

VOLUME LXXIII

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# THE NATIONAL GEOGRAPHIC MAGAZINE

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THIRTY-TWO PAGES OF ILLUSTRATIONS IN FULL COLOR

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With 19 Illustrations and Map

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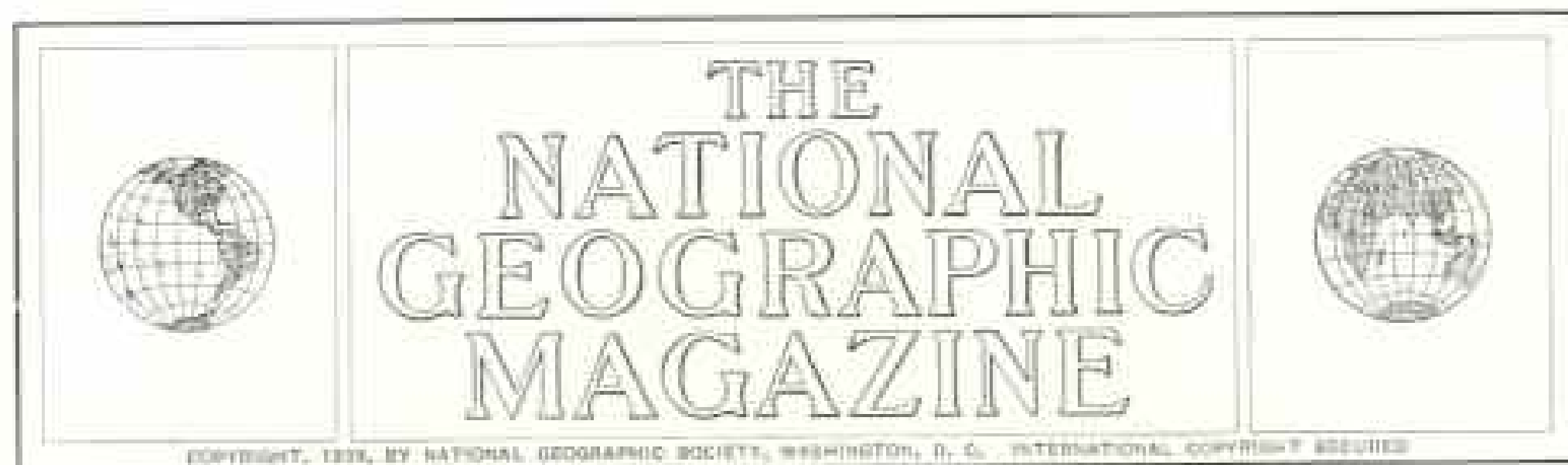
With 11 Illustrations

KENNETH W. VINTON

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## NEW MEXICO MELODRAMA

BY FREDERICK SIMPICH

**B**AXTER, my partner, lay dead where he fell when the Apaches first fired into our camp—his head close to our bean pot.

"The Indians had caught and tied me, and were going to burn me. Squaws crowded around; they spit tobacco juice into my eyes and stuck me in the arms and stomach with cactus thorns."

So James McKenna told me, long years after his escape from these Apaches. Later he sat in the New Mexico Legislature, and wrote a book about his hair-raising career as meat hunter, Indian fighter, and gold seeker in this extraordinary State whose polyglot culture and melodramatic annals distinguish it from others in our Union.

To any pioneer like McKenna you might say, "What part did you play in making New Mexico?" And he, too, might answer, "I survived!" The supreme achievement in earlier days!

Vague fragment only, McKenna's adventure is among infinite theatrical episodes which enliven the story of this spectacular country. No State has staged events that seem more improbable; yet, despite cynics' claims that history is a conspiracy against truth, official records authenticate many an otherwise incredible incident.

### SPANIARDS CAME SEEKING CITIES OF GOLD

Take a trip, for example, out to that old Zuni town which lies south of Gallup, in the extreme west of the State. Today it is nothing but an agglomeration of terraced, mud-plastered houses. It was never anything else. Yet it was a very similar village, predecessor of this one, whose re-

ported treasures led the first Spaniards to come here from Mexico, looking for the fabled Seven Golden Cities of Cibola!

Visit Santa Fe, the capital—which was long the western terminus of that romantic highway, the Santa Fe Trail (map, pages 532-3).<sup>\*</sup> Go into the Capitol here, and listen to the lawmakers talking; speech may be in either English or Spanish, for nearly everybody in the State, except newcomers, can speak some brand of Spanish, and thousands talk the Indian tongues (page 550).

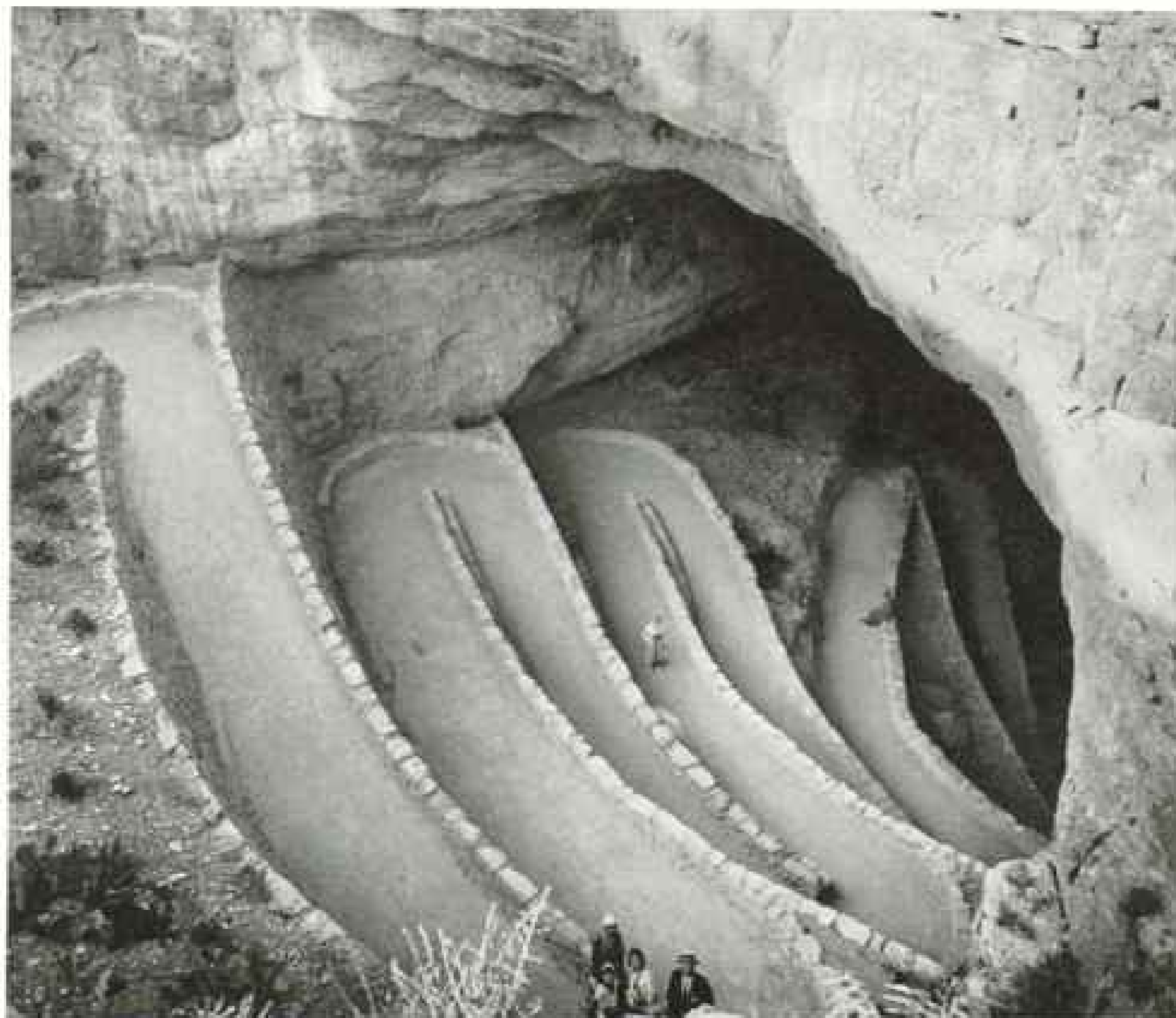
It all sounds very foreign, like Mexico, or Chile; yet, you reflect, this is a full-fledged State in our Union. Its population is less by far than that of Washington, D. C., and it has only one member in the House of Representatives; yet it has two Senators, whose votes are equal to the two senatorial votes of New York State, with more than 25 times its population.

One Sunday I went to church in Albuquerque, to hear a bishop talk. He spoke of missions, and the souls of Indians.

The very night before, in my bedroom at the Franciscan Hotel, I had been reading about Spanish priests and their work among the Indians—a record in keeping with the dramatic annals of New Mexico.

Revolting in 1680, these Indians killed most of the Spaniards who by then had settled in the northern part of the State, and drove the rest south to El Paso; they burnt churches, buried the bells and crucifixes; they shed their priest-given cognomens and called themselves by their old

<sup>\*</sup> See "The Santa Fe Trail, Path to Empire," by Frederick Simpich, in *THE NATIONAL GEOGRAPHIC MAGAZINE* for August, 1929.



Photograph by Brunson De Con from Galloway

#### DOWN THE RAMP TO SUBTERRANEAN WONDERS AT CARLSBAD

A cloud of bats, flying from this dark hole at dusk, led a curious cowboy to discover the now famous caverns. Along such gradients even wheelchair visitors can roll deep down into this new wonder of the world—explored by the National Geographic Society in 1924 and described in *THE GEOGRAPHIC* for January, 1924, and September, 1925 (Color Plate XI, and page 560). For those who wish to avoid the long climb back, high-speed elevators rise 754 feet to the surface.

tribal names. They even took soapweed baths, to wash off the stains of Christian baptism!

#### VISITORS FAR OUTNUMBER RESIDENTS

Now there is a common trait which lures us to historic spots where exciting events have occurred. We try in imagination to see again, and even vicariously to share in, hair-raising adventure. This trait accounts in part for the crowds—equal to six and a half times the State's population—that swarm into New Mexico every year to look and to ask such questions as:

"Can we see the Penitentes crucify one of their Brothers?"

"Where in Taos did Indians shoot Governor Bent's face full of arrows?"

"Is it true that in Carlsbad Caverns there

is a room big enough to hold a giant air-ship?"

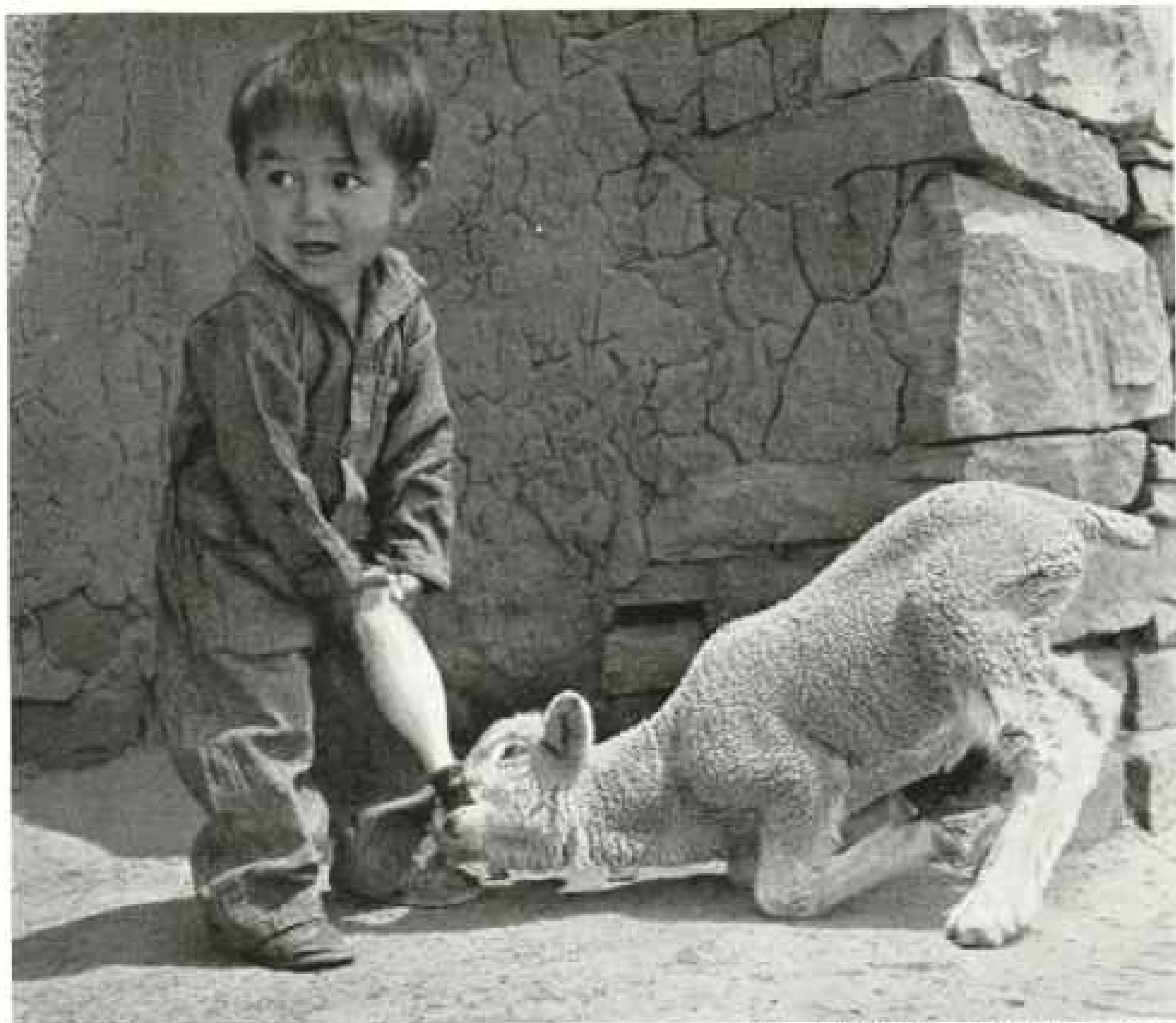
"Inscription Rock, where the Conquistadores cut their names—that is what I want to see; and a Rain Dance, and the oldest old mission."

"Where is the forest ranger who fried and ate a lion?"

"Where is that high Acoma Rock that the Spaniards jumped off in coats of mail?"

Acoma Rock! In all world battle tales no feat is more astonishing than that of Spaniards who, seeing their brothers in arms being brained by clubs, leaped from the parapets of that sky city and dropped into soft sloping sands drifted about the foot of its steep 357-foot cliffs. Of the five who jumped, four survived!

In Albuquerque I talked with scholarly



Photograph by Walter Hening from *Black Star*

#### HAVE A HEART, LAMB! SAVE ME A DROP!

Ovine greed, entrenched in the town of Zuni, has this boy worried. And what a privileged character the lamb must be—among all New Mexico's woolly legions—to be favored with a nursing bottle!

Gilberto Espinosa, one of whose ancestors came with the Conquerors. For the Quivira Society he translated Captain Gaspar de Villagra's *History of New Mexico*, which was first published in 1610—ten years before the Pilgrims' landing and 14 years before Captain John Smith's *Generall Historie of Virginia*.

Villagra's remarkable rhyming history is, therefore, the first of all our "State stories"! In it he details the terrible butchery on top high Acoma Rock, in which he took part, when cornered soldiers leaped over the cliffs.

#### INDIANS TODAY LIVE PEACEFULLY ON THIS EMBATTLED ROCK

You can motor out to this rock, as thousands do, going west from Albuquerque via Laguna. From miles away, over the high plateau, it looks like a sawed-off volcano with a town on top. Circle about and see

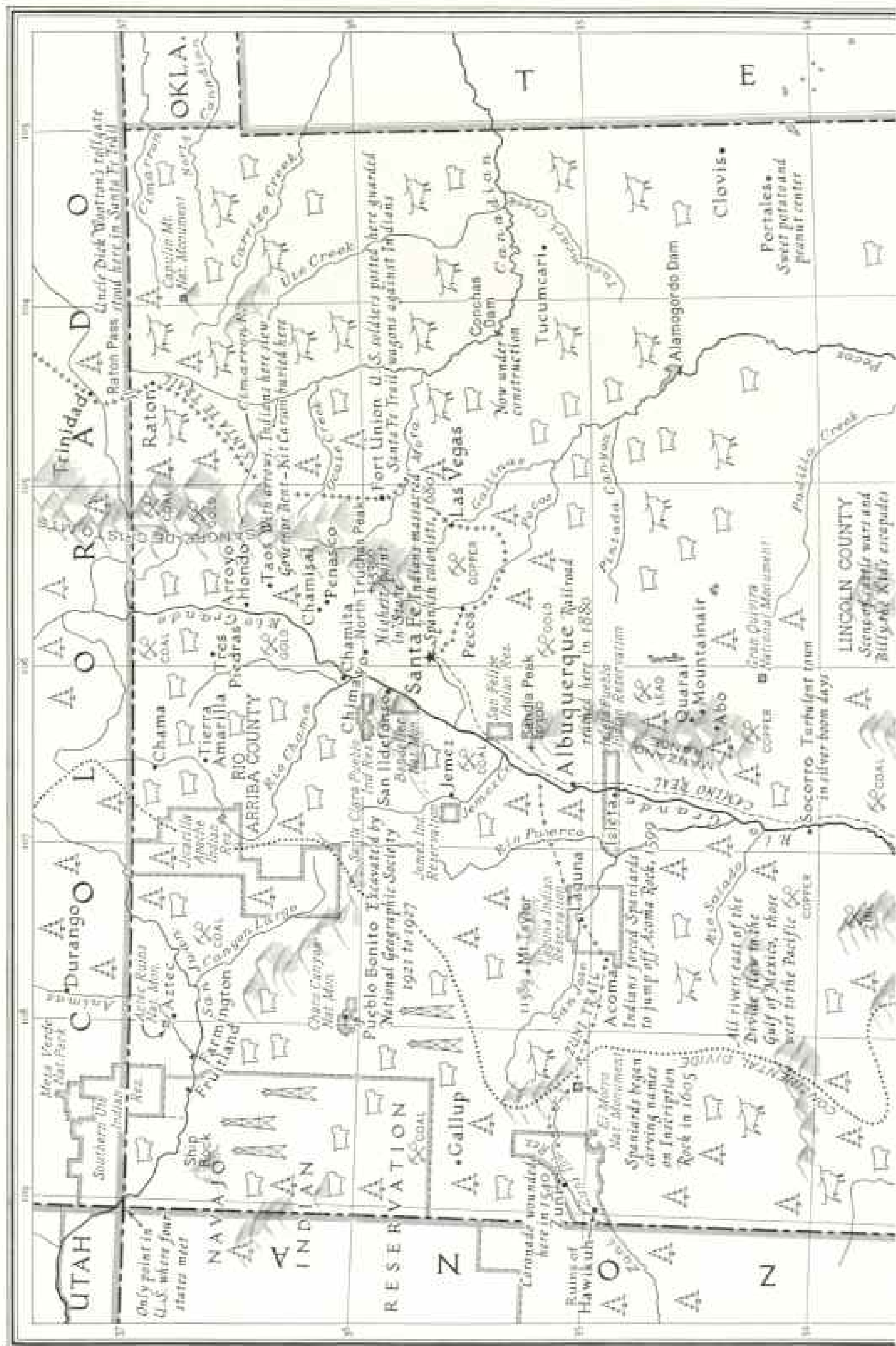
how in places the sand dunes slope away from its cliffs, and you can understand how the Spaniards could really jump down and yet survive (page 549).

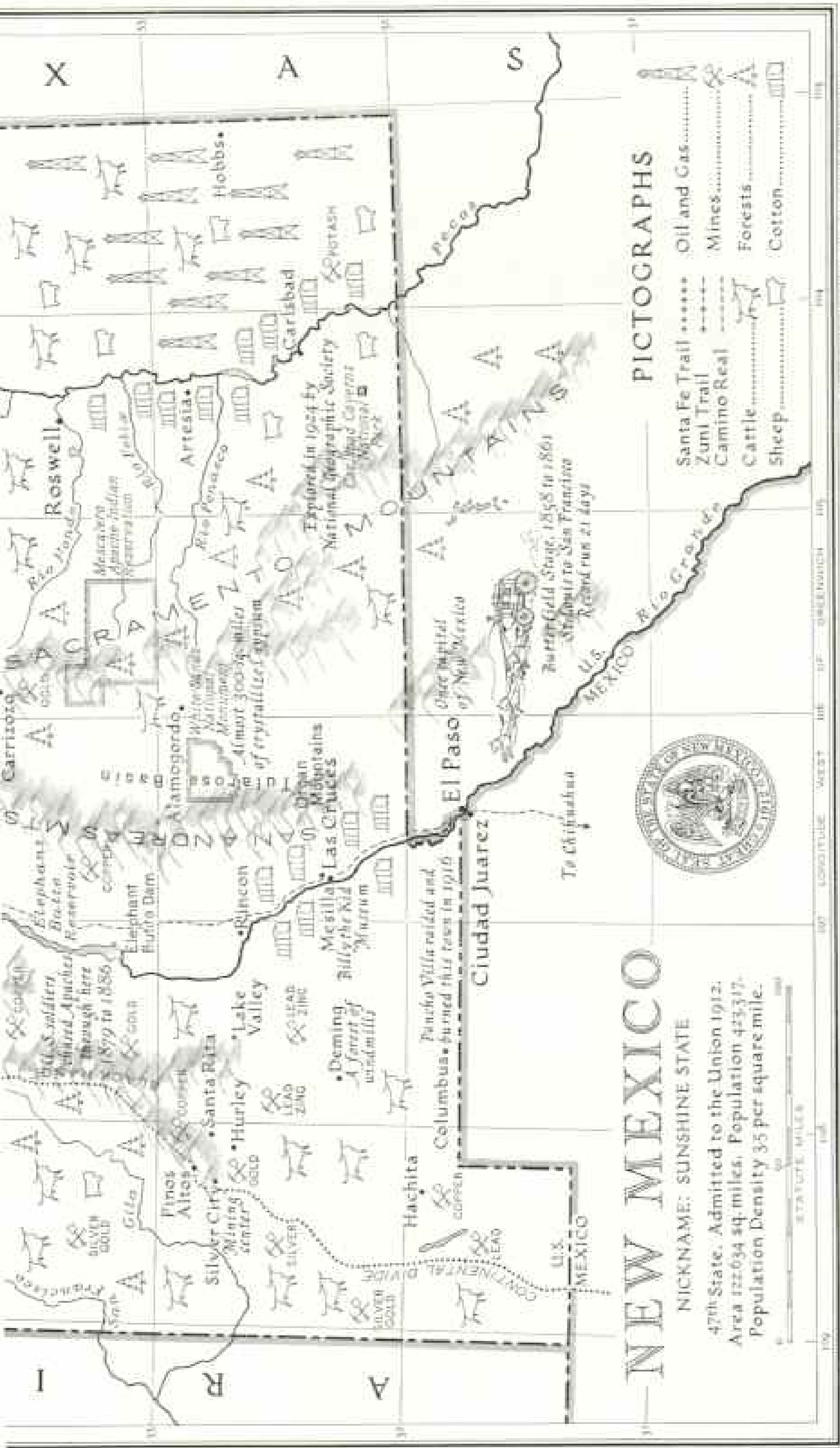
Using the ancient trail, whose same footholds cut in smoothly worn stone were used by the Conquistadores climbing up here to fight about 400 years ago, we too ascended the rock.

Accustomed now to visitors, the Indians paid us but slight notice. We called on their "governor," who asked us to a lunch of beans, corn cake, and goat meat. Then we went to see the old Acoma mission church, and a cemetery made from earth carried up from the plains below.

Through unknown centuries these Indians have lived up on this rock: food they grow in fields far below; wood they drag up, laboriously; water they also carry up, when enough rain is not caught in natural







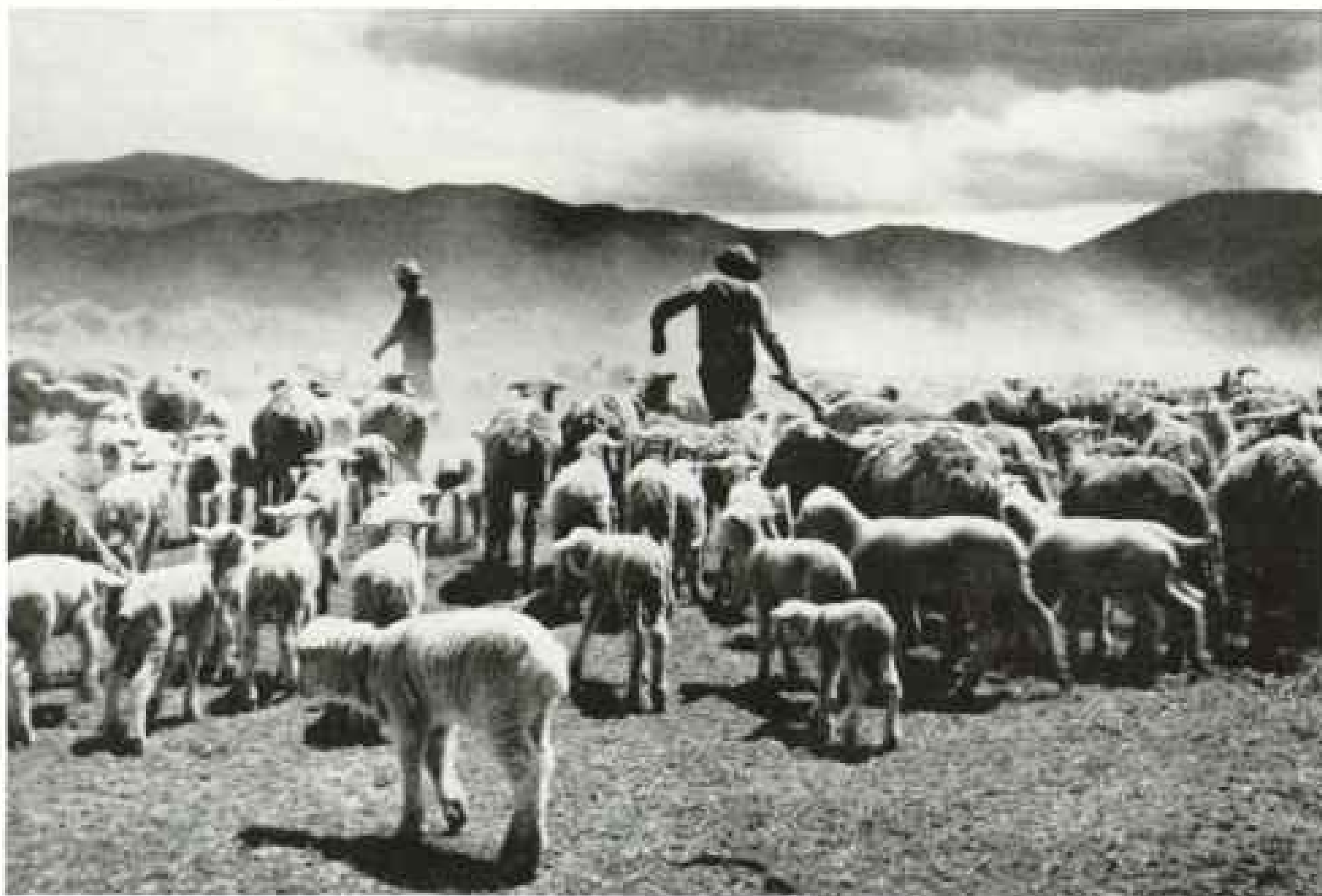
Now oil gushers roar, hootheats of milling herds thunder on the range, cotton gins whirl in the Union's fourth largest State, whose early settlers were familiar with the whoops of raiding Apaches, the rumble of covered-wagon wheels, the rattle of market fire. Irrigation has opened wide areas, formerly waste land, to profitable cultivation. Almost continual sunshine, high elevation, and clear, dry air give New Mexico prominence as a health and vacation resort. Original routes are shown of the Camino Real, Zuni and Santa Fe Trails, used respectively by Spaniards, Indians, and pioneers from the East.



Photograph by Bradford Washburn

NEVER CLIMBED, SHIP ROCK LIFTS ITS TAWNY "SAILS" TO HEAVEN

Upthrust nearly 1,900 feet above the flat desert on the Navajo Reservation, this natural skyscraper is known to the older Indians as the Winged Rock. They believe "it was once a big bird that flew here from the north with their ancestors riding on its back!" The rock is the hardened core of an ancient volcanic vent. Of more resistant material, it has outlasted surrounding soft shales that have worn away.



Photograph by Mrs. Branson De Cou

LAMBING TIME ON A RANCH NEAR TAOS

Since the days when Conquistadores introduced sheep, flocks have formed the basic pastoral industry of this State, which has nearly six times as many of the wool bearers as it has people.

basins on the rock.

From Acoma we turned north again and soon passed that astonishing geological phenomenon known as the Enchanted Mesa. It somewhat resembles Acoma, and on top of it, also, in years gone by, a few Indians had their homes. Now it is uninhabited.

At Laguna, an Indian town within sight of the Santa Fe Railway which crosses northern New Mexico, we came upon a great Indian fair which is held here each September.

Visitors from many tribes were gathered, trading horses, buying and selling, gambling, dancing, popping away at white clay rabbits in shooting galleries, and crowding into a creaking old Ferris wheel (Color Plate X).

While we were there the Santa Fe's crack streamlined train, the Super Chief, went whizzing by, leaving behind it a mile-long cloud of dust, tumbleweed, and whirling paper scraps.

Truly an impressive sight this was—a roaring, silvery monster racing across a vast continent; yet, to the phlegmatic Indian mind, it was only another train.

In the crowd here were several Zufis. They interested me deeply, because it was their reputed wealth of gold which brought Coronado here on that historic march which was to shape the destiny of our Southwest.

Following the wide, smooth motor road



Photograph by Richard H. Stewart.

#### TEACHER "TAGS" THEM TILL SHE LEARNS THEIR NAMES

On the first day of school at Jicarilla Apache Reservation the white teacher pinned each boy's name on him till she could associate it with his face. New Mexico's Indian population totals more than 35,000.

that sweeps past Laguna and into Albuquerque, I went out to the near-by State University to talk with its president, Dr. James F. Zimmerman, who is among those planning to observe the 400th anniversary of Coronado's march, in 1940.

#### A SLAVE "DISCOVERED" NEW MEXICO

Of course, as every lover of American history knows, the annals of our Southwest start with Cabeza de Vaca. He, with two other Spaniards and a Moorish slave named Estevan, were the first Europeans to cross America from Texas to the Mexican west coast. Shipwrecked and cast ashore in

Texas, they later wandered west part way up the Río Grande, and then off southwest.

Cabeza had learned Indian tongues in his years of wandering, and somewhere along here he heard that to the north lay certain cities rich in gold and precious stones. When he finally fell in with other Spaniards who were catching Indians as slaves near where Culiacán, Sinaloa, now stands, he repeated this treasure yarn.

Why the Spaniards in Mexico at once believed this tale is easy to understand. Cortez had but recently taken golden plates as big as cartwheels from Montezuma's Aztec palace; already other reports had come to Mexico about the fortunes in gold owned by Incas in Peru—so why shouldn't there be golden cities in New Mexico?

A friar, Marcos de Niza, was sent to find out. Preceding him as scout went Estevan; this dusky slave was, then, the first non-Indian ever to penetrate what is now the second youngest State in our Union, yet the first to be widely explored by whites.

Estevan succeeded in reaching the Zuñi towns, but the Indians slew him, cut him up, and divided the pieces.

Fray Marcos saw Hawikuh, the first Zuñi pueblo, only from afar; and turned back to Mexico to report that he had actually seen the mysterious cities.

#### CORONADO FOUGHT IN GILDED ARMOR

Then came Coronado. On July 7, 1540, at Hawikuh, he fought the first of all Spanish-Indian battles in our Southwest. "I ordered the musketeers and crossbowmen to begin the attack," he wrote.

"They (the Zuñis) directed their attack at me because my armor was gilded and glittered. . . . They knocked me down to the ground twice with great stones. . . . If I had not been protected by the headpiece I wore, the outcome would have been bad for me. . . ."

Finally the Spaniards won, and when the Zuñis fled, the famishing whites searched Hawikuh and found much "corn, beans, turkeys, and salt."

Corn and beans are still grown by these Zuñis; also, they still hunt wild turkeys—though now they're scarce. For salt, they go to their sacred salt lake, as they have for centuries. They are good farmers, but cherish old customs, old rituals.

Far more sophisticated and progressive, for example, are the Isleta Indians, whose

well-tilled farms spread along the Río Grande Valley near Albuquerque (Color Plate XVI).

Since there are so many Indians here—and Indian problems, social and otherwise—I went back to see Gilberto Espinosa, who knows so much about New Mexico. Into the night we talked.

"These facts you must ponder well," he said, "if you write of New Mexico. The East knows it, of course, as a State of rare scenic charm, where Nature's convulsions have raised majestic mountains and carved out huge caverns of strange subterranean beauty; a vast, sunshiny realm of long, smooth roads, healthful climate, pleasure resorts, dude ranches, old missions, prehistoric ruins, oil wells, and copper mines.

"But most important of all is the human race—or races—that live here. In them, I think, is your story."

#### INDIANS CLING TO PAGAN RITES

In the beginning Spanish settlers formed a pioneer fringe along the Río Grande, whose rich valley, before windmills and artesian wells came, included most of the irrigable land whereon white or Indian farmers could live.

From this pioneer fringe along the Río Grande, settlements spread to other valleys; then, in our time, to plains and mesas where wells and windmills now lift water. But neither man's machines nor his skill with imported plants and modern farm methods have weaned this Indian-Spanish State from all its old ways.

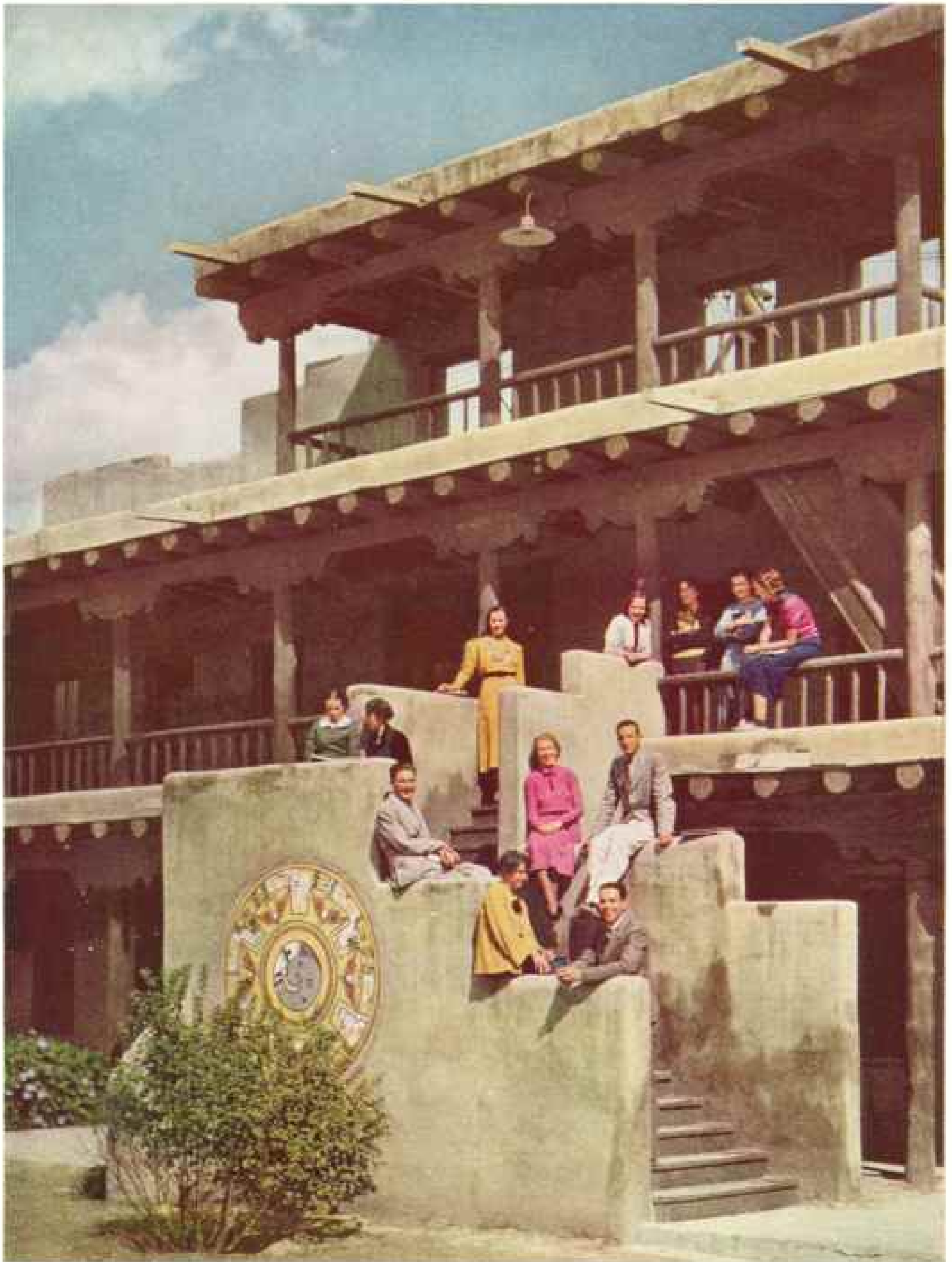
You can't lump the people here and compare them with inhabitants of any other State; not unless, for example, you can imagine New England with Indians still living around Boston in wigwams and behaving about as they did when the Pilgrims landed.

That is what Pueblos and Navajos are doing here. They were gardeners and nomad herdsmen, not hunters and fighters like the Apaches; they have adopted few of the white man's ways—except that they like such things as soda pop, second-hand Fords, and .22 rifles for killing game.

Priests baptized Indians here before ever a cross was raised anywhere else in what is now the United States, with the possible exception of Florida. Yet today, after some 400 years, New Mexico utters more pagan prayers to tribal deities than it was saying when Coronado came, because it has



NATURE PAINTS NEW MEXICO



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Finlay Photograph by Richard H. Stewart

AT THIS UNIQUE SORORITY HOUSE, STATE UNIVERSITY COEDS ABSORB CULTURE  
AMID IDEAL SURROUNDINGS

Attention of all visitors to this growing southwestern seat of learning at Albuquerque is invariably drawn to the distinctive architecture peculiar to campus buildings. The modified blend of Pueblo Indian and Spanish mission styles attains an effect in keeping with the spirit of this old State.



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TOSSED INTO HILLOWS. THE MOVING WHITE SANDS OF ALAMOGORDO STRANGELY RESEMBLE A STORMY SEA.

Finlay Photograph by Richard H. Stewart

On sunny holidays young people put on bathing suits and shorts and go out into the white velvety dunes for sun bathing and picnics. Pioneer settlers feared that the shifting ocean of gypsum, whose waves range up to 50 and even 100 feet in height, might some day reach and engulf their homes. Now the desert has become the White Sands National Monument and is reached by a good motor road.



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#### COLLECTORS SCOUR THE STATE FOR OLD RUGS MADE IN CHIMAYO

Newer patterns like these are also popular. Isolated, un-Americanized, Chimayo village is noted for its weaving, for its chili, and for the tales of miracles that occur in its old Santuario.



Finlay Photographs by Richard H. Stewart

#### HOW TO DRAPE THE MANTILLA IS PART OF SOCIAL TRAINING

At fiesta time New Mexican girls wear their lace shawls over costumes of velvet, lace, or taffeta. The striped *rebozo*, or scarf, on the arm of one young lady is of heavy silk, decorated with gold and silver thread.



MARIA MARTINEZ OF SAN ILDEFONSO, FAMED AMONG INDIAN POTTERY MAKERS.

Decorated jars, urns, and ollas have been made in the Southwest since remote antiquity. Today, preparing their own clays and mixing their colors, and copying ancient tribal symbols, certain Indians produce pottery just as in the long ago.



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Finlay Photographs by Richard H. Stewart

A PLAIN CASE OF EYES BEING LARGER THAN TUMMIES

"Watermelons smiling on the vine" near Clovis, a prosperous town in one of eastern New Mexico's fertile irrigated areas. Six acres here grew more than 5,000 fine melons, many a one so large that neither of these children could have lifted it!



NATURE PAINTS NEW MEXICO



NAVAJO SQUAWS WEAVING RUGS AND BLANKETS, PROVIDE MUCH OF THE TRIBE'S INCOME

Choosing colored yarns from her basket, the squaw at this primitive loom forms symmetrical patterns from memory. Indians usually market their huge output of rugs and jewelry through licensed reservation traders or curio shops in near-by towns.



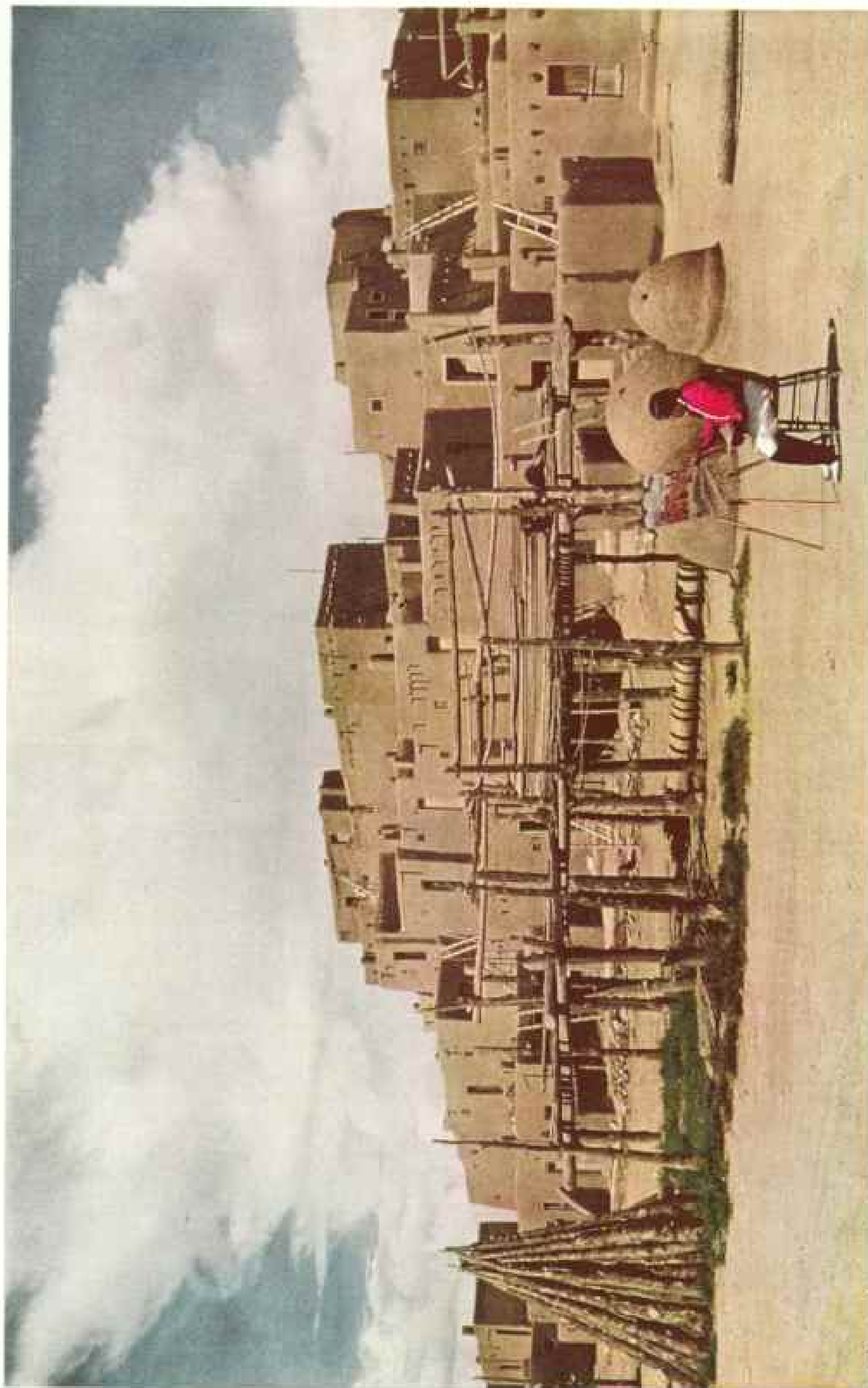
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Finlay Photographs by Richard H. Stewart

"WATCH CLOSELY NOW, AND SEE HOW PAPA MAKES A BRACELET"

With his charcoal fire, bellows, anvil, hammer, and other tools, this Navajo silversmith works in his hogan, or earth-covered home, east of Gallup. Silver jewelry forms the equivalent of a savings bank account for many a Navajo.





© National Geographic Society

Finlay Photograph by Richard H. Stewart

BUSY AT HIS EASEL, A TAOS INDIAN ARTIST "PAINTS TO SELL," AS DO HIS WHITE COLLEAGUES WHOSE METHODS HE COPIES

This vast Taos community house, one of America's first apartment buildings, used the setback type of architecture centuries before New York skyscrapers copied it on a larger scale (Color Plates XI and XIII).



© National Geographic Society

#### STYLES SELDOM CHANGE FOR SANTA CLARA INDIAN GIRLS

The first Europeans visiting New Mexico found these Indians wearing white buckskin boots, weaving, making pottery, crawling to housetops on ladders—living much as today (Color Plate XIII).



Finlay Photographs by Richard H. Stewart

#### BIG GUN, BUZZ-SAW SPURS, AND DAYDREAMS OF ADVENTURE

On the chair hang leg irons and handcuffs once worn by Billy the Kid; also the club of Sheriff Pat Garrett, who killed him. Behind the boy is a "covered wagon" chair for sun bathing at O'Bar'O Ranch near Carrizozo (Plate XII).



GOATS GO ROUND AND ROUND TO THRESH THIS FARMER'S WHEAT

Its grain still in the head, ripe-cut wheat is spread on hard, clean-swept ground. Then the goats, kept moving in a circle by trained dogs, tramp out the kernels.



© National Geographic Society

Finlay Photographs by Richard H. Stewart

FRIENDLY, RUSTLING COTTONWOODS SHADE A FARM HAND'S HUMBLE HOME

The verdant, luxuriant valley about Mesilla and Las Cruces, below Elephant Butte Dam in the Rio Grande, has become through irrigation an agricultural area famous for fruits: melons, cotton, alfalfa, and other products.

more Indians. Fetishes, witchcraft, home-made gods, flagellation, even a now-modified form of crucifixion, all persist.

Like the confusion of tongues in Babylon, here is heard the chatter of 35,000 Zuñis, Tewas, Apaches, and Navajos. Such tongues are strange even between one tribe and another.

At some Indian school athletic meet you may see Pueblo boys boxing with Spanish Americans. Girls from the Indian school sit apart in the big hall, chewing gum, shouting when an Indian wins—which he often does.

Pueblo boys in sport suits crack jokes in English, leave the place in Fords or on bicycles—and 24 hours later, were whites allowed, you might find the same youths in their secret cellar-like kiva, lost in the mazes of ancient tribal rites.

"Few Indians are really Christians," said Gilberto Espinosa. "Nearest to it are those at Isleta.

"This is a bilingual State. Even in a small town like Gallup one theater shows a Spanish talkie every day.

"It's impolite to ask a native New Mexican whether he is Mexican or Spanish. Whichever he may be, he will resent the question, because he knows that by birth he is an American.

"Most of us, of course, are a mixture of both Spanish and Mexican, and many of the Mexicans are part Indian. But! What some of our Eastern fellow citizens don't stop to think is this: Families like mine are really among the first and oldest white families in America.

"One of my forefathers came with the Conquerors. My folks have lived right here in this Rio Grande Valley for over 350 years. Of course we lived under Spanish and Mexican flags before the Stars and Stripes were raised. But we were here a generation or more before the Pilgrims landed.

"Outside New Mexico these distinctions are meaningless. But here, to simplify nomenclature and gratify every element's pride of race, we call the people who came here via Mexico 'Spanish Americans' or 'native New Mexicans'; people from other States, even from Missouri and Texas, we call 'Anglo-Americans' or simply 'Anglos.' Thirty-five thousand are Indians, pagans under the skin, and tenacious of old ways.

"We still like Navajos for servants. In old days, before Lincoln freed the slaves,

if we wanted a new cook we just went out and caught one.

"From these Indians came our weaving, irrigation, and farming.

"It was at Taos, up near the Colorado line," he continued, "that we had our first contact with men from eastern States. That was when Zebulon Pike came in there, after finding the peak that bears his name. Since then Taos has changed from a fur-trading town to an art colony, but you should see it."

#### TAOS OCCUPIES AN OLD PUEBLO SITE

So we motored north, through Santa Fe and the Indian towns that dot the Rio Grande Valley, climbed a long, long hill, and came to ancient Taos, which straddles a creek at the foot of high mountains as it did in Coronado's day.

Here is the home of civilized Pueblos who built many-storied apartment houses and were skilled in various arts and crafts long before Columbus found America (Color Plates VI, XI, and XIII).

Pike reached Taos in 1807, and was arrested for trespassing on Spanish territory. On his heels came the Mountain Men, that audacious breed of meat-eating Yankee beaver hunters who trapped from Oregon to the lower Rio Grande years before the Government at Washington had gained even a vague idea of this western domain.

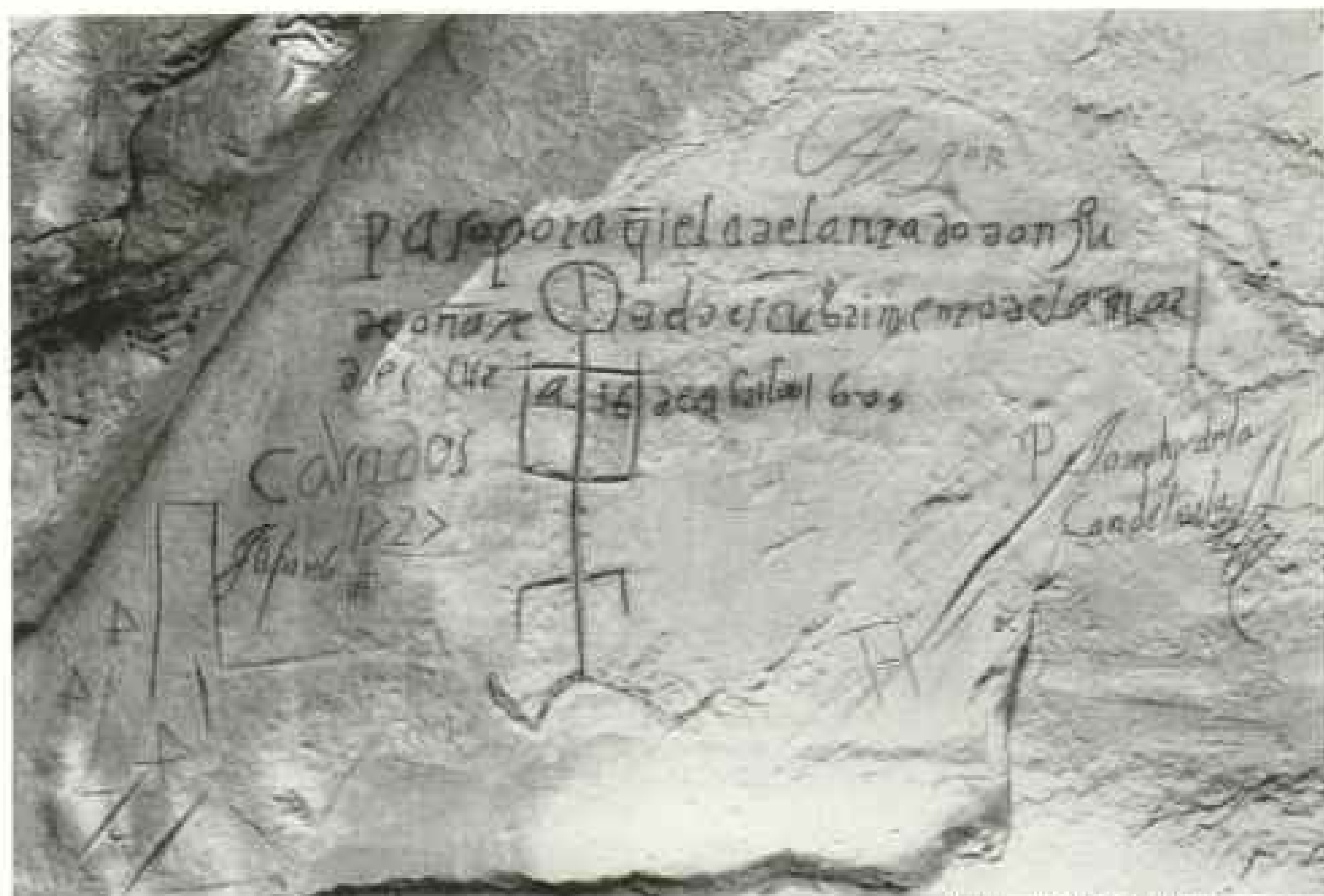
Taos, to these rough, bearded, buckskin-clad hunters from Missouri and Tennessee, was a paradise. Here were wine, guitar music, smiling señoritas to dance with, and places where you could trade skins for powder, shot, and new traps.

Often the overland freighters for Santa Fe came in from Raton Pass via the Cimarron Valley and Taos; today, in fact, a good road—a branch of the Santa Fe Trail—follows this same early route of the covered-wagon traders of long ago (p. 548).

How these prairie schooners, rolling into the old Plaza at Santa Fe, disgorged their heavy loads of St. Louis hardware, tools, calico, clothing, and jimcracks, and made a Roman holiday of feast and fandangos for the señoritas is an oft-told tale.

With their advent this remote colony, which, till then, bought goods in Europe and landed them at Veracruz, some 1,270 air line miles to the southeast, turned its back on Old Mexico and faced east. That is why, in our War with Mexico, this prov-





Photograph by Richard H. Stewart

#### NEW MEXICO'S STONE AUTOGRAPH ALBUM BEARS OÑATE'S MESSAGE OF 1605

Cut in the smooth, white walls of steep Inscription Rock (now El Morro National Monument) are numerous white men's signatures and Indian signs, some of very early date. Queerly abbreviated, the carving reads: "Passed by here the officer Don Juan de Oñate to the discovery of the sea of the south on the 16th of April, 1605" (sometimes read 1606). This appears to be the rock's oldest Spanish inscription, though Indian writings are still earlier (page 351).

ince yielded so easily to General Kearny's troops.

