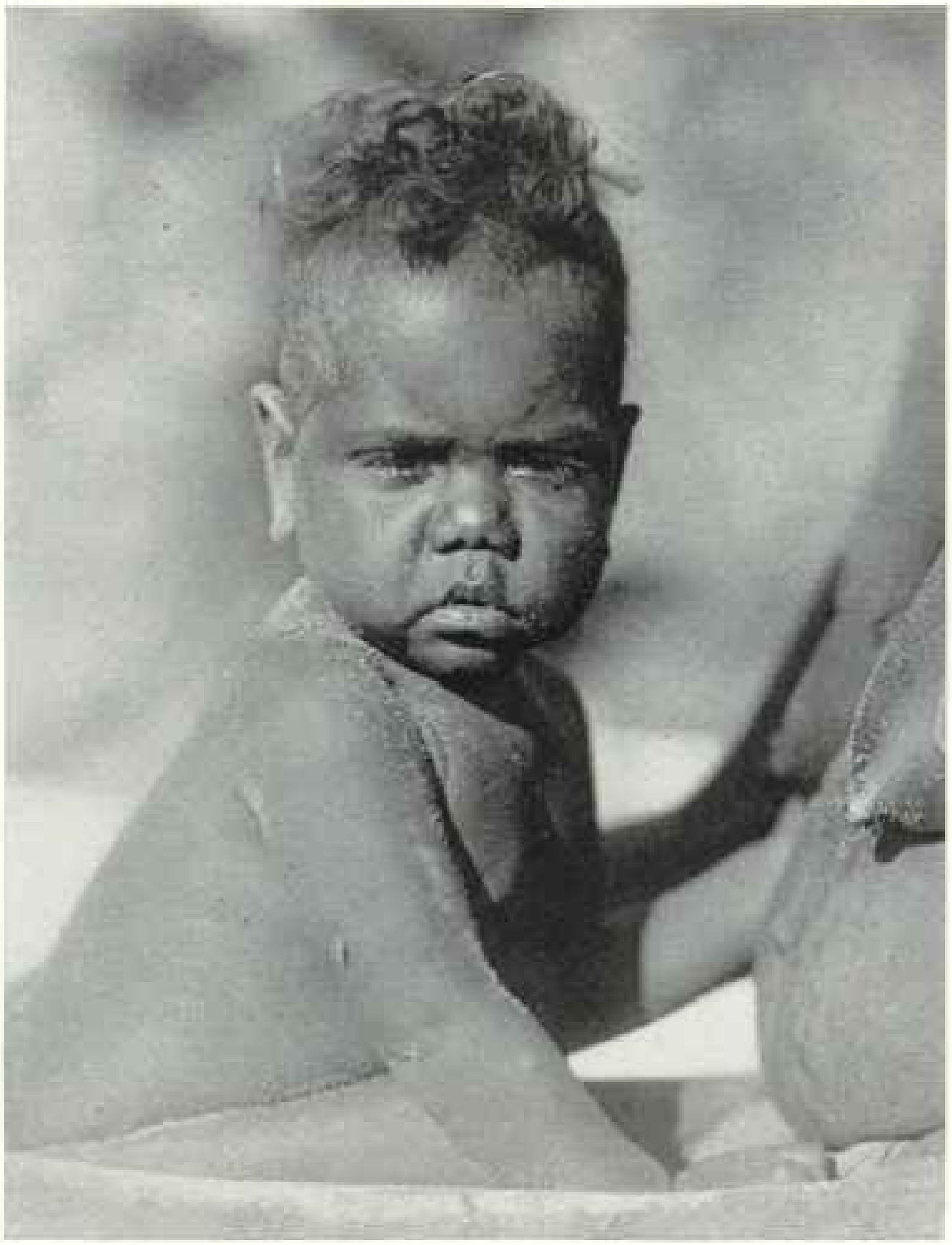
Raiwalla, my guide (page 415), looked meaningly at me, paused to spit with an emphasis that had a curious, telling quality, then remarked drily: "I bin talk first time! By'm-by snake come!"

A supernatural visitation!

Raiwalla was not in the least surprised; he had foretold just this and he was vindicated. As for me, I had no answer; a really satisfactory response must sound spontaneous! It was, indeed, a remarkable coincidence.

I collected and catalogued more than 300 snakes in Arnhem Land, but this was the *only death adder I met in more than two years!* We took him back alive, more than 200 miles in my water tin (page 423).

To tell of the animal life of Arnhem Land,



Wilderness Baby Is Mamma's Spoiled Darling

When born he was pinkish brown, and mother smeared his body with charcoal to turn him a stylish black. He will not be weaned until his sixth year. Until initiation he will be indulged in every way—never scolded or punished.

and of its geographical difficulties, is no easy matter in a small space, for the abiding impressions are often of little things, incidents, a glimpse of something that suggests mystery.

And then, again, the wonder of all these things is largely in the eye of the beholder; they are, as book reviewers say, "not everybody's meat." But I recollect vividly a memorable afternoon on the middle Glyde River in central Arnhem Land.

Archerfish and Mudskippers

The Glyde is a strongly tidal stream and at low water is reduced to a trickle running at the bottom of two steeply sloping walls of deep gray mud—a river, in fact, whose only claim to even passing notice is its really striking resemblance to the great gray-green, greasy Limpopo of Africa.

The boys were all ashore and away, and I was alone on the boat. No very promising prospect greeted me from the deck. At first I saw only gray, discolored water, gray and muddy banks, and, high above, a fringe of gray-green mangroves. Nothing more.

But in a moment a fish, its body laterally flattened and marked by a series of black cross bars, projected a curious undershot, disdainful snout. He was quite an ordinary fish, one that you might, in a manner of speaking, pass in the street without comment, except that his nose betrayed him. I recognized *Toxotes*, the archerfish or riflefish. This is a sporting creature that, by the simple expedient of a jet of water cunningly aimed, brings down flies and small insects unwary enough to settle too close to the water.

Nor was this all. When I shifted my gaze a little higher, the bank was transformed and was teeming with life. For a moment I had the impression of an aerial view of a busy city, albeit one of bizarre inhabitants.

Hordes of fiddler crabs, each male with one great overdeveloped, asymmetrical claw upraised as if in threat or in defense of his blue armored body, emerged from unpromising-looking holes in the ground. Each raised aloft a pair of eyes on long stalks and began to bow and scrape.

It was a kind of Mad Hatter's tea party, so that momentarily I had the impression that I was back in civilization.

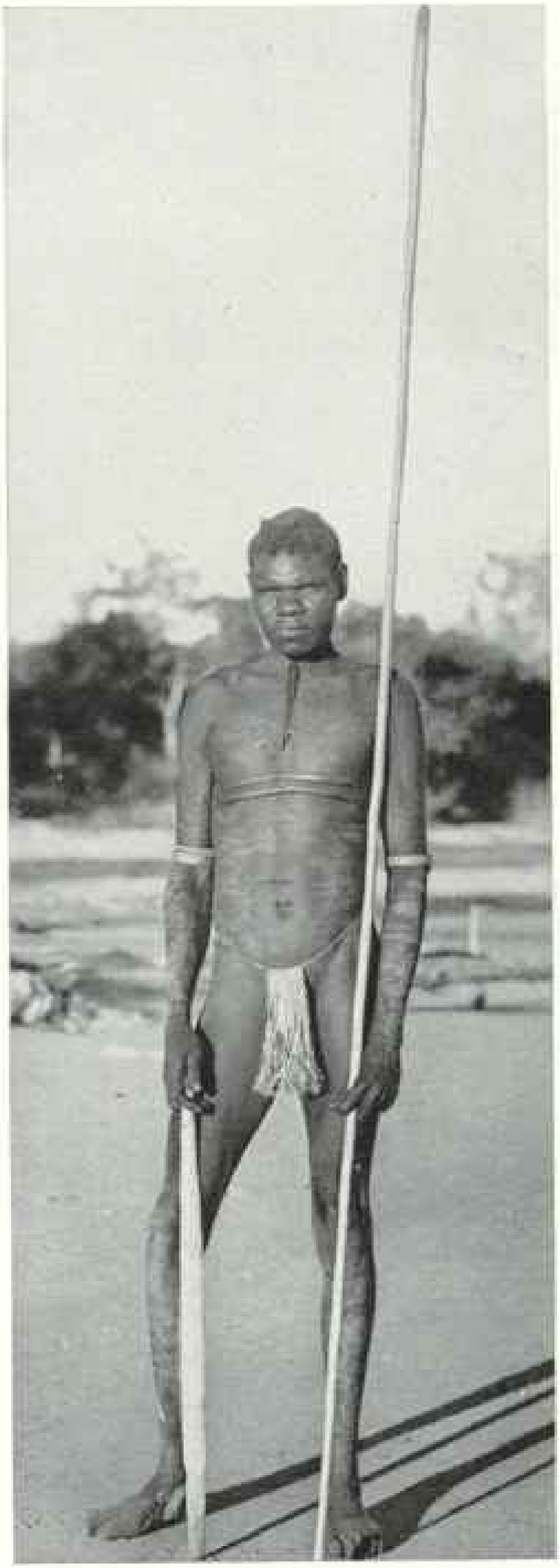
Dotted here and there over the great mud flat were those curious and wonderful little jumping mangrove fish, or "mudskippers." Because of their freakish breathing mechanism,

Crocodile Islanders Traverse Deep Coastal Waters in a Frail Bark Canoe

The author rode a leaking bark canoe into mosquito-infested swamps where wild geese hid their eggs (page 416). A single sheet of eucalyptus bark sheathes the hull; seams are lashed with cane.

Father Emu, Who Mothers the Family Brood, Takes Striped Chicks Exploring

Australia's flightless emus, next to their cousins the ostriches, are the world's largest birds. On long legs they race across the plains; a pursuing motorist clocked one at 32 miles an hour. Arnhem Land hunters, lying in tree-branch ambush, spear emus feeding on fallen fruit.



A Hunter-warrior Lives by His Spear

He has several types of spears. Some are for game. Most of those used for birds and fish are multi-pronged. Another, capped with sting-ray spines, is for ceremonies. This hunting lance is iron-tipped. A throwing stick (in the right hand) increases the arm's leverage, speeding the cast.

they are able to leave the water for long periods. They leap about on dry land by employing their pectoral fins and tail fin much as a seal does its flippers.

Hunting the Water Buffalo

But these are small fry. If you are impressed by size, I could tell of a buffalo hunt or two that would have been epics even in the days of Paleolithic man.

There are a few water buffalo in eastern Arnhem Land, introduced in the early days of white settlement in the Northern Territory. Their strongholds are still far to the westward, in the Alligator Rivers region and thence eastward as far as the King; but a few, generally lone old bulls filled with wanderlust, range as far east as Cape Arnhem. Perhaps they are outcasts from a herd, immense in size and morose through isolation, for too much introspection is an ill thing even for a buffalo.

The natives still hunt these formidable beasts on foot with spears, preferably with stone-headed spears traded from the far-famed quarry at Ngillipidgi (pages 416 and 429).

Since they cannot hope to kill with a single spear thrust, they must make the quarry bleed and then follow him until he falls from loss of blood and exhaustion. A jagged stone spearhead, which becomes detached from its setting of "sugarbag," or beeswax, when it penetrates, is ideal for the purpose, for it causes a dreadful wound.

If the natives catch the buffalo in mangroves or heavy timber, he is easily approached, for the tree provides a safe refuge for the hunter. In the open, however, among flats of blady-grass or low scrub, a wounded bull buffalo is a formidable enemy.

At Buckingham Bay not long ago a lone hunter followed a buffalo and succeeded in wounding it. But the animal turned the tables on the hunter, whose pulverized body and tracks told the tale of his death, which must have been slow and prolonged.

Still more recently, at Cape Arnhem, a great bull was followed and wounded. After a heroic encounter the wounded beast took to the water, swam some miles out to sea, and found refuge on a rocky islet.

For the most part, the interior of Arnhem Land is unmapped and largely unexplored. On the coast are great salt pans and low coastal plains, sometimes bare, sometimes sparsely covered with *Salicornia*, the rank grass that thrives in brackish, marshy conditions.

This country is interlaced by a maze of salt-water estuaries and salt arms, which are infested with crocodiles. Inland the country

The Nomad Has No Matches; Yet He Kindles Fire in 40 Seconds

Each hunter carries a bundle of firesticks and fiber tinder. As one stick rotates in a slot cut in another, friction starts a flame. On chilly nights the aborigines sometimes carry smoldering torches to light their pipes and keep themselves warm.

rises to low wooded hills, barren, often outcropping with stone and with an abiding loneliness. But travel here has its rewards.

First Crossing of Arnhem Land on Foot

I remember vividly that crossing of east Arnhem Land on foot in 1935. The maps told nothing. For days we had walked across the bed of a dry swamp, its soft green sward and peat muffling our footfalls, to emerge at last on the foothills of a range. From the top we gazed across a wide valley to a vista of blue hills, which was to be repeated day by day.

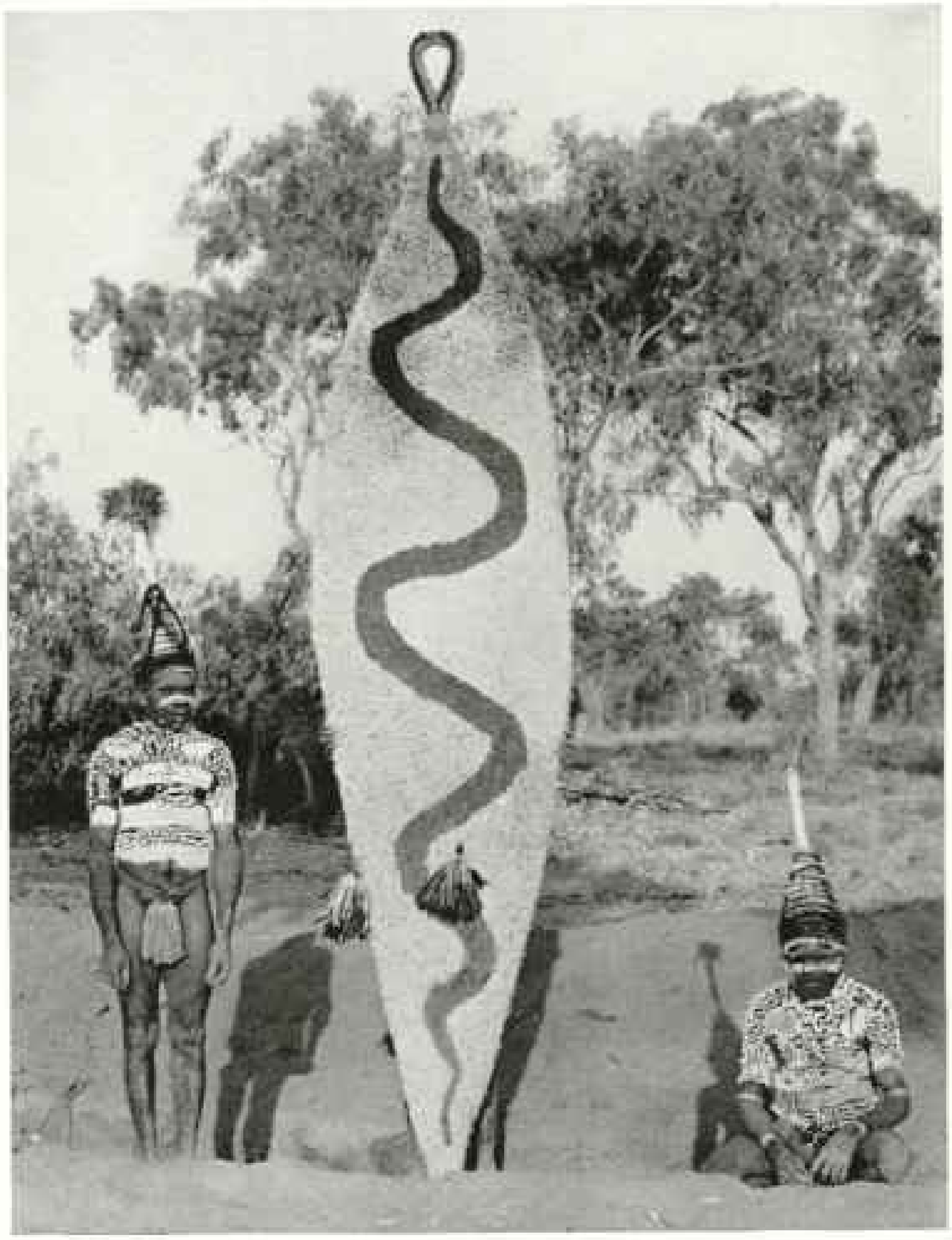
One knew that if one traversed the valley and climbed the hills in the blue distance there was the same again, and tomorrow, and tomorrow, and tomorrow. And nothing; nothing at all to suggest that ever human eye had looked on it before. Certainly no white foot had ever trodden there.

