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Map of Southwestern United States

My Life in the Valley of the Moon

GENERAL OF THE ARMY H. H. ARNOLD (RET.)
17 Natural Color Photographs WILLARD R. CULVER

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The Curlew's Secret

With 5 Illustrations and 2 Maps
12 Natural Color Photographs ARTHUR A. ALLEN

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Mapping Our Changing Southwest

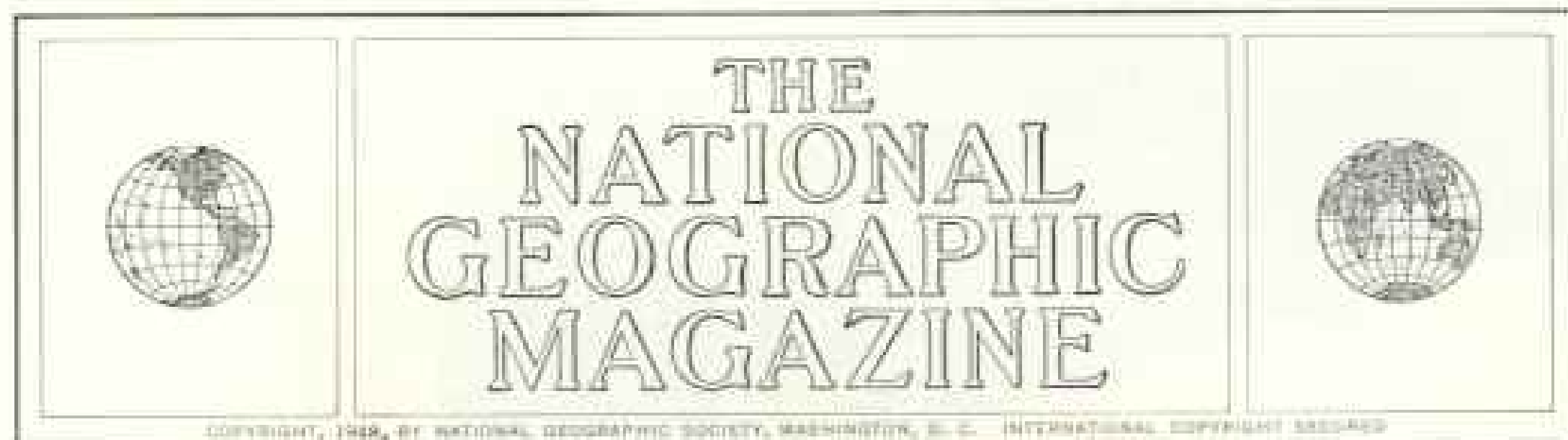
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My Life in the Valley of the Moon

BY GENERAL OF THE ARMY H. H. ARNOLD (RETIRED)

Formerly Commanding General of the U. S. Army Air Forces

With Illustrations by National Geographic Photographer Willard R. Culver

WORLD WAR II had ended. I was tired—quite ready to turn over the reins of air power to others—for I'd spent most of my adult life in airplanes.

So when reporters at a National Press Club luncheon asked me, "What are you going to do when you leave Washington?" I was ready to answer.

"I'm going out to my ranch, in California's Valley of the Moon," I said, "and sit under an oak tree. From there I'll look across the valley at the white-faced cattle. And if one of them even moves too fast, I'll look the other way."

"You mean you're through with airplanes?"

"Yes! If one dares fly low over my ranch house, I'll grab a rifle and try to shoot it down."

By chance, many news dispatches carried that wisecrack, which later was to bounce back on me!

Till we got settled on our ranch, we hadn't realized how calm and restful life could be, far from the din, hustle, and bustle of cities, far from all the talk I'd heard for years about flight training, airplane production, international conferences, armies, navies, and war.

We became just one more family of many families who live in this serene, picturesque Valley of the Moon, made famous by Jack London's writings (map, page 692). Our ranch is not large; but it's big enough to hold a fine house on a hillside (Plates II and III). Its patio furniture I made in my own workshop. The place is big enough for two dogs, a couple of horses, several hundred chickens, some dairy cattle, and a few Polled Herefords.

It wasn't our aim to go into the ranch business on a big scale. But we could, we found, make some money with milk cows, chickens and eggs, melons, vegetables—and hay.

"Chain Reaction" of Hay and Cattle

But we soon learned what every rancher knows about that endless chain—hay and cattle. It's like the hungry small boy—his jam and bread never come out even! Neither would our hay and cattle. More cattle, more hay; more hay, more cattle!

But that's no way to retire and rest, I figured. So, after an overnight decision, I took the bull by the horns, so to speak, and sold off all the dairy cattle.

I kept the Herefords—and the riddle, albeit a simpler one, of making hay and animals come out even.

Spaniards and Mexicans loved this valley and grazed their flocks and herds here generations ago. Their happy-go-lucky spirit of *mañana*, or never doing today what you can put off till tomorrow, still lingers.

We soon found it easy to slip into this serene way of delightful idleness. Everybody here likes to play, and the pioneer Spanish-Mexican fondness for fiestas still survives. How readily we took to it!

Particularly pleasant it is for my wife and me to sit in our redwood chairs, drink in the quiet beauty of our valley, and watch the half-tame quail feed about our garden.

How far away, on such calm, sunny afternoons, seem all the roar of four-motor bombers, the fiery flash of aerial battle, or even the wrangles of diplomacy.



This Adobe Wall Was Standing when California Was Mexican

Around 1836 Gen. Mariano G. Vallejo, Mexican military commander in northern California, built the house near Petaluma for watching the aggressive Russians (page 696). From their stout stockade at Fort Ross, the Muscovites sent trappers to hunt sea otters and agents to stir up the Indians. Other foreign powers made bids for California, but Vallejo coped with all save the Americans.

But suddenly, one startling day, this idyllic picture changed!

An Airplane "Possessed of the Devil"

With all of California—in fact, with the whole Pacific Ocean available to them—two pilots in separate planes had to pick the air just over our valley for their dogfight practice!

Worse yet, they picked the air right over our ranch! . . . Get out the machine gun, Garand rifle, carbine—anything that will shoot!

Round and round those two Air Force planes cavorted, perhaps to show a friend in the vicinity how good they were, perhaps to impress their former chief. Who knows?

The climax came more swiftly than anyone anticipated. The pilots were not so good as they thought they were; their flying precision did not equal their good ideas and intentions. As suddenly and as unexpectedly as those things happen, one plane flew too close to the other and cut its tail off!

How disconcerting to the most unabashed airman, to find himself in the air over the home of the erstwhile Commanding General of the Army Air Forces with no tail on his plane!

The plane that had done the damage, suffering itself from a damaged prop and landing gear, limped back to Hamilton Field, some 20 miles distant, and landed on its belly. The pilot was uninjured; there was no passenger.

The second pilot, the one of the tailless plane, bailed out, and floated with the wind to a golf course two miles away, where he landed unharmed.

But his plane! It acted like a thing possessed of the devil. It did none of those things a normal plane should

have done. Any aeronautical engineer or designer will tell you it is impossible for a plane to fly without a tail. But that one did! It maneuvered in circles of ever-decreasing size, always coming down closer and closer to our house.

Down, down, but always flying just as if it were spiraling normally. It came so close we knew it must hit the house, cover it with gasoline, and start the inevitable disastrous fire. But it missed the roof by inches!

Over the rose garden it went and out into the south pasture, where it crashed and exploded in a hole it had made in the ground some 30 feet across. Almost instantly it was

consumed in fire of great intensity. Nothing left but a mass of wreckage!

My conscience was clear. I had *not* shot it down! But would any of my Eastern friends believe me? Far too many letters were received shortly thereafter. "Well, I see you did it! What kind of gun did you use?"

Since then, no more airplanes!

The serenity of the Valley of the Moon is wonderful; so much so that this morning one of the men working on the place went up to the spring, saw what he thought was a jack rabbit's hind end, tried to grab its legs, and found it was a fawn! He saw the doe and another fawn, and then, almost too late, the buck, charging out of the bushes right at him.

He ducked behind a rock for safety, just in the nick of time. The buck shoved the two fawns into the brush with his horns, and the family disappeared.

Wildlife Neighbors and Bird Visitors

Why did we come to El Rancho Feliz?

I suppose, from a practical standpoint, chiefly because Sonoma is one of about three spots in the United States where my wife does not suffer acutely from hay fever.

But, apart from that, we would have come, anyway. Does one need further reason than a family of unafraid deer not more than a few hundred feet away from his back door; or three coveys of quail that come to the house to get feed and water, morning and night; or the dozens of hummingbirds, and many other species of birds, that come daily to the bird baths and to the dishes of tidbits that are always ready for them?*

Could one ask more than expansive horizons



The Author Plants a Baby Giant

"For about 40 years," writes General Arnold, "I have traveled to all kinds of places in many corners of the world. . . . When we came to selecting a place to settle, we chose the Valley of the Many Moons." This seedling came from the Spreckels estate a few miles from the Arnold ranch. "Come back in 2,000 years and I'll show you a giant redwood," says the retired air general.

of softly rolling wooded hills stretching away to blue-misted mountains (page 694); or the fascination of the valley itself—the colorful wool and warp of its history, its serene indifference to the driving, restless tempo of today, its charming devotion to the gracious living, the leisureliness, the romance of a yesteryear?

Sonoma is an Indian name. Some say it means "Valley of the Moon;" others insist it means "Valley of Many Moons." Still others

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Holidays with Humming Birds," by Margaret L. Bodine, June, 1928; "Hummingbirds in Action," by Harold E. Edgerton, August, 1947; "Befriending Nature's Children (California wildlife)," by Agnes Akin Atkinson, February, 1932.



Drawn by Harry R. Oliver and Irvin E. Allenant

California's Romantic Valley of the Moon Lies Within Easy Distance of San Francisco

Sonoma, where General Arnold retired to a ranch home, was Mexico's northern California headquarters. Fort Ross was the Russians' coastal citadel. Drakes Bay is named for Sir Francis Drake, who landed from the *Golden Hind* in 1579, set up a cross, and claimed the country for the British. Jack London had his ranch home near Glen Ellen. Napa is famous for its wineries.

say it was formerly the name of an Indian chief and has a different meaning.

When we who live here see the moon rising over the Mayacmas Mountains, we understand why Indians thought there were many moons.

A Valley of Rich Variety

Standing out with surprising bigness, apparently never twice in the same place, the moon appears and disappears behind the different peaks. It may suddenly make a startling appearance above a low point on the mountain ridge; again, it may come from behind a clump of trees or over a large live

oak, but, seemingly, always from a different direction.

As valleys go, the Valley of the Moon is not large. It probably measures about 10 miles across its base at the south, where it opens out into the level, low-lying plains and swamps that border San Pablo Bay. Triangular in shape, the distance to the apex at the north is about 15 miles.

Small as it is, in pre-white man days the valley provided food and clothing for several thousand Indians. Deer and bear roamed the wood-covered hills and mountain sides, even after the white man came.

Down in the valley proper, lush grass and native clover covered the fertile land, which, with its rich vegetation and many clear streams, provided food and shelter for numberless flocks of ducks and geese and for the beautiful California quail. Then, too, the streams were filled with fish.

Food was never a question for early inhabitants. Neither was there any need for a Fish and Game Commission to create and enforce conservation measures prior to the coming of the white man.

The Grapes of Three Valleys

Adjacent to the Valley of the Moon, beyond the range to the east, lies the Napa Valley. This entire area—the Sonoma, Napa, and Petaluma Valleys—provides our country with some of its very best grapes and its extra-fine wines. To this section came the Italian, Swiss, and French vinegrowers and winery experts, bringing with them the European technique of growing grapes and making wines. Today wineries are spotted throughout the area (Plates V, XI, XIII, and page 713).

At the head of Napa Valley lies Calistoga, a small town marking the site of an old Indian village located near active hot springs and geysers (Plate VII). The Indians seem to have recognized the health-giving properties of the hot sulphur-bearing water and built shelters for those who came for treatment.

Many years later the white man came. He not only realized the benefits of the hot sulphur water but also sensed the scenic value of the geysers, from an economic point of view, and, in his efforts to capitalize on both, established the town of Calistoga.

What effect, if any, all this heat and constant turmoil beneath the earth's surface had upon forests of hundreds of centuries ago is not clear; but not many miles from the Calistoga geysers lie gigantic petrified redwoods.

These enormous trees maintain their grandeur even in a petrified state, regardless of whether they are entirely uncovered or whether they lie with but a portion of their trunks exposed, the balance of the trees still remaining hidden in the hillside. Trunks of these petrified trees look similar to those of their descendants, which today grow to great size and height in this area (Plate XII).*

Near the head of the Valley of the Moon is the city of Santa Rosa, seat of Sonoma County. County government was moved to Santa Rosa from Sonoma one evening, when the good citizens of Sonoma were having a town meeting to determine just how to prevent the Santa Rosans from getting it!

Santa Rosa is an extremely modern, fast-

growing young city. Luther Burbank settled there in 1875. He obtained a small plot of ground, and then, with his uncanny knowledge of plant life, gave to mankind vegetables and fruits larger in size and more improved in flavor than any that had yet been produced, even in California! Burbank's home and gardens are still a mecca for thousands of tourists (Plate VI).

Egg Basket of a Nation

To the west of Sonoma Valley, across a small range, lies the Petaluma Valley. It has been known for many years now as "the egg basket of the United States." Chicken ranches are as thick there as orange groves in southern California. Every family, regardless of the size of its property, seems to raise chickens and sell eggs. Chickens, mostly white Leghorns, are seen in all directions, by thousands and hundreds of thousands.†

This entire area, from the Pacific shores eastward to the great Sacramento Valley, also provides pasture for hundreds of dairy farms and ranches, with their Jerseys, Guernseys, and Holsteins.

Sonoma Valley has abundant natural and farm resources. Why Spaniards were so slow to realize its value is not clear. After establishing the Mission Dolores in San Francisco in 1776, they slowed up in their explorations and settlements. It seemed they needed a new impetus, an extra push, to carry them into this then unknown territory to the north of San Francisco Bay.

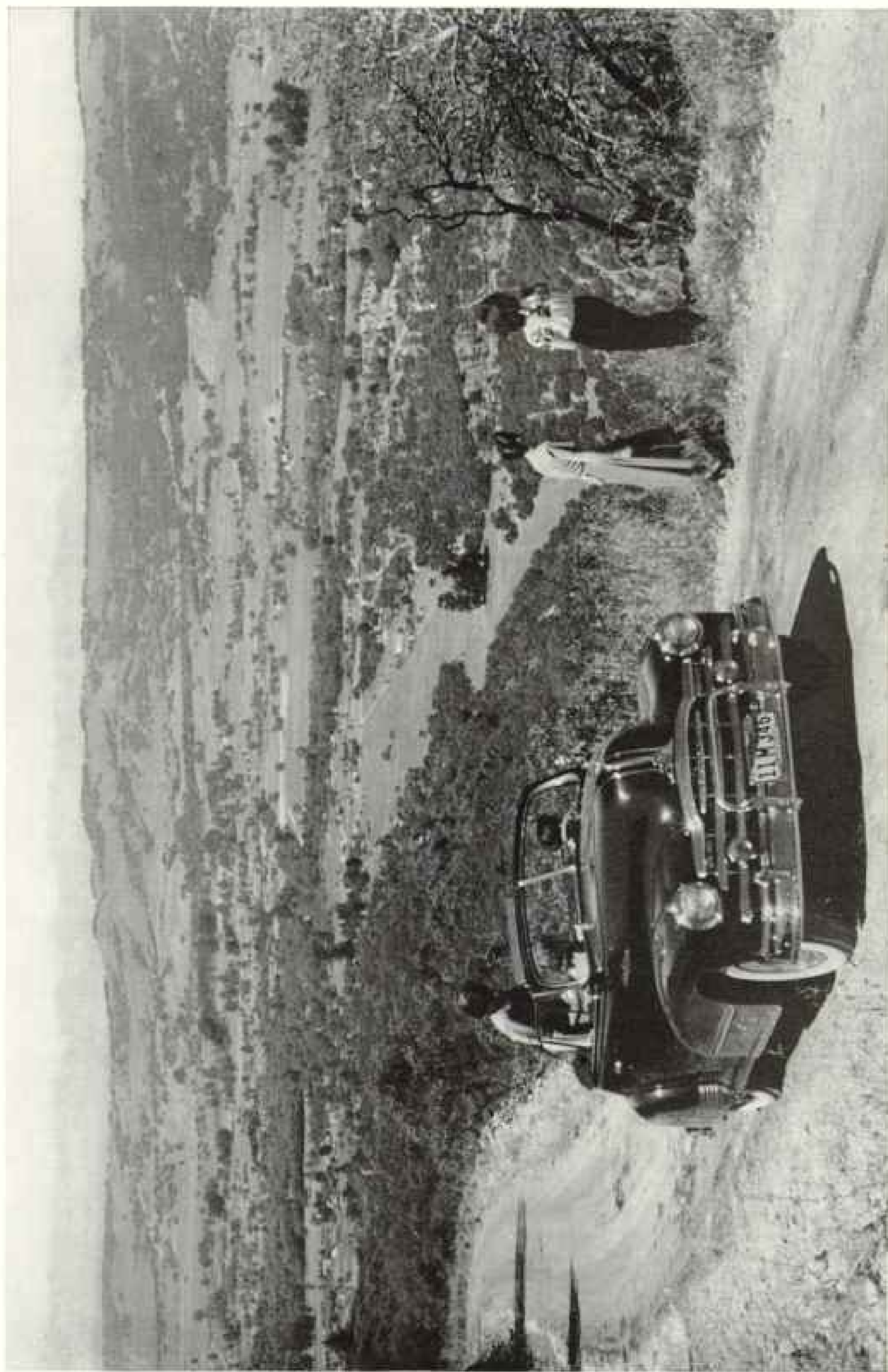
The region was not entirely unknown to white men, however, for in 1579 Sir Francis Drake, if we may accept some historians, led a small detachment across the mountain ranges from the Pacific and may have traveled as far east as the Valley of the Moon. The trip was made while sailors careened his ship for recalking and cleanup on the shores of what is now Drakes Bay.

The Spaniards themselves should have known something of the fertility of the area, after Captain Quiros, having left the San Francisco water front in a barge, poled, sailed, and rowed up the Petaluma Creek in 1776.

In much the same way as they proceed today, without so much as a "by-your-leave" or "may-we," in 1812 the Russians landed at Bodega Bay, west of the Valley of the Moon. Before the slow-moving Spaniards

* See "California's Coastal Redwood Realm," by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, February, 1939.

† See "Northern California at Work," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, March, 1936.



Luther Burbank's "Chosen Spot of All Earth" Delights Travelers, Who View the Valley from Its Eastern Approach

Indians named the Valley of the Moon, and Jack London, who owned a ranch here, spread its fame. Prosperous little communities, pleasure resorts, vineyards, poultry farms, and cow pastures dot the valley. The mountains "are lovely," Burbank wrote; "the valley is covered with majestic oaks. I cannot describe it."

realized what had happened, they had established permanent settlements, with fortifications, not only on Bodega Bay but also at Fort Ross, some miles north.

From that time on, Russian hunters and trappers roamed the entire coastal and valley areas at will, going as far south as San Francisco Bay.

By 1816 the Russians had 28 of their own countrymen and 80 Aleut Indians at Fort Ross. That same year they called on the Spanish governor at Monterey, asking for a treaty to cover their settlements and their fur hunting. That seemed the "push" the Spaniards needed!

Up to that time they had been using velvet glove tactics; but now they politely but firmly asked the Russians to go home. The Russians, using their own brusque methods, declined as firmly to go, in the meantime continuing their trapping, hunting, and foraging over the entire Sonoma region. This matter was not settled until the Russians' voluntary withdrawal in 1841.

The Russians Left Their Mark

The Russians did not withdraw from this section of our country without leaving their mark. We still have "Russian River" and "Fort Ross," and small near-by towns, each an outgrowth of an early Russian settlement.

A far more serious and important Russian imprint, however, is the effect of their indiscriminate campaign against fur-bearing animals.

The sea otter is a typical example. In the early 1800's these animals were found along the California coasts and in the bays in countless numbers. Killing them for their fur was comparatively easy.

While the Russians were in northern California, slaughter of these sea otters was terrific, comparable to our slaughter of the bison on the Great Plains. Although the Russians were not solely responsible for the almost complete extermination of the sea otter, they probably killed more than any other one group of people.

In the years following the Russian departure, practically no sea otters were to be found. Today, after years of conservation measures, they are staging a comeback, so that one may now occasionally see several hundred of them at a time.

To return to the northward march of the Spaniards:

In 1817 they established a mission at what is now San Rafael. Later they sent another expedition to Sonoma Valley to explore and see what the Russians were doing. Gabriel

Moraga, leading the party, reached Sonoma Valley but returned after a tough fight with the Indians, having accomplished little.

Four years later, in July, 1823, a Sonoma settlement was started in earnest.

In that year Ensign José Sánchez, Don Francisco Castro, and Padre José Altimira paddled up Petaluma Creek and crossed the mountains into Sonoma Valley. They found the hills covered with large oaks of many kinds, red madroña, manzanita, and bay trees; in mountain valleys they found the giant redwoods.

They crossed more streams and located more springs, both hot and cold, in the valley than they had ever seen before in California. Wild game seemed to be everywhere. Indians told them they were in "Sonoma Valley."

They selected a site near the clear, cool springs and planted a cross, the location of the new mission. Padre Altimira wished to locate a site for a mission which would replace the Mission Dolores in San Francisco. They had found in this valley everything that was lacking on the sand dunes surrounding the San Francisco Mission.

Here was the place to establish the last of the missions. The white man had arrived, had come to stay, in the "Valley of Many Moons."

Spaniards called the place "New San Francisco." Padre Altimira wrote in his journal: "Everyone is greatly pleased with the location, particularly with the native stone to be found for building and with the many springs of clear water." Later he wrote to the governor: "All agree that it offers more advantages than any place between here and San Diego."

Founding of Sonoma Mission

The mission was completed and called "San Francisco Solano." Missionary work was started. Papooses were baptized; Indians were clothed and fed, taught religion, sewing, and various arts and trades. Male and female Indians were housed in separate buildings. Everything seemed to be progressing most satisfactorily when in 1826 the mission burned to the ground. History places blame for the fire on the Indians.

The mission was destined for much misfortune. It later burned a second time, but by 1829 a new mission, an adobe building with tile roof, was completed. This time the mission was there to stay.

During this later period, a new figure, Mariano Guadalupe Vallejo, rose in the Spanish government. Vallejo was a very young man in 1829 when he took over as commandante of the Presidio of San Francisco.

Prior to that he had shown remarkable skill, not only in fighting and defeating the Indians but also in getting along with them as neighbors without fighting. He had also gained the reputation of being a military leader, an excellent disciplinarian and drill-master.

Realizing the capabilities of Vallejo, Governor José Figueroa sent him to colonize the northern frontier and later to secularize the missions. Vallejo started at once making trips throughout the territory under his jurisdiction. On his first trip to Sonoma he lost a saddle horse on an island in San Pablo Bay. The mare was finally found, and a new name came to California (attention Navy), the Spaniards calling the island "Mare Island."

In the meantime, the Sonoma Mission had grown and prospered. Its grainfields yielded 2,000 or more bushels a year; its holdings comprised over 2,000 head of cattle, 700 horses, 4,000 sheep, and a vineyard with more than 3,000 grape-bearing vines.

Figueroa continued to be much disturbed by the aggressive actions of the Russians. In 1833 he sent Vallejo to Fort Ross to learn just what the Russians had in mind with regard to their future settlements, what kind of alliances they were making with the Indians, and what their intentions were.

Russians "Viewed with Alarm" in 1830's

Vallejo was convinced that additional settlements must be started nearer to the Russians, to stop their advance. In October of 1833, Spaniards began to arrive at Petaluma; another colony was started at Santa Rosa. Neither colony lasted long, but there stands today the old adobe ranch house built in 1836 by Vallejo near Petaluma on the ranch he had selected for his own operations (page 690).

Figueroa still "viewed with alarm" the Russian situation and designated Vallejo as "Military Commander and Director of Colonization of the Northern Frontier," with instructions "to establish a colony at Sonoma and arrest the progress of the Russians."

With Indian and other aid Vallejo moved his headquarters to the site of Sonoma and laid out plans for a pueblo. He first outlined a central plaza of about eight acres and built the pueblo around it.

A road 110 feet wide, sufficient width for six pieces of artillery to gallop abreast, was staked out, leading south from the plaza to the point of debarkation on Sonoma Creek. Town lots and large acreages were granted to Vallejo's friends and relatives. Barracks for his soldiers and Vallejo's quarters were placed adjacent to the mission.

Fortifications were built in the near-by hills, and a wall with embrasures was erected around the barracks. In determining the metes and bounds of the pueblo, Vallejo used a hand compass and a leather lariat. The hand compass was not too accurate, and the lariat stretched, or became taut, depending upon whether the air was damp or dry, and whether the survey was made in the early mornings or during the dry middays.

These irregularities in directions and distances caused the American civil courts much trouble years later when it became necessary to record the deeds.

Two taverns were built in the pueblo, the Blue Wing Inn and Hotel El Dorado. Both housed many famous men during the next few years. In its early history the Blue Wing provided quarters and gambling accommodations for Joaquin Murieta, the outlaw, and for "Three-fingered Jack" Garcia. Their gangs, dispersing after robberies and raids in far-distant parts of California, retreated to this famous old inn.

Fugitives from justice seemed to gravitate toward Sonoma. A "Colonel Rogers" (an assumed name), wanted for crimes in the East, lived in the General Persifor F. Smith home for about 30 years. He probably could have spent the rest of his days there in peace, had it not been for his inherent fear of Federal officials.

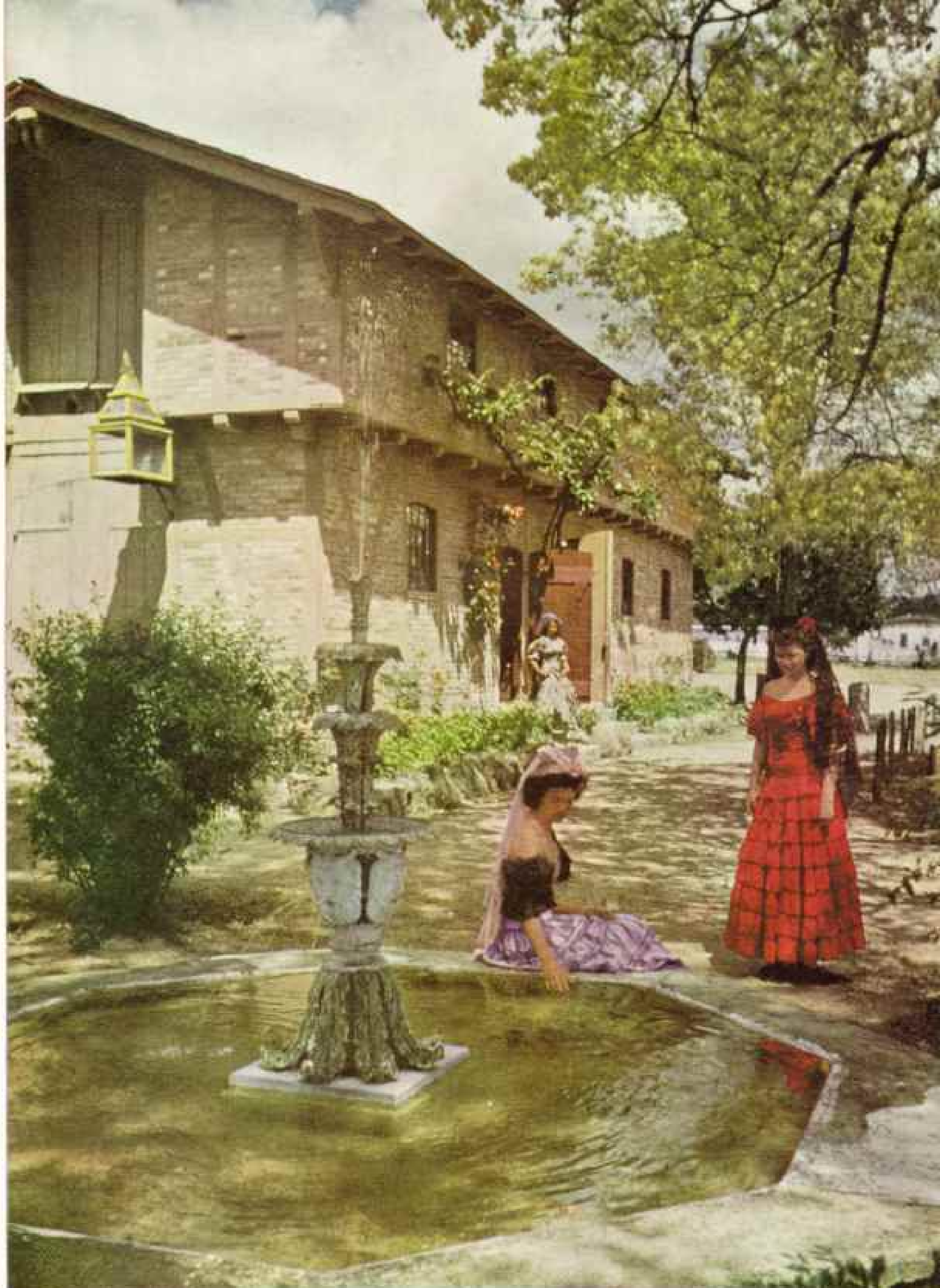
When President Grant landed in San Francisco on his return from a tour of the world, he made a trip to Sacramento. When he expressed a desire to return to San Francisco by coach, a search was made for a suitable stopping place at which to spend the night. Somebody suggested General Smith's home at Sonoma.