Taos today, but for the slap of paint on canvas, a few modern buildings, and dust raised by motorcars in place of bullocks, has changed but little. You may even be awakened by somebody chopping wood to cook breakfast, or by the rattle of hoofs as Indians gallop by on mysterious early-morning errands.

Pike, if he came back, would see in curio stores much the same Indian handicraft he found here 150 years ago. But if he dropped in for dinner at Café Don Fernando, instead of beaver men and Spanish army officers he'd find gay parties of Taos painters, girl vacationists in slacks, and dude ranch guests in hair pants and crazy-quilt shirts; and, all around the walls, local artists' paintings hung for sale.

From all over America visitors come now to Taos, to see its ancient communal houses, to visit its art colony, to paint and photograph, or to buy pictures, pottery, and blankets.

From utter silence in guidebooks I judge

few writers ever jolt over rough, empty roads that wander west from Taos into Río Arriba County.

Yet if you would get far from madding crowds to "see further and see less," what a serene and happy land! One day we rode 31 miles without sighting even a sheep.

#### VAST DISTANCES, AND SOLITUDE

You don't realize how silent complete silence can be and how restful to your ears until, on some calm day, your car is halted and perfect stillness makes itself felt. The tremendous distances you can see, over these rolling piñon-dotted plateaus, only add to it.

Once, long alone in such an environment, I saw a hawk suddenly swoop from overhead and strike a small bird so hard that feathers flew like white smoke from bursting shrapnel, and the slight noise of this brief struggle seemed magnified to ostrich-combat volume.

Tying Santa Fe to Colorado is a narrow-gauge railroad with leisurely toy trains. One, a mixed affair of boxcars, day coach,





Photograph by Mack

#### RIO GRANDE PUEBLO INDIANS PRANCE AND POSTURE IN A DEER DANCE

This costume festival, now often witnessed by white visitors, originated as a ceremony of the Hunting Society. It was held in honor of the supernatural or ancestral deer, that he might multiply and thus provide hunters with meat. Masks of spruce boughs hide the dancers' faces as they imitate a deer's actions.

and caboose, was halted at Tres Piedras, where we chatted with the crew.

"This country is emptier now than it was when I got here 38 years ago," said an engineer. "Tie hackers have cut most of the good oak; gold seekers quit long ago; droughts drive out the homesteaders, one crowd after another. About all I see now along my run is sheepherders and a few stray women out robbing the pack rats' nests for piñon nuts."

"I NO GOT SCARE FOR YOU!"

School had just opened when we got to the Jicarilla Apache Reservation. "Visitors seldom come," said the teacher. "We're too far off the roads."

Busy with crude painting and flat wood carvings, Apache boys barely answered our questions. But I know they understood. In a lively scuffle between two boys of unequal size, the smaller shouted, "You twice my big, but I no got scare for you!"

"Yes, they can learn English all right," said a teacher, "and they soon come to use tools with some skill. But after they finish, the whites won't hire them; they soon drift back to reservation life."

Forced north by bad roads, we crossed

into Colorado, went west toward Durango, and then back south into New Mexico, to see Aztec Ruins, a National Monument. It stands near the modern town of Aztec in the lower Animas Valley. In certain old rooms, now restored, are displayed various ancient objects once in daily use.

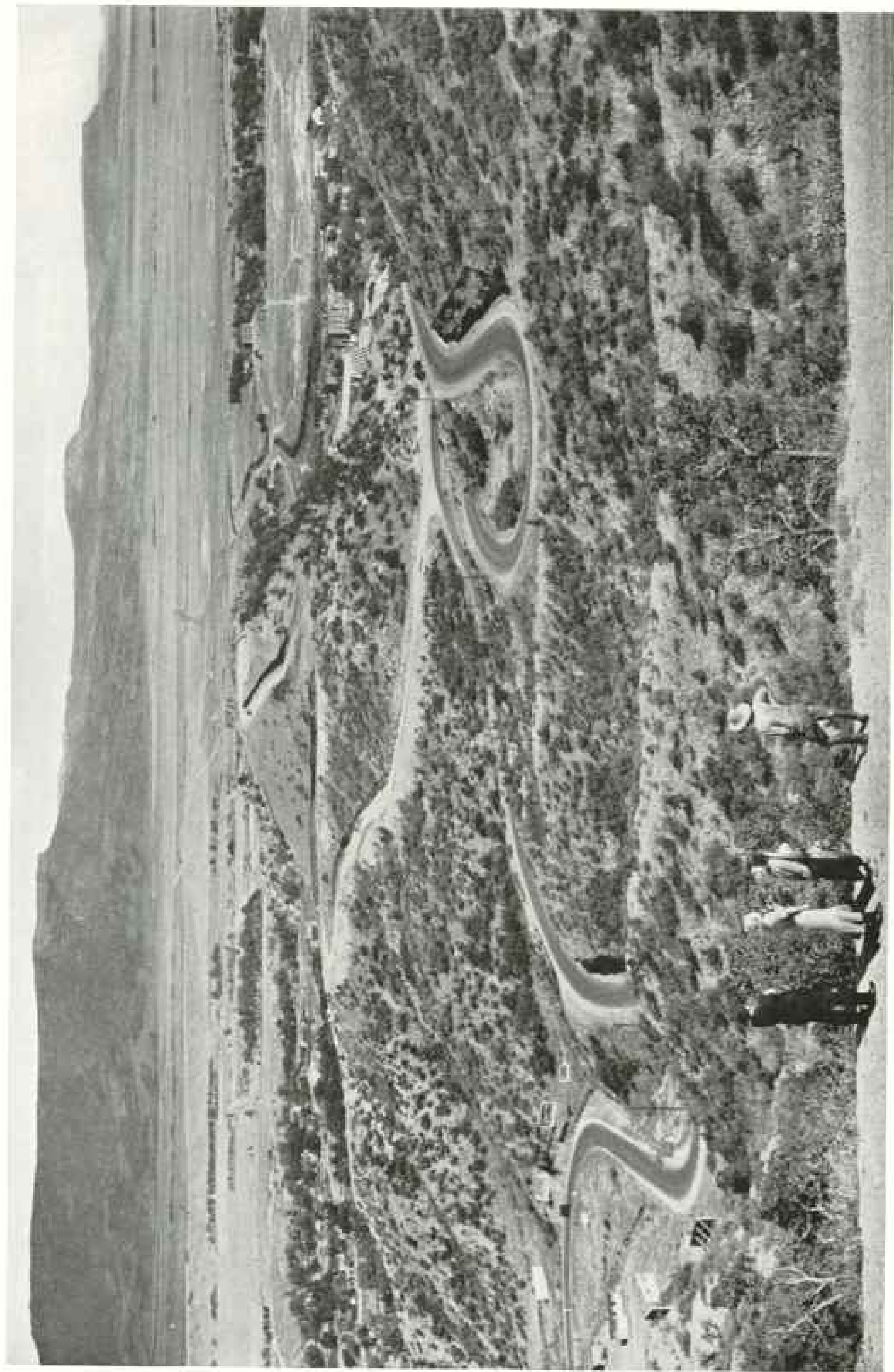
Misnamed by pioneers, Aztec was really built by the same kind of sedentary Indians who inhabited Pueblo Bonito.

Most famous of the State's prehistoric ruins, Pueblo Bonito stands under the yellow north wall of Chaco Canyon, fifty-odd miles south of Aztec.

Nine hundred years ago, Pueblo Bonito was the Chicago of the Southwest, says Dr. Neil M. Judd of the Smithsonian Institution. It was a cultural center as well as a trading mart. To its two plazas, shadowed by terraced dwellings, came traders on foot with shells from the Gulf of California, with parrots and macaws from the tropical forests of Mexico.

In 1921 the National Geographic Society began exploration of Pueblo Bonito, under leadership of Dr. Judd.\*

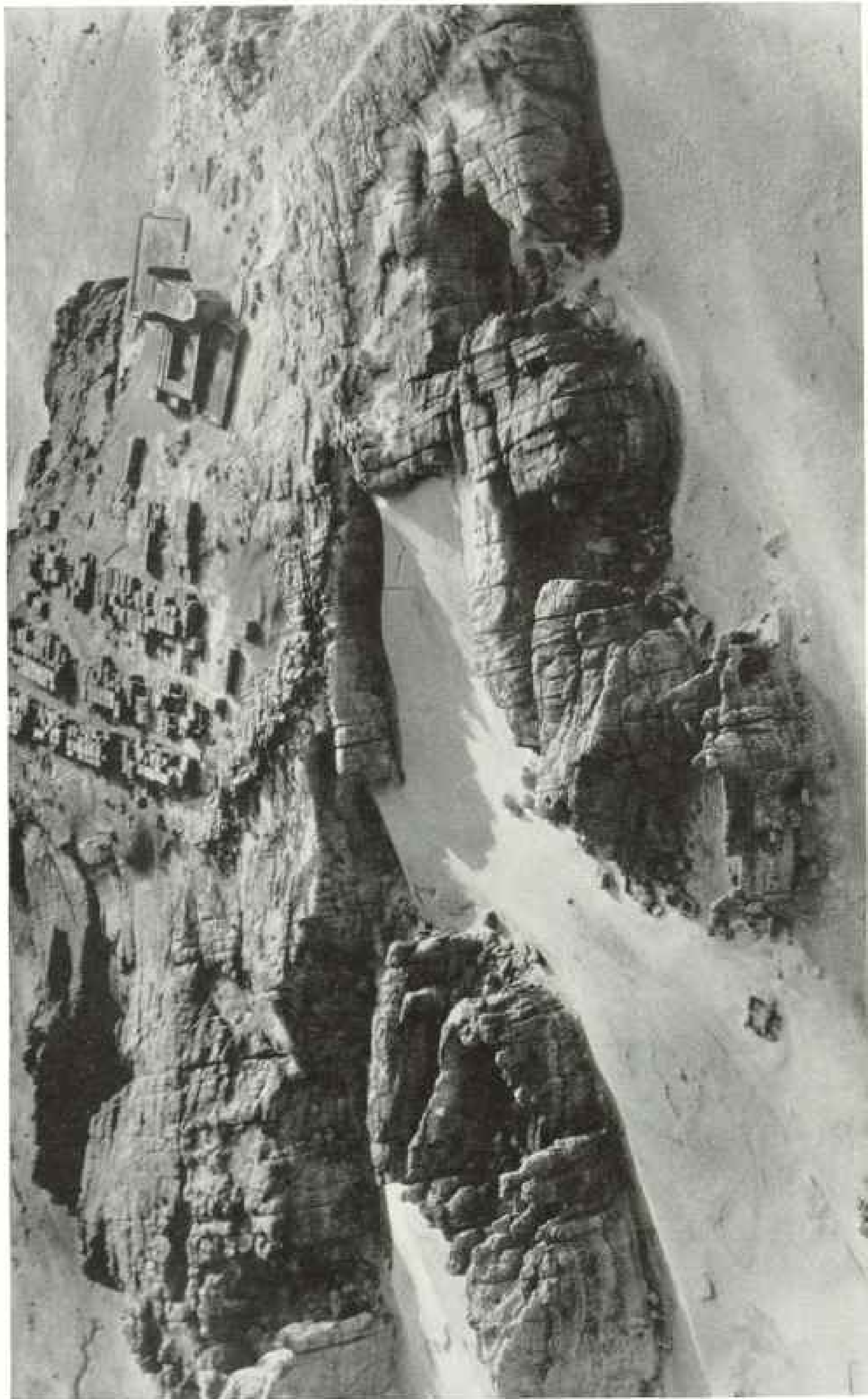
\* See articles in *THE NATIONAL GEOGRAPHIC MAGAZINE*, March, 1922, July, 1923, and September, 1923, by Neil M. Judd.



Photograph by Richard H. Stewart.

TRAINS OF COVERED WAGONS ONCE WOUND OVER HIGH RATON PASS ON THE ORIGINAL SANTA FE TRAIL.

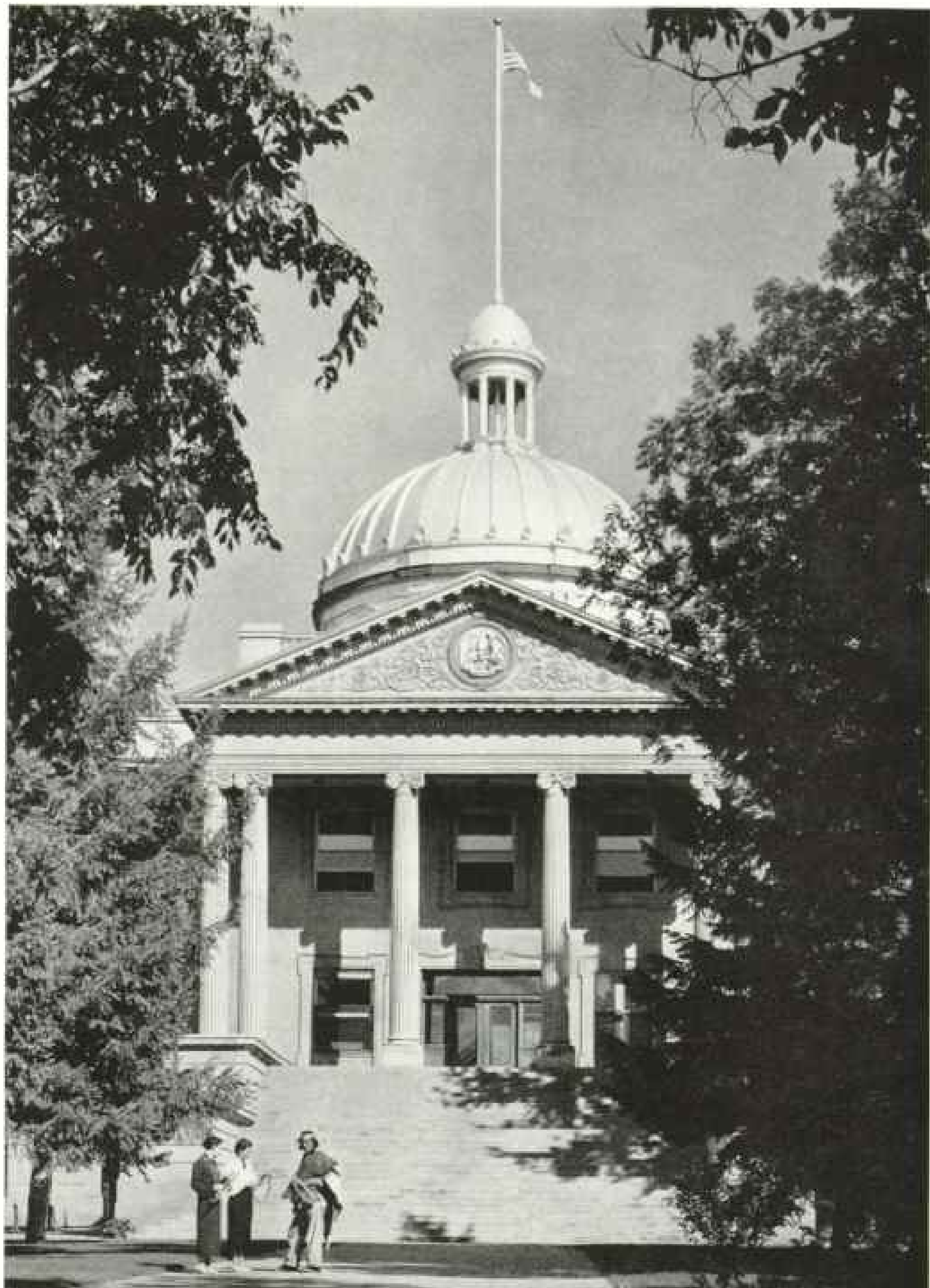
At the foot of the hills lies the city of Raton, a stage station on the pioneer route which opened up the Southwest to settlement. General Stephen W. Kearny marched his army of occupation over the pass in 1845 when he claimed the Mexican province of New Mexico as American territory. Santa Fe Railroad tunnels under the hill.



Photograph by Margaret Bourke-White

ATOP THIS ROCKY AB-ISLAND, WHOSE FANTASTIC EROSIONS SEEM LIKE GIANT SCULPTURES, PERCHES THE ANCIENT SKY CITY OF ACOMA

Through centuries soft-moccasined people climbing trails up to this 70-acre rocky table top have worn deep footholds in its steep sides. In the old church are 40-foot timbers dragged up from distant mountains. Fray Marcos de Niza, in 1539, was the first white to see the rock, but he didn't climb it. Coronado visited it the following year. In 1598 Oñate's lieutenant, Juan de Zaldívar, led soldiers up the cliffs, only to be slain with many of his men (p. 530). Five Spanish soldiers, wounded by knives, jumped over the cliffs, at whose feet sloping sand dunes broke their fall, so that only one was killed. Slight-seeing motorcars now approach Acoma up a troughlike valley.



Photograph by Richard H. Stewart

AT SANTA FE, OUR OLDEST CAPITAL CITY, STANDS NEW MEXICO'S CAPITOL

This is a bilingual city, for Spanish is widely spoken in New Mexico, both in and out of official circles. Among both geographic and family names, those of Spanish origin predominate. Indians still sell jewelry and blankets to visitors in the shadow of the dome.

For seven summers The Society's representatives searched abandoned rooms for scraps of information from which the life once lived here could be reconstructed.

They learned that Pueblo Bonito was the creation of two Pueblo peoples, so culturally unlike they probably spoke different languages. One had occupied the site and farmed its neighboring fields for generations before the second group arrived about 1000 A. D. Sixty years later they initiated an extensive rebuilding campaign.

It was this second group that gave Pueblo Bonito its far-flung prestige; that built and rebuilt until they exhausted the limited local forest and brought about an erosion problem they could not control.

In a remarkable piece of scientific detective work, Dr. A. E. Douglass determined the age of the ruins by a study of the tree rings in their charred and weathered beams. Pueblo Bonito was abandoned about 1150 A. D.\*

#### IN AN EDEN OF FERTILITY

Sharply in contrast with such dusts of antiquity is bustling modern life in fertile San Juan Valley, 40 miles north. From turbulent cattle wars in east New Mexico, many stock raisers moved here years ago. Now local hogs and lambs take top prices at Denver and Los Angeles markets; much wool is shipped, and many horses, mules, and cattle are raised.

Between Farmington and Fruitland, on U. S. No. 550, whispering cottonwoods arched overhead like giant Malayan ferns to form a shady lane. From roadside orchards rose the fragrance of big red apples. Husky, good-looking maids in overalls climbed ladders to help with the picking.

Morning-glories bloomed among the cockleburs along irrigation ditches, and great silver tanks of a Continental oil refinery glistened in the sun. Though less important than the rich fields of southeastern New Mexico, these San Juan Basin fields, with Rattlesnake and Hogback domes, have yielded millions of barrels of oil. Natural gas is piped far.

Though local travel flows north and south between Durango and Gallup, few transcontinental riders suspect that hidden away up here in northwest New Mexico, tucked between the Southern Ute and

Navajo Reservations, lies such an Eden.

This trip is worth taking, if only to see Ship Rock, which rises nearly 1,900 feet above the flat plains of Navajo Reservation. This mighty landmark is one of Nature's odd pranks in rock sculpture. Navajos say it was once a big bird that flew here from the north, with their ancestors riding on its back! After the people climbed off, it turned to stone (page 534).

#### "HEAP LONG IRON" CARRIES OIL

Parallel with U. S. Highway No. 666, which runs straight south to Gallup, men in welders' helmets were laying a pipe line.

"Don't stare at that electric torch!" a workman warned a Navajo bystander. "It'll sunburn your eyeballs."

"Ugh!" grunted the Indian. "Heap long iron!" So it was—a piece of welded pipe stretching 96 miles to tanks in Gallup.

Since Kit Carson helped General Kearny put the Navajos on this reservation, they have multiplied enormously. Good stock raisers, they also make most of the Indian blankets and jewelry that figure in Southwest trade. Weaving they learned from captive Pueblo women.

To them Gallup is the center of the world. They flock to this town every August, with members of some thirty other tribes, for the annual Inter-Tribal Indian Ceremonial.

#### ON INSCRIPTION ROCK MEN HAVE CUT MESSAGES FOR CENTURIES

Drive some sixty miles southeast from Gallup and you come to Inscription Rock, in El Morro National Monument. Some call it the stone autograph of New Mexico, because of many white men's names and Indian signs cut on its steep, smooth sides.

Among legible inscriptions Juan de Oñate's name is first. Returning from "discovering the South Sea," he carved his record here on April 16, 1605 (page 546).

Dating from the 1620's to 1774, some fifty other Spanish inscriptions appear on the rock. Higher up are Indian petroglyphs, which have never been deciphered.

Says one carving:

Lt. J. H. Simpson U S A & R. H. Kern  
Artist

visited and copied these inscriptions,  
September 17 18th 1849.

Later other passing Americans left their names and dates; sometimes people come here to read these names, looking for clues to forbears who "went West" in immigrant days and were never heard from.

\* See, in THE NATIONAL GEOGRAPHIC MAGAZINE for December, 1929, "The Secret of the Southwest Solved by Talkative Tree Rings," by Andrew Ellicott Douglass.

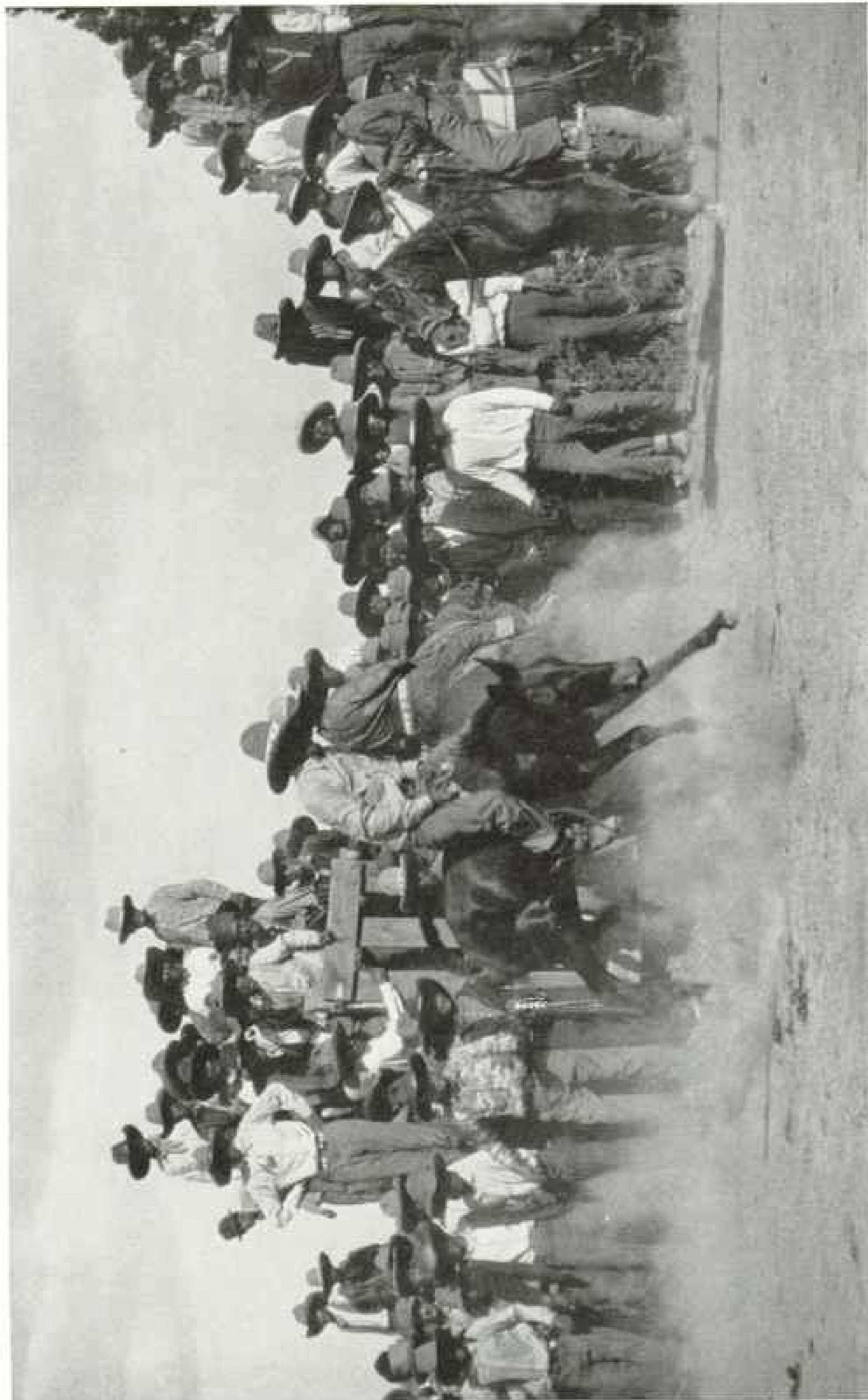




"ATTEN-SHUN!"—H. O. T. C. CADETS OF NEW MEXICO STATE COLLEGE DRAW UP ON PARADE AT LAS CRUCES BENEATH THE ORGAN MOUNTAINS  
 Photograph by Rivers



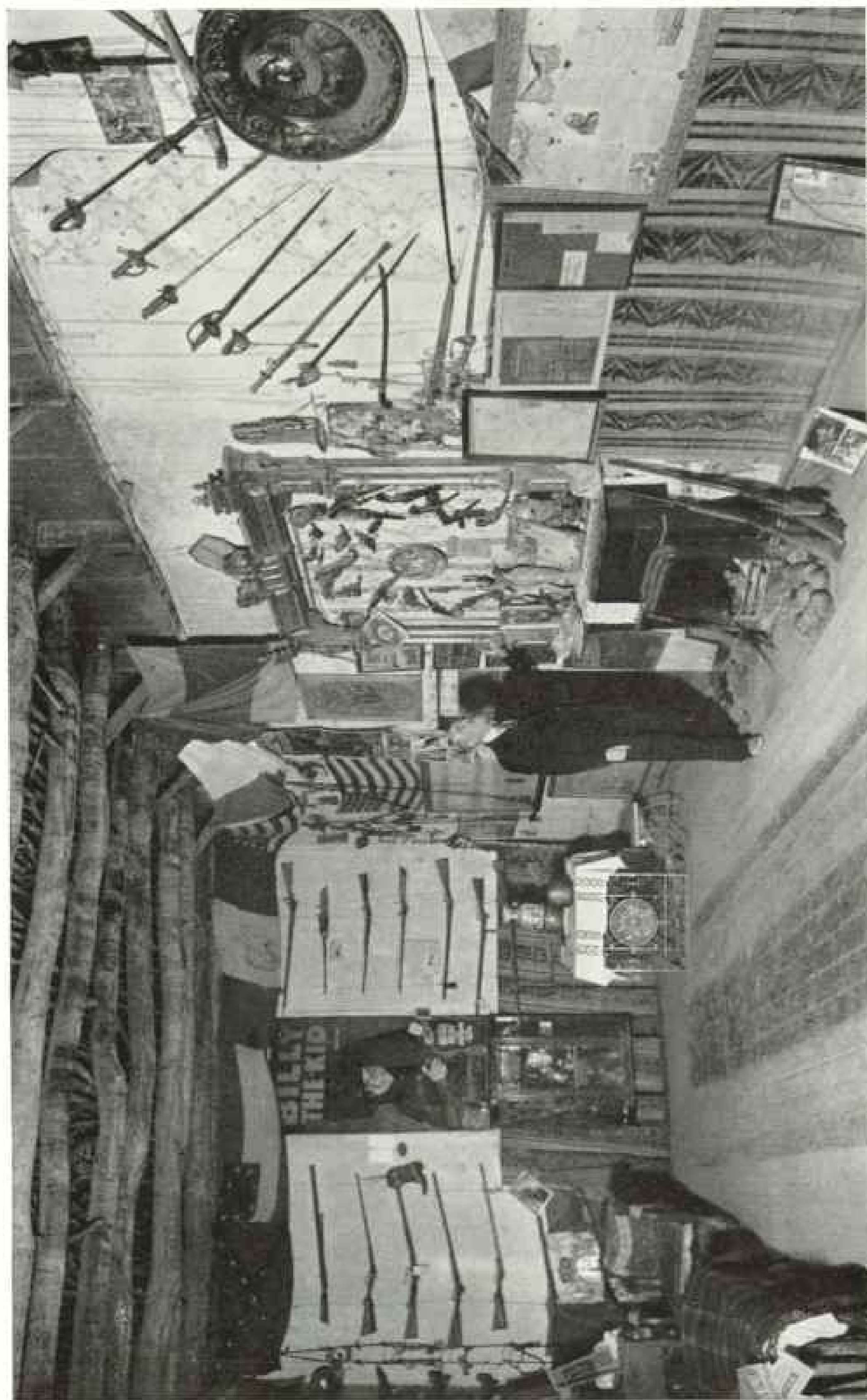
ROPING CALVES LOOKS EASY—BUT TRY IT! DUSTY AIR IS FULL OF YELLS, FRIGHTENED BAWLING, AND THE SMELL OF BURNING HAIR  
 Photograph by Richard H. Stewart



Photograph by Edward Kemp

TAIL CURLLED UP, HEAD DOWN, BUCKING STIFF-LEGGED, A TRICK MULE TRIES TO "PILE" THE INDIAN

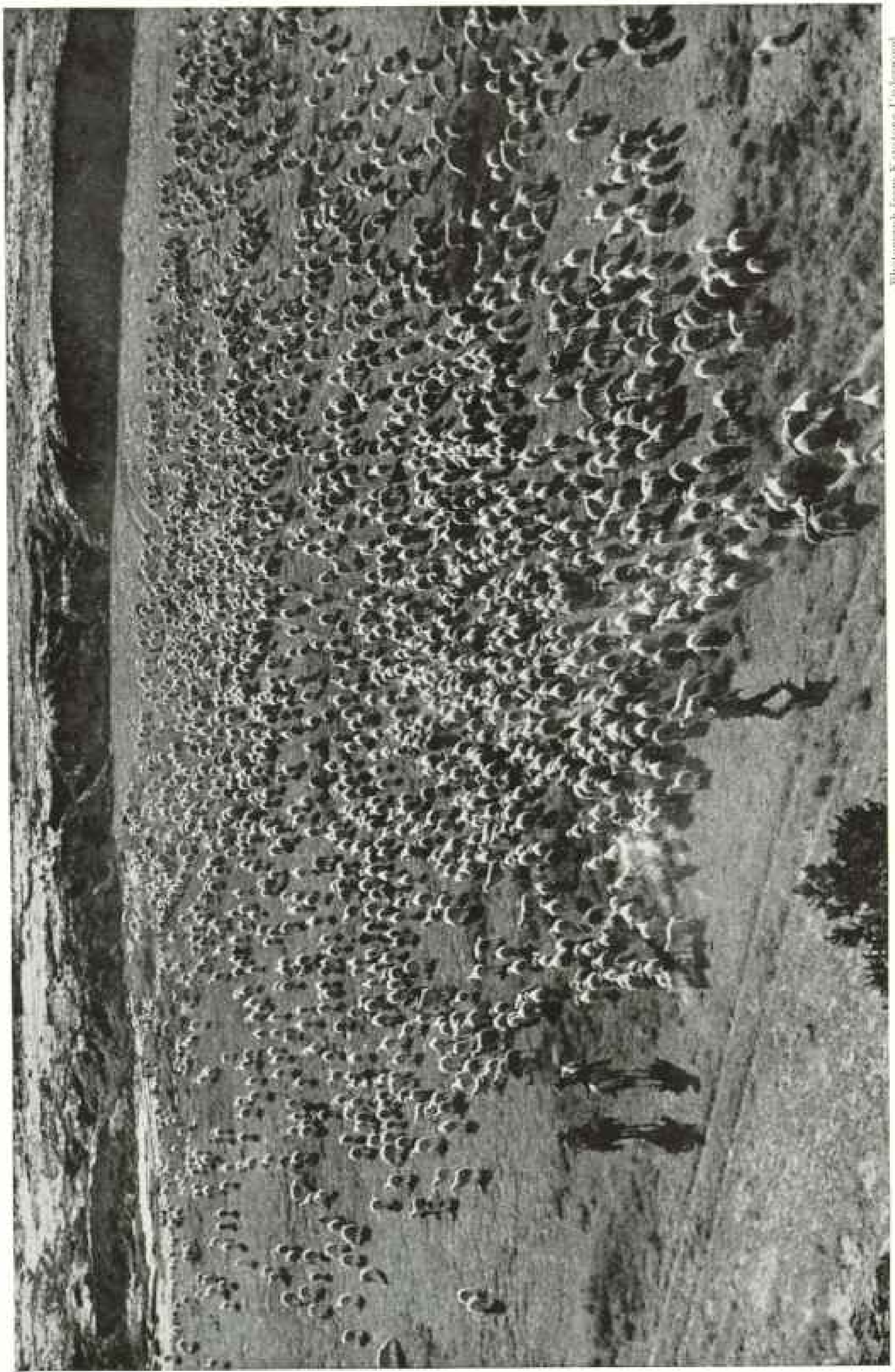
"Pulling leather" (holding on), the Navajo gives him the spurs, while tribal spectators at Gallup's Indian fair yell in broken English--imitating whites--"Stay with him!" and "Ride him, cowboy!"



Photograph by Richard H. Stewart

"BILLY THE KID MUSEUM," SHOWPLACE OF MESILLA WHERE THE SOUTHWEST'S MOST NOTORIOUS OUTLAW WAS SENTENCED TO BE HANGED

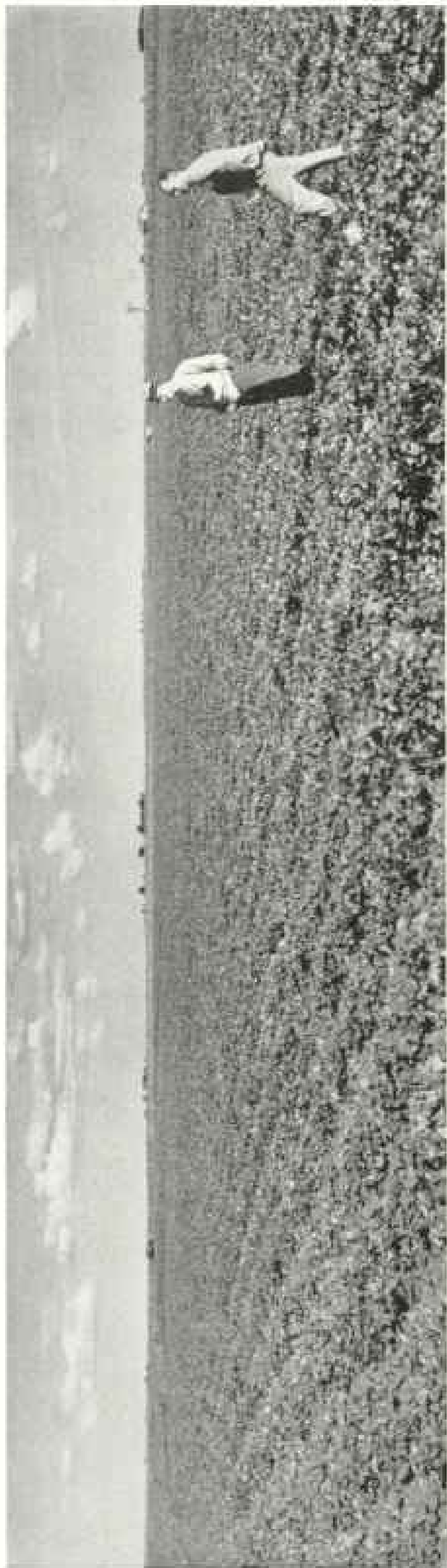
After his conviction for murdering Sheriff Brady, the Kid, though shackled with handcuffs and leg irons, killed his two guards and escaped. Ten weeks later he was trapped and shot. The ruthless but unassuming left-handed desperado, with a final score of 71 killings, had many friends, danced well, and was always cheerful and care-free even in danger. Spanish swords, historic documents, pioneer pistols, and flintlock rifles recall New Mexico's turbulent past.



Photograph from Keystone-Underwood

MYRIAD GOATS ARE DRIVEN TO SLAUGHTER TO SAVE THE RANGE FROM OVERGRAZING AND EROSION

Wind and rain quickly ruin the land in arid regions where protective grass has been destroyed by close-cropping flocks. To save the lessening forage and scanty soil on the Navajo Reservation, about 148,000 sheep from overstocked areas have been sold as food to various relief agencies.



YOU CAN WALK KNEE-DEEP, FOR MILES, IN SWEET-POTATO VINES. NEAR PORTALES WHERE WELL WATER HAS MADE A GARDEN OF DRY WASTES



Photographs by Richard H. Stuart

TO SHOOT PROWLING PUMAS, COVOTES, WOLVES, OR SHEEP-KILLING DOGS, HERDERS NOW CARRY RIFLES

Packed with a stove, tub, blankets, tent, water barrel, and food tins, burros are ready for the summer drive of the flocks to mountain valleys.

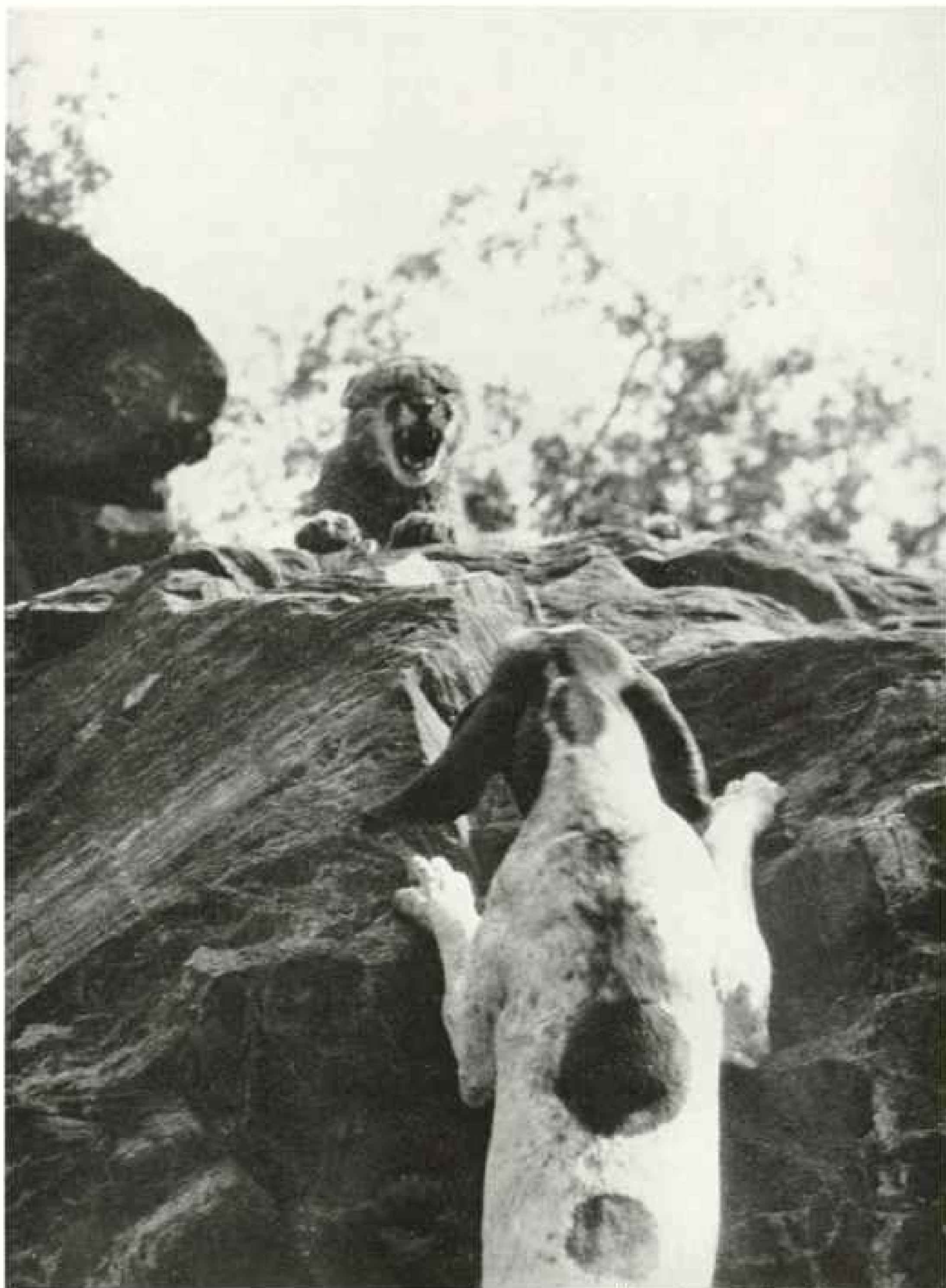




Photograph by Gilbert Grosvenor

TENSE FACES, LAUGHING FACES—INDIAN, SPANISH, YANKEE PACES STARE AT A GLISTENING AIR LINER

Symbolizing the polyglot pagant of New Mexico's history, children of several racial stocks examine a big plane just landed at Hachita. First invaders of this desert territory were Spaniards looking for the fabled Seven Golden Cities of Cibola, in the mid-sixteenth century. Gradually the white man overran the vast region formerly partitioned among Indian tribes—Apaches, Pueblos, and Navajos. Opening of the Santa Fe Trail brought fleets of prairie schooners from the Mississippi Valley. Today, with a total population less than that of Washington, D. C., New Mexico still preserves the culture and traditions of the three principal races that have shaped its past.



Photograph courtesy U. S. Biological Survey

**SNARLING, A MOUNTAIN LION AT BAY FACES HIS CANINE TORMENTOR**

With one jump this big cat could have pounced on the photographer! Also called cougars, these animals have been known to "broad jump" 40 feet on the level and to leap 25 feet into the air to reach a branch. Hunters and dogs cornered this beast for a motion-picture cameraman, who filmed the scene. Scientifically known as the puma, the mountain lion ranges throughout both Americas, adapting itself to all climates, and is still found widely throughout the western United States.

Over a high, empty world you can ride east from El Morro National Monument to cross the Continental Divide, pass the Ice Caves, and jolt over loggers' rough roads and along abandoned tracks that hint at lumbering operations years ago. Now millions of prairie dogs live beside these old roads, and close-cropped grass shows that sheep are about.

Nearly six times as many sheep as people live in New Mexico. Though the days of big barons who owned more than they could count are past, the State's brand register still shows some 3,000 owners, nearly all with Spanish names. Experts can face a line of sheep jumping through a "counter" made by dropping two pines to form a V-apex, and read the owners' earmarks just as traffic cops may read license tags on passing cars.

#### RUSTLERS ON RUBBER TIRES NOW

Bovine annals here reek with cattlemen's fights. Bloody Lincoln County war—and that immortal outlaw Billy the Kid—have kept fiction mills running for literary decades (Color Plate VII and page 554).

Cattle thieves still operate, but now use motor trucks and work swiftly by night.

Bitter gun feuds between sheep and cattle men, like cowmen's running fights with raiding Apache and Navajo thieves, belong to yesterday.

New Mexico was never a great cow land. To get meat, pioneer Spaniards, carrying lances, used to go buffalo hunting to west Texas. As buffalo vanished, cattle herds grew up in New Mexico, for the State needed more and more meat, to feed soldiers, railroad builders, miners, and Indians on reservations.

For years, until the 70's and 80's, fights over ranges and water rights kept this borderland in bloody, lawless uproar.

Of romance and adventure no State has seen more than has New Mexico; but now, letting the past bury its dead, it gives thought, in many excellent schools, to building up the character of a rising generation.

New Mexico Military Institute at Roswell is among America's best. Scientifically tackling the problems of farm life in arid land is the fine State College of Agriculture and Mechanic Arts at Las Cruces (p. 552).

State University, just outside Albuquerque, draws many students from the East. Conspicuous are its campus buildings, their architecture based on forms evolved by Pueblo Indians before the coming of Colum-

bus, later modified by the Spanish conquest, and now adapted to modern needs (Plate I).

Visit the School of Mines at Socorro, once a turbulent silver camp, and students show you through their excellent laboratories, where collected ore specimens hint at what a highly mineralized State New Mexico is.

#### SPANIARDS MISSED FORTUNES IN ORE

Neither Coronado nor later Spanish treasure seekers found gold, it is explained, because they sought it in sands, or in the hands of Indians. They were not hard-rock miners; yet, time and again, they must have marched their men over the very ledges from which—in the later days of stamp mills and smelters—were to come vast fortunes, particularly in silver and copper.

Some dry placer mining there was in Spanish days, as when peons panned dust in the gulches about Sandia Peak, near Albuquerque. No fortunes came from these deposits—but a good story about an old man named Candelario who found a \$700 nugget.

"As soon as my luck was known," he said, "I became Don Candelario. Within a week I was Don Juan Candelario; then Don Juan de Candelario, Caballero. My name grew for three weeks, till my gold was gone. Then I became simply 'Old Candelario' again!"

Not till the westward drive of railways, and the rise of Cripple Creek and the Cripple Creek Lode bonanza, did a real mining boom hit New Mexico.

Imagine the excitement when a man picked up a "rock" to throw at a cow and found it was solid silver, and thus located the great Pinos Altos Mine!

In its whole mining history this State records less gold production than California in one early boom year. But from copper, lead, coal, silver, zinc, and other metals, and more recently from oil and gas, it gains enormous profits—if not so much excitement.

#### OLD SPANISH MISSIONS DEFY TIME

No structures in our land arouse more interest than do the old Spanish missions.

Soon after the founding of the first mission in New Mexico at San Gabriel (now Chamita) in August, 1598, by Juan de Oñate, Franciscan padres began to spread over the State, preaching to the Indians.

With their bell towers and buttressed

walls, these missions were imposing structures. Those at Quarai, Abo, Gran Quivira, and elsewhere—with their towers over 70 feet high—were truly the cathedrals of the New World.

In Santa Fe, a hundred years ago, stood no less than five Spanish churches and three private chapels. Of these only the Church of San Miguel remains. These old churches of New Mexico are little known to the world at large; yet the ruins of missions built at Jemez and Pecos in 1617, the church on Acoma Rock built in 1629, and San Miguel church in Santa Fe are structures of impressive grandeur.

#### CARLSBAD CAVERNS, A WORLD WONDER

Most glorious of all New Mexican architecture, however, is Nature's miraculous handiwork in Carlsbad Caverns.

With their vast vaulted ceilings, their long avenues lined with fantastic sculpture, and their colored stalagmites suggestive of huge organ pipes, these subterranean phenomena truly constitute a new wonder of the world (Color Plate XI, and page 530).

How the curiosity of Jim White, Texas cowboy, led him to these caves nearly forty years ago is an odd tale. At dusk one summer day he saw what looked like a great funnel-shaped cloud of smoke pouring from a hole in the ground. Riding closer he saw that the "cloud" was formed of myriad bats flying out of a cave.

Other men must have seen this hole, of course, for White himself later found a skeleton in it. But it was he who, after long effort, induced local people to join him in further exploration.

Today when guides flash on the lights, visitors with rich imagination see here a strange world of glistening reptiles and wild beasts, of evil gargoyles, of golden domes, mosques, minarets and pearl pagodas, with colored stalactites forming symmetrical chandeliers. Some say they can even see trees hung with Spanish moss.

First to make an intensive study of these caverns was the National Geographic Society. Its published reports, with colored pictures of the subterranean wonders, brought visitors from all over the world.\*

School children now come here by busloads in crowds of 500 to 1,500. They sing

\*See "New Discoveries in Carlsbad Cavern: Vast Subterranean Chambers with Spectacular Decorations are Explored, Surveyed, and Photographed," by Willis T. Lee, NATIONAL GEOGRAPHIC MAGAZINE, September, 1925.

"Rock of Ages," and eat lunch in the underground dining room.

Jim White's curiosity over a flight of bats has brought more than a million people to this new world wonder. It has been said that though God gave this cave to man, He gave him no words with which to describe it.

On the Pecos River near by is the thriving little city of Carlsbad. It is in the heart of a Government irrigation district where valuable crops of cotton and alfalfa are produced.

With its pretty homes of Spanish architecture, tree-shaded paved streets, excellent public museum and library, and a municipal bathing beach freshened by waters from mineral springs, Carlsbad is a welcome oasis in the desert.

Driving north from Carlsbad, we came to Roswell at mess time. Bugles blew, drums rattled, and military school boys in neat uniforms ran shouting from dormitories and fell into line for cornbeef drill.

Orchards, gardens, and lush green fields hereabouts make this another garden spot.

Yet how quickly you drive out of these oases!

New Mexico is mainly an arid land. Till men built storage dams and irrigation canals, or dug artesian wells and set up windmills, human life had been confined to the banks of a few streams. To this day, only about one acre in fifty can be tilled. Most of the State is now as it was in the beginning and ever shall be—uninhabitable.

Yet this same wild, unspoiled emptiness adds charm and mystery to spectacular New Mexico. Above its moody deserts rugged mountains tower to skies that glow pinkly at dawn, turn blue at midday, and burn with gold at twilight.

Hot as summer sun may be, moonlight falls on whispering cottonwoods with a caressing Andalusian quality that satisfies even the soul of a shepherd.

#### WATER'S TOUCH IS MAGIC HERE

So much grotesque plant life lines the desert roads that, driving past it, you get the impression that you're going through one vast botanical garden.

Contrasting sharply with the forested slopes of adjacent mountains, this desert life ranges from cactus, yucca, and smelly greasewood to a desert vine with a grim sense of humor that grows what looks like a cantaloupe!



## NATURE PAINTS NEW MEXICO



© National Geographic Society

Finlay Photograph by Richard H. Stewart

FULL OF PEP, THOUGH "IN THE RED," A FARMER STRINGS HIS CHILI PODS

"All a peon needs to furnish his house is a string of red peppers and the picture of a saint" is an old Southwest saying. This colorful crop was picked near Espanola, not far from the Santa Clara Pueblo Indian Reservation. "Chili con carne," or peppers and meat—with a tamale or enchilada of cornmeal—is a popular repast here as in Mexico.



© National Geographic Society

Finlay Photograph by Richard H. Stewart

REMINDFUL OF OLD COVERED-WAGON DAYS IS THIS LAGUNA FIESTA WITH VISITORS FROM MANY SCATTERED TRIBES

In September each year, the gathering begins with Mass in the mission church. Then come dancing, Ferris-wheel and carousel rides, gambling, fortune-telling, horse trading—and much eating. Mainly to market and trade, Indians attend from as far away as the Arizona Hopi country.



© National Geographic Society

VISITORS VIEW IN AWE NATURE'S OVERWHELMING CARLSBAD  
CAVERNS SCULPTURE

Now largely explored and lighted, and fitted with elevators and walks, this vast underground labyrinth of galleries, ornate with stalagmites, stalactites, and fantastic figures, reveals itself as truly a new world wonder.



Finlay Photographs by Richard H. Stewart  
AGAINST A BACKGROUND OF ASPENS, TAOS ARTIST BERT PHILLIPS  
PAINTS HIS INDIAN MODEL

Fresh from the Académie Julien in Paris, Phillips came to Taos in 1897, and was a pioneer in founding its now world-famous society of artists. In quest of pictures he ranges the mountain roads in his studio-on-wheels.





EASY LIFE IN THE SHELTERED PATIO OF O'BARRO RANCH, NEAR CARRIZOZO

Friendly sun warms the bright red tiles; high walls break winds; orchards, gardens, and fat stock furnish ample food. Peace and contentment now, where once raged the Lincoln County wars.



© National Geographic Society

Finlay Photographs by Richard H. Stewart

HAPPY CHILDREN RIDE AN ANCIENT OXCART AT SANTA FE'S FIESTA

With song, dance, fireworks, and frivolity, the capital city celebrates De Vargas's reconquest of the old town. Faced by La Ponda and the Governor's Palace, the Plaza is decorated for this annual fête.



# NATURE PAINTS NEW MEXICO



## TAOS BOYS DO A "HOOP DANCE" TO THE BEAT OF A DRUM

Long ago, tradition says, Taos Indians "bought" this dance from a Plains tribe. It has no religious significance, as have so many dances, but is given solely for entertainment.



© National Geographic Society

Finlay Photographs by Richard H. Stewart

## CHILDREN MARVEL AS ARTIST BALINK MAGICALLY REPRODUCES AN INDIAN'S FACE

These are Santa Clara Pueblo Indians. They call their town K-ha-poo, or "Where Roses Grow Near Water," and make an undecorated, all-black pottery, which squaws rush out to sell when visitors arrive.



Finley Photograph by Richard H. Stewart

LIKE SOME FANTASTIC CRATER OF THE MOON, THIS OPEN-PIT MINE MAKES A BIG HOLE IN NEW MEXICO

Widely known Santa Rita Mine, a Kennecott property near Silver City, was shut down when this picture was made; hence the green pools in its bottom, and its deserted look. Now it is operating again, and a huge new smelter is being built at near-by Hurley. About 2,200 men work in this open pit at peak operation.



© National Geographic Society

Finlay Photograph by Richard H. Stewart

COTTON FROM THE 4,400-ACRE STAHMANN RANCH NEAR LAS CRUCES IS SHIPPED TO GALVESTON FOR EXPORT.

Distant rugged blue Organ Mountains shimmer through heated summer skies; cottonwoods rustle in warm, dry breezes. Every green thing grows prodigiously in rich soil kept moist by water from the vast artificial lake formed by Elephant Butte Dam in the Rio Grande.





GOOD HOUSEWIVES ARE THESE AMIABLE SQUAWS

On the Isleta Pueblo Indian Reservation south of Albuquerque, one squaw balances a basin of provisions while her companion grasps a homemade whisk broom. Indians of this tribe are respected citizens as well as excellent farmers.



© National Geographic Society

Finlay Photographs by Richard H. Stewart

RUINS OF AN ANCIENT COMMUNITY HOUSE IN FRIJOLES CANYON

In this region, now the Bandelier National Monument, archeologists have carefully reconstructed the daily life of the thrifty, crop-growing Indians who dwelt here long before Columbus's voyages.



Tough, proletarian jack rabbits, gregarious prairie dogs that like to sit upright beside their holes, and the omnivorous coyote adapt themselves to this arid environment.

Put water anywhere on this desert, and it blossoms like a rose.

In every favored region you find happy, wholesome ranch life, the excitement of oil fields, or satisfying work in orchards, mines, or the manifold occupations of towns.

Healthfulness is proverbial. "Fog is news." Climate is a prime asset of the State; it is one main reason why so many visitors come. You find it enshrined in one bit of local philosophy: "This is a fine place to live, but a hard place to make a living."

All across New Mexico, sight-seeing is a cumulative emotional adventure. To wind up at Santa Fe is like seeing all the characters of a play come on the stage in a last act with appropriate lights and music.