Days sometimes were spent in crossing a few hills having rocks so sharp that one's boots were cut to tatters on a single patrol; and then this ordeal would be succeeded by a day (and a night) when 40 miles would be left far behind and one felt that he could never tire.

The world was still young; difficulties were made to be laughed at; one could carry the world on one's back. While under the spell one is unconquerable.

The most difficult travel was near the coast, for here I encountered many rivers that were not named, not even suggested on the maps.

Time after time we found our way barred by salt-water estuaries. At first I thought of detours, for there is always something sinister



Sacred Snake Is Etched on Shield with Human Blood

Only initiated men may look upon the clan emblem, under penalty of death. Its proud custodians crown themselves with emu plumes and paint chests with white pipe clay. Bird down forms the shield's white background.

about these dark-green or muddy depths into which a crocodile has slipped imperceptibly from his sunning on the mud bank, like a boy in school intent on avoiding the stern eye of authority.

The Discretion of the Crocodile

But this is merely the reptile's discretion—I could write a treatise upon the discretion of the crocodile. If you think he has gone, you are mistaken! Generally he reappears in midstream. All that shows above the surface is the tip of his insidious snout, with its valvular nostrils, and his evil golden eye.

We soon perfected a technique for crossing these rivers. To raft our gear across, the boys collected dry "float wood" and the bark of a *Hibiscus*, lashed the logs together to form a flattened raft, and covered it with paperbark. Pushing this ahead of us, we swam together in a body, making as much noise as possible. There were crocodiles present, and even when we did not see them the banks were scarred by their sharp claws and grooved by their great slides. Scarcely one of these rivers or creeks but has its more or less recent story of a crocodile victim.

But for us there was no danger! The natives said so. You would not die by crocodile unless it was preordained; unless a medicine man had worked his evil magic and willed it so, so that you were under his spell.

But I—sometimes I remembered that though there might be twenty of us, my skin alone was white!

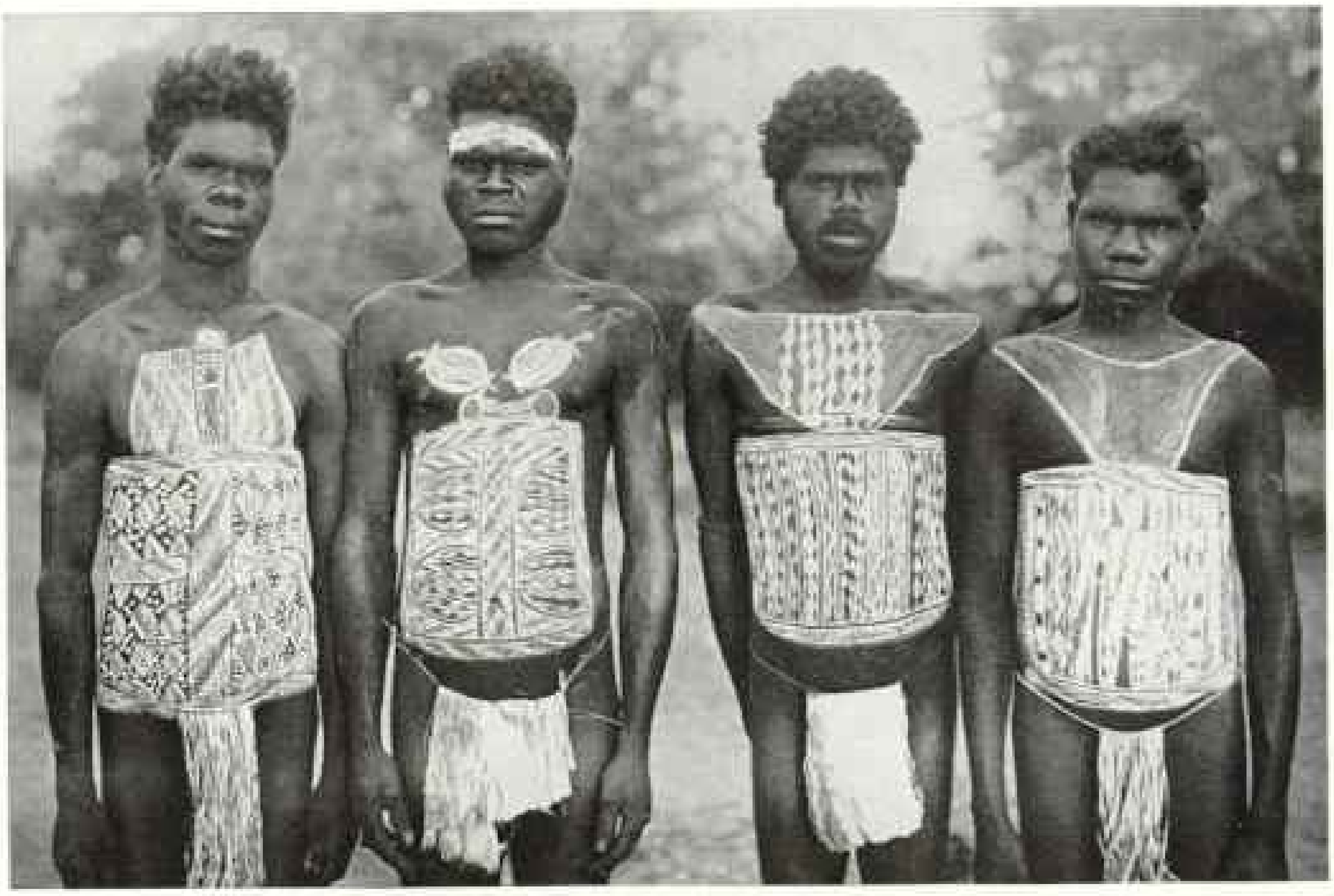
I see still a crossing place by the Minnie, a river to the south of Blue Mud Bay. We had been waiting for the tide to fall in order to reduce the distance we had to swim. We were three—one boy and I, and Tiger, most faithful of dogs. When the proper time came, we went down to the spot to make ready.

The crocodile is a wily reptile. With a timeless patience that has something of the inevitability of eternity, he makes it his business to watch fording places that provide him with victims. Sure enough, there was one in midstream, right in our path.

He was floating high in the water, brazenly; even the hard scutes of his tail were clearly defined. But he had come too soon.

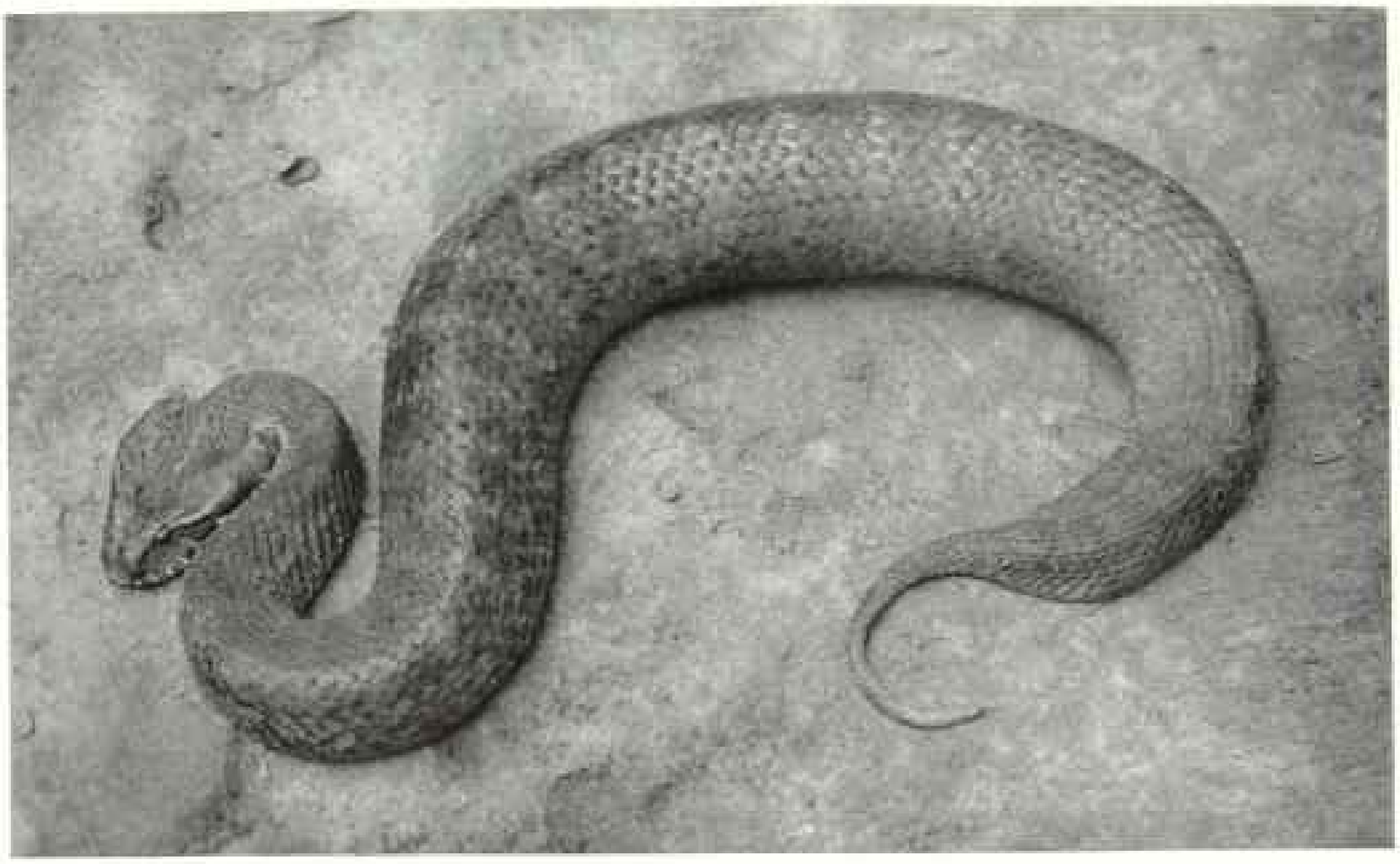
We made a detour upstream, waited for nightfall, and crossed in the dark.

It was bitterly cold; I remember the struggle through the tangle of mangrove roots on



White Clay Embroiders Lacy Patterns on Newly Initiated Clan Members

Symbols are painted by old men in a pagan ceremonial roughly corresponding to Christian baptism. They represent designs "invented" by the clan's mythical ancestors. Their meaning is secret.



This Ugly Death Adder Stole into the Author's Bed. "We Took Him Back Alive"

In camp one evening Dr. Thomson felt "something clammy." Mistaking its venomous nature, he allowed the snake to crawl across his bare legs; then he made a leisurely capture (pages 415, 417). The death adder's spiny tail bears the undeserved reputation of stinging. Fangs carry its deadly poison.

Primordial Women Pluck Fruit from a Living Fossil

This cycad, whose ancestors grew in the Coal Age, is not the palm it seems to be. The nuts are toxic, but soaking and cooking remove poison from the flour. Baked, the bread lasts for weeks, giving the natives a food reserve. A straw cape (right), woven from pandanus leaves, serves as sleeping mat, tent, raincoat, and mosquito net.

the far side in the pitch-darkness. We moved to the edge of the salt pan and lay down for a few hours. Daylight saw us pushing off again northward.

Tales of Tree Dwellers

The object of this journey was twofold. Primarily it was to demonstrate beyond question that the area was really under control; that I had succeeded in my undertaking, and that, in spite of all that had happened, a white man could live and travel in the interior without danger from the natives. But it was also to enable me to see the interior of Arnhem Land, to make contact with the natives, and to make a study of the native food resources.

We set out on this journey in October, hottest and driest time of the year, which precedes the breaking of the northwest monsoon, the wet or rainy season.

On the first two days we traveled through dry, arid, inhospitable country. On the third day we crossed the Glyde River, here a little trickle that passes through a wide gap between hills, and entered a low-lying area. It was a vast swamp bed like a fine park, covered with fresh green grass and studded with clumps of splendid paperbark trees.