To this Colonel Rogers objected. The Secret Service became suspicious. An investigation was made, and Colonel Rogers was returned to the east coast for trial! His case was dismissed, but the "Colonel" did not return to Sonoma.

"Tears of the Mountain"

Vallejo used the springs to the north of the city as a water supply for his troops. He called the springs *Lachryma Montis*, "Tears of the Mountain." Those springs give forth abundant pure, fresh water and have been used by the city of Sonoma as a water supply ever since Vallejo burned the three-inch holes through redwood logs for water pipes. Thus was created the city's first water supply (Plate V).

The Spanish settlement at Sonoma prospered from the first. The soil was extraordinarily fertile, water was plentiful, and hot



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1

Photographs by Willard H. Carter

A Swiss Chalet in the Valley of the Moon Recalls California's Gold-rush Days

Its timbers, ready-cut and numbered, served as ballast on a ship carrying forty-niners around the Horn. The chalet stands in Sonoma on an estate of Gen. Mariano Guadalupe Vallejo, the valley's pre-American overlord.



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11

Home from the Wars, General of the Army H. H. Arnold Strolls the Color-splashed Flower Gardens of His Valley Ranch

Illustrations by Willard H. Culver

On a Sunny Terrace Overlooking the Valley's Eastern Rim, General and Mrs. Arnold Enjoy the Hard-won Fruits of Peace

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Reproduced by Willard H. Cutler



This Valley Ranch's Of Swimmin' Hole Is a Man-made Pool on a Sun-drenched Terrace

Mountain springs feed the crystal-clear pool. Only 40-odd miles from Golden Gate Bridge, the sequestered valley is a popular week-end and vacation spot for San Franciscans. City dwellers find it fragrant in season with acacia blossoms and new-mown hay, ideal for rest and relaxation.

Tradition has it that Indians traveling a dipping trail through the valley saw the moon rise seven times over the serrated Mayacmas Mountains. In awe they named the place Sonoma (Valley of the Moon). Jack London, who settled down there, popularized the translation as the title of a novel (Plate XVII).

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Illustration by WILLARD B. CULVER





← **Mustache Bristling, He Prunes and Ties a Vineyard Monarch's Gams**

The old-timer began work in this vineyard 60 years ago. The gnarled grapevine was planted when Ulysses S. Grant was President.

About 1855 Col. Agoston Haraszthy, a Hungarian nobleman, first grew cuttings from choice European vines in the Valley of the Moon. Today the grape is king of California fruit crops; the State produces more than 90 percent of U. S. wines.

Redwood Water Pipes → Brought the "Tears of the Mountain" to Sonoma

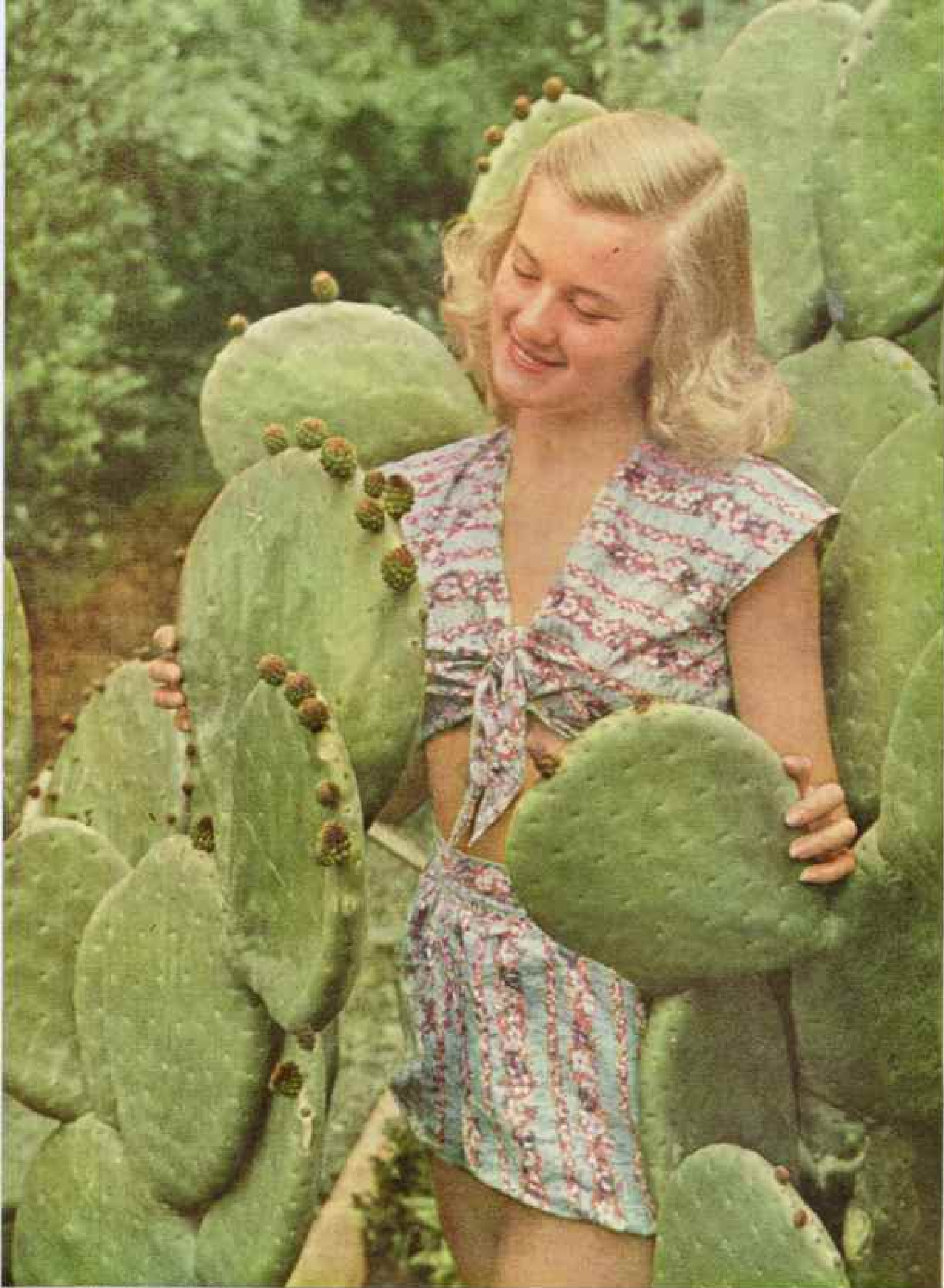
In 1835 Mexican General Vallejo founded the valley town of Sonoma. To the frontier settlement he piped water from copious mountain springs he likened to rushing tears.

Excavation about the town's plaza still uncovers the crude pipes, well preserved after more than a century underground. The three-inch holes were burned through the logs.

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Photographs by William B. Carter





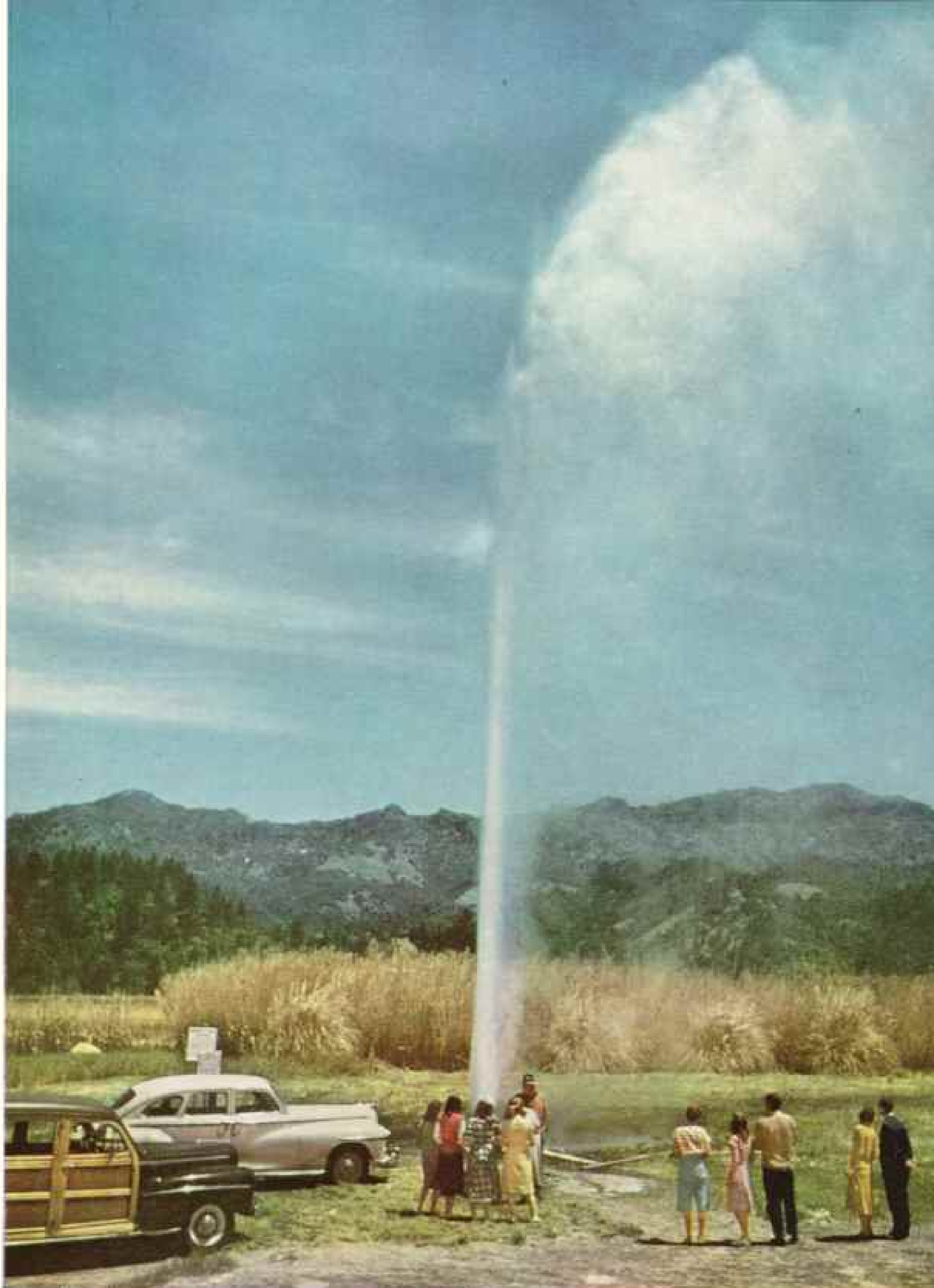
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VI

Kilachtrons/br Willard R. Culver

Luther Burbank's Velvet-skinned Cactus Holds No Terrors for Bare Arms and Legs

In Santa Rosa the great plant breeder labored half a century. One of his experiments, lasting 16 years, produced this spineless form of cactus to provide feed for cattle in arid regions.



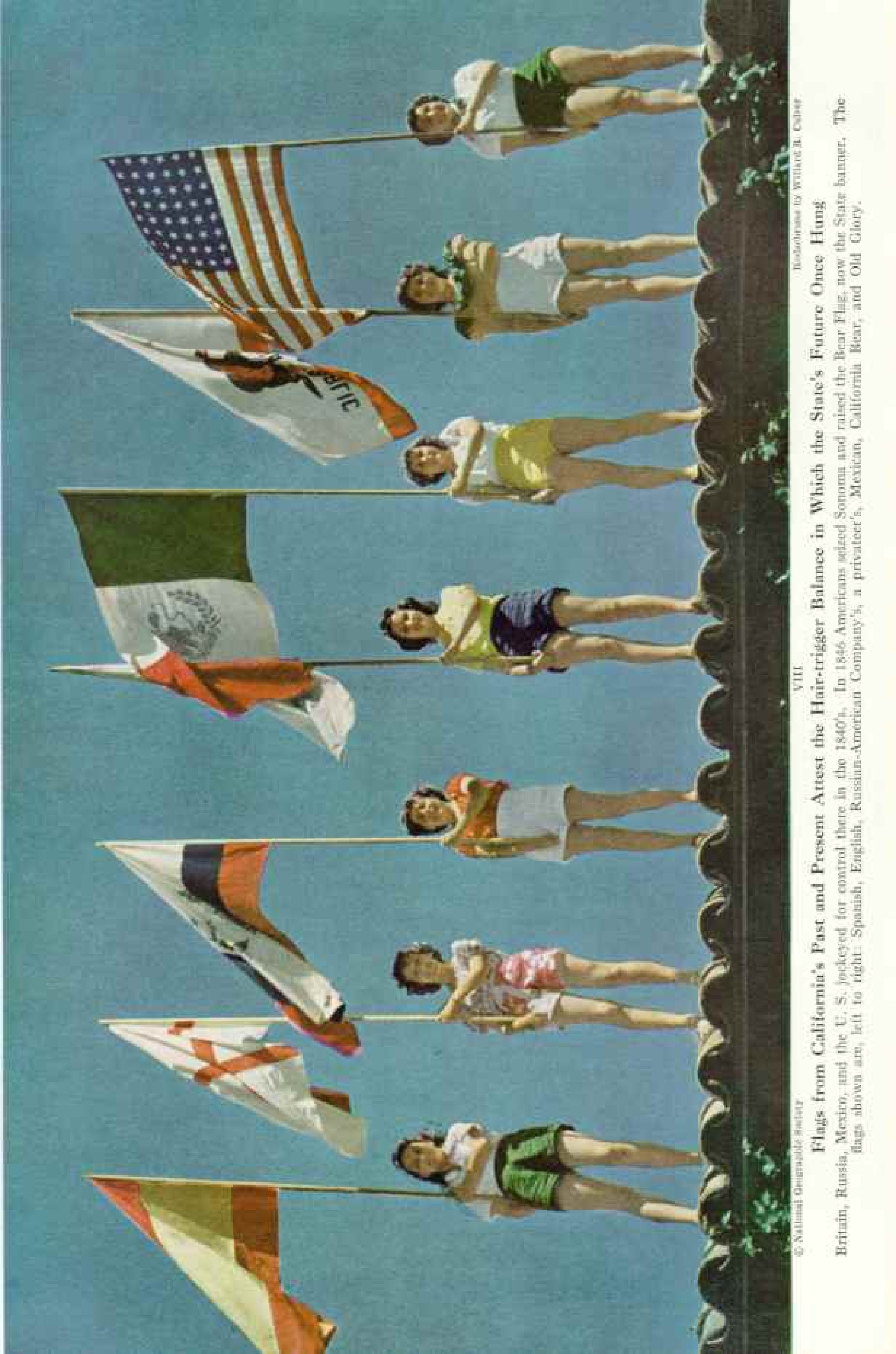
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VII

Illustration by Willard B. Carter

That She Blows! Vacationists Gape as California's "Old Faithful" Shoots Skyward

Well might they borrow the whalers' cry when this hot-tempered geyser, near Calistoga, blows its top, every 30 to 60 minutes. Numerous geysers, fumaroles, and hot springs recall this region's volcanic origin.



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VIII

Illustrations by Wilbert B. Carter

Flags from California's Past and Present Attest the Hair-trigger Balance in Which the State's Future Once Hung

Britain, Russia, Mexico, and the U. S. jockeyed for control there in the 1840's. In 1846 Americans seized Sonoma and raised the Bear Flag, now the State banner. The flags shown are, left to right: Spanish, English, Russian-American Company's, Mexican, California Bear, and Old Glory.

Sidewalk Plantings Brighten Valley Towns, "Curb Service" Provides a Young Cyclist with a Nosegay of Showy Fig-Murigolds

© National Geographic Society

IX

Kodachrome by Willard H. Oubrey





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X

Illustration by William H. Carter

Under a Hot Sun Filipino Workers Prune and Train Burgeoning Hop Vines in a Vast Spider's Web of Trellis Strings

At harvest time vines cover the field in tentlike bowers 20 feet high. Mechanical pickers swallow them, disgorging the bitter cones which, after-dried, give beer its tang. West Coast States grow virtually all the domestic crop; California valleys produce some 7,500 tons of hops a year.

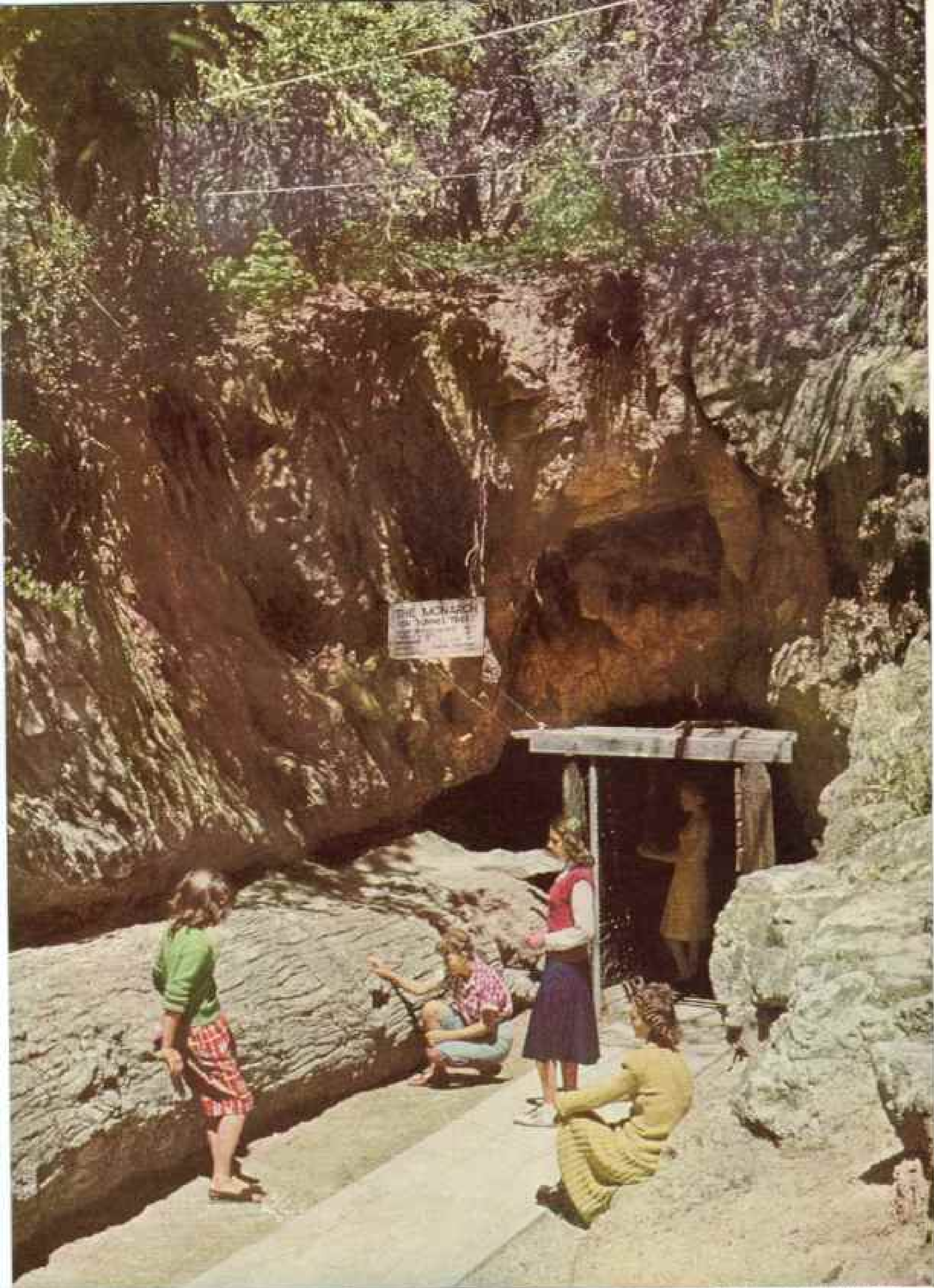
A Farmer Cultivates Grapevines and Visitors in the Valley of the Moon, Birthplace of California's Vast Wine Industry

© National Geographic Society

XI

Illustration by William B. Carter





© National Geographic Society

XII

Kodachrome by Willard R. Culver

Redwood Monarch in the Petrified Forest Rules Prostrate Trees Six Million Years Old

A blast from near-by Mount St. Helena toppled the trees; volcanic ash preserved them as fossils. They lie in a double tier underground. The Monarch, averaging 8 feet in diameter, has been excavated for a length of 126 feet.



© National Geographic Society

XIII

Enochisme by Willard R. Culver

From an 1,800-gallon Cask a "Wine Thief" Steals a Sample of Its Aging Burgundy

The 70-year-old cask, hand decorated, stands in the underground storage tunnels of Beringer Bros., Inc., which honeycomb a limestone hill in St. Helena. The "wine thief" is the sampling device held by the girl on the ladder.



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XIV

Sentinellike Eucalyptus Trees, Warned by a Fog Bank Racing Inland from the Pacific, Stand Guard Against Destructive Winds

Sci captains brought eucalyptus seeds from Australia in gold-rush days. Fast-growing and strong, the tall trees are valuable chiefly as windbreaks. In four California counties citrus growers maintain 2,000 miles of eucalyptus trees to protect orange and lemon groves.

Reproduction by Richard B. Coker

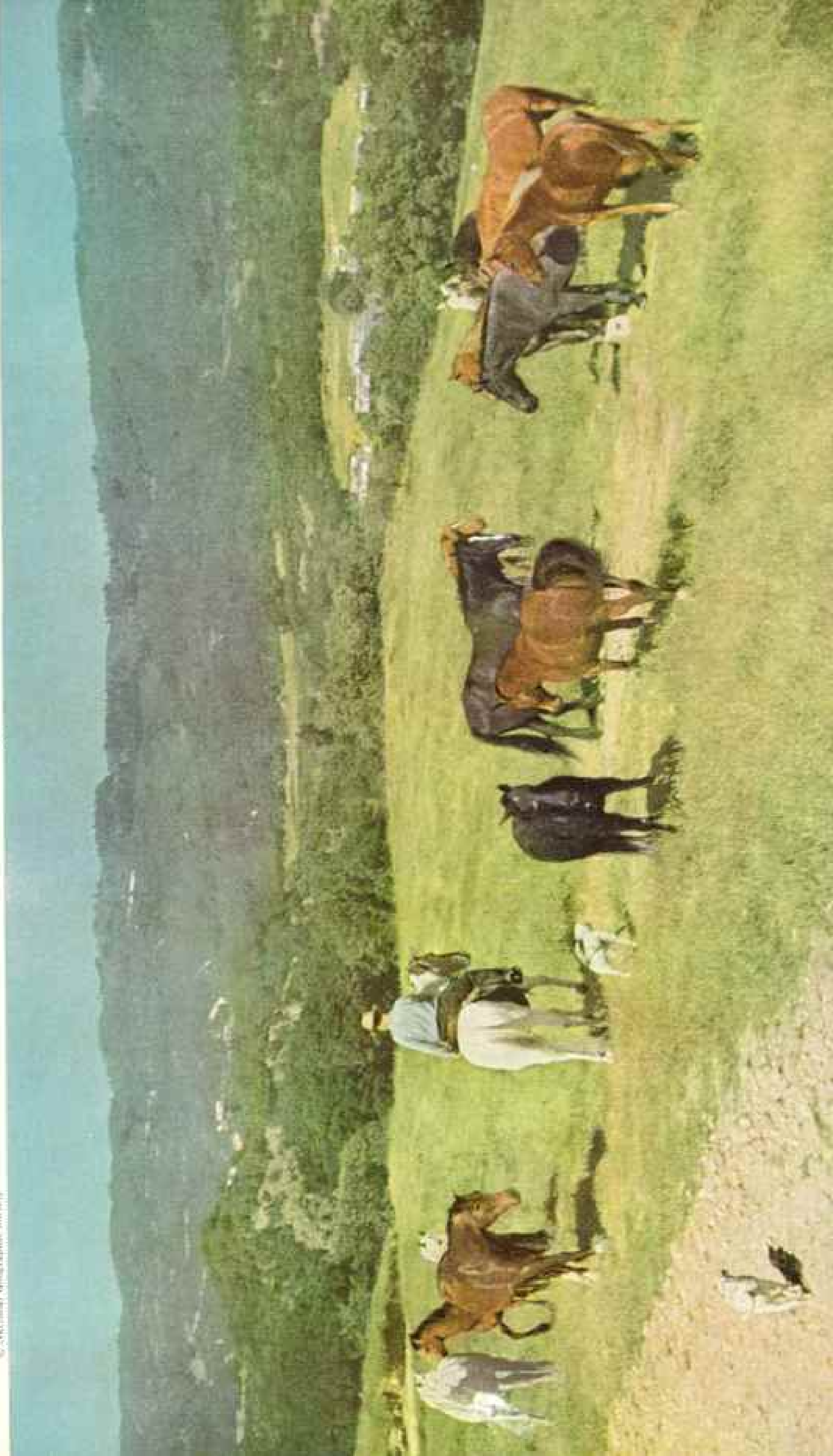
On the Jack London Estate, Now a Dude Ranch, Saddle Horses Graze on a Sunny Hillside Pasture

Dude ranches dot the pleasant valley. In 1905 the author retreated to a 1,500-acre ranch near Glen Ellen. There he followed the regular hours he recommended to writers. His daily 1,000-word stint done before lunch, he spent afternoons in the saddle overseeing ranch operations.

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XV

Reproduction by Willard B. Culbert





After Years of Wandering, Jack London Settled Down in the Valley of the Moon

Like the chief characters in the novel he named for the valley, London ended there a long quest for an ideal place to live. The author's widow stands before his bas-relief in her home on the ranch.

springs provided health centers. Abundant stone and the woods covering the hills provided plenty of building materials.

In 1845 the Commandante's brother, Salvador Vallejo, planted an enormous vineyard, long known as "Buena Vista." That vineyard was to make history for the wine-making industry. It continued as just another large vineyard until 1856, when Col. Agoston Haraszthy, a Hungarian nobleman who knew vines and wines from long years of experience in Europe, bought the property.

Haraszthy went back to Europe shortly after. When he returned to Sonoma, he brought back large quantities of cuttings from the best vines abroad. Within a short time he had 6,000 acres of vines growing, vines of the best types; but, what was far more important, he was growing the vines without irrigation!

He thus introduced into California a new technique in the raising of grapes. It was not long before most of the vineyardists in California stopped irrigation of their vines. The Buena Vista Company built long underground caves in the limestone hills, similar to the best European wine caves, or cellars, and these Buena Vista cellars still exist.

While the pueblo was growing and prospering, it seemed that Vallejo himself was to have one great problem after another in his administration of the northern frontier. Other nations besides the Russians were interested in this fertile area.

In 1841 John McLoughlin, the Hudson's Bay Company factor at Fort Vancouver, and Sir George Simpson, governor-in-chief of the Company's activities in the Americas, paid a visit to California. In January of 1842 they worked their way up Sonoma Creek.

Reaching the dock after dark, they spent the night there quite uncomfortably, but next morning everything was changed. Vallejo gave them a true California welcome, with troops, Indians, salutes, colors, and flowers galore! With his customary hospitality Vallejo did everything to make their stay pleasant. They saw the entire Valley of the Moon and surrounding countryside at its best, with local guides to show them points of interest.

When the sight-seeing was over, Sir George Simpson talked with Vallejo about California's past, present, and future. Very quietly, and with true British tact, he led up to suggesting the advantages of tying up with the English. Looking back on that conference, it would seem we of the United States are fortunate that Vallejo knew his diplomatic technique. He listened a lot, said little, and agreed to nothing! The British party rode away

the next morning, the purpose of their visit unfulfilled.