#### SANTA FE RE-ENACTS ITS HISTORY WITH SONG AND GAIETY

Of play Santa Fe makes a fine art. To wear tight Spanish pants, serapes, and big hats without looking ridiculous seems to be the gift of its Anglo residents.

With song, dance, and hedonistic hilarity, it celebrates, each September, the Spaniards' return to the city after the Indian massacres of 1680 (Plate XII and p. 529).

Booming guns open this spectacle rebuilt from history. Impersonating De Vargas, his courtiers, soldiers, and camp followers, paraders enter from the hills north of town: they wear armor, carry spears, and drag ancient cannon. Mixed with the familiar army odors of hot leather, horse sweat, and axle grease may also float a faint suggestion of red wine.

Vagabond fiddlers and clowning troubadours swarm the tree-shaded plaza before the old Palace of the Governors, where booths sell food, drink, flags, candy, and false faces to scuffling Indians and chattering country folk.

At night, from La Fonda's flat roof, opera and ballad singers fill the floodlit air with melody, and a "mariache" band from Guadalajara—with white-horse patterns on their gaudy uniforms, and three-foot sombreros—plays by ear on homemade violins, cellos, and jumbo guitars.

Then the pious, in a mile-long procession, carry their candles up a long hill capped by a great cross, dedicated to New Mexico's Franciscan martyrs. I marched with the line, and found it all very solemn. Priests

broadcast a prayer, like another Sermon on the Mount.

Santa Fe abhors the blues. To banish care at this fiesta it builds a huge, inflammable effigy of Zozobra, God of Gloom, and sets fire to him. His 10-foot jaws swing on hinges; when a man pulls a hidden wire, his whale mouth opens and closes, and a talking machine in him growls loudly, "Wow! I'm getting hot!"

#### "GLOOM" IS REDUCED TO ASHES

When ugly Gloom is burnt to ashes, crowds hurry back into the Plaza. Hilarity is unconfined. Overflowing La Fonda's great ballroom and patio, you meet Spanish grandees, bullfighters, knights in armor, and ladies clad in old lace shawls and court robes, heavy jewels, and great tortoiseshell combs that came from Spain generations ago, or have been faithfully copied. Others dance in the streets or in the Plaza. Literally, there is no sleep till dawn.

Active in preparing Old Man Gloom for sacrifice, in planning pageants and decorations, is the local colony of artists and writers. Some are nationally famous; others are just here. But their studios, exhibits, and social functions add distinctly to Santa Fe's unique character.

World fame, however, comes to Santa Fe with the archeological work and publications of the School of American Research and the Laboratory of Anthropology. Such scientists as Hodge, Hewitt, Bandelier, Kidder, Morley, Morris, Chapman, Nussbaum, Judd, and Roberts—adding magnificently to the sum total of human knowledge by digging, collecting, study, and translation—have painstakingly revealed the hidden stories of the ruins which tell how men lived in this Southwest through centuries long past.

Even for the Southwest, Santa Fe is a small town. Yet, like Jerusalem, its size cannot dwarf its importance. To the pious it is a holy place, as its full name implies, "The Royal City of the Holy Faith of Saint Francis of Assisi." To the more worldly, Santa Fe is to the State what Paris is to France, a symbol of a pleasure-loving people, and a pattern of life.

A unique State, New Mexico. An easy place to be happy in. A good place to dig up ruins, or study Indians, or dream, or make poems or pictures, or pick piñon nuts or raise sheep or hoe beans—or just a friendly, serene place in which merely to "survive."



PIOUS MONKS OF KUMBUM ROOFED WITH GOLD THE HOUSE OF THE "GREAT LORD BUDDHA"

Beneath the flat tablelike roof of thin gold sheets (center) sits Jö, a golden image ten feet high. Five thousand lamas dwell in the rich monastery town near Sining. Each year tens of thousands of Lamadists trek here for the Butter Festival. Huge idols and bas-relief pageants and tableaux, all worked in colored butter made from yaks' milk, are set up around the courtyard (left center) outside the main chanting hall (page 598). Hundreds of tiny butter lamps illuminate the waxy images at night.

# FOUR THOUSAND HOURS OVER CHINA

BY CAPT. HANS KOESTER

*With Illustrations from Photographs by the Author*

**B**Y AN odd trend of destiny it has been my lot to fly planes over Europe, Africa, both the Americas, and Asia.

Getting acquainted with first one strange land and then another brought in each case its own peculiar joys and satisfactions.

But to me China, over whose ancient places and chattering millions I flew for four years with mail and passengers and bombs and other things, must always remain the land of incomparable fascination.

Some of the sights which unfolded below as I flew up and down the vast hinterland of that inscrutable country still seem almost incredible.

To shake off the feeling that I must be dreaming, I have to look, time and again, at the photographs I took—photographs not only of some of my human freight, but of graceful Chinese temples, of floods such as Noah saw, and of dry, empty wastes curiously suggestive of pictures of the waterless moon.

## HAZARDS INCLUDE DUST, HAILSTONES, BULLETS

In those four eventful years of odd adventures and unfamiliar scenes, I carried almost every conceivable kind of human being, from generals, diplomats, and "big butter-and-egg" Orientals to lamas and other holy men—and once a full cargo of giggling, perfumed singsong girls.

Often we fought through blinding dust storms of appalling range and choking density; we flew over one region devastated by hailstones of almost unbelievable size. Many times I was shot at from the ground. One of my fellow pilots was shot down. Some died in other catastrophes.

Without night flying equipment, radio beams, or trustworthy weather reports, much of this pioneer China flying called not only for maximum quick thinking, but for luck, and yet more luck. It was only luck, for example, that often saved us from collision with junks that swarm the Yangtze when, forced down on the river by terrific rainfall, we had to turn our bouncing amphibian into a taxi and roar along for miles over the yellow, angry flood.

My first job was with the China National Aviation Corporation, a subsidiary of the

Curtiss-Wright Exploration group, flying the run up the Yangtze River between Shanghai and Hankow (map, page 574).

In pioneering this route, we used Loening amphibians, single-motored ships carrying eight passengers in addition to the pilot and a Chinese co-pilot.

Part of my duty was to train native flyers. I found they made excellent fair-weather pilots, but were apt to lose their heads in bad weather or emergencies. All were friendly and grateful for the little advice I gladly gave them, and I could scarcely save myself from the numerous Chinese dinner parties to which they later invited me.

## YANGTZE JUNKS HAMPER FLYING

Winter on the Yangtze, with fog, rain, and snow, makes for bad flying. Often visibility was poor. To keep on our path in storms we had to fly very low over the yellow flood; often with almost a zero ceiling, we actually dodged around a constant stream of junks. Instead of the scheduled six hours, this flight frequently took ten or twelve.

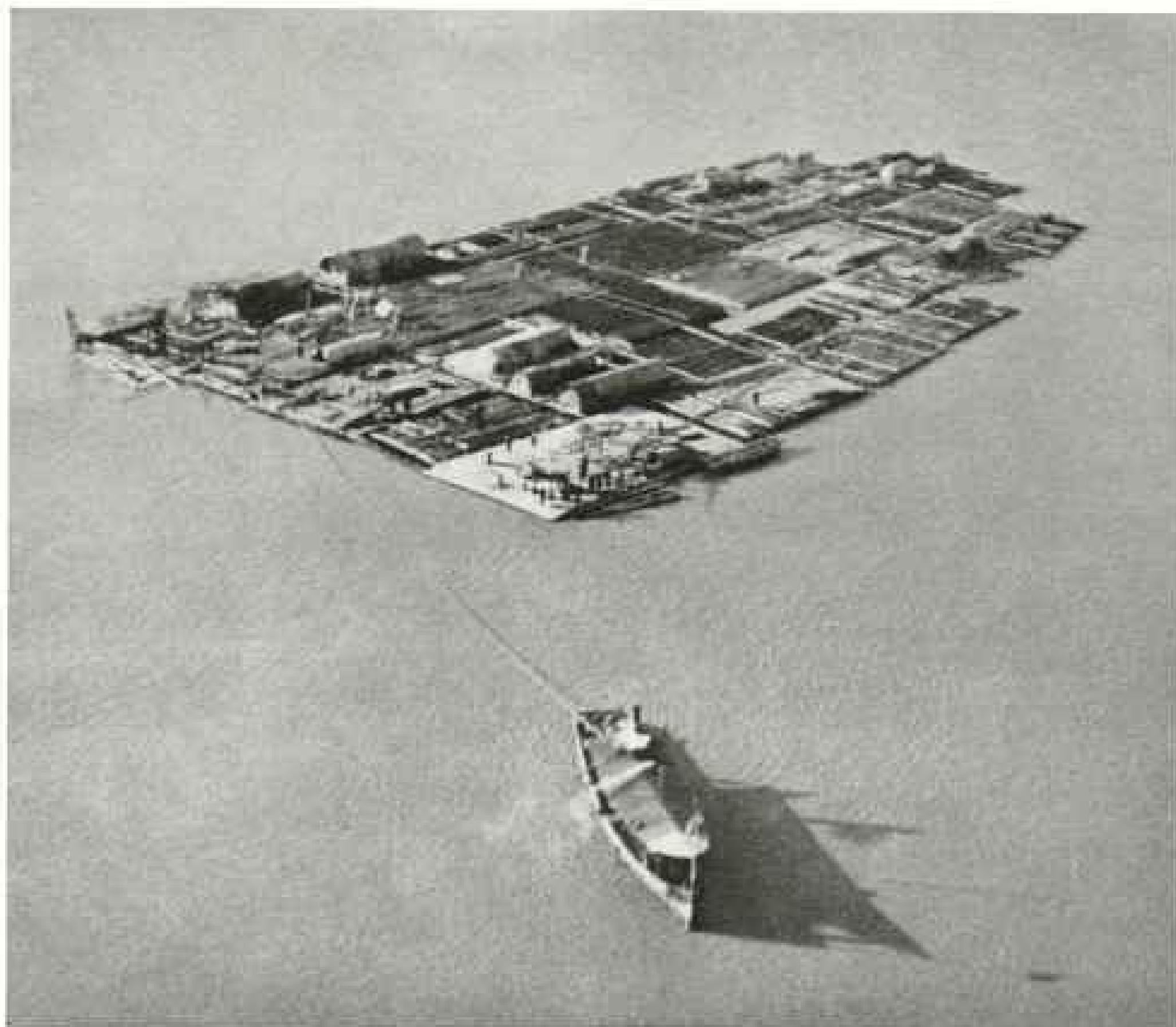
On one stormy trip I had to land on the river six times, and then taxi along with the throttle half open, in motorboat fashion. One Christmas Eve, when we had to alight on the Yangtze and taxi up its tributary, the Whangpoo, to reach Shanghai, we found that stream as crowded with junks as Broadway is with automobiles.

Rain turned into snow and visibility into nothing. On the Shanghai water front, before the Cathay Hotel in the dark, I hit a junk with my wing and had to run for shore lest we sink.

## LOST, WITH A LOAD OF BOMBS

When later I joined the German-Chinese Eurasia Aviation Corporation, one of my first jobs was to carry bombs for Chiang Kai-shek in his long war against the Chinese Communist armies.

After one such trip to Honanfu, south of the Yellow River, we turned back for Shanghai. Delayed by fuel troubles, I saw that we could not make it before dark. The plane was equipped with radio, but the ground crew, still unfamiliar with these new aids to navigation, could give us practically no help.



WHOLE VILLAGES FLOAT ON GIANT LUMBER RAFTS THAT FLY TUNG TING LAKE

Dusk soon will fall, so the small steam launch is towing the awkward craft to shore for the night. Trees tied together with bamboo rope form the main structure, on which an entire community erects its huts. Securely built, it cannot disintegrate on stormy days. Timber is transported from inland Hunan Province, 500 miles from Shanghai. Trips take several weeks. When the Yangtze River is reached, the sections will be broken up before completing the voyage to the coast.

In the growing dark we got lost over the swamp country west of Shanghai; luckily, however, I finally spotted an old pagoda, a landmark I had known when flying the Yangtze. Direction thus obtained, the plane bored through the night, passed the Eurasia's dark landing field—which was then the size of a cow pasture—wobbled over some trees down into the airport of the China National Aviation Corporation on the Whangpoo, and at last came to a stop in a muddy potato patch.

An hour later, safe on the roof garden of the Park Hotel in Shanghai, I looked down into bright traffic-jammed streets and felt as happy as a soldier back from a hard straining in the trenches.

China, now linked with the Western Hemisphere by Pan American's Pacific Clip-

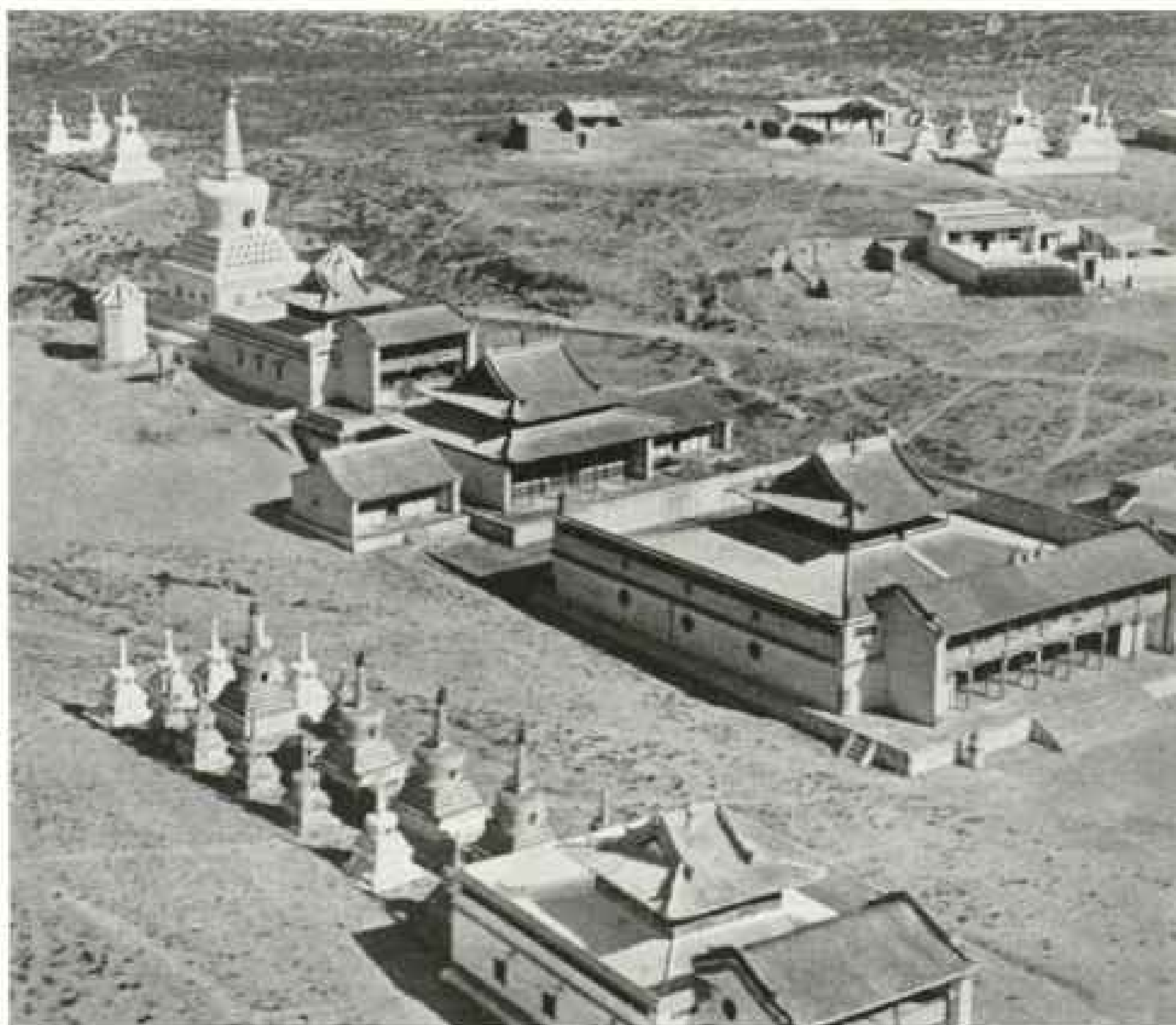
pers, had long hoped to establish direct service to Europe by way of Russia. But every attempt to reach an understanding with the Soviet Government to permit flights over Siberia had failed. An alternative was a line to Canton and thence to Hanoi, French Indo-China, to connect with the Air France planes for Europe.

#### TRAIL-BLAZING, HANKOW TO CANTON

My company flew one plane down to Hanoi studying this problem, and I was chosen to pioneer the line from Hankow to Canton via Changsha, with a Junkers-W34.

The Junkers had radio equipment and blind flying instruments, but no radio beacon had yet been used in China. For eight months, however, I flew that route, calculating time and drift by ground view.





DEEP IN THE DESOLATE GORDAS DESERT STANDS A TEMPLED CITY

Lamaist priests and monks are the only inhabitants of the isolated community about 100 miles northeast of Ningia. Camel caravans that halt infrequently with food supplies are the only contacts with civilization. Pagodalike structures surrounding the temples are tombs (page 593).

At Changsha we usually got a message from Canton, three hours away, stating whether visibility there was such that we could land. If not, we were forced to turn back.

#### STOICAL PEASANTS AWAIT DROWNING

There is much rain in South China. At Changsha a dike had to be built around the airport to keep water off when the river rose. It felt odd, to say the least, bringing my plane down into that apparently below-sea-level field; junks floated past, their masts towering high over the plane! Sometimes the dike broke and turned our field into a swimming pool so we could not use it at all.

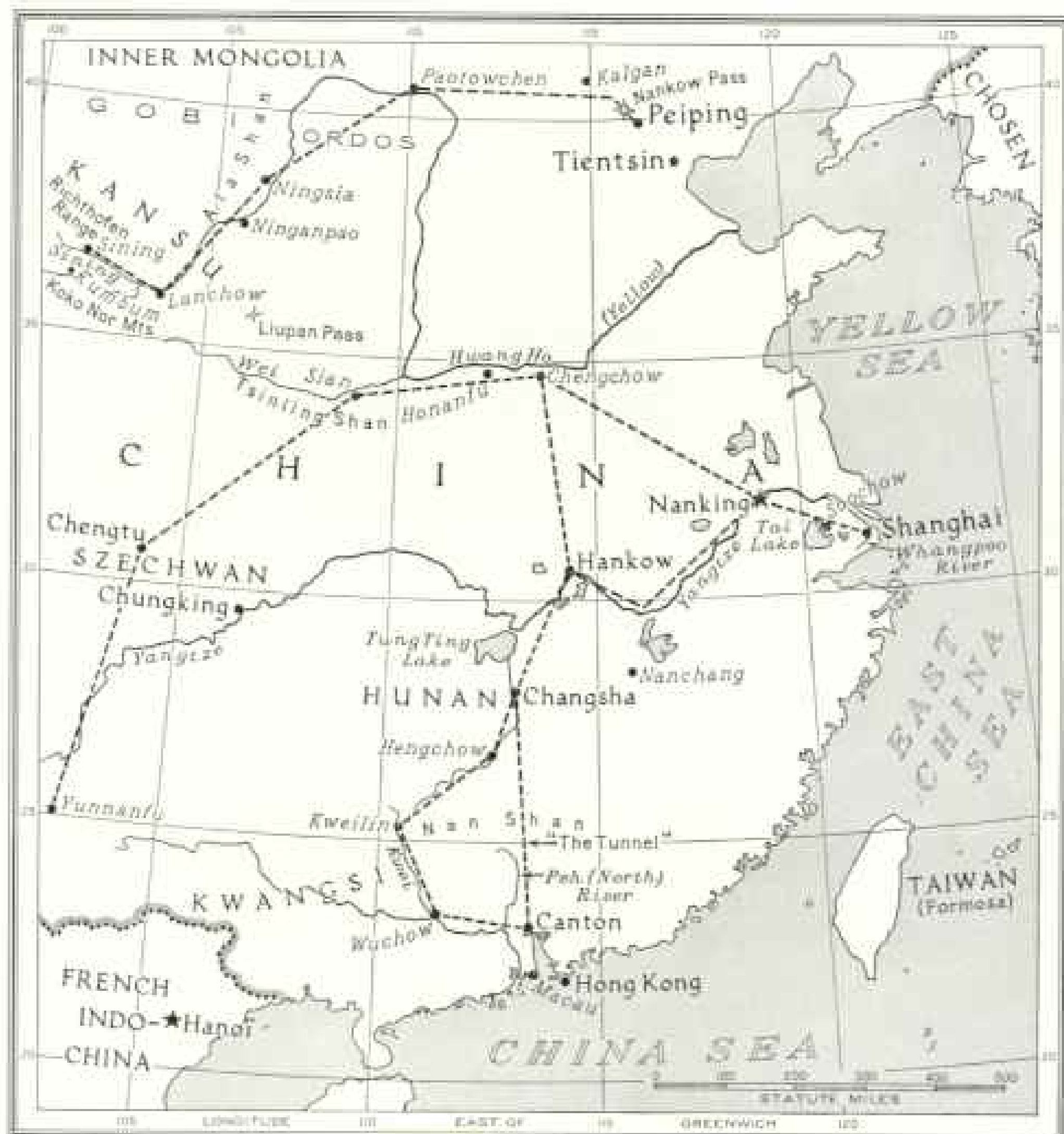
During one flood between Tung Ting Lake and Hankow, I saw thousands of peasants sitting on housetops and dikes stoically waiting for the rising river to drown them. In a land plane, with wheels, there was nothing

that could be done, but I wondered at first why Chinese in boats went calmly past and left so many of their countrymen to drown. Later I was to learn more about Chinese ways and superstitions.

One day a small boy playing on the banks of the Yangtze slipped and fell in. I went in after him, but lost him in the swift, muddy current. Imagine my astonishment when, climbing sad and dripping out of the river after my failure to save the poor boy, I was congratulated by Chinese friends.

"The river gods had claimed him," they explained. "If you had saved him from joining his ancestors in Paradise, that fault would have been yours, and you would have been left in a very embarrassing position."

I began to understand, then, why the boatmen drifted past indifferently, leaving people to drown on the sinking houses and the crumbling dikes!



Drawn by Newman Runstead

#### FOUR YEARS OF AERIAL TRAIL BLAZING IN ANCIENT CHINA

Captain Koester's initial route as a commercial flyer was from Shanghai to Hankow, up the Yangtze River. Then he flew from Hankow to Canton via Changsha, first on a direct line that led through narrow gorges for 100 miles, later on a safer path by way of Kweilin. Next duties were simpler—carrying passengers and mail from Hankow to Chengchow. Going north, he piloted planes from Peiping to Lanchow and Sining by way of Paotowchen and Ningsia. His final flights, the longest, passed through the heart of the country, from Shanghai to Yunnanfu.

Air service between Changsha and Canton carried passengers and mail on a regular schedule twice a week. Ordinarily this trip was uneventful, but on one flight in a rainy season, my co-pilot and I were forced to take off into a heavy fog.

First radio reports were somewhat reassuring, indicating high visibility over Canton. But very soon after our ship rose in the air, we had to start blind flying. Fog and rain obscured the ground.

At the end of three hours we were flying over Canton in a heavy fog and downpour. Radio reports now announced low clouds and bad visibility over the city.

#### IN FOG OVER UNKNOWN COUNTRY

I searched in vain for an opening in the fog so that we might attempt a landing. There was no recourse but to return to Changsha.

On the flight back I hoped to sight a

familiar mountain peak landmark to guide us; but now it, too, was entirely hidden in fog. We flew on in clouds. After a six-hour flight, we should have been above Changsha. However, in flying lower to locate our exact position, we discovered that we had drifted from our course and were over a part of the country which I did not recognize.

Because of the storm, my copilot was unable to pick up our position by radio. As we flew north through sheets of rain, the danger grew. Night was coming on. We were lost, and our petrol was running low.

I knew that the only safe emergency landing places in South China, even in dry seasons, are the sand banks along the rivers; therefore, our best chance lay in finding such a sand bank large and dry enough on which to land our plane.

Finally we glimpsed a small stream, and followed its course—only to find that the gravel bank was too narrow for landing. There was fuel for only ten more minutes!

I flew on along the stream. The minutes were going by. I was watching them go, checking time off, but always watching, searching for an open space. Finally a little bit of open field appeared before us, on the left bank of the stream. In the dim



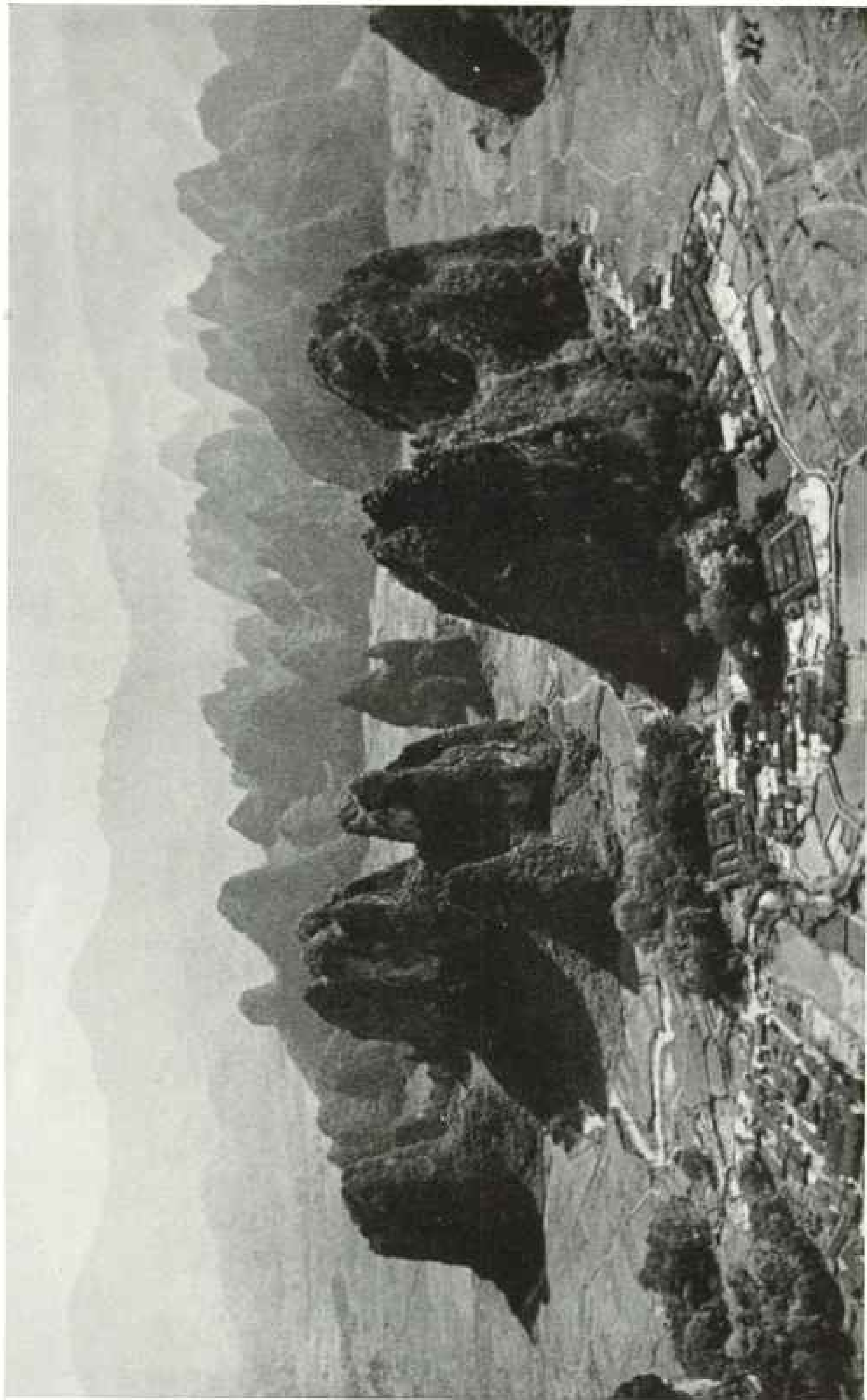
EACH BRAID REPRESENTS A BOOK OF THE SACRED "KANJUR"

Although garbed in everyday attire, this upper-class Tibetan girl symbolizes Lamaism's "Bible" by her 108 plaits. When in ceremonial dress, she suspends from her hair a woollen cloth studded with bits of silver, amber, turquoise, and gold. Ornamental pins are hand-wrought silver.

twilight it seemed just another strip of rice land, but there could be no more delay—I must land, whatever might happen.

Descending, I saw a large white circle on the ground. Here was actually an airdrome!

Somehow, by sheer luck, we had drifted over a region in which Chiang Kai-shek had been building airdromes. Starting from Nanchang, he had placed them at strategic points through the mountainous country for the use of his bombing planes in his drive against the Red armies.



STUDENTS OF CHINESE ART WILL RECOGNIZE THESE JAGGED PEAKS, SO COMMON IN ORIENTAL LANDSCAPE PAINTINGS

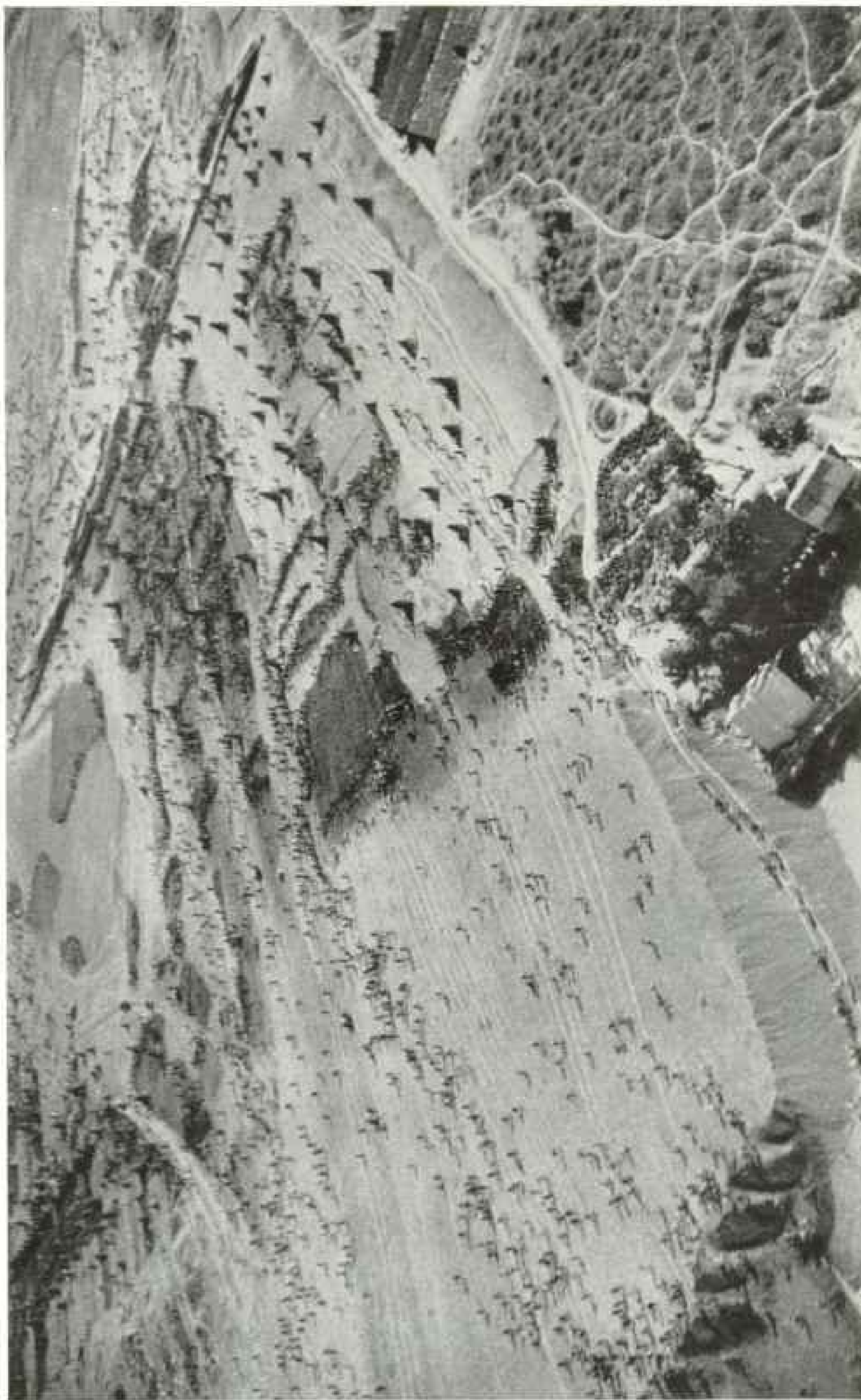
Early one morning many hundreds of years ago, legend records, a native artist climbed one of these limestone pinnacles and painted the successive rows of amazing mountains around him. As time went on, his work was seen and admired in other parts of China and it became the fashion to portray mountains after his style, even though the formations are peculiar to this isolated section of Kwangsi.





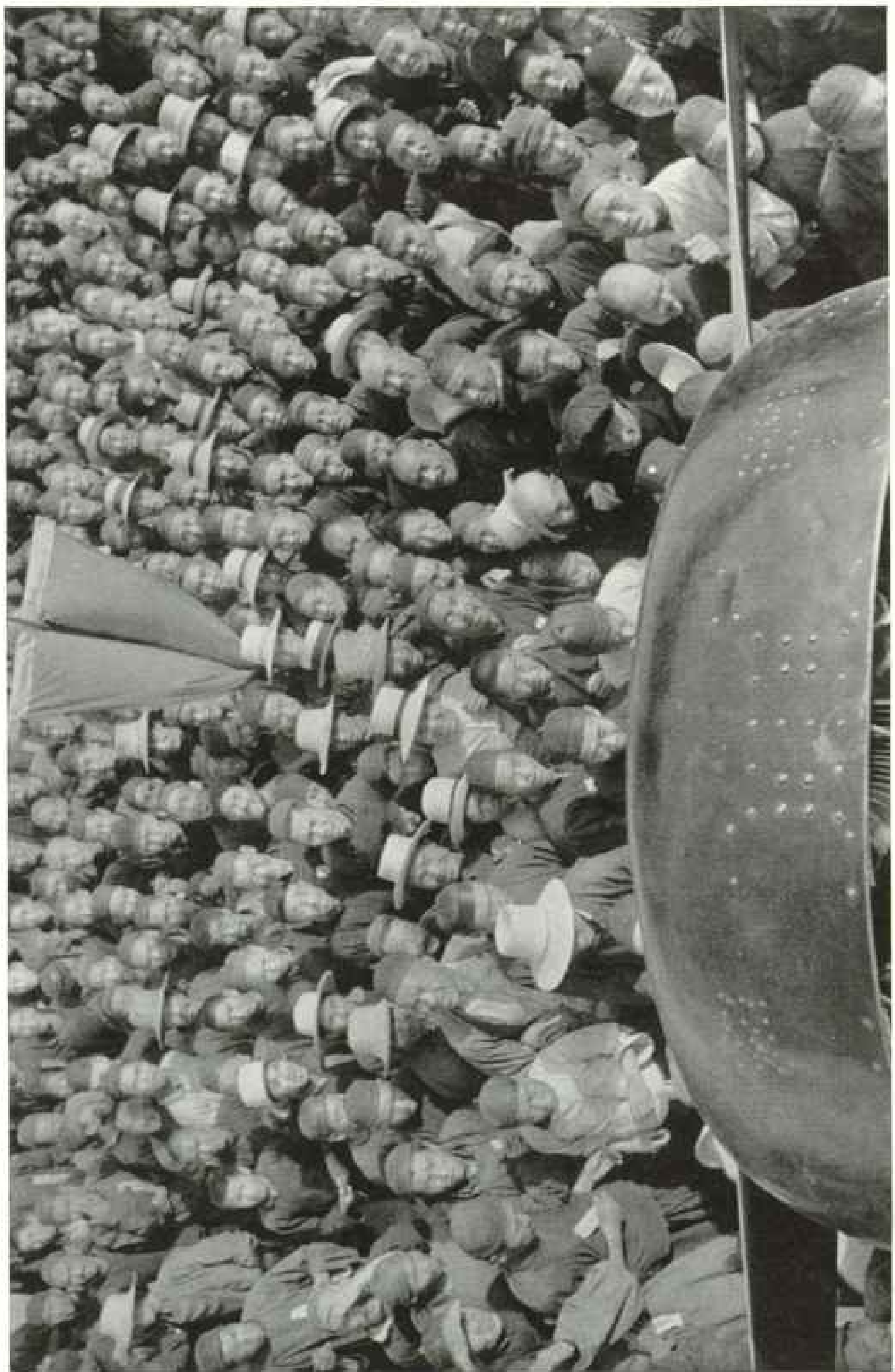
TYPHOONS OFTEN WREAK HAVOC ON CANTON'S "WATER TOWN," WHERE SAMPANS CLUSTER LIKE BEETLES AT A FEAST

So congested is the population that thousands spill over from the dry land and dwell in craft on the Canton River. Adjoining the Bund (right foreground) the boats are so thick that river traffic problems become acute. All the necessities of life may be obtained in this independent community without going ashore. Night life is especially gay in the floating hotels and restaurants.



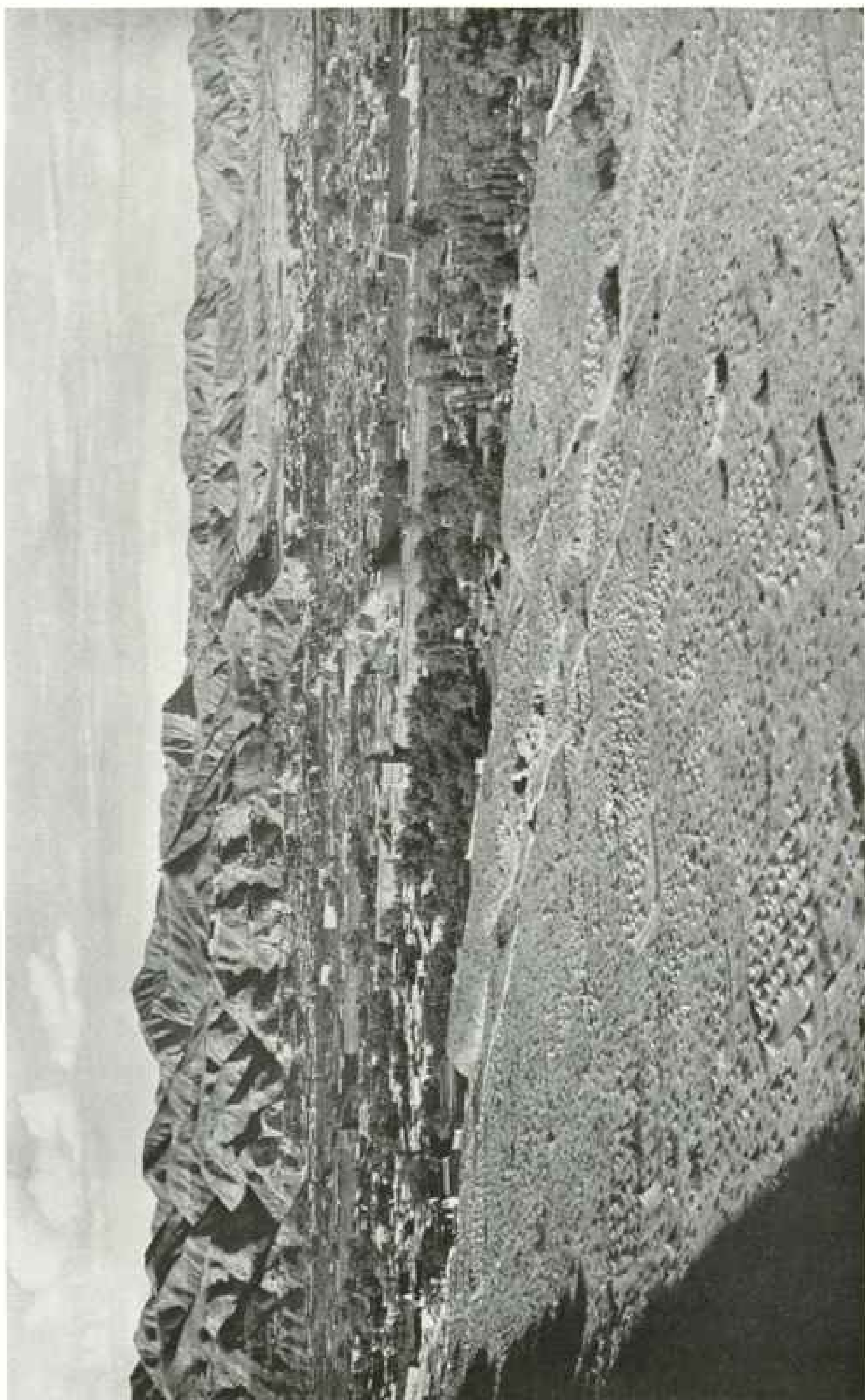
MYRIAD ANT-LIKE COOLIES SWARM ACROSS THE FIELD TO MAKE, BIT BY BIT, A SMOOTH AIRPORT

Laborers have nearly completed removing part of the hill in the foreground, near Hengchow. Earth pillars resembling termites' nests were left so that overseers might determine the amount of soil removed and compute the pay. Once Captain Koester chanced upon a new airdrome when, off his course and running out of fuel, he was trying desperately to land in a heavy fog (pages 574-5).



EXCITED PEASANTS STORM THE MAMMOTH BIRD FROM THE SKY, FORCED DOWN IN AN ISOLATED VILLAGE

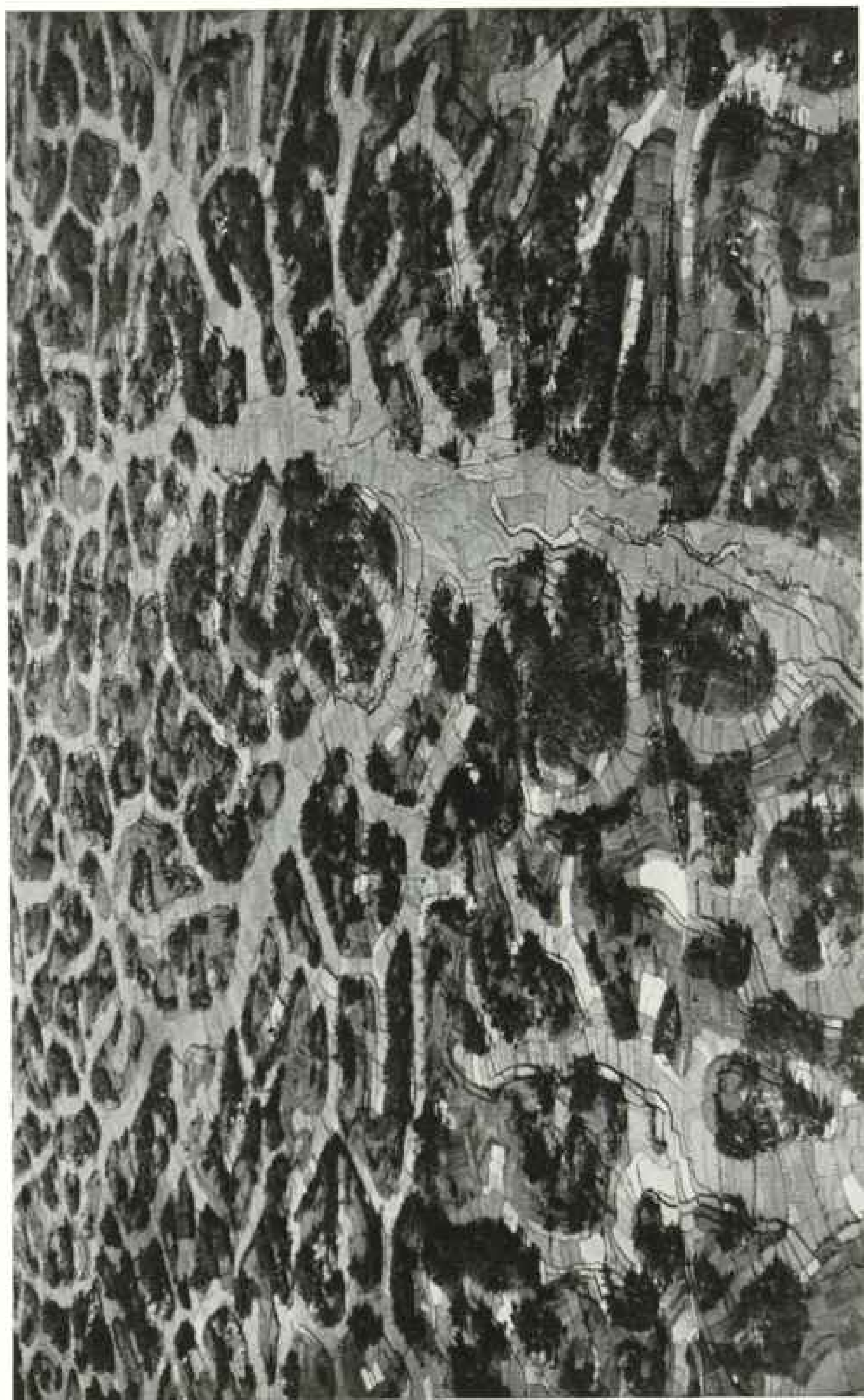
Usually, on emergency landings, Captain Koester drew a large circle about the craft and the curious peasants scrupulously remained behind it. Here, at an inland point between Canton and Hengchow, the throng was so dense that those in the rear, eager to get their first plane, pushed the ones in front over the line (page 564).



LANCHOW HUDDLES AT THE FOOT OF SLOWLY CRUMBLING MOUNTAINS; IN THE COUNTLESS MOUNDS BEFORE IT SLEEP THE CITY'S DEAD

Part of the city was hurled skyward the day before Captain Koester first visited it, when a large store of explosives, clumsily moved, blew up (page 395). Close to the high Mongolian plateau, this far western capital of Kansu suffers extreme heat and cold. The Huang Ho, near by, is crossed on a bridge of boats in summer and on ice in winter. Recent government policy is reclaiming for practical use much of the vast stretches about Chinese cities now used for graveyards.





AS FAR AS THE EYE CAN SEE, NOTHING BUT PADDY FIELDS AND HILLY CLUMPS OF TREES!

Peasants build their huts in the island thickets, so that every inch of clear space may be flooded and planted with rice. Homes are of wood, with straw and bamboo-thatched roofs. Chairs, tables, and even cups and dishes are almost entirely self-sustaining; virtually nothing is obtained from the outside world. Yunnanfu, the capital, is connected with Hanko, French Indo-China, by rail, and is much more modern than the hinterland.



WILL HE DOFF HAT OR SPECTACLES WHEN HE MEETS YOU?

If this Chinese "sage" belongs to the old school of culture, he will remove his glasses of polished mountain crystal in the presence of a friend or a superior. The author tells of a youth who, appearing before one of his elders, removed neither glasses nor hat. "If you are 'old style,'" said the older man, severely, "take off your spectacles; if you are 'new style,' take off your hat!"

In the beginning of our flights to Canton, we used a route which we nicknamed "the tunnel" (map, page 574). It led through the mountain gorges south of Changsha, in the dangerous passes of which one of our pilots crashed and lost his life.

#### FLYING 100 MILES IN A "TUNNEL"

To cross this mountain range and not lose our way when dense clouds hung low, it was necessary to thread the narrow gorges where the North River breaks through these mountains.

Some stretches of this gorge route were

so narrow that the plane could not be turned around if we had wished; the only insurance against supreme disaster was to go forward.

When clouds came down particularly heavy, we were sometimes compelled to fly from 50 to 100 miles through this tunnel. We could never see more than a short distance ahead, and constant banking, first right, then left, was necessary to keep from scraping against the steep walls of the gorges, which in places were 3,000 feet high.

This tunnel finally became a mental hazard. Eventually we worked out another route, twice as long, but much safer. On the map, we found near Hengchow a small river flowing northeast from Kweilin, whence the Kwei

—a larger stream—can be followed south to Wuchow and then into Canton. This is part of the ancient inland water route—rivers, lakes, and canals—over which freight moved between Peiping and Canton.

For eight months I flew the Hankow-Canton run, profoundly enjoying the magnificent scenery of this part of China—a fairyland from the air, though not always so fragrant or undilutedly happy when one descends, climbs out of the plane, and has closer contact with it!

Canton's European concession lies on the Shameen, an island in Canton (Pearl)



OIL FOR THE LAMPS OF CHINA—FROM A COWHIDE BAG!

Merchants in Lanchow mount their skin containers on small hand wagons which they roll through the streets. An opening at one corner permits the oil to pass into waiting pots and pans.



"TABLE D'HAT"

Coolies, excavating for an airdrome, take time out for lunch. An inverted sun hat supports the community chow bowl. Rice with soybean sauce is transferred from bowl to individual saucer and then disappears by chopstick.

River. At night, crowded with junks and gaily decorated sampans, this fascinating river maze is known as the "Venice of Canton" (page 577).

For a few cents one can hire a sampan and drift past hotels built on junks, where flower girls play lutes while men eat, drink, and gamble. Colored lanterns swing all about.

Lasting three days, the Dragon Boat Festival shakes the Canton River once a year. Some of the narrow native craft, decorated with banners and parasols, may hold as many as 60 Chinese. Paddled by peasants keeping time to the rhythm of a drum in the center of the boat, they rapidly gather momentum and cut through the water at high speed. Races with three or four craft competing are loudly cheered by crowds on the river banks or afloat.

Conspicuous in the hilly country about Canton is the White Cloud Mountain, almost entirely covered to its summit with graves, set in horseshoe shape. I saw this type of grave architecture many times in this part of China.

In Canton I first tried living in a Chinese hotel. Soon it became apparent that Chinese hotels are primarily places of amusement; they stay open until dawn—only then the noisy chatter and clatter of mah-jongg games die down.

A "Silk Street" and an "Ivory Street" flourish in almost every large South China town. However, modern China is rapidly losing its old art of designing and, unhappily I think, seems more interested now in imported designs from Paris and London.

#### CHILDREN NAP ON WILD BUFFALOS

Looking down from the plane on these South China flights, I constantly saw in the paddy fields the enormous and rather wild water buffalo, known in the Philippines as the carabao. Sometimes it was hitched to a plow; sometimes it was wallowing contentedly in the cool mud.

This slow, heavy creature is anything but tame. Without its daily mud bath it is likely to be moody and dangerous. It is quite likely to attack a saddle horse, throwing the rider into a muddy rice field, and has been known to kill foreigners out snipe shooting.

However, the water buffalo is astonishingly friendly and obedient to children, who can subdue it with a switch. It calmly submits to being used as a plaything, and

youngsters often climb on its back to doze undisturbed.

For months I flew between Hankow and Chengchow. On one of the flights we were carrying a rather heavy load across high mountains. Drizzling rain in which we had taken off continued steadily through the pass and soon began to form a thin layer of ice on the wings.

At first I didn't think it would become dangerous, since usually one can fly under such conditions for some time. Knowing that beyond the range lay a warmer open valley of rice fields, I continued with wide-open throttle, even though I was gradually losing altitude.

#### FORCED DOWN AMID KINDLY PEASANTS

With heavy, low-hanging clouds, visibility grew worse and it was apparent we were being pressed down, not so much from the weight of ice covering the plane as from the distorted shape of the wings. But we made the pass, flew down on the other side of the range, and saw a large winding river with sand banks. A quick descent, I knew now, was imperative.

A successful landing was made, and instantaneously what seemed a thousand peasants flocked from nowhere to see the airplane (page 579). With emergency tools we tried to scrape off the ice in order to continue the flight, but the steady drizzle froze as it touched the metal wings; there was nothing to do but remain there all night.

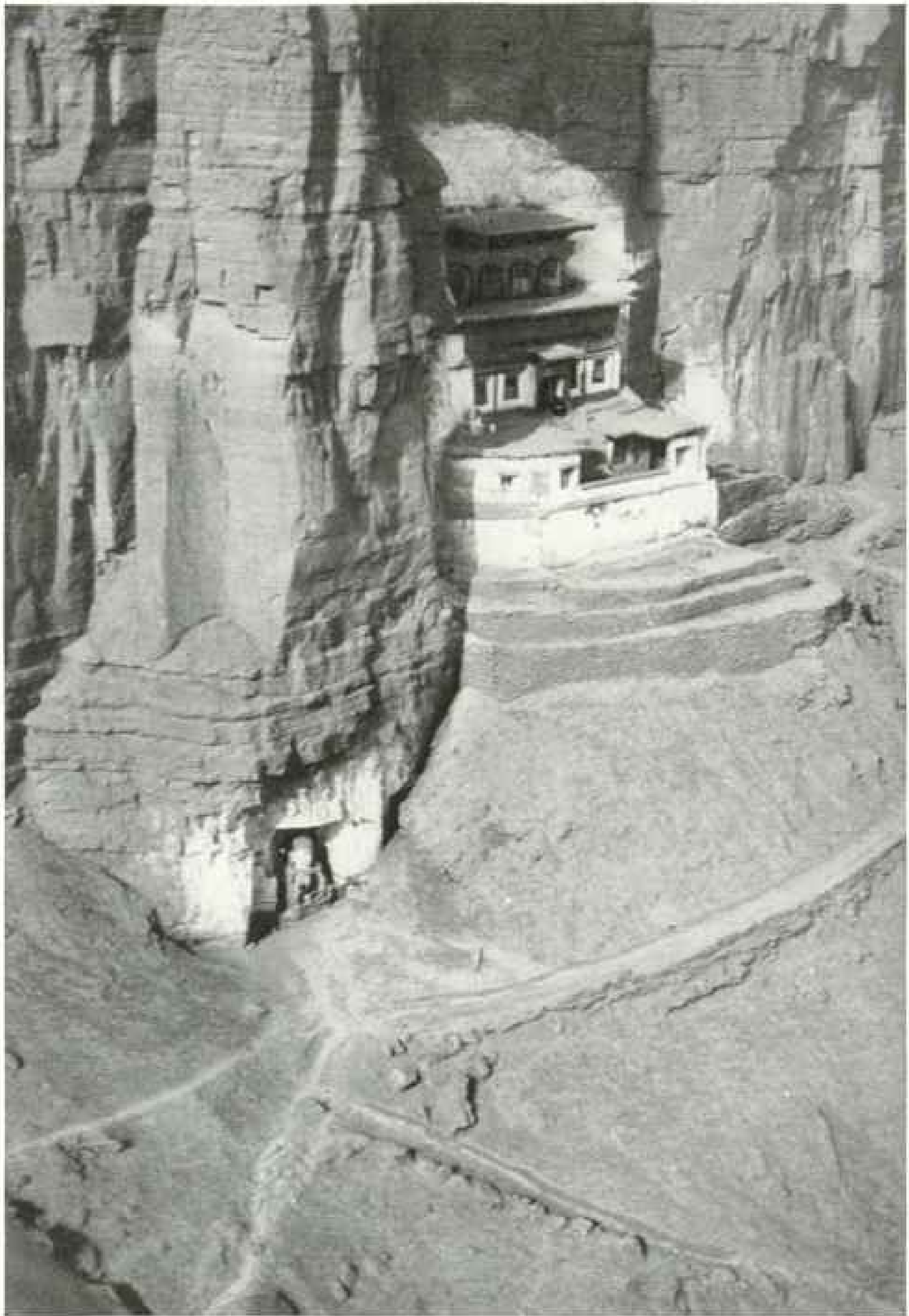
On all my forced landings in China I was treated with great kindness by the peasants. From their meager food supply they always brought the best they had for my passengers and me.