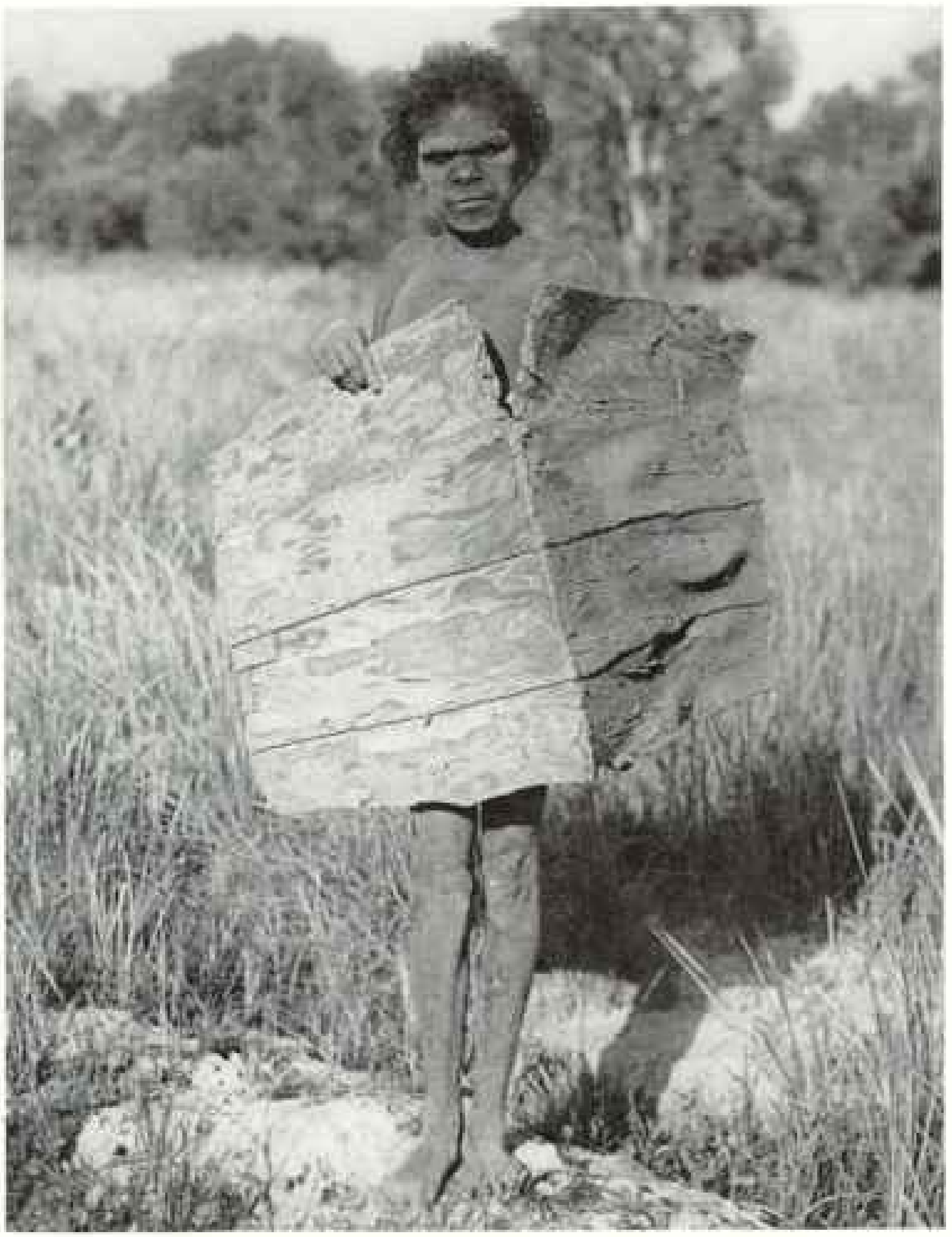
The natives told me that during the "wet" this area was converted into a great lake or swamp which formed the nesting place of the magpie goose, also called semipalmated goose (*Anseranas semipalmata*). They made long journeys, they said, into the swamp in quest of the eggs of the wild geese (page 416).

These journeys occupied many days and were carried out in bark canoes of a curious type. Since there was no dry land, they built platforms in the trees, on which they lived and cooked their food.

These reports fired me with determination to return again before I left the territory and find out all about it, for nothing of this kind had ever been recorded hitherto from Australia. Far away to the east, south, and west, rugged hills and rocky outcrops rose abruptly and showed blue in relief against what we could see of the horizon.

The patrol journey promised to be of interest geographically and to shed some light on the tangled river systems as represented on the only maps available.

Toward the end of the rains in 1936-37 the natives began to bring in reports that gladdened my heart. The floodwaters were rising, the "water grass" was high; the geese were mating and beginning to trample down the long grass to form their great nests.



Modesty Wears a Plywood Fig Leaf

Visited centuries ago by Indonesian sailors, natives of Groote Eylandt learned to screen their women behind portable walls of bark. This precaution set a permanent style. Unmarried men are forbidden to enter the women's quarters.

Navigating the Glyde River

I took the *St. Nicholas* as far up the Glyde River as I thought safe, but encountered difficult and dangerous conditions (page 407).

At high water the river had been a wide, slow-running stream; but a few hours later the tide had fallen rapidly, and we found ourselves between two walls of sticky, villainous-looking gray mud. We were so far down that we could see nothing of the surrounding country above the banks, and we were still descending, in a river bed now reduced to a narrow stream of water that had suddenly become a raging torrent.

The water was of a dark, muddy color, thick with logs, trees, and other objects which were being swept toward the sea. The river was running with dangerous swiftness, and the stream was far too narrow to enable me to turn a boat more than 40 feet in length and drawing six feet of water.

I put out as much anchor chain as I dared, got out a second anchor, and put out bow and stern lines to the banks. But by this time the current was running so swiftly that the vessel was in danger. I had to let go the stern lines, lest she get broadside to the current, and concentrate on keeping her in the center of the narrow ravine that now formed the river until the tide turned.

Mosquitoes came in millions and I spent one of the most wretched nights of my existence. On the following morning I swung the boat on the full tide and took her downstream to a safe anchorage.

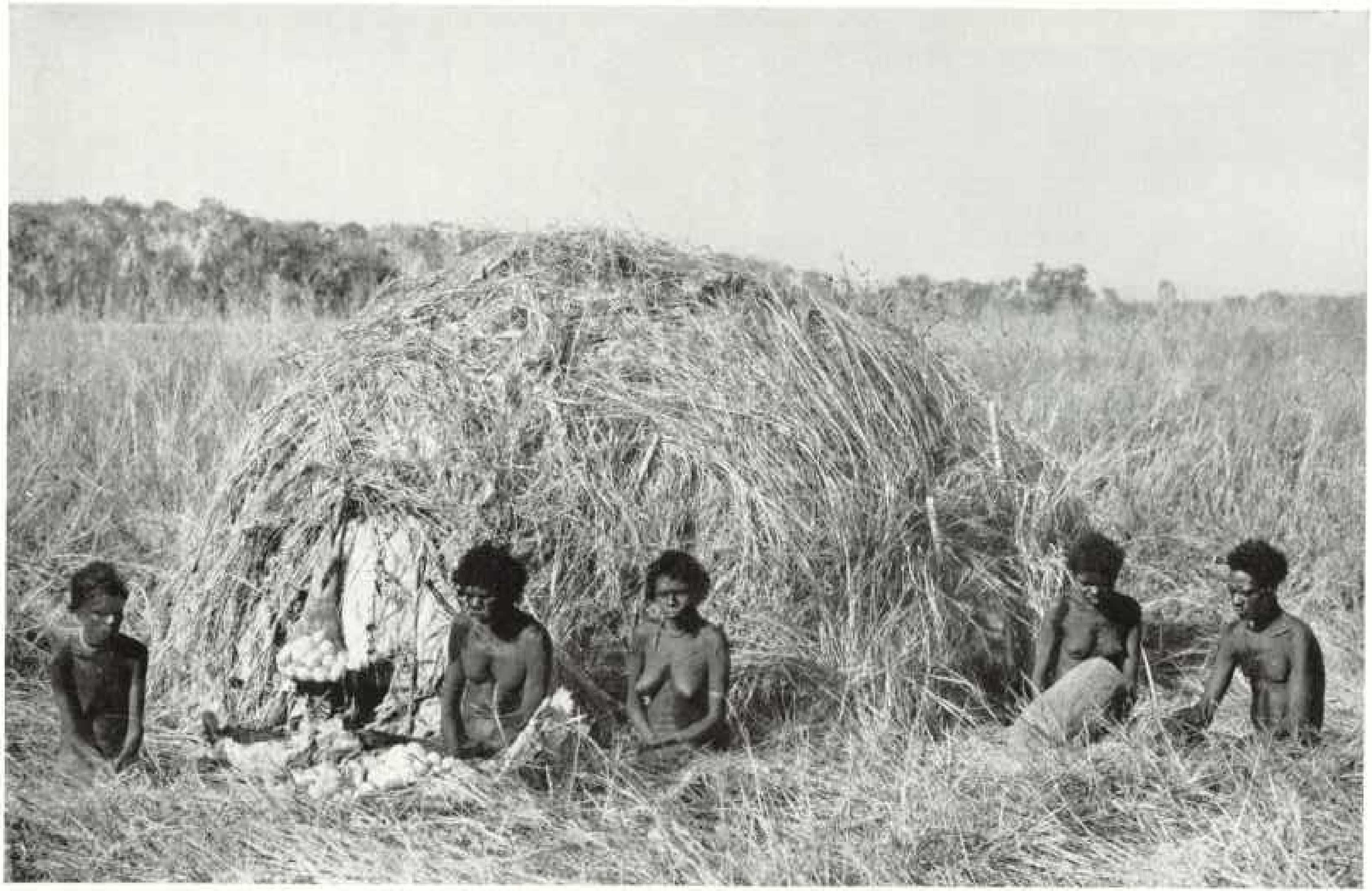
My efforts were rewarded. Not only was the whole country through which we had walked on the overland journey the previous year now converted into a great swamp, but the natives in reality did journey in bark canoes into the swamp in quest of goose eggs.

I accompanied these expeditions twice and obtained photographic and cinematograph records of these remarkable peoples.

Since there was no dry land on which to camp, and the canoes, only 10 feet in length, were too small for sleeping, the natives were obliged to camp in the trees. In the upper

To Trap Fish and Harvest Swamp Roots, Nomads Settle Down Beside a Stagnant Billabong on Blue Mud Bay

Rushes produce edible corms and water lilies tender rootstocks. Fish are speared, netted, and caught in weirs. Blue Mud Bay, whose hinterland appears here, was named in 1803 by the navigator Matthew Flinders, who wrote: "The bottom here is a blue mud." It is like quicksand; waders sink to their thighs.



Swampland's Haystack Igloo, a Screened-in Mosquito-raid Shelter, Makes Life Possible for Egg Hunters

When night brings hungry, humming swarms, the women crawl into their thatched paperbark hut, plug the door, and light smoky fires. Usually their men are deep in the swamps, hunting geese. Dozens of goose eggs, ready for roasting in coals, hang above the narrow entrance as if in a Christmas stocking (page 424).

Water-lily Seeds, Ground to Paste, Molded in Loaves, and Baked, Make Lily Bread

The author, who ate native foods for two years in Arnhem Land, found the bread palatable, though it is heavy, coarse, and unleavened. Lily seed capsules rest on the cook's right.

branches they constructed crude platforms where they slept and cooked their food.

Only the men took part in the excursions into the swamps; women and children remained in camps on the high and dry land on the margin of the Arafura swamp. Only frail bark canoes, each made from a single sheet of the bark of the stringybark tree (*Eucalyptus tetradonta*), were employed on these long quests by the goose hunters (page 416).

Accidents often occurred. On the last journey I made, 21 canoes set out. One was destroyed on the journey, the stern of another was torn off and had to be resewn, and a snag was driven through the bottom of the canoe in which I squatted in a pool of water.

Each canoe carries, as a rule, only one man. He propels it with a pole, after the manner of a punt, with extreme skill and dexterity. Driving the canoe through narrow openings among the trees which stand in the water or through dense thickets of grass is hard work and calls for expert handling and long practice. My canoe was only of normal size, and with two men aboard instead of one it was so deep in the water as to have very little freeboard. At frequent intervals water slopped over the edge, and I sat all day in a puddle.

My canoeman spoke a language that I could not understand. Since he knew no English, conversation was confined to two or three words in a language of the coast.

"Bulna, bulna! Ngarra yauyun!" he would exclaim with monotonous regularity. "Wait, wait! I shall bail." Or, when the discomfort of the steadily rising water grew acute, I would exclaim in turn, "Yauyuro, yauyuro!" (Bail, bail!)

Because of the incredible number of mosquitoes, which make life almost insupportable for a human being, the natives construct a special type of house (page 427). It is beehive-shaped, like those of many other parts of Arnhem Land. In addition to the usual covering of paperbark it is heavily thatched with grass, in which only one or two doorways are left, so small that entry to the hut can be gained only by crawling.

At sundown the natives retreat into the *wurlies*, plug the entrance holes with grass, and light smoke fires within, making a hole in the roof just sufficient to permit the smoke to escape.

One night my kangaroo dog, Tiger (page 406), lay on the open deck of the *St. Nicholas* on the Glyde River. In the morning he was covered with gorged *Anopheles* mosquitoes so distended with blood that it exuded in drops

Stone Age Man Inspects His Armory of Chipped-flint Spearheads

Ngillipidgi flints, chipped with pounding stones and packaged in bark parcels (left), are traded for hundreds of miles. The author is the first white man ever to visit the quarry (page 416).

from the ends of their bodies, and the deck had the appearance of having been sprayed with blood through a fine spray. From that time Tiger had to live inside the wurlies at night or he could not have survived.

Tree Platforms

The long journeys with the goose hunters and the camps in the upper branches of the trees were the most remarkable experiences of the two years I spent in Arnhem Land.

The platforms were frail and somewhat crude affairs, made by wedging three or four poles in forks suitably situated and laying sticks across them to form a floor. The floor was then covered with sheets of tea-tree bark.

No nails, lashings, or fastenings were used, and one had to be careful to avoid upsetting the platform by walking close to the edge.

When firewood was required, the natives climbed out as far along a branch as seemed expedient and broke off dead sticks. If their demands were more ambitious or when the supply was exhausted, they crawled backward over the edge of the platform, descended the tree trunk to the canoe moored below, poled across to a neighboring tree, climbed for the required wood, and repeated the performance on the return journey.

But it was an unforgettable experience to sit in early morning or at night looking across the parklike expanse of the swamp to see, from one's sleeping platform, the sun rise or set over the water; to watch the long file of canoes at dusk converging on the prearranged camping place, bringing in their spoils; to see at night on all sides the glimmer of campfires high up in the trees or reflected below in the dark waters of the swamp; and to listen to the talk of the natives as they lived over again the day's adventures, recalling critical moments in the stalking of the quarry killed or lost, while they plucked and cooked the geese.

These are the unforgettable things, not least because no white man had ever seen them before. These are the things that remain, the things that I see as I write. Already almost forgotten are the long, endless nights of torment when the mosquitoes made life almost a burden. Forgotten, too, are the days when every forward plunge of the canoe through the grass brought down a shower of ants and spiders; the gorged leeches; the trickles of blood down one's legs; and the pools of blood on the bottoms of the canoes.

Toward the end of the goose-egg season the water was beginning to dry up in the swamps

and the vegetation was breaking down and growing very dense. This made our progress increasingly difficult, but eventually we reached the boat, worn out with hard travel, lack of sleep, and the ordeal by leech and mosquito. Our skins were cut with the sharp cutting grass and had become rough, dry, and scaly through constant immersion in water.

To add to the difficulties, my equipment was beginning to show the strain. The cameras were constantly developing faults. Sometimes shutters jammed, and I had to sit down and effect temporary repairs.

I was relieved to find the boat safe, but the boys that I had left in charge reported that a big airplane with "*mintji* like damper" (marks like a damper) had flown up the river and swooped low over the boat.

The mintji were the colored "cockades" of a Service aircraft, an amphibian from the RAAF, which was to meet me in the Crocodile Islands (page 412) for a reconnaissance of the region over which I had been walking for nearly two years. The plane had arrived at the rendezvous before me, and we were still nearly a day's journey up the river.

But it was low water, and we could do nothing until the tide turned. We snatched a hurried supper of goose eggs and lay down for a short rest.