Not many months before, Vallejo had had a visit from a French representative, M. Eugène Duflot de Mofras, from the French Legation in Mexico City. After De Mofras had taken the customary trips around the valley and had been extended the usual hospitality, and departed, Vallejo wrote to his governor: "There is no doubt but that France is intriguing to become mistress of California."

Though Vallejo balked the diplomatic approaches of the British and the French, the envoys, advance agents, and pioneers of another great country were in the offing. By them he was to become "buffaloed" and completely baffled.

Then Came the Americans!

The American settlers started coming like a gentle breeze and ended like a hurricane! Nothing that Vallejo did, no action that he took, seemed to retard their arrival or postpone the inevitable.

The first of the Americans came out to settle in the valley in the 1830's. For a while their numbers were small and presented no great problem for Vallejo. He was a very generous man and even gave land grants to those he thought worth while. However, when the 1840's came around, the American settlers, hunters, and trappers had begun to reach the Valley of the Moon and its surrounding area in large numbers.

In the meantime, the governor had directed Vallejo "to drive the immigrants back across the mountains." Vallejo could not see his way clear to do this. Having to pay his own army personally, and all danger from the Indians and from the Russians now being gone, Vallejo disbanded his troops.

Besides Vallejo, there was another man in California at that time who understood the Mexicans, and understood them well. That man was Capt. John C. Frémont. Frémont also recognized the strength and capabilities of Vallejo. At the same time, he realized that drastic action of some kind must be taken to establish American control of California.

On June 12, 1846, either with or without Frémont's backing, a group of 33 well-armed men, under the leadership of Ezekiel Merritt, rode from the vicinity of Frémont's camp, near Sacramento, to Napa. There they stayed for two days. Then, with a very early morning start, they rode to Sonoma, arriving about daybreak on June 14th. There was little Vallejo could do about it, for his small detachment of soldiers was no match for the American riders.



A Man-tailored Bird Is Measured for White Meat

Valley of the Moon, and the cackling country clear to Petaluma, are musical with crowing, clucking, and gobbling. One valley ranch raises 60,000 broad-breasted turkeys a year. This gobbler submits to Thanksgiving's measuring block with no apparent fear of the consequences.

Even though capture and imprisonment by that group of tough-looking frontiersmen were staring him in the face, Vallejo did not forget his true California hospitality. He invited the leaders into his house to have a drink of wine or brandy while they talked things over, meanwhile entertaining the others outside. The wine was fine, the brandy excellent, and the captors soon became "well oiled"; but that did not stop them.

In a matter of hours the famous Bear Flag, said to have been made from a woman's petticoat and other odds and ends, was flying from the flagpole in the Sonoma plaza. The Mexican flag was down to stay, and Mexican rule of northern California was about over. The

Bear Flag flew in the plaza until July 9, when it was hauled down by Lt. J. W. Revere of the *USS Portsmouth*, and the American flag raised in its stead (page 716).

Vallejo was taken prisoner and held at Sutter's Fort, in Sacramento, for about a month, and then released.

He returned to Sonoma and continued his efforts to make things more pleasant for those who lived in the Valley of the Moon and extended his aid to those in need anywhere in California. He built a new home on his ranch to the north of the pueblo and lived there for many years, becoming one of California's most prominent citizens. He was a member of the committee that drafted the constitution for the State in 1849 and, later, was a State senator for several years.

In 1847 a company of Col. J. D. Stevenson's regiment of New York Volunteers was sent to Sonoma for station. They occupied the old Vallejo barracks. One of the company commanders,

Capt. John B. Frisbie, married one of Vallejo's daughters.

Days of the Gold Rush

The gold rush of 1849 and later brought new prosperity to the town of Sonoma. Vallejo, with others, visited the diggings. But Sonoma, with the exception of those U. S. soldiers who deserted and made tracks for the Mother Lode country, did not get the gold fever; it retained its original status as an agricultural community.

Following the Bear Flag incident, several famous and soon-to-become-famous people came to the valley. They came on business, they were stationed there at the Army post,

they came from curiosity, or they came just as travelers. The register of the Blue Wing must have been a "Who's Who" of California.

Frémont arrived almost before the Bear Flag was hauled down. Gen. Persifer F. Smith, American military governor, established his headquarters here in 1849. Kit Carson was present at the time of the Bear Flag revolt. Governor Lillburn W. Boggs served there as first American civil governor of northern California.

Three lieutenants of the U. S. Army, U. S. Grant, W. T. Sherman, and Philip Sheridan, each destined to become a great war leader for the Union cause, lived in the small town for a while.

Jack London Added to Valley's Fame

Once, when the town mayor "got off the beam" in his work, Sherman was sent to Sonoma to bring him to Monterey for disciplinary action. This he did with customary Sherman efficiency! H. W. Halleck and Joe Hooker, two Civil War generals of note, were stationed at the Sonoma barracks for a time. Hooker remained in the valley longer than most of the others. He acquired a large acreage to the north of the town and lived there until the Civil War called him away.

Our list of relatively contemporary celebrities who came to the valley can terminate with Jack London, who arrived in 1904 and later bought a ranch of some 1,400 acres high up on the mountainside. It was there he built his home, "Wolf House," an impressive dwelling wonderfully located. However, it burned before he ever lived in it. Jack London wrote many of his novels in the valley; one, *The Valley of the Moon*, probably was the first advertisement for the valley (Plates XV and XVI).

Sonoma did not grow fast. A railroad was built to the valley; the civil governor and his staff departed to establish their capital elsewhere; the military headquarters left for other parts. Sonoma even lost to more ambitious and energetic Santa Rosa the distinction of being the seat of county government.

Vineyards and wineries increased. Small resort towns grew up around the hot springs. Orchards were planted, which produced prunes and pears with the same profusion as that with which the vines grew grapes.

In the 1890's it was apparent that Sonoma, the Valley of the Moon, was just about the right distance from San Francisco for weekend residences. Thus came into existence Sobre Vista, the Spreckels estate. Here Rudolph Spreckels raised and raced horses, had fine cattle and vineyards, and the Valley of

the Moon again became well known throughout the State and the country. Mrs. Adolph Spreckels lived there for years. During World War II she generously turned her estate over to our Army Air Forces for use as a rest and recreation center.

Today Sonoma is still a small town of about 1,500 people. Its characteristics have not changed very much since the days of Vallejo. The vineyards are still flourishing, the wineries are operating, Buena Vista is being rejuvenated, and its vineyards and winery are producing lavishly.

A new industry has made its appearance, the raising of turkeys. In the Valley of the Moon the broad-breasted ("Mae West") turkey is raised in large numbers. Turkey ranches are small, medium, or large. With 4,000 turkeys you have a small ranch; with 7,000, about medium. Then there is the Weidemier Ranch where some 60,000 turkeys a year are raised. That is a big one!

Turkey raising is a very exacting business, because the birds can be inexplicably dumb! For example, if one frightened bird climbs into a barrel, all the others try to follow, and soon a couple of dozen have smothered to death!

Horse racing and training in the valley have changed. Instead of racing thoroughbreds, attention now centers on raising and training three- and five-gaited horses. The Wagon Wheel Ranch not only sends turkey eggs and turkey breeding stock all over the world; it also raises outstanding five-gaited horses.

Old Landmarks of the Plaza

The Sonoma plaza today retains many of the old landmarks. The mission, rebuilt around the original adobe walls, is now a museum. The barracks, built to shelter the company of Spanish soldiers mobilized by Vallejo to keep the Indians under control and to prevent further advance by the Russians, is still here. The Blue Wing tavern still stands in its original form. The El Dorado is there, too, but it has had so much modern face lifting that it has lost its attractive Spanish characteristics.

At the corner of the plaza, where the original Vallejo flagpole stood and where the Bear Flag was raised, stand now a commemorative statue, a plaque, and a new flagpole. Pieces of the original flagpole are in the museum. The Vallejo ranch house has been taken over by the State and is unchanged in form or appearance.

Around the pueblo are many of the original adobe houses which still retain their unique appearance. From time to time, when excava-



Sonoma's Bear Flag Plaque Marks the Spot Where American Rule Began in California.

In a surprise raid, June 14, 1846, a small group of Americans seized power from the Mexicans and ran up the California Republic's grizzly flag, its red stripe said to have been cut from a woman's petticoat (page 714). On July 9 the Stars and Stripes was raised in its place. Few Mexican civilians objected to the change. Vallejo, the Mexican general, became a California legislator; his valley ranch house remains a State monument.

tions are made around the plaza, the present reverts to the past when pieces of the old redwood water pipes, laid by General Vallejo, are uncovered (Plate V). As far as can be seen, the redwood is in just as good condition today as when laid about a hundred years ago. Throughout the valley, also, arrowheads, mortars, axheads, and pestles are unearthed from time to time, relics left by Indians at the sites of their old villages, near the spas, or on their battlefields.

Valley's Charm Unchanged

The caballeros are gone, but the rodeos and the fiestas are still here. Herds of thousands of cattle are replaced by turkeys, but the grapes and wineries, the charm of the valley, and the hospitality of its people are unchanged

from the days of Mariano Vallejo. The climate, the trees, and the rolling hills are the same.

For about 40 years as an officer of the Army, I have traveled with my family to all kinds of places in many corners of the world. We have been stationed on both coasts, in the Great Plains, along the Great Lakes, and in the mountains.

We have enjoyed the best that the islands of the Pacific had to offer, and we have suffered from the heat, humidity, and the insects. We have lived in ease and comfort in the farming area of the Atlantic States.

However, when we came to selecting a place to settle permanently, to secure a ranch, to build a home, we chose the Valley of the Many Moons.

Masterpieces on Tour

BY HARRY A. McBRIDE

Administrator, National Gallery of Art

MIRACULOUSLY surviving the war, some of the greatest art masterpieces of Europe, many painted before Columbus crossed the Atlantic, are being seen and enjoyed by millions of Americans. Nearly a million people viewed them in Washington, D. C., alone.

As art lovers feast their eyes upon these priceless works of long-dead masters, or view the reproductions of selected paintings in these pages, they may well see in the background the lurid flash of bursting bombs, furtive flight from shattered Berlin, the gloom of a German salt mine. Probably no such collection of art in history has traveled so far and had so many narrow escapes.

Safeguarded as carefully as VIP's (Very Important Personages), 202 German-owned masterpieces were brought from Germany by the United States Army in December, 1945, for safekeeping and proper preservation at the National Gallery of Art, in Washington. They soon became known as "very important paintings."

In the collection were 15 works by Rembrandt, six by Rubens, five by Botticelli, two by Pieter Bruegel (Breughel) the Elder, two by Vermeer, three by Raphael, five by Titian, three by Watteau, and five by Jan van Eyck, as well as paintings by Fra Angelico, Giovanni Bellini, Lucas Cranach the Elder, Dürer, Giorgione, Frans Hals, Hans Holbein the Younger, Fra Filippo Lippi, and others (Plates I to XXIV).

"Very Important Paintings" Cross Country

From Washington all but the most fragile have gone on a tour of 13 cities—New York, Philadelphia, Chicago, Boston, Detroit, Cleveland, Minneapolis, Portland, Oregon; San Francisco, Los Angeles, St. Louis, Pittsburgh, and Toledo—before being returned to Germany.*

What a story these paintings could tell! Like Europe's millions of displaced persons, they were shunted hither and yon by war.

All but two of the paintings in this famous collection came from the Kaiser Friedrich Museum, in Berlin. This impressive building of Italian baroque style was completed by the German Government in 1903 at the junction of the Spree River and the waterway called the Kupfergraben in the heart of the city. At the start of World War II it housed one of the world's greatest art collections.

The real nucleus of the collection was the gift in 1821 of nearly 600 paintings, mainly of the Italian schools, by the British merchant, Edward Solly, then living in Berlin. In fact, the Solly mark appears on the backs of several of the masterpieces which traveled to America. Among them are the famous "Saint Sebastian" and the "Venus," by Botticelli; "Madonna and Child," by Raphael, and the famed Titian "Self-portrait."

The museum building itself suffered severely from aerial bombardment. The massive dome was shattered, a large part of the roof demolished, the lower floor piled high with rubble, and the stone walls so cracked that the cellars were flooded with several feet of water. Its reconstruction will be a long and costly job.

In the first days of the war the Nazis expected heavy air raids over the German capital; in 1939 the curatorial staff of the Museum hurriedly removed the most precious works of art to its vaulted stone cellars.

Although early air raids did not materialize, the paintings were left in the cellars. Many were carefully crated, but not all, because even then wood was scarce, and specialists to do the packing were even scarcer. The uncrated paintings were merely stood around the cellar walls.

In 1943 air action over Berlin started in earnest. Close to two railroad stations, the Kaiser Friedrich Museum, with its glass skylights, no longer formed a safe repository for such treasures. The collection made its first move from home, to an air raid shelter on Dönhoffstrasse.

Soon this protection also became inadequate and a second move was made, this time to a flak tower, a huge concrete anti-aircraft station, near the Alexanderplatz.

The flak tower provided excellent protection. The paintings were placed on various floors. There were accommodations for a curator and restorer and, most important for preservation of the paintings, the structure was air-conditioned.

Early in 1945 conditions in Berlin became more and more critical. As air raids increased in intensity, the art experts wanted the paint-

* The German-owned paintings are scheduled to be at Minneapolis, October 29-November 17; Portland, November 24-December 3; San Francisco, December 9-28; Los Angeles, January 3-22; St. Louis, January 29-February 17; Pittsburgh, February 23-March 14; and Toledo, March 19-31.



National Geographic Photographer R. Anthony Stewart

A Record-shattering Throng of Art Lovers Surges at the National Gallery's Doors

Coney Island would not have been surprised, but administrators of the Nation's art collection were amazed by the popular interest. They knew of no other art show to compare in popularity. Washington's cherry blossoms, blooming simultaneously, proved scarcely more alluring. Five-week attendance totaled 964,970. This April 11, 1948, crowd waiting for the 2 p. m. opening eventually swelled to 67,490.

ings removed from the city to safer quarters, but the military authorities lent a deaf ear to their pleas. Officials in charge of transport refused aid.

Suddenly, however, there came a direct order from Hitler that the most precious of the art objects be evacuated immediately.

The order came a little late, because rail transportation was already out of the question and motor vehicles were scarce. Nevertheless, beginning on March 12, 1945, some 1,400 paintings were loaded onto small, dilapidated open trucks.

The trucks were not big enough to accommodate the largest masterpieces, and it proved impossible to evacuate them and also nearly 800 paintings of lesser quality. All were necessarily left behind.

Thus a large number of paintings remained in the flak tower, and here, at the time of the Russian entry into Berlin, some 400 are reported to have been destroyed by fire and explosions. Among them were such world-renowned works of art as the "Pan," by Luca Signorelli, and the beautiful "Conversion of Paul," by Rubens, a canvas 8½ by 12 feet in size, as well as a magnificent Cosimo Tura, "Madonna Enthroned."

The remaining 400 paintings were supposedly removed by the Russians. In any event, their present whereabouts is a mystery.

Ten-hour Trip to a Salt Mine

The little open trucks, bearing, among others, the great paintings recently exhibited at the National Gallery of Art in Wash-



National Gallery of Art

The Army Ran the Art Show; Snappy MP's Warned Any Poking Finger, "Don't Touch!"

National Gallery guards and military police directed traffic as on a busy corner. Said one, "It was like Union Station on a holiday." One flustered visitor, who asked for a ticket to New York, thought it was! A woman came befeurred in a live marmoset; another brought her Siamese cat on a leash. Both were refused admission. Rubens's "Perseus Frees Andromeda" hangs in the background (Plate XXI).

ington and at other museums throughout the country, had to leave Berlin before 8 p. m., because at that hour intensive air raids began.

Since the trucks could not travel by night because of the danger of accident in the black-out, the drivers stopped and slept in the woods a few miles outside of the city. Neither military guard nor any sort of covering was provided for the precious cargo, but fortunately, during the evacuation, no looters were encountered and no rain fell.

Only two trucks were available, and these made several trips each before further movement became impossible. The 10-hour trips to the chosen hiding place were all accomplished safely.

The destination was the Merkers salt mine, southwest of Erfurt. Here the collection was

placed some 2,100 feet below the surface level, together with vast hoards of other valuables, money, jewels, and Nazi loot (page 746).

Third Army Troops Find Hoard

On April 7, 1945, this tremendous treasure-trove was brought to light by the coming of United States troops of Gen. George S. Patton's Third Army.

Two elderly Frenchwomen, impressed laborers of the Germans, stopped one of the first officers they saw, Lt. Col. W. I. Russell, of the 90th Infantry Division. Largely by sign language and pointing to the mine entrance, they informed him that the mine contained untold treasures. He investigated and found literally millions in gold coin and bullion, jewels, and other valuables.

Beyond the boxes and bags of gold and silver the Colonel noticed an old painting leaning against the wall. He did not know it at the time, but this painting was Rembrandt's famous work, "The Man with the Golden Helmet." Three years later the Colonel, on duty near Washington, was surprised to recognize it on the walls of the National Gallery of Art during the exhibition in Washington!

Further search revealed crate after crate of great paintings. These masterpieces and other works of art were then taken over by the Arts and Monuments officers attached to the United States Army.

Thousands upon thousands of notable works of art were found, not only in salt mines but also in storerooms of castles, in vaults of banks, in cellars of monasteries and churches, and in isolated private homes. They had been hurriedly evacuated and stored to protect them from air raids, and now they became a real problem for our Army.

Art collection centers were established at Munich, Wiesbaden, Marburg, and other places. In Munich the two huge modern buildings on the Königsplatz, built to be the headquarters and shrine of the Nazi Party, were used for storing art—a use, incidentally, which was a far cry from the bellicose aims of their builders. In Wiesbaden the museum on the Wilhelmstrasse was chosen.

To these centers rumbled big, well-guarded Army trucks day after day, bearing their precious burdens. These moves were more leisurely—air raids were a thing of the past.

Looted Art Returned to Owners

In the centers the art objects were classified by our Arts and Monuments officers into two categories—German loot, and collections of legitimate German ownership.

The loot was promptly sent back by our Army to the country from which it came. On one day alone a train of 45 freight cars filled with works of art was sent back to France. Hundreds of thousands of looted items were returned to the country of ownership. A magnificent job has thus been done by that branch of our Army known as the Monuments, Fine Arts, and Archives Branch.*

The Kaiser Friedrich collection was trucked first from the Merkers mine to vaults in the Reichsbank in Frankfurt and later to the collection point at Wiesbaden—150 miles from its wartime quarters in the salt mine.

In October, 1945, it was decided to send a part of the great Berlin collection to the United States for safekeeping until better facilities could be made available in Germany.

The collection centers at Munich and Wiesbaden had suffered considerable war damage, little or no coal could be spared to heat them, and there was difficulty in obtaining glass to replace the shattered windows and material to make the roofs watertight.

Moreover, the Army was forced to guard what was probably the greatest accumulation of art ever brought together in one small geographical area.

The United States Zone was filled not only with the treasures of all the important German, Austrian, and Hungarian museums except Dresden, but also with the vast pile of art looted by the Nazis from various occupied countries.

Personnel and Material Scarce

Material such as canvas, varnish, glue, and paints for the preservation of pictures was lacking, and German museum personnel was scattered or still being screened.

On the principle that it is better not to have all your eggs in one basket when the going is rough, as it was immediately after the occupation of Germany, a selection of "some 200 paintings" from the Berlin museums was made upon orders from high authority.

Packing of the paintings for their transatlantic journey was started in the Wiesbaden museum, in rooms piled high with precious paintings, sculpture, and other art pieces.

The progressive intensity of Allied bombing in Berlin was here discernible. The first packing cases made for evacuation of the paintings were of excellent wood, carefully fashioned, with hinged tops, hardware handles, and beveled edges. As urgency increased, plain boxes of flimsy material were hurriedly nailed together. Finally, there were crates in which the paintings were merely piled on top of one another with no pretense of careful packing.

Many of the old, ornate frames were broken beyond repair, and many of the paintings themselves were damaged.

Packing materials for the long voyage were almost unobtainable, but by using the better crates from Berlin and by "scrounging" tar paper from some stock pile, the job was finally completed.

Cameras Record Each Painting's Condition

Of great help was the discovery of a large supply of chemically treated cellophanelike paper which the Germans had been using in air raid shelters as protection against gas. This material, proof against fire and water, was used to line each packing case.

* See "Europe's Looted Art," by John Walker, NATIONAL GEOGRAPHIC MAGAZINE, JANUARY, 1946.



National Geographic Magazine

ROGIER VAN DER WEYDEN (1400?-64), Flemish • Portrait of a Young Woman

With this five-century-old painting the NATIONAL GEOGRAPHIC MAGAZINE introduces a series of 25 German-owned masterpieces recently exhibited in the National Gallery of Art and other American museums. They have been selected from 202 paintings, roughly valued at \$80,000,000, which the United States Army in 1945 rescued from a Thuringian salt mine. Rogier's "Young Woman" is remarkable for severity of tone. From a palette full of bright colors the artist dryly chose black, gray, and a laundry-fresh white. He loved to dramatize a soulful expression.



National Geographic Magazine

HANS HOLBEIN THE YOUNGER (1497-1547), German • Georg Gize

When the Reformation slowed the demand for church art, the scholar Erasmus sent Holbein, his German protégé, from Basel to London with a letter of introduction to Sir Thomas More. As a portraitist, Holbein cultivated the Hanseatic merchants of the Steelyard, the German house beside the Thames. Their symbol, the steelyard, or scale, here hangs from a shelf.

Holbein, who loved details, pictured this Dutch trader surrounded by the tools of his trade: money box, inkstand, quill pen, seal, and scissors. A metal ball for string calls to mind the old-fashioned grocery. A leather container suggests the modern brief case. The carnations show no change in four centuries. Correspondents from various parts of the world here address the sitter as Gison, Glisse, and (Latin) Crysen, but his own brother, who should know best, calls him Jerg Gize (letter in hand).

Eventually Holbein became Henry VIII's court painter, but royal connections did not save him from an unknown grave. He died in a London plague.



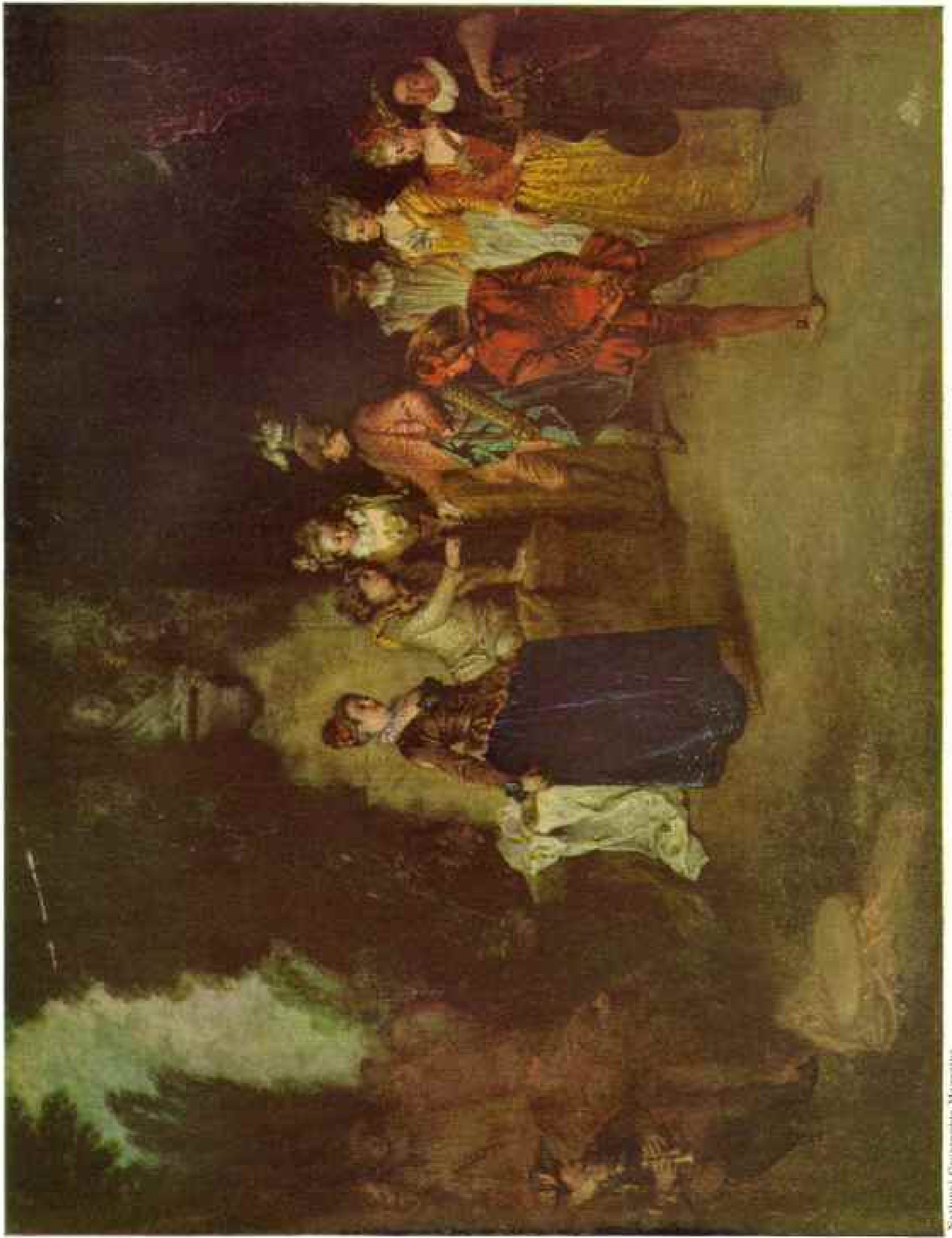
National Geographic Magazine

ALBRECHT DÜRER (1471-1528), German • *Madonna in Prayer*

Dürer was born in an age when the printing press, combined with the renaissance of art and learning, was making over Germany. Nürnberg, his birthplace, was a center of the new printing industry. With the published word went the published picture. Printing gave Dürer the opportunity of addressing his superb illustrations to the many instead of to the few. To this day his wood and copper engravings remain the pith of perfection.

Like Leonardo, his contemporary, Dürer was a thinker, producing treatises in geometry, perspective, and fortification. Though Dürer was traveled, his art remained typically German, tinged with gloomy Gothic mysticism. Some forty of his paint-and-brush portraits survive. In many of these he portrays fabrics so rich that they excite the sense of touch. He delighted in strong coloring.

An example is here seen in the Madonna, so radiantly clad in red and blue. This small wooden panel appears to be the fragment of a larger work.



National Geographic Magazine

ANTOINE WATTEAU (1684-1721), French • *The French Comedians*
Tyrannical Louis XIV's death restored comedy to the French court. Watteau, dying of tuberculosis, interpreted the new gaiety.



National Geographic Magazine

HANS BALDUNG (1484-1505), German • Saint George; Saint Catherine; Adoration of the Magi; Saint Agnes; Saint Maurice



National Geographic Magazine

JEAN BAPTISTE SIMÉON CHARDIN (1699-1779), French • The Draftsman

A Parisian carpenter's son, Chardin never forgot his humble beginnings. Scorning the pompous fancies of his day, he painted homely, intimate scenes. Buyers, preferring sentimentality, ignored Chardin's realism and sincerity. To later artists he became a model of freshness and charm.

As a colorist, Chardin holds high rank. "The Draftsman" shows him using pigments with restraint. In this subtle composition the soft green portfolio stands out as the most colorful item. The artist's fondness for playing with light and shadow is well illustrated. Chardin gave his eyes to his work; blindness overtook him in old age.



National Geographic Magazine

GEORGES DE LA TOUR (1600?-32). French • *Sebastian Mourned by Saint Irene and Her Ladies*

From "Painter to the King" to utter oblivion was the fate of Lorraine's "famous artist." La Tour gained the royal favor by presenting a "Saint Sebastian in the Night" to Louis XIII. That monarch, says an old chronicle, removed all other paintings from his quarters to enjoy La Tour's dramatic night scene the more.

With changing styles, La Tour's very name was forgotten. A fellow Lorrainer resurrected his memory in 1865, but could point out none of his works. These were not discovered until, beginning in 1914, a dozen came to light beneath epurious Spanish identification tags. La Tour used torch or candle like a powerful spotlight to create a religious atmosphere.



National Gallery, London

TITIAN (1477?-1576). *Venus with the Organ Player*

Titiano Vercelli (Titian) left the world a portrait gallery of 16th-century giants. Dukes, dukes, popes, and emperors adored him with titles and commissions, but he had to claim some of them for his feet. One of his patrons, Philip II of Spain, resembled this anonymous organ player. Titian! His very name describes his Venuses' golden hair and rippling flesh tones. The distant mountain reflects his birthplace in the Dolomites. Greater than ever, the artist was almost 100 years old when plague struck him down and carried off his beloved son. Thieves then plundered the treasures in his Venetian mansion. Two similar paintings, by Titian or his pupils, hang in Madrid.