This time we were invited to a room heated with a charcoal fire. But icy winds had torn through its rice-paper walls, and the poor peasants did not have the means with which to renew the frayed paper. After tying down the plane with ropes which we always carried for such an emergency, we sat most of the night beside the small fire. Next morning two relief planes arrived from Hankow and Chengchow.

#### BLINDING DUST THREE MILES IN AIR

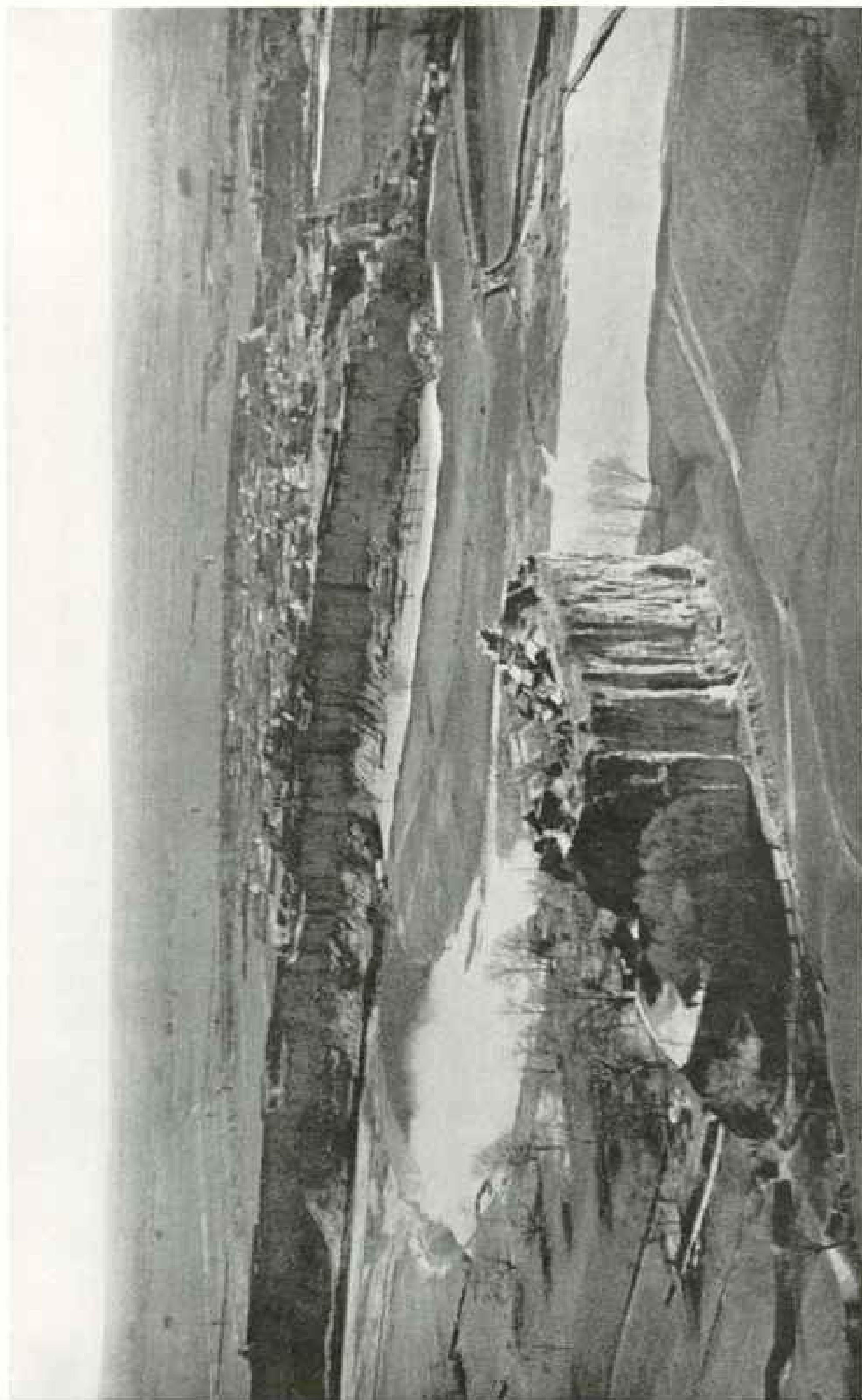
Dust storms rage all about Chengchow. Much soil here is loose and dry; whenever there has been a long drought, even the smallest windstorm will start what might be called a "real-estate movement."





BACKDROPS OF WHITEWASH OUTLINE LAMA TEMPLE AND BUDDHA IN BOLD RELIEF

Sheltered in niches among the massive rocks of Sining Valley, these works of pious builders withstand the extreme climatic changes. Paths, well worn for centuries by the feet of pilgrims from near-by villages, lead to the shrines.



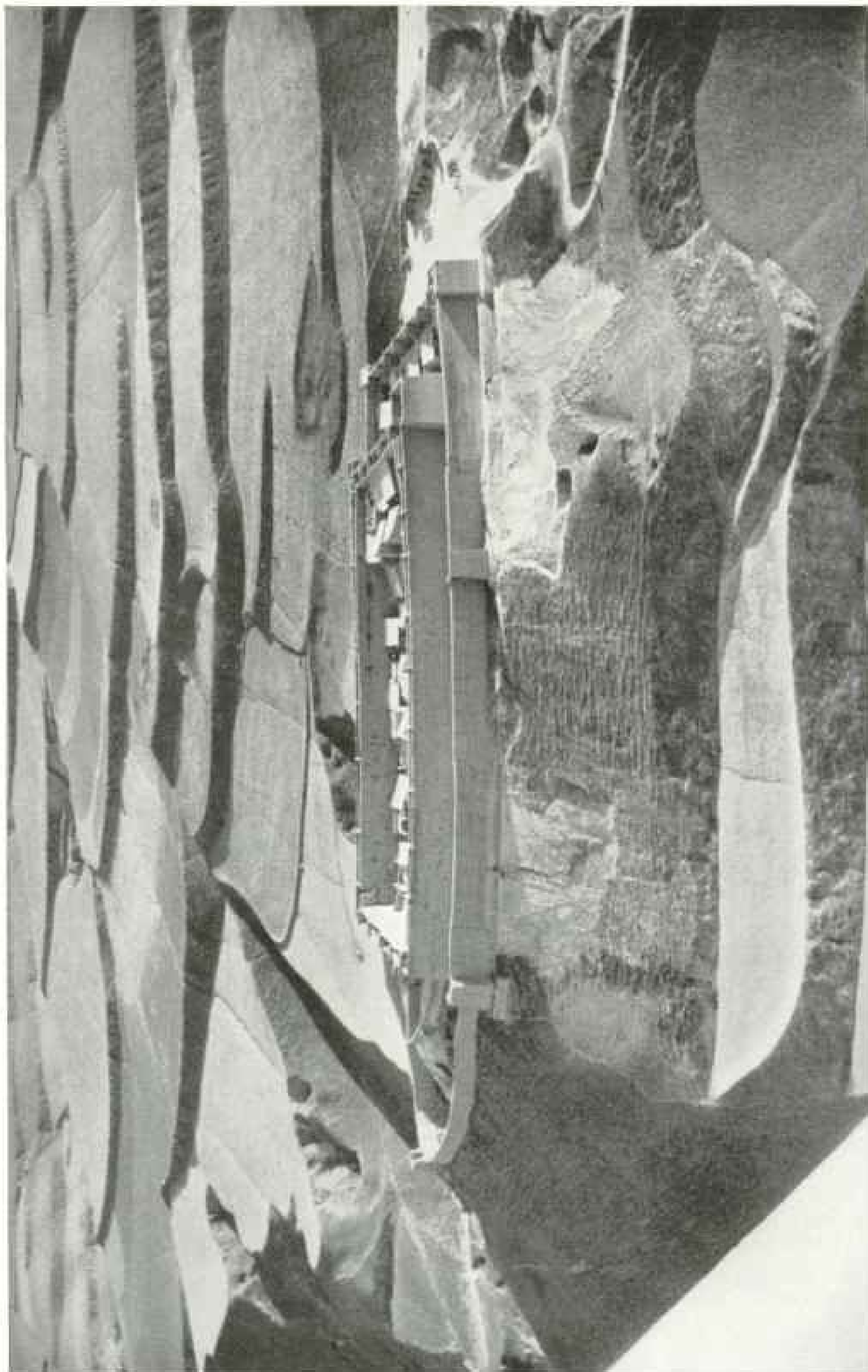
HWANG HO PEASANTS FORTIFY AN OUTPOST THAT BATTLED EROSION TO A STANDSTILL

Many thousands of years ago the dust of the Mongolian plains blew over and settled on North China to form the loess country. It covered the original landscape, often to a depth of hundreds of feet. Perhaps this is an original peak, its head covered with the newer soil. When the mounding stream attacked the base, solid rock withstood it; the loess came tumbling down in vertical cleavage, typical of this formation. Or perhaps the cliff was saved merely by the vagaries of the river.



TREELESS WASTES IN CHINA'S LOESS COUNTRY SERVE AS A LABORATORY FOR AMERICA'S STUDY OF SOIL EROSION

Problems raised by vanished forests and intensive cultivation through the centuries in Kansu Province have interested U. S. Department of Agriculture scientists eager to check land wastage in the United States. Farms flourish in the valley because of intelligent conservation by terracing. Much of North China once was timbered, but succeeding generations cut down the trees to obtain wood and more cleared land. This left the soil prey to destructive forces.



SHIP-SHAPE STANDS THIS OLD NORTH CHINA VILLAGE, WHOSE DWELLERS HAVE SUCCESSFULLY COMBATED SOIL WASTAGE.

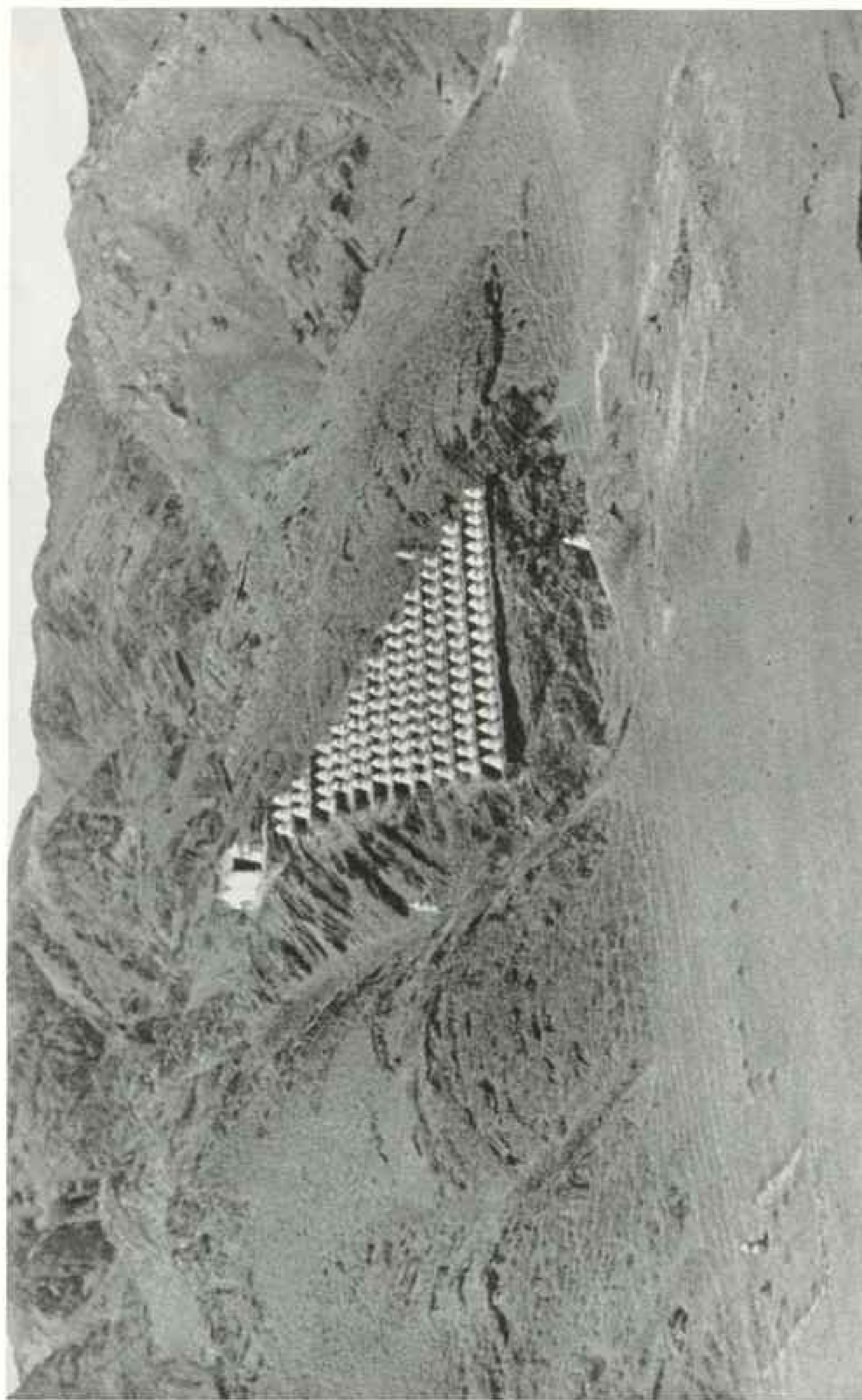
To keep out bandits, peasants near Lanchow built their mud walls along the natural lines of the hill's crest, outlining a prow and blunt stern. They have relentlessly resisted erosion by waves of bench terracing. Ridges on the left have started to waste away and, unless vegetation is encouraged along the banks, the process will go on. Here farmers have good wheat crops when rain is plentiful, but seasons of drought bring famine. Sheep tracks furrow the steep slopes in the foreground.





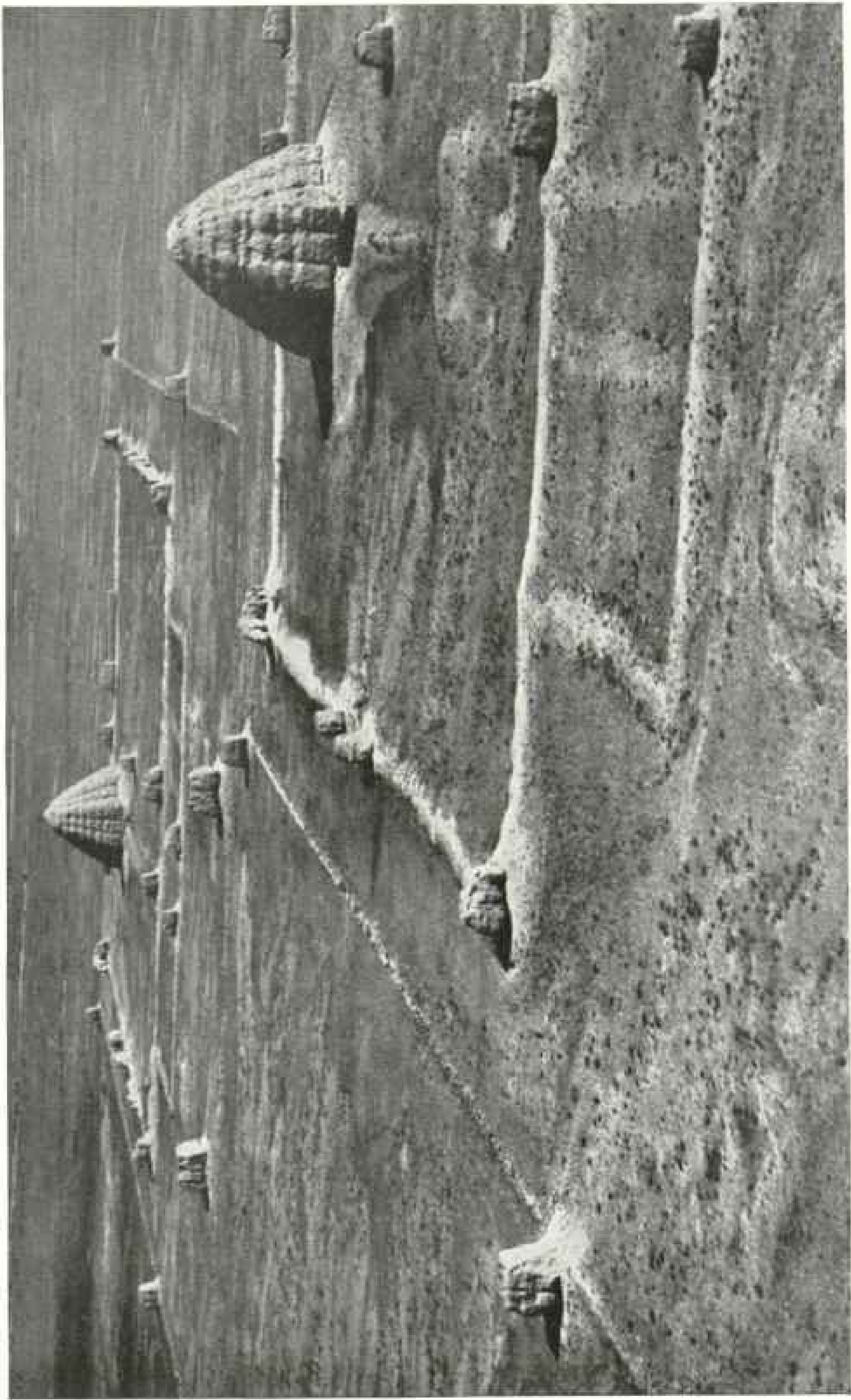
NATURE WORKED HAND IN HAND WITH PATIENT FARMERS TO BUILD UP THE TERRACES SINCE NOW DESTROYS

Farmers in this loess region marked out narrow strips of natural vegetation on the gentle slopes. Then they plowed the soil between. As the rain washed the yellowish earth downhill, each successive row of vegetation caught and held the silt; thus the land was progressively flattened out into bench terraces. Now the main stream and its tributaries, growing deeper, reach out like the tentacles of a giant octopus, gradually undermining and eating away the countryside.



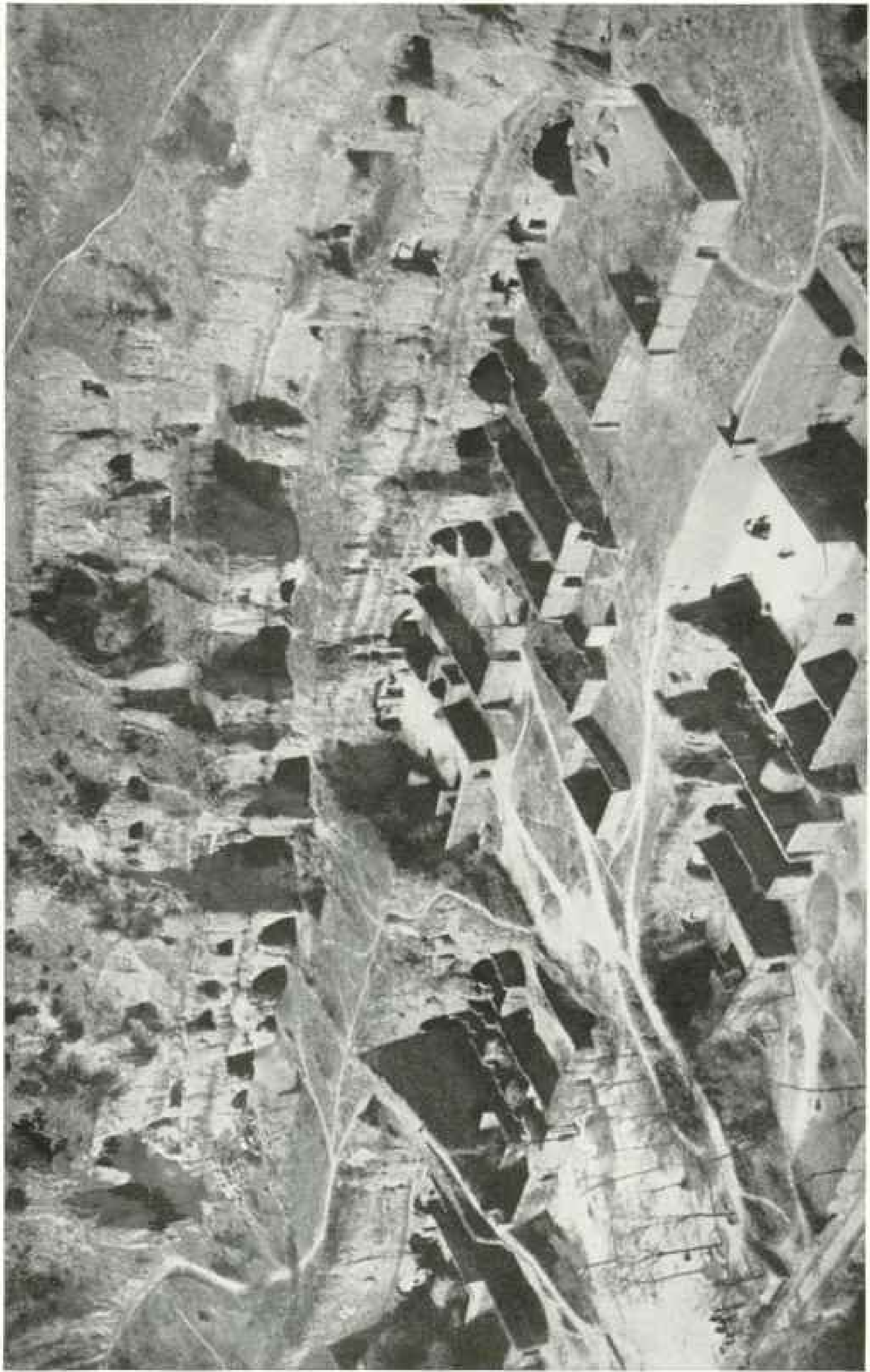
TOMBS OF SUNG DYNASTY GENERALS, SLAIN BY TATAR TRIBESMEN, FORM A HUGE TRIANGLE NORTH OF NINGANPAO

More than 100 military heroes were hurried together near the banks of the Hyang Ho seven or eight hundred years ago. They requested this group burial before going into battle, legend tells. So isolated are the graves that few Europeans or Americans have visited them. Captain Koster came upon the group while flying off the beaten path in search of the unusual.



ROYAL MONGOLIAN TOMBS, NEGLECTED AND CRUMBLING AFTER 600 YEARS OF RAIN AND WIND

Successors to Genghis Khan were buried here, north of Nîmpeia. Today the walls have nearly disappeared and the towers at their corners are mere heaps of earth. Remnants of large compounds indicate that the tombs once were massive structures.



HURROWED DEEP IN CLIFFS OF LOESS, WHOLE VILLAGES RELY ON "THE GOOD EARTH" TO SUPPLY ALL THEIR WANTS

Cave dwellers between Sian and Lanchow dig back as far as 200 feet to hollow out commodious homes in which even beds and tables are often made from the soil. Mud-walled yards keep sheep and cattle in at night. Warm in winter, cool in summer, these troglodyte homes often serve generations. Many proved to be death traps 18 years ago, when an earthquake devastated part of Kansu Province, killing 100,000. (See "Where the Mountains Walked," NATIONAL GEOGRAPHIC MAGAZINE, May, 1922.)





HOME TO THE HUMAN MOLES OF KANSU PROVINCE IS SIMPLY A HOLE IN THE GROUND

Opening out of the square courtyards are the man-mole caves in which live the isolated Chinese peasants of the loess country. The arrow points to one of the stairways leading below the surface into the yard at the left. The subterranean dwellings are carved out of the hard soil. No mortar is used, but sometimes a little water is applied to smooth the walls. The farmer in the foreground is running to safety upon the approach of the airplane—probably the first he ever encountered (p. 596).



"I'LL BE HARD TO HANDLE, I PROMISE YOU THAT"

The song hit from "Roberta" could apply to this fancifully decorated Lanchow mule, for he fully lives up to the title. Highbred, spirited, and ill-tempered are these highly prized and much pampered animals in Kansu Province. So fractious are they that the chain hanging from the bridle sometimes is passed between the upper lip and the teeth for more effective curbing.

Flying under such conditions is difficult, since the pilot can see scarcely a half mile ahead. Often we met dust at 15,000 feet, and still we were not able to climb over the storm. Through such dust we often flew blind, as in fog.

My eventual transfer to Peiping was a relief from the mosquitoes and intensely hot, sleepless nights of a Canton summer. In the old north capital I found the cultured Europeans, including ambassadors and ministers, enjoying the rare beauty of a different kind of Chinese life, where more of the old arts survive.

In my Chinese house, with its entrance through a circular hole in the wall, I slept in summer in a tree-shaded garden, and often was awakened by the cries and clatter of the street venders.

Each peddler has his own peculiar noise with which he advertises his wares. The barber clicks a bamboo rattle. There is also the candy and vegetable merchant with a Chinese yodel all his own. These peddlers prowl the narrow, winding streets till late at night.

While I was flying in the north, the

Chinese Government decided to run an air line from Peiping via Paotowchen, and Ningsia to Lanchow—mainly to keep an eye on events in Mongolia, it appeared.

This is really the most barren run in the whole of China, because beyond Paotowchen we had to cross the Ordos Desert. Our course first led over the Nankow Pass and the Great Wall, which in this part of the country is remarkably well preserved. Leaving Kalgan to the right, we reached Paotowchen in three hours.

#### FLYING IN 40-BELOW-ZERO COLD

In this region was encountered the most extreme cold I ever experienced in flying.

The Siberian climate extends down from northern Mongolia as far south as Peiping, and during my flights I ran into temperatures of 40° below zero. Even the compass was frozen; but during such cold weather there is always a clear sky, and a compass is not needed.

On flights over mountains near Paotowchen I had noticed a strangely beautiful Buddhist temple. One convenient day, with the help of our Chinese agent, who borrowed

two horses from the local military force, I set out to visit it, starting from the flying field with two soldiers as guards.

We were hardly outside the city walls when the guards, learning where we were headed, tried to dissuade me from venturing too far into "bandit country." I went on, but the soldiers kept slipping behind, and finally deserted altogether.

Nearing the great temple, I was surprised to see that the three-storied building in the compound was uninhabited save for one giant image of Buddha. About the base of the palace, however, were many dirty shacks which served as homes for the monks. Only the gods may be comfortably housed.

Returning to Paotowchen in the afternoon, I found my two soldiers peacefully waiting near the city walls, not in the least embarrassed at having left me to face any bandits alone.

#### WILD HORSES CAVORT ON THE PLAINS

Covered-wagon emigrants to America's Far West could not have seen more wild horses than I saw (Mongolian ponies) on some of these vast North China plains. I used to fly low to see them better, and they would gallop away, tails in air, when they heard the loud roar of motors. Often there were several hundred in a single herd.

On the Ordos Desert, out toward Ningsia, are many towns that seem composed wholly of temples (page 573). The lamas chose to build their holy palaces far out on desert wastes, seldom visited except by camel caravans which bring supplies. These isolated priests and monks eat enormous quantities of mutton, and all the religious strongholds reek with the odor of mutton and tallow.

Crossing the Ordos Desert, I once ran into a sandstorm and landed in a dry river bed near a temple city. After the storm blew over, we tried to go on that afternoon to Paotowchen, only half an hour away; but the motor had become so cold it couldn't be started.

#### MONKS FEAST ON CANNED FRUIT

Overstuffed monks from the village had waddled down to see the plane when we landed, and since I had always wanted to sleep in one of their temples we accepted their invitation for the night. Our emergency rations proved a banquet for the friendly monks; they had never before tasted coffee, or the American tinned fruits

which we gave them. Their astonishment was tremendous.

That night they let us sleep on their *kangs*—brick beds like kilns or stoves, with fire in the ovens. The next morning's attempt to warm the plane by lighting a fire under the motor was successful, and the flight was continued to Paotowchen.

From Ningsia huge mountain ranges, the Ala Shan, stretch for many miles into the Gobi to the north. At the foot of the mountains are royal graves dating from the days of Genghis Khan.

Eager to put something fresh before my lens, and since I was flying without passengers, I deviated from the regular course and flew over a completely uninhabited region. Here I was astonished to find white stone monuments—small dagobas in a triangular setting (page 590).

Later on, in Peiping, a scientist told me that these are the tombs of more than a hundred generals of the Sung Dynasty who asked to be buried there. A monk caretaker keeps the tombs in good condition and whitewashes them now and then.

The last lap of this northern route through Inner Mongolia brings us into Lanchow.

Here the Hwang Ho Valley, only a mile and a quarter wide and spotted with many big, clumsy wooden water wheels used in irrigation, is bordered with 900-foot loess mountains. Although our plane had radio direction finders, there was always great difficulty in getting down into Lanchow if we approached it flying in clouds.

#### DIRE PERIL IN STORIES OF EXPLOSIVES

Enormous masses of explosives had been stored in the cellar of some barracks in the middle of Lanchow. The day before my arrival, when these were being moved by inexperienced methods, they exploded and blew a good-sized section of the city into the sky.

Lanchow is situated on the Hwang Ho, or Yellow River, west of which begin the high mountains of Tibet; to the north is the Gobi. This whole district—the loess country—suffers from terrible droughts, during which people must retreat to the valleys to find water.

Also, frightful earthquakes have occurred around Lanchow, shaking down the small clay houses and rocking the hills.

From the time big trimotored planes were introduced, flying in China became more of a joy than in our pioneering single-



THE PANCHEN LAMA'S BAND PLAYS EUROPEAN MARCHES

When Captain Koester flew His Serenity from Lanchow to Sining, the musicians, proudly garbed in approved Western uniforms, greeted the plane. Instruments of the latest type did not improve the quality of their music! The private tent of the "Living Buddha" stands behind, decorated with strips of cloth sewed on the canvas in geometrical patterns.

motor planes, when the pilot knew death menaced if his one motor "konked out"!

The new planes, well equipped with the most modern radio devices, could transport 14 passengers in addition to a heavy load of mail and express. With their introduction, a biweekly service was established from Shanghai via Nanking, Chengchow, Sian, and Chengtu to Yunnanfu.

Beyond Nanking there was a three-hour flight to Chengchow over absolutely level country, the North China lowlands—safest of all our air routes, but also the most uninteresting.

Beyond Chengchow toward Sian planes approached the first high mountain ranges and passed over Honanfu, where the Chinese Air Force had a training field. They then followed the Yellow River.

#### WHERE PEOPLE LIVE IN MERE HOLES IN THE EARTH

This stream flows through some of the strange, dusty loess country. Here Chinese peasants live underground. From the sky are seen what appear to be large square holes; on closer examination these prove to

be depressed courtyards, from which extend cave homes. The rooms and courtyards are approached by means of steeply descending stairways that pierce the earth at some distance from the main opening (page 593).

Most of the cave dwellings are in the banks of wind-blown earth, or loess, which flank the Yellow River. Beyond these banks, and at a still higher level, rise rock mountains. Centuries ago one of the highest peaks was chosen among five holy mountains of China. Its summit is covered with innumerable small temples and monasteries, to which Buddhist pilgrims toil upward by thousands of steps carved in the precipitous slope of the mountain.

At the beginning of our regular flights to Sian we lived at our airdrome, since it afforded the cleanest living quarters in the town. In recent years, however, Sian has grown rapidly, and we later made our headquarters in the modern hotel built by the Chinese travel organization.

This hotel stands close to the big wall of Sian, which is wide enough for several cars to drive abreast upon it. Long night walks





TIBET'S LIVING BUDDHA SOARED TO CELESTIAL HEIGHTS—BY PLANE

On a special yellow-cushioned throne, His Serenity, the Panchen Lama, flew from Lanchow to Sining with Captain Koester (page 598). This spiritual leader of millions of Lamaists died in the fall of 1937. His priests now await an eclipse, earthquake, cloudburst, or avalanche to reveal their new leader. Under such auspices the lama's soul may enter an unborn infant, identified at birth by his full set of teeth and his ability to say the name of Buddha.

on this wall are a delight; one can look over the city and the wide, open valley of the Wei River to the far-distant peaks of the Tsinling Shan, covered with snow most of the year.

#### DESTRUCTION OF TREES IS MAKING CHINA A DESERT

To flyers it is evident that North China is becoming more and more a desert from lack of trees and from improvident cultivation of the soil; the Gobi is slowly creeping down into central China. Large forests which once grew here have gradually disappeared as food growers have cleared the land to gain more soil to till.

One odd reason given me for the disappearance of the forests was that bandits used to hide in the woods and the Chinese cut down the trees to destroy their refuge!

Years ago, a German friend of mine was retained by the Chinese Government to study the possibility of reforestation in this vast and largely treeless region. He worked there for many years, giving his life to the replanting of trees, but was never able to

overcome the Chinese delight in destroying solid woods.

Often, he told me, he had planted a long stretch of young trees, only to find them uprooted soon afterward. Finally he broke under the hopelessness of his task.

In southern China, however, particularly in the Canton area, effective reforestation has been carried on for some years by the Chinese Government.

Aerial routes of the Eurasia branched off from Sian. One led high over the Tsinling Shan peaks to Chengtu and then on to Yunnanfu; the other, the northwest route, ran to Lanchow, taking a course directly over the heart of the loess country. Large areas of once inhabited territory with compact and often fortified villages now lie deserted because of droughts.

While the loess is extremely fertile soil, lack of regular rains here frequently ruins crops. Enormous quantities of North China's "good earth" consist of loess, the product of centuries of dust blown down from the plains of Mongolia (pages 586-589 and 592-3).

It was in this loess region that one of the Eurasia's pilots lost his life. He took off in a snowstorm and in his blind flying over Liupan Pass the plane iced up so rapidly that he was forced down. He was killed with all his passengers.

It took a searching expedition many weeks to reach the wreck and bring the bodies down to Sian. One Chinese passenger who was in the plane had disappeared. Later it was told locally that he had stepped out of the crash entirely unharmed; then had taken his bag and walked home to avoid being questioned.

THE LIVING BUDDHA ARRIVES BY CAR, GOES BY AIRPLANE

Much excitement ensued one day when the late "Living Buddha," or Panchen Lama, arrived by car at the Lanchow airdrome. I was eager to photograph him, a procedure to which he courteously submitted. He seemed to enjoy the attention, walking back and forth with his head thrown up, and looking around with a proud, pleasant smile of complete self-satisfaction.

His high priests prepared for him in the airplane a special throne covered with the sect's official yellow cushions. On this he sat with legs crossed Buddha-wise (p. 597).

It fell to my lot to fly him back to his mountain monastery, Kumbum. Taking off for Sining, we flew along the Yellow River for a short distance through the rugged gorges surrounding Lanchow and then followed the Sining River. To our right we had the Richthofen Range and to the left the Koko Nor Mountains, both snow-tipped summer and winter.

The airdrome in Sining was crowded with Tibetans, most of whom came from the Kumbum Monastery to welcome the returning Lama, band and all (page 596).

His priests, riding ponies, wore golden helmets of peculiar shape. Many women of the better class were there, glittering with beautifully carved jewelry in the form of flat hand-carved silver plaques inlaid with semiprecious stones, coral, and so forth (page 575). The Western, mannish-appearing felt hats worn over their finely braided hair contrasted sharply with their colorful costumes.

As soon as he descended from the plane, the Lama entered his handsomely decorated tent, followed by a long row of peasants who crawled to kiss the hem of his robe.

That evening the governor of Sining invited us to a feast, and later to an open-air Chinese theater.

The next day we flew out to visit the Panchen Lama's monastery and took numerous photographs of golden-roofed Kumbum, lying in a deep valley over which flying was rather difficult because of strong down-currents (page 570).

BY AN AIRWAY THREE MILES HIGH TO MOUNTAIN-WALLED SZECHWAN

Leaving the picturesque Panchen Lama amid his priests, I returned to Shanghai and immediately started my flights to Yunnanfu.

South of the Wei River and Sian begin the high mountain ranges which create a natural barrier protecting southwest China and its rich province, Szechwan, against any enemy from the north. All flights toward Yunnanfu had to be made at a minimum height of 15,000 feet. Often the country below was invisible, and we followed our course entirely by radio direction finder.

Until fairly recently Chengtu, the capital of Szechwan, could be reached only by mules or carrying chairs. By such means it took months to cross the narrow passes through high mountain ranges. There is no railroad, and only in late years has a motor road been built from Chungking to Chengtu. Because of this isolation, Chengtu has kept its Chinese character to an unusual extent.

In recent years Chiang Kai-shek has given the city considerable attention, foreseeing the possibility of having to control China eventually from this well-nigh impenetrable fortress.

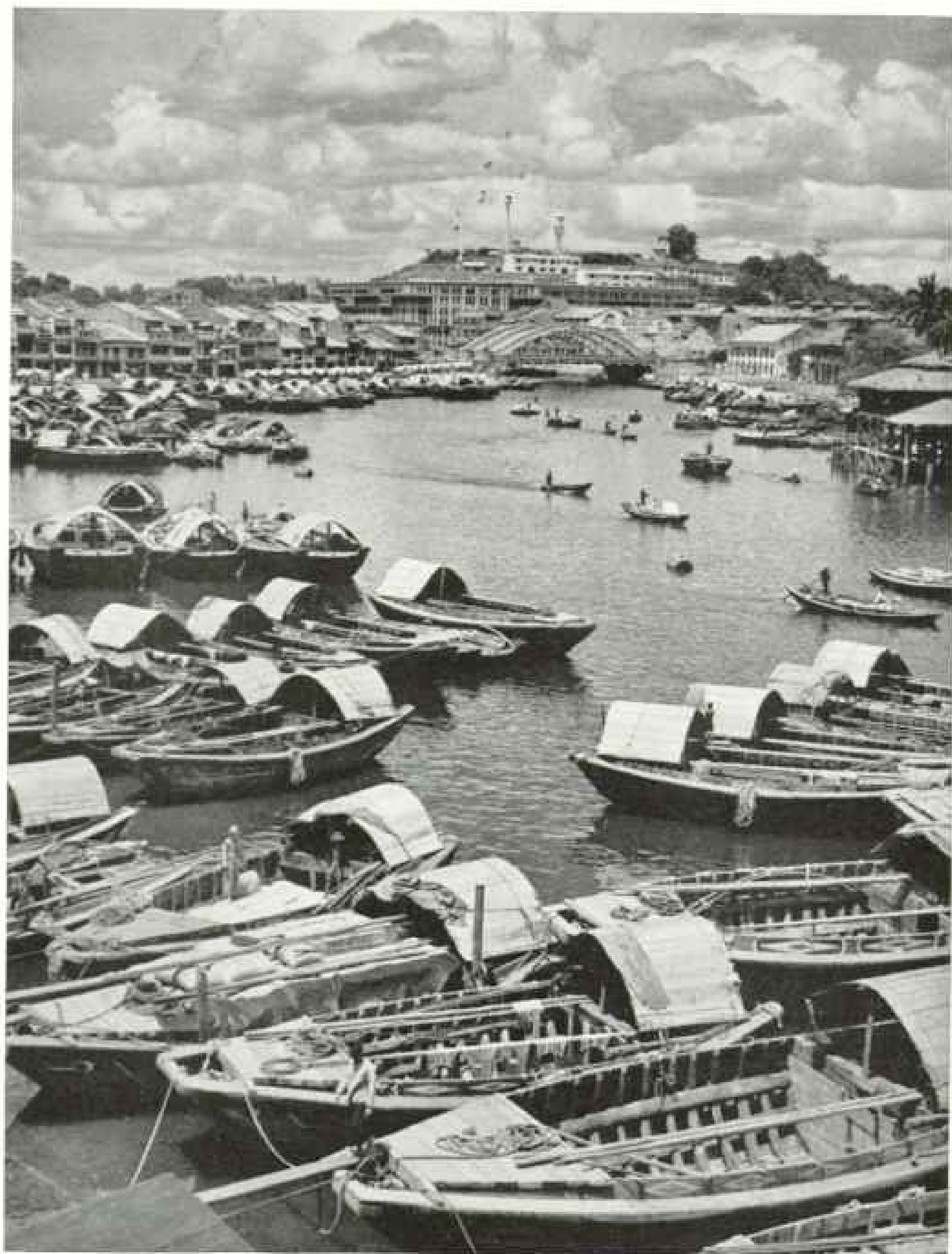
Yunnanfu, of course, with its railroad from Hanoi, is more progressive. It lies at an altitude of 6,500 feet at the north end of a beautiful mountain lake, which now serves as a summer resort frequented by French society fleeing the tropical heat of Hanoi.

Looking back on the development of flying in China, one can see enormous progress. Instead of the small single-motor airplanes, airmen now use large, modern transports. A radio network has been established all over the country.

Chinese take readily to air travel. If they feel any fear, they never show it.

It is easy to foresee a remarkable future in the air for this land of vast distances and mighty geographic barriers.

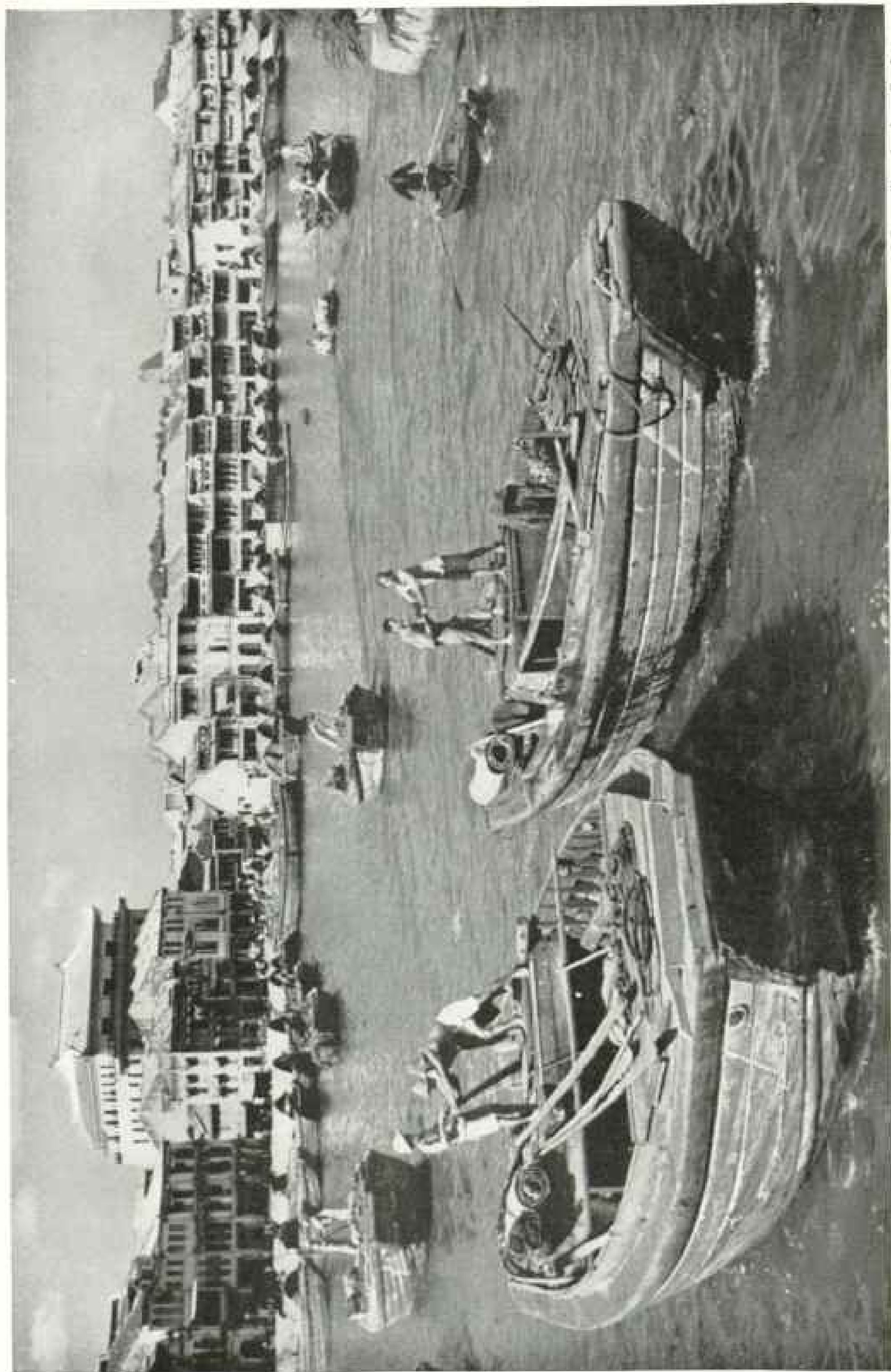
## Singapore: Far East Gibraltar in the Malay Jungle



© Screen Traveler, from Gendreau

PORT CANNING IS OUTMODED, BUT THE RIVER IT DEFENDED IS MORE ALIVE THAN EVER

Singapore, British naval base and strategic point on the age-old silk and spice route through the Straits of Malacca, has outgrown its leisurely life centered about this river. Ultramodern defenses, just completed, make the flat tropical jungle island impregnable. Dedicated February 14, 1938, the 1,000-foot King George VI dry dock and air base here give British battleships a haven 9,500 miles from home. Naval headquarters cling to the flag-decked hill on which Malay rulers lived centuries ago.



© Screen Traveler, from Goodhue

WITH THREE SWEATING COOLIES WAGGING ITS TAIL, A ROUND-EYED BARGE CAN CARRY MANY TONS OF CARGO

Across the dark waters of the mother river, convoys of boats work their way into the very heart of the modern metropolis, just as they did before the age of steam. There is little to distinguish this most typical of Singapore scenes from similar ones in China.





ARISTOCRAT OF WALKING STICKS IS THE MALACCA CANE

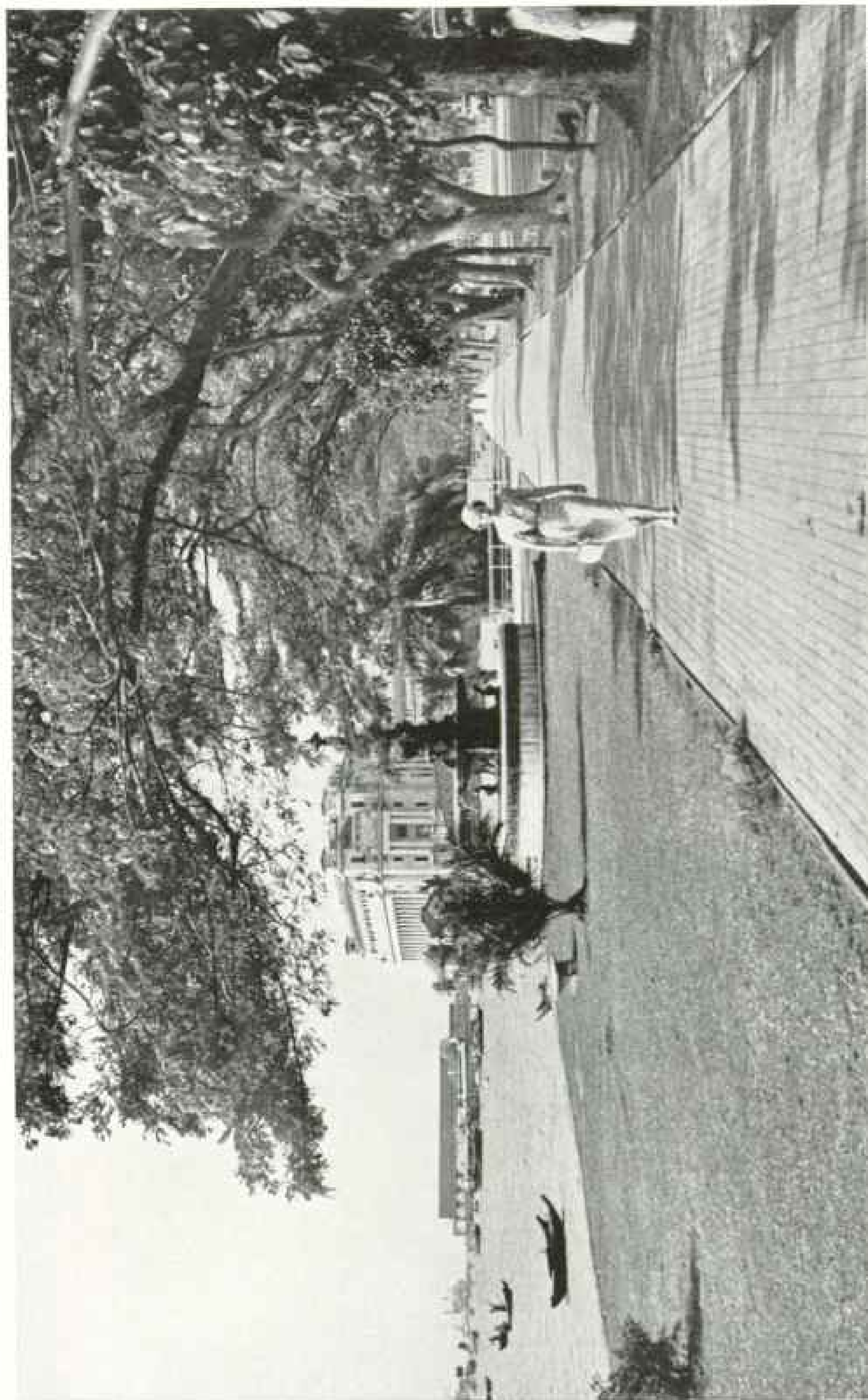
Rattan must measure an inch in diameter and a yard or more between joints to merit oiling, smoking, daily polishing, a gold ferrule, a Bond Street label, and association with top hats and tiaras.



Photographs © Screen Travels, from Gentilini

NOT SOUP, BUT SOUVENIR IS THIS TROPICAL TURTLE

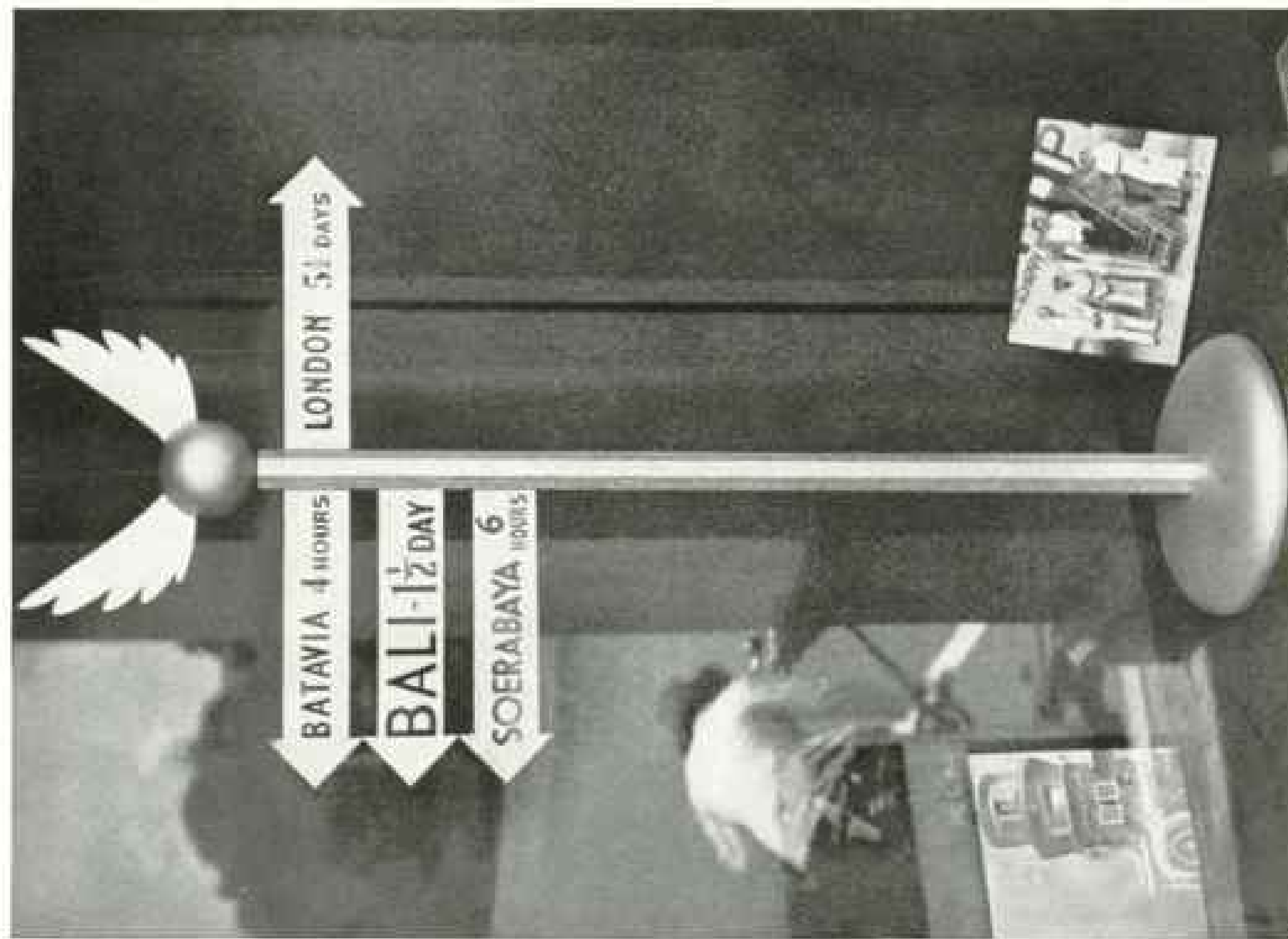
Tortoise shell ranked with spices as a spur to East Indian exploration. Despite the competition of interior shell, buffalo horn, and modern plastics, the 13 thin plates on the back of the hawksbill still provide objects of translucent beauty,



© Screen Traveler, from Gradinaru

THE POST OFFICE HAS CAPTURED BATTERY POINT, BUT SINGAPORE'S ESPLANADE IS STILL GREEN AFTER 100 YEARS

Beyond Singapore River a crowded city pushes its modern buildings seaward onto former tidal flats. But here on the north bank, lawns and shade trees carry on the original tradition of a breathing place for the tropic town, where, on the average, it rains half an inch every other day.