During the night, as soon as the tide turned and the moon rose sufficiently high to show the river as a shining pathway between two dense black walls of mangroves, we swung the vessel and ran downstream, dead slow, fighting the longing for sleep and keeping a sharp lookout for the great logs floating everywhere. At daylight we crossed the bar and ran out into the open sea.

I can live it over again as I write; even now, after many months of "civilization," I cannot believe that it is merely a memory.

These are the real things, and I fancy I hear still the loud "He-e-e-e," like an organ note, with which the goose hunters hail one another down the long lanes of the swamp, or the husky trumpeting of the geese over my sleeping tree. That was real; it was then that I was alive.

It was bitterly hard work, and I was often lonely, sometimes discouraged. But why do I yearn to be a blackfellow again?

Arnhem Land Expedition of 1948

HOW do Arnhem Land aborigines subsist? How do they compare with other primitive peoples? What birds, beasts, and fishes share Arnhem Land with them, and how do these creatures influence the native way of life?

Answers to such questions are sought by American and Australian scientists who compose the Arnhem Land Expedition of 1948, sponsored jointly by the National Geographic Society and the Smithsonian Institution in cooperation with the Commonwealth of Australia. They will spend the 1948 dry season, March to October, in this Maine-size aboriginal reserve in the northeastern corner of Australia's Northern Territory.

Leader of the expedition is Charles P. Mountford, ethnologist of the South Australia Museum at Adelaide. Mr. Mountford, student of his continent's aboriginal art, customs, and culture, described "Earth's Most Primitive People" in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1946. His American associates in Arnhem Land are four Smithsonian Institution scientists.

Photographs and measurements of the natives, and mechanical recordings of their various dialects, will be made by Frank M. Setzler, anthropologist. He will also make facial masks for use in the U. S. National Museum exhibits.

Native fauna, extinct elsewhere in Australia, will be sought by Dr. David H. Johnson, mammalogist. Many Arnhem Land mammals are marsupials, from tiny mouselike animals up to giant kangaroos. There are bats and rodents in strange variety, the dingo or wild dog, and the dugong.

Bird specimens from northern Australia will be collected by Herbert G. Deignan, ornithologist. Species and even genera new to the Museum series are a possibility.

Arnhem Land's archerfish and mud-skipping goby (described on page 418) are listed for study by Dr. Robert R. Miller, ichthyologist. Among other strange fishes Dr. Miller expects to meet are the stinging catfish, the rock-skipping blenny, and a fish found inside sea anemones.

Nowhere in Arnhem Land are charted trails passable for trucks or automobiles. The expedition's approach to the reserve is by small schooner to coastal stations on Van Diemen Gulf, the Arafura Sea, and the Gulf of Carpentaria. Natives serve as porters for journeys inland.

Of five bases selected for the expedition's use, one especially suited for study of marine life is on Groote Eylandt (Big Island), just off Arnhem Land's east coast in the Gulf of Carpentaria.

Other bases are at the heads of navigation of mainland streams, where Christian missions were established early in the century. These are lonely exceptions to the ban on the white man in Australia's aboriginal reserves.

Accompanying the expedition will be Howell Walker, Staff Photographer of the NATIONAL GEOGRAPHIC MAGAZINE, who already has spent several years in Australia.—THE EDITOR.

The Society Maps a New Australia

WITH ship and plane loads of 20th-century pioneers pouring into sparsely settled Australia, the National Geographic Society this month brings to its 1,700,000 members a 10-color supplement map of the island continent.*

This full-length portrait shows a continent in transformation. The sheep-raising, cattle-driving, wheat-growing country is going industrial.

Early in World War II the Dominion's defense needs prompted amazing industrial progress. Now expanding factories seek workers; jobs far outnumber applicants. Australia wants people—millions of them.

During the war some 2,000,000 Americans became acquainted with Australia and its sturdy, congenial people. Many married Australian girls and stayed. Ten thousand inquiries representing 20,000 potential migrants have been received from Americans. Financial assistance is offered immigrating veterans by the Australian Government.

"We want a million of these splendid GIs," said the Australian Minister for Immigration, "and could employ 200,000 right now if we could land them on our shores." He called for "men and women with the spirit of adventure, the old pioneering spirit of your covered-wagon days."

Given similar encouragement, more than 400,000 citizens of the United Kingdom have applied for admission since the war's end.

Map Reflects Wartime Surveys

The notable increase in world interest in the "land down under"—squarely "under" the North Atlantic Ocean—caused the National Geographic Society to choose Australia as the subject of its first 1948 supplement map. The geographic information which it contains is more detailed and accurate than was heretofore possible, because in Australia, as in many other regions, extensive new surveys and mapping projects were carried out during the war.

Trimetrogon aerial surveys made by the United States Army Air Forces completely mapped the continent's little-known north coast, resulting in much changed detail in that wild area. Valuable base material was provided by the Australian Government's 1:1,000,000 map sheets covering the continent.

The new National Geographic map's scale of 1:6,000,000, or 94.7 miles to one inch, is large enough to show all cities and important towns and villages. The map, 31½ x 25 inches, even locates homesteads in the continent's vast open spaces. It contains 4,418 place names.

Scale variation is held to a minimum by use of the new Chamberlin Trimetric Map Projection, developed by the National Geographic Society and previously used in its map of Canada, Alaska, and Greenland in June, 1947.

Highways and railroads are shown, and an unusual feature is the inclusion of a small, square black symbol to show the many railroad points where goods and passengers must be transferred because of changes in the width of tracks.

In Australian colonial times, when most of the railways were developed, each colony built its own line on its own gauge, with no thought of a continental system. Even today each State manages its own lines, and the many different gauges have not yet been standardized. This adds to the transportation handicap imposed by the great central desert lands.

To go from Cairns, in the northeast, to Perth, in the southwest, a shipment would travel from Cairns to Brisbane on a 3-foot 6-inch gauge; from Brisbane to Albury on a 4-foot 8½-inch gauge; from Albury to Port Pirie through Melbourne and Adelaide on a 5-foot 3-inch gauge; then to Kalgoorlie on a 4-foot 8½-inch, and on to Perth on a 3-foot 6-inch again. Each change in gauge requires unloading and reloading in different cars.

Though supplemented by many feeder lines in the more thickly inhabited sections near the coasts, and by "dead end" lines south from Darwin and north from Adelaide, this roundabout transcontinental line avoids the continent's great "dead heart." It is as if the United States were serviced by one transcontinental railway running from Maine to California by way of Jacksonville, New Orleans, and El Paso.

Inhabitants Cling to Coasts

To picture Australia, with its 7,500,000 people clinging largely to coastal and urban areas, imagine the United States as unpopulated except for the residents of New York City. Spread the bulk of these along the Atlantic seaboard, scattering a few handfuls inland; drop some around Key West and garnish the Gulf shore between southern Florida and New Orleans; then skip over to Los Angeles and deposit the rest.

* Members may obtain additional copies of the new map of Australia (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ each on paper; $1 on linen; Index 25¢. Outside United States and Possessions, 75¢ on paper; $1.25 on linen; Index, 50¢. All remittances payable in U. S. funds. Postage prepaid.

Australia and the United States are nearly identical in size, but less than a third of the half-arid continent gets 20 inches of rain a year.

The map shows the scarcity of mountains and permanent lakes and streams. Here is not a single glacier, and no perpetual snow fields, except in some secluded hollows on 7,305-foot Mount Kosciusko. Compared with river-chiseled Alpine Europe, most of the Commonwealth from an airplane looks as smooth as a newly made bed.

Flattest and most regular in outline of the continents, Australia is also unique in the fantastic creatures which have developed and survived there throughout centuries of seagirt isolation.

Among them are that strange egg-laying mammal, the platypus; the kangaroo; the lovable little koala; the fairy wrens; and the laughing kookaburra bird.

Black aborigines, the most primitive people left on the earth, still roam the Australian wastelands, hunting their food with spear and boomerang. Some, nowadays, make excellent stockmen.

Much of the vast desert interior is uninhabited. In the south, on the Nullarbor (No Tree) Plain, travelers see not a single tree along the world's longest stretch of straight railway—328 miles.

Thousands of Wells Water Livestock

Yet, in some areas, abundant water lies under the barren, sunbaked earth. Beneath 600,000 square miles in interior Queensland and the northeast quarter of South Australia extends the Great Artesian Basin, supplied largely by rains which fall in the east-coast mountains.

Water seeps inland through natural pipe lines, tilted strata of porous rock, and is tapped by more than 7,000 wells, which vary in depth from 10 to 6,000 feet. Thus water is provided for the huge herds of sheep and cattle that graze on the grassy plains.

In the northwest the map also shows the Desert Artesian Basin. Similar basins underlie the Nullarbor Plain and a large area east of Adelaide.

Where rainfall works its alchemy, trees, flowers, and people thrive. In eastern Queensland, for example, lavender jacaranda blossoms trace streets of frequent towns. Crimson bougainvillea half smothers bungalows. Heady frangipani fragrance hangs in the air. Banana plantations march up and down abrupt slopes. Sugar-cane fields in emerald waves sweep rich coastal plains. And people know the smell of earth after rain.

About half of Australia's people live in six big cities near the sea. Sydney, with a population of 1,398,000, is the fourth largest city in the British Commonwealth, being surpassed only by London, Calcutta, and Bombay. Melbourne has 1,184,000, Brisbane 394,000, Adelaide 370,000, Perth 240,000, and Hobart, Tasmania, 72,000.

Much smaller is Canberra, Australian capital, with only about 15,000 in the Capital Territory. Inset maps give close-ups of Sydney and Melbourne.

East Supports Heaviest Population

Cradle and crucible of the nation, the rainier eastern seaboard still supports the heaviest human concentration, the busiest iron and steel centers. Here the majority of immigrants will live and work.

Most of Australia's major coal mines lie within the wet east and southeast, though Western Australia also produces considerable quantities of coal.

Gold accounts for Kalgoorlie in the western desert; without a 350-mile pipe line from hills near Perth it would die of thirst.

A promising powerhouse for increased industrial activity, neighboring Tasmania holds hydroelectric possibilities greater than all the mainland's. It contains 74 percent of Australia's total potential water power. The vanguard of some hundreds of Polish immigrants is already working along its lines of water diversion.

Rich in dairy farms, fruits, cattle, and sheep, this island State (shown in an inset) is like a transplanted England.

Manufacturing Makes Rapid Strides

Wool and meat, grain and gold still make up the bulk of Australia's exports; yet today its manufacturing earns about 60 percent of the national income, compared with 39 percent in 1937-38.

Machines and methods molded in World War II now make aircraft, ships, automobiles, electrical appliances, textiles, pottery, medicinal drugs, and many kinds of luxury and consumer goods customarily received from abroad. Every trade or profession has its vacancies.

Close at hand is the overcrowded Far East, and Australia's two and a half persons per square mile contrast strikingly with Japan's 469 or Java's 817. But to the Occident, not to Asia, this continent-country looks for large-scale immigration.*

* For further articles on Australia, see the "Cumulative Index to the National Geographic Magazine, 1899-1947, Inclusive," $2.50.

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To carry out the purposes for which it was founded sixty 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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On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted $25,000, and in addition $75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

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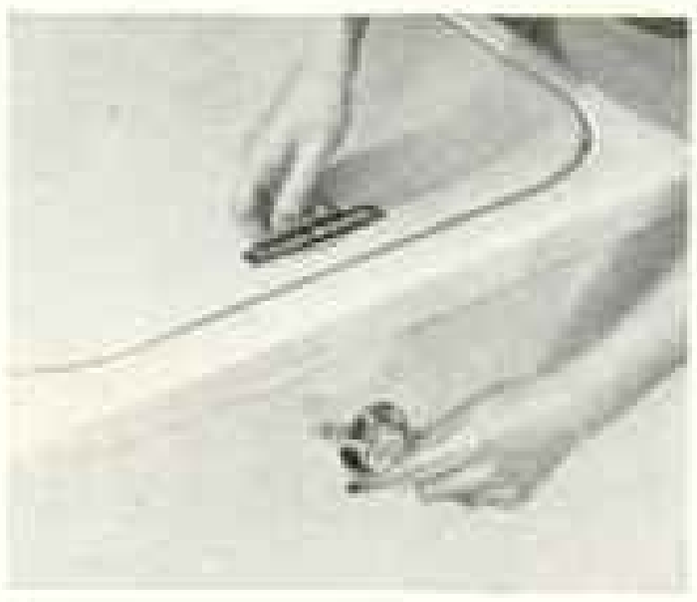

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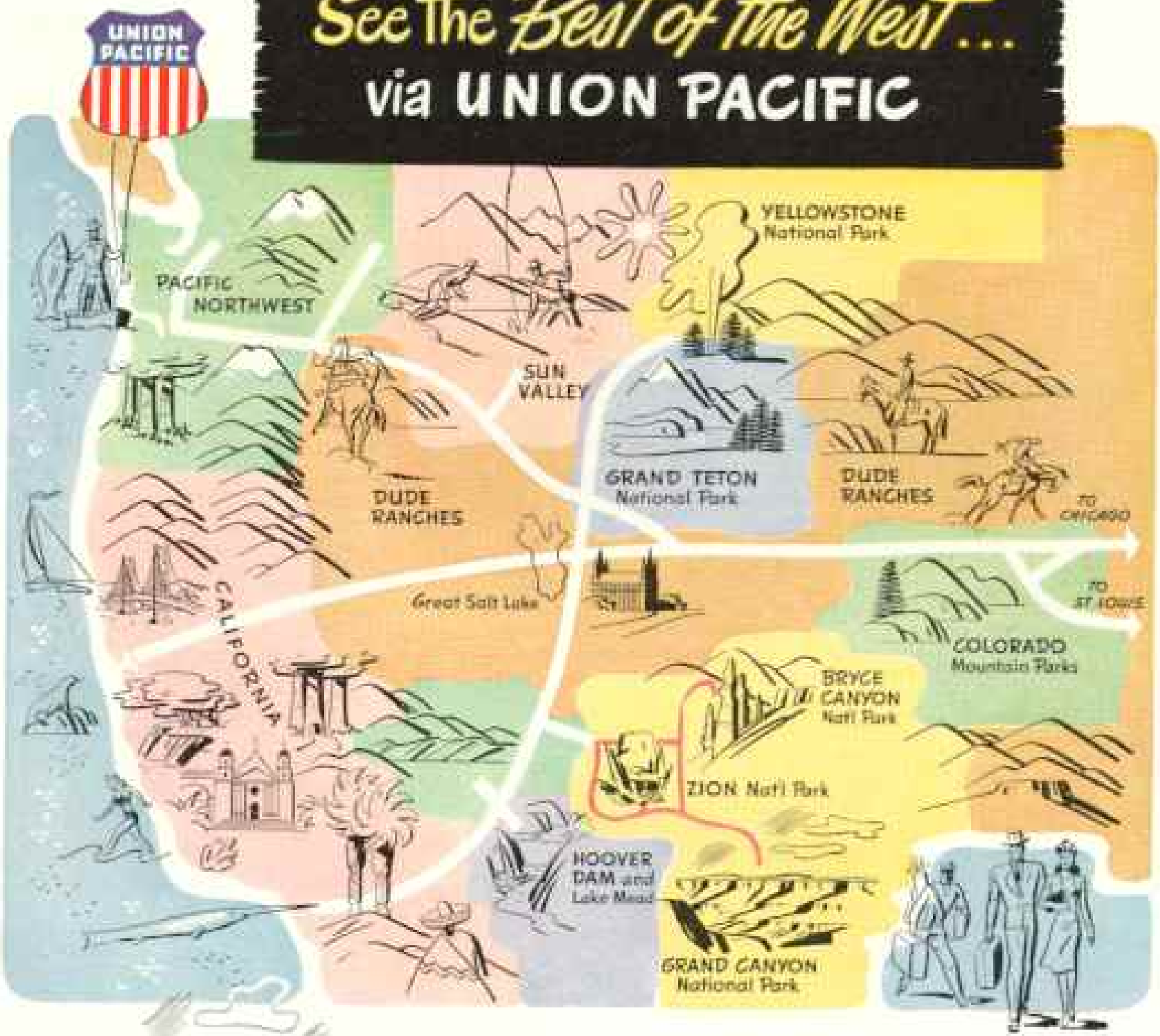