National Geographic Magazine

ÉDOUARD MANET (1852-83), French • *The Greenhouse*

The founder of Impressionism arranged his "greenhouse" on his Paris veranda. Husband and wife, his friends, posed for him.

ANDREA DEL CASTAGNO
(1425?-57), Florentine •

Assumption of the Virgin

"How reprehensible is the vice of envy," wrote Giorgio Vasari, who in his *Lives* described his fellow artists of the Renaissance. "Andrea del Castagno," he said, "secured a commission to decorate [a] chapel in collaboration with Domenico Veneziano. Andrea was most envious. . . . It asked him that this stranger should be belittled by the Florentines [and he] began to plot to remove his competitor. . . . One evening . . . Andrea disguised himself and posted himself on a street corner and with a lead weight crushed his victim. . . . When the crime was discovered, Andrea ran to the scene, crying, 'Alas, my brother! Domenico died in Andrea's arms. . . . The truth was never known till Andrea confessed it on his deathbed.'"

This murder story has one small flaw: research shows the "victim" outlived his "slayer" by four years. Andrea painted the "Assumption" in a wooden altarpiece. The Virgin, attended by Saint Julian and Saint Monica, is borne heavenward on the green, red, and gold wings of angels. She is enveloped by a flaming cloud known as the *mandorla* (Ital. *mandor-shaped*), a device used to suggest glory. Its red-and-gold brilliance served to light up art works in dim, candlelit churches.

Flowers bear out the legend that when the Madonna was carried aloft, roses and lilies sprang up in the tomb.



RAPHAEL (1483-1520) *Umbrian* • *Madonna and Child with the Little Saint John*

Among the world's artistic geniuses, how if any lived to enjoy so much renown as Raphael. Sixteenth-century Roman called him their "divine painter."

Summoned by the Pope, the 27-year-old Raphael took his place beside Michelangelo and other artists in the beautification of Rome. He became the chief architect of St. Peter's and the conservator of Rome's antique monuments. In the Vatican he executed a noble series of frescoes. To carry out his plans, he had a retinue of 50 talented pupils.

Fortune did not spoil him; Raphael's beauty and kindness charmed everyone. When at 57 years he died of fever and his body lay beside his unfinished "Transfiguration," all Rome mourned at his loss.

With other Renaissance artists, Raphael re-created the classic beauty of the Hellenic world. In his hands convention's rigid saints acquired flesh and blood.

Into two working decades the artist compressed three major style developments: his Perugian, Florentine, and Roman periods. This Virgin he painted in Florence, as he did so many others. In his Madonna's pity and tenderness he set a new standard for spiritual beauty and feminine charm.

Raphael's mastery of composition is here well illustrated. Within the folds, or circular painting, he has arranged a pyramid of figures whose graceful equilibrium appeals instantly to the eye.

An Italian landscape occupies the background. The infant John (left) wears the camel-hair shirt which he adapted to manhood.

Sometimes the picture is called the "Terra-cotta Madonna" because for many years it was a possession of the Dukes of Terracina.

National Geographic Magazine





National Geographic Magazine

PIETER BRUEGEL THE ELDER (1525?-69), Flemish • *Flemish Folk Sayings*

Though celebrated as a landscape artist, Bruegel loved to depict the plain people. Here he immortalizes 92 of their proverbs. Upper left: "Tarts grow on the roof" corresponds to our own "Pie in the sky." "Don't butt your



Like a Cartoon Out of the Sunday Comics Is the Picture of Folly Inn head against a stone wall" (below) and "Casting roses before swine" (center) are equally banal. So is "Don't count your eels (chickens) before they're caught" (right). For his dulleries Bruegel earned the nickname "Peasant."



National Geographic Magazine

BERNARDO STROZZI (1581-1644), Genoese • *Judith with the Head of Holofernes*

Besieged, the Israelites were on the brink of surrender, when Judith the widow, rich, beautiful, and chaste, "clothed herself with the garments of her gladness" and went into the Assyrians' camp. General Holofernes, "caught by his eyes," invited her into his tent, but drank so much he fell asleep. Judith "loosed his sword . . . struck twice upon his neck and cut off his head." At daybreak the Israelites routed the enemy, and Judith sang, "Her sandals ravished his eyes, her beauty made his soul her captive." Book of Judith, part of the Apocrypha, tells the story. The artist was a Genoese monk.



National Geographic Magazine

FRANS HALS (1580-1666), Dutch • *A Little Girl with Her Nurse*

Scorning elegance, Hals portrayed his own stout Dutch people, from ladies to tavern braves. Realism earned us little bread for his ten children, however, that Hals had to sell his few possessions to pay his baker. For years after his death his works fetched us little as five shillings. As if to forget his worries, the artist painted many smiling faces. This happy child seems about to burst into giggles. Her cap is so delicate one can almost count the threads and feel the texture. Lace-makers might use it as a pattern. Nurse holds a pear.



National Geographic Magazine

ALESSANDRO BOTTICELLI (1447?-1510), Florentine • *Giuliano de' Medici*

In fabulous 15th-century Florence, Lorenzo de' Medici, duke, financier, and poet, held court thronged with Renaissance geniuses, including Botticelli, the dreamer in colors. Another favorite was Giuliano, the duke's beloved younger brother. Conspirators one day killed Giuliano and stabbed Lorenzo. Botticelli has left us this tempera-on-wood memorial of the pale, aristocratic younger Medici. Showing him in his 20th year, the portrait appears to have been painted following his death.



National Geographic Magazine

JAN VAN EYCK (1386?-1441), Flemish • *The Man with the Pink*

To the Van Eyck brothers, Hubert and Jan, art owes a stimulating invention. Others tried mixing pigment, oil, and varnish, but their oil dried stickily and their varnish stained. The Van Eycks' formula overcame these defects. Italian artists did not learn their secret for half a century. Jan's "Man with the Pink" (carnation) wears the bell and cross of the Brotherhood of St. Anthony. This circumstance fixes the probable date (1422-25). In those years Jan was the court painter of Duke John of Bavaria, who bestowed the device.



National Geographic Magazine

GERARD TER BORCH (1617-81), Dutch • *Fatherly Advice*

As charmingly as he depicted Dutch beauties, Ter Borch was even more skillful in capturing the texture of their glossy satin gowns. So many of the painter's ladies wore the material that one might suspect him of having draped model after model in the same satin dress.

This very picture is often called "The Satin Gown," a more suitable title than the one used here. As the old masters seldom named their works, "Fatherly Advice" must have been the choice of a poor observer. The curly-haired gentleman, who holds a coin in his hand, obviously is too young to be the young woman's father, and his expression betrays no paternal interest.

Variations of this picture exist in Amsterdam and London. A toilette of the young woman used to hang in Dresden.

Some 460 Ter Borch works have been catalogued. Perhaps the most celebrated is his paint-on-copper "Peace of Münster," a congress dealing with the Thirty Years' War.

Visiting Madrid, the artist was knighted by Philip IV, his employer.



National Geographic Magazine

JAN VERMEER (1632-73), Dutch • *The Pearl Necklace*

"The Pearl Necklace" is a good definition of the art critic's term, "Vermeer yellow." In painting hair, jacket, window curtain, and the chairs' leather decorations and brass buttons, the artist repeated the hue, like a modern color press. Most of the 33 to 40 accepted Vermeers reveal the same love of lemon yellow. Blue was another favorite.

For years this Dutch master was so neglected that his works were peddled under more popular names. His fame revived less than a century ago. Vermeer became a cult; devotees adored even this bare wall as a masterpiece in white.

Not long ago Vermeer became world news. Hans van Meegeren, a frustrated Netherlands artist, hoaxed his scornful critics by painting six "original" Vermeers and "discovering" them. With their acceptance by critics, he made a fortune. Hermann Goering in 1945 bought one for \$250,000. Arrested for "collaboration," Van Meegeren pleaded that he had swindled the enemy instead. Painting for his liberty, he forged a seventh Vermeer as evidence. In judging an old master, he said triumphantly, critics "look first for the signature."



National Geographic Magazine

MEINDERT HOBBEEMA (1658-1709), Dutch • *A Road Winding Amongst Clumps of Trees and Small Farms*

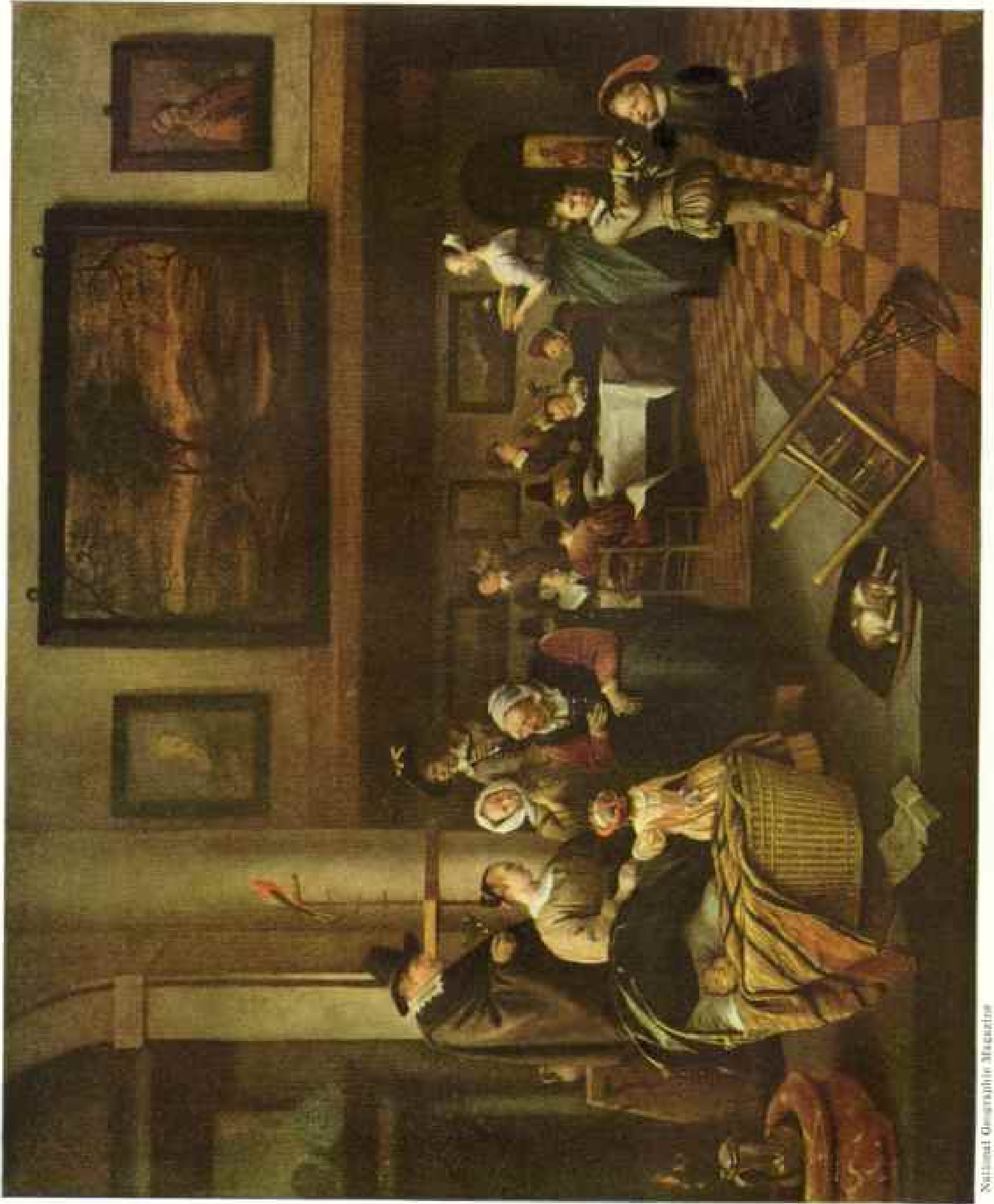
(Hobbema's three-century-old landscapes still mirror the Dutch countryside with fidelity.)



National Geographic Magazine

PETER PAUL RUBENS (1577-1640). Flemish • *Perseus Frees Andromeda*

Perseus wed the girl on the rock; Rubens was married to the model. Andromeda still shines among the stars where Cernik legend placed her.



National Geographic Magazine

JAN STEEN (1626?-79), Dutch • *Baptismal Party*

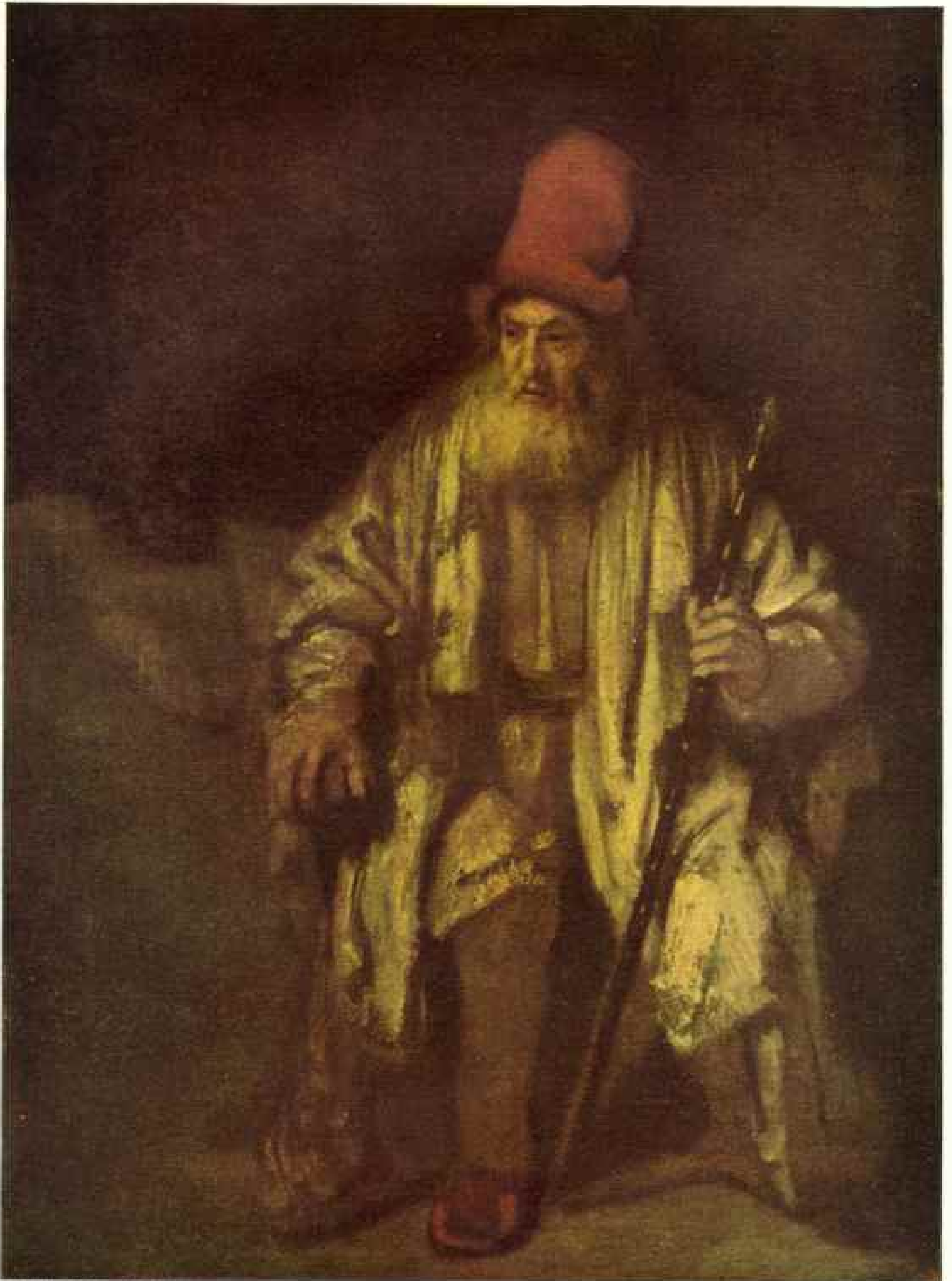
Steen's admiration of Frans Hals is reflected in the two mantelpiece portraits. One (right) is in Germany; the other (left) cannot be traced.



National Geographic Magazine

LUCAS VAN LEYDEN (1594-1333), Dutch • *The Chess Players*

Rustic and comic scenes by Leony prepared the art world for the realistic 17th-century Dutch masters.



National Geographic Magazine

REMBRANDT (1606-69), Dutch • *Old Man with the Red Cap*

Precise in youth, Rembrandt van Rijn in age became bold and rapid, indifferent to details. His sketchy "Old Man," painted around 1655, illustrates the sacrifice of beauty for character. The background is a dash, fingers are a few brush strokes; but the face shines with Rembrandt's celebrated magic light. Such a soul-searching study met little popular favor. Rembrandt was Amsterdam's darling until, with the death of his wife in 1642, fortune turned to bankruptcy. Evicted from his art treasury home, he toiled in poor lodgings to satisfy his creditors.

A group of German photographers from Marburg took record photos of each painting before it was boxed, to establish its condition as the Army had found it. Thereafter it was up to the Army to protect the collection and to return it without damage or deterioration. There the Army did a superb job!

It was November, 1945. Snow and ice were already present in certain areas; roads and bridges were still in war-torn condition. Wiesbaden was a long way from any seaport. Accordingly, it was decided that the 202 should travel by rail.

Boxcars were out of the question; baggage cars were unheated and often windowless. But in the severely blasted railroad yards at Frankfurt, amid twisted rails, grotesquely shattered locomotives, burned-out freight and passenger cars, we found two German hospital cars bearing large red crosses.

From these the interior equipment had been removed. They could be heated and the windows were intact—perfect parlor cars for the 45 cases of paintings, with room to spare for 10 Army cots for the armed guard which was to accompany the shipment.

Convoyed by truck from Wiesbaden, the paintings were carefully loaded and the two cars were shunted around the city to the passenger station, where they were attached to the "Main-Seiner," the night express to Paris. Thus started on November 20, 1945, the most important transatlantic voyage of art!

Jean Frenchman Finds a Way

The next step was from Paris to Le Havre, and here it looked for a time as if a real snag had appeared. A small French switch engine coupled onto the two cars to take them from the Gare de l'Est to the Gare St. Lazare. The track led through a tunnel. Suddenly, with a whistled shriek of warning, the engine jolted to a halt at the tunnel entrance.

French trainmen waved their arms and shouted. The cars were too big for the clearances. Mon Dieu, what was to be done now? Conferences, measurements, pandemonium!

Then came a big, muscular foreman who settled the matter with an ax. He chopped off the lower steps of each car, then climbed up on the roof and knocked off the tops of the ventilator hoods. The cars went through.

Next stop was Le Havre, alongside the Army transport *James Parker*. Always the paintings were under strict armed guard, night and day. Security measures were perfect.

Hand-carried aboard, the cases were carefully stowed and lashed along one side of the officers' air-conditioned dining saloon, well above the water line.

Here the military police guard was replaced by ten returning soldiers who volunteered for the task of protecting the paintings and also of enforcing the rule against smoking in the officers' saloon. This restriction did not seem to make the German paintings too unpopular with the passengers.

After an uneventful crossing, the ship passed the Statue of Liberty at 5 p. m. on December 6, with no visible impression upon Botticelli's "Saint Sebastian" or Van Eyck's "The Man with the Pink" (Plate XVII), or upon the other German-owned masterpieces. Though America was still a wilderness when many of them were painted, they were to discover here an amazingly art-conscious nation.

Unloading at a pier in New York began at seven the next morning. Each crate was hand-carried down the gangplank and carefully placed in two Army trucks and a trailer truck for the trip to Washington. Carpenters built protecting rails in the trucks so that there would be no jolting or movement.

Art Preceded by Shrieking Sirens

Under heavy armed escort in four staff cars, with an extra truck and tires in case of emergency, the radio-controlled convoy left the pier at noon.

Like royalty, the masterpieces passed through New York streets and a specially cleared lane of the Holland Tunnel behind police motorcycles with blaring sirens.

Relays of State police led the convoy through New Jersey, Delaware, and Maryland. A special ferry took it across the Delaware River at Pennsville.

The distinguished visitors were met late that night at the District of Columbia line by a Washington motorcycle police escort. Moving through red lights with shrieking sirens, they passed the Capitol and arrived in state at the National Gallery of Art, which was to be their temporary home.

The Gallery staff started immediately unpacking them. On rubber-tired carts the crates were gently moved, one by one, to the large so-called "copyist's room"—an air-conditioned room with red-tiled walls, gray cement floors, and heavily barred windows.

Exclamations as "Assumption" Stands Revealed

It was an exciting moment when the first of the masterpieces was removed from its wrappings in these surroundings. The beautiful "The Assumption of the Virgin," by Andrea del Castagno, appeared in all its golden glory amid exclamations from the curatorial staff (Plate X).



U. S. Army Signal Corps, Official

General Patton's Yanks Discover "The Greenhouse" in a Gloomy German Salt Mine

In Merkers, April 7, 1945, two slaves of the Nazis pointed out to the Third Army a treasure-trove of art and gold. At sight of the hoarded bullion a popeyed lieutenant "almost fainted." Since that day the world has forgotten the cash; the irreplaceable old masters have added to their glory (page 747 and Plate IX).

The 202 paintings were minutely examined, again photographed for condition reports, and found to have suffered no damage on the voyage.

The many masterpieces which arrived unframed were provided with strong temporary frames of stained poplar. They were wiped to remove accumulated dirt and grime and hung on heavy wire screens.

The policy of the Gallery, as custodians for the Army, was to do everything it could toward safeguarding the paintings, but no restoration other than that absolutely necessary for preservation was attempted. This was thought to be a job for German restorers upon return of the paintings.

Daily inspections were made; temperature and humidity were carefully controlled. Many of the paintings were on delicate wooden panels, some of which had become warped years ago; therefore, it was necessary to handle them with special care.

In the mine, too, they had become saturated with moisture. Had they dried out too quickly, contraction of the wood would have caused blisters and cracks.

The National Gallery could offer ideal conditions for the proper readjustment of these panels to normal atmospheric conditions.

To Be Returned in Better Condition

Because of the air-conditioning system at the Gallery, unique among large museums, relative temperature and humidity could be controlled in the copyist's room so that the pictures would lose excessive moisture slowly and safely. From this point of view, particularly, the pictures are in better condition today than when they left Germany.

Some showed incrustations of salt from water which had dripped on them in the Merkers mine. This damage was carefully removed, and so successfully that salt marks are now noticeable on only two of the paint-



National Geographic Photographer B. Anthony Stewart

Manet's Picture, Rescued by Americans, Is Shown to Americans in Washington, D. C.

National Gallery throngs were so dense that the deepest ranks sometimes could see "only the heads, not the bodies." Front rows, however, never failed to make way for a wheel chair; this courteous MP assists by reading the catalogue aloud. Visitors from faraway States included some who had never before attended an art exhibition. "The Greenhouse" is often called "In the Conservatory."

ings, "The Altar of Saint Omar, Life of Saint Bertin," by Simon Marmion, and the "Flemish Folk Sayings," by Bruegel (Plates XII-XIII).

Thus the famous collection remained in storage, benefiting by its quiet sojourn. But in March, 1948, the Army decided that the time had come to return the paintings to Germany, since conditions had improved to such an extent that they might now be safely cared for in their homeland.

The National Gallery of Art was requested to exhibit the collection so that Americans might see it before shipment.

Accordingly, without preview or special fanfare, the paintings were hung in eight large rooms and the exhibition opened to the public on March 17, 1948, the seventh anniversary of the inauguration of the Gallery itself.*

This was an Army show, and a detail of military police from the newly activated 3d Infantry Regiment, in spick-and-span new

uniforms, was supplied to assist the staff of the Gallery in the protection of the paintings.

Then started a phenomenon that writers in the art world are still trying to explain. March 17th fell on Wednesday, and 8,390 visitors came to see the German-owned paintings, not an unusually large number for an opening day.

The attendance, however, steadily increased.

All Attendance Records Broken

On the following Sunday afternoon, several thousand were waiting when the doors opened at 2 o'clock.

On that day, 35,593 persons passed through the entrances, shattering the Gallery's previous high of 27,823 for any one day.

Attendance for the first two weeks reached

* See "Old Masters in a New National Gallery," by Ruth Q. McBride, NATIONAL GEOGRAPHIC MAGAZINE, July, 1940.

257,728, and still the crowds poured into the building.

The peak day was April 11, the number reaching 67,490, something heretofore unheard of in art museum history (page 718). The show closed on Sunday, April 25th, and a completely exhausted Gallery staff, with the added detail of MP's, had received the astounding total of 964,970 visitors!

Crowds on many days were so large that the paintings could hardly be seen.

On the Mall side of the building, as many as 22 large buses were parked in one day. Motor coaches brought tourists from Maryland, Pennsylvania, Michigan, and two loads of colored schoolchildren from Birmingham, Alabama.

A busload of art students from Missouri traveled two days and two nights to see the exhibition.

Hundreds of classes came with their teachers from local and neighboring schools.

President Drops In; Comes Again

President Truman, out for his morning stroll, appeared at the service entrance one Sunday morning before the Gallery building was opened. He was shown the collection and enjoyed it so much that he made arrangements to come the following evening with Mrs. Truman and their daughter.

At a press conference later, the President lauded the exhibition and informed the reporters that his preference was the famous portrait of a merchant, "Georg Gisze," by Holbein (Plate II and page 750).

A picture of this great masterpiece immediately appeared in many newspapers, and thereafter special guards were required to handle the crowds that wanted to see the President's favorite.

Special guests were invited to night showings. Senators and Representatives, their wives and secretarial staffs, came, as well as Cabinet officers and high officials of the armed forces. Queen Helen of Rumania and Ingrid Bergman, the movie actress, with many other notables, viewed the paintings.

One reason for the exhibition's success undoubtedly is that it was held at the height of the Washington tourist season; the famed cherry blossoms were in bloom. Also, as is the case with all activities at the Gallery, there was no admission charge. The newspapers, too, played an important part in publicizing the event, for this was deemed the most important temporary exhibition of paintings ever shown in this country.

Nevertheless, it remains something of a mystery as to why these paintings should have

taken the public's fancy to such an extent. The permanent collections in some of our own galleries—in Washington, New York, Chicago, Boston, and Philadelphia, for example—contain paintings as great and, with few exceptions, examples of the old masters equally superb in quality and quantity.

Time and again the Gallery guards remarked about the orderly crowds, "What fine people these are!" or "Where do all these nice people come from?"

Of course, there were a few visitors like the one who wanted to know where the Kaiser-Frazer pictures were, and one well-dressed man wanted to see the "Hoiman" Goering loot!

But most of them were serious in their tour. Delight and even veneration were often reflected in their faces. In most cases, their motive obviously was more than idle curiosity.

Interest became so keen that the exhibition period at the National Gallery was extended one week by the Army. Then arose an insistence by the press, and by many persons in the art world, that more Americans be permitted to see it.

After a request by a subcommittee of the Senate Committee on Armed Services, and after consultation in Berlin with Gen. Lucius D. Clay, Commander in Chief, European Command, and Military Governor, it was decided that these masterpieces should go on a tour of the United States before being returned to Germany in April, 1949.

In each of the cities visited thus far, the paintings are being accorded the same warm welcome extended them in Washington—and, incidentally, are becoming the best-known and certainly the best-publicized collection of great art seen in this country.

Most Delicate Paintings Start Home

Before the collection started its American tour, however, it was decided wise to withdraw 52 paintings—especially those on delicate wooden panels "most likely to suffer damage or deterioration" if sent on an exhibition tour—and to return them at once to Germany.

Under Army auspices these were packed in 24 crates at the National Gallery. A wealth of packing material and expert care, to ensure their safe arrival, was used. Again they proceeded, on May 17, 1948, under police and military escort to Brooklyn, riding at reduced speed all through the night to avoid daytime traffic.

Special accommodations had been provided for the paintings and for their armed guard on the large United States Army transport *General Edwin D. Patrick*. Inside one of the mid-



National Gallery of Art.