Photograph by Maxmud Owen Williams

#### SIGNS OF THE TIMES AT THE "CROSSROADS OF THE EAST"

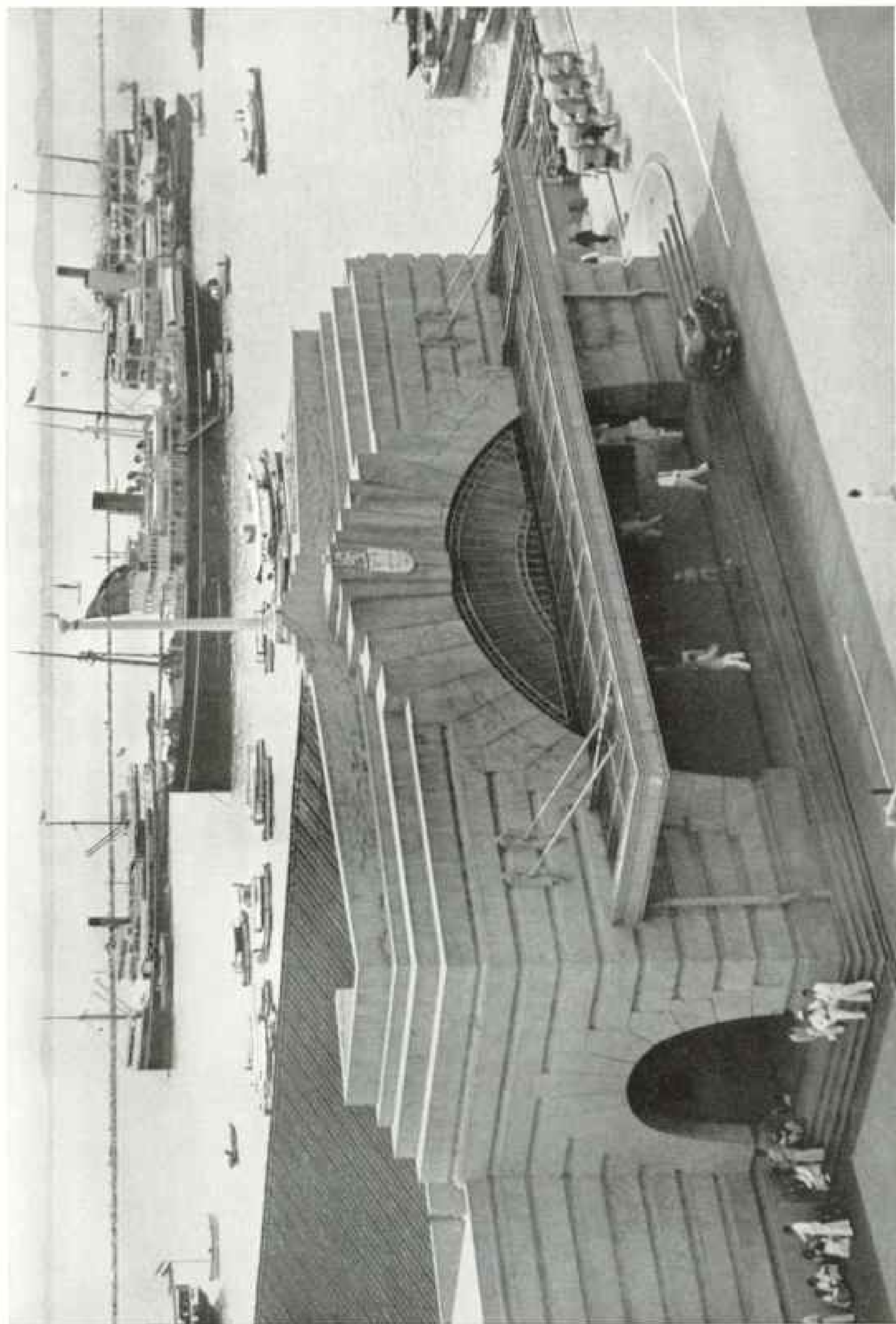
Four square miles of swamp and jungle have been transformed into new flying fields, where airplanes now succeed mosquitoes.



© Green Traveler, from Gendreau

#### WHAT DRIVER COULD PASS A SIKH TRAFFIC CONSTABLE?

Bearded Sikhs from North India are dignified members of Singapore's police force. They control a flood of rickshas, bicycles, bullock carts, and automobiles.



© Scenic Traveler, from Gindlerau

CLIFFORD'S PIER GIVES A FREE-PORT WELCOME TO SMALL-SHIP PASSENGERS FROM SIAM, SARAWAK, SAIGON, OR SUMATRA





THIS ARAB SERVES THE WORLD-WIDE BROTHERHOOD OF PHILATELY

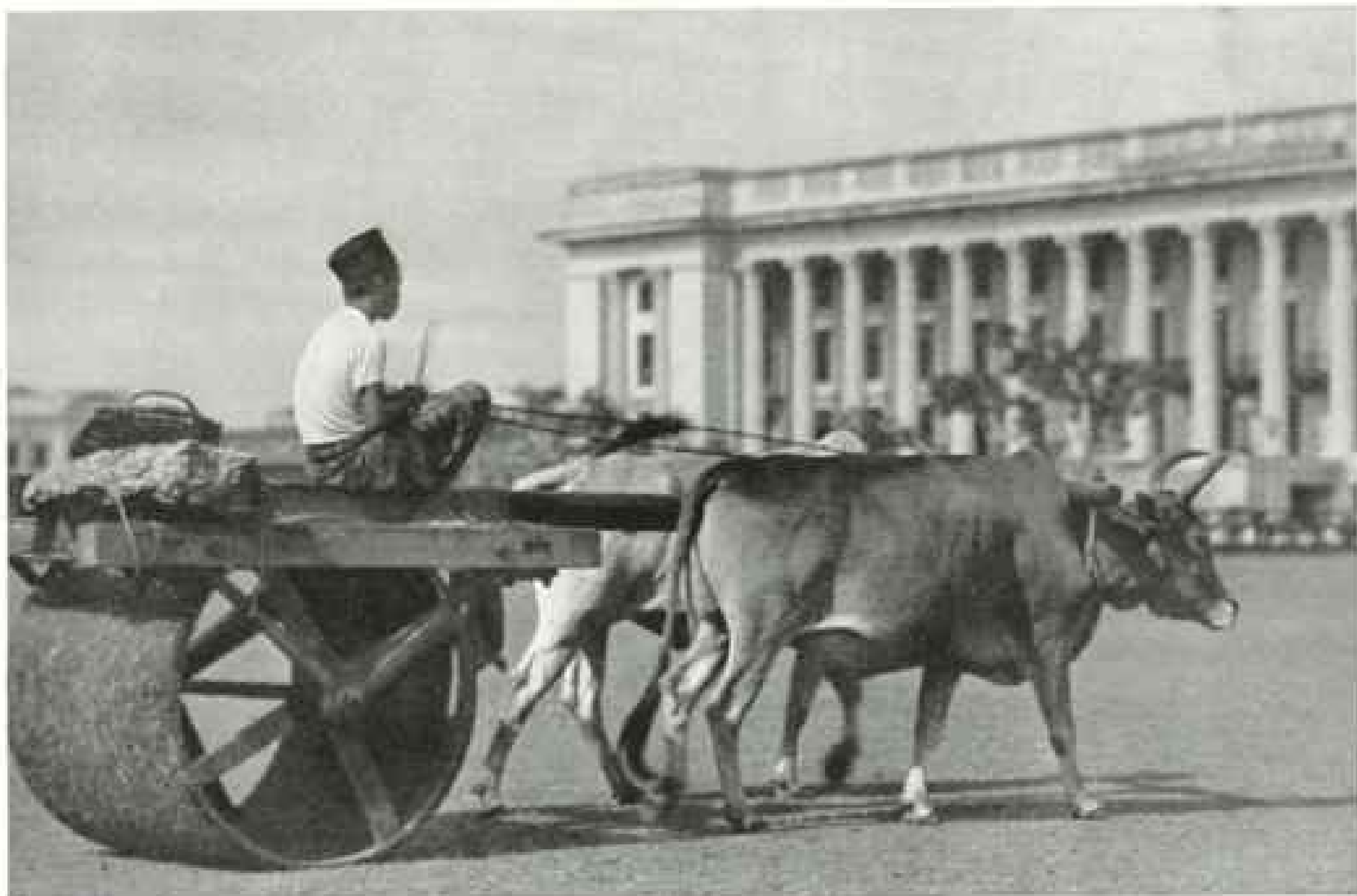
In a city whose retail trade is divided between East Indians and Chinese, a street peddler must have real talent. Many a world traveler remembers the high-pressure salesmanship of this old man who hails from Hadhramaut.



Photographs by Maynard Owen Williams

RIVALING LAMP AND FLASHLIGHT IS A CHINESE BABY'S SMILE

In Singapore, where one man in fifty is a European, one in eleven an East Indian, and one in eight a Malay, three out of four are Chinese. Men greatly outnumber women among all groups except the Malays.



NEW MUNICIPAL OFFICES LOOK OUT ON CRICKET PITCH AND FOOTBALL FIELD  
Drawn by cattle which some Singapore residents consider sacred, a roller prepares the lawn-like Padang.



Photographs © Screen-Traveler, from Gentlemen

RAW MATERIAL FOR RICKSHA, BICYCLE, AND AUTOMOBILE TIRES, RUBBER BOOTS, TENNIS SHOES, AND BALLS

Malaya does not export all its half-million-ton crop of rubber. Singapore manufactures 20,000 pairs of tennis shoes a day, and 6,500 tires. Local fire engines owe their quick getaway to a nonskid floor of rubber tile.



Photograph by Maynard Owen Williams

SELF-IRONING LAUNDRY HUNG ON POLES DRAWS VISITORS TO THIS OBSCURE LANE NEAR THE FOREIGN SHOPPING DISTRICT

Just off North Bridge Road, where Chinese vie with East Indians in selling silks and bathing suits, cotton goods and fountain pens, French perfumes and German cameras, is this teeming alley with the red-and-white fire-station tower in the background. Not leisure but endless activity impresses one who delves into the byways to watch paper lanterns acquire pictures, chunks of wood become clogs, rattan shaped into a deck chair, or bits of leather made into tiny shoes for Chinese feet. The tricycle is used as a delivery wagon.



Photograph by Irving Gallows

SIR THOMAS STAMFORD RAFFLES, WHO FOUNDED MODERN SINGAPORE ON A JUNGLE ISLAND, NOW SURVEYS A METROPOLITAN SCENE

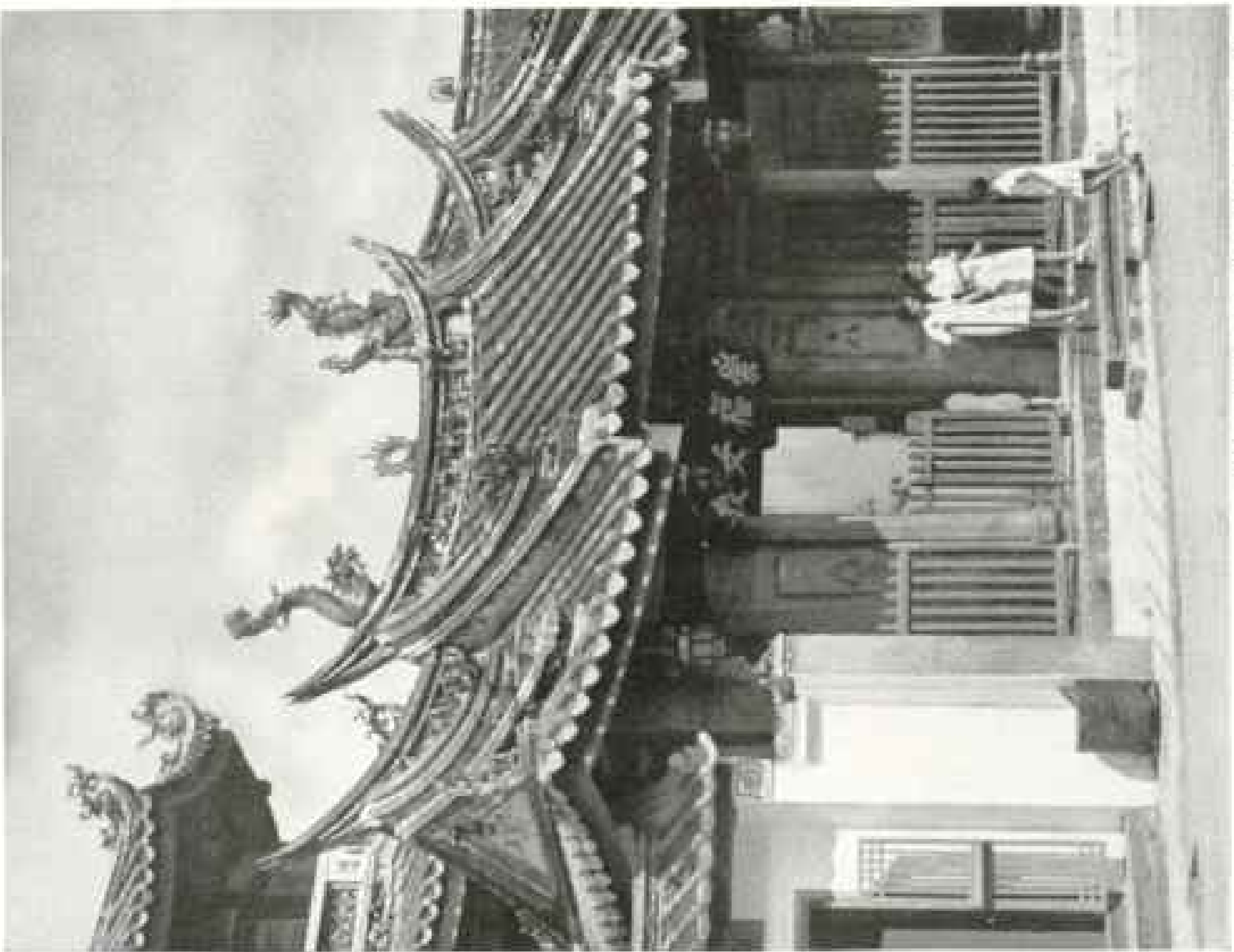
His tiny statue in front of Victoria Memorial Hall faces a row of motorcars waiting for the green light. The martyr-statesman was censured for emancipating the slaves, and his widow was charged for the expenses incurred in founding Singapore. The obelisk gives English, Malay, Chinese, and Tamil versions of Raffles's advocacy of local free trade. Fort Canning, now a signal station, crowns Government Hill (upper left). Beyond the trackless trolley is the exclusive Cricket Club. Beside the many-columned Municipal Building (right) a new Supreme Court building is rising. The spire marks St. Andrew's Cathedral, built by convict labor in 1862.





ISLAM'S STAR-AND-CRESCENT RISES ABOVE A CITY OF MANY FAITHS

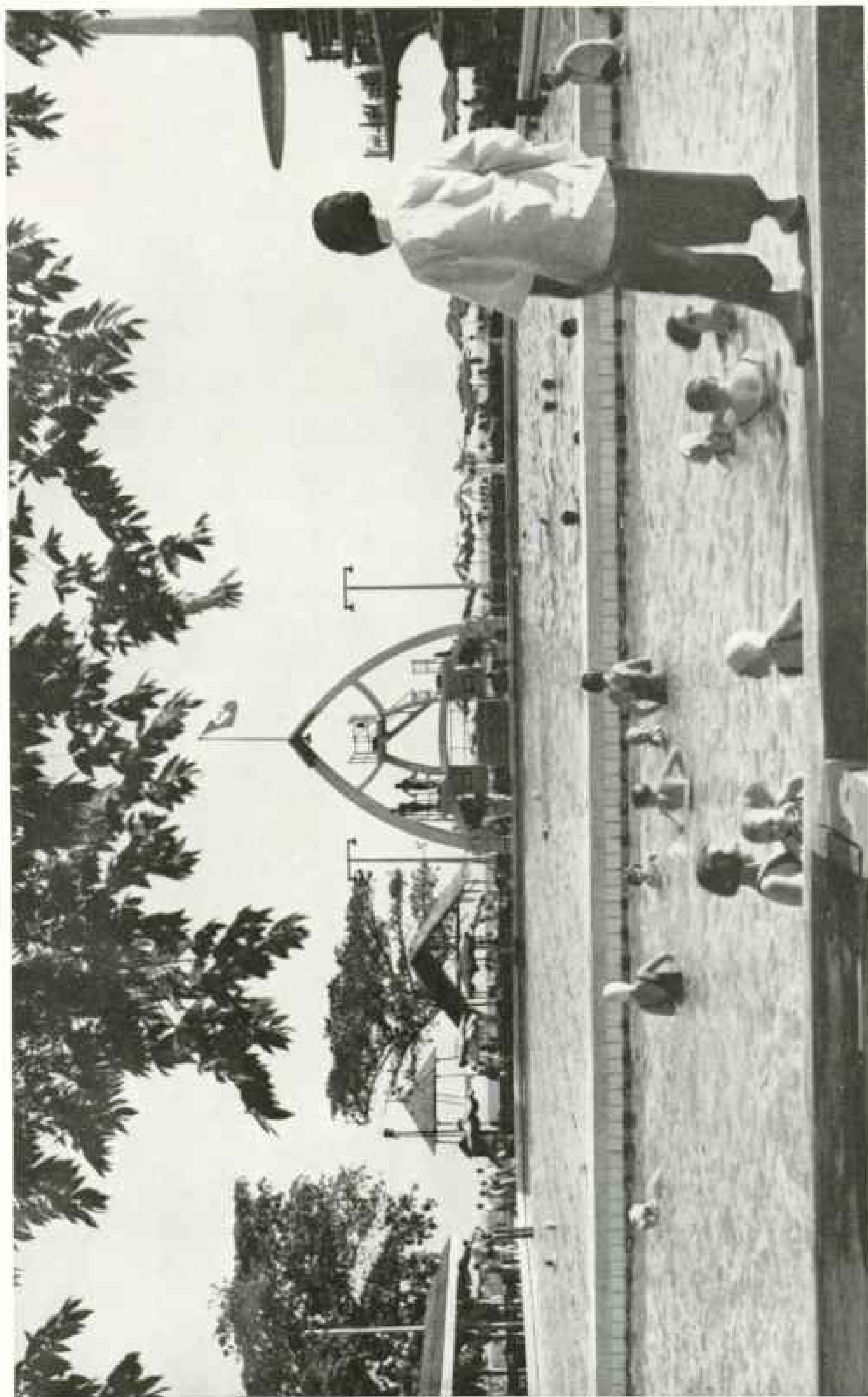
Mosques, Hindu temples, synagogues, churches, and Chinese temples serve the worshippers in the capital of the Straits Settlements. Religious edifices add variety to the local architecture.



Photographs © Screen Traveler, from Gentlemen

SCHOOLGIRLS IN MODERN DRESS LEAVE A CHINESE TEMPLE

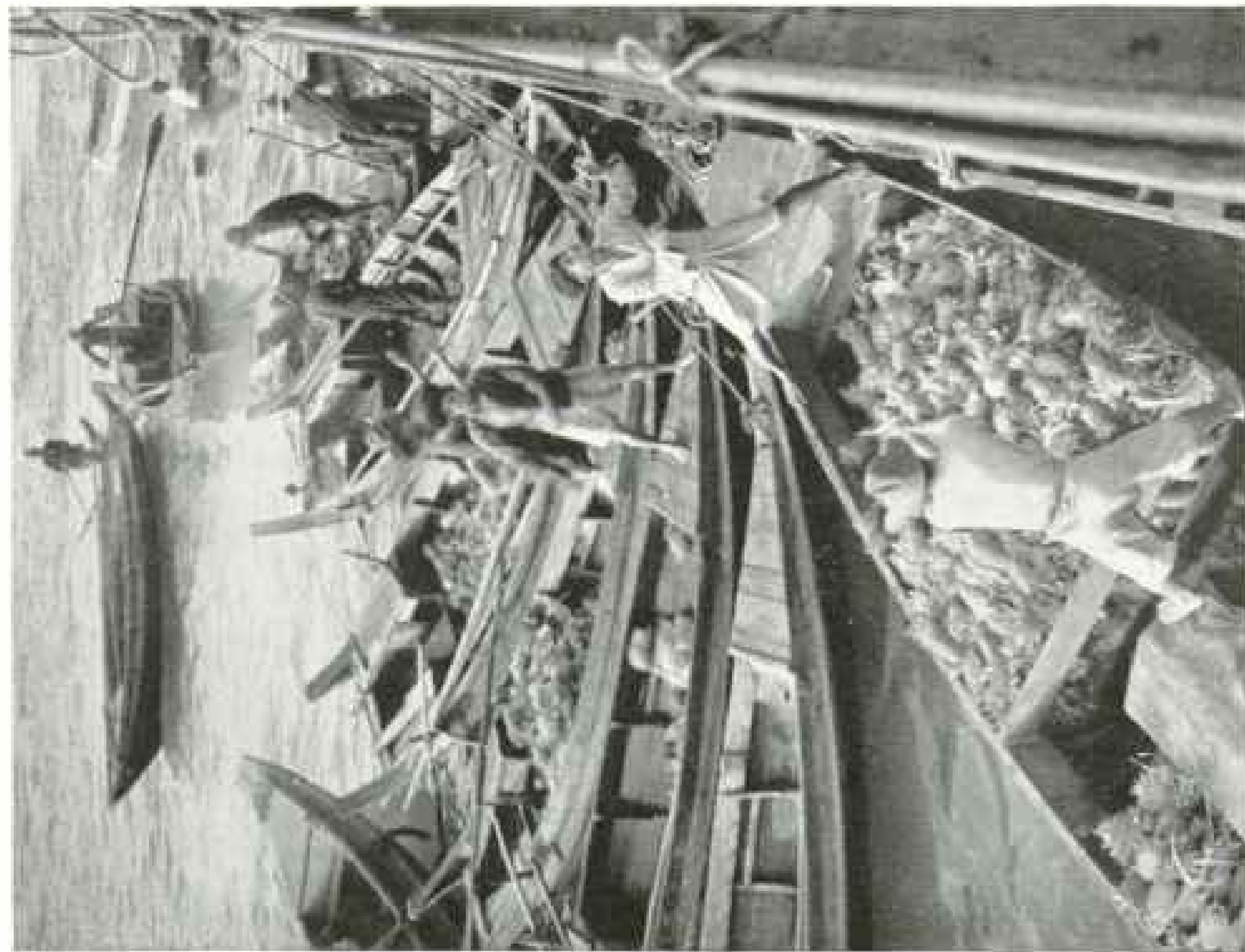
Free from heavy taxes and from the troubles of China, the prosperous Singapore Chinese, forming three-fourths of the cosmopolitan population, are deeply appreciative of British rule.



© Screen Traveller, from Geopress

#### CHIEF ATTRACTION OF A LONG LIDO IS THE SINGAPORE SWIMMING CLUB

Mid-town cricket, tennis, badminton, and football, and suburban golf and horse racing, help keep the European population fit. But along the eastern shore are many beaches and shark-free enclosed pools, and this non-tidal basin where children splash under the watchful eyes of their Chinese *amoyes*, or nurses. Few cities offer better facilities for sports than this sea-level metropolis, less than a hundred miles from the Equator, where European women are vastly outnumbered by the men.



© Scam Thiofer, from Gendreau

#### PINEAPPLE CANNING IS A MAJOR INDUSTRY

In such small boats many "piers" are transhipped from local steamer to cannery. Modern methods are used, labor is skillful, and the annual canned pineapple crop is valued at \$5,000,000. Hundreds of such small rowboats help solve the problem of water traffic between ship and shore.



Photograph by Maynard Owen Williams

#### SINGAPORE'S CHINATOWN COVERS THE CITY

American shirts and soaps, fountain pens and typewriters are sold on North Bridge Road, where East Indian and Chinese merchants compete for trade. But much of the city is as Chinese as Shanghai and those who pass by give no hint that this is Chinatown, not China.

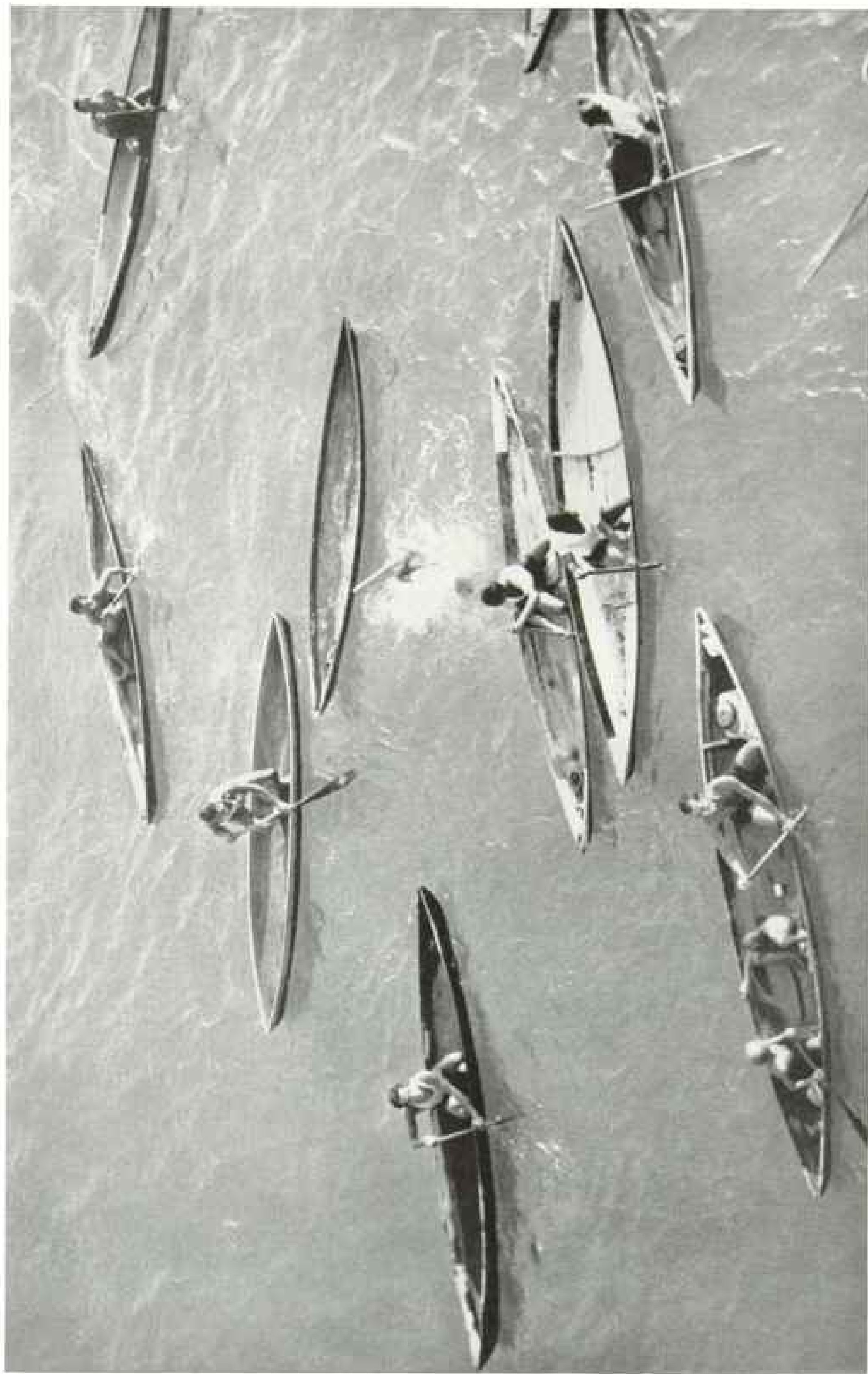


© Screen Paper, from Gendreau

A HEAVILY FORTIFIED OUTPOST OF EMPIRE AND FREE PORT FOR GREAT SHIPS STILL SHOWS A SILHOUETTE OF SAILS

Free trade has made Singapore one of the twenty greatest ports in the world. Situated on the sea route between the population centers of Europe and Asia, it not only exports much raw materials as rubber, tin, and copra, but also acts as distributing center for manufactured goods which are transforming the life of Siam, Indo-China, the Netherlands Indies, and all Malaysia. Few residents see Singapore's modern fortifications and naval base, hid in the jungle 14 miles from town.





© Screen Traveler, from Goodhue

COIN DIVERS IN THE "CITY OF LIONS" PUT ON A FIRST-CLASS SHOW FOR TROPICAL TRAVELLERS

Without letting the ball touch the water, these boys pass it from one tiny canoe to another or tirelessly but it against the ship's side. One old man uses a "trick" clear. Just before he dives, he puts the lighted end in his mouth; coming up, he turns the cigar around and smokes it furiously. Excess water in the canoes is tossed out with a flick of the foot.



WEARING THEIR SHIRTTAILS OUTSIDE TROUSERS OR SARONG, EAST INDIANS TRAMP  
BATTERY ROAD IN SINGAPORE



Photographs © Screen Traveler, from Gendreau

A MOST PUBLIC STENOGRAPHER SERVES HIS CHINESE CLIENT

Despite the fair degree of literacy in the polyglot capital of the Straits Settlements and the lack of privacy in correspondence thus openly arrived at, the public letter writer still does business at his old stand.

# MONKEY FOLK

BY WILLIAM M. MANN

DIRECTOR, NATIONAL ZOOLOGICAL PARK, WASHINGTON, D. C.

*With Paintings from Life by Elie Cheverlange*

THE GEOGRAPHIC presents in this issue the first series of full-color illustrations of monkeys yet to appear in any periodical. The monkey folk have been popular since earliest times, and now portraits have been painted in colors of the principal types. A second series of paintings, depicting gorillas, chimpanzees, orangutans, and gibbons, by the same talented artist, Mr. Elie Cheverlange, will be published in an early number of THE NATIONAL GEOGRAPHIC MAGAZINE.

AFTER many years of intimate acquaintance with monkeys, in the cage, in my home, and in the wild, I am beginning to understand the full meaning of the expression "monkey business."

I have been bitten by monkeys numerous times and in various parts of the world. I have been embarrassed by monkeys time and again. They have thrown water in the faces of visiting dowagers and broken canes and umbrellas of distinguished guests. They have playfully fled from me through the length and breadth of a ship, leaving greasy tracks on impeccable table linen in a de-luxe dining room. They have practiced chemistry in my bathroom, making a strange mélange of the contents of my medicine cabinet, then sampled the potent miscellany of medicine, shaving cream, and soap.

Yet I like monkeys. Of all the animals in the Zoo or out of it, none has a firmer hold on my affections. I have seen Indians in South America hunting monkeys for food, but I would no more think of shooting a monkey than I would of shooting a human acquaintance. In fact I have known humans I was tempted to shoot, but never a monkey.

## UNCONSCIOUSLY MONKEYS CARICATURE MANKIND

In captivity monkeys are always among the most popular of animals. This may be because the four-handed folk have something approximating a sense of humor, prankish and perverted though it often is. Their capacity for mischief amounts to genius, and they hold up a mirror of caricature before our human foibles.

Another reason for the popularity of monkeys, I think, is the fact that—like bears and elephants—they are interested in the public. Those superb snobs, the lion, tiger, and leopard, on the other hand, stare disdainfully past the visitor who snaps his

fingers at them, says "Woof, woof," or uses baby talk. People like to be noticed and recognized, even by a monkey, and even when they know that this interest is largely prompted by the hope of a peanut.

Monkey nature calls for careful study, and is almost as baffling as human nature. Pick up a monkey, even a tame one, and he will probably bite you. But hold out your hand invitingly and very likely he will climb aboard. He likes to be the one to take the initiative. Once well acquainted, he will probably cling to you much of the time, putting up a most outlandish fuss when deprived of that privilege.

## WHEN FANGS MEAN FRIENDSHIP

Sometimes visitors to monkey houses are greeted by a display of terrible teeth, particularly by the baboons. This is often an indication of special friendship, the equivalent of a smile. When I approach the cage of Napoleon, our Mandrill (Color Plate IX), he bares his teeth in seemingly dreadful fashion, but it only means he is glad to see me. Napoleon and I are great friends.

Monkeys have been kept in captivity since earliest times, for they have always attracted the attention and interest of people.

The Egyptians worshiped some kinds, and mummified the huge gray-mantled Hamadryas Baboon of the Sudan (page 618 and Plate XIII). The Hamadryas is a forbidding creature and exciting to look upon. One sees it in zoos and often in circus side shows where it sits sullenly in a cage labeled "lion-slaying gorilla." This, of course, is just showmanship, though this long-fanged baboon could put up a fierce and efficient fight against almost anything.

King Solomon kept monkeys, probably the Rhesus, or Bengal variety, which today is brought into America by the thousands for exhibition purposes or more frequently



Photograph by Harrison Howell Walker

#### CAPUCHINS TAKE A PURELY ACADEMIC INTEREST IN CIGARETTES

Offered a smoke by an attendant at the Washington, D. C., Zoo, these white-faced little fellows from South and Central America observe the pack politely—but they never use tobacco, thank you!

for experimental work in biology and medicine (pages 622, 636-7, 639, 654-5, and Plate XVI).

Shylock's daughter, in Shakespeare's *Merchant of Venice*, traded her father's turquoise ring for a monkey, and Shylock, furious, declared he would not have given the ring "for a wilderness of monkeys." Most any zoo would, though.

Every child seems to want a monkey. Recently we had as guest in the National Zoological Park at Washington a little mountain girl from Virginia who in all her life had seen no animals at all except the domestic ones on her father's hillside farm. She spent a day looking over the collection, and that evening she informed us that if she could have anything in the world she wanted, it would be a little monkey.

One of my early boyhood's exciting events was the acquisition of two dollars in real cash. With this I proposed to buy a monkey when the circus came to town. For weeks I worked ineptly, with a dry-goods box and some wooden laths, to make a

monkey cage. It was a beautiful cage to look at, with a trapeze, a sleeping platform, and a supply of food from the family table. But I know now that had a monkey been placed in it he would have walked right out again.

As it turned out, my cage was never put to the test, for when the circus arrived my hopes were dashed. The management was not interested in my two dollars.

So it was many years before I actually possessed a monkey of my own. Since then I have had many, some as pets but more as inmates of the Zoo, which, after all, is the very best place for captive monkeys.

#### A BITELESS MONKEY? NO SUCH ANIMAL!

One of the duties of a zoo director is to answer questions about pets. Except just after the circus leaves town, when people want to know how to care for the chameleons they have bought from the circus folk, monkeys are the subject of more inquiry than any other animal.

What kind of monkey does not bite?



Answer: It has not yet been discovered.

What kind of monkey makes the best pet?

Answer: Almost any young monkey; almost no grown monkey.

How do you care for and feed monkeys?

Answer: They should be kept warm and dry, free from drafts, and with room for exercise, and fed on a varied diet of fruits, vegetables, and cereals. Some of them like an occasional bit of meat, and a few are passionately fond of insects.

How do you rid a monkey of vermin?

Answer: Most monkeys do not have vermin, though a few do from time to time. The continual picking at their own and each other's fur is for the purpose of obtaining salty particles of dried, sloughed-off skin. A flea on a monkey must have a hard time!

Contrary to popular opinion, monkeys do not often have tuberculosis. Those that die are usually victims of pneumonia or intestinal troubles; also, perhaps, of homesickness and the lack of certain foods obtainable only in their native haunts. Spider Monkeys of South America have been found to have malaria in the wilds.

#### FIVE HUNDRED KINDS OF MONKEYS

There are so many different kinds of monkeys that if you saw a new one every day for a year there would still be more than a hundred you had not seen. Of course no zoo has anything like a complete collection, as there are so many varieties and some of them cannot live in captivity.

Numbering half a thousand kinds, monkeys occur on all the continents except Australia, though in Europe they are found only in Gibraltar and in North America only in Mexico and southward. Generally monkeys are characteristic of warm countries, but sometimes, as in northern Japan and Central Asia, certain kinds may be seen disporting themselves amid ice and snow.

Usually monkeys live in family groups, sometimes few in number, but often they flock in tremendous tribes containing hundreds of individuals. Some kinds sleep in hollow trees, others in the open, perhaps curled up in a convenient tree crotch.

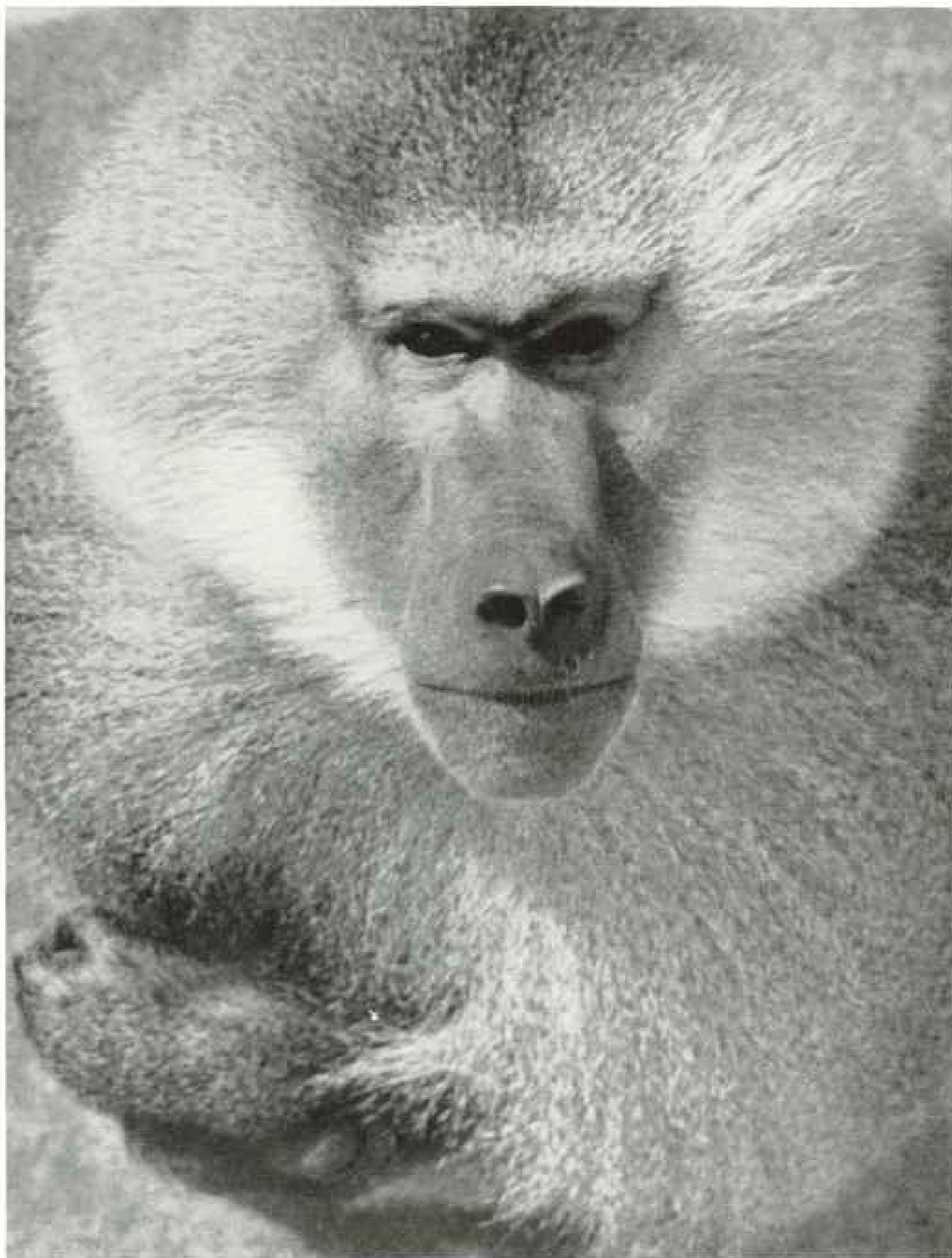
They are generally polygamous, sometimes monogamous. There have been cases of a monkey, bereft of its mate, pining away of grief. Usually they have only one young at a time, the baby clinging tightly to its mother's fur as she runs or swings through the treetops. Sometimes they bear twins, and marmosets, low in the monkey scale, on rare occasions have triplets.



Photograph from Wide World

#### EIGHT OUNCES OF MARMOSET AND A FOOT OF TAIL

Little monkeys are sold as pets in the markets of many Central and South American cities, along with pigeons and canaries. They often suffer from stiffness of the legs when in captivity (page 619).



Photograph by Scherl from Black Star

#### PORTRAIT OF A GRIZZLED WARRIOR

Long slate-colored whiskers and well-developed, ash-gray shoulder cape stamp this Hamadryas as a staid veteran. When a tribe of the sacred Egyptian baboons (Plate XIII) comes down from the Ethiopian hills on a foraging expedition, such old fellows act as leaders and lookouts. They call out occasionally to preserve order in the band, usually a noisy and disorderly crowd trusting entirely to the vigilance of the scouts for safety. These "generals" take their duties so seriously that they forego eating while the pillaging is in progress.

In size the members of the monkey tribe vary from the little Pygmy Marmoset of Brazil, which can be cupped in a man's hand, to the giant doglike baboon of Africa.

The many families of monkeys, leaving out the great apes (gorilla, chimpanzee, orangutan, and gibbon) on one end of the line, and the lemurs, or half monkeys, on the other, can be divided into two main groups: those of the New World and those of the Old.

#### MANY AMERICAN MONKEYS HAVE AN "EXTRA HAND"

The New World monkeys have a monopoly on prehensile tails, which they use as a fifth hand for assistance in climbing and swinging through trees and also for picking up objects (Color Plates I, III, and IV). Their Old World relatives, in contrast, use their tails only for balance (Plate VII).

The monkeys of the New World also differ in having nasal passages which are widely separated and pointed outward, and, with the exception of marmosets, they have four more teeth, two in each jaw.

Monkeys of the Eastern Hemisphere have the nose openings closer together, often have large callosities on the posterior, and a great many of them are provided with cheek pouches, an Old World monkey monopoly.

They have exactly the same number of teeth as has man, and these are sometimes highly developed into vicious weapons of offense and defense.

#### SQUIRREL-LIKE MIDGETS OF MONKEYDOM

Smallest and most primitive of the monkeys are the marmosets, about the size of squirrels, which inhabit the forests of nearly all of tropical America. Their fingers are almost like claws, and they are the least monkeylike of all (pages 617, 621, and Plate V).

Hundreds are sold each year and many are kept as pets, but unfortunately they are subject to a pathetic stiffness of the legs. The little animal is unable to move about as it loves to do, and spends most of its time shrieking at its master or mistress.

Marmosets, like other monkeys, eat fruit, vegetables, and green things, but they are ravenously fond of insects and spiders. In camp on the Río Beni in Bolivia I had a number of marmosets in a large cage alongside my cot. At the sight of a spider or cockroach held in a pair of forceps, they

would all leap against the mesh of the cage and each scream a shrill request to be served first.

Once, when traveling afoot, I was given a marmoset by a native girl. It rode my shoulder during the afternoon march, keeping quiet and peaceful, but in the evenings when I tied it to the edge of a supply box it started shrieking.

The raucous sound got on the nerves of all of us, so for a little relief I took a woolen stocking and slipped it over the monkey's head. He gave a quick dive into the toe, stopped his complaining, and went to sleep. After that, each evening when bedtime came, I would open the stocking and in he would pop, perfectly content till morning.

There are numerous kinds of marmosets. The commonest ones in captivity come from Bahia and Pernambuco in Brazil, and from various places in Colombia and Panamá, where they are sold in markets like pigeons or canaries.

Then there is the exquisite Golden Marmoset of the upper Amazon, which occasionally is seen in captivity and sometimes does quite well (Plate V). The late Madame Abreu of Habana, Cuba, owned a pair that had seven babies while they were in her possession, and recently several have been born in the United States. Nothing could be more appealing than one of these minute baby monkeys.

#### LOST—A MARMOSET WITH A MUSTACHE

One species of marmoset, very personal to me, is one of those "seen and lost" specimens of my early collecting.

It was brought to me at Riberalta, Bolivia, by a native friend of a friend of mine who found it on the upper Madre de Dios River in Peru.

I made a cage for it and started toward the Amazon with this and the rest of my collection.

But later, during the two-day railroad journey around the falls of the Río Madeira, the train jiggled, the door of the hurriedly made cage flew open, and its occupant leaped from the train.

I have described the monkey to various authorities and looked in all the books, but nothing like it is known. So somewhere on the upper Madre de Dios in Peru still lives, presumably, an unknown species of marmoset.

Its color is black, but on its face is a curious white mustache. The hairs are short, but the pattern is like that of the mustache



IN ONE MIGHTY LEAP, "TARZAN" SPANS A 25-FOOT GAP ON BARRO COLORADO ISLAND

A fallen trunk left an opening in the monkeys' treetop route. Instead of abandoning it, the Howlers took to the air. Dr. Frank M. Chapman, of the American Museum of Natural History, made this remarkable series of photographs which are from his forthcoming sequel to *My Tropical Air Castle*.



Photographs © Frank M. Chapman; courtesy *Natural History*.

POISED FOR A PERFECT "FIVE-POINT" LANDING, DOWN PLUMMETS A HOWLER

Projecting thumbs prove the figure is a monkey, although, with arms and legs extended to break the fall, it resembles a lizard. His leap is not as mighty as his brother's, but he succeeded in sailing over the gap, on his island home on Gatun Lake, Panama Canal Zone.



#### FROM BOUGH TO BOUGH FLITS A NATURAL ACROBAT

Every afternoon when the balsa trees were blooming, this Geoffroy's Marmoset (Plate V), with four companions, paid a 4-o'clock call in the garden of Dr. Chapman. Uttering cheerful twitterings, the little creatures danced busily back and forth, inspecting the scores of blossoms.



Photographs © Frank M. Chapman, courtesy *Natural History*

#### IN SCORNFUL TONES, WILD CAPUCHINS DERIDE CAGED BROTHERS NEAR BY

No sympathy was extended to captive mates by these white-faced monkeys, paying a visit to imprisoned brethren on Barro Colorado Island, Panama Canal Zone. Dr. Chapman reports that the prisoners cowered in terror at their former comrades' display of hate.





Photograph courtesy New York Zoological Society

**"IN THE STOCKS" FOR HIS OWN GOOD!**

After this doleful *Cebus* had suffered a broken arm at the New York Zoological Garden, he insisted on disarranging the bandages with his teeth. The large wooden collar was devised to prevent him from disturbing the splints while the bone was knitting.



Photograph by Doremus

**"AS INNOCENT AS A NEW-LAID EGG"**

William S. Gilbert quite aptly could have applied his allusion to this one-day old Rhesus and the cassowary egg. Frank Buck is holding both to show the comparative sizes of some of the queer products of his animal farm at Amityville, New York.

of a mid-Victorian dandy. This is something for somebody to discover some time and record.

DOUROUCOULIS  
WORK THE  
NIGHT SHIFT

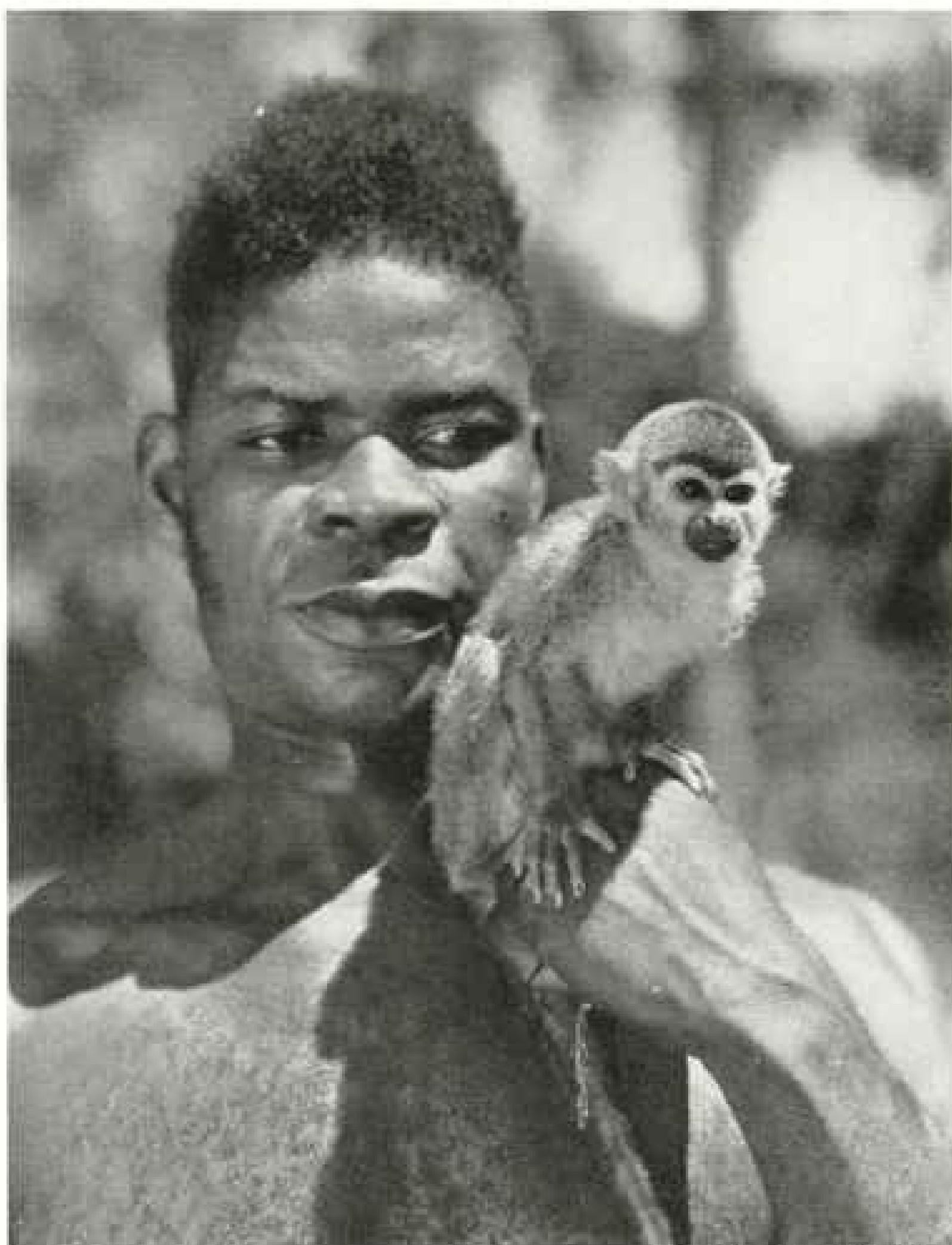
The only strictly nocturnal monkey known is the little Owl Monkey, or Douroucouli, a gentle tropical American species with big eyes that see in the night (Plate II).

During the day it sleeps in the hollows of trees, but it wakens at any unusual sound and peers drowsily out to satisfy its consuming curiosity. Several times while traveling through the jungle I have happened to disturb a Douroucouli's slumbers and have suddenly become aware of a face staring at me with big, bewildered-looking eyes—apparently as bodyless as the Cheshire cat in *Alice in Wonderland*.

The Squirrel, or Moss Monkey, or "titi," of South America, is an engaging little creature with a funny elongated head (Plate II).

It lives in large groups, and in those few areas in which it has not been continually molested by hunters it has little fear of man. One can buy any number of them in boxes like pigeon crates in the market at Belém (Pará), Brazil; yet they are not often seen out of their native land because they are unusually delicate.

In fact, a great many of the South Amer-



© LaVigne, from Grindheim

HIS ENEMIES CAN'T GET HIM NOW!

The master of this Squirrel Monkey could scarcely drive him back to the Amazon jungle. He much prefers the protecting shoulder to trees where birds of prey lurk, on the lookout for him. He may keep his comfortable perch all day and will do his best to be a gentle and devoted pet.

ican monkeys are little known elsewhere, either because they are rare or because they do not take kindly to captivity and are short-lived. Among them are the ouakaris, or cacajaos, stocky in build with short tails and very long hair. They are slow in movement and gentle in captivity, though inclined to be "one-man monkeys," developing a violent attachment to their owner and completely ignoring everyone else.

One of them, covered with long shaggy hair and possessing unusually large feet and hands, resembles in a remote way a pygmy orangutan. Recently we saw a fine example in the zoo at Osaka, Japan.

The Saki Monkey, which looks like a sad little old man, is delicate, but capable of close and devoted attachment to a single master (Color Plate III).

#### NATURE GAVE THE HOWLER A MEGAPHONE

Largest of the South American monkeys are the Howlers, some red and some black, which live in small troops in the high trees. They possess an unusually developed vocal box which enables them to make a roaring sound that carries long distances (Plate III and page 620).

Howling Monkeys range throughout Central and South America. A number of troops exist on the famous Barro Colorado Island in the Canal Zone, a reserve dedicated to the study and preservation of local animal life.\*

They evidently do not like rain, for one day as a rain cloud passed over the island we could actually follow the path of the storm by the howling of the monkeys, each troop taking up the cry as the rain struck it.

Young Howlers are gentle and affectionate, but likely to be morose; they seldom live long in captivity. Like most young monkeys when kept as pets, they love to cling to their owner and are apt to emit nerve-racking squalls when this privilege is denied them, making themselves so disagreeable that the owner will pick them up and hold them in order to obtain a little quiet for himself.

#### ROASTED MONKEYS ARE A GRUESOME SIGHT

In many parts of South America monkeys are the favorite food of the Indians and flee at the sight of man. However, some can be easily duped by imitating their cries. The long-legged, long-tailed Spider Monkeys (Plate IV) and the Capuchin, or Cebus, Monkeys (Plate I and page 621), of which there are two dozen kinds, are most often attracted in this manner.

Once I sat with an Indian on the river bank near the edge of a forest in Bolivia. In the distance we heard the call of a troop of these Cebus. The Indian so cleverly imitated the call that the troop came nearer and nearer, finally reaching the very edge of the forest. Then they saw us and hurriedly disappeared.

Spider Monkeys are called by a high-pitched yell, broken by beating the mouth with the palm of the hand. Even when

they do not come to this call, they answer and thus give away their whereabouts. The Indians follow, shooting them one by one until the entire troop is dead.

Among the Mosetenes living on the Rio Bopi in Bolivia, it has been found necessary to move the villages about once every 20 years, because the monkeys in the vicinity become completely exterminated by this incessant hunting for food.