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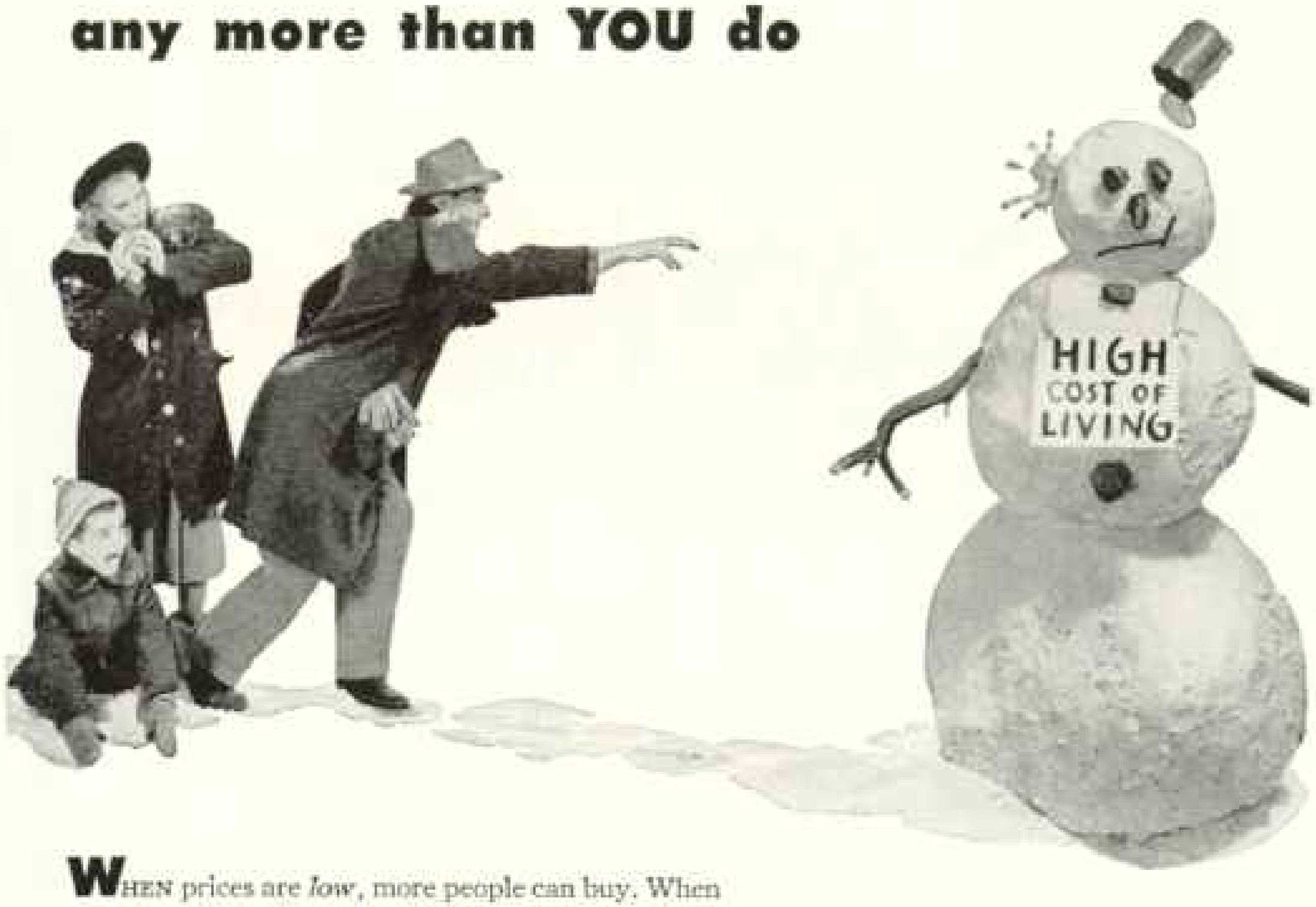

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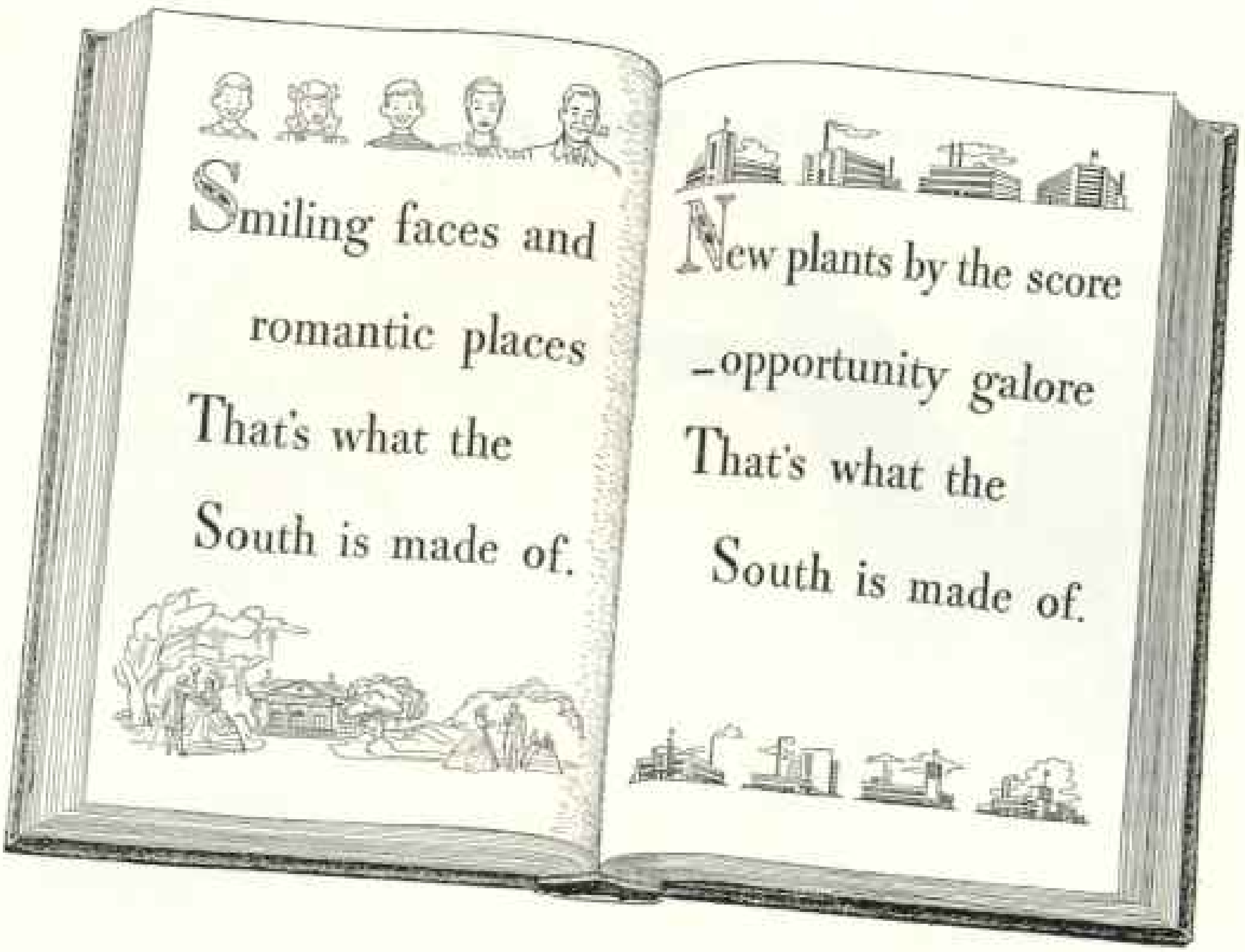

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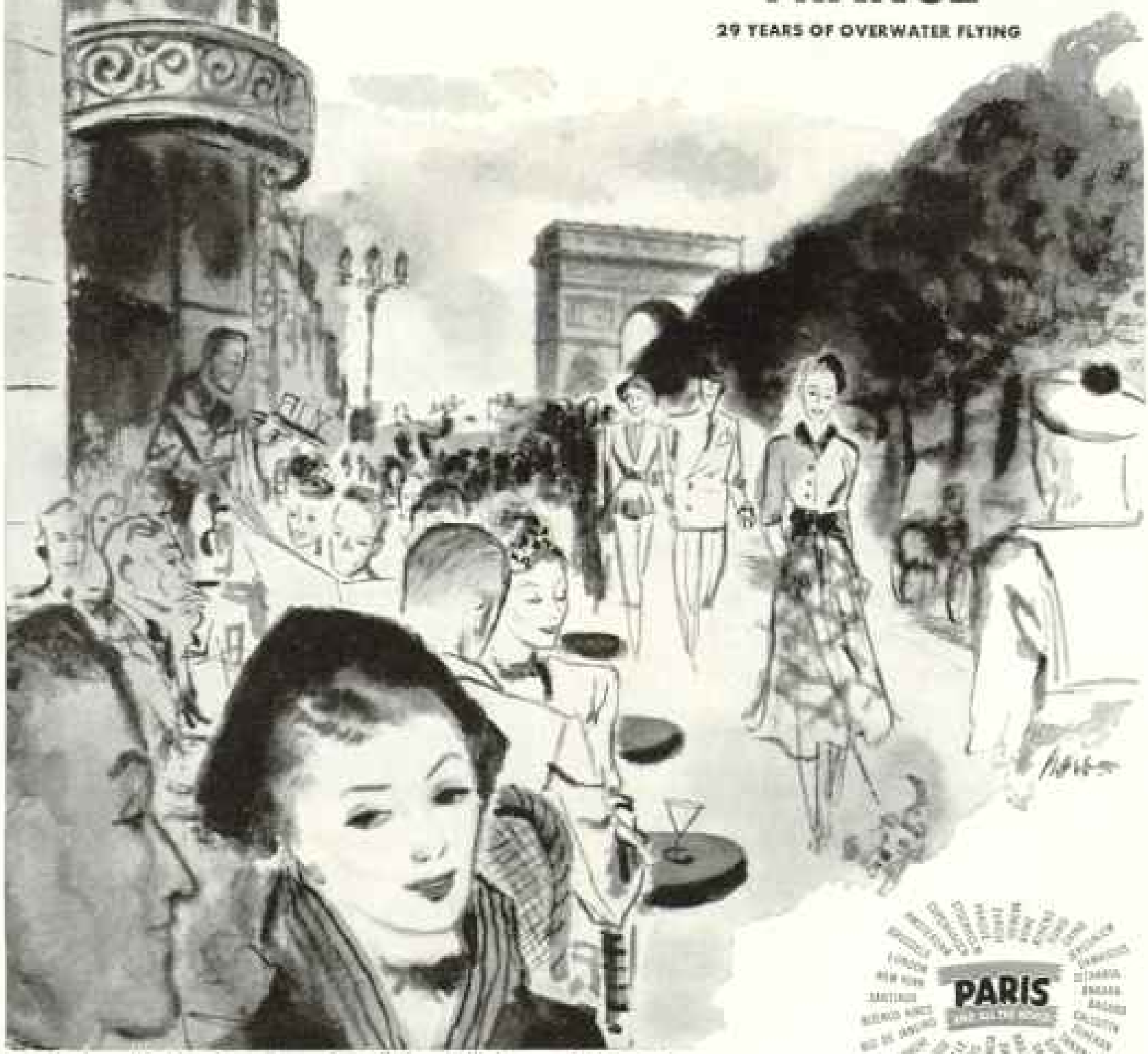

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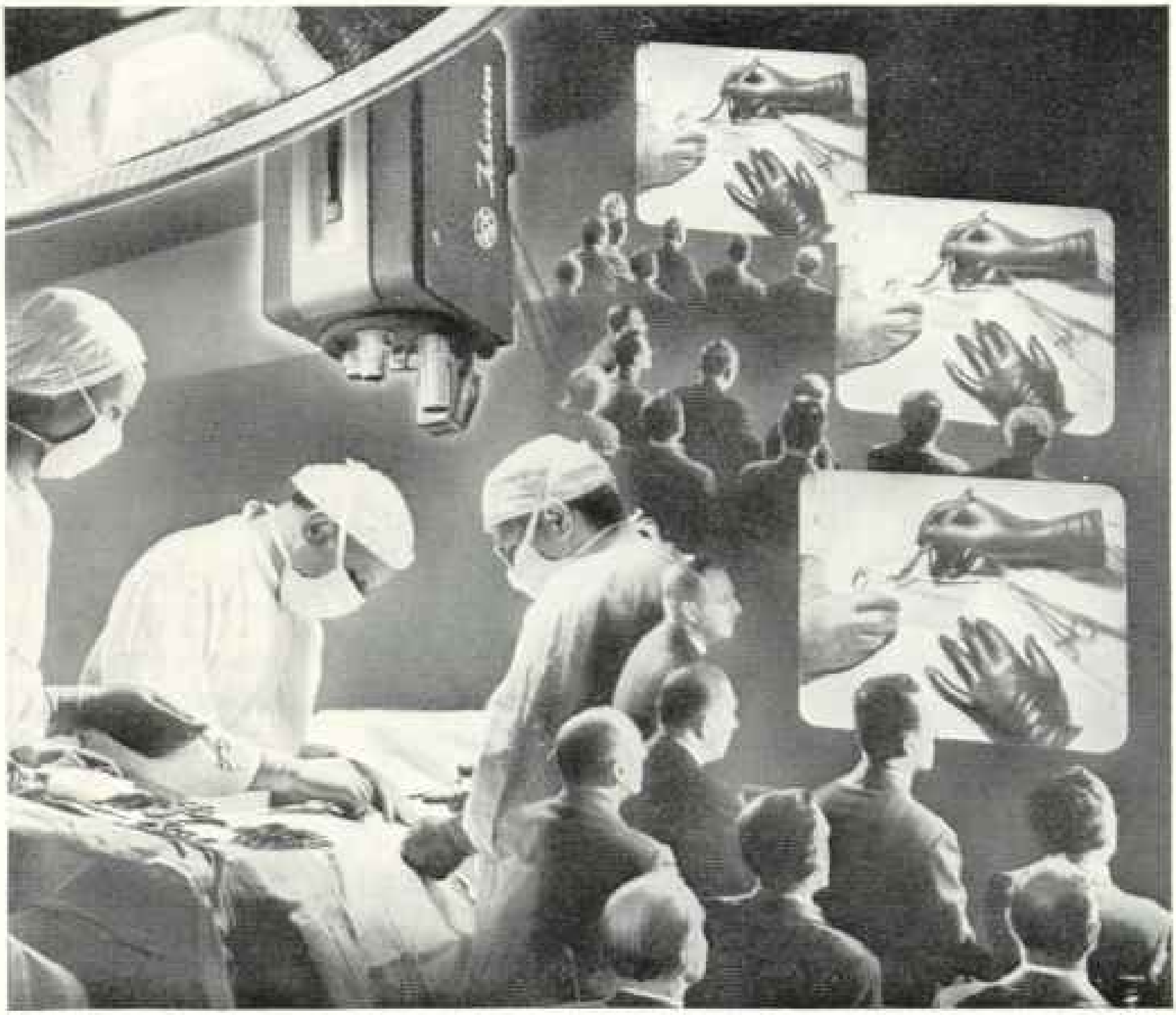

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For Better Homes and Offices Since 1893.