Masterpieces Going Home to Germany Are Pampered Like Royal Egyptian Mummies

From Washington, 52 pictures were trucked to Brooklyn under military and police escort. They crossed the Atlantic under humidity control. On receiving them, a Munich curator said, "Their convalescence in America has done them good" (page 750). Harry A. McBride, the author (in Army uniform, extreme right), oversaw their removal from the National Gallery to Munich. He was then a colonel on special assignment. Comdr. Keith Merrill (in naval uniform) was in charge of the military detail.

ship hatches, on A deck, a huge "trunk" 21 by 10 by 6½ feet had been constructed with two-by-fours and heavy plywood.

This chest was lined with asbestos packing, and its walls and floors were covered with thick blankets. It was strung with lights and provided with electric fans to control temperature and humidity.

Fire extinguishers were placed around it, and an armed guard of one officer and four men was constantly on duty.

Sealed Crates Photographed for the Record

At the loading and unloading, Army Signal Corps photographers took pictures of each crate, showing the numbered seals intact. This may seem an almost unnecessary pre-

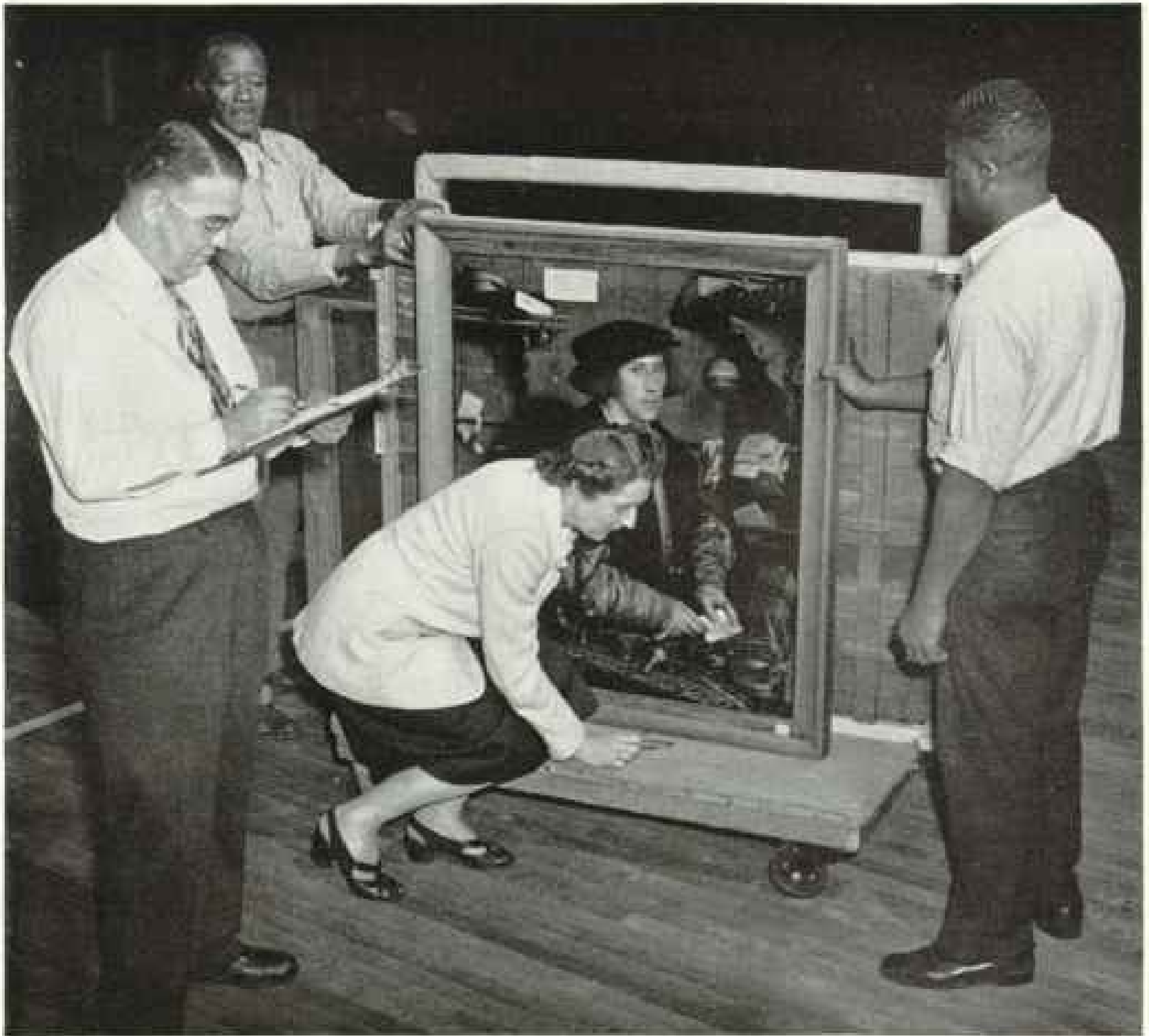
caution, since some of the cases weighed more than 500 pounds; yet it would have been embarrassing, to say the least, if the shipment had arrived minus a Van Eyck or Fra Angelico.

This time the paintings landed at Bremerhaven. A special baggage car and a sleeper for the accompanying officers and men were waiting.

German stevedores carried the big boxes across the tracks and placed them in the car; carpenters built heavy wooden props to protect them against jolting.

As an added safety measure, an empty baggage car was placed between the precious cargo and the locomotive.

During a downpour of rain the shipment



National Gallery of Art

Curator and Painting, Old Friends from Berlin, Hold Reunion in Washington, D. C.

Dr. Irene Kühnel knew Holbein's "Georg Gisze" when she worked in the Kaiser Friedrich Museum. She assisted in the evacuation of the paintings from the Berlin flak tower. As a consultant to the United States Army, she here checks their condition before leaving the National Gallery. This picture was one of 53 sent home to Germany as too fragile to risk a long tour (Plate II).

was unloaded in Munich's main station. Each case, already covered with heavy waterproof tar paper, was further protected by several pairs of blankets.

Bystanders wondered what it was all about. A GI went up to one of our armed guards and exclaimed, "What's going on here? Officers working!"

By midnight the 24 cases were safely deposited in the art collection center, the former Nazi headquarters on the Königsplatz.

"The United States Keeps Faith"

The following day the paintings were unpacked with painstaking care, checked against the record photographs, and examined minutely by the German curatorial staff, who

were visibly moved by this concrete example of how the United States keeps faith.

German newspapers carried accounts of the return of the masterpieces.

It became an excellent morale builder, and arrangements were made for special exhibition of these much-traveled works of art in the large and perfectly preserved Haus der Kunst, one of Munich's famous modern exhibition halls.

To the officers in charge of this operation, nothing could have been more welcome than the remark by the chief German curator: "The paintings arrived without damage. They are in better condition than when they left Germany. Their convalescence in America has done them good."

The Curlew's Secret

BY ARTHUR A. ALLEN

Professor of Ornithology, Cornell University

Leader, National Geographic Society-Cornell University-Arctic Institute of North America
Expedition to Alaska

With Illustrations from Photographs by the Author

UP TO June 12, 1948, one bird—and one only—of all the 815 species of North American birds had successfully hidden the secret of its nesting place and summer home from the eyes of man.

This bird of mystery was the bristle-thighed curlew, so named because of dubious adornments sprouting from its flanks and even its belly (Plate I).

No bigger than a pullet, but strong of wing, this great little traveler was known to winter on Tahiti and other South Sea islands and in spring to fly 5,500 miles, often by way of the Hawaiian Islands, to the coast of Alaska (map, page 754). But there it seemed to vanish into the thin air of the North.

The story of the curlew's secret begins before the American Revolution with the famous round-the-world voyage of the British navigator, Capt. James Cook, during the years 1768 to 1771. It ends with a 1948 expedition sponsored by the National Geographic Society, Cornell University, and the Arctic Institute of North America, which was organized in 1944 by distinguished Canadians and Americans.

First Specimen Found in 1769

Captain Cook had already demonstrated his appreciation of science, his knowledge of navigation, and his administrative ability when he was selected by the Lords of the Admiralty to sail the *Endeavour* on a voyage of exploration around the world.*

The main objective from the standpoint of the Royal Society was to make observations on the transit of Venus across the sun, which might give information of value to astronomy and navigation. This happens about once in a hundred years and the Society, desiring data from widely separate points, wished the transit of June 3, 1769, observed from an island in the South Pacific.

Tahiti, then called Otaheite, had been visited by Capt. Samuel Wallis, R.N., the year before and was selected as the most likely spot. Thither Captain Cook directed his course, leaving Plymouth, England, late in August 1768. Sir Joseph Banks, an ardent naturalist, was chosen by the Royal Society to accompany the expedition.

After an unusually well-ordered voyage, the expedition anchored at Tahiti on April 13, 1769, and stayed until July 13. It established friendly relations with the natives and recorded successfully the transit of Venus.

Three months on the island gave Banks and his helpers plenty of time to harvest a representative natural-history collection, and this was made available to other scientists upon the return to England.

Examining the expedition's bird collection, John Latham, a leading ornithologist of the day, recognized a curlew from Tahiti as different from the European whimbrel. When he published his *General Synopsis of Birds* in 1785, he listed the new bird as the Otaheite curlew. Its present scientific name is *Numenius tahitiensis*.

Bristles Noted by Titian Peale

After Captain Cook had shown the way, practically every naturalist who visited any of the South Sea islands between September and April found Otaheite curlews and sent specimens back to the various museums of Europe.

From 1838 to 1842 Titian Peale, son of the artist Charles Willson Peale, accompanied the United States Exploring Expedition to the South Seas under Lt. Charles Wilkes and found a curlew, in the Low (Tuamotu) Archipelago, which he thought to be a new species. Because he noted curious bristlelike feathers on the flanks and belly, he called it *Numenius femoralis*, and the common name, "bristle-thighed curlew," has stuck to this day.

The bird proved to be the same as the one in Sir Joseph Banks' collection. The characteristic bristles—more conspicuous in some individuals than others—appear to have gone unnoticed by Latham.

For a hundred years after the discovery of the bird, naturalists believed it to be a resident of the South Seas and thought it must nest on some other island than the one they were studying. Then on May 18, 1869, Ferdinand Bischoff collected a bristle-thighed curlew at

* See "Columbus of the Pacific," by J. R. Hildebrand, NATIONAL GEOGRAPHIC MAGAZINE, January, 1927.



Drawn by Harry S. Oliver and Irvin E. Alliman

Vast Alaska Was the Haystack, a 6¼-inch Nest the Needle

Air transportation and a combination of good weather, good judgment, and good luck enabled the National Geographic Society-Cornell University-Arctic Institute of North America Expedition to find the first known nest and eggs of the bristle-thighed curlew. This ornithological hide-and-seek ended in one of the loneliest spots on the continent—a stretch of tundra above what the expedition named Curlew Lake.

Kenai, Alaska, across the Kenai Peninsula from Seward.

On May 24, 1880, Dr. E. W. Nelson, who later became Chief of the United States Biological Survey, found two curlews on the west coast of Alaska, near St. Michael.

Five years later, on August 26, Dr. C. H. Townsend found one still farther north on the Kowak (Kobuk) River, and it began to be suspected that possibly the summer home of the mystery bird might be Alaska.

Nevertheless, as late as 1896, when R. Bowdler Sharpe published the 24th volume of *Catalogue of Birds in the British Museum*,

covering the shore birds of the world, he still gave as the range of the bristle-thighed curlew "Northwestern North America (rarely), visiting most of the islands of the Pacific Ocean, in some of which it is supposed to breed."

Early in the 20th century an increasing number of observations on this interesting bird were made without dispelling the mystery.

Homer R. Dill and William A. Bryan, returning from Laysan Island in the Hawaiian group in 1911, reported about 250 bristle-thighed curlews using the island, and even roosting on the roofs of old buildings in a very unorthodox manner for shore birds.



"Better Take Rations for Two or Three Weeks in Case I'm Grounded by Weather"

With a National Geographic map in hand, Nat Browne, veteran bush pilot, checks plans with expedition members at Mountain Village, Alaska, and warns that fog and storm may prevent him from picking them up on schedule. Ready to load supplies are Warren Petersen (left), David Allen, and Henry Kyllingstad (right). Beyond, Nat's red single-engined Bellanca bobs at anchor on the Yukon beside native fishing craft.

In 1922 Dr. Paul Bartsch, Curator of the Division of Mollusks at the United States National Museum, writing of a trip to the Midway Islands, reported these curlews abundant and tame there during November. They were feeding on *Scaevola* berries.

Curlews on Laysan Steal Eggs

The following year Dr. Alexander Wetmore, now Secretary of the Smithsonian Institution and a Trustee of the National Geographic Society, visited Laysan Island and found the curlews numerous. He reported them behaving in a still less orthodox manner—eating

the eggs of terns, frigate birds, and boobies.

The curlews were undisturbed by the presence of the observers, and Dr. Wetmore's companion, the late Donald R. Dickey, made motion pictures of them stealing the eggs of a frigate bird. Two of these pictures were published in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1925, accompanying an article by Dr. Wetmore, "Bird Life Among Lava Rock and Coral Sand."

Sometimes the curlews impaled the eggs, but more often they carried them away in their bills to break them on the sand.

So far as I know, this is the only time that



From South Sea Isles the Curlew Flies 5,500 Miles to Bleak Alaskan Tundra

anyone has ever seen any shore bird eating the eggs of other birds, and we are at a loss to explain how the habit may have developed.

The curlews were often accompanied by ruddy turnstones, which also departed from all shore bird tradition by plunging their bills through the eggs of terns.

Meanwhile, these curlews continued to turn up in Alaska. In August, 1911, Rollo H. Beck collected a series of the birds about Nome, although farther to the northwest, around Wales, Alfred M. Bailey, Director of the Colorado Museum of Natural History, got but a single bird in some twenty years of collecting.

In 1924 Herbert W. Brandt, of Cleveland, and Henry B. Conover, Research Associate at the Chicago Museum of Natural History, made an 850-mile trip by dog team from Fairbanks to Igiak Bay and Hooper Bay on the Bering Sea, by way of Mountain Village on the Yukon. Their explorations gave us the clues that finally led us to the nesting ground.

On May 22 Conover collected one curlew at Hooper Bay, but saw no more until the last day of July and the first week of August. Then, about twenty miles from the head of Hooper Bay, he found the curlews in abundance, already started on their fall migration. Several hundred were seen scattered over the tundra, feeding on blueberries. All were adults without young, as is usual with shore birds starting their southern migration.

This discovery led Brandt to surmise that the nesting ground might be "at the eastern end of the Askinuk Mountains, or on Kusilvak Mountain, and perhaps the mountains to the northward of Mountain Village on the Yukon River" (map, page 752).

In 1929, however, Arthur C. Bent, in his monumental work, *Life Histories of North American Shore Birds*, summarized what was known at the time by writing:

"The above facts would seem to indicate that the main breeding grounds are somewhere in the interior of extreme northern Alaska, probably on the barren grounds."

Added weight was given to this belief when David Brower collected an immature bird on the Meade River in northern Alaska in August, 1943. E. L. Jaques had found adults near Teller, northwest of Nome, in July, 1928.

On the other hand, Ira N. Gabrielson, while Director of the Fish and Wildlife Service, visited Alaska in 1940 and reported flocks of curlews around Naknek and the Kvichak River the last of July.

This was the status of our knowledge in the fall of 1947. The nest and eggs of all other North American birds had been found; this curlew alone defied the ornithologists.

About this time I received a friendly letter from Warren M. Petersen, an Alaska Native Service schoolteacher at Kalskag, on the Kuskokwim River. He wrote me of his interest in birds and of efforts that he and Henry Kyllingstad, teacher at Mountain Village, had made to find bristle-thighed curlews.

In the summers of 1946 and 1947, following the suggestions of Brandt and Conover, these two men had searched in vain the eastern edge of the Askinuk Mountains. Earlier, Kyllingstad, with his small son, had climbed to the top of Kusilvak Mountain without getting a clue to the whereabouts of the curlews.

Expedition by Plane Proposed

Petersen suggested the possibility of employing local bush pilots for transportation from one lake to another after melting of the ice in June. He sent photographs he had made the previous year and convinced me that even a one-month trip might yield results of interest and value.

Alaska was one of the objectives listed in the general plan of bird study which the National Geographic Society's Committee on Research had tentatively approved, and the quest of the unknown had occupied the Cornell Laboratory of Ornithology for years.

I immediately wrote Dr. Gilbert Grosvenor, President of the National Geographic Society, suggesting a cooperative expedition with Petersen, Kyllingstad, and the Arctic Institute of North America to find the bristle-thighed curlew's nest. By return mail this proposal received Dr. Grosvenor's cordial approval.

Then ensued weeks of correspondence with Petersen and Kyllingstad, made simpler by



Jumping-off Place for the Curlew Quest Was Mountain Village on the Yukon

So full of sediment is the river—here nearly a mile wide—that its channels photographed white. Black stream and ponds at top (north) were clear and absorbed light. The nest was found 20 miles north of this Eskimo town.

the air-mail service and by the fact that they could talk to one another by radio although they were more than a hundred miles apart.

One factor worried us more than any other—the weather. Fogs often roll in from Bering Sea and last a fortnight. Flying is then impossible and even tramping over the mountains or tundra may become precarious.

To get color films of the bird life under bad weather conditions, we knew we should have to be prepared with some sort of artificial sunshine, as well as waterproof protection for our equipment. Since all transportation in Alaska would be by air, equipment would have to be light and reduced to a minimum.

Weeks of planning, testing, and packing followed. One gadget after another was tried and discarded; but the total of essential equipment made us decide that it would be best to have my son David start two weeks ahead with the heavy luggage. I would follow by plane as soon as university duties permitted.

David left Ithaca, New York, by train on May 18, bound for Seattle and thence by ship to Seward and train to Anchorage. There he arrived on May 29.

Ithaca to Anchorage in a Day

Leaving Ithaca on May 28, I arrived at Anchorage on the same day as David, but some six hours earlier, after 18 hours of flying.

Beyond Edmonton, Alberta, the plane followed, more or less, the Alaska Highway. We watched the flat, carpetlike wheatlands gradually change to rolling hills covered with light-green cottonwoods and birches; then to black spruces for miles on end.

Innumerable ponds and lakes dotted the landscape, and I imagined them teeming with waterfowl, although we were flying too high to see individual birds. The streams were all running full and brown, with more loops and bends than a snake.

Snow-capped mountains began to appear, and we could see the highway winding its tiny thread up valleys and ridges toward a pass. Soon we were looking down on snow-covered ridges through drifting clouds and snow squalls like fine horizontal lines of white.

Swinging southwesterly over the pass, we followed the Glenn Highway down the famed Matanuska Valley to Anchorage, where we arrived at Elmendorf airport shortly after noon.

Anchorage is a bustling little town of about 20,000. It has more than redoubled its population since the last census and gives promise of becoming the metropolis of Alaska.

I like to say that the whole town turned out upon our arrival, and so it did. The demonstration, however, was not for our bene-

fit, but just the response to a fire on the main street. This the volunteer fire department quickly subdued with modern equipment.

Streets were crowded with cars, store windows were full of equipment, building was going on everywhere, and all prices were high.

Birds abounded in the near-by spruce forest, and we heard our first varied thrush's song—a long drawn-out, buzzy policeman's whistle of one note, quite disappointing from so distinguished a bird.

Moose and Grizzlies Sighted from Plane

Next morning we shipped all our baggage by air and boarded the Alaska Airlines' two-motored plane bound for Bethel, with stops at Homer and Naknek.

The pilot flew low along the Kenai Peninsula, which is largely a game reserve. Perhaps he enjoyed seeing moose and grizzlies as much as we did. Several moose had calves—one had twins—and once we saw five bears within a stone's throw of one another.

On our way from Homer to Naknek, we passed over beautiful Lake Grosvenor, long and narrow and blue, like the Finger Lakes at home, and Mount La Gorce, snow-capped and enshrouded in clouds.

From Naknek we followed the low-lying coast and then climbed once more to cross the snow-covered Kilbuck Mountains before we broke out over the tundra marking the delta of the Kuskokwim River, on which Bethel is located. Green trees fringe the river, but elsewhere is only the brown tundra with its thousands of lakes, ponds, and tidal channels like a giant jigsaw puzzle.

At Bethel we met Nat Browne, the bush pilot to whom we were to entrust our lives for the next month (page 753). His muscular frame, kindly smile, and matter-of-fact manner gave us confidence as he showed us the red Bellanca we were to use, anchored in the river in front of his home.

Warren Petersen, who had flown down from Kalskag two days before with his wife and daughter, joined us and showed us the "sights"—a group of houses and other buildings set along the streets at odd angles indicative of their temporary nature. The river changes its channel frequently and the whole town stands ready to move on short notice.

Because the ice never goes out of the ground, no cellars or stable foundations are practicable for even the largest buildings, including a modern hospital. A good jack is part of the necessary equipment of any home.

At 7:30 in the evening Nat Browne flew us to Mountain Village, on the Yukon (page 755)—a 70-minute flight—and landed us at



Tents of the Expedition (Left) Lie Amid a Maze of Lakes and Ponds

David Allen surveys Igiak Valley, between foothill ranges of the Askinuk Mountains, where the expedition found scores of nesting birds but no bristle-thighed curlews. Such a labyrinth of lakes is a paradise to waterfowl and shore birds, but a headache to men on foot (page 759).

the front door of Henry Kyllingstad. Henry is not only the Native Service schoolteacher for this area, but the weather observer and radio operator as well.

So far as I could see, this whole country revolves around the schoolteachers, who are supposed to know everything and do anything from mending motors to bringing babies into the world and looking after the health of the whole community. Of course they cannot prescribe medicine without first locating the hospital physician and describing to him over the radio all the symptoms of the patient.

Plane Serves as Patrol Wagon

In the Kyllingstad home we were entertained for two days while Nat Browne carried a planeload of natives to one of the canneries on the coast and returned to fly up the river

with the local guardian of the peace. On this trip they brought out a native who had gone berserk and attempted to decoy his companion within range of his gun by honking like a goose!

The delay afforded us opportunity to complete our plans for the curlew hunt, as well as to scour the hills for 10 miles around.

Each May since 1944 Henry had seen a few bristle-thighed curlews passing over Mountain Village, calling as they flew, and so low that when he answered their clear whistle he had been able to make them circle back. Our search yielded us little, however, except a pair of Hudsonian curlews that David located about five miles inland, the nest of a golden plover, and that of a Wilson's snipe, in addition to many nests of hoary redpolls and varied thrushes in the alders.



Discovered, the Curlew Abandons Attempts at Camouflage

A quick dash that flushed the sitting bird first revealed the actual nest of the bristle-thighed curlew (page 769). The male soon returned to incubate, and this time David Allen approached more quietly. When he was almost within arm's length, the bird—flattened out and motionless—realized it had been found. Suddenly a bit of tundra sprouted an eye and bill! After the second day the birds became so accustomed to observers that one could practically touch them on the nest (Plate III).

We planned to make our first trip to Igiak Bay and the foothills of the Askinuk Mountains a little farther west than the region which had been explored by Henry and Warren in 1947. This was not because we really expected to find the curlews there, but because I wanted to get color plates of the other shore birds and waterfowl for the NATIONAL GEOGRAPHIC, and this region had the reputation of being a wildfowl metropolis.

Furthermore, I thought it might be unwise to find the curlews until they were surely nesting, lest we be distracted by migrating birds and waste our time on an unproduc-

tive area. It never occurred to me that they would start nesting, as apparently they did, shortly after the middle of May.

Our plan was to work near Igiak Bay for a week or ten days and then to start hopping northward. Avoiding the coastal area that had been combed unsuccessfully by our predecessors, we would concentrate on the foothills of the coast range about seventy miles inland—if we could find a lake on which to land within walking distance of the mountains.

Two or three days at each stop, we hoped, would be enough to determine whether curlews existed in the area.

As soon as Nat returned with the Eskimo prisoner, we loaded part of our supplies into the plane and started for Igiak Bay, 80 miles to the southwest. Warren, David, and I were to pitch camp while Nat returned for Henry and the rest of the supplies.

The trip across the Yukon and over the tundra had an air of quiet excitement. The fringing thicket of cottonwoods and alders along the Yukon passed below us; then numer-

ous old flood channels and winding estuaries, and finally thousands of ponds, lakes, and channels of most irregular shapes and sizes. Occasionally we could see flocks of ducks and geese, and especially the white whistling swans, tiny specks on the water.

Engulfed in Cloud Amid Mountains

The plane droned past Kusilvak Mountain, a 2,449-foot cone rising from the flat tundra. Foothills of the Askinuks appeared—rounded ridges with projecting castlelike rocks.

Finally Igiak Bay hove into sight and we began to look for a landing place that gave

promise of birds and a modicum of comfort.

We flashed by a valley that showed a sizable lake hugging the foot of the hills. By shouting and pointing we let Nat know that we wanted to look it over.

All this time the sky had been beautifully clear, although we could see clouds along the horizon, hanging over the tops of the Askinuks.

We came to another pass through the mountains, and Nat banked to circle back to our first valley. All went well until we rounded the first mountain, when suddenly we were engulfed in clouds. It was like jumping into bed and pulling the sheet over your head. We could see absolutely nothing, but we knew the mountains were towering on either side.

Nameless Lake Alive with Wings

Fortunately, we passed out of the cloud and there was our lake below us. Gliding down and banking abruptly, we found ourselves in a flurry of swans that had risen at our approach. On terrified wings they were escaping in all directions. For a moment the air was filled with geese, ducks, and cranes. We had come to the right spot!

The pontoons struck the water and we skittered along for half a mile; then we came back to a quiet mooring on what we now called Igiak Lake, since it had no name on the map. Two feet of snow still lay in the alders, and the lake was fringed with ice.

For the first nine days we camped on an open spot in the alders with snow all about us and a rivulet running through the cook tent. We had found a drier knoll for our sleeping tents, a couple of hundred feet up the side of the mountain.

A fascinating week of activity followed. Up early for a good breakfast, we shouldered cameras, tripods, and blinds and were off for the day in four different directions, carrying bars of chocolate for lunch. We explored the dry ridges of the mountains for curlews and the castlelike outcroppings for rough-legged hawks and gyrfalcons.

Henry made one 20-mile hike to the top of the highest peak, looking for surf-birds, but found only snow buntings and Baird's sandpipers that were not nesting in the valley.

One after another, the birds gave up their secrets until we had marked the nests of 44 of the species that dwelt in the valley.

Birds such as the western sandpiper, northern phalarope, Alaska longspur, hoary redpoll, tree and savannah sparrows were so common that we scarcely bothered to look for their nests when the birds fluttered out before us.

Nests of white-fronted, emperor, and cackling geese (Plate V) were plentiful; we found

15 nests of the little brown crane and five of the whistling swan.

Upon finding a nest we wished to photograph, we first marked the spot with high-visibility orange cloth.

To get the birds used to a blind, we usually set up a dummy blind, a tripod of three sticks and a shelter half, about twenty feet from the nest. We left it for a day or two, or until the weather cleared sufficiently for photography, then replaced it with a more commodious blind set six to fifteen feet from the nest, depending on the size of the bird.

Before long we had eight dummy blinds and three full-sized blinds and were moving with our cameras from one nest to the next, as occasion demanded.

David shared my pack and served as "go-awayster" by tucking me into the blinds and conspicuously leaving the vicinity so that the birds would think the coast clear.

On one of the brighter days I started the morning in a blind by the nest of a little brown crane about two miles from camp. Two hours later, having obtained stills and motion pictures of this bird, I jumped to the blind by the nest of an emperor goose and then to one by a black-bellied plover. I finished the day with a western sandpiper, Sabine's gull, old-squaw, and spectacled eider (Plate VII)—the last two not requiring blinds.

It was all very exciting to an ornithologist. Fortunately, the days were long and sometimes we did not get back to camp until seven or eight in the evening, tired and hungry.

The first impression upon starting across the tundra is that of a marvelous springy sidewalk, and we felt we could walk forever without tiring. We soon learned, however, that the moss closed over our boots and formed insidious suction cups. Then there were ponds to ford and marshy spots that nearly pulled one's boots off. By the time we were three miles from camp we realized we were tired before the day had really started.

Watery Labyrinth—and No Detour Signs

Another difficulty was the endless labyrinth of irregular ponds that always barred the direct route back to camp after a long day on the tundra (page 757). With my binoculars I could spot the white tent from afar, but as soon as I directed my course toward it, I would come to a pond too deep to ford.

There were no detour signs, and I had to learn from sad experience which side of the lake led into another and worse detour. What should have been two or three miles as the crane flew ended up as four or five as the ornithologist plodded.

By the end of the week I had punched two more holes in my belt. I was feeling fine and could tramp two miles without puffing, but then it was time for Nat Browne to return. We had satisfied ourselves that there were no bristle-thighed curlews in this area, though there seemed to be almost everything else.