Spider Monkeys, half roasted, half smoked, whole, with head and legs not removed, and the tail curled like a watch spring, are a gruesome sight to anybody except these Indians. Yet the meat, rich and full flavored, is quite pleasant to eat, especially after a long diet of the usual boiled green bananas and rice.

The Spider Monkey, and its close relative the Woolly (Plate IV), are perhaps the most intelligent of all the South American monkeys. The latter lives entirely on leaves, twigs, and fruit, and is considered the greatest delicacy itself as a food. But one who has ever known a Woolly personally would almost as soon think of eating a friend.

Woollies are among the gentlest and most affectionate of all monkeys, with a beautiful coat of soft hair and a long prehensile tail, naked at the under side of the tip. This functions most effectively as a fifth hand.

One Woolly that we had in the Zoo, in company with a number of other monkeys, acted as the good provider. There were trees near the cage and the monkeys would reach out and pull off the leaves until all those within arm's reach were picked and eaten. But the Woolly would stick out his tail, with its longer reach, wrap the tip of it around a leaf, and bring it into the cage to be hurriedly consumed by his less gifted pals.

This altruistic procedure was highly unusual, as unselfishness is hardly a simian trait. At mealtime it is every one for himself. Even babies get little consideration, but they soon learn to take good care of themselves.

Unfortunately, the Woolly Monkey, a delightful pet with a most engaging personality, is so delicate in captivity that specimens very rarely live more than a few years.

One can gauge the difficulty of keeping this animal alive by its comparative value. When we were coming down the Rio Madeira in Brazil, the standard price at the remote Brazil-nut collecting stations was one dollar and a half each, after a bit of arguing. At Manaus on the Amazon it was

\* See "Who Treads Our Trails?" by Frank M. Chapman, in THE NATIONAL GEOGRAPHIC MAGAZINE for September, 1927.

## WHO'S WHO IN THE MONKEY WORLD



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Painting by Ellis Cheverlaine

### SPRINGTIME BRINGS AN ORGAN-GRINDER AND HIS RING-TAIL, OR CAPUCHIN, MONKEY

The latter name comes from the dark patch of hair which suggests the cowl of a Capuchin monk. The other refers to the long curling tail which serves its owner as a fifth hand and is used in swinging from branch to branch in its South American forest home. Old World monkeys, in contrast, use their graceful tails only for balance. Comical and intelligent, with tiny, knowing face and wrinkled brow, the CAPUCHIN is the monkey usually seen with the hurdy-gurdy man in the United States. Another accomplished penny-collector is the Rhesus Monkey from India (Plate XVI).





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#### OWL MONKEYS, OR DOUROUCOULIS, SEE AT NIGHT

Nocturnal, these tropical Americans spend the day in hollow trees. When disturbed, they peer out sleepily with big blinking eyes. Tempting tidbits to Douroucoulis are giant spiders and centipedes.



Paintings by Ella Cleveland

#### SQUIRREL MONKEYS ARE "BRALNY" BUT NOT OVER-BRIGHT

Their brain extends far to the back of the skull and, in proportion to the body, is actually larger than a man's. These small South Americans, also known as "moss monkey" and "titi," live chiefly in large groups.





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Painting by Elie Chevreulange

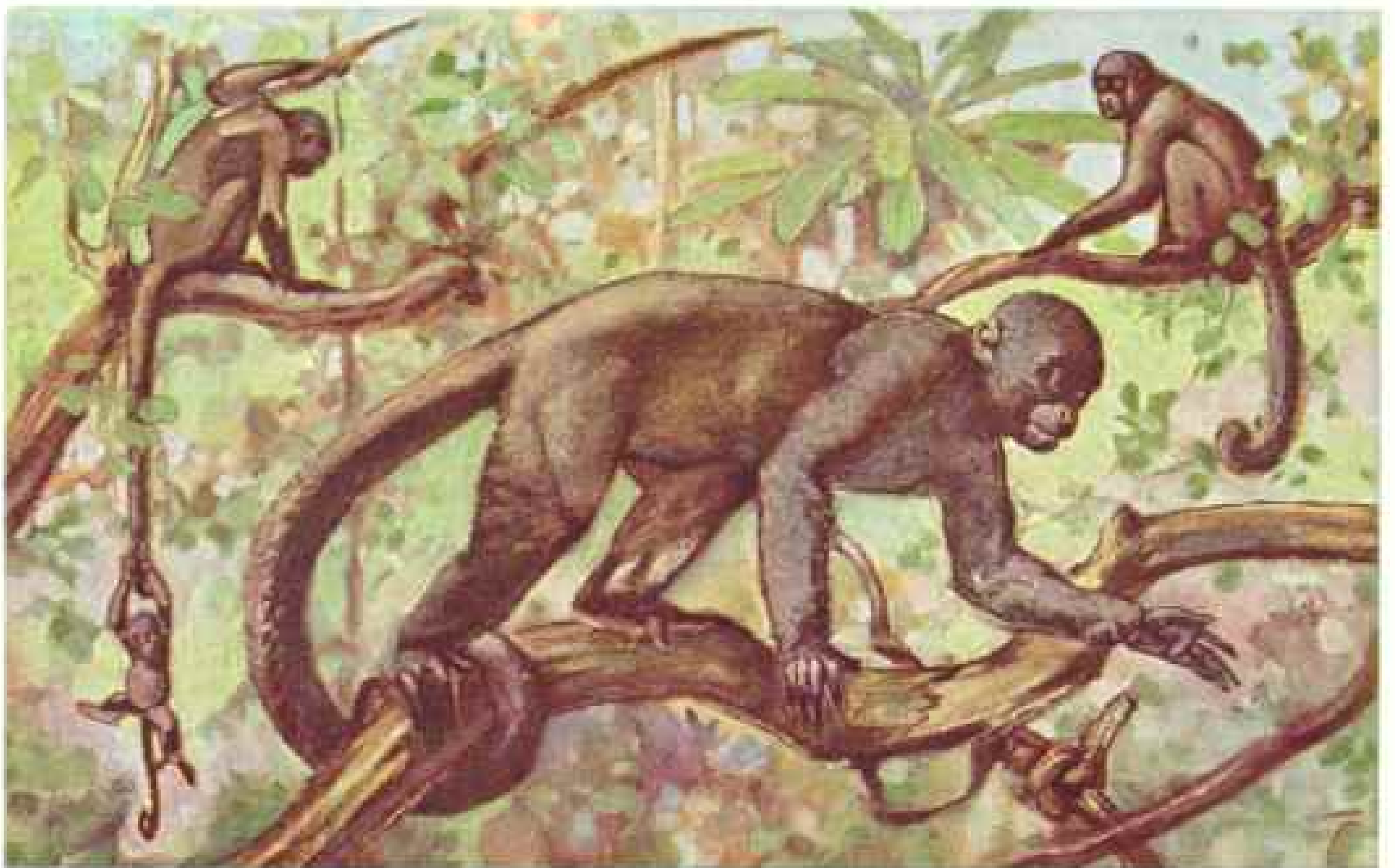
LARGEST OF AMERICAN MONKEYS IS THE HOWLER (LEFT), WHOSE BEARD HIDES A HUGE, BONY, DONKEY-LIKE "AMPLIFIER"

With this natural built-in loud-speaker, a Howling Monkey can so magnify its voice that a choir of them, roaring in the jungle dawn, can be heard for miles. Its tail is strongly prehensile—one shot by Darwin still hung by its tail though stone-dead, and the tree had to be felled to get it. This is a Red Howler. Another tropical American is the Bearded Saki Monkey (right), with dense chin whiskers and bushy, non-prehensile tail.



SPIDER MONKEYS ARE MARVELOUSLY ADAPTED BY NATURE FOR SWINGING THROUGH THE TREETOPS

From the hooklike hands to the sensitive bare tip of the long, exploring tail, these slender acrobats are masterpieces of specialization to fit an environment. But to some South American Indians they are merely meat, to be shot, roasted whole, and devoured. One of these monkeys, dangling head downward from a branch, distinctly suggests its spider namesake.



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Paintings by Elie Cheverance

BABY WOOLLY USES MOTHER'S WONDERFULLY EFFICIENT TAIL AS A HANDY, READY-MADE SWING

No monkey makes a more engaging pet than the Woolly, but as captives they are usually short-lived. Natives of the Amazon and its tributaries call them *barrigudo*, meaning "big-bellied."

## WHO'S WHO IN THE MONKEY WORLD



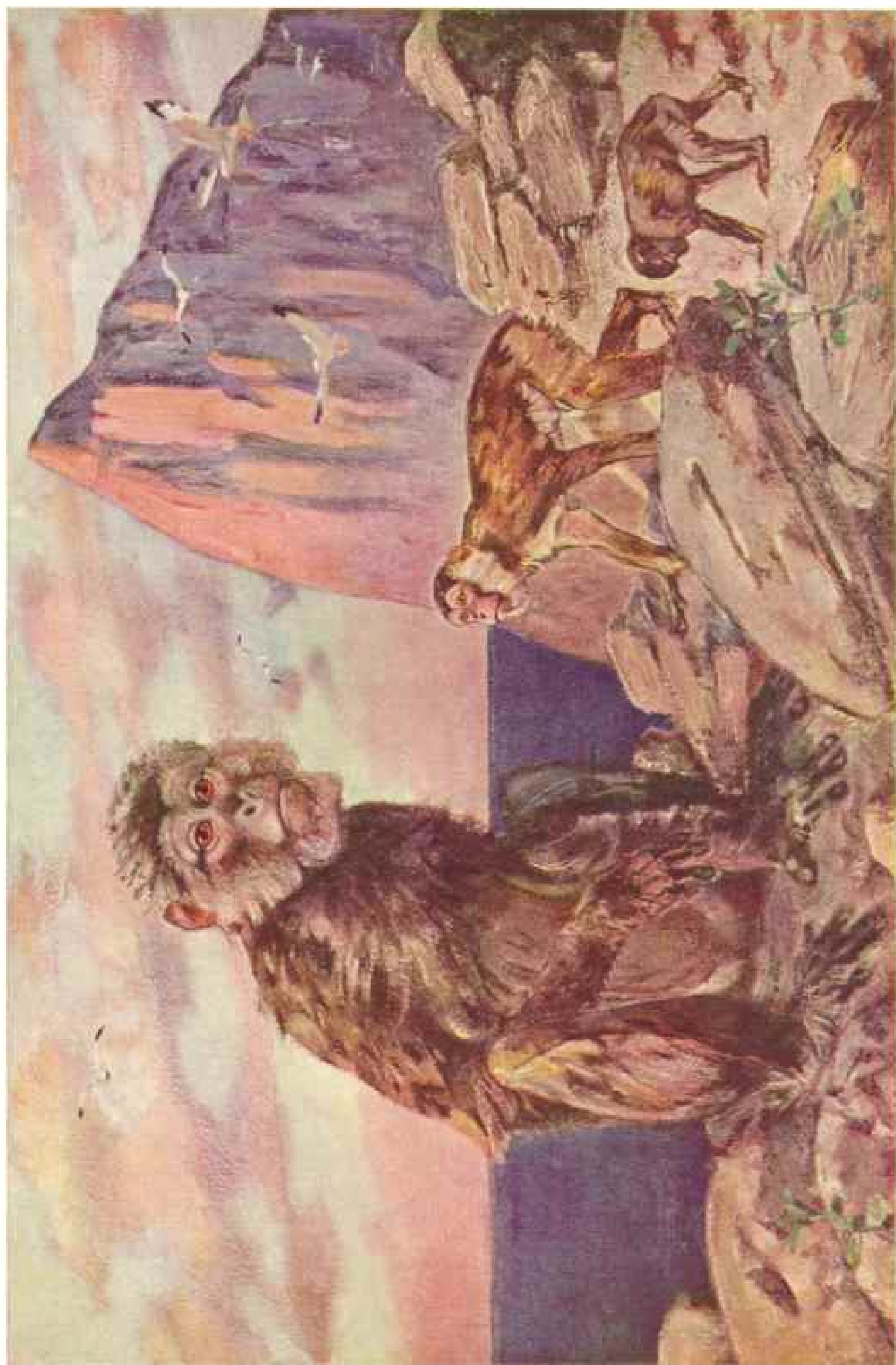
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Painting by Elie Cheverlange

MARMOSETS, LOW IN THE SIMIAN SCALE, SEEM MORE LIKE SQUIRRELS THAN MONKEYS

One of the daintiest of all the monkey tribe is the little GOLDEN, or LION MARMOSET (upper) from the Amazon, with its handsome, lionlike mane. GEOFFROY'S MARMOSET (lower pair), from Colombia and Panama, has a white shirt front with sleeves to match, and a chestnut patch on the nape of the neck. Numerous other kinds inhabit tropic America and all are popular as pets. The father is often saddled with nursemaid duties, the young clinging tightly to his fur. Pawlike feet, with claws instead of nails, indicate the marmoset's low rank in the monkey scale.



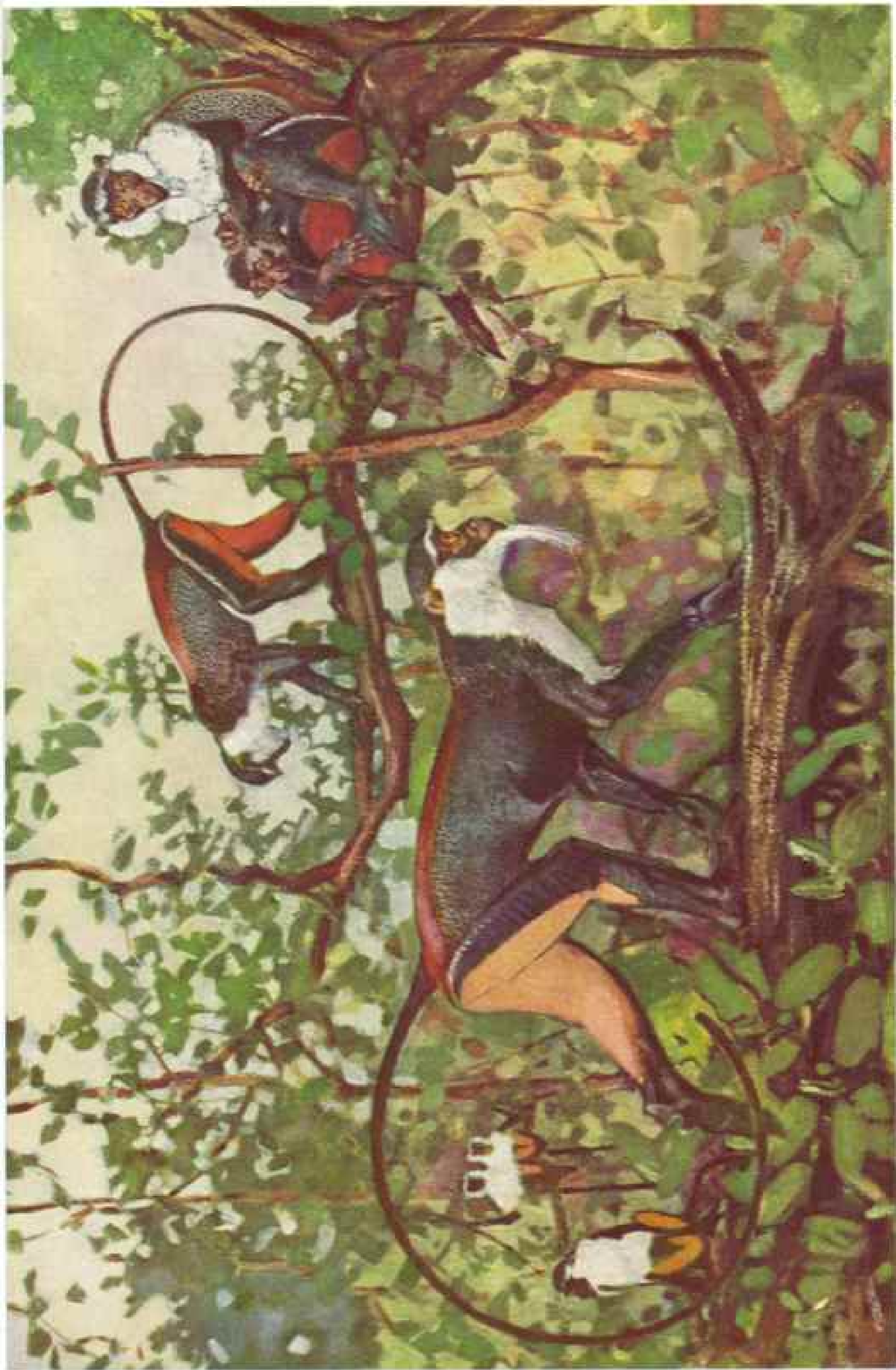


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Painting by Elie Chaveyranne

EUROPE'S ONLY WILD MONKEY IS THE BARBARY APE, OR MAGOT, WHICH LIVES ON THE ROCK OF GIBRALTAR

These powerful tailless macaques—found also on the African shore of the Strait—are a familiar sight on the famous Rock. Local legend says that when the apes go the British, too, will go. The only official "Keeper of the Apes" in the whole British Army looks after them. A full-grown male is bigger than an Airedale terrier. George, who lived for ten years in the Washington, D. C., zoo, delighted in throwing water at visitors.



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Painting by Elie Chervetlunge

# ROLOWAY AND DIANA MONKEYS USE THEIR LONG, GRACEFUL TAILS FOR BALANCING, NOT FOR CLINGING

Even experts sometimes confuse the Roolway (left) with the Diana (right), which is colored differently and wears a shorter goatee. Both belong to the African family known as "guenons" — gentle, arboreal little monkeys with cheek pouches in which they store food. Those handy pockets, incidentally, are an Old World monkey monopoly, just as a prehensile tail, or "fifth hand," is found only in New World species (Plates I, III, and IV).





© National Geographic Society

Painting by Elie Cheverland

FATHER GUENON KEEPS WATCH FOR LEOPARD, PYTHON, OR HAWK WHILE  
MOTHER CALMLY GROOMS THE BABY

These are DE BRAZZA GUENONS, at home in an African treetop. The type of hunting being carried on by the monkey on the lower branch is a favorite simian sport. But, contrary to popular opinion, this is not usually a quest for vermin, but rather a "beauty parlor" operation which yields the groomer occasional bits of dead, salty skin and the "groomee" apparently great contentment. The name "guenon" means "one who grimaces."

five dollars, with more arguing. And at Pará the price was anything the market man could get.

#### JACK HAS HIS LITTLE JOKE

One of those canny individuals had a wonderful animal, adult and in fine condition. After loud and serious bargaining that lasted two days, I got the monkey and named him Jack. We came back on a boat whose captain was bitterly opposed to carrying animals aboard his ship, though after a day or two he became interested in our collection and even helped me cut up pumpkins for my charges.

Then Jack, who was tethered by his belt with too flimsy a cord, got loose one unlucky morning. When I walked out to the animal quarters he was having a nice time playing with a bird cage, holding it in his hands, jumping up and down, and whacking it on the deck. The contents, a dozen small and rare birds, he had killed.

When I appeared, Jack beamed at me, but when I saw the bird cage and spoke to him sharply he realized I was angry and promptly fled. Naturally I went after him. He stopped for a moment to toy with an exposed steering gear that had been recently greased, then jumped through a porthole into the dining room, ran along the dining table, jumped out another porthole, and scurried along the deck.

The steward had just put a clean tablecloth on the table. After tucking a bill in his hand and telling him to change the cloth before the captain saw it, I hurried on deck—just in time to see Jack duck down into the fore-castle. I followed, but he had disappeared.

Sailors were asleep here and there, but one, half awake, was looking around with a vaguely startled expression. When I told him I was looking for a monkey, comprehension dawned.

"So that's what just walked over my face!" he exclaimed.

On deck again I saw Jack make for the other end of the boat, but a little later, perhaps realizing that I was too tired to be angry any longer, he came over to me and gave himself up. It was he who afterwards in the Zoo used his tail to gather leaves for the other monkeys.

#### CAPUCHIN MONKEYS SEE THE WORLD

Best known of the South American simians is the Capuchin, or organ-grinder monkey, common not only in Central and South

America but in captivity throughout the world (Plate I).

A zoo director is often asked which animal he loves best, and my usual reply is that with 3,000 animals in his care he must spread his affection evenly over the entire lot. But certain animals do stand out, and among the Capuchins are a few I shall always remember.

One was Matthias. When I first saw him he was sitting on the shoulder of a weeping Bolivian girl. She stood in line with other girls watching the selection of conscripts for the Bolivian army. Her sweetheart was among them. I put some money in her hand, she put Matthias on my shoulder and then turned the coins over to her soldier boy.

Matthias came home with me, and I gave him to the Zoo, where he lived for years. He became paralyzed in his old age and when I came to visit him he would roll over and over against the bars to be petted. Once, when I had been away for seven months, he yelled a hearty recognition as soon as I walked into the monkey house.

#### AN ORGAN-GRINDER MONKEY TAKES A VACATION IN THE ZOO

Another old friend is probably one of the best known organ-grinder monkeys in the world. During the spring and summer he travels with his Italian owner from Washington, D. C., to Texas and back, and is then deposited in the Zoo while his master, the organ-grinder, leaves to spend a well-deserved winter holiday in Rome.

Several times I had noticed the two of them about Washington. The monkey would dance, turn somersaults, and make a grand bow on receipt of a coin.

Expecting to see the little fellow perform, I stepped behind the guard rail one day after he had been left in our monkey house and handed him a dime through the bars of his cage. He took it in listless hands, dropped it, turned his back to me, and sat down on the farther side of the cage. As performers say, he was "not working."

Still another favorite was a little white-faced Capuchin given me in Honduras the day he was caught. Being concerned with other things at the time, I put a belt around him and tied him to a window ledge, where he sat for an hour or more giving various calls. After a day or two he stopped one of these calls, and I was never able to decide what that particular utterance meant; probably it was a call to the troop, which he soon forgot.



Photograph by Dutton De Cour Trun Galloway

"NOW START SOMETHING!"

Stoutly clinging to his master's arm, the little Sumatran Macaque feels fairly safe, although he is a little dubious about something. If he were denied the right of holding fast to that cool sleeve, he would make a scene, squealing and crying!

Like others of his kind he could be most vociferous, and the most piercing of his calls was when a fly came into the room. He would strike at it and show the greatest and loudest terror. Perhaps he associated it with the large stinging wasps so abundant in his native treetops.

Europe's only monkey, the Barbary Ape, is not a native of Europe, but originated across the Strait of Gibraltar and was introduced long ago. It is now one of the characteristic sights of the Rock, which has been replenished at least twice.

Not an ape at all, it was given that name on account of the absence of a tail

(Color Plate VI).

These Barbary Apes, or Magots, are large and powerful monkeys, and at the same time delicate in captivity, though we had a pair that lived at the Zoo for more than ten years.

The male, George, developed a wonderful accuracy in throwing water at the public. He would take his drinking pan and with a lightning-like motion hurl the contents into the face of a person ten feet away if he did not happen to like the individual.

We replaced the monkey's drinking pan with a large stone basin that he could not lift, but we were defeated there too. When someone would stand in front of the cage and annoy him, George would pretend not to notice his enemy,

but would stroll casually toward his water supply. Then, cupping his capacious hand, he would scoop up water and hurl it at the visitor. His victims will always remember him for his unfailing accuracy.

#### BABOONS ARE FORMIDABLE FIGHTING MACHINES

Baboons differ from many other monkeys in living on the ground rather than in trees, though they are also expert climbers. They are distinguished by their long muzzles and rather short tails, and are provided with cheek pouches in which they store food. Usually they have heavy posterior callosities

which serve as a sort of cushion or stool on which to sit (Color Plates IX and XIII).

In general, the baboons are the largest and most powerful of monkeys and live in large troops, sometimes dangerous for humans to approach. In some districts of West Africa the natives fear even to defend their crops from marauding troops of baboons, because the animals will turn on their attackers and are capable of doing much damage with their powerful jaws and huge teeth.

Bane of the baboon world in turn is the leopard, from whose lethal leap they usually flee with headlong, chattering haste—every man for himself and the leopard take the hindmost. There have been instances, however, when greater courage was shown, several long-fanged males standing their ground and fighting off the deadly cat. Other cases have been reported in which a lone adult ventured back, daring predator or guns, to save a baboon baby which chanced to be left behind. And this is not to be explained by mother love, as the rescuer was a male.

The word "baboon" is probably derived from the fact that the Hamadryas of North Africa and Arabia, sacred to the Egyptians, was dedicated to the god Babon. This is one of the most distinctive species, the males



© R. Rathus

#### HANUMAN, MONKEY GOD OF INDIA, RALLIES HIS COHORTS

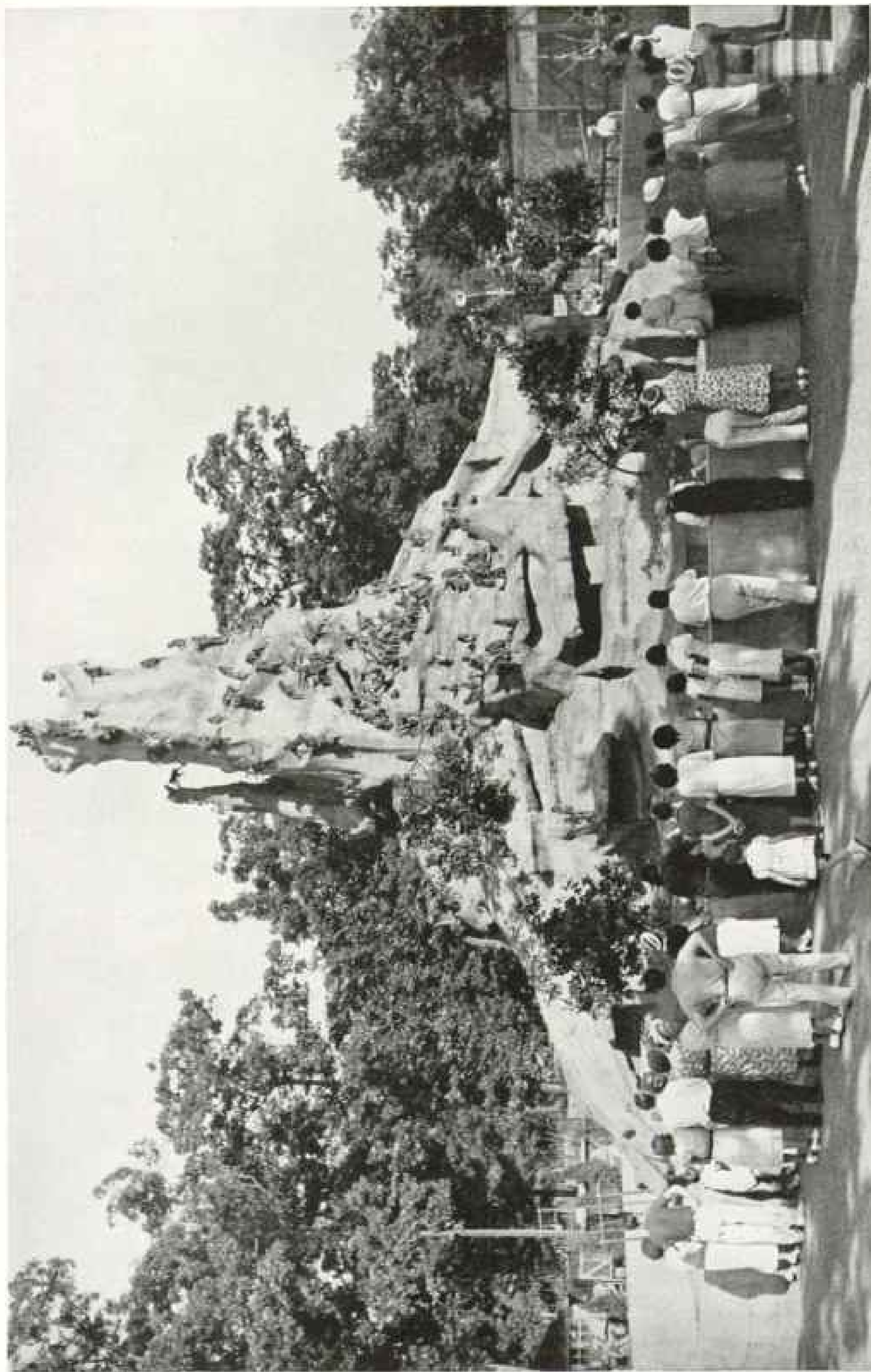
Carvings representing the deity, similar to this sculptured work in a Swami shrine at Una, are found in many temples. Legend tells that a black-faced, long-tailed langur aided Rama, the seventh incarnation of Vishnu, in the conquest of Ceylon by forming a bridge of rocks. His descendants have been sacred ever since. Langurs are never slain, although in some cities they are so numerous and bold that the natives become exasperated over their pilferings (page 653).

being characterized by a tremendously long mantle of gray hair around their shoulders (page 618 and Plate XIII).

When a Hamadryas is angered its ruff stands out like the fur of an angry cat.

These powerful beasts are trapped in numbers in the Sudan and are frequently exhibited in menageries. Adults are fierce; yet the keeper, armed only with a broom, will go among a troop of fifty on a zoo "monkey island" and calmly feed his charges. They do most of their fighting among themselves.

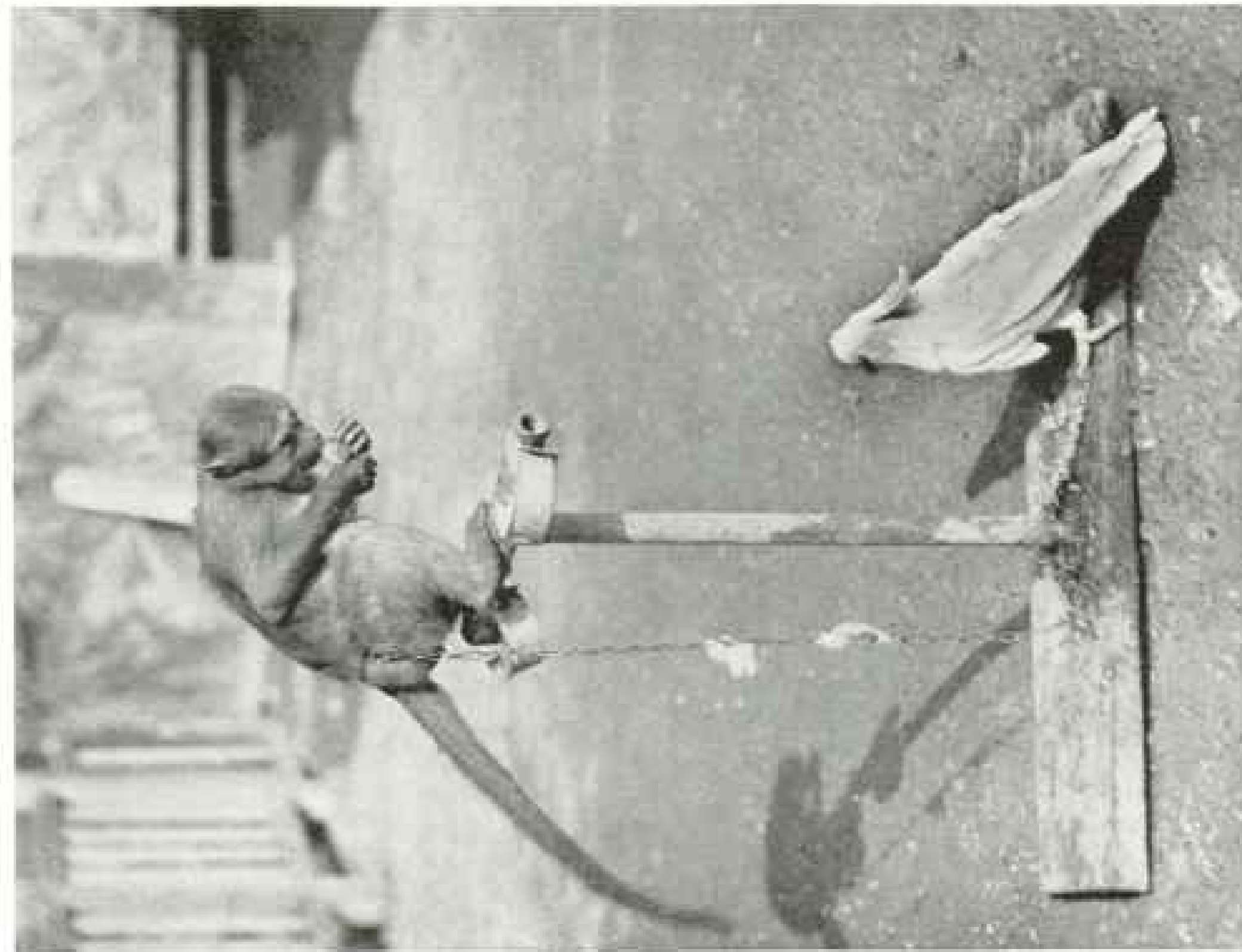




Photograph by Dromann

LONG ISLAND TRAFFIC TANGLED UP WHEN 450 "MONKEY MOUNTAIN" DWELLERS BROKE BOUNDS THREE YEARS AGO

New Yorkers view the antics of 450 Rhesus simians at Frank Buck's "Jungle Camp," Amityville, N. Y. A band of them explored the "great unknown" in August, 1915, when a keeper, after feeding time, forgot to pull up a plank placed over the moat which confines them. They scampered across and roamed main highways and tree-tops for several days. Virtually all were recaptured, although a few succumbed to automobile injuries and effects of experiments with the third rail of a railroad.



#### ROBBER'S ROOST

Jacko, a pet macaque, has driven the cockatoo from her perch in his English master's garden and, totally oblivious to her ruffled feelings, is enjoying a few tidbits from her feed pan.



#### "WHO'S THAT KNOCKING AT MY DOOR?"

Barnacle Bill, a young Rhesus, lives in Margate, England. After adventuring all day in the garden, he raps long and loud when ready to re-enter the house. British colonial officers in India often bring these monkeys home as pets.



Sketches by Eli Cheverling

#### MONKEYSHINES FROM THE ARTIST'S NOTEBOOK

Action drawings, not to scale, on which the series of paintings were based, show postures and traits of a variety of simians. A Geoffroy's Marmoset crouches (upper left) beside a dangling Spider Monkey. The Squirrel Monkey (upper right) turns his back on a big Howler which is glaring at a quizzical Woolly. Below the Howler, facing in opposite directions, are a white-faced Capuchin and a silky-fringed Guereza. Playfully grasping the tail of the De Brazza Guenon (left center) is a Gelada Baboon. Approaching him stalks a Roloway Monkey. A mother and baby Red-headed Mangabey, a seated Mandrill, and a walking Drill are at the bottom.



Photograph by L. W. Hufferaker

"CAREFUL, MOTHER, ON THOSE SHARP PRONGS"

Rhesus Monkeys carry their babies across the spikes on the gate of the fort at Agra, India. Although not held in such high esteem as the langurs, these simians are sufficiently respected to escape molestation. Known as the bandar in India, this species is immortalized in the stories and poems of Rudyard Kipling, especially *The Jungle Book*.

The Gelada Baboon, with its curiously upturned nose, enormous canine teeth, and bare patches of red skin on its chest, is entirely different from the others. Apparently it is confined to the mountains of Ethiopia, where it lives in moderate-sized troops (Plate XIII).

The Chacma, from the rocky hills of South Africa, is perhaps the most powerful of all the baboons. It can stand a great deal of cold weather, for we had one in the National Zoological Park that lived without artificial heat for more than 20 years, finally dying of old age.

CHAC KEPT UNION HOURS

Chac, as we called him, was a methodical monkey. Each day at four o'clock he would enter the small house provided for him and close the door. His day's work as an exhibit was done. He would come out again at the voice of someone he knew, visit a few minutes, and then once more retire.

Another member of the tribe is the Olive Baboon of both East and West Africa. The very first day I was on safari in Africa I strolled a short distance from our camp in

the evening and ran across a troop of Olive Baboons, 200 or so in number. They hurried in a brown mass up a rocky ledge, but an old and tremendous male served as a rear guard. Walking backward, he glared and barked his defiance.

BABIES RIDE MOTHER'S BACK

Once we surrounded a small troop of these Olive Baboons. They fled in all directions, but several young, not expert enough to leap on the back of their own or someone else's mamma and ride to safety, sprawled on the ground, clutching the earth with all four feet and yelling.

We picked them up, took them into camp, and used a bit of iodine where they had bitten us. They were tame in 24 hours, and traveled with us throughout the rest of our trip, perched on baggage carried by natives or riding the shoulders of one of our party. Young baboons make most engaging pets.

In the same group with the Olive Baboons are also the Long-armed and the Golden. There is an occasional albino born among these animals; we had one for many years in Washington.



The two most brilliantly colored members of the baboon tribe are the Drill and the Mandrill, both large, heavy beasts from West Africa.

The Mandrill has great corrugated cheeks with purple predominating; the Drill has a rich line of lipstick color on his lower lip (Plate IX, opposite page).

We have one well-known Mandrill, Napoleon, who has lived with us for 27 years. Some fifty years ago the Barnum Circus had a Mandrill called Napoleon, and our head keeper, who has been with the Park for nearly half a century, named ours after the other.

#### FOILED BY A POLICEMAN'S HELMET

It was a young Mandrill from West Africa that developed into the greatest practical joker in our Zoo. He would lie against the bars of his cage with his hand out. Then he would apparently concentrate on passing a straw from one hand to the other and back again.

Visitors, to attract his attention, would extend a cane or an umbrella in his direction, when with lightninglike rapidity he would grab it. Canes were simply thrust against the cage and broken, but umbrellas were far more delightful. He would open one and then dart through a door several sizes too small for the umbrella. A gold watch on a chain was an unusual treat for him, and an old-fashioned marabou boa a source of delight for hours.

Our record shows that during his life at the Zoo he seized 68 canes and umbrellas, also a policeman's helmet. The latter was his only defeat. It was steel reinforced, and he could not get it through the bars. He had to be satisfied with such portions as he could pick off, and he was never quite the same monkey afterwards.

#### FRENCHY, THE DRILL, IS A SHOWMAN

Frenchy, our Drill, arrived at the Zoo 21 years ago when he weighed three pounds; now he weighs about fifty. He has developed a knowledge of crowd psychology. He knows that the bigger the crowd in front of his cage, the better the chance of a peanut; so he takes a large wooden ball with which he is provided, slams it mercilessly around the cage, and whirls himself like a dervish. Naturally people rush to see the performance; whereupon he calms down and comes to the front of the cage looking for payment for his act.

In Africa also live the large families of

guenons and mangabeys. The guenons, some twenty species in number, live mostly in West Africa, though some of the species occur across the continent. They are small monkeys and essentially arboreal.

The smallest is the Talapoin, olive green in color, with a black face, orange rings around the eyes, and an orange stripe on the upper lip. Its relative, the Mustache Monkey, has a modest, close-clipped mustache (Plate X).

Commonest of all the guenons is the Green Monkey, the one most frequently exhibited in collections. Differing from most of its relatives, it is very quiet and seldom utters a sound.

The Green Monkey was introduced into the New World on the island of St. Kitts, in the West Indies, more than two centuries ago, and has now become so abundant that monkey shooting is sometimes pursued as a sport there.

A number of the guenons are ornamented with bright colors and long, graceful tails. The Roloway and the Diana, two of the most beautiful, are gentle and affectionate in nature, especially when young, and are cleanly in habit (Plate VII).

The Roloway and Diana differ from each other in certain characteristics, such as the length of the beard and the coloration, but the two species are almost always confused in collections.

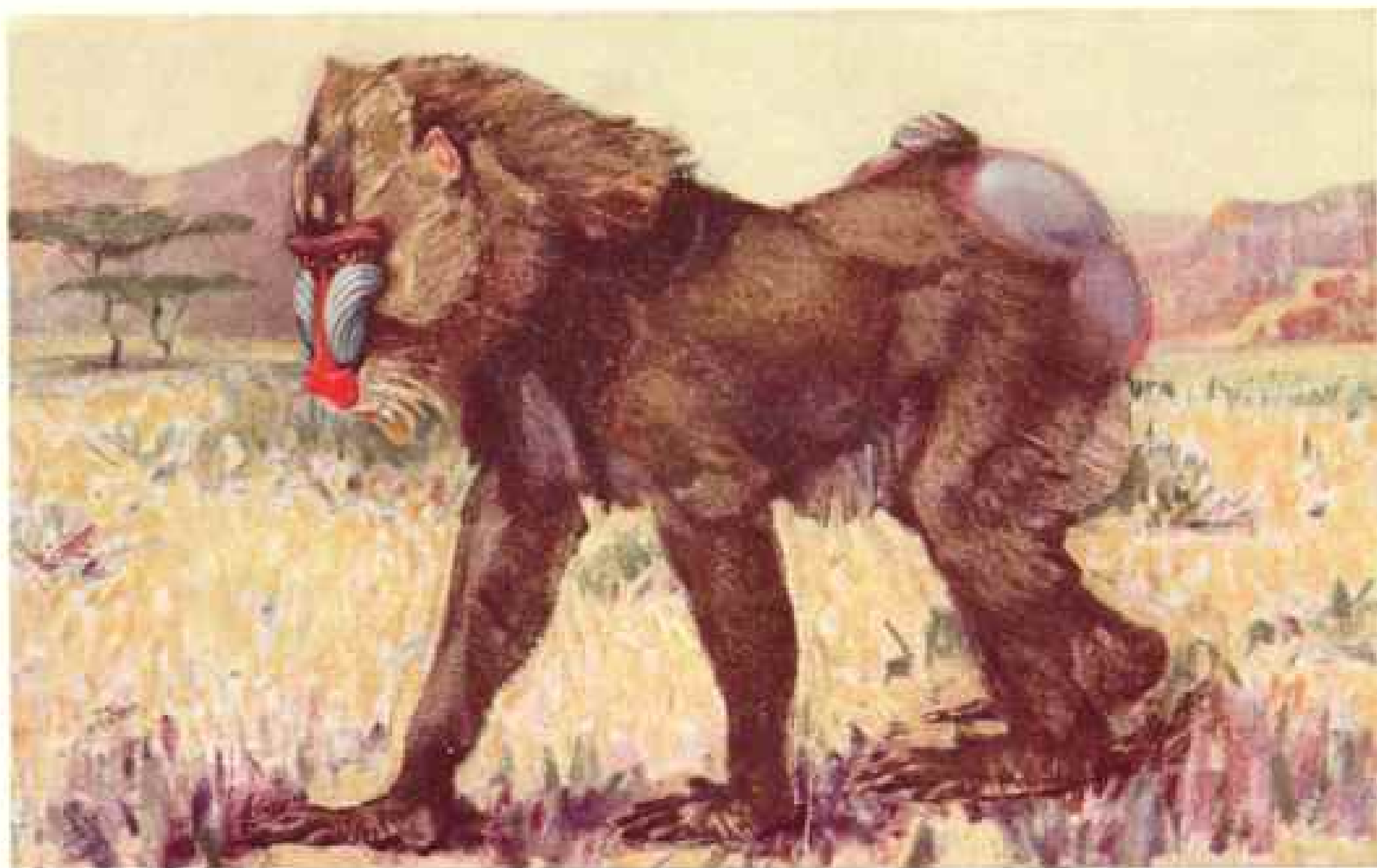
In order to straighten out this confusion I once put one of each, side by side, in adjoining cages so that the difference could be readily seen, and stood in front of these cages with practically all of the zoo directors of America, who were attending a convention in Washington at the time. All of us admired the monkeys and noted the differences.

But the following day I found that the labels had been accidentally misplaced. The Roloway was labeled Diana, and the Diana Roloway, and not one person, including the writer, had recognized the mistake!

In Tanganyika we captured a number of Blue Monkeys, or Vervets, which also belong to the guenon clan. These animals have been much hunted for their skins, used commercially as trimming on women's clothes, but the Government has recently passed laws protecting them.

One of our native assistants in Africa, a youngster, carelessly let one of our best specimens escape. We scolded him, and the boy disappeared from camp for two days.

## WHO'S WHO IN THE MONKEY WORLD



THIS NIGHTMARE-FACED BABOON, THE MANDRILL, IS AS DANGEROUS AS HE LOOKS.

West African natives respect his powerful teeth and fear to defend their fields from raiding bands. The animal's incredibly grotesque face with flaming-scarlet nose and corrugated, bluish cheeks probably inspired witch doctors in the creation of hideous devil masks. Even the bare, calloused patch on the MANDRILL'S seat has been colored by whimsical Nature. Napoleon, the model for this painting, has lived in the National Zoological Park at Washington, D. C., for 27 years.

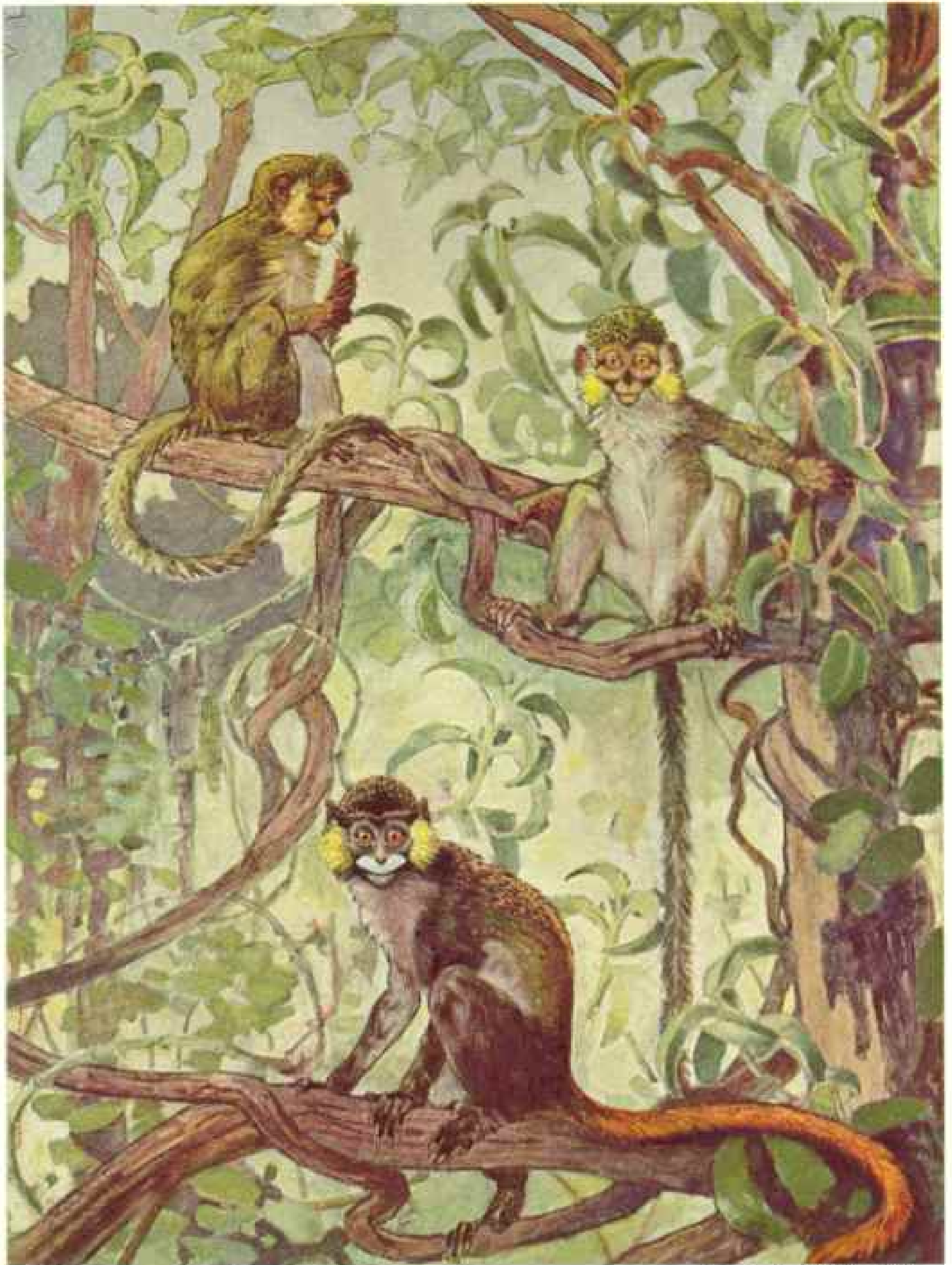


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Paintings by Ella Cheverlouse

THE DRILL LOOKS AS IF HE WORE LIPSTICK, BADLY APPLIED

Actually, however, he is extremely virile and if necessary will even tackle a leopard. The DRILL, like the Mandrill, develops huge, razor-sharp upper canines. Frenchy, who sat for this portrait, was a three-pound baby when brought from West Africa 21 years ago; now he weighs fifty.



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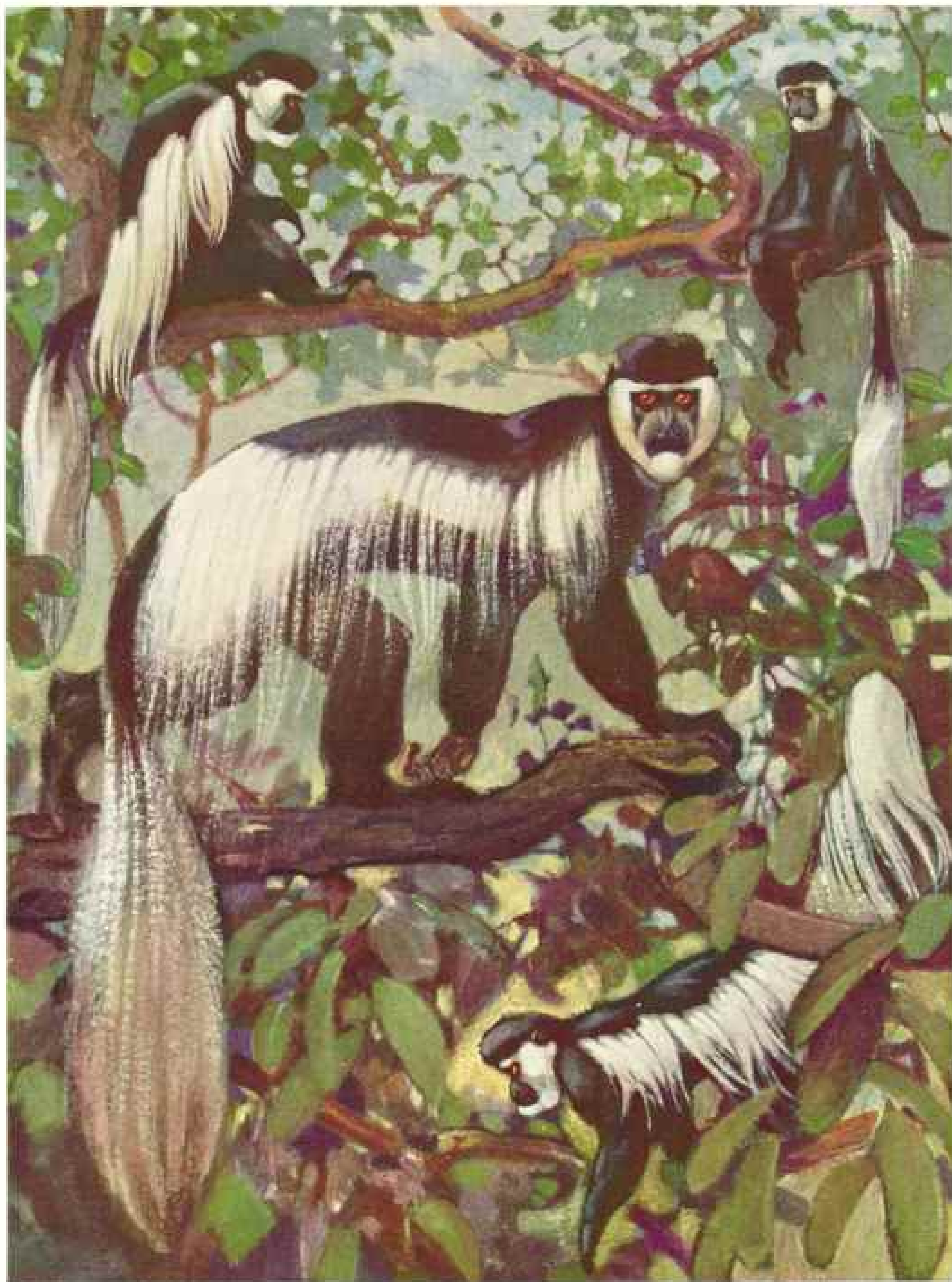
Painting by Elie Cheverlinet

TALAPOIN AND MUSTACHE MONKEYS HAVE AN AIR OF PERPETUAL WORRY

Their expressions belie their dispositions, for these little African tree dwellers are as carefree as butterflies. Both are guenons (Plates VII and VIII). Smallest member of that numerous family is the TALAPOIN (top pair) with its flaring side whiskers of brilliant yellow. The MUSTACHE (lower) combines the colorful sideburns with a lip adornment which comically fails to match.