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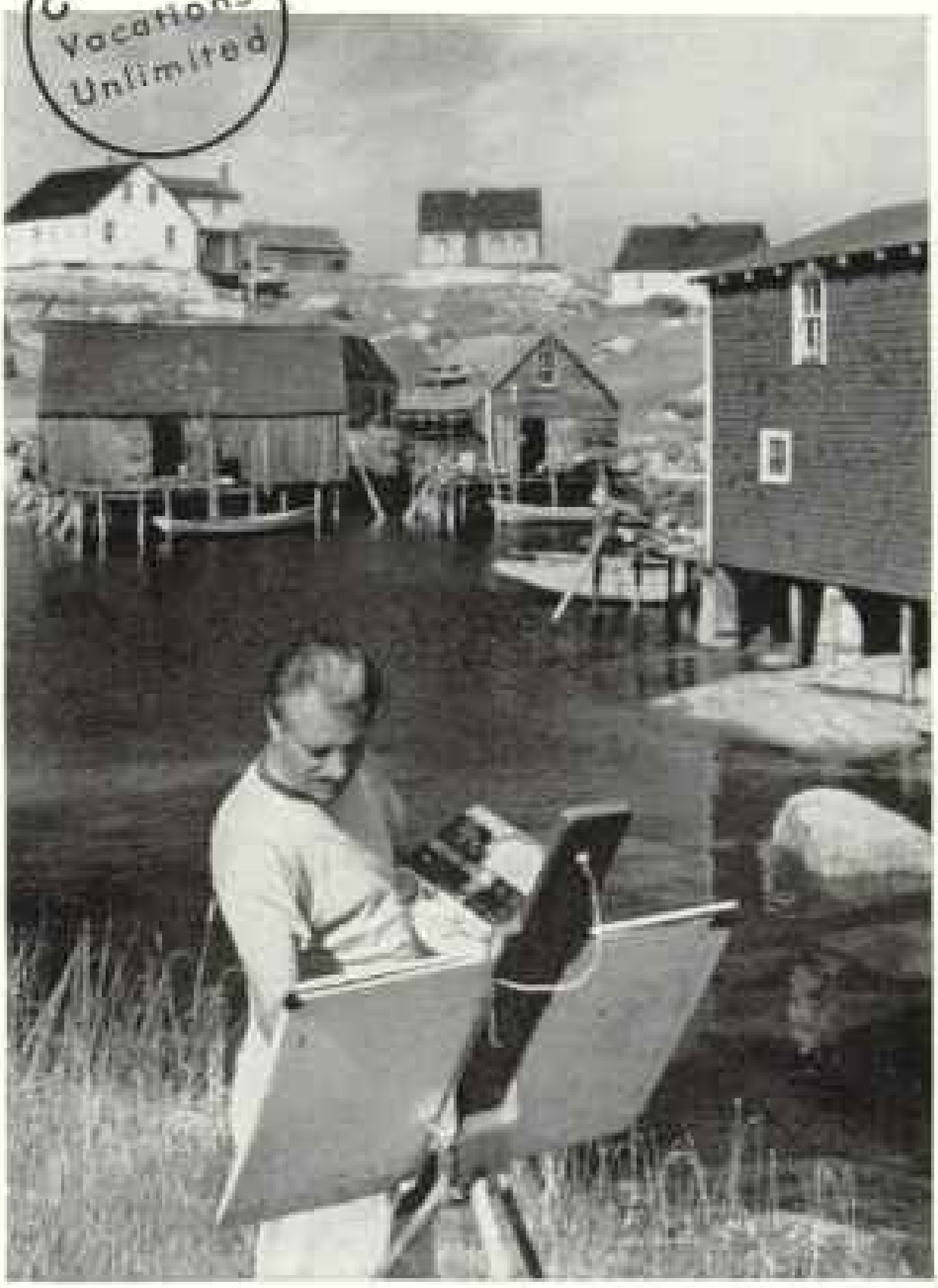

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Got a *special* sort of vacation all dreamed up? Of outdoor life in National Parks? Of luxury life on an inland cruise or at some secluded resort? Big-city sightseeing? A fishing party into the deep woods? Canada has it all ready for you. So bring your vacation dream along—*live* it this year in Canada. For information, write:

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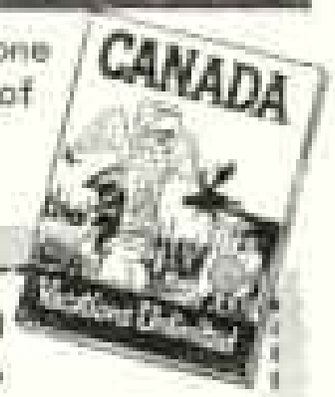

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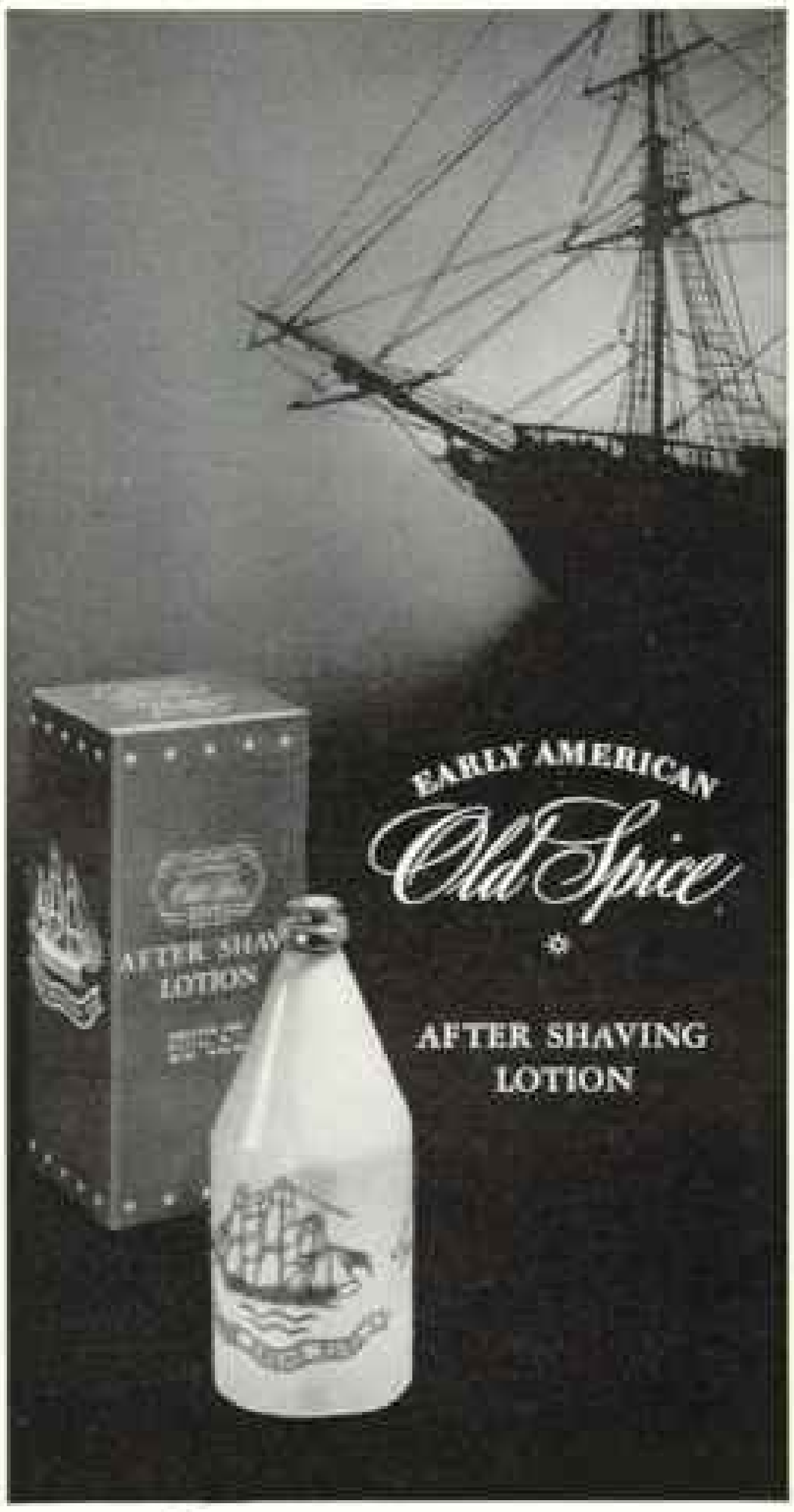

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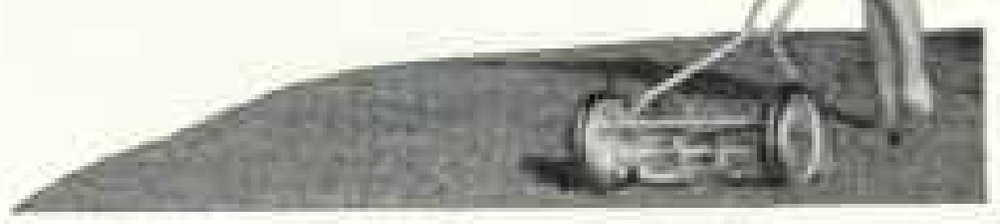
*POPULAR FAVORITES IN HAND and POWER Models

Thousands of satisfied owners have found there is no other mower like an Eclipse. You, too, will appreciate the smooth, effortless operation, economy, durability and mowing precision of your Eclipse.

20" ROCKET—This rugged precision POWER mower features finger-tip control, easy starting and positive action clutch. All 3—wheels, reel and sharpener—are POWER DRIVEN. No mixing of gas and oil . . . less fumes . . . less noise.



MODEL "L"—Noted for its handling ease, Model L is ruggedly constructed and correctly balanced for mowing precision. Among many exclusive features, you'll find natural grip all-steel handles, accurate finger-tip adjustment, smooth shearing action and many more.

THE ECLIPSE LAWN MOWER CO.

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*Because of Eclipse popularity, it may take a little longer to get your favorite model. We suggest placing your order early.

Laze the city daze away-

in Beautiful- **NEW HAMPSHIRE**

In summertime New Hampshire you find a new and different world . . . cool, restful, serene. As you golf, fish, swim or just relax amid majestic mountains, placid lakes and the green of rolling hills, the turmoil of the city is far away—cares are forgotten.

In New York visit the N. H. Information Bureau, 10 Rockefeller Plaza

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248 Capitol Street, Concord, N. H.
Send for FREE the 1948 N. H. Vacation Kit, with illustrated booklets, maps and other information.

"MALIGNE LAKE alone is worth the trip—world travellers have called it the loveliest anywhere. We'll visit the Columbia Icefield, too, for a close-up look at real, live glaciers."

"

...and we'll all have fun at JASPER

IN THE CANADIAN ROCKIES

"Yes, we're heading for Canada this year! For Jasper Park Lodge, Canadian National Railways' famed resort in the Canadian Rockies. We'll ride and swim and hike and sunbathe. And, sonny, you'll see bears and deer—maybe a moose. All in favour? . . ."

JASPER SCENERY is superb. On the fairway, or riding along the "Sawdust Trail", or lounging by the heated outdoor pool, you just have to look up to see breathtaking beauty.

SEE MIGHTY MT. ROBSON (just west of Jasper) from Canadian National's *Continental Limited*. Through sleepers from Montreal, Toronto, St. Paul, Minn. to Jasper and Vancouver. New cruise ship on the Alaska run this summer.

U.S. CITIZENS need no passport.—For information about rail travel anywhere in Canada, consult Canadian National. Offices at: Boston, Buffalo, Chicago, Cincinnati, Detroit, Duluth, Kansas City, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh, Portland, Me., San Francisco, Seattle, St. Louis, Washington, D.C. . . . Montreal, Canada.

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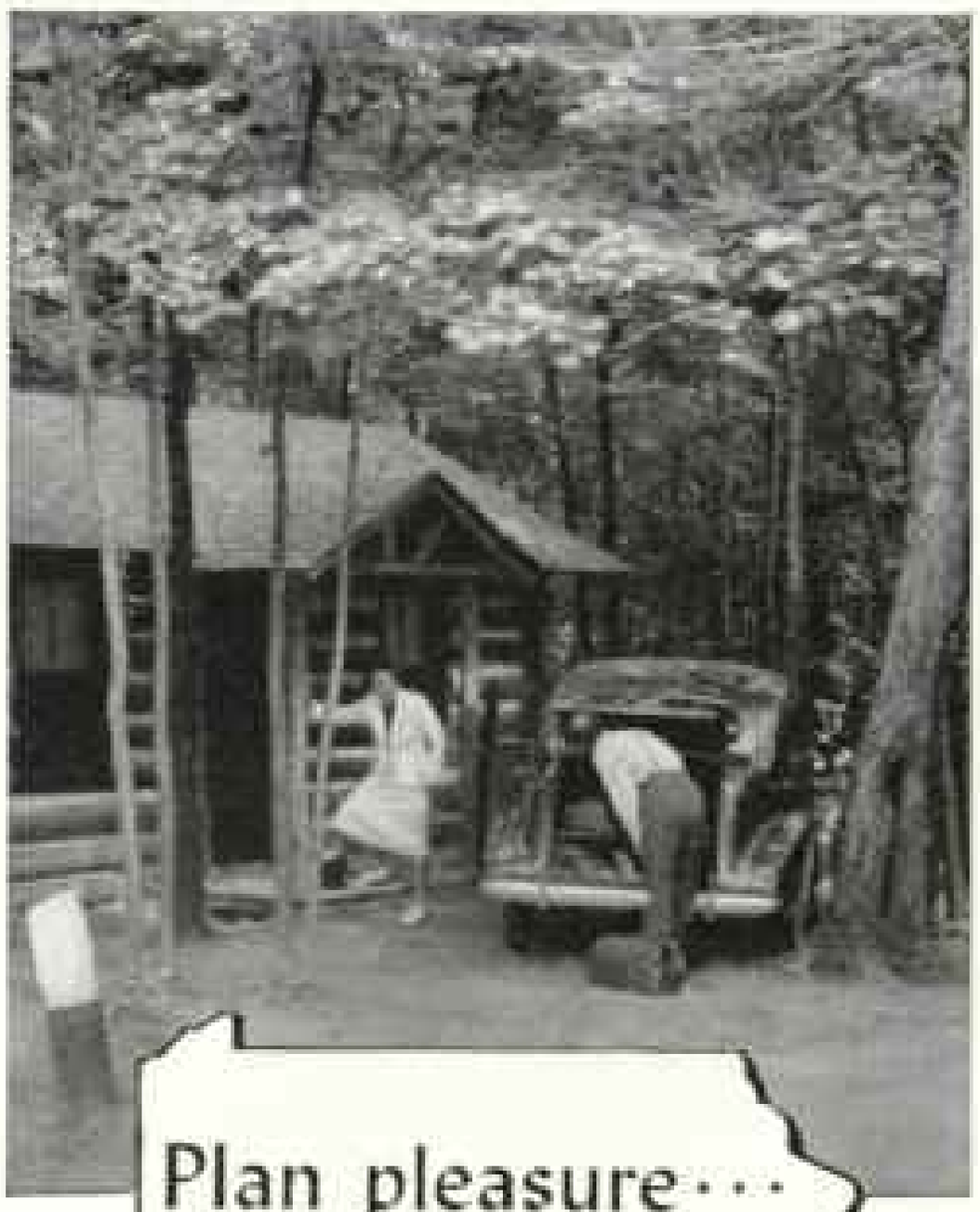

Plan pleasure . . .