Nat arrived at 4 p. m. on Friday, June 11, as arranged. We were scarcely expecting him because clouds hung low on the mountains.

In the first planeload went Henry and David, with half the equipment, bound for Mountain Village to pick up supplies and then to fly to a lake about twenty airline miles north of the town. Camping there for two days, David and Henry could explore for curlews until Warren and I arrived Monday on Nat's second trip.

When the pilot returned for us, he lifted his plane over the Askinuks, followed the shore of Scammon Bay, with its high cliffs, then flew over the pond-filled tundra, across the coffee-colored Yukon, and finally to what we christened Curlew Lake at the base of a low range of mountains.

As we glided down, we spotted the white tent and the two boys on the shore.

Behind the tent the mountain rose at a 60-degree angle, but from a height of 2,000 feet we had seen a whole series of barren, desolate ridges beyond. The lower face of the mountain was a tangle of alders, but toward the top it was typical tundra with patches of snow still defying the sun.

163-year-old Mystery Solved

"What news?" I called as the red Bellanca taxied up to the shore. We were planning merely to take on supplies and head for the next lake.

"Seen any curlews?" I queried, half facetiously, as neither Dave nor Henry replied.

I saw them exchange peculiar glances, and I expected one of Henry's Swedish stories or some joke from David. They apparently had a story, and perhaps they had rehearsed it. Something misfired, however, as it often does in times of excitement, and out it came—"We have found the curlew's nest!"

Who said it? I looked from one to the other in amazement. There was such a degree of sincerity and pent-up feeling in the simple little statement that I didn't for a moment doubt its truth. There was no question; the 163-year-old mystery had been solved. They had found the summer home of the bristle-thighed curlew; they had seen the actual nest.

I can't remember getting out of the plane. I can't remember any incidents of the landing, but that story of the discovery, as it unfolded

in the next few minutes, is as clear to me now as if I had been there myself.

Nat Browne had delivered the two boys at the lake at 11 p. m. on Friday, June 11, and they had pitched camp in the afterglow of a sun that had just passed below the horizon. From the air they had seen the ridges behind the mountain and had decided to explore them the following day.

Next morning they were up early and climbed to the top of the ridge behind camp. David started south and Henry north, along the plateau behind the mountain, skirting the alders and scrutinizing the open areas.

Two hours from camp, when they were perhaps a mile apart, they heard, at about the same time, a peculiar whistle, somewhat like that of a black-bellied plover—"Piu-wit"—and spotted a curlew flying toward David.

Henry had heard the bristle-thighed curlew in previous years as it flew over Mountain Village; David was familiar with the Hudsonian curlew from Churchill on Hudson Bay. Neither one doubted they had found the long-sought bird. They froze in their tracks.

The curlew circled and set its wings for a level, plateaulike area a mile away. This area differed from most of the tundra in that it had some broken rock protruding and had numerous clumps of black lichen spotting its surface like shadows.

Hours of Watching, Then a Dash!

A couple of hours of intense watching with binoculars ensued. Meanwhile the watchers kept out of sight, but drew steadily closer.

The curlew was plainly more interested in this one piece of several acres of tundra than in any other. Even after long sorties, he kept coming back to it.

Occasionally a parasitic jaeger, a hawklike gull, would skim over the tundra. The curlew paid little attention to it until it approached a certain place. Then he would call excitedly and fly at the jaeger and drive him away.

There was now little question in the boys' minds that they had found the curlew's nesting ground. Somewhere before them the female bird was sitting on her long-sought eggs.

After spending years hunting birds' nests, one develops an understanding of bird behavior. Gradually, as he watched the guardian curlew, David eliminated one spot after another until he felt he knew just about where the nest should be.

Even so, it is not always easy to find the actual nest. Sometimes when a bird sees an enemy approaching, it will sneak off its nest and flush ostentatiously from quite a different spot. Again, the bird will freeze and rely upon its

The Curlew's Secret



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1

Illustration by Arthur A. Allen

A Bird of Mystery No Longer—the Bristle-thighed Curlew at Its Alaskan Home

Although known to science for 165 years, this member of the sandpiper family was the last of all North American birds to give up the secret of its nesting place and home life. On June 13, 1948, north of Mountain Village, Alaska, its nest and eggs were found at last by an expedition sponsored by the National Geographic Society, Cornell University, and the Arctic Institute of North America. A far-flying migrant between northern wilds and South Sea islands, this curlew was observed and collected on Tahiti in 1769 and was first described in 1785. Bristles on feathers of flanks and belly show clearly as the female perches on a boulder near the long-sought nest.



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11

Redactiones by Arthur A. Allen

♣ From the Newly Discovered Eggs Emerged This Downy "Four of a Kind"

The eggs in both nests were "pecked" and emitting peeps when found. To ensure a safe debut, one of these youngsters was hatched in an improvised incubator and Dr. Allen's sleeping bag. He claims to be the first and only "midwife to a bristle-thighed curlew."

♣ End of a Long Quest Came with Finding of These Four Eggs

Their discovery by David Allen and Henry Kyllingstad, members of the National Geographic expedition, completes the record for all the 815 species of North American birds, as the eggs of the others were already known. These are slightly smaller than hens' eggs.





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III

Ketchikan by Henry C. Killingsland

♣ **Protectively Colored, the Motionless Bird Was Invisible Three Feet Away**

Warren M. Petersen, Alaska Native Service school-teacher and also a member of the National Geographic Society expedition, found this second curlew nest only after scrutinizing for several hours every square foot of the acre of tundra where it was thought to be.

♣ **First Nestling of Its Kind To Be Seen by Man**

A venturesome "first-born" bristle-thighed curlew crawls from beneath his father's wing to get his initial view of the big world. Idly he picks at the dwarf azalea that grows beside his Alaskan home, a mere depression in the tundra moss.

Ketchikan by Warren M. Petersen





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IV

Illustration by Arthur A. Allen

Spotting the Bird, Then Watching It Closely, Two Men Made Ornithological History by Finding This Bristle-thighed Curlew's Nest

Success brought the thrill of a lifetime to David Allen and Henry Kyllingstad, for others had searched in vain for more than 150 years. By using a pontoon plane, the expedition combed parts of Alaska unknown to earth-bound predecessors and found the nest on a piece of tundra forsaken by all other birds.

A Pint-sized Canada Goose Nests Beside a Nameless Alaskan Lake

Smallest of seven traps of Canada geese is the cackling goose, with relatively short neck and stubby bill, found nesting on a grassy point.

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VI

Kodachromes by Arthur A. Allen

↑ **This Visitor from Russia "Wigwags" as She Walks**

Like other members of the wagtail and pipit family, the Alaska yellow wagtail has a way of flipping its tail up and down when promenading. It breeds in northern Siberia and Arctic Alaska, but winters in China. In the male the yellow extends to the bill.

↓ **Her Mate Is a Chesty Fellow; Hence the Name "Pectoral Sandpiper"**

In spring the male inflates his breast until he is as misshapen as a pouter pigeon; then he flies in circles over the tundra, calling "wood-wood-wood" to prospective mates or antagonists. Pectoral sandpipers winter in South America. Some wander to New Zealand.





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VII

Kodachromes by Arthur A. Allen

♣ **To Make a Living, He Leaves No Stone
Unturned**

The ruddy turnstone finds much of its food by turning over beach stones and shells for the animal life beneath. This male is incubating four large eggs. As with other shore birds, the parental instinct is often stronger in males than in their mates.

♣ **A Duck with Glasses Lines Her Nest
with Eider Down**

The curious leather arrangement on the face accounts for the name "spectacled eider," more descriptive of the black-and-white male than this female. Her four or five large grayish eggs are laid on the open tundra, not far from water, in Arctic Siberia and Alaska.





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VIII

Kodachrome by Arthur A. Allen

A Crane with a Stain Guards Two Large Eggs on an Alaskan Hillock

This northern representative of the sandhill crane is called the little brown crane because of its smaller size and apparently brown coloration. The brown, however, is merely a stain that varies considerably with individuals of many of the northern waterfowl and is probably acquired from the ponds which they frequent. This is the female; the male is whiter about the face. So wary is this bird that it usually spots visitors a quarter of a mile away and leaves its nest. Thus the eggs often fall prey to parasitic jaegers—hawklike gulls. Newly hatched young have brighter coloring, about the hue of a red fox. In fall these cranes fly off to California, Texas, and Mexico.

protective color to escape detection (page 758).

David had no way of knowing how bristle-thighed curlews would react. There is one technique, however, that is often effective when nothing else works—surprise. If a bird can be faced with an unusual situation suddenly, its reaction is likely to be less favorable to itself than if it has a moment's time.

David removed his rubber boots lest they impede his actions, beckoned to Henry, who had now moved up to the same side of the promised land, and sprinted the hundred yards that intervened between him and the chosen spot.

The reaction of the bird was as he had hoped, and the result is now history. She flushed twenty feet in front of him, and he found the curlew's nest.

In the nest were four eggs nearly as large as those of a domestic hen. Dull greenish with spots of gray and dark brown, they blended well with the tundra (Plate II).

The nest itself was a mere depression beside one of the clumps of black lichen and a mat of Alpine azalea (*Loiseleuria procumbens*). It measured $6\frac{3}{4}$ inches across and $2\frac{1}{2}$ inches deep and was very smooth on the inside, though made of the surrounding reindeer moss and grasses which ordinarily present a rough appearance.

Birds So Tame No Blind Was Needed

After finding the nest the boys hurried back to camp, fearful lest the jaegers should steal the eggs, and returned with blinds and cameras. They did not realize that no blind would be necessary for a bird that perhaps had never seen a human being at close range.

Since many of the South Sea islands, where these birds winter, are uninhabited, and since not even an Eskimo would visit this forlorn bit of tundra, we were doubtless as unusual to the curlews as the curlews were to us. We set up a mutual-admiration society, the birds scrutinizing us as closely as we watched them.

We soon discovered that the eggs were already pecked and the young birds could be heard peeping inside the shells. This perhaps helped to tame the curlews because birds' attachment to the nest is strongest at the time the eggs are ready to hatch.

Since we needed a specimen to deposit in the United States National Museum, to serve as the type, it was necessary to take one of the eggs immediately and remove the chick through a door in one side.

In the meantime, we located another nest. After seeing this second pair of curlews on the tundra, we spent hours dragging the area with a rope and scrutinizing every depression

before Warren Petersen finally spotted the incubating bird. Flattened on her nest three feet in front of him, she matched the moss and grasses so well that at first he wasn't sure whether he was looking at a bird or just another piece of tundra (Plate III).

In the second nest the jaegers had stolen two eggs and a third had a large hole in it. The fourth was pecked and ready to hatch, like those in the first nest. What worried us now was the danger that the jaegers might get the remaining egg, or even all those in the first nest, before we could see and record the downy young.

An Ornithologist "Mothers" a Curlew

We were on the point of setting up camp next to the nest, where we could take turns guarding it, when it occurred to me that it would be easier to carry one of the eggs back to camp and hatch it in an incubator.

I had in mind my experience in Quebec, where I successfully mothered a baby red-throated loon in my sleeping bag.*

Returning to camp, I heated stones over our gasoline stove, wrapped the stones in a towel, and placed them in one of our spare water buckets. I made a nest for the egg out of cotton and an old sock.

At night, instead of getting up every few hours to heat stones, I placed the nest in an empty tin can and took it to bed with me in my sleeping bag.

All the next day I heated stones, and as the little bird squirmed inside the egg and its tiny "egg tooth" gradually cut through the shell, I helped it along with judicious use of forceps. I wanted it to emerge without ruining the shell for scientific purposes.

The youngster was not yet out of the shell when bedtime came, so once more I took the egg into my sleeping bag. The following day I had the satisfaction of making the final delivery and claiming for myself the distinction of being the first and only midwife to a bristle-thighed curlew.

In the meantime, Providence watched over the nests, the jaegers did not get the eggs, and they hatched normally. The parent birds by this time paid no attention whatsoever to Henry and Warren, who obtained some truly remarkable photographs of the birds with their young and of themselves less than a foot away (Plate III).

During this time David covered many ridges and, though he found no more nests, he saw a total of about twenty bristle-thighed

* See "Sea Bird Cities Off Audubon's Labrador," by Arthur A. Allen, NATIONAL GEOGRAPHIC MAGAZINE, June, 1948.



DAVID ALLEN

Dr. Allen Serves as "Midwife to a Curlew"

The author aids the chick's debut to keep the shell as intact as possible for the National Museum, Washington, D. C. Taken from the first set of eggs of the bristle-thighed curlew ever found, the egg was hatched by Dr. Allen in a crude incubator and the warmth of his sleeping bag (page 769). Six hours after this photograph was made, the chick had emerged, dried off, and was indistinguishable when placed with its brothers and sisters (Plate II).

curlews. This indicates that the area we discovered is undoubtedly a part of the main summer range of the species, which may extend northward for several hundred miles, and even into the foothills of the Brooks Range.

Why these curlews should want to leave the warm, luxurious shores of Tahiti and the other South Sea islands, fly 5,500 miles over the open sea, and arrive at one of the most forlorn stretches of tundra in North America, deserted by all other birds and still largely covered with snow, just to lay four eggs, is hard to understand.

The rest of our trip would have been anticlimactic had it not been that we were working

with such exciting birds as whistling swans, Pacific godwits, and an emperor goose that became as tame as the curlews.

Since there was no need of continuing northward up the range, Nat Browne flew us back to Igiak Lake, where we had left so much unfinished business. The next day it rained, and it kept raining for a week, with hardly a break in the clouds.

Back to Civilization Just in Time

The following Sunday it cleared, and we had a full day with our cameras before the plane came for us at 6 p. m.

On the first trip Nat took Warren and Henry and most of the baggage back to Mountain Village.

"Hope you kept out your sleeping bags," he called as he left.

It had an ominous sound, but the sun was still shining brightly—although we did notice a few clouds peering over the Askinuks.

At 8 o'clock Nat was back and obviously in a hurry. We dumped the rest of the equip-

ment into the plane, roared across the lake and up over the mountains, and then discovered the reason. A great sea of fog concealed everything.

Overhead the sun shone as brightly as ever, but, had we been thirty minutes later, our valley would have been filled with clouds and we would have been stormbound without provisions or sleeping bags.

How serious it might have been we did not learn until after we had returned to the States. Then a letter from Warren Petersen told us that we were the last people to move and that for two weeks thereafter all planes were grounded.

Lascaux Cave, Cradle of World Art

BY NORBERT CASTERET

With Illustrations by National Geographic Photographer Maynard Owen Williams

IN THE hills of Dordogne, France, prehistoric caverns riddle the soft rock like holes in a cheese. Beside the little River Vézère the Lascaux Cave has surpassed all others in one respect. On its walls, fresh as the day cave men of at least 20,000 years ago outlined them on the rugged rock, is the finest collection of prehistoric drawings ever found.

This realistic art, done from life, shows what vast changes have come since Old Stone Age artists recorded subjects familiar to them but now unknown within a radius of thousands of miles.

Savants, provided with such new data, strive to solve the secrets of ages compared with which those of the Babylonians and the Pyramid builders are almost modern.

With Dr. Maynard Owen Williams, of the National Geographic Society, and his charming wife, I rode south across France to see these wonders for the first time. A cold wave had frozen the gutters of Paris, and beside the winding Vézère shiny stalactites of ice glittered in the weak sun of January. It reminded me of a day when we had swum in glacial waters at Montespan, 26 years ago (page 776 and map, page 774).

Out of the Mouths of Children

"Wise men," I said, "are delving deeper into the long-forgotten secrets of prehistory. But it was out of the mouths of youngsters that the first announcements of much prehistoric art have come."

"You know," exclaimed my American friend, "that is a story! You have spent most of your life squirming through this prehistoric underground. You have a tremendous following among French youth. You are the one to tell it."

"But before you describe the wonders of Lascaux, you might tell how children, even truant schoolboys, helped discover such high-brow relics of low-browed cave men."*

So here it is.

France, rich in prehistoric caverns, was the cradle of all art. It shares with Spain those magic Pyrenean grottoes upon whose rocky walls Old Stone Age men left sketches and paintings. Today they are important clues to man's beginnings. These prehistoric art treasures, relics of the Aurignacian and Magdalenian epochs,† go back 15,000 to 30,000 years. Prehistorians study these ancient rec-

ords—and sometimes discover new grottoes themselves.

But through curiosity, love of adventure, and unspoiled talents for observation, mere youths have endowed the solemn science of prehistory with sensational finds.

These amateurs have not been able to interpret the secrets of the past, but they have often pointed the way to new wonderlands.

A Little Girl Leads the Scientists

In Spain, a certain Marcelino de Sautuola, a lawyer, had a passion for prehistory. In 1879 he was digging away in an obscure cave not far from Santander.

Its name, Altamira, until then hardly known, has since become a household word.

One day, fateful in the epic of man's gropings toward the dawn of time, Sautuola took his little daughter into the spooky hole.

Soon tired of watching her father scratching away, Maria stretched out on her back. Perhaps peopling the shadows with creatures of her own dreams, she looked up at the cracked and pock-marked ceiling above her.

Suddenly she cried out that she saw, painted in red and black, the forms of bulls.

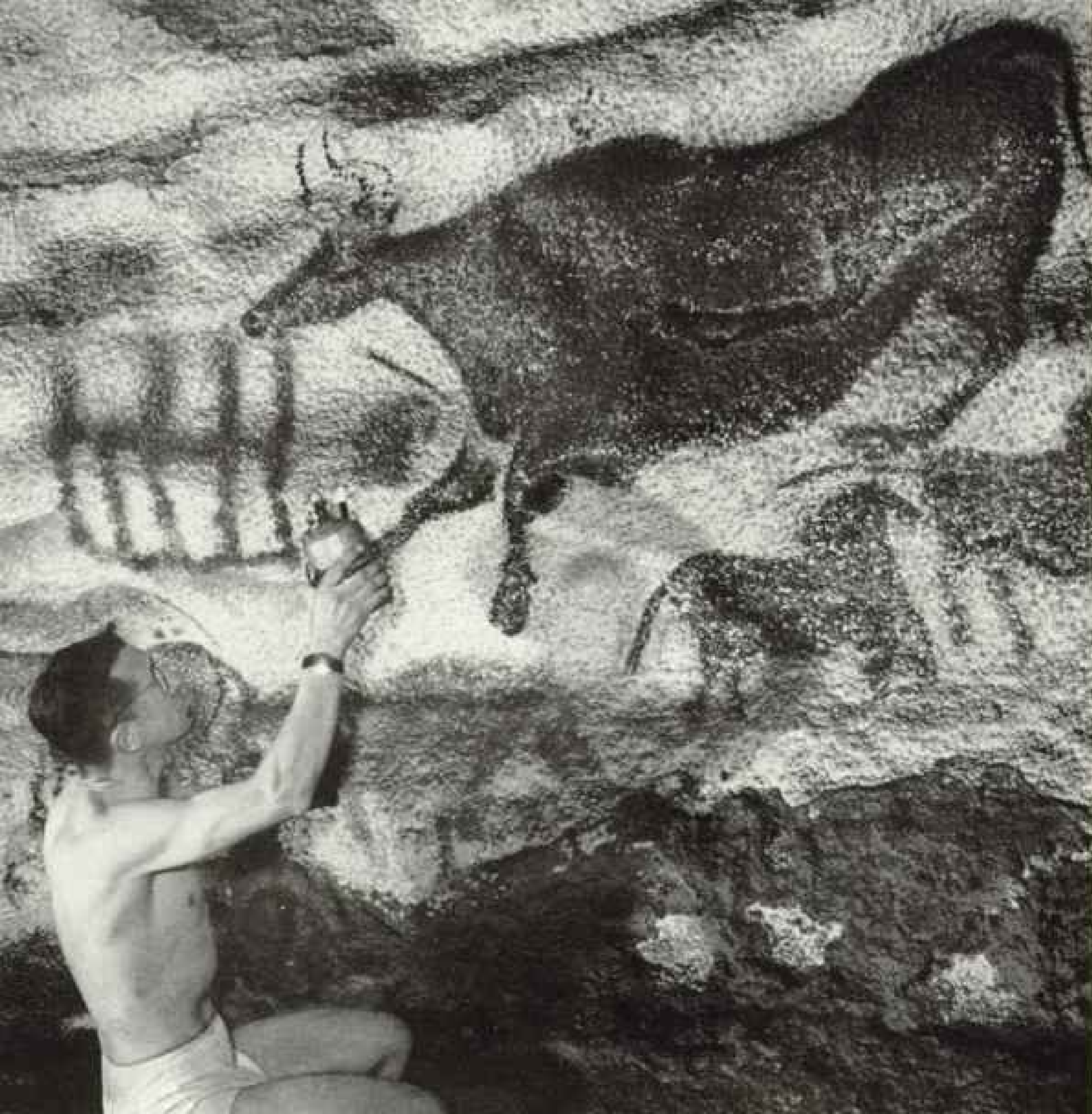
Busy with his own dreams, Sautuola paid little attention. For some years he had known many crannies of the retreat. Of course no painting of this kind decorated its vault. Shadows perhaps, but nothing more.

But an excited child is not easily hushed; so he looked up. The fame of the wonders he then saw was to sweep the world.

Sure enough, there were the outlines of "bulls" or, on closer observation, bison, whose high-humped shoulders admitted no mistake. The lawyer-archeologist looked long at this vivid mural. He had never noticed it, because, in order to see it best, the observer must get away from its irregularities.

* See "Parade of Life Through the Ages," by Charles R. Knight, NATIONAL GEOGRAPHIC MAGAZINE, February, 1942.

† The Aurignacian epoch, noted for its well-designed flints, was so named by Abbé Henri Breuil from the French cave of Aurignac. This epoch corresponds to that of the Cro-Magnon (Great Hole) Man, perhaps 20,000 years ago. About 8,000 years later came the Magdalenian epoch, whose culture reached from Spain to Siberia. It takes its name from a rock shelter near the monastery of La Madeleine, near Lascaux. In this article the author uses a conservative chronology. Some authorities date the Late Old Stone Age as long ago as 100,000 years.



Cave Man Norbert Casteret Sheds Light on a Prehistoric Cow

The feeble glow from his acetylene lamp illumines only a portion of the painting, but the photographer used its flame to fix the focus for his camera. While exploring horizontal caves Casteret wears little, but under waterfalls and in deep grottoes he dons clothes and helmet for protection against falling rocks.

Only by lying on his back, as his dreamy daughter Maria had so providentially done, could he see the picture whole.

So it was that little Maria de Sautuola had the high honor of making the first real discovery of prehistoric mural paintings ever found in a cave.

In the Altamira cave there are not only bison, pictured in varied attitudes. Lifelike reproductions of stags, roes, and wild boars indicate what fauna were familiar to skilled observers 20,000 years ago.

Altamira was the most magnificent known grotto up to 1940. Then the French cave of Lascaux, still all too little known, succeeded

it as the outstanding wonder of all prehistoric art known to date (page 785).

A Child Crawls Underground

In 1895, while spading away, a farmer near Les Eyzies came upon a narrow, rocky passage whose existence he had never suspected. An adventurous boy offered to crawl into this narrow hole, carrying a candle.

When he reappeared, the lad reported that the narrow walls of the long tunnel were covered with the outlines of wild animals.

Reacting from their anxiety at his long absence, the crowd accused the boy of having too much imagination for one of his tender



This Big Red Bovine Is Deformed by Wall Slant and Perspective

Because of unevenness of cave walls, three flash lamps were used in making each color photograph to soften the shadows. The photographer burned up two bushels of flash bulbs while taking the Kodachromes which accompany this article.

years. But scholar Emile Rivière confirmed the boy's story. Here at La Mouthe, as at Altamira, was authentic prehistoric art.

From then on, archeologists no longer fixed their eyes on the ground but made the most minute inspection of the walls. As if by magic, discoveries of prehistoric carvings and paintings multiplied.

Vacation Days Well Spent

A retired French officer of the Engineers, Commandant Molard, spent his leisure time mapping caverns.

In September, 1906, he was in the grotto of Niaux, one of the most extensive of Pyre-

nean caverns, near Tarascon. With plane table and tripod he sighted out the conventional base lines—one straight ahead toward the flame of a lamp carried by his son Paul, the other back toward a lantern in the hands of another son, Jules.

After a long and tiresome siege the cartographers had surveyed nearly a thousand yards of twisting galleries.

As 15-year-old Paul moved ahead, his father set up his plane table at the exact point he had just left.

The boy called back, "Twenty meters." Then suddenly he exclaimed, "Drawings!"

"What did you say?"



Drawn by Harry R. Oliver and Tristram K. Alliman

In Three Clusters of Water-carved Caves, Prehistoric Man Left the Finest Known Old Stone Age Art

While the valleys of the Vézère, the Ariège, and the Besaya were forming, water curved grottoes in the calcareous rock. Eons later, for reasons still unknown, men carved and painted the cave walls with animal figures and an occasional human being. In the area of Les Eyzies (inset), such prehistoric art museums are numerous. Greatest of all, so far, is the Lascaux Cave, in cave-riddled Dordogne, above the quiet river town of Montignac. Places marked with an open square are cave locations.

"Drawings! The whole wall is covered with them!"

Leaving his plane table, calipers, and pencils, the retired engineer ran to join his son.

There was no doubt about it. His youngster, Paul, had just discovered—after how many millenniums?—a herd of bison, horses, stags, and young bucks in this grotto of Niaux, now recognized as one of the most noteworthy in all the annals of prehistory.

High School Boys Find the Famed "Clay Bison"

Six years later, another father and his three sons were gathered outside a cavern in the Ariège, called the Tuc d'Audoubert.

Because a stream poured forth from this hole, the cavern had never been explored.

But on this July day in 1912, Count Bégouën and his sons Max, Jacques, and Louis, high school students of Toulouse, decided to cruise up the subterranean river in a homemade ship of fortune.

Since they did not know into what they were headed, they advanced with caution. Slowly

they floated along on the black water. After a winding and thrilling voyage, they left their boat to proceed on foot. The narrow corridor soon spread out into a vast chamber, its high ceiling glistening with dazzling stalactites.

The adventures of the day had surpassed all expectations, but the job was only begun. Tempting avenues led off in all directions.

One must know the fascination of such adventures, carried out in the bowels of the earth, to realize that from that day forward the whole world of the three young speleologists centered in the Tuc d'Audoubert grotto. Their true love was a hole in the ground.

One October day in 1912 when they had scrambled up a steep chimney, they found themselves in a small chamber from which there seemed to be no exit. But one of them, sticking his lamp between two heavy pillars which had almost grown together, found that the gallery went on.

After breaking away the restricting columns, the young explorers squirmed along, flat on



Prehistoric Artists of This Region Often Pictured Ibexes

In this Lascaux Cave group the ibex at the left appears drawn by finger smear, the fainter one at right by puffs of paint blown from a hollow bone. Scientists do not know the meaning of the barred rectangle, but some believe that, filled with food in a season of famine, it may have attracted wild animals.



Norbert Casteret

An Underworld Explorer Crawls Like a Worm to Reach Subterranean Galleries

The author's most thrilling entry to one cave (Montespan) was made alone by swimming through a siphon blocked by glacial water, with matches and candle wound in a rubber bathing cap (page 776).

their bellies. Climbing with great difficulty, they came to the end of this "rathole." Standing erect, they advanced through a vast cavern.

Suddenly they stopped in front of two superb bison modeled in clay—two masterpieces of prehistoric statuary, the work of Magdalenian hunters.

The excited boys hastened to tell their father.

All four at once set out for the cave. Again they had to embark on the underground river, scramble up the steep chimney, and squeeze into a crooked gallery through whose throat they could pass only by crawling on elbow and thigh.

The slender lads were able to squirm through, but the tall figure of Count Bégouën was too much for the rocky gullet to swallow. Try as he would, he could not pass.

His sons, safely beyond the obstruction, hauled on his arms. Little by little the passage was made without broken bones or scraped skin. But it was by so close a margin (and I can vouch for this point, since I got the facts from the stately hero himself) that, puffing heavily but safely through the hole, Count Bégouën noticed that his trousers had remained behind!

The Bégouën Boys Do an Encore

Two years later, close to the cave of the clay bison, the Bégouën boys noticed a natural well which might communicate with the adjacent cavern.

A sounding line showed a depth of less than 70 feet. They unrolled their rope, and the eldest of the boys, with the help of a companion named François Camel, let himself down into the abyss.

Half an hour passed. Three-quarters. Still no sound from below. As Jacques and Louis anxiously prepared to descend, joyous shouts rang through the woods.

Covered with mud and with their clothing torn, Max and Camel arrived, happy as larks.

Said they: "The well does not connect with the cave of the bison at all, but with another, big and beautiful, decorated with prehistoric drawings. From there we crawled into the light of day."