WHO'S WHO IN THE MONKEY WORLD



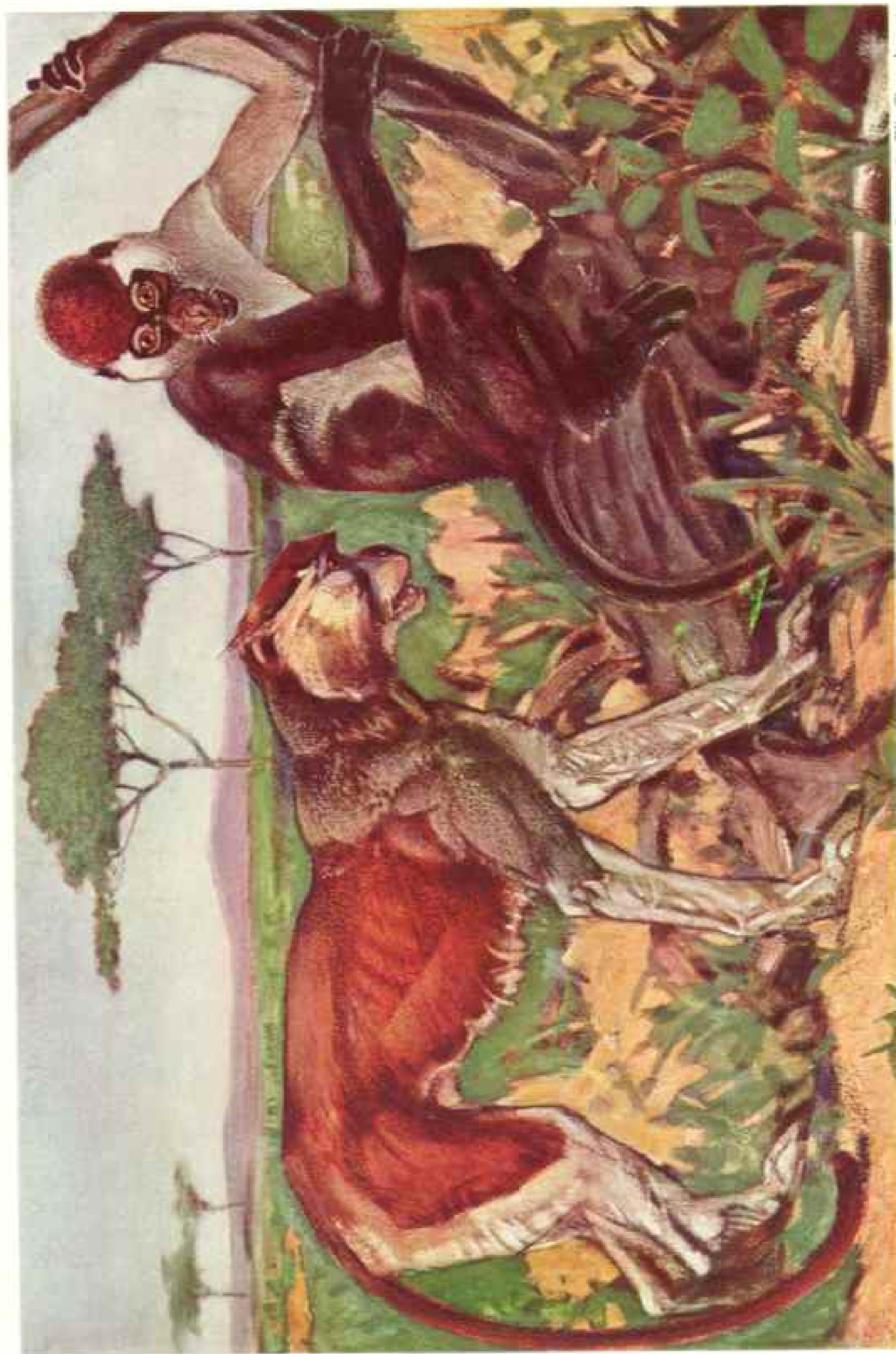
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Painting by Elie Cheverlunge

THEIR SILKY FRINGES LOOK LIKE WINGS AS THEY LEAP FROM BRANCH TO BRANCH

These striking beauties are GUEREZA MONKEYS, now becoming extremely scarce because of intensive hunting. Their lovely fur is prized alike by Parisian modistes and by African savages who use it for decorating their shields. The long, trailing white draperies and plumes serve the monkeys as natural camouflages in the moss-hung, light-and-shadow-marked jungles of Ethiopia.





© National Geographic Society

Painting by Elie Chevreton

# IN AFRICA NATURE HAS FITTED ONE MONKEY FOR LIFE ON THE GROUND, ANOTHER FOR DWELLING IN TREES

The Hussar (left), also known as the Military or Pata, shows a remarkable development of leg and arm muscles, while the hands and feet have become stubby and pawlike from generations of running over rocks and sandy plains. The result is more doglike than simian. In contrast, the Rapp-Headed Mangabey is equipped for an arboreal existence, with sinewy arms and four strong hands for clinging to branches. It purses its lips as if to be kissed.

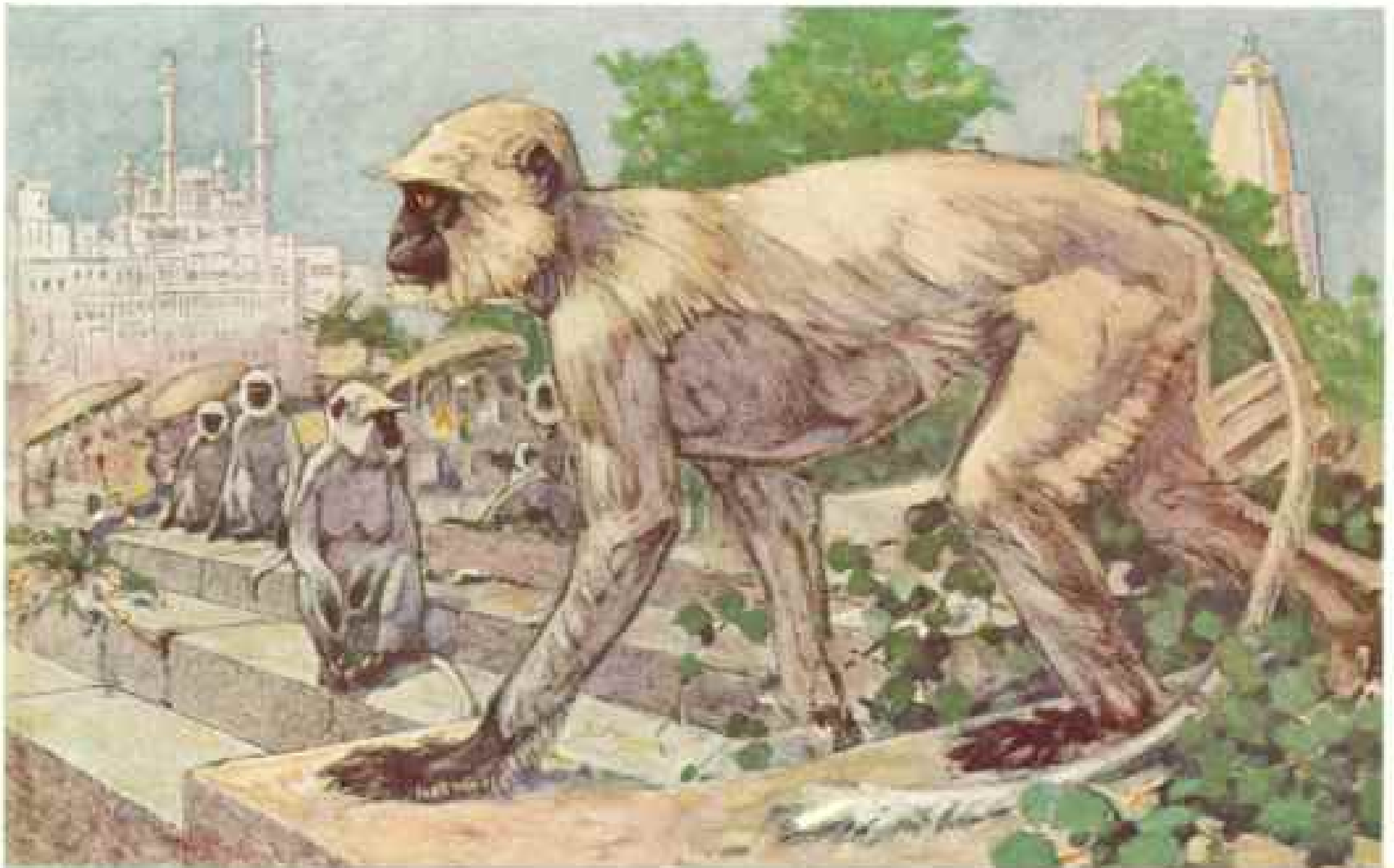


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Painting by Elie Cheverlange

EGYPT'S SACRED BABOON, THE HAMADRYAS, WEARS A LONG GRAY MANTLE; THE GELADA IS EMBLAZONED WITH A RED "HOURGLASS"

Though he looks like an old lady in bonnet and shawl, the Hamadryas (left) is a fierce, powerful fighter and sometimes in side shows is ballyhoed as "the lion-slaying gorilla." The Gelada (right), of the Ethiopian mountains, is another formidable fighter, with enormous canine teeth. A distinctive feature, besides the "hourglass" or "bleeding hearts" design on the chest, is the curiously turned-up nose with deep pits at the sides.



HANUMAN MONKEYS ARE SACRED IN INDIA—BUT NOTHING IS SACRED TO THEM!

These black-masked, jockey-capped rascals have free run of the temples and city streets, pillaging and playing pranks undisturbed, for the natives regard them as descendants of the monkey god Hanuman. Rather striking and unusual in appearance, the HANUMAN, or ENTILLUS, belongs to the slender, long-legged, long-tailed group known as the "langurs," an Asiatic branch of the simian tribe.



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Paintings by Ellis Cheverlange

BORNEO'S PROBOSCIS MONKEY WEARS NEARLY THREE INCHES OF "ROMAN NOSE"

Flaring outward and downward from the flesh-colored face, that astonishing organ somehow imparts a bizarrely human expression. In fact, the native name for the animal means "white man." Many attempts have been made to bring Proboscis Monkeys to the United States, but they always die. Their home is in dense jungles overlooking water, in which they swim.



## WHO'S WHO IN THE MONKEY WORLD



"SPEAK NO EVIL, SEE NO EVIL, HEAR NO EVIL," THESE PIOUS MONKEYS PREACH

JAPANESE MACAQUES are traditionally portrayed three in a row, with one holding its mouth, another its eyes, and the third its ears to point a threefold moral. The innocent expression on their red faces is a bit misleading, however, for these monkeys are full of mischief and will bite if angered. Inured to cold weather, they live among the pines of northern Japan.



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Paintings by Elie Cheverange

LONG CREST AND TINY TAIL IDENTIFY THE "BLACK APE" OF CELEBES

Characteristic, too, is the tremendous frontal ridge over the eyes. When a National Geographic Society expedition visited Celebes last year, this distinctive macaque was comparatively rare. The old fellow pictured here is seeking a sea-food dinner of crabs and shellfish to vary his usual diet of fruits, leaves, and grubs.





© National Geographic Society

Painting by Ellis Chevering

HORDS OF RHESUS MONKEYS SCAMPER UNDISTURBED OVER ROOFS AND WALLS IN INDIA, BIG-EARED BABIES CLINGING TIGHTLY TO MOTHER.

These were the "monkey-folk" of Kipling's *Jungle Book*, the bad, mischievous *bandar-log* who kidnapped the man-cub Mowgli. Though not so venerated as the Hanuman Monkey (Plate XIV), the Rhesus stands high enough in native esteem to be safe from harm despite continual mischief-making. It is found all over India and probably ranks as the most numerous of all monkeys, both in and out of captivity. Many are used in biological research or exhibited in zoos, while others see the world with circuses or as partners of the hurdy-gurdy man (Plate I).

When he returned he brought the monkey with him. He had simply stayed on its trail until he had worn it out. What happened to this boy during his two days alone in the East African big-game country should make a thrilling story, but we never could get a word out of him about it.

In West Africa lives the small group of monkeys known as the mangabeys (Plate XII). They have long tails and are especially characterized by conspicuous white eyelids. Gentle in captivity, they show recognition of friends by pursing their lips as if for a kiss.

#### MONKEY FUR IS PRIZED BY PARIS MODISTES AND AFRICAN SAVAGES

Of the "thumbless" Colobus Monkeys of East and West Africa, so called because the thumb is rudimentary, the best known and most striking is the Guereza of Ethiopia. Jet black, it has a mantle of long white hair on the sides and a long white bushy tail (Plate XI).

A number of related species live in various parts of Africa and are usually carefully protected by the authorities. They are inoffensive animals, staying in high trees and feeding on leaves. In captivity they are shy and morose, though occasionally one becomes accustomed to cage life, thrives for many years, and even grows playful and affectionate.

The fur is known commercially as "monkey fur" and has been exported in large quantities to Europe for use on women's clothes. Ethiopian warriors use it for decorating their shields.

#### A SIMIAN SYMPHONY

Bringing home a shipload of live monkeys is hard on the eardrums as well as the nerves. Returning from an African expedition a few years ago, I had seventy monkeys in cages stored in a row in an empty coal bunker. They soon learned that I was the good provider, and when I would come with food every one of the seventy would seize the bars of his cage and ask as loudly and raucously as possible to be served first.

The discord was so terrible that it really got on my nerves, and I would prepare a large basket of food out of their sight, dash in, start at the left side and put food in each cage as rapidly as I could. Instantly that particular cage would grow silent. The performance was somewhat like conducting a symphony in which one section of the orchestra is suddenly silenced.

Commonest and best known of all monkeys is the Bengal, or Rhesus, which is found over much of India and collected and exported by the thousands, not only for exhibition but for use in research work in disease (Plate XVI, opposite page).

In a single recent year there were records of 12,992 Rhesus Monkeys coming into the United States. They are susceptible to most of the diseases of humans, and much has been learned by the study of their reactions to medical treatment.

These animals are shipped in large crates and I have seen as many as a thousand in one cage awaiting inspection. Constantly playing when young and fighting when old, they invariably attract crowds.

#### RHESUS MONKEYS OUTDRAW A RHINO

There is a story of a disgusted circus owner who, at great expense, purchased a rhinoceros. When he came into the menagerie tent to see the reaction of his public, he found three persons in front of the rhino cage and 500 others looking at forty dollars' worth of Rhesus Monkeys!

The Rhesus belongs to a group of short-tailed monkeys called "macaques." One, the black, crested macaque of Celebes, has a tail so tiny as to be hardly worth mentioning, and, like the tailless Barbary Ape, is often called an ape for this reason (Plate XV). It is much more striking in appearance than the Moor Macaque (also from Celebes) on account of the tremendous crests over the eyes.

While collecting animals in Celebes last year, we made many inquiries about this so-called "Black Ape" and found it to be quite scarce; in fact, nobody had one nor would any of the natives promise to find a specimen for us. The Moor Macaque, however, is comparatively common, and as we were leaving we purchased four from a Chinese trader. They were in a bamboo cage and we did not look at them carefully.

Several days later, when we had more time, we were investigating our collection and found that one of the four belonged to the rare crested species, a tiny specimen which had deceived both the trader and ourselves. He is now disporting with his companions in a cage at the Washington Zoo.

#### IN SUMATRA A MONKEY DOES A MAN'S WORK

There are numerous other kinds of macaques, including the Crab-eating Macaque, the Pig-tailed, the large red-faced Devil Ape



Photograph by Maynard Owen Williams

#### OFF TO WORK IN THE COCONUT GROVE ON A BICYCLE BUILT FOR TWO

Perched at ease on the basket, the Pig-tailed Macaque is ready to ride to his place of toil. His Sumatran master sends him into the trees for sirihle nuts that are still green, for these contain water which is palatable to some. The monkey labors industriously, but if he feels he is being worked overtime, he will be sure to sulk.

from northern Siam, and, handsomest of the lot, the Wanderoo, or Lion-tailed Monkey, dark in color, with an enormous fringe of lighter hair around the head.

The Pig-tailed Macaque is the only monkey I know of that is definitely employed by man at useful labor. It is the coconut picker for natives in parts of Malaya and in Sumatra. Travelers have told about it, but often their accounts have been considered merely "travelers' tales" and have been doubted.

On our recent trip to Sumatra on the National Geographic Society-Smithsonian Institution Expedition, we saw many of these monkeys at work. Their owner takes one to a coconut tree and sends it up, fastened to a long string. The monkey climbs to the cluster of coconuts, twists off the right ones, and drops them to the ground (above, and opposite page).

In one native village I noticed—and coveted—a fine specimen of this monkey,

owned by a woman from whom I had just purchased a live dove. But when I asked if she wanted to sell the monkey, her reply was definitely in the negative.

"No," she said. "If I should sell you that monkey my husband would have to work."

#### A MONKEY MAGICIAN MYSTIFIES HIS MATES

It was a Javanese Macaque in our Zoo that became the deepest object of interest to his cage mates. Like many other Old World monkeys, macaques have large cheek pouches, which come in most handy at meal-time when everyone is eating out of the same pan. Food is hurriedly thrust into these pouches to be consumed later.

This Java Macaque seized a Brazil nut and crammed it into his pouch. He could not get it out and neither could the animal keeper; so an operation was necessary.

When the wound healed there was left a tiny opening, and the monkey discovered that he had become a magician. He could



Photograph by Maynard Owen Williams

#### MONKEYS REALLY WORK FOR A LIVING IN SUMATRA, PICKING COCONUTS

Pig-tailed Macaques, tied to long cords, are trained to climb palm trees and dislodge the fruit. They do not throw the nuts down, but merely work them free with their feet so that they will drop to the ground. Such reports once were discounted as idle tales of South Sea travelers, but members of the National Geographic Society-Smithsonian Institution Expedition to the Netherlands Indies saw the natives using the animals for this purpose. Dr. Mann tried to buy one, but his owner, a woman, refused, saying, "If I should sell you that monkey, my husband would have to work" (opposite page).





Photograph by Harrison W. Smith.

"STAND BY FOR INSPECTION"

Social obligation impels this Asiatic Macaque to aid pussy in the grooming operations. Failure to "spruce up" or fondle a mate makes a monkey an outcast in any troop, for simian friendship is based largely on this trait. Keepers, by rubbing the skins of hostile charges, often change their hatred to esteem. The pets belong to the captain of a ship which plies between Singapore and Sarawak.



Photograph from John Toulitzky

SACRED LANGURS OF INDIA MEET THE "FREE LUNCH" TRAIN DAILY AT DEHARI

Through the coaches the monkeys swarm, eagerly grabbing nuts, bananas, and other food the native passengers carry for them. Sometimes, when fruit is plentiful in the hills, they are late. Then the guard calls "Ao!" (Come) and the tribe scampers in from the hills. Langurs are useful to tiger hunters. Dashing through the trees, they follow and hoot at the big cats, their deadly enemies.



JIGGS, SIMIAN MOVIE STAR, REHEARSES WITH "THE JUNGLE PRINCESS"

The setting, on a tropical island, is for a scene in the new Paramount picture, *Jungle Love*, starring Dorothy Lamour. Shortly after the film was completed, the performing chimpanzee died, and a female, Anna, now is being groomed for similar roles. An article describing the great apes—chimpanzees, gorillas, orangutans, and gibbons—will appear in a later issue of *THE NATIONAL GEOGRAPHIC MAGAZINE*.

pass a straw right through his cheek and pull it out of his mouth. This he did hour after hour, his cage mates showing unmistakable interest in such magic.

The red-faced Japanese Macaque—the "speak no evil, see no evil, hear no evil" monkey—abounds in parts of Japan, where it is protected. It can stand extremely cold weather and in the United States lives out of doors throughout the year without suffering (Color Plate XV).

A pair of Japanese Macaques in the Washington Zoo had a curious habit of plucking the hairs from each other's face in a very definite pattern. They would trim away busily for hours at a time.

One species of macaque, the Tibetan, lives in the forests of eastern Tibet and is distinguished from the others by its large size and richly haired tail.

#### LANGURS ROAM SOUTHEASTERN ASIA

Slender, long-legged, and lacking cheek pouches, but provided with a tail as long as the head and body together, the members of the monkey group known as the "langurs" range over most of southeastern Asia, one species living in the highlands of Tibet.

We learned of them first from the writings of Robert Knox, who was a prisoner on Ceylon for nearly 20 years. In 1681 he wrote:

Photograph from *Wide World*

## "STORMY WEATHER"

In more ways than one, the outlook is gloomy for this small Rhesus. His expression infers that he appropriated the umbrella without permission and that he is well aware of his misdeed. Practical jokes are too often played by these Indian monkeys.

"They are as large as our English spaniel dog, of a darkish-grey colour, and black faces, with great white beards round from ear to ear, which make them show just like old men. They do but little mischief, keeping in the woods, eating only leaves and buds of trees; but when they are caught they will eat anything."

The best known of the langurs is the Hanuman, so sacred to the god of that name that it ranges throughout the villages of India, protected from all, and plundering at will (pages 635, 652, and Plate XIV).

Its natural food consists largely of leaves and buds, and, like other monkeys of the same feeding habits, it never lives very long in confinement. I believe this is due to some deficiency in nutrition in the diet we are able to provide.

The Himalayan Langur, a large relative of the Hanuman, lives among the pines and deodars of northern India and in Kashmir. Other species live in southern India. Some are called "leaf monkeys," probably on

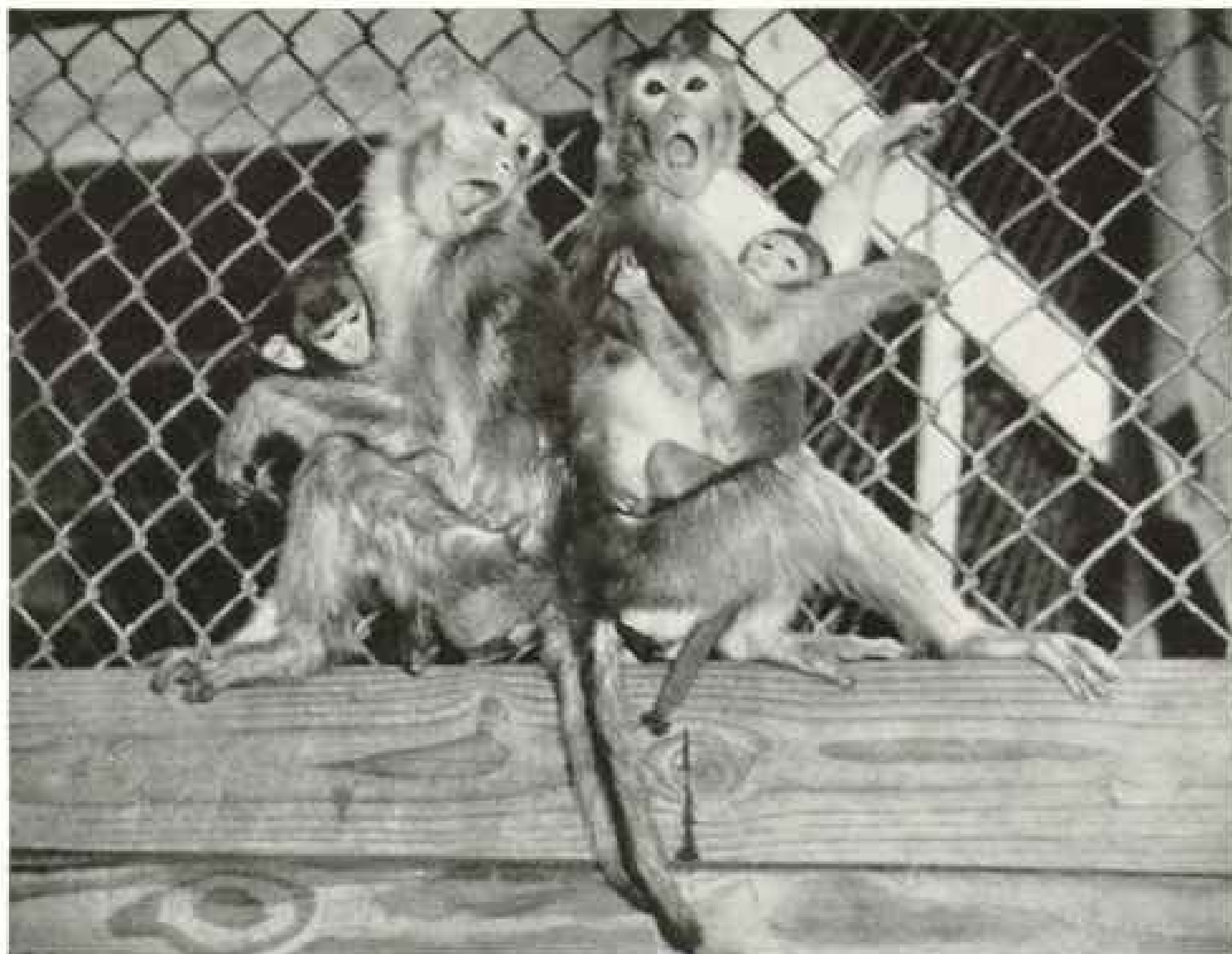
account of their leaf-eating habits. All have fringes of hair around their faces.

One of these is the Purple-faced Monkey from Ceylon, whose face is really purplish and surrounded by long whiskers.

In the naturally inhospitable highlands of eastern Tibet lives a langurlike monkey, the Tibetan, distinguished from all the others by its short, upturned nose. It occurs also in northwest China in the mountains of Kansu, in forests where snow lies on the ground for the greater part of the year, subsisting on such fruit as it can find and on bamboo leaves and shoots.

A relative of the langurs is the famous Proboscis Monkey of Borneo, known for its enormous elongated nose, which, in the full-grown male, projects nearly three inches outward and downward (Plate XIV).

Though common in Borneo, where they occur in troops in the forest, Proboscis Monkeys apparently cannot live in captivity. They become tame almost immediately after capture. They settle down



Photograph from Wide World

## TAILS ENTWINED, PROUD MOTHERS CROON A SQUEAKY LULLABY

Wide-open mouths also express an aversion to flashlight bulbs. The babies are about two and a half months old. Rhesus Monkeys in Central Park Zoo, New York City, enjoy displaying their offspring to admirers. Parents, inordinately pleased with their children, sometimes show them to friends so often and in such unfavorable weather that the effects are fatal.

and apparently are content; they eat vast quantities of food. Then for some reason—even in Borneo, their home—they suddenly drop dead. Nobody really knows why.

Many attempts have been made to bring them to Europe and America, but so far as I know only one has ever arrived alive—and that one died not long after reaching the Amsterdam, Netherlands, Zoo.

## A NEW HIGH IN MONKEY MISCHIEF

Once we had in our Zoo a Bonnet Monkey from India, which used to do the most daring thing I have ever seen done by any member of the simian tribe.

His next-door neighbor was a spotted hyena, and this beast the monkey delighted to entangle by poking straws through the keyhole.

But when this palled, the monkey carried his teasing to a new high in apparently suicidal foolhardiness. Stretching a long arm through the front bars of his cage and

between those of the adjoining one, he would rap the hyena on the nose and then whisk his hand deftly back just in time to escape the outraged jaws.

The feat was the more remarkable because the partition between the cages was of solid boards and the monkey, reaching around the corner, could not see the hyena. Nevertheless, the quickness of the hand never failed to deceive the eye. The monkey thoroughly enjoyed his joke and made it a daily practice.

This daredevil was a large male, with the bonnetlike tuft of dark hair which gives his species its name. In addition he wore earrings, his ears having been pierced by a former owner, and these adornments, combined with his hyena-baiting, helped to make him stand out as a definite character.

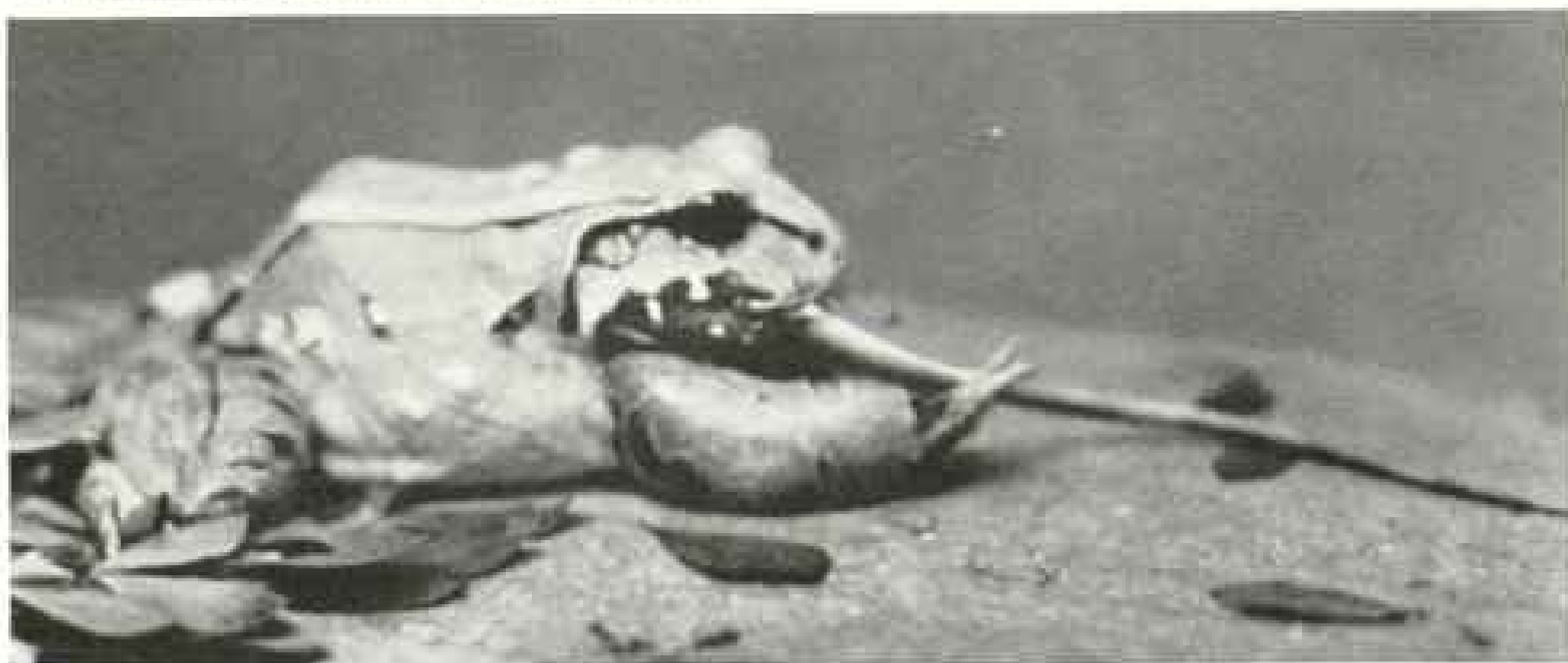
In fact, any monkey house is far more than a mere collection of animals. It is a collection of mischief, moods, and distinctive personalities.





JUMP! SNAP! SMOKY'S STEEL-TRAP JAWS CLOSE ON A YOUNG IGUANA

This captive smoky jungle frog in Panama, complacently devouring a lizard, seems stopped by a hind leg. Put a victim in the cage and, at its first move, the big frog bounds forward quickly to the attack, lashing out with its wicked tongue.



STUFF IN THAT LAST LEG—AH, THAT'S BETTER!

With both hands, as a child would grip a lollipop, old *pentadactylus* steers the lizard's tapering tail into his gullet. The author observed that victims were swallowed head first and suffocation quickly ended their thrashings.



SMOKY WAS A HANDFUL, IN MORE WAYS THAN ONE

His captor was kept busy catching bats, snakes, and lizards to satisfy the caged amphibian's voracious appetite. Any living creature, within two-thirds of his own bulk, was acceptable fare. His astonishing capacity was discovered when an eight-inch flycatcher vanished from the frog's cage!

# A FROG THAT EATS BATS AND SNAKES

## In Captivity, This Big Jungle Amphibian Exhibits an Extraordinary Appetite

By KENNETH W. VINTON

*Science Instructor, Cristobal High School, Panama Canal Zone*

*With Illustrations from Photographs by the Author*

IN THE gloom of caves or dense vegetation in Central and South America lives a creature which stands at the head of the class as a pugnacious carnivore and cold-blooded killer. Yet this ogre is nothing but a big frog, *Leptodactylus pentadactylus*, also known as the "smoky jungle frog."

The one I have in captivity will coolly attack and attempt to swallow almost any living thing, within two-thirds of its own bulk, that comes in range of its long tongue. Snakes, lizards, needle-toothed bats—all disappear into its bulging stomach.

We think of jaguars, crocodiles, and boa constrictors as dangerous, but, in proportion to its size, old *Leptodactylus pentadactylus* ranks second to none as a coldly ferocious fighter.

### ONLY A FROG, BUT WHAT A FROG!

I first met the smoky jungle frog as he splashed noisily through the shallow water in the mouth of a cave near Cristobal, in the Panama Canal Zone.

Three high school boys and I had come prepared to take flashlight pictures of the great masses of bats that clung to the rocky ceiling. As we reached for our flashlights at the sound of loud splashing, we all expected to see a crocodile whose retreat to the near-by jungle stream had been cut off by our sudden appearance.

But the beam showed only a large frog, his huge protruding eyes reflecting the light tinged with a reddish glow.

For an instant there were ejaculations of mingled surprise and disgust, spoken with such emphatic frankness that an ordinary frog would have wilted with shame. Then the boys dashed into the shallow water to make a capture.

The frogs—there were several in the pool—proved to be far more agile than they looked, and it was several minutes before two of the husky amphibians were securely clutched.

These spotted, thickset creatures were

difficult to hold, for their slimy bodies were likely to slip from the tightest grasp every time their great muscular legs shot backward with explosive suddenness.

On emerging from the cave, we found that the frogs were light tan, with mottled spots of a much darker tan, the whole color scheme shading away to pure white on the stomach and under parts. Later we found that the light tan on the back can, on occasion, turn to a dark brown.

In build these frogs were somewhat like the northern bullfrogs (*Rana catesbeiana*), with broad heads, large protruding eyes, and stout, burly bodies. Subsequent measurements showed their average weight to be about a pound each.

Their arms and legs were short and stocky, with bulging muscles. The feet were unwebbed and had five toes, while the front limbs showed the odd combination of four fingers and a horn on each hand.

On the underside of the male's body, between the arms, were two queer black-tipped, hornlike structures, having much the appearance of mammary glands. Examination showed them to be of a firm composition resembling that of a knob on a rubber tire (page 661).

Later observations of the jungle frog's food-getting habits indicated that one use of these odd structures was to prevent its victims from slipping when it clamped its muscular arms around them and drove its horned toes into their bodies while it crushed them in its awkward embrace.

A practical demonstration could easily be had by holding the frog in one hand and sliding the fingers of the other between its forelimbs. The explosive suddenness with which the powerful bowed arms clamped one's hand never failed to produce a recoiling reflex. Although the skin was never broken by the prod of the horned toes, a solid contact was far from comfortable.

It was about a year later when it occurred to me that these large frogs had



BEWARE, LITTLE FROGGIE, THAT FAT CANNIBAL'S DARTING TONGUE!

With his long muscular tongue, the smoky jungle frog can flip insects and small lizards into his throat and swallow them with one gulp. Only once during two years of captivity did the big frog overestimate his powers. A noisy, nimble little parakeet successfully withstood every attack (page 663). The small spotted frog is a rare Panamanian species.

not been given the consideration they deserved. With several boys I returned to the cave, but this time we searched its waters in vain.

#### UP POPS THE HERO—OR VILLAIN

It was as we were leaving the mouth of the cave that we met the hero—or perhaps the villain, depending upon one's viewpoint—of this story. A blue *Morpho* butterfly zigzagged gracefully across the trail and into the wall of green at its edge. As the nearest boy lunged at the beautiful creature with his net, a very large smoky-colored frog sprang from cover and, with long, graceful hops, fled for the cave.

Unlike most frogs, this one never hesitated in his flight, but continued his queer bounding pace until he had disappeared into the dark mouth.

When we rushed back in hot pursuit the flashlights quickly located him in the bottom of the pool, and as he proved to be a rather slow swimmer it was easy to maneuver the big amphibian into our dipnet.

His introduction to civilization did not seem to disturb the composure of the big

frog, for he sat in his pan of water and looked out through the side of his cage with the satisfied air of one who has returned home after a long and hazardous journey.

Possibly he did sense a vague feeling of safety after years of dodging crocodiles, boa constrictors, ocelots, hawks, and dozens of other natural enemies that would go a considerable distance out of their way to feast on his large, meaty body. However, the fact that he would eat nothing during the first week seemed to indicate that he was not entirely at ease in his new habitat.

#### GRASSHOPPERS BEGIN TO DISAPPEAR

Assuming that almost any frog's food resistance could be broken down by placing large grasshoppers in its presence, we tried to keep a few in his cage at all times. During the first week they crawled around until they died of starvation and had to be removed from the floor of the cage. But after about ten days the grasshoppers began to disappear.

In a short time the big frog would snap an active insect from the end of a long



SEEKING SHELTER IN THIS CAVE, BATS INSTEAD MEET SUDDEN DEATH

Snarling fruit-eating bats use this cool oasis in the jungle for a "hangar," while huge carnivorous frogs splash in shallow pools on the floor. Bats fluttering too low may be snatched and gobbled down by the agile amphibians. Here was captured the smoky jungle frog that Mr. Vinton kept in a cage to observe its amazing feeding habits.

pair of tongs. This proved to be an efficient method of feeding, but the main difficulty was in getting grasshoppers, for during the wet season in Panama they are scarce.

Cockroaches, beetles, and other insects were added to the bill of fare, but the problem of filling such a spacious stomach with small insects was a difficult one.

#### A FEATHERED CAGE MATE VANISHES

The answer to this problem came as an accident and just in time to save the frog from decorating a specimen jar, for I had about decided that he would be much easier to take care of if immersed in a solution of formaldehyde.

It was late one afternoon when a student rushed in with a bird that had flown into a wire and injured its wing. It was one of the species of flycatchers and about eight inches in length.

I was busy at the time and directed the student to put the bird in the frog's cage for safekeeping.

The next morning the bird was gone, and it took only a little probing to detect a large lump in the frog's stomach!

A few days after the flycatcher had disappeared a large mouse was placed in the cage, and as it ran across the floor the big frog came to attention, eyes bulging.

Reaching the corner of the enclosure, the mouse started to climb up the side—and here the story ended, for there was a sudden movement, a low smacking sound, and the frog was sitting back again as calmly as if the incident were just a part of the daily routine.

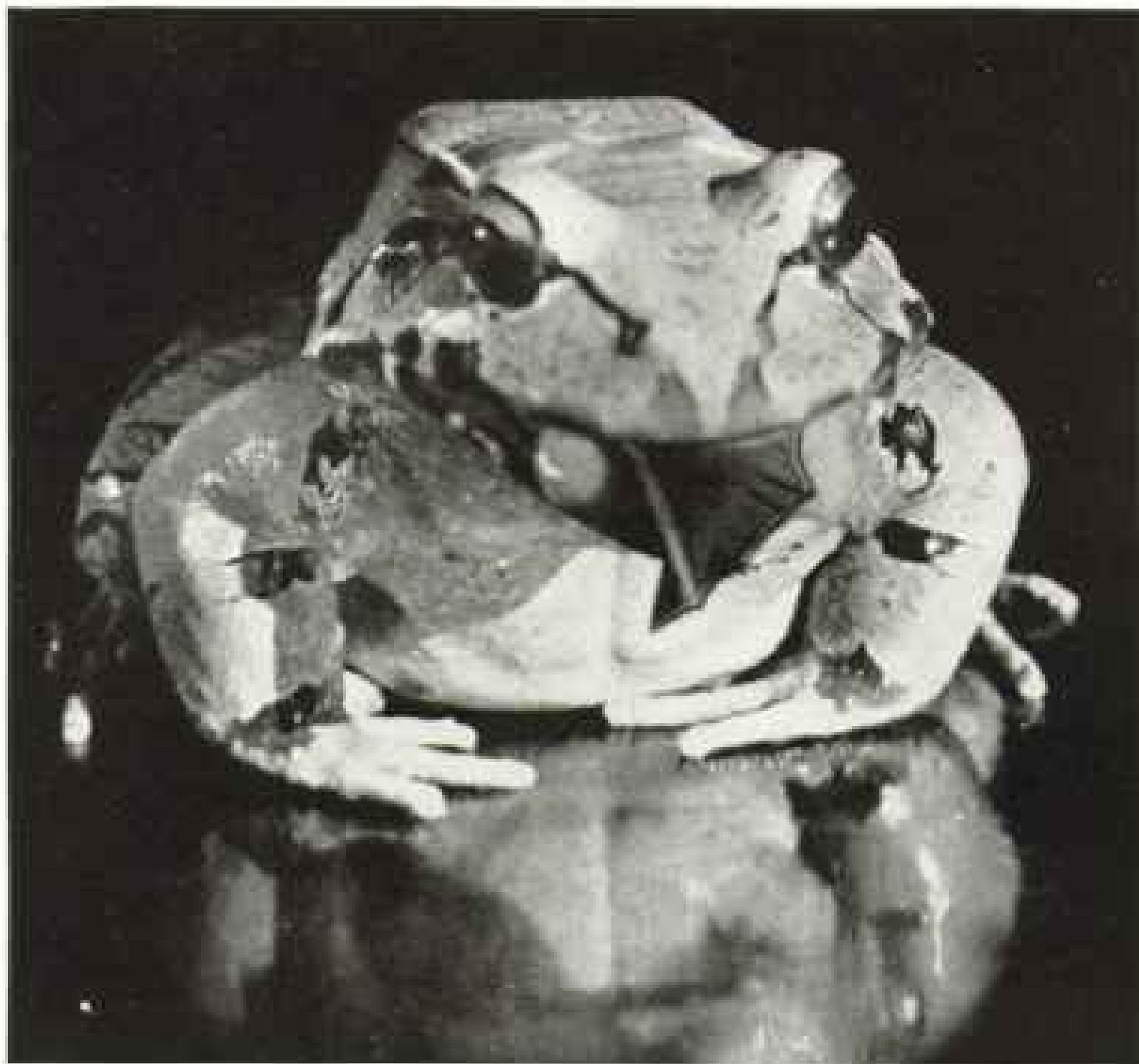
The whole movement had been too fast for the eye to follow, but the sleight-of-hand trick had not been quite perfect, for a small foot and the tip of a faintly twitching tail were still sticking out of one corner of his mouth.

The frog made no further movement for several minutes; then, apparently satisfied that the mouse was dead, he gave a gulp and the victim was in his stomach.

#### NOT ONLY A KILLER BUT A CANNIBAL

From this time on, the frog held the biological spotlight as he steadily increased his reputation as a cool, deliberate old killer of the first magnitude.





#### THE LAST OF A JUNGLE BAT

As awesome and deadly to its victims as an army tank, the smug frog brushes in with his flexible tongue the end of an obstinate wing. If the bat were not suffocated in Smoky's mouth and gullet before swallowing, the flying mammal's needle-sharp teeth could pierce the frog's stomach in one bite.

He proved himself to be not only a carnivore but a cannibal as well, for he devoured, without hesitation, all shapes and sizes of frogs and toads. He also showed a great fondness for lizards and young iguanas. It was not uncommon for him to swallow a lizard whose body was much longer than his own. X-ray pictures, taken after he had swallowed some unusually large specimen, always showed his stomach to be filled from pelvis to throat.

#### THE FROG'S MOST DEADLY POSE

These demonstrations indicated that the big frog had little preference in choosing his diet, but that he was quite particular concerning the manner in which the prospective food should behave before he became interested in it.

The choicest specimen might be within easy reach of his long, flexible tongue and he would not pay it the slightest heed unless it moved. But at the first signs of life the big amphibian was all attention.

This was his most dangerous pose, for any further movement on the part of the

intended victim was sure to be followed by a sudden swishing smack as the long muscular tongue snapped against the body of the creature.

If the object happened to be an insect or small lizard, it would be picked up bodily by the nimble tongue and flipped back into the yawning jaws with such suddenness that there could be no opportunity for resistance before it had disappeared down his throat.

The whole movement was executed so quickly that it left the observer half wondering whether there really had been

anything there in the first place.

When the victims were too large to be swallowed at one gulp, he exhibited unusual dexterity in the use of his hands as he gripped their bodies and steered them into his mouth (page 656).

The frog always opened the attack by shooting his muscular tongue against his opponent's head or body and jerking him off balance; this was followed almost simultaneously by the pull of the grasping hands that directed the unlucky creature's head into the gaping mouth.

Once this was accomplished, the frog's hands were kept busy brushing obstinate legs, tails, and wings away from the corners of his mouth so that they would not hinder the progress of the unfortunate specimen through the yawning gullet. Occasionally, when he encountered creatures that were difficult to swallow, he resorted to his bear-hug tactics to keep them from escaping before he had the head well into his jaws.

On the day the frog attacked a young opossum (*Didelphis marsupialis etensis*) he earned his meal, for the opossum, with his

large, bony legs and tail, was as big as three or four mice.

On this occasion he used his usual technique of snapping the head of his prey into his mouth before it had a chance to offer resistance. The frog seemed to know that he could not hold the opossum as he had the mouse, for after a little preliminary skirmishing he swallowed the young marsupial down as far as he possibly could.

The opossum resisted death to the last. One could see his head working around in the frog's stomach, and, even though I knew his teeth to be immature, whenever a large bulge protruded from the frog's side I half expected to see a hole appear and a pointed nose push through the body wall.

At the same time the prehensile tail, most of which was still unswallowed, lashed about until it came in contact with the frog's arm and promptly wrapped around it in a death grip. The opossum, however, was fighting a losing battle. In three or four minutes he went limp and was completely swallowed.

Of all the creatures that the smoky jungle frog feeds upon, the bats are probably the most dangerous, for their needle-sharp teeth could, if given a chance, cut through the stomach wall in one bite.

Nevertheless, the bats appeared to be one of his favorite foods, for he never allowed



POWERFUL ARE VISELIKE ARMS AND HORNY HANDS

Built like a wrestler, the smoky jungle frog often uses bear-hug tactics to hold larger creatures until he can cram their heads into his throat. Few victims can escape the grasp of muscular, bowed forearms, spurlike thumbs, antiskid knobs on his rough chest (page 657).

one to stay in his cage very long without attacking it. He had probably eaten many bats before, for thousands of them must have fluttered past him every evening as they flew from their cave in search of food.

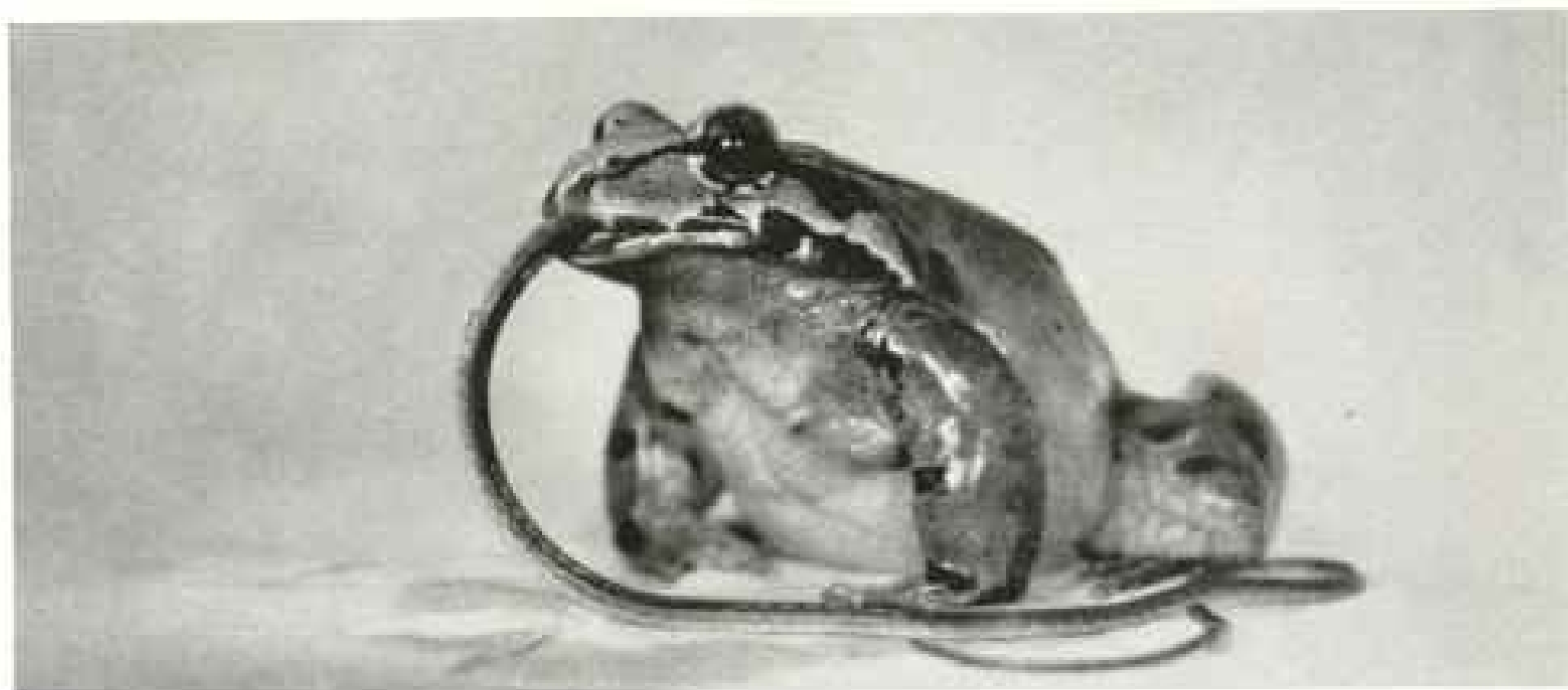
He would seize a bat head first and hold it in his mouth until it was dead; then, after considerable clawing and scraping with his hands, he would straighten out the wings so that it could be swallowed.

On one occasion, after he had devoured a large fruit-eating bat, I found that there were a few scratches in the back of his lower jaw which were bleeding slightly. This was exceptional, however.



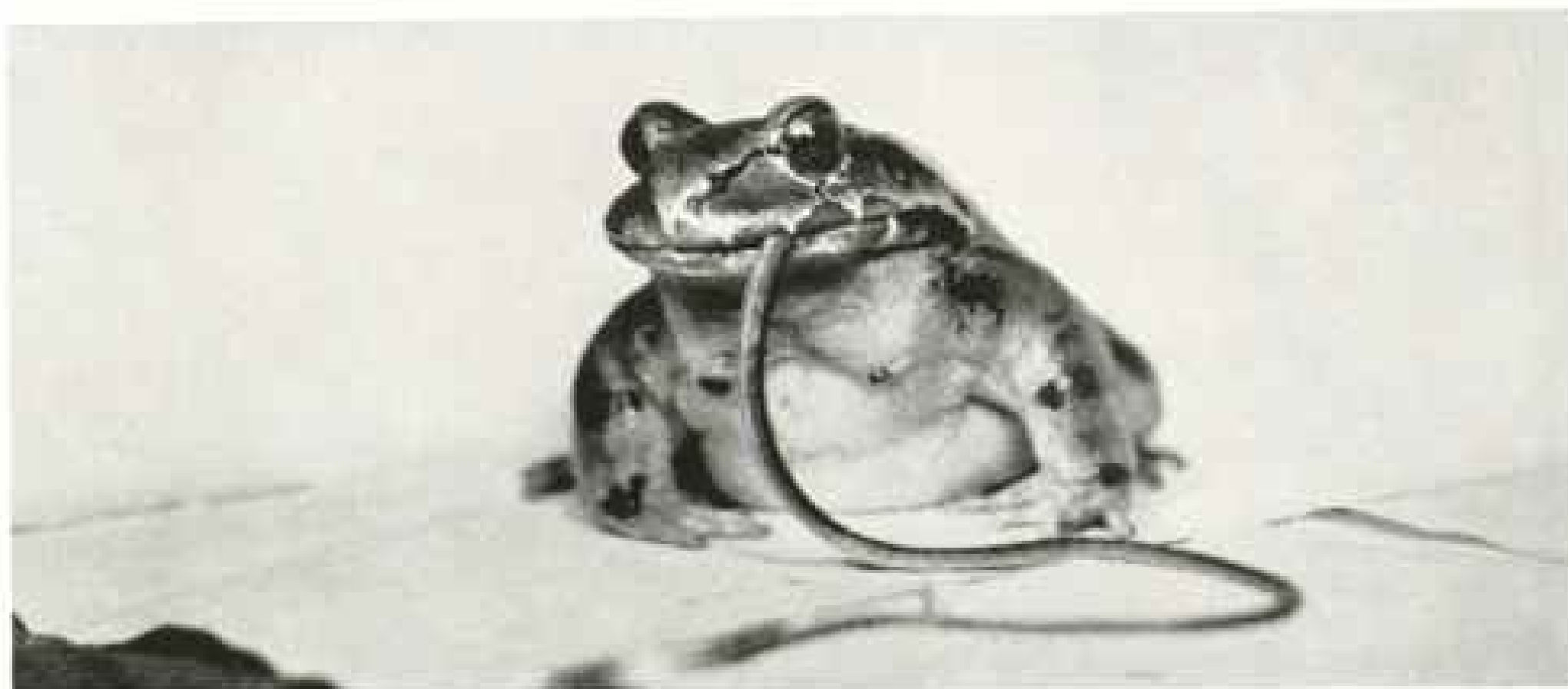
FIRST MORNING—FROG SWALLOWS SNAKE'S HEAD AND FIGHT IS ON

This time the frog's big eyes proved bigger than his stomach! Before suffocation, the  $4\frac{1}{2}$ -foot green tree snake thrashed about fiercely, curling its wriggling body about the attacker. Here the reptile grows limp and the two-day swallowing marathon has begun.



NEXT MORNING—SMOXY WAITS FOR HIS STOMACH TO MAKE MORE ROOM

Gorged but confident, the killer eats his way along the snake—the thickest part already inside him.



THAT EVENING—THE SNAKE'S END IN SIGHT!

After 36 hours of swallowing, the tail has mellowed with age. The following morning the last of the reptile had vanished.

The evidence indicates that the frog finds safety in his highly efficient surprise attack which leaves the most seasoned warrior gasping for breath.