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Plan with great expectations a vacation in Pennsylvania—for this state is a host great and gracious enough to satisfy them.

Here is America's meeting place . . . more than 200 years of our country's culture . . . economy . . . folkways . . . are rooted and in full flower in Pennsylvania.

Here, for your vacation pleasure, are more improved roads . . . metropolitan cities . . . small towns . . . thrilling historic shrines . . . more quaint folkways and traditional foods to delight you than in any other state in the nation. Here are vast state parks and forest areas . . . natural wonders . . . famous resorts . . . fine fishing and hunting . . . good living. You will enjoy Pennsylvania.

Send the coupon, please, for detailed information.

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Please send me free maps and literature about Pennsylvania's vacation highlights. Dept. N-9—'48

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Your attention is instantly captured by a Magnavox.
Those first clear, true notes lift you from everyday things into a world of beauty.
Here is beauty for the eye, too. For the warm woods and careful
cabinetry are just as beautiful in their own way as the music Magnavox reproduces. You will
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THE MAGNAVOX BERKELEY... *$330. With FM $415.*

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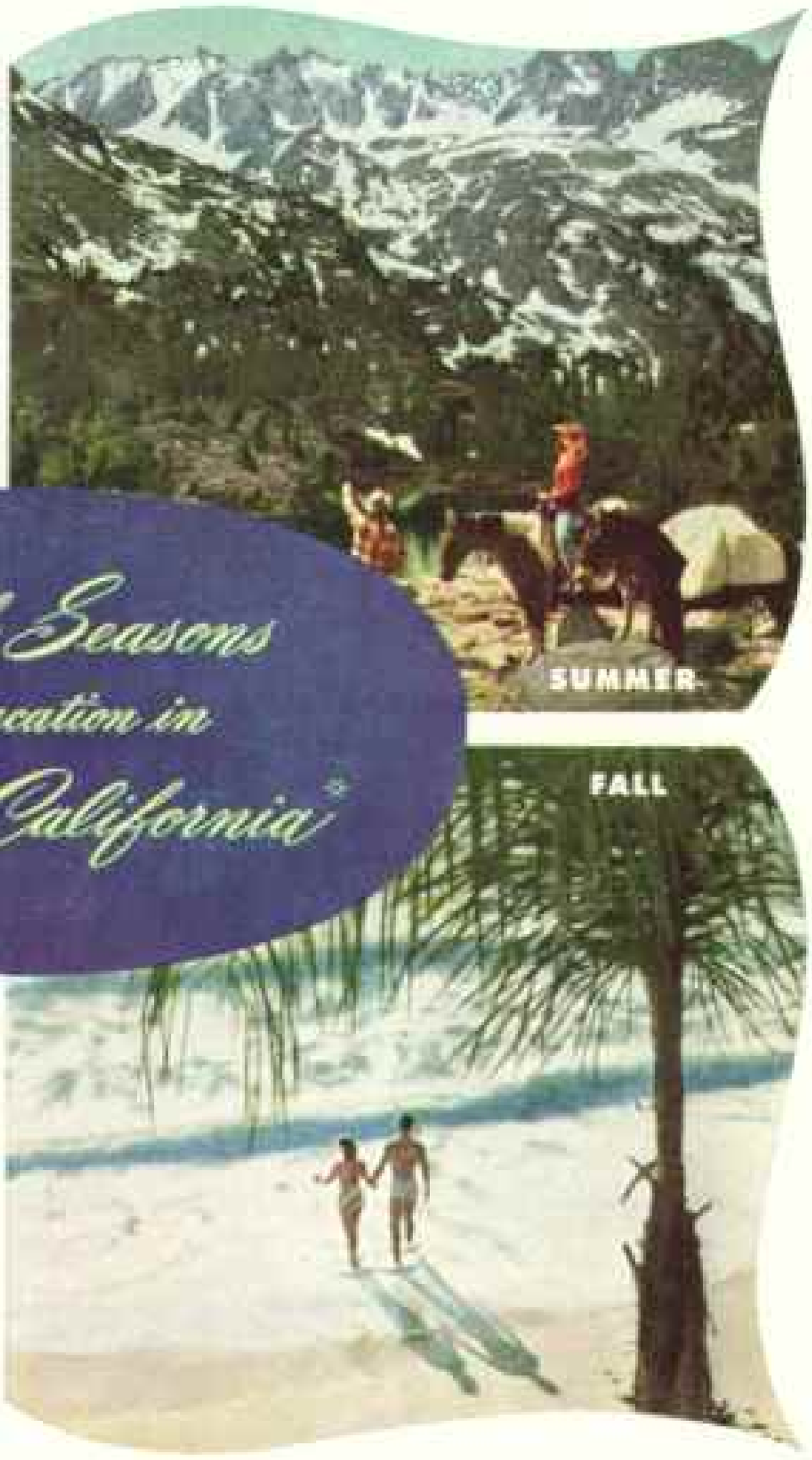

4 Good Seasons

for your vacation in Southern California*

Dry subtropical climate (Southern California is the only place in the U.S. that has it) air-conditions each worry-erasing day—makes this an *all-year* playground. Most every day of the year you can swim, ride, sail, play golf or tennis. *Any* time of year is the *best* time to visit our old Spanish missions, a magic Pacific isle, foreign quarters, orange groves, movie and radioland. Yes, you can enjoy all this *any time* in Southern California. And—don't forget—each season offers its *own* special attractions.

WINTER—Bake in the sun at a desert resort . . . see the Tournament of Roses, poinsettias and camellias in bloom . . . Pacific regattas, horse races.

SPRING—Still delightful on the desert . . . fun at the beach. Great fields of blue, red, and yellow wild flowers. Spring air as warm as June.

SUMMER—The gentle Pacific with long, white beaches. White sails leaning to the wind. Horse racing. Sleep-under-blanket evenings. Lavish night life.

FALL—Water bathing goes on . . . and the desert calls again. Rough-and-tumble rodeos. Speedboat meets. The annual harvest of dates and wine grapes.

*America's 4-Season Vacationland

COME WHENEVER YOU CAN—Los Angeles County and all Southern California are *best* whenever you can get away. Send coupon today for our big "What to Do and See" color booklet. Then, when you arrive, call at the All-Year Club's Free Visitors' Bureau, 517 W. 6th St., for the many other booklets and vacation aids we have ready for you.

ALL-YEAR CLUB OF SOUTHERN CALIFORNIA, LTD.

This advertisement sponsored by the Los Angeles County Board of Supervisors for the citizens of Beverly Hills, Glendale, Hollywood, Long Beach, Los Angeles, Pasadena, Pomona, Santa Monica and 182 other communities. Copyright, 1948, by All-Year Club of Southern California, Ltd.—a non-profit community organization serving vacationists.

No one should plan to move now to Southern California to live unless definitely assured in advance of permanent housing.

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Please send me your free vacation booklet "WHAT TO DO AND SEE IN SOUTHERN CALIFORNIA."

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Salt water cruising

on mountain-girt Puget Sound spices your Washington vacation

This marine and mountain wonderland offers varied steamer and ferry trips . . . or fishermen and yachtsmen may set their own courses in rented boats. There are the alpine attractions of Mt. Rainier and Mt. Baker, the Blue Glacier on the Olympic Peninsula—all near Seattle and Tacoma, seaports for Alaska and the Orient. East of the Cascades are Spokane's lakelands and Grand Coulee Dam. And the gloriously scenic trip to Washington is part of the fun on The Milwaukee Road's super-speed Olympian HIAWATHA.

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For picture-filled folders describing the attractions of the Northwest, address H. Sengstacken, Passenger Traffic Manager, The Milwaukee Road, 801 Union Station, Chicago 6, Illinois.

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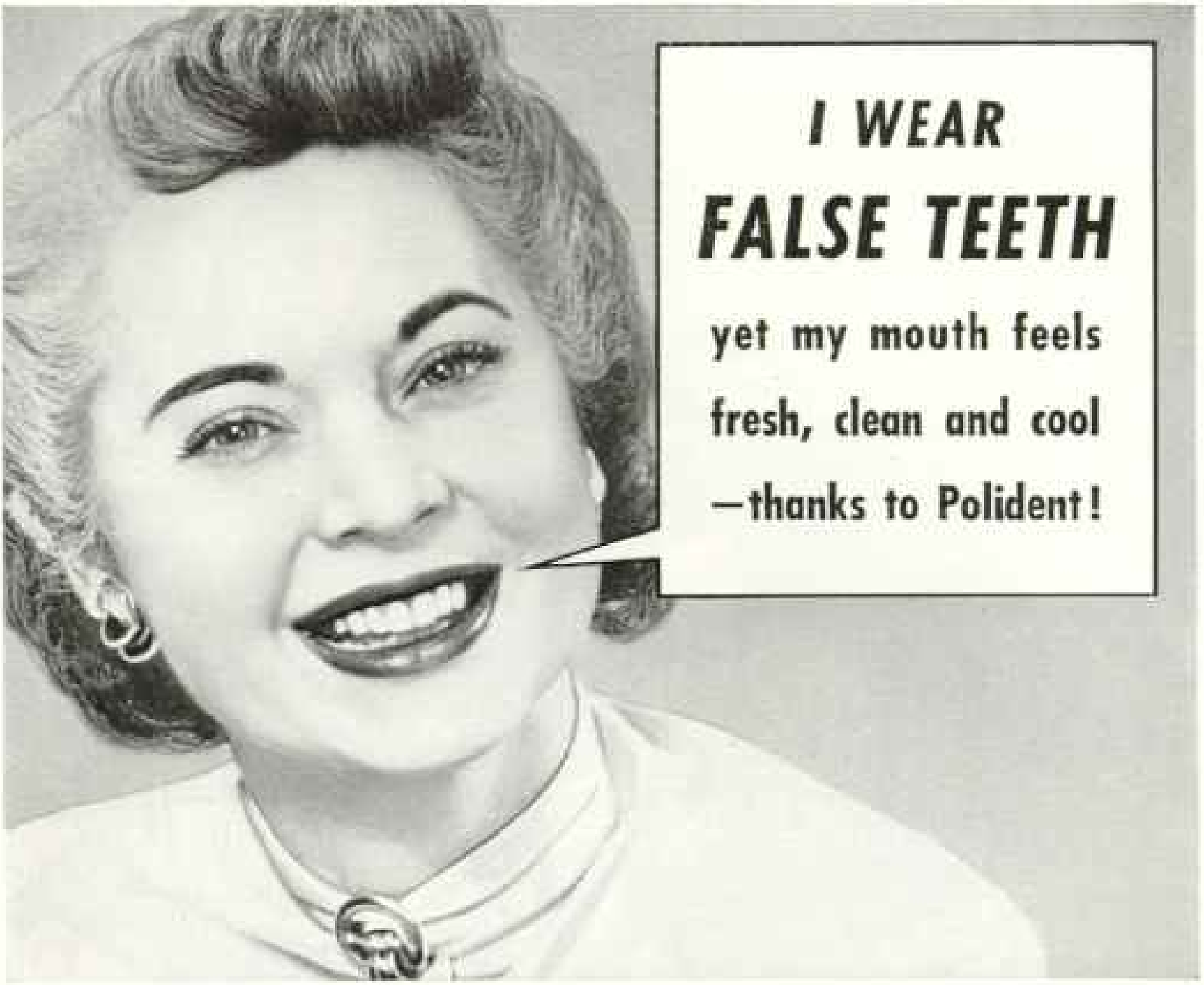
45 Hours Chicago to Puget Sound via St. Paul, Minneapolis, Yellowstone, Butte. Low round trip fares returning via California or the Canadian Rockies.

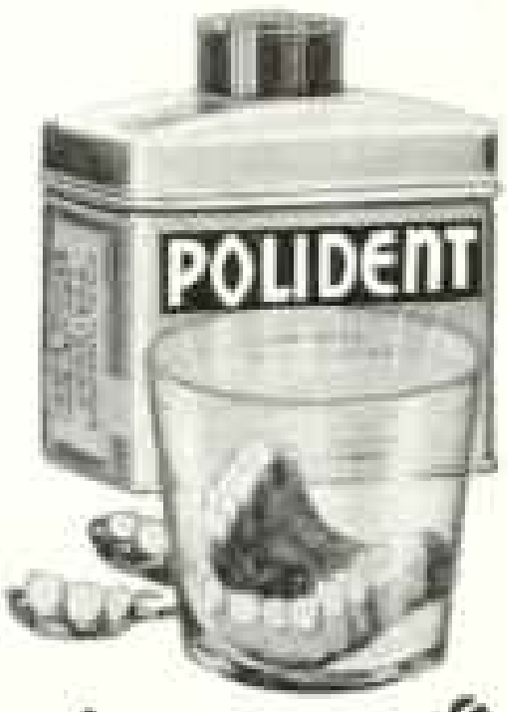


keep your dental plates odor-free by easy daily soaking in Polident

WHEN plates taste bad—feel hot and heavy in your mouth, watch out for "Denture Breath", the oral disturbance that comes from improper cleansing. False teeth need the care of a special denture cleanser—POLIDENT. Safe, easy, quick, Polident leaves your plates clean, cool and fresh. No fear of offensive "Denture Breath".

And remember, Polident keeps your false teeth more natural looking—free from offensive odor, too. For a smile that sparkles, for a mouth that feels cool, clean and fresh—soak your plates in Polident every day.