Everyone was happy. Still another cave with prehistoric paintings on its walls!

"Splendid!" said Count Bégouën. "Since this cavern has no name, I name it, in your honor, the Cave of the Three Brothers' (Trois Frères).

Among the many splendid paintings on its walls is one of a dancing sorcerer wearing a mask, a silhouette since famous among prehistorians.

Vacation time is obviously a favorable season for discovering grottoes. That is why, one July day in 1922, a youngster climbed a hill near Cabrerets, a dozen miles from Cahors.

A True Explorer at 14

With a candle in his pocket, he deliberately set out to explore a rocky crack he had found. That a mere youth should be doing such a thing may seem surprising. But his catechism teacher, the Abbé Lemozi, was also a distinguished prehistorian. He taught his students the pleasure of underground exploration.

That is why, this Thursday morning, the youngster plugged along toward what looked like an ordinary fox hole. "But," he said, "it *must* be a cave."

The entrance was so narrow that his candle might have burned him, but he squeezed inside and down a steep descent into a high-vaulted chamber.

To please his curé, young David had ventured underground. But this cavern was so vast that its very silence was terrifying. Excited, he reported to his friend the curé.

Led by the 14-year-old, the Abbé Lemozi began a complicated and toilsome exploration through a labyrinth in which the small youth had a considerable advantage.

Finally the Abbé and his young pupil entered a cavern as captivating as Ali Baba's. Neither jewels nor gold was their reward, but a procession of mammoths, horses, bison, and bears, carved by flint tools of the Stone Age or painted in red and black.

Thus, a mere youth—on purpose—made a most sensational prehistoric find.

Face to Face with a Faceless Bear

In that same year, 1922, I entered the hitherto unsuspected Cave of Montespan. In a lonesome exploration I followed a subterranean river for nearly two miles under a hill in Haute Garonne.

A 30-page story of this adventure, involving a sightless swim through a water-filled siphon with my candle wrapped in a rubber bathing cap, appeared in the NATIONAL GEOGRAPHIC MAGAZINE.*

The following year I returned, for there were signs that this two-mile underground tunnel might contain relics of prehistoric man.

In those days I had trained a team of four friends in my methods of exploration, and since they were all excellent swimmers, they

* See "Discovering the Oldest Statues in the World," by Norbert Casteret, NATIONAL GEOGRAPHIC MAGAZINE, August, 1924.



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Kodachrome by Richard Owen Williams

Michelangelos of Cro-Magnon Days Decorated This Sistine Chapel of Prehistory

Across the walls and ceiling of Lascaux Cave in central France horses, cattle, and ponies move in action shots painted by hunter-artists during the Old Stone Age, about 20,000 years ago.



Calcite Crystals Centuries A-growing Prove the Bull's Head's Age

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111

A Schoolgirl Studies Wild Ponies Now Long Extinct

Endorhina by Maxford from Williams





© National Geographic Society

IV

Illustrations by Maynard Owen Williams

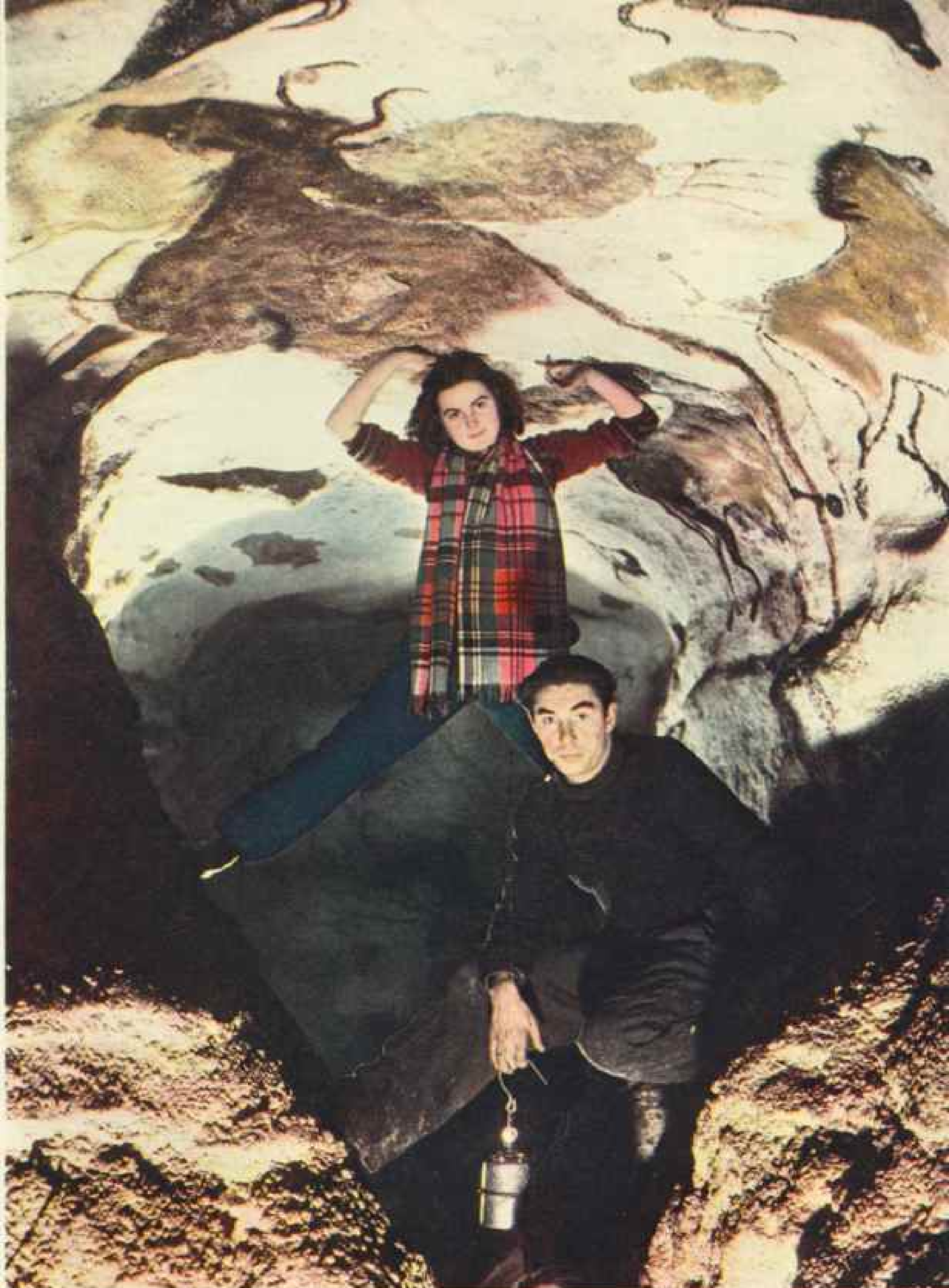
✦ **Prehistoric Artists Knew Their Bison, Gone from Dordogne since History Began**

Whether two enemies are calling it a day after combat or hurrying away to new pastures is unknown. Evidently the humpbacked beasts were painted from life by one familiar with them.

✦ **Was the Arrow Slinger Who Scarred This Painting a Vandal or Magician?**

What seem careless scratches may be arrows through which a sorcerer sought to kill his prey. Much prehistoric art was religious when religion was mere magic. Monsieur Laval's niece shows the scale of the figures.





© National Geographic Society

v

Kochstranz by Maynard Owen Williams

Marcel Ravidat, Then Seventeen, Discovered This Greatest Gallery of Prehistoric Art in 1940

Like the *Mother Goose* cow, an Aurignacian bovine jumps over Germaine Marchier's head. Above the Mongol-like horse (right), a four-tined mark may represent a trap. Rough walls and darkness complicated the artists' task.



† VI Standing in the Dark Void of Lascaux,
the Jovial Conservator and His Pupils
Are Revealed by Blinding Flashlights

Behind them a giant bull of Plate II nuzzles the antlers of a deer. When the youthful discoverers first entered this cave, they immediately told their schoolteacher of its amazing display of prehistoric art. M. Léon Laval, whose sense of humor is keen, thought they were pulling his leg.

Painted on the wall near the inner end of the gallery is a stampede of wild horses. One steed, his feet thrashing the air realistically, falls backwards off a cliff or into a trap.

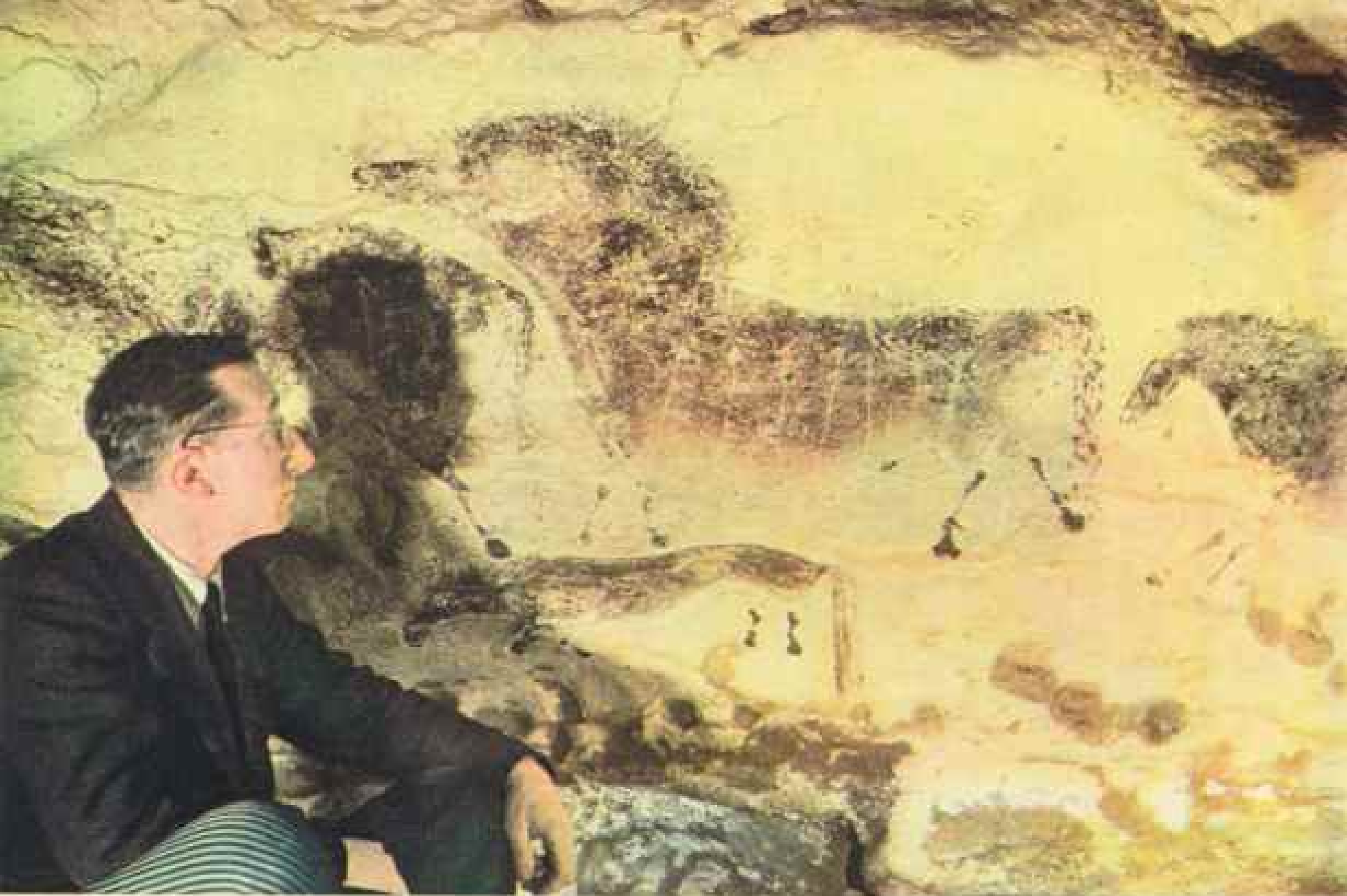
The unknown artists knew their models at first hand and portrayed them so skillfully that there is no mistaking their subjects. In one long fresco five stags follow one another with lifted heads and outstretched necks. Although only the heads are pictured, there can be little doubt that the animals were fording a stream or swimming a lake.

Lascaux figures painted in red and black stand out with incredible freshness and vivacity despite their prodigious age.

† A Fallen Chip Marks This Bull's Head,
Portrayed with Brush, Fingers,
or Primitive Air Gun of Hollow Bone

Perhaps the stone splintered before Christ was born. Such drawings come from a time before men became farmers. Meat was their main diet, and various forms of magic were used. It is probable that such prehistoric art was not for art's sake, but to insure full stomachs through sorcery, divination, or augury.





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VIII

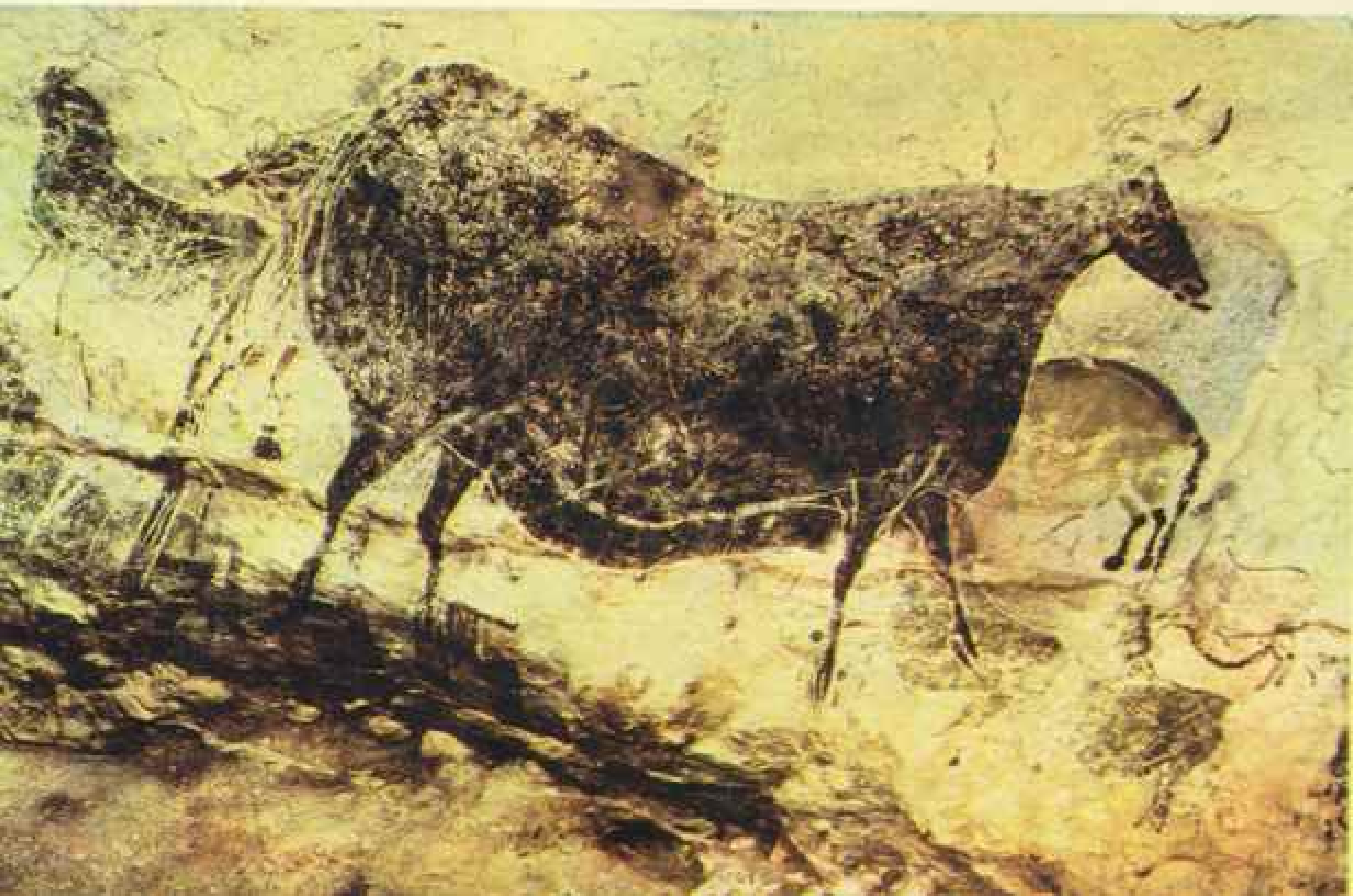
Kodachromes by Marnard Owen Williams

➤ **This Arrow-marked Stallion Has Been Chasing His Mate (Left) for 15,000 Years**

Nobody knows by what light the cave men depicted the wild animals that flourished in their day. By torch, bonfire, or dry moss floating in fat? No smoke stains smudge the walls of Lascaux Cave.

✦ **Such Overlaid Drawings Cause Much Controversy among Savants**

Is a pregnant cow a prayer for fertility? Are her graceful legs a heritage from an earlier deer painting? Such questions are still unanswered, for the cave men, superb artists, could not write.



burned—if one may so describe it—with the desire to test the glacial waters and water-clogged siphons of Montespan.

However, on the day agreed upon, only Henri Godin, the most ravenous of all for subterranean adventure, could join me.

When we emerged from the cave with our teeth chattering from the cold, we were thrilled as well as chilled. We had just found clay statues of lions and a headless bear, similar to the famous clay bison of the cave of Tuc d'Audoubert (page 776).

Within a month, with pick and shovel, my friends and I had so lowered the level of the stream that eminent scholars were able to wade up what had been a water-clogged siphon.

Because of their passion for learning, these distinguished prehistorians were not stopped by the cold subterranean stream. They found these modelings of lions and bear still recognizable, although experts, granting them an antiquity of 20,000 years or more, called them "the oldest statues in the world."

Truancy Hits the Jack Pot

The Cave of Thieves (*Baume—Cave; Latrone* or *Ladrone—Thief*) is not far from that showpiece of Roman architecture, the Pont du Gard.

Known for centuries as a haunt of brigands and a hide-out for Protestants during the War of the Camisards, the cave was already familiar to archeologists.

In April, 1940, some high school students of Nîmes cycled along the banks of the Gard, looking for likely caverns to explore. Entering La Baume Ladrone, Suter, Roque, and Martin followed it back for 300 feet. At its inner end they felt a draft blowing through a tiny hole in the terminal wall.

With his bare hands Suter went to work to remove the clay cork which closed this bottleneck.

Roque and Martin tried to talk him out of it.

"Come on, don't be foolish! It is getting late. We'll come back later."

Outvoted, Suter had to agree. But two weeks later they all returned with picks and shovels. They were cramped by the tight walls. The work was hard. But they had become willing slaves of the demon of adventure.

Suddenly there was no more clay in front of them. Nothing! They stretched their hands through into dark emptiness. Silently, but for the beating of their hearts, they entered a high, chilly hall, like an underground cathedral.

Suter's foresight had paid off. On the rock walls they made out the crude paintings of elephants, rhinoceroses, stags, and ibexes as well as of some strange reptile ten feet long.

This cavern of Gard added a bright chapter to the dusty archives of prehistoric art discovered by youngsters.

A Fox Hunt Wins Fame

Some of the great discoveries of young explorers were the result of mere chance. The heroes of Lascaux, accessories before the fact, deliberately sought out the underworld even if it was only as the haunt of fox or badger.

How amazed the young scamps would have been if, on that morning of September 12, 1940, when they took their dog Robot into the domains of the Countess Emmanuel de La Rochefoucauld, anyone had predicted the results of their poaching!

As in *The Three Musketeers*, they were four: Marcel Ravidat, 17; Georges Agnel, 16; Jacques Marsal, 15—all Montignac lads—and Simon Coencas, a 15-year-old visitor from Paris.

Arrived at the top of a hill a mile or so from Montignac and not far from the old manor of Lascaux, the young men wandered amid the stones and juniper thickets. While sniffing around, Robot fell into a hole hidden by bushes.

Loudly the young fellows called their dog. There was no answering bark. Then Ravidat, the oldest, spread aside the brambles and discovered a sort of natural well into which he cautiously descended.

Arrived below, with no other light than a box of matches, he found his dog. A tempting corridor lay ahead, but his matches were gone.

Next day, provided with a rope, candles, and an oil lantern, the four boys set to work.

Yesterday's young fox hunters, now transformed into speleologists—the Greek word for cave lovers—edged along a ridge of fallen earth, scrambled between the piled-up floor and the rock roof, and at about 50 feet below ground level entered the first hall.

There, by the feeble beams of their niggardly light, they suddenly made out on the whitish walls the most extraordinary array of prehistoric paintings and drawings that modern man has ever seen up to now.

An immense cavalcade of fantastic animals, a veritable menagerie of long-forgotten epochs, stretched out before the astonished eyes of the young men. Everywhere, lifelike outlines stood out from the walls, and the boys moved in a hazy atmosphere of dream paintings fixed on rugged rock. All excited, they



During the Chill Winter, the Baudry Family Hugs the Fire

For two days the mustached Gaul helped Dr. Maynard Owen Williams photograph the wonders of Lascaux. In the Baudry kitchen at Montignac the party feasted on food Paris could not surpass.

rushed to tell their teacher, M. Léon Laval.

With the skepticism of a veteran schoolmaster, he thought they were pulling his leg. But he consented, despite the sedentary habits of a bookworm, to follow them into the treasure cave of Lascaux.

A few hours later, when he crawled out, the schoolteacher, too, was infatuated by the find. He telegraphed to the noted French prehistorian, Abbé Henri Breuil, and to Count Bégouën. They all declared that, deep underground at Lascaux, they had found the zenith of all known prehistoric art.

While awaiting the next wonderful discovery—which is sure to come—the cave of Lascaux completes our list. Do not these living ad-

ventures, which I have checked and double-checked, surpass the derring-do of fictional heroes? Where in the annals of science has youth played such a part?

Love of Caverns Unites Two Old Friends

The grotto of Lascaux—by far the finest and best-preserved gallery of prehistoric art—was introduced to me, a veteran of more than a thousand underground galleries and abysses, by a reporter for the NATIONAL GEOGRAPHIC MAGAZINE.

After more than 30 years of globe-trotting for the NATIONAL GEOGRAPHIC MAGAZINE to scenes of geographic, historic, and artistic interest the world over, my old friend, May-



Madame Baudry, Friend of Cave Explorers, Makes Pets of Her Hens

Centuries before man felt the need of a literature, he had the impulse to paint cavern walls. The Vézère region, carved with countless limestone caves, is a fertile field for the study of France's prehistoric art galleries. Madame Baudry's farm gives access to Lascaux Cave, the most recently discovered.

nard Owen Williams, invaded my own chosen field and hustled me off to the choicest prehistoric prize of all. Overflowing with energy and avid for information, he brooked no delay.

Once before, just after I had discovered the oldest statues in the world (page 785), he had come to Toulouse, where I was a student, and asked to see the watery cavern into which I had swum to fame.

I do not know whether NATIONAL GEOGRAPHIC readers then realized the professional drive and personal curiosity which led him, in mid-February, to strip to the buff and plunge into the glacial waters of Montespan. I waded ahead in water up to my chin, hold-

ing high a lantern. He followed me, brandishing a tall tripod with its camera, and nursed along packets of flash powder under the cave drip that tingled on our necks.

Since that adventure deep in the earth, I had read that Williams had crossed the snowy roof of the world as a member of the famous Citroën-Haardt expedition across Asia from Beirut to Peiping.*

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Citroën Trans-Asiatic Expedition Reaches Kashmir," October, 1931; "First Over the Roof of the World by Motor," March, 1932; and "From the Mediterranean to the Yellow Sea by Motor," November, 1932, all by Maynard Owen Williams.



Hubert Cartier

Down a Cobweb Ladder the Author Descends into a Pyrenean Underworld

In making a difficult descent of 1,463 feet in the cave of La Henne Morte (Dead Woman), his party traversed waterfalls, which extinguished their lanterns, and encountered bats 1,000 feet below ground. For five days and six nights the speleologists remained in the cave. Their steel and duralumin ladders are so light that one man can carry enough for a 300-foot descent.

For years I had had no news of my persistent partner in subterranean aquatics. But in January 1947, coming from a lecture I had just given in the Salle Pleyel in Paris, I had a pleasant surprise. My friend advanced with outstretched hand, wearing the same boyish smile I had known 23 years before.

Right off the bat, as if we had been separated only for a week or so, he told me that Dr. John Oliver La Gorce was interested in Lascaux and suggested that I climb into his car and set off to study and photograph the Lascaux murals, about 270 miles south of Paris.

He knew that caves are my weakness, and I had long desired to visit this Louvre of prehistoric art. We were soon on our way.

When we stopped in front of the village school, the pupils, who were having their recess, ceased playing to gather around the "swell car" bearing the name of the National Geographic Society.

But we made even more of a sensation when we met the former schoolmaster M. Léon Laval, the friendly and generous Conservator of Lascaux Cave (Plate VI).

My life work has been the exploring of grottoes. Dangling by spiderweb ladders under the choking mass of subterranean waterfalls, spending five days and six nights during one deep descent in August 1947 into the cave of La Henne Morte (patois for "Dead Woman"), coming upon footprints left by hunters and hunted 15,000 years ago, studying bats and cave crystals—that has been my life.

My lectures have been attended by thousands of young people avid for adventure, by oldsters avid for a better knowledge. My books have been translated into many languages.

M. Laval was much impressed by my standing as a 20th-century cave man, but I



Arm Bone of a Cave Bear Gives the Casterets Food for Thought

With no more deadly weapon than a sharpened flint or a bow and arrow, prehistoric cave man defended himself from wild beasts or hunted for food. When the author, here seen in his "eagle's nest" workshop at St. Gaudens, explores a new cave, Paris dailies send special writers to give a running account of his adventures and discoveries. Besides being one of Europe's leading speleologists, he is a skilled skier, alpinist, swimmer, and discoverer of the "oldest statues in the world" (page 785).

assured him that I was not a prehistorian.

That was no excuse. I had ignored the cavern which had brought passionate interest to his peaceful life and had made a humble schoolteacher the trusted conservator of an incomparable treasure. M. Laval grumbled at my neglect, his gruffness a transparent disguise of the pleasure he took in showing us his treasure house.

Despite a bad case of grippe, he immediately put himself at our disposal. After a memorable omelet with truffles and jugged hare, we climbed the steep and rocky road which leads to the cave.

Veterans Aid in Photography

Thanks to M. Laval, our party was completed by two men who would aid us in the delicate and exacting processes of subterranean photography. Later, Williams assured us that he had never had better assistants.

One, a 56-year-old peasant with weather-beaten skin and large mustache, was Baudry, proprietor of the farmhouse inn which was our local base. Here his 84-year-old mother was the life of the party (pages 786, 787).

The other was Marcel Ravidat, discoverer of this so-long-exclusive art gallery (Plate V).

Supple as a cat, he led the way. At the entrance where he found fame, he gave way to his old schoolmaster, Léon Laval, who was to point out the wonders under his charge.

An ugly shed raised its leaky roof above tumble-down steps that led into the vitals of the earth.

Farther down, rude steps had been cut in the steep earthen slope. But both they and the guardrail were more treacherous than usual, for they were covered with stalactites and stalagmites of ice which M. Laval had to break away with his boots before we could reach the outer door of thick steel.



Is This Rhinoceros Wearing a Woolly Arctic Coat or a Tropical Sun Tan?

If woolly, he lived in central France during a glacial epoch, perhaps 20,000 years ago. If not, he was drawn when a warmer climate moved across Europe. His two horns and familiar shape identify him.

Behind the outer wall was a second made of carefully cut stone, a veritable fortress wall, fitted with a gate.

The Fine Arts Commission, including this cave among the proudest national monuments of France, immediately did what was essential to protect the incomparable treasures.

Since none may enter without the Conservator's permission, neither unintentional damage nor willful vandalism is to be feared. The unessentials—an entrance pavilion, a stone stairway, and a motor road to the cave entrance—may come later.

In the Underground Sanctuary

A dull sound echoed through the subterranean corridors as the heavy door swung to behind us. We were shut off from all distractions of modern life. Down there amid the shadows we felt isolated from the world's cares. Freed from the tyranny of time, we were eager for the conjuring up of the mighty past. How many millenniums, here unmarked

by the swing of sun and stars, had faded away since our Stone Age ancestors decorated these time-haunted walls!

Our guide, a jovial companion, suddenly became serious.