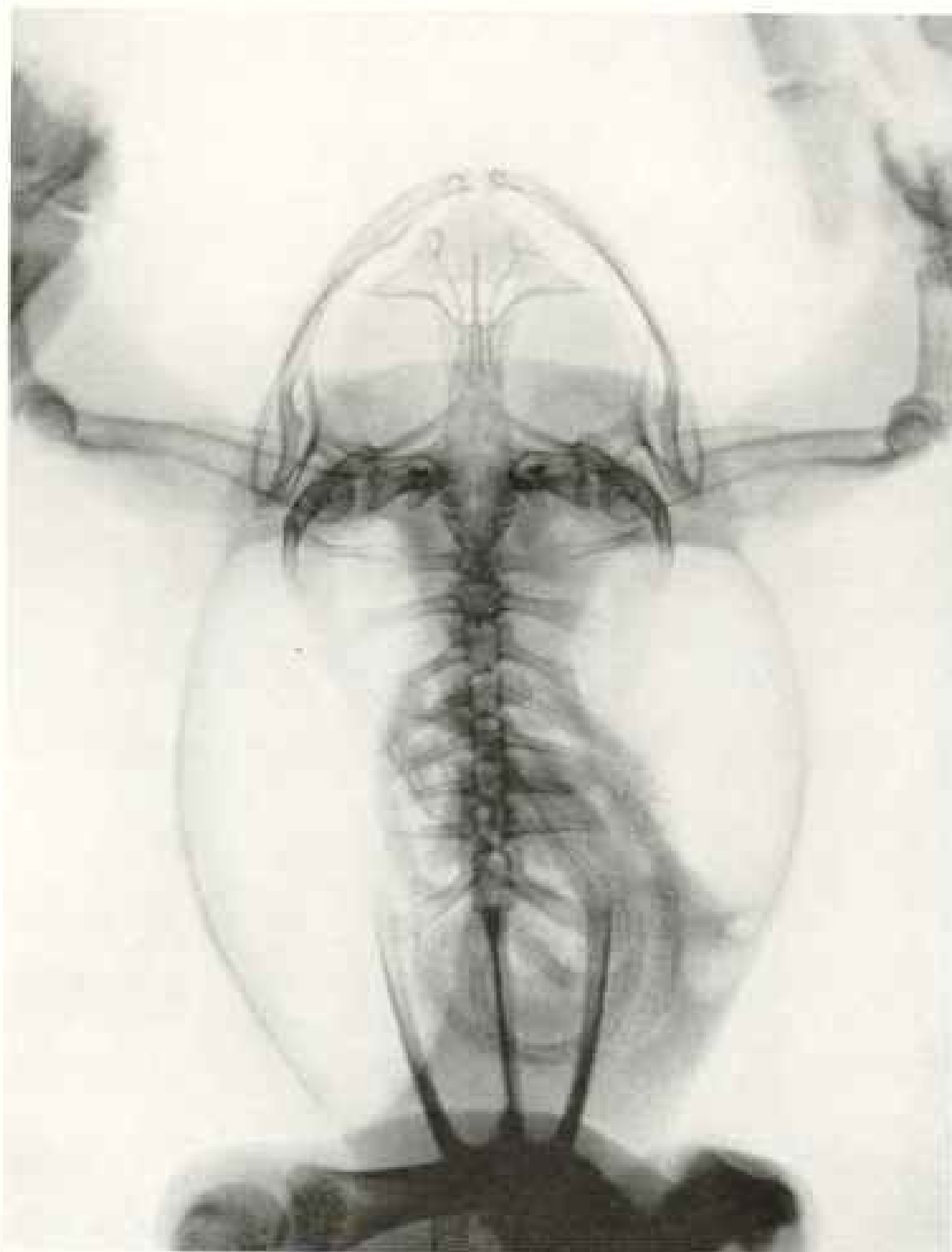
During two years of captivity, the frog made only one error in judgment — a noisy little parakeet. The parakeet, like its larger relative, the parrot, is a perching and climbing bird and has a thickset, powerful little body, short legs with strong grasping feet, and a large hooked beak.

The frog apparently failed to make these observations, for as soon as the parakeet walked within striking distance he confidently snapped his long tongue against the unsuspecting bird.

The parakeet, taken by surprise, was jerked off balance by the sudden pull of the frog's tongue, but he was too strong a bird to be bowled over so easily. With a startled squawk and vigorous beating of his wings, he recoiled so violently that he tore himself free.

The big amphibian was not convinced of his error, however, for time after time he repeated his attack. The results were always the same: a series of piercing squawks accompanied by a violent thrashing of wings and the scratching of clawed feet on the floor; then the bird would be free again.

The parakeet probably had his narrowest escape when he was attacked while



X-RAY SHOWS UP A FROGFUL OF COILED RAT SNAKE

The 29-inch reptile appears as a dark mass in the lower right corner of the egg-shaped abdomen. At first wary of attacking the snake, Smoky finally caught it off guard when it slipped and fell while climbing. Only after a violent struggle did the frog kill his lashing victim. The smoky jungle frog is only one of many carnivorous species that eat creatures approaching their own bulk.

standing on the edge of the frog's water pan, because, in the mad scramble that followed, he fell into the shallow water.

Taking full advantage of the situation, the frog followed the bird into the water and grasped it around the body with his strong arms.

In the light of the amphibian's past performances it seemed impossible for the bird to escape. But escape he did, though not without a terrible flopping and splashing interspersed with shrill screams. After four or five seconds he clawed and pecked his way out of his unwelcome bath and climbed,



wet and shivering, to the top of the cage.

It was plain that the bird's ego, a quality with which he was generously endowed, was badly shaken, for it was several hours before he began his usual chattering and strutting.

#### SWALLOWING A 29-INCH SNAKE

Of all the frog's food-getting episodes, perhaps the most dramatic was the time he swallowed a 29-inch spotted rat snake.

Two reptiles—the rat snake (*Spilotes pullatus*) and a stocky little 26-inch boa constrictor (*Constrictor constrictor*)—had been living in the same cage with the frog for a long time, and it appeared that each member of the trio was more or less respectful of his neighbor's combative powers. As a result, each one kept to himself and there had never been a serious quarrel.

The clash between the frog and the snake was, in a way, the result of an accident: it possibly would never have happened if the rat snake had not been climbing up the side of the cage, lost its grip, and slid suddenly to the floor with its head a few inches from the amphibian's nose.

The frog, acting as if he had been waiting for this very thing, snapped the snake's head into his mouth almost before the spotted reptile had completed its fall.

The snake lashed about wildly, coiling itself around the frog and exerting every effort to withdraw its head from the suffocating throat.

The frog thrust off the coils with his strong hands; then, grasping the snake's body, he drew it in and swallowed the head still deeper.

At about this time the prehensile tail of the snake found the dry branch that had been placed in the cage for the reptiles to climb upon. In a few seconds it had wrapped its body around the branch in a series of smooth, tight figure eights.

The frog swallowed the snake up to the branch, clamped his jaws hard, and pulled, but the figure eights would not move.

Growing more impatient, he doubled up, and, placing his feet on the branch, he lunged backward with all his strength. As he did so, two or three inches of snake slipped out through his jaws and had to be quickly reswallowed to keep it from forming another loop on the already heavily wrapped hitching post.

The frog, by this time, had swallowed six or eight inches of the snake's body and he seemed as determined as a bulldog to increase this advantage. He shook his head sideways, he bounced, and he jerked until the snake's round body had, in the region of his mouth, taken on the appearance of a piece of flat, badly stretched tape.

In this struggle, as in all others, the amphibian was sure of ultimate victory, for even a snake cannot live with its head in a frog's stomach.

After about an hour it appeared that the snake was nearly dead, for the loops of the figure eights were losing their tenseness. This seemed to give the frog renewed hope, and with persistent pulling and jerking he gradually dragged a few more inches of the resisting snake from the branch.

Finally, after nearly an hour and a half, a vigorous tug stripped the last lifeless coils from their support and the battle was over.

By this time the amphibian's spacious stomach was bulging like a blowfish's; so, in spite of his vigorous gulping, several inches of the reptile's tail refused to disappear.

This did not seem to bother the frog, however. After he had made sure there was no more room in his stomach, he stopped swallowing, and, with the tail still hanging from the corner of his mouth, he settled down with a philosophic air to wait for his digestive juices to make room for the last morsel. Inside of an hour the last of the snake had disappeared.

More recently, the frog swallowed a four-and-one-half-foot green tree snake, overestimating the capacity of his stomach by two and a half feet of snake (page 662).

#### STRANGE MEMBER OF AN ODD CLAN

There are nearly 2,000 species of frogs scattered over the earth. There are giant frogs and pigmy frogs, climbing frogs and burrowing frogs, hairy frogs and horned frogs, and frogs that carry their young in the skin of their backs.\*

But of all the odd members of the order, the strangest, to me, is this carnivorous, icy-hearted killer that lurks in tropic caves.

\* See "Our Friend the Frog," by Doris M. Cochran, with 14 illustrations in color from paintings by Hashime Murayama and 16 from photographs, in THE NATIONAL GEOGRAPHIC MAGAZINE for May, 1932.

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To carry out the purposes for which it was founded fifty years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material which The Magazine can use, generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

Immediately after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

The Society cooperated with Dr. William Beebe in a deep-sea exploration of undersea life off Bermuda, during which a world record depth of 3,028 feet was attained August 15, 1934, enabling observations of hitherto unknown submarine creatures.

The Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed \$100,000 to Admiral Byrd's Antarctic Expeditions.

The Society granted \$25,000, and in addition \$75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the forest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

The Society's notable expeditions to New Mexico have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast ceremonial dwellings in that region, The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to an officially recognized altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

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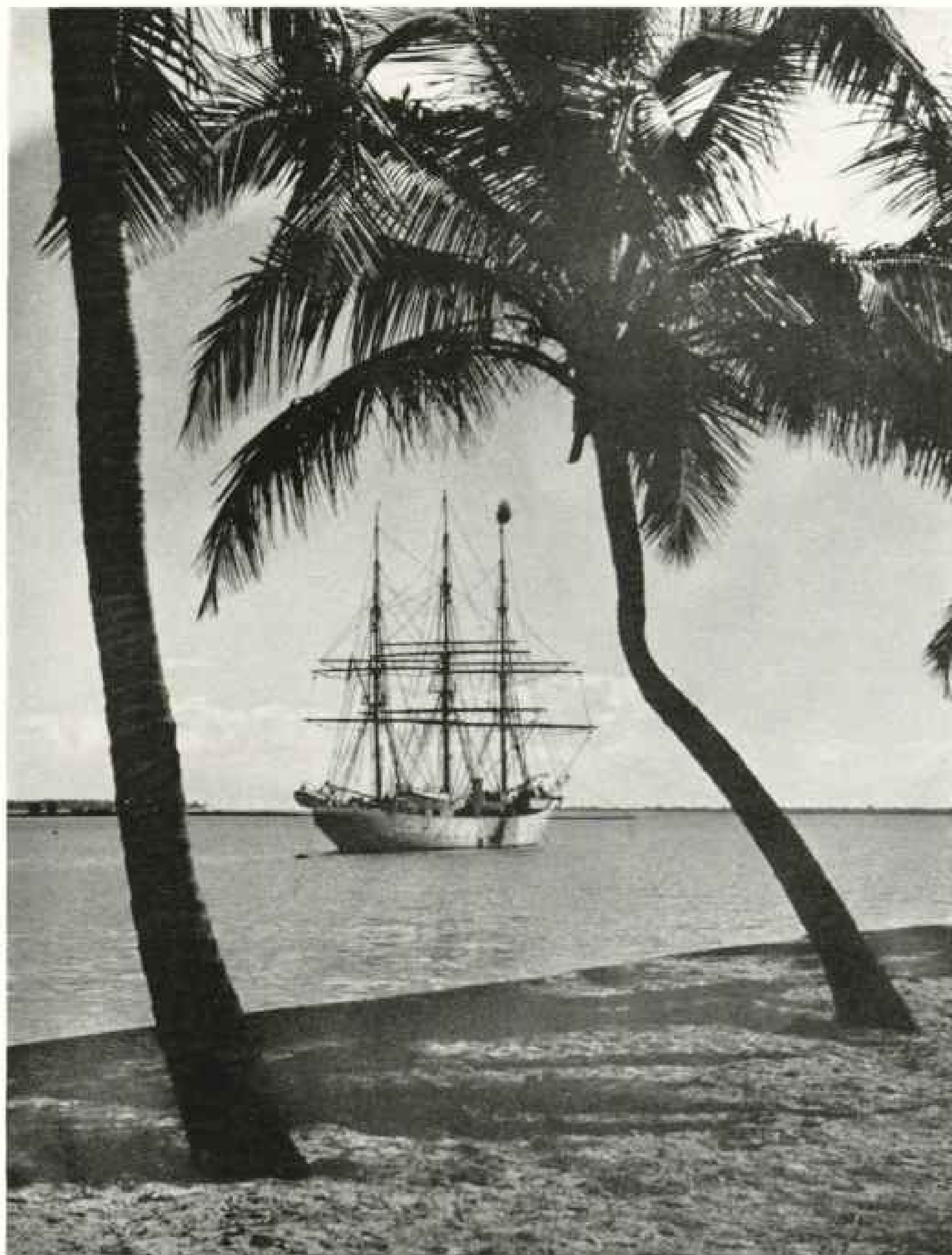
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A "twelve," to many people, still denotes a car for the wealthy alone. In times past, that has been true. Today it is no longer true. *This "twelve" is medium in price.* It is still true, however, that a "twelve" is a smoother, gentler,

and a more luxurious ride—and more fun!

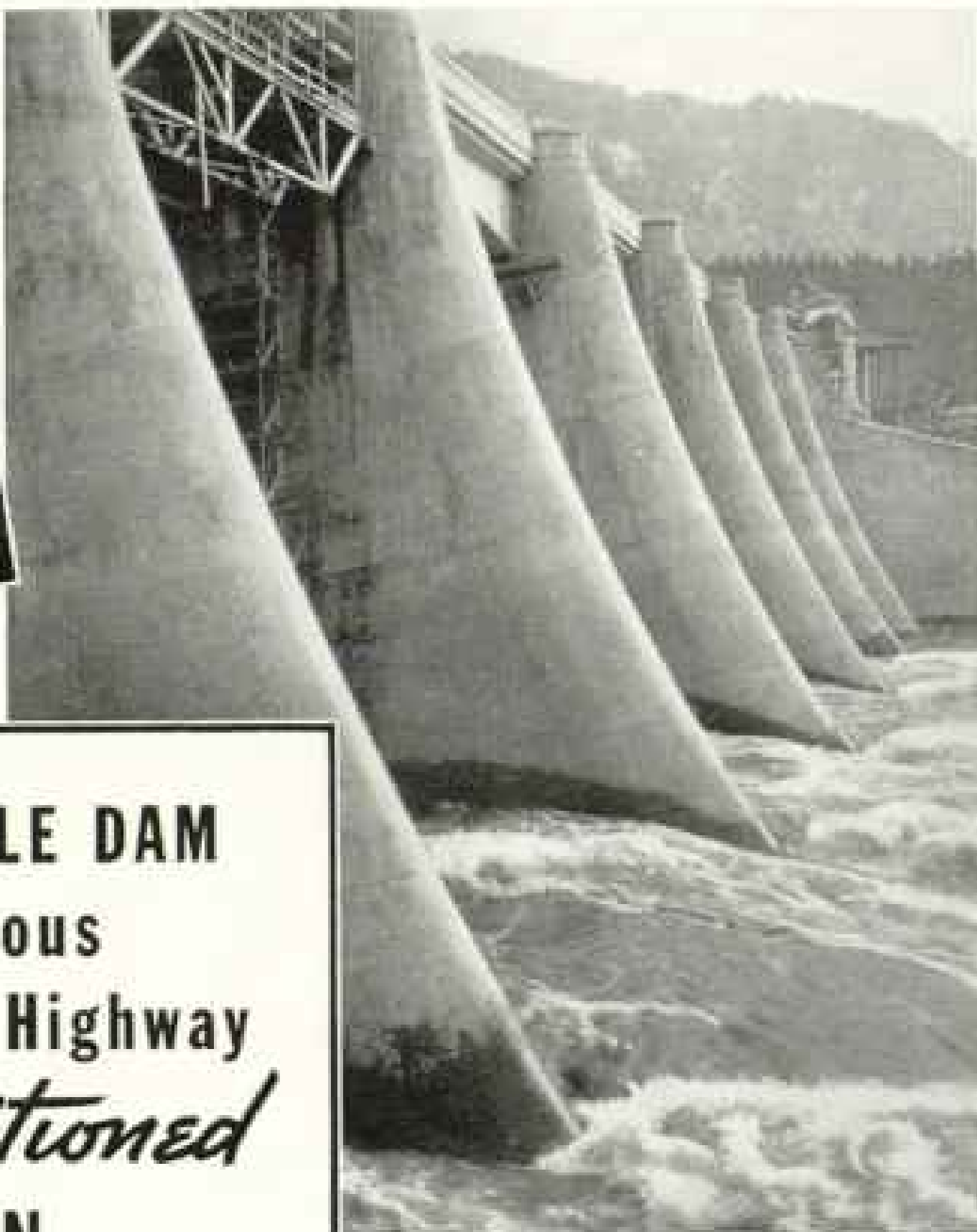
This "twelve" is not only ahead in number of cylinders. It is advanced in all ways. It is a new idea for a 12-cylinder engine to give 14 to 18 miles to the gallon. Yet this engine does, cheerfully. It is a new idea to provide so much size, safety and luxury at medium price. Yet this car provides them.

Modern in appearance and performance, the Lincoln-Zephyr is today's new transportation. It will give more pleasure than you thought a car could ever give. It will open roads you thought you might never see. It offers the kind of travel you thought might not come for years! Lincoln Motor Company, builders of Lincoln and Lincoln-Zephyr V-12s.

*Lincoln-Zephyr V-12*



*Majestic Mt. Hood, where you may ski in midsummer.*



**See BONNEVILLE DAM**  
on the famous  
**Columbia River Highway**  
in *Air-Conditioned*  
**OREGON**



*St. Peter's Dome as seen from an aisle of greenery on the Columbia River Highway.*

**R**ivalling the famed Columbia River scenery for fascination is Bonneville Dam—Uncle Sam's gigantic navigation-power project. For here is one of the greatest engineering wonders of the world, a tremendous enterprise costing more than \$50,000,000. Completed after four years of construction, it now harnesses the power of the mighty Columbia and extends navigation for ocean-going vessels 187 miles from the mouth of the river.

Bonneville Dam is located directly on the beautiful Columbia River Highway (U.S. 30). See here the highest ship lock in the world. Take the famous Mt. Hood Loop trip in rhododendron time. Or drive on down the lower Columbia River Highway to Astoria, first settlement in the Pacific Northwest, where the river meets the ocean.

See all of *air-conditioned* Oregon. It is a land of cool summer nights; invigorating days. Vacations here are inexpensive. Average expenditures of motorists visiting Oregon in 1937 was only \$3.60 a day. Send for the State's illustrated booklet. We will include a new folder on Oregon's wild flowers if you make special request on margin below or by letter.

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Thanks to America's farmers, your crankcase now stays "FULL" longer . . . you use *less* oil yet get *better* lubrication for your engine.

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**RESULT:**

*Stays* **FULL** *longer*

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**25** CENTS A QUART



• Sailing Alaska's smooth ocean lanes, your ship will pause before a sparkling blue glacier that towers perhaps three hundred feet from the water's edge. Then, the Captain, like Joshua of old, sounds the ship's whistle to bring down tumbling, thundering tons of ice, as fell the walls of ancient Jericho!

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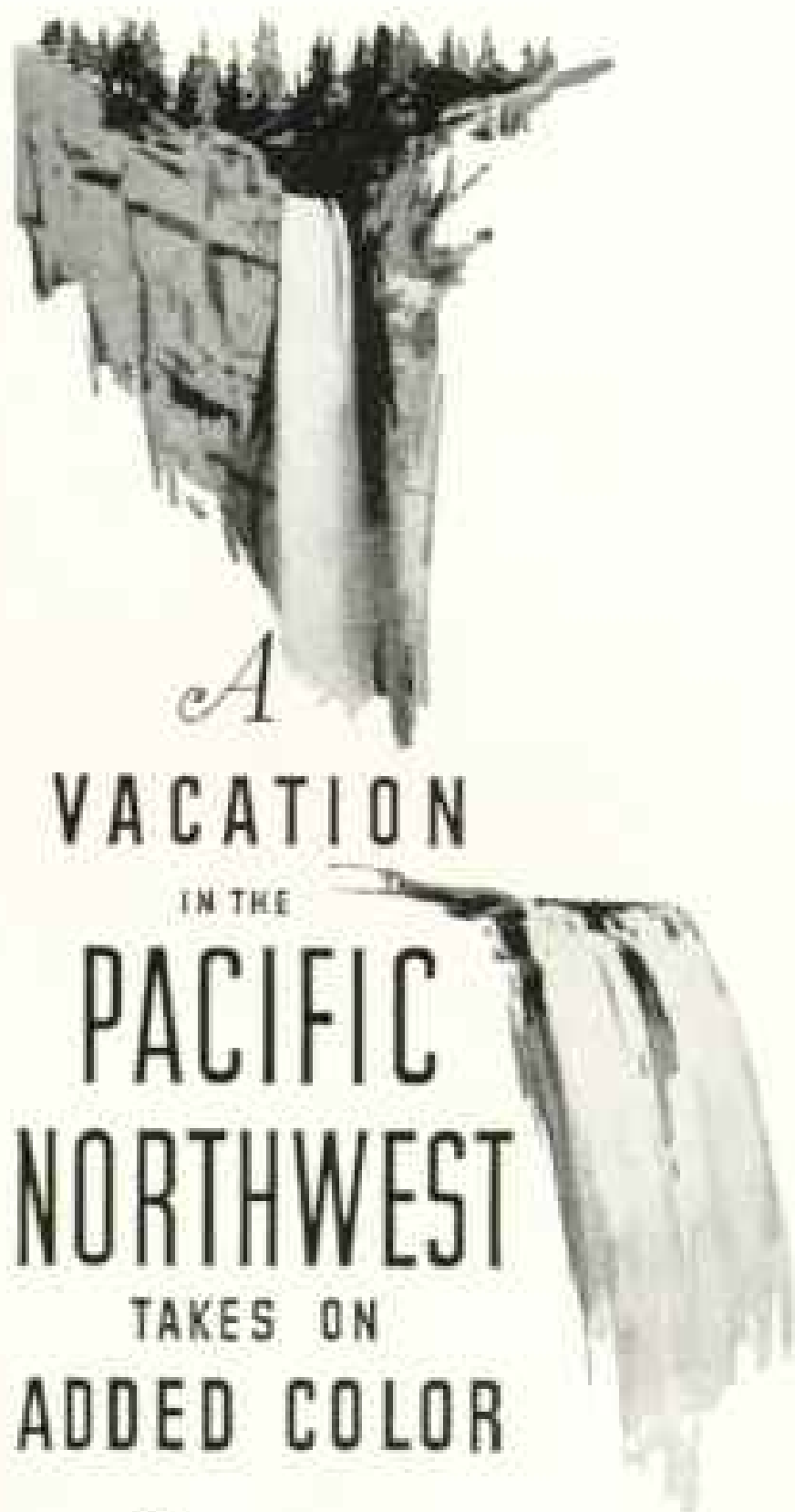
NORTHERN PACIFIC  
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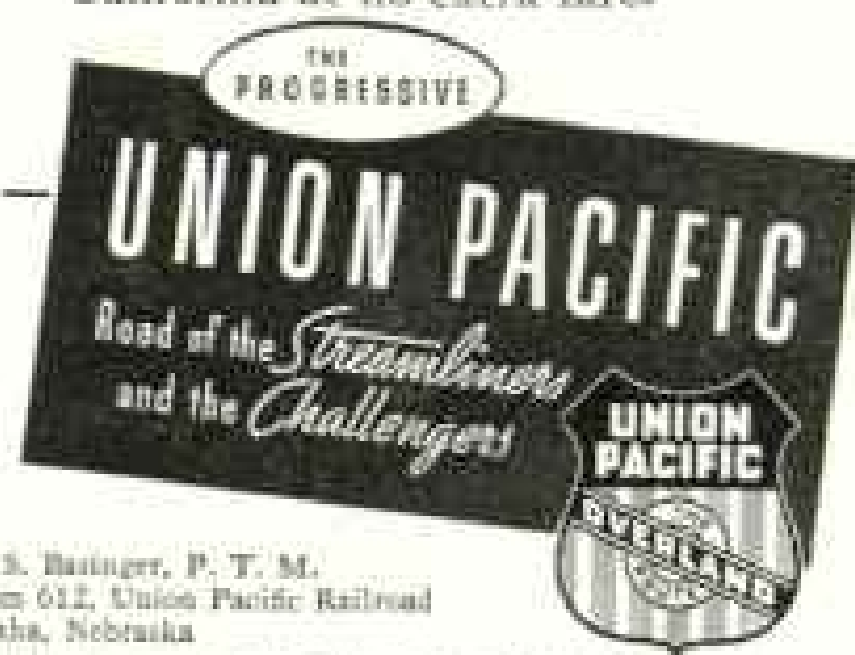
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# These little spuds went to market



IT seems very simple for a woman to drop in at her grocer's and say:

"I'll have a peck of potatoes—25 pounds of flour—a pound of coffee—half a dozen oranges—a package of corn flakes—and how's your lettuce today?"

But did you ever wonder how all these things find their way to the corner grocer?

Instead of one woman, think of twenty-five million who do the buying for their families.

Instead of a peck of potatoes, think of three and a half million *tons* delivered to all the corner grocers in a year.

Think of 8,600,000 *tons* of wheat flour—1,790,000 *tons* of oranges and grapefruit—868,000 *tons* of cereal and you begin to see the amount of food moved by the railroads every year.

Coming back to the potatoes—the average

distance this humble food travels by rail, between the fields where it is raised and the counter where it is sold, is 741½ miles.

And the only thing which can make potato-raising profitable for many people is the fact that their potatoes can get to a market several hundred miles away.

If that transportation were not easy—potatoes would pile up unused in the country—while city people paid fancy prices for the few that could be hauled in.

This in a simple way demonstrates the indispensable part the railroads play in helping the man who raises food to find a market—and the consumer to enjoy the pick of the nation's food at a reasonable price.

The rate at which this service is rendered is low—no other form of transportation could handle the tonnage at close to the price if in fact it could handle it at all.

ASSOCIATION OF  
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EMERGENCIES LIKE THIS



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In exhaustive road tests made by the largest independent testing laboratory in the country, against regular and premium-priced tires of America's six largest tire manufacturers, no tire tested, regardless of price, came up to this new tire in non-skid action.

Here, at last, is a tire so utterly different in action that, at the first sign of a skid, it turns the wet road under your car into a "dry" surface.

See your Goodrich dealer or Goodrich Silvertown Store for a thrilling demonstration ride. For safety's sake, ride on Goodrich Safety Silvertowns.

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**B**OTH regular, and also the premium-priced tires of America's six largest tire manufacturers were submitted to a series of exhaustive road tests made over a three months' period by us, to determine their resistance to skidding and wear, with the following results:

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PITTSBURGH TESTING LABORATORY



### 2 LIFE-SAVING FEATURES . . . AT NO EXTRA COST!



The never-ending spiral bars of the Life-Saver Tread act like a battery of windshield wipers—sweep the water right and left—force it out through the deep grooves . . . give the rubber a dry track to grip.



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# The new Goodrich SAFETY Silvertown

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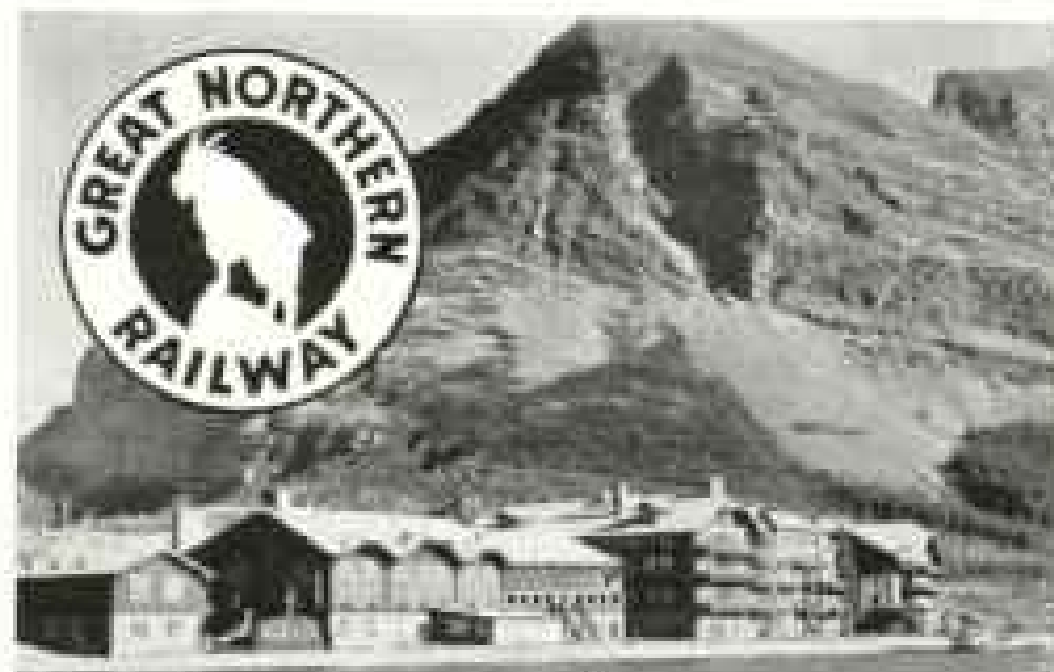
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**Only one cleaner gives you all these time-and-work-saving conveniences—plus other exclusive features. It is a Hoover Cleaning Ensemble. Any woman can own one for as little as \$1.25 a week.**



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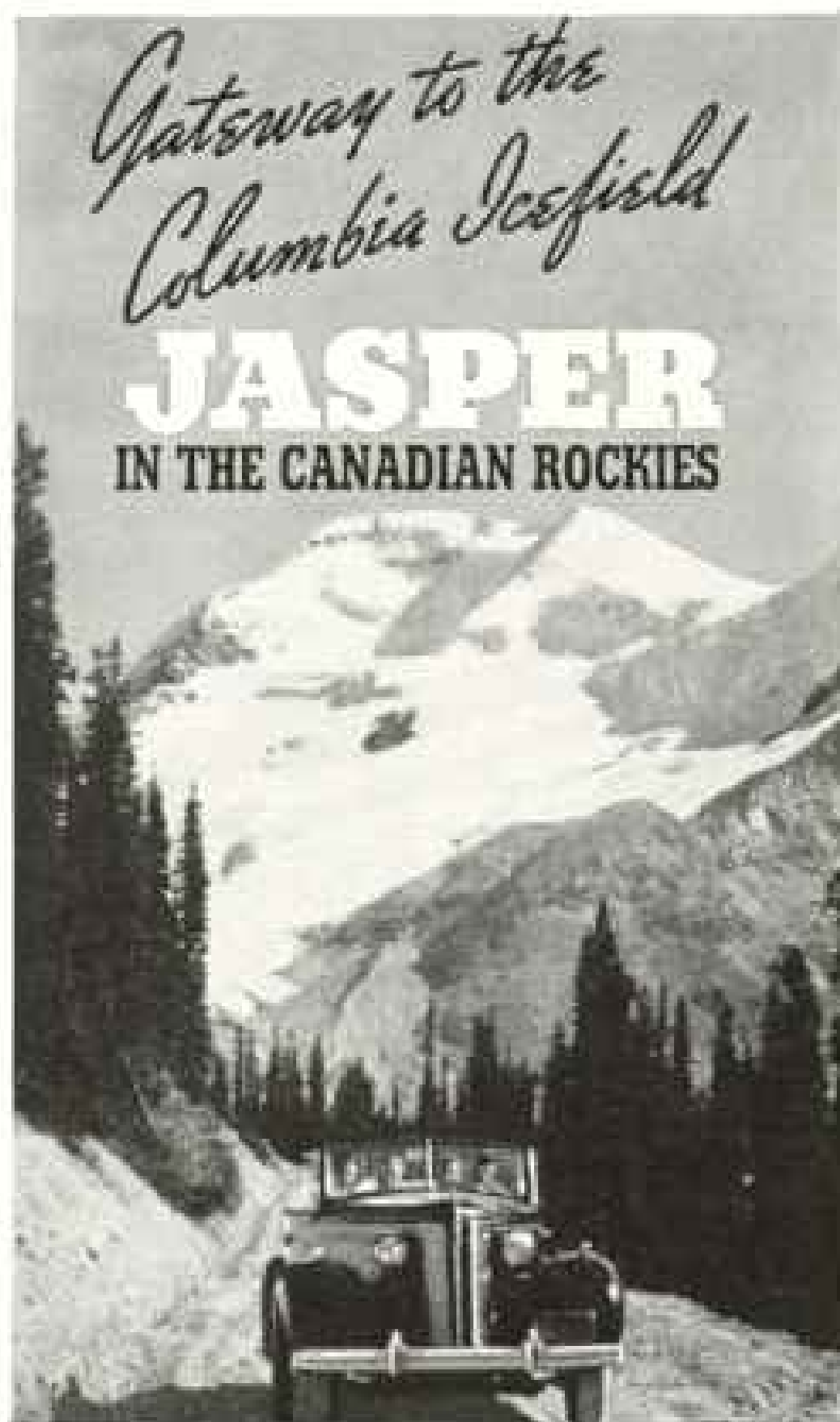
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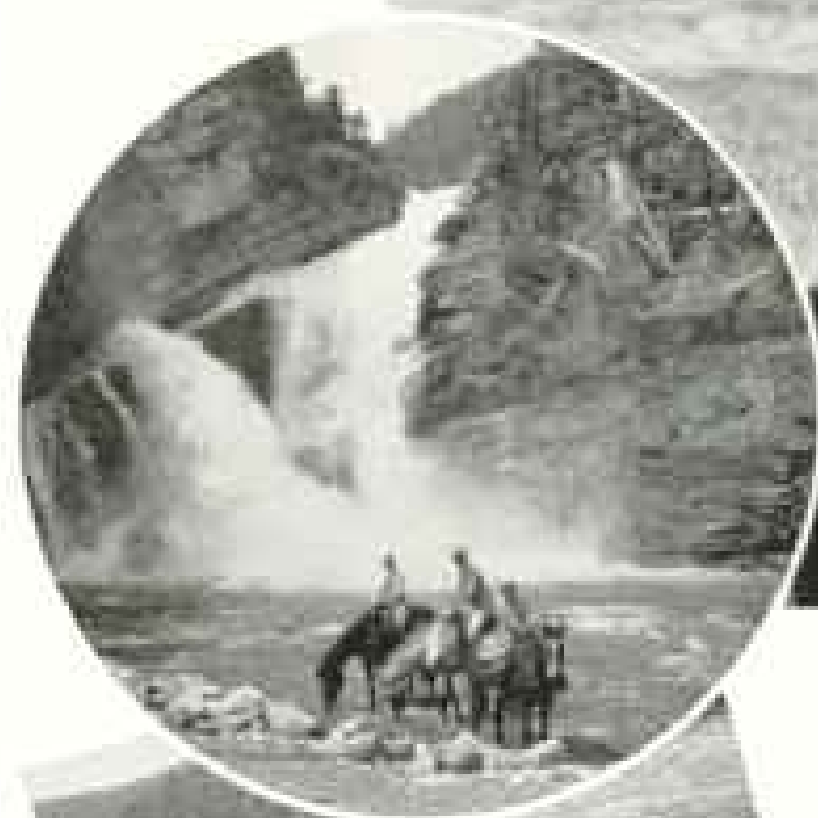


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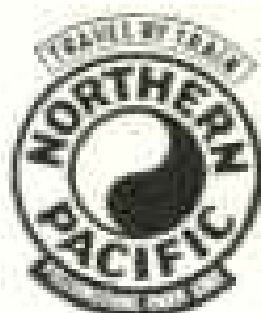
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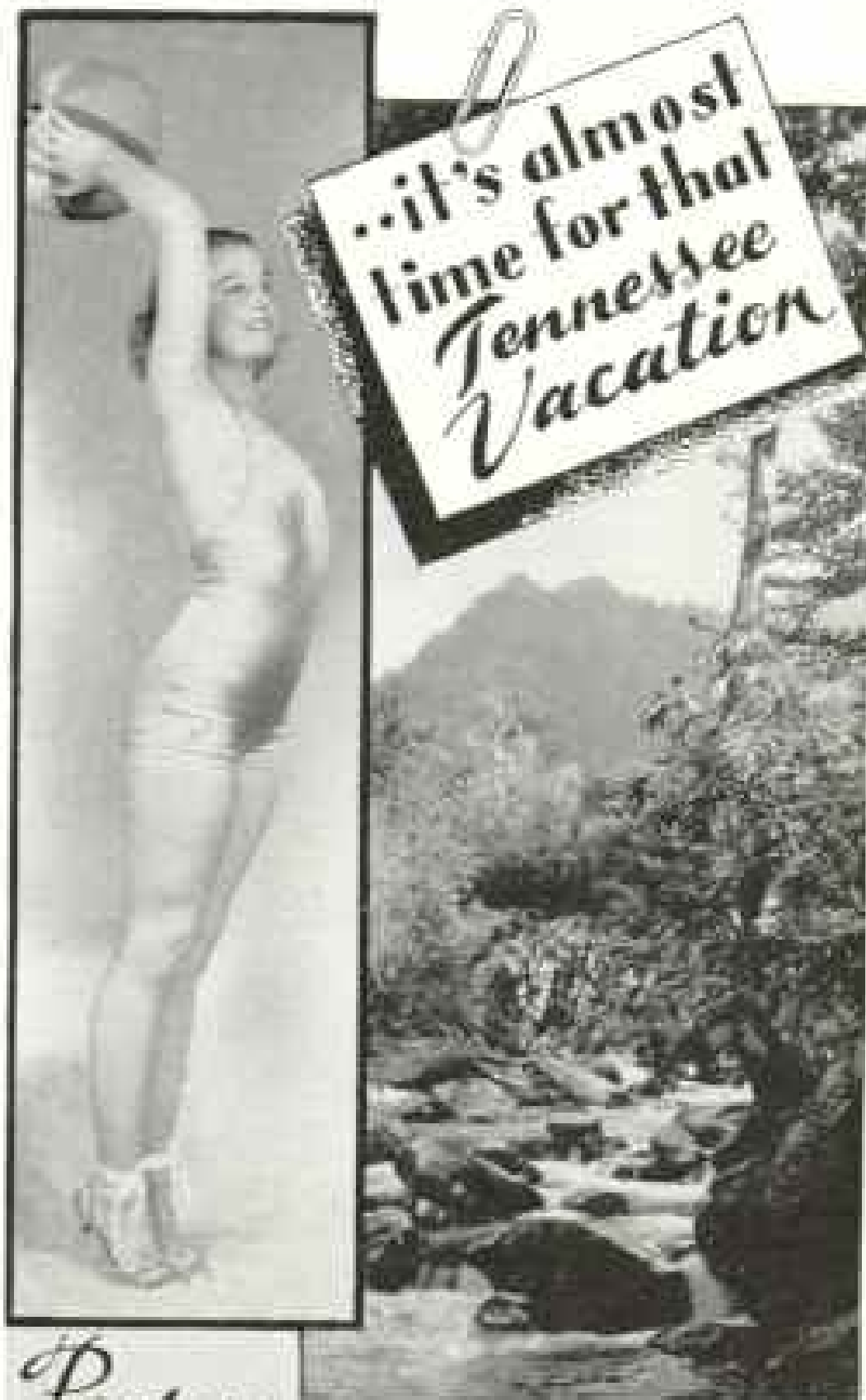
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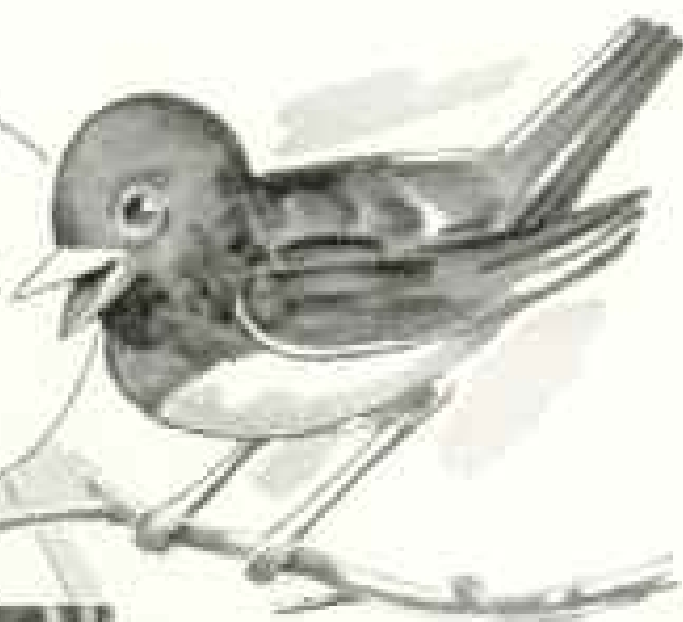
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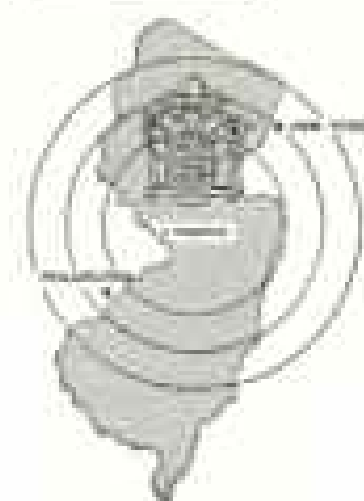
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The more enlightened modern husbands become, the more they want to share the problems of their wives. Realizing the value of peace and serenity, they do

all within their power to maintain a happy and unworried home atmosphere.

If your wife expects a baby, be a modern husband. Remember that scientific maternity care, *from the very beginning*, is vitally important both to her and to your unborn child. Have her consult a qualified doctor at once and at regular intervals until after your baby is born.

Doctors and nurses can do a great deal to keep expectant mothers well and comfortable. They can help to give unborn babies healthier and stronger bodies and to make their arrival easier and safer.

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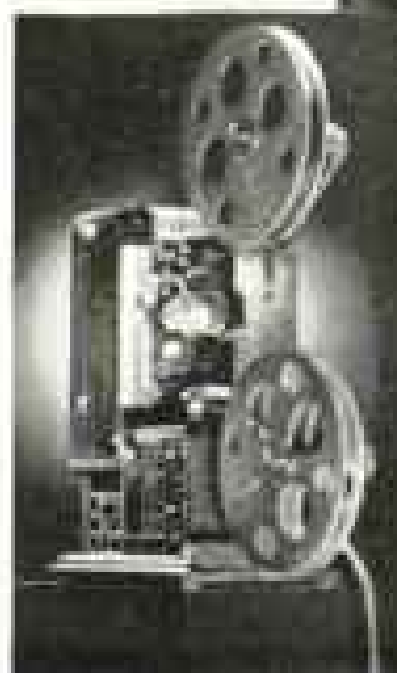
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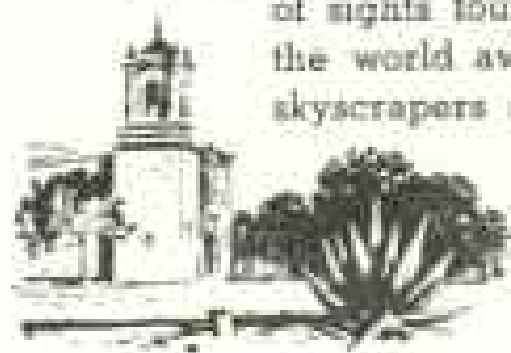
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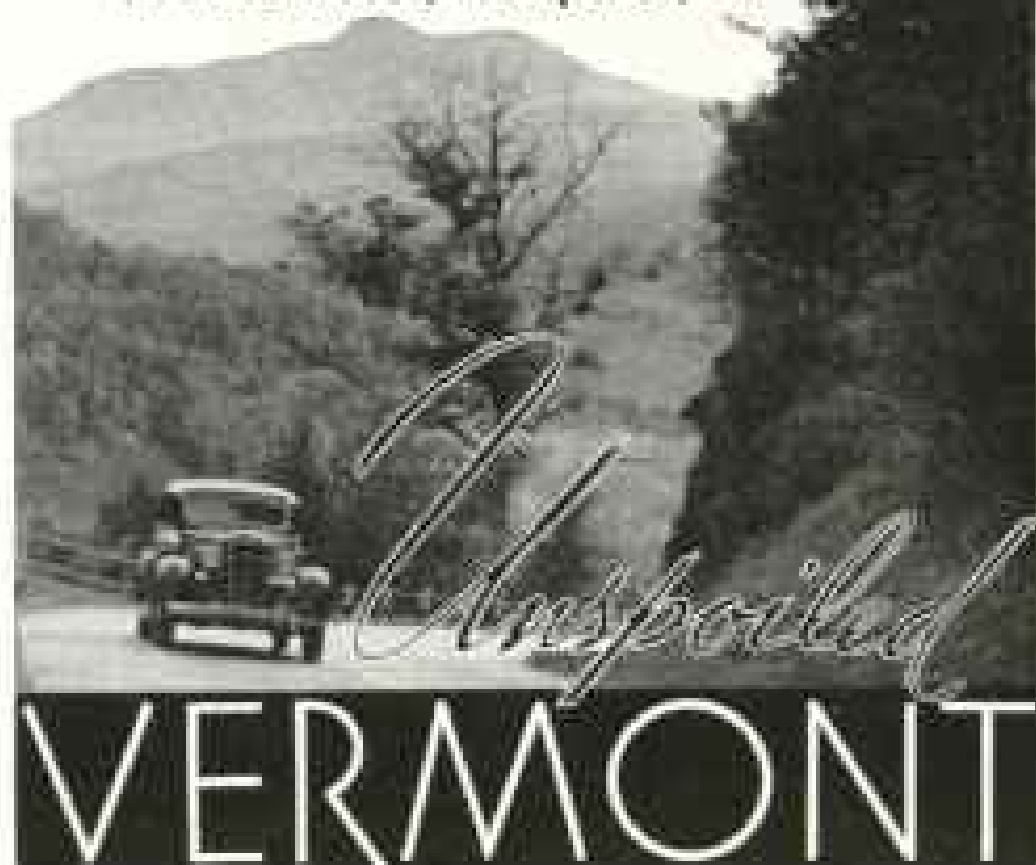
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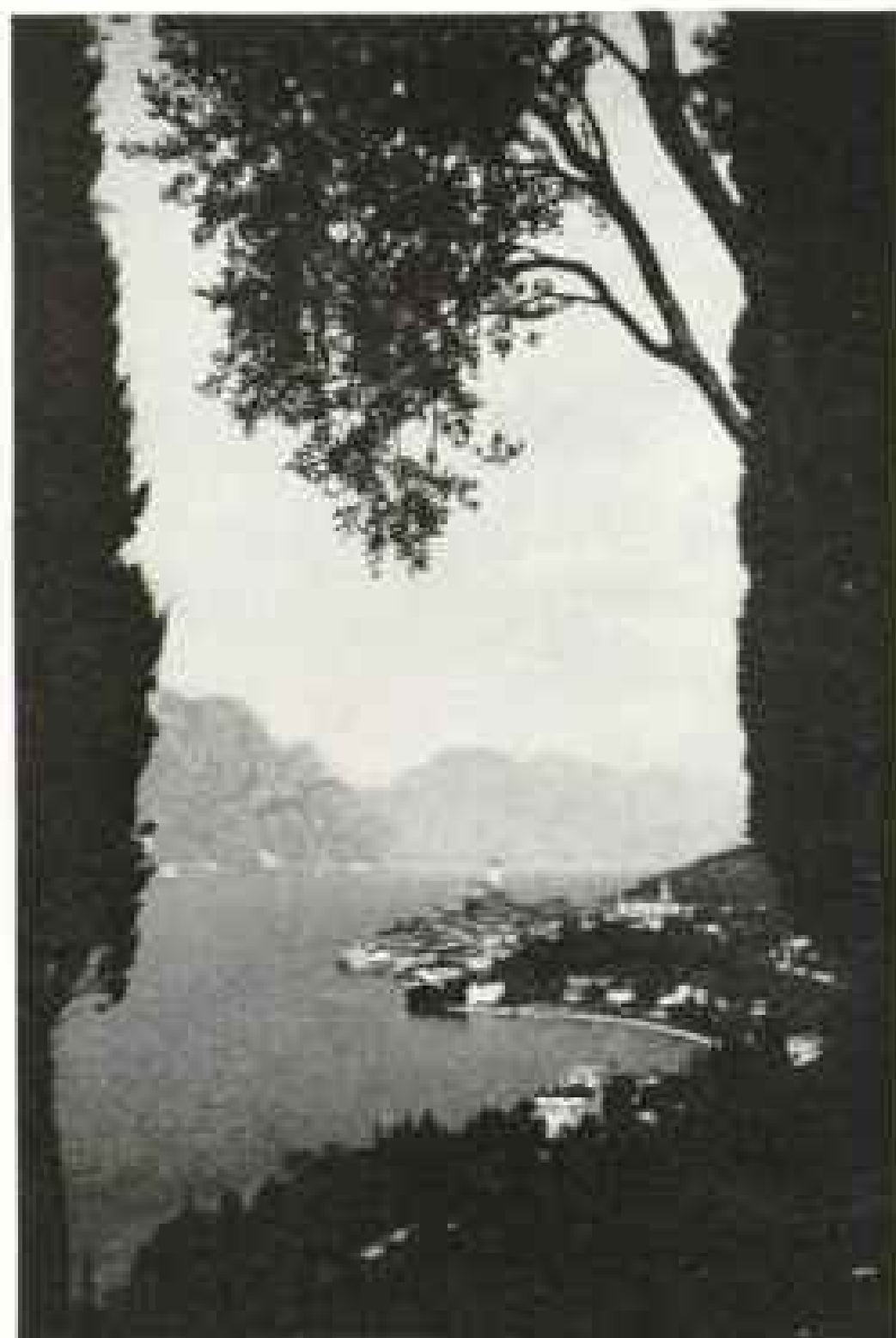
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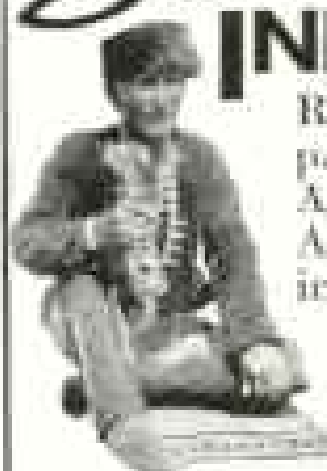
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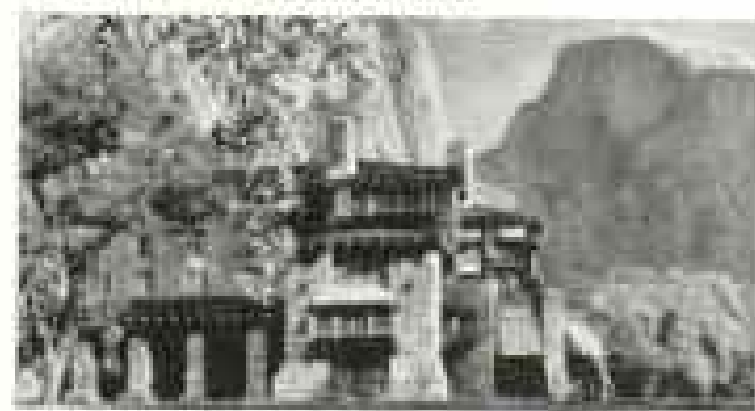
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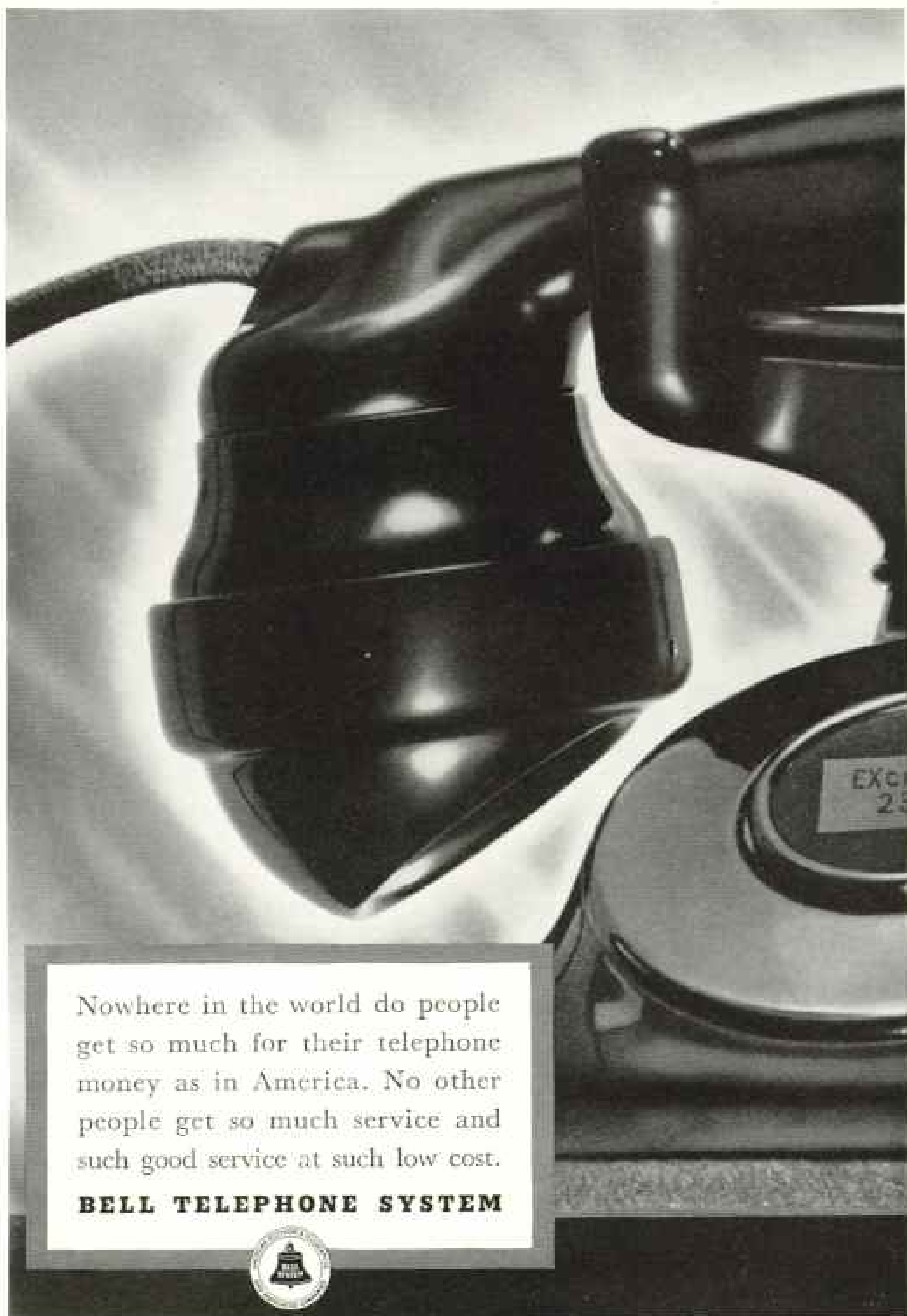
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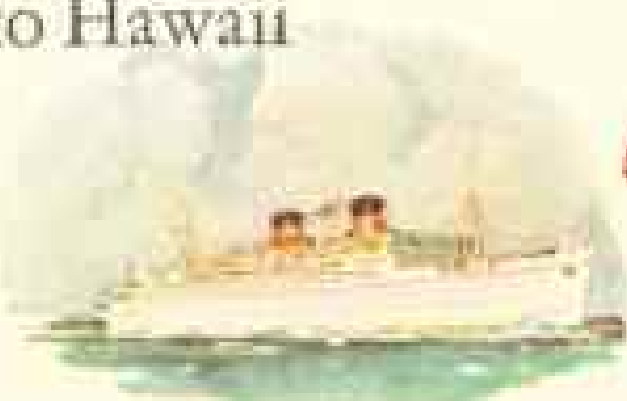




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