Polident comes in two sizes—regular and large economy size—available at all drugstores. It costs only about a cent a day to use, so get a can of Polident tomorrow, sure.



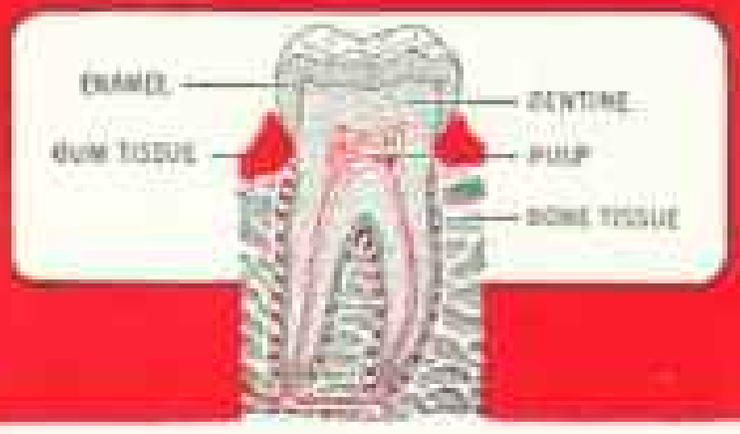
NO BRUSHING

Soak plate or bridge daily —fifteen minutes or more— in a fresh, cleansing solution of Polident and water.

Use POLIDENT Daily

RECOMMENDED BY MORE DENTISTS THAN ANY OTHER DENTURE CLEANSER

Your teeth look like this



When decay starts,  it eats through the hard enamel and spreads into the softer dentine. 

Unless checked, this infection reaches the pulp chamber from  which it may enter the blood stream causing damage in other parts of the body.

Periodic examination, cleaning, and treatment of teeth by your  dentist can usually check decay before serious damage occurs.

Gums must also be guarded.  Bleeding gums, pyorrhea, and trench mouth can indicate infection. *See your dentist regularly to help safeguard your health!*

GOOD TEETH DESERVE GOOD CARE

Don't wait for pain to drive you to the dentist. Visit him every six months, or at such intervals as he suggests.

The dentist's examination, aided when necessary by the X-ray, usually can detect hidden trouble such as abscesses at the roots of apparently healthy teeth. Prompt treatment can generally correct the condition before it may impair your health.

For further helpful information on teeth and gums, send for Metropolitan's Free Booklet, 38-N, "Good Teeth."

How a dead tapir kept Orellana's men alive

THE 57 Spaniards who sailed with Francisco de Orellana down the Amazon in 1542—the first white men to cross South America—started their perilous voyage on empty stomachs.

Orellana expected friendly natives to furnish food. But instead, the Spaniards were met by well-armed war parties. Every time they dared to land to get a square meal, they had a stiff fight.

By late summer, after eight months of hardship and thousands of harrowing miles, the men were too sick and weak to fight longer for their food. Adrift near the mouth of the Amazon, starvation stared them in the face.

Then, one evening at dusk, a lookout sighted a dim shape floating on the water. A canoeman, sent to investigate, brought back—to the amazement of all the men—a dead tapir, enough meat to feed them all for days.

By miraculous good luck, Orellana's men were saved from starvation.

Today, the good luck that saved Orellana's men is still the exception, not the rule. And the average man, particularly if he has a family, dares not lean on his luck when the going gets tough. Instead, if he is wise, he depends on the certain, sure protection of modern insurance to guard his family from financial hardship—now and for the future. It's as simple as this:

By investing in accident and life insurance a small fraction of what you earn now, you can make sure that those who depend on your income will have money for what they need, no matter if mishaps or death befall you.

Especially if you have young children, you'll want to know about Travelers' Triple Protection Plan—a way to give your family more life insurance protection at economical cost.

See your Travelers agent or broker today.

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ALL FORMS OF INSURANCE AND SURETY BONDS

The Travelers Insurance Company, The Travelers Indemnity Company, The Travelers Fire Insurance Company, The Charter Oak Fire Insurance Company, Hartford, Connecticut. Serving the insurance public in the United States since 1864 and in Canada since 1865.

Only Sheaffer's **FINEST** *Bear*

THIS *Mark of Distinction*

LOOK FOR THE WHITE DOT TO GET MOST FOR YOUR MONEY!

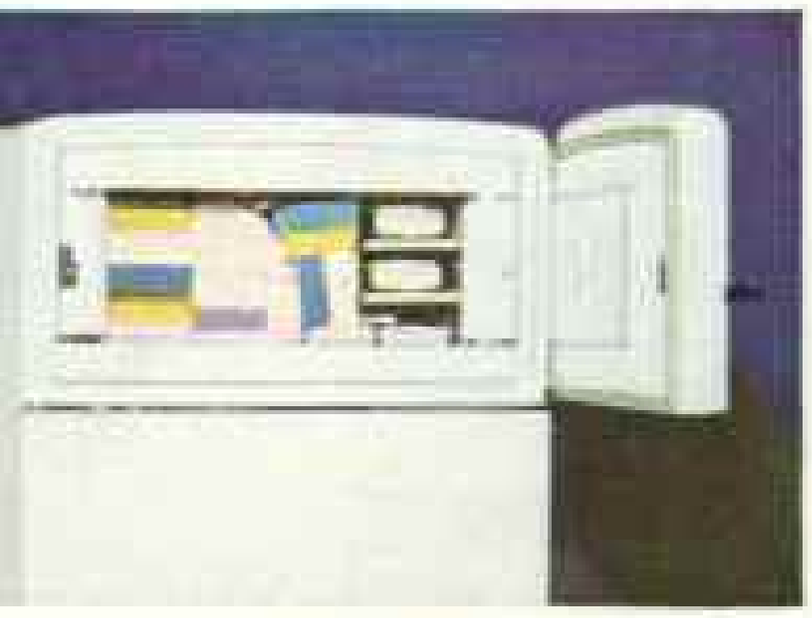
When you find the White Dot—you've found the best pen! It's the Mark of Distinction that identifies Sheaffer's top quality—Sheaffer's completely new, post-war pen that out-features and out-performs every other manufactured today! That's a strong statement, but any pen bearing the White Dot easily lives up to it, as you readily can prove to yourself by trial and comparison. W. A. Sheaffer Pen Co., Ft. Madison, Ia. • Malton, Ont., Can.

CREST DE LUXE THREESOME
Pen $17.50 Pencil $6.00
Stratowriter $12.50
Complete Set $36.00, plus fed. tax.

Listen Every Sunday to SHEAFFER'S PARADE with Eddy Howard—NBC Network: 3 P.M. Eastern Standard Time

SHEAFFER'S

The 1948 Two-Door Refrigerator-Home Freezer Combination!



Upper part: a Home Freezer—separately refrigerated and insulated, with its own separate door!

ZERO STORAGE: For quick-freezing foods and ice cubes, and for dependable, long-time storage of up to 53 pounds of frozen foods. This compartment will provide *zero* temperature *at all times* . . . so *very* important in keeping frozen foods.

The following "Timetable" shows practical storage periods for maintaining high quality of frozen vegetables, fruits, and meat:

0° up to 12 months 15° up to 1 month
10° up to 3 months 20° 1 to 2 weeks

Lower part: a Space Maker refrigerator—separately refrigerated and insulated, separate door. No defrosting!

FRESH-FOOD STORAGE: Gives you 6.7 cubic feet of storage space for fresh foods. (This is practically as much refrigerated *fresh-food* storage as in an ordinary 8-cubic-foot refrigerator.) Keeps the temperature and humidity just right. *No need to cover dishes!*

5-Year Protection Plan: Included in the price of every G-E Refrigerator is a written 5-year Protection Plan, consisting of a one-year warranty on the complete refrigerator, plus additional four-year protection on the sealed refrigerating system. G-E retailers offer convenient terms.

The two-door refrigerator offers important advantages... plus famed General Electric dependability!

In convenience, efficiency, and economy, this great, new refrigerator offers you *more* than any "two-temperature," one-door refrigerator.

No waste of cold in the freezer when you open the refrigerator door! No dripping into the refrigerator from the freezer compartment.

And you get the advantage of famed G-E dependability.

This great, new refrigerator is equipped with the G-E sealed-in refrigerating system—unmatched for dependable performance.

See the General Electric Refrigerator and Home Freezer Combination at your retailer's. General Electric Company, Bridgeport 2, Conn.

GE Refrigerators

More than 1,700,000 in service ten years or longer

GENERAL ELECTRIC

Only Greyhound can offer

TRANSPORTATION FOR ALL THE NATION!

. . . and at fares that make it the "Biggest Bargain in Travel"

CALIFORNIA CALLING . . .

One hundred years ago, James Marshall discovered gold in California. This year there will be gay Centennial Celebrations throughout the State. Enjoy them to the fullest . . . and go Greyhound.

● Today you can walk into any Greyhound bus office and order a ticket for travel *to* and *through* every one of the 48 States, up into Canada, down to Mexico.

It's good to know that one ticket will take you almost anywhere you want to go—assured of modern and restful coaches, a single high standard of service, and one of the World's outstanding records of safe operation.

Can you think of any other transportation that will take you from the Atlantic coast to the Pacific shore for less than 46 dollars, plus tax? Equally low fares apply to thousands of cities, towns and communities.

This year America holds more vivid color and interest for the traveler than ever before in history . . . and the nearest Greyhound station is "Main Entrance" for those who want to fully enjoy these riches.

GREYHOUND

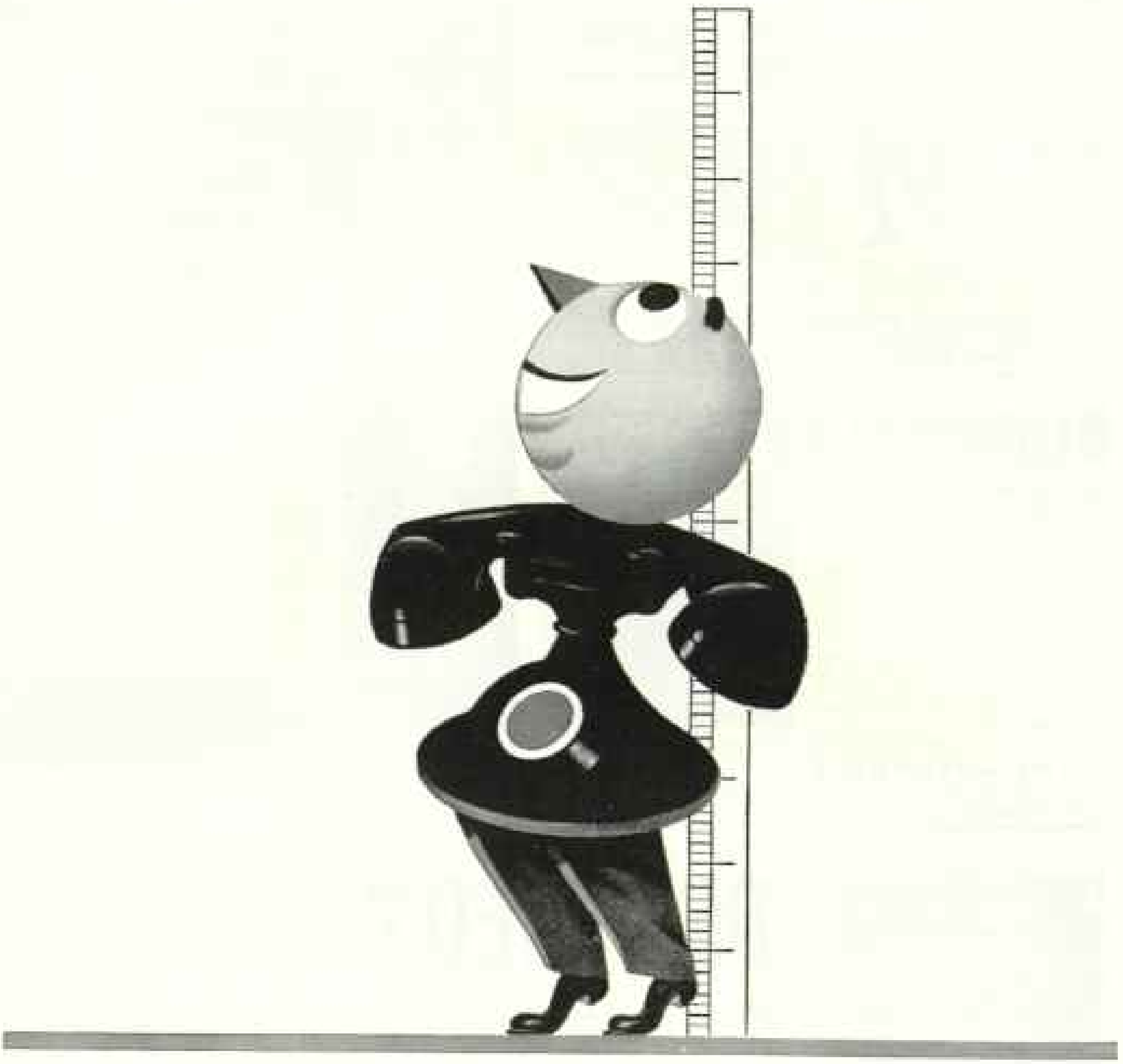
She came in on the *Super Chief*

How else would she travel to and from California?
For the Super Chief is one of the most glamorous all-room trains in America, filled with people who know how to travel and appreciate the best in travel.
It serves those famous Fred Harvey meals.
It operates on a 39¾-hour schedule between Chicago and Los Angeles.
The Super Chief is the flag-bearer of Santa Fe's fine fleet of Chicago-California trains which run each day.

Santa Fe

SANTA FE SYSTEM LINES . . Serving the West and Southwest

T. B. Gallaher, General Passenger Traffic Manager, Chicago 4



A LOT OF GROWING TO DO

This is a big country and to furnish nation-wide telephone service, the Bell System has had to be big for a long time. But in the last few years it hasn't been nearly big enough.

Even though we've broken all records and added more than 6,000,000 new telephones in the past two years, there are still about a million orders for service that we haven't been able to fill because of lack of equipment, switchboards, cable and buildings. Many more Long Distance circuits also are needed.

It will take time and a lot of money to make the Bell System big enough for the nation's needs but we're on our way—in a big way—to giving you more and better service than ever before.

BELL TELEPHONE SYSTEM

S. S. Brazil ✷ S. S. Uruguay ✷ S. S. Argentina

The Good Neighbor Fleet is Back

Completely rebuilt, modernized and restyled, the 33,000-ton luxury liners of Moore-McCormack's Good Neighbor Fleet bring back to South American travel all the comforts and pleasures that characterized their prewar service, together with smart new decorations and furnishings. They will establish a regular schedule of fortnightly departures with the fastest, largest ships in service to South America, calling at Rio, Santos (port for Sao Paulo), Montevideo, Buenos Aires and Trinidad, and resuming 38-day luxury cruises.

From Pearl Harbor to V-J Day, Moore-McCormack Lines operated more than 150 ships, lost 11 vessels, transported 754,239 troops and carried 34,410,111 tons of war cargo. To discharge such responsibilities in time of crisis, America's Merchant Marine must be kept strong in peace —as in war.

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