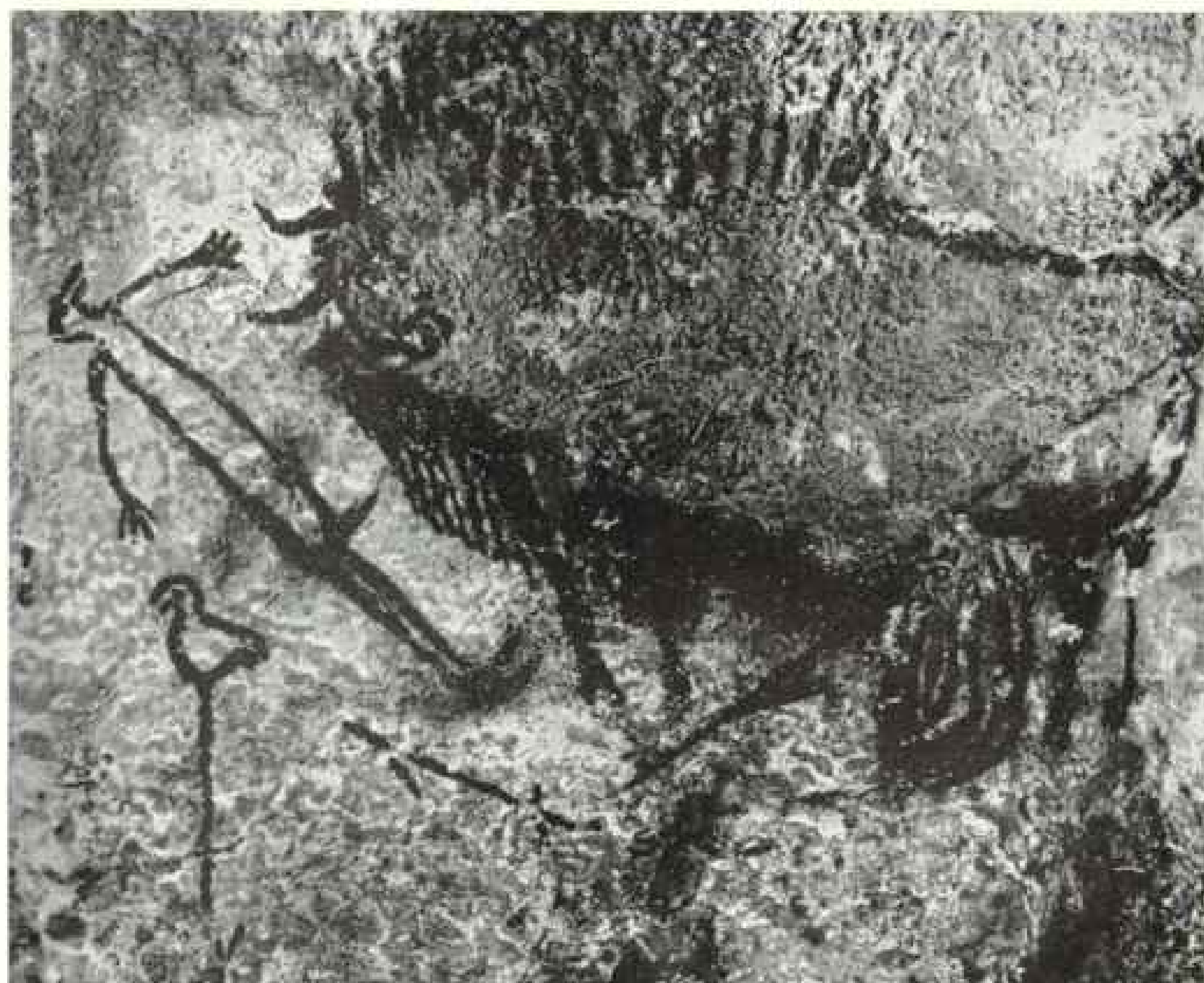
In the sunlight he had overflowed with comical quips. Now in the dark he gave us a sober introduction to the prehistoric masterpieces.

Silently he directed the beams of his lamp toward the wall. We gradually saw the outlines of a gigantic bull traced in black on the tawny rock. One could not miss the impressive force and realism of this ageless art.

"It is the largest drawing of all," said our cicerone. Then, under his breath, as if unwilling to measure such an aristocrat in mere figures, "It is 18 feet long" (Plate VII).

We were amazed at the fidelity and fine proportions of this giant taurine, traced (by what method and with the aid of what light?) on a steep, cracked, rugged, and scaly wall.

Soon, even in dark corners remote from our



Fernand Windels

His Entrails Hanging, a Wounded Bison Charges the Hunter

This upended hunter, gored by the bison, has a body like a stick and a head like a bird. A similar bird—perhaps his totem—perches near by. To get a soft, even light, Fernand Windels, official photographer at Lascaux, used small acetylene lamps, moving them during exposures lasting from five to twenty minutes each.

feeble lamps, we could make out strange patterns on walls and roof.

There were still more bovine giants, red horses in full gallop, a sort of hyena, and beside it some strange creature which seemed to have wandered out of a nightmare and fixed itself on the rocky wall.

This hybrid monster had a head like nothing on earth, with two rectilinear horns springing from its forehead like those of the legendary unicorn. Its sides and bloated belly were covered with leopard spots.

What had the prehistoric artist tried to picture here? It is still a mystery.

Once again we glanced at the giant bull and other animals. But M. Laval led us along until, with heads tipped far back and our breath almost cut off, we gazed in open-mouthed admiration.

Fifteen or 20 feet above our heads we saw a herd of bulls and cows pictured in the most varied positions. On the ceiling, figures

painted in red and black stood out with incredible freshness and vivacity despite their prodigious age.

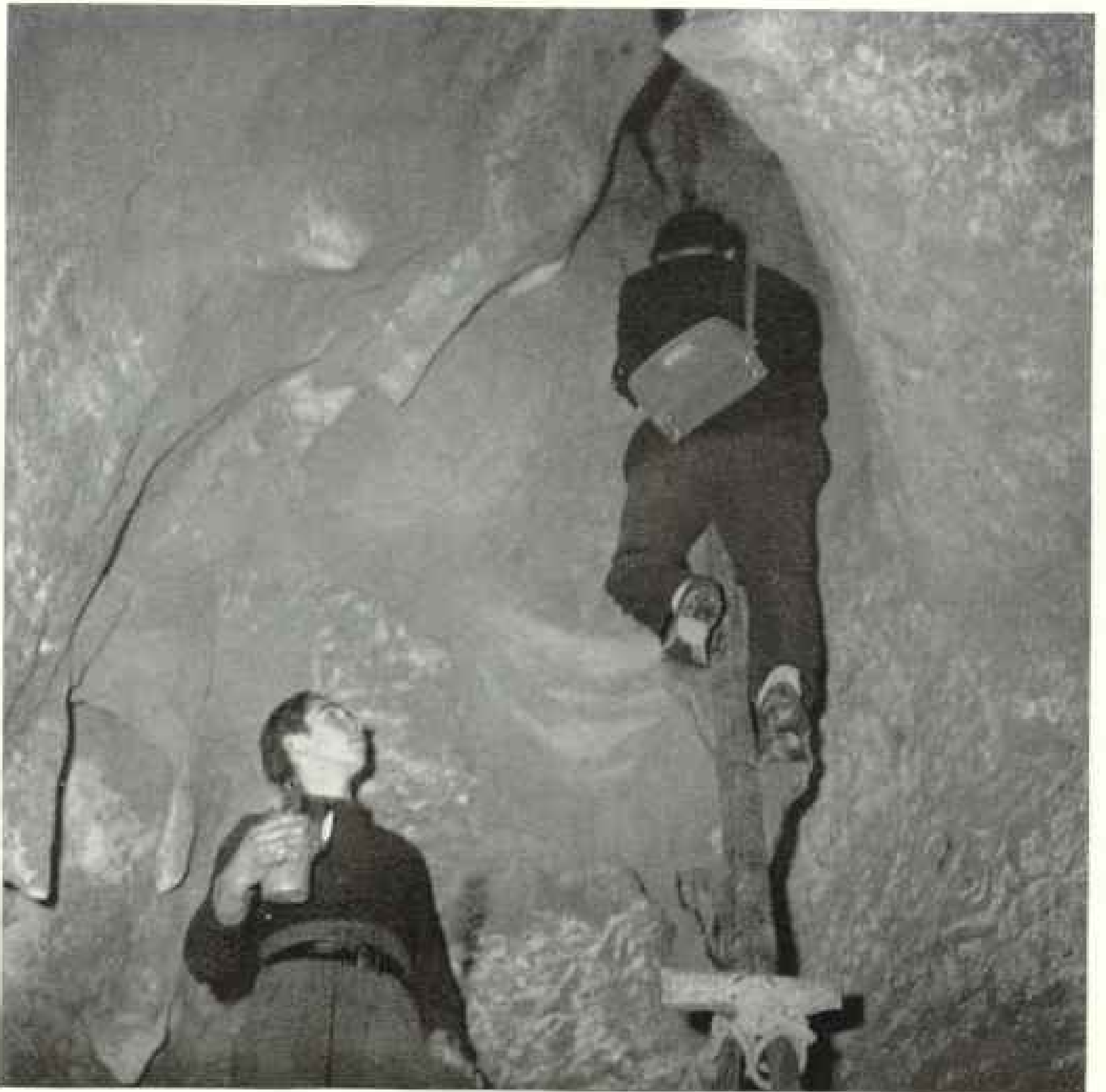
Since these are typically Aurignacian figures, the most conservative estimate is that they date back 15,000 to 30,000 years—say three to five times the extent of recorded history.

True, these paintings had been executed with indelible natural colors of ocher and oxide of manganese. And the remarkably dry cave, long sealed up by a cave-in, was exempt from destructive elements.

In a Prehistoric "Zoo"

Rain and wind had not worn off the surface. Ice had not chipped off the color nor fog or sunlight faded its tones. So these prehistoric frescoes have been preserved better than in any other cave yet known.

We saw a whole procession of shaggy little horses like Shetland ponies, a herd of fleeing



To Reach the Painting of a Wounded Bison, Explorers Use This "Parrot Ladder"

The rhinoceros and the bison charging the hunter pictures (pages 790 and 791) were found at the bottom of this natural well, 25 feet deep. Few visitors are allowed to enter the narrow pit lest the paintings be damaged.

deer, a big-horned stag of the tundra, a big black bull reaching out his muzzle toward a tuft of grass (Plate III).

Near the inner end of the gallery is a stampede of horses, one of which falls over backwards off a cliff or into a trap.

The unknown artist knew his models at first hand and portrayed them so skillfully that there is no mistaking his subjects. In one long fresco five stags follow one another with lifted heads and outstretched necks. Although only the heads are pictured, there can be little doubt that the animals are fording a stream or swimming a lake.

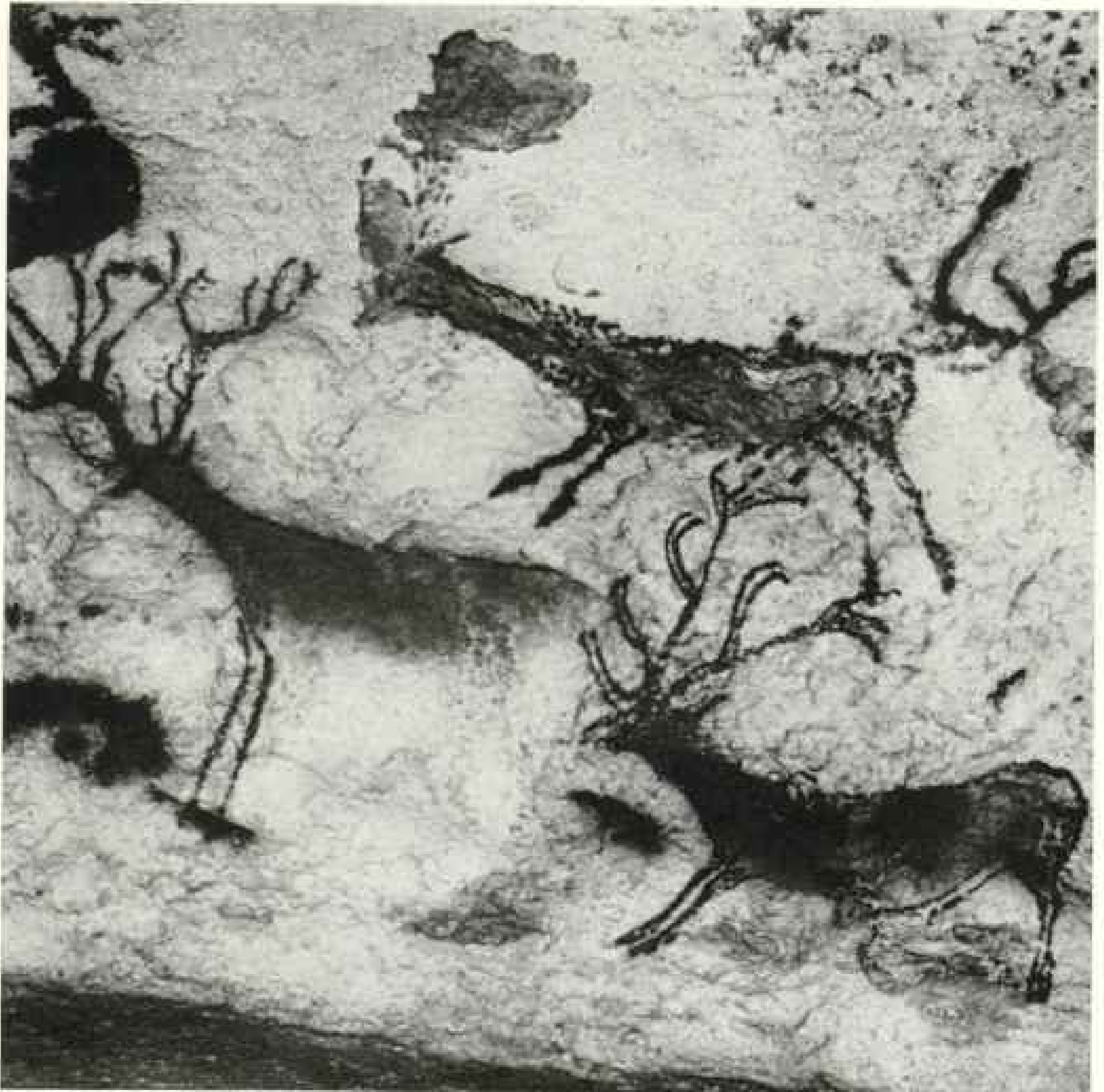
Not far from this masterly scene, a red horse and a black bison are pierced in vital

spots with seven arrows. Two great jet-black bison gallop away in opposite directions. Who can doubt that some prehistoric Frederic Remington was reproducing a scene familiar to his eyes but still a mystery to ours?

These 400 animal portraits, some half hidden by later figures, are so superimposed and tangled that they form a highly complicated puzzle. Whether the original artist corrected some body lines or a subsequent critic edited his efforts, who can say?

Even photographs cannot do full credit to the lifelike postures and proportions of the figures.

While we could move at ease, only being careful not to stumble as we progressed from



Ferdinand Winkels

Prehistoric Stags Are Pictured with Thick Horns, Thin Legs

Stone Age hunter-artists made realistic pictures of horses, cattle, and bison. But in dealing with antlers they let themselves go. Horns on the left are lost in the black muzzle of a giant bull.

one frame to another in this salon of prehistoric art, our photographer was having a time, toting his apparatus about in the dark and setting up his floppy-legged tripod on the steep and slippery floor.

An absence of moisture has been a major factor in preserving this very ancient art. But during our visit the grotto was more humid than it may have been for tens of thousands of years. It took two hours of breathing and polishing to warm the lenses enough so that they would not mist over completely.

Now standing on tiptoe and leaning back at a crazy angle, now kneeling and curled up in tight corners, our photographer went

through bending and stretching exercises which may seem excellent for preserving a good figure but which tomorrow may prove to be a crick in the back or a pain in the neck.

Mountain photography is a job for trained athletes, but underground toil is aggravated by the fact that one aims in the dark, focuses in the dark, and has to banish this darkness with the exactly measured light of flashlights.

Williams has faced Mother Earth without losing his smile. True, I did catch him muttering a phrase in which he summed up his distaste for both the glacial swim at Montspan and his cramped position at the moment. Doing the grand split across a narrow passage and perched in his stocking feet on two sharp



Norbert Casteret

Casteret Enters One of His Thousand Caves

rocks, he was tangled up in a large focusing cloth and playing hide-and-seek with his glasses, platcholders, cable release, and flashlight cables.

With a seeming sincerity which shocked and disquieted me, he burst out, "I hate caves!" But when he emerged, his face red and his hair mussed, his mischievous eyes gave the lie to the impious words which he had dared to utter in this subterranean temple, sacred to some religion based on hunger, pain, and man's early strivings toward knowledge.

Soon afterwards he tried another unusual exercise by descending into the pit of the cave on a swaying and unstable "parrot ladder" (page 792). At the bottom of the well we found ourselves packed in like sardines, with no place to back up. Our distant an-

cestors had also found their way into these lugubrious depths, for in this place of oblivion they had pictured a remarkable hunting scene, perhaps the most sensational of all.

With his spear an Aurignacian hunter has so torn the flanks of an enormous bison that its entrails protrude from the gaping wound. Thus a picador's horse is sometimes disemboweled by an angry bull.

The bison, maddened by pain and hatred for his insignificant assailant, has turned on him with dagger-curved horns. Unstable, seemingly suspended in air, the hunter falls backwards with his arms in the form of a cross (page 791).

How many times such dramatic spectacles must have marked the first unequal combat between man and beast! How many a hardy hunter, unafraid to attack such redoubtable monsters with some feeble weapon, must have died in such a way!

Is that imagination?

In any case, some 30,000 years ago one man among many went down into the deepest depth of the Lascaux Cave. There, unbelievably perched on a tiny ledge, working with some crude crayon by the light of a smoky torch, he scratched down on a crowded bit of wall this disturbingly realistic picture.

For some obscure reason he felt the urge and had the talent to record this tragic and brutal scene—a Stone Age snapshot, based on man's early struggles for food or safety.

While we concentrate and ponder on this ageless masterpiece, our companion, flat on his belly and with his neck twisted against the rock wall, screws his eye to the view finder while he attempts to photograph this bewildering picture of life as it was before history began.

Sinai Sheds New Light on the Bible

BY HENRY FIELD

*Physical Anthropologist, University of California African Expedition**

Photographs by William B. and Gladys Terry, Expedition Photographers

"SAND, deep sand, ahead. Keep the wheels turning. Never mind which track you follow."

So said our desert guide, one-eyed, one-armed Selman, known to every Bedouin in Sinai. For all his physical infirmities—he was injured while dynamiting sharks in the Red Sea—he knew every inch of Sinai's rock and sand.

We were approaching St. Catherine's Monastery on Christmas night. The date was January 12, 1947, for its Greek Orthodox monks still followed the Julian calendar.

First we crept through deep sand, then over rough cobblestones which paved hairpin bends on low but steep hills. Then, towering above us against the stars, we could see the ramparts watched over by the monks for 1,400 years.

Mount of the Ten Commandments

The two trucks stood nose to nose against the dark, shadowy wall. Their panting and gear-grinding over for the day, they seemed glad to have reached this religious haven at the foot of Mount Sinai. They could not have been parked very far from the spot where the children of Israel awaited the return of Moses with the tablets of stone bearing the Ten Commandments.†

A huge wooden gate swung open near by. A dozen figures streamed toward us. In the center, their beards silhouetted by the swinging lanterns, strode two monks. Suddenly we were confronted by a language difficulty, for none of us spoke Greek. Then out of the night came these reassuring words:

"That's O.K. right there. Welcome all to St. Catherine's. Merry Christmas!"

Father Nile, master of five languages, greeted us (page 809). We echoed his cheerful salutations.

Unloading the trucks began. Many willing hands, guided by Arabic words, assisted us. Our helpers were Jebeliyeh (Men of the Mountains), hereditary servants of the monastery. We were led through the gate, across paved courtyards, and up stone staircases to a wooden balcony off which opened guest rooms.

The night was cold and clear, for St. Catherine's stands 5,000 feet above the level of the Red Sea. Father Nile, who was to be our guide and companion for the next five days,

served us a hot meal before retiring. (Incidentally, he is named for St. Nilus, not for the River Nile.)

"Where the Sun Rises in the West"

About 200 airline miles from Cairo and Jerusalem, this isolated monastery is in the south-central part of the Sinai Peninsula, which forms the land bridge between Africa and Asia (page 797 and map, page 799).

As we stood on the cold balcony early the next morning, Father Nile commented that this was one of the few places in the world "where the sun rises in the west." Indeed, this did seem to be true. St. Catherine's nestles against the shady northern flank of 7,497-foot Gebel Musa, the traditional Mount Sinai, which blocks the early-morning rays. They are reflected onto the monastery from a rocky flank on the west.

During breakfast we explained to Father Nile that we were the Sinai phase of the University of California African Expedition.

Wendell Phillips, 26-year-old leader of this expedition, described how on lonely watches during his five years in the merchant marine he had dreamed of hunting for fossil man and apes in Africa. We were part of that dream come true. Scientific research was then in progress in Sinai, in the Faiyum of Egypt, in South Africa near Johannesburg, and in the great Kalahari Desert.

The dream of a Cairo-Capetown expedition with a fleet of 22 automobiles, an airplane, and a motorboat was becoming a reality.

Every branch of natural history was represented in some phase of the work. There were searchers for primate remains and cultural traces of ancient man, recorders of measurements and observations on the modern peoples, fossil hunters, collectors of animals and plants, researchers in tropical medicine, and several photographers.

* Dr. Field was Curator of Physical Anthropology, Field Museum of Natural History, Chicago (now Chicago Natural History Museum), until he entered United States Government service in 1941, doing research on the Near East. He has led or participated in nine archeological expeditions to Europe, Africa, and southwestern Asia.

† See "East of Suez to the Mount of the Decalogue," by Maynard Owen Williams, NATIONAL GEOGRAPHIC MAGAZINE, December, 1927.



Little Did the Owner Think that Scientists Would Study His Skull

Dr. Field, the author, measures with his calipers one of 19 skulls from an old "beehive" tomb in Sinai's Wadi Solaf. Wendell Phillips, 26-year-old leader of the University of California African Expedition, records the 11 measurements and many other observations made on each skull by the anthropologist. Head shapes proved similar to those of modern Bedouins—long and narrow (page 811).

Wendell, looking around the table at the Sinai group, described our various duties.

Prof. William F. Albright, of Johns Hopkins University, a specialist in ancient languages and Biblical archeology, was on the trail of early historical records linking Palestine and Trans-Jordan with the Nile Valley. He was studying ancient Egyptian cultures and was especially interested in the proto-Sinaitic inscriptions at Serabit el Khadim, the oldest writing in our alphabet. His wide experience and profound knowledge were throwing new light on certain Biblical problems.

My jobs were to measure and describe in detail every Bedouin willing to submit to the calipers, compile all available tribal data, and search for surface Stone Age sites wherever we might wander in Sinai.

With us were William B. Terry, field executive and photographer; his wife, Gladys, business manager, photographer, and pilot; and

Walter Thompson, technical assistant and handy man.

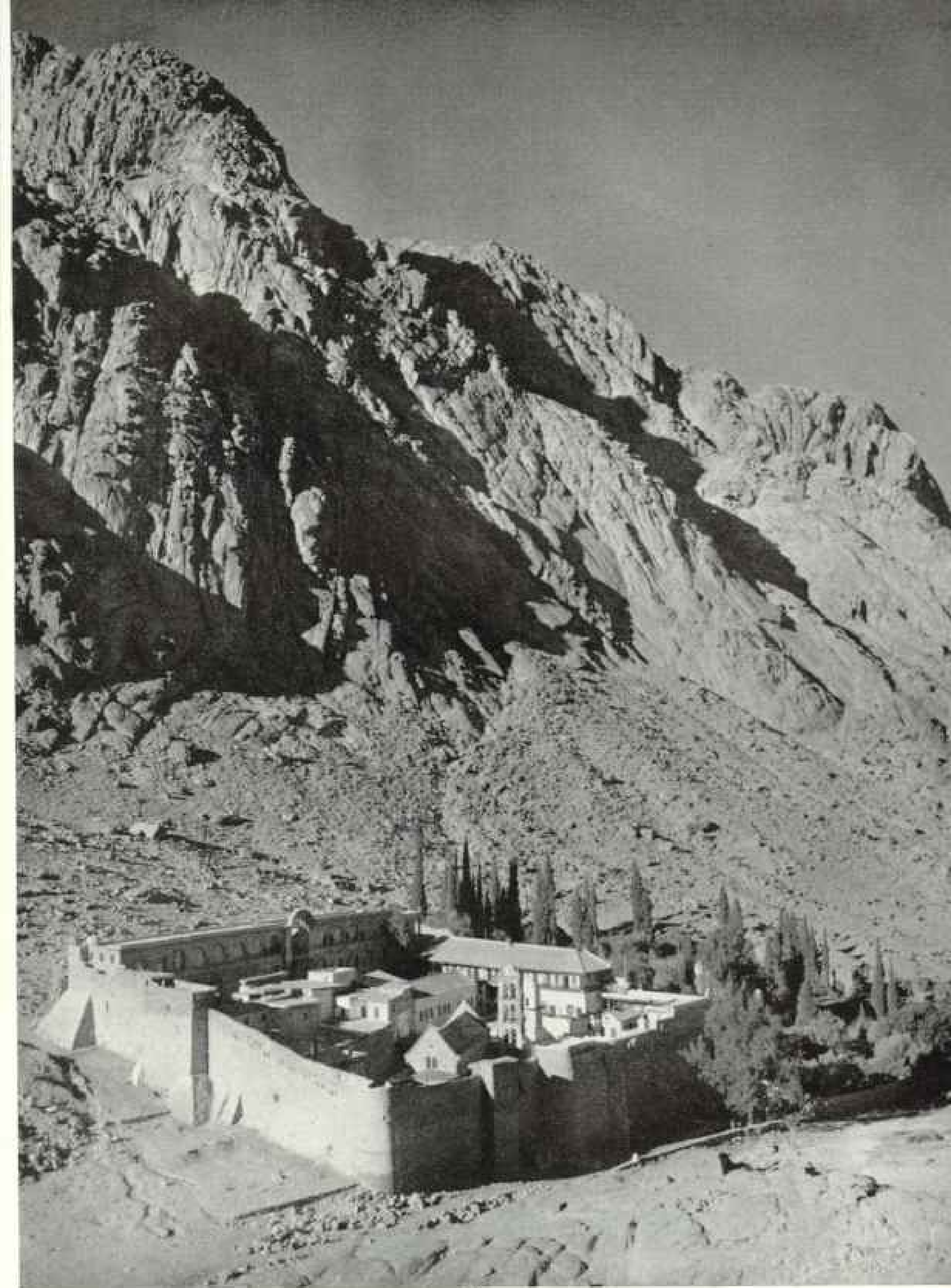
Down below, guarding the trucks, were Selman; Saleh Umbarak, a Jebeli guide; and our three Guftis, Hamadi, Mahmud el-Far, and Maghrabi (pages 805 and 813).

Skilled Guftis Proud of Reputation

Guftis are trained excavators from Qift, near Luxor. They are direct descendants of men trained in excavation methods and technique by the distinguished Sir W. M. Flinders Petrie, "father of archeology," and later by Dr. George Andrew Reisner, of the Boston Museum of Fine Arts, and others.

The Guftis are proud of their skills and knowledge. Throughout Egypt, the Sudan, Palestine, Syria, and the Trans-Jordan, they are respected by all.

These men are practical aids as well, for they can cook, keep house for scientists in the



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To the Desert-worn Expedition This Monastery Offered Warm Welcome—in English
Here at the foot of Mount Sinai, on which Moses received the Ten Commandments, the Christian faith has burned like a beacon for 1,400 years (page 793). The walls and battlements protected early Christians.



American Colour Photographers

"And the Glory of the Lord Abode upon Mount Sinai"

Beneath a cross-marked gateway 600 feet from the summit of the mountain where the Lord gave Moses the Ten Commandments stands a pensive servant of St. Catherine's Monastery.

desert, and take charge of the details of an expedition generally. They make explorers their personal responsibility. For example, if a Gufti's personal charge should lose any of his belongings, this would be a serious reflection upon Gufti reputation.

At the monastery our hosts showed keen interest in the results of our expedition thus far:

We had found a chain of prehistoric sites on the land bridge between Africa and Asia, proving that ancient man had migrated across this region.

The Gulf of Suez turquoise port of the ancient Egyptians had been located and dated (page 800).

This dating made possible a new decipherment of the oldest writings in our alphabet, on the walls of the turquoise mines at Serabit el Khadim. These we had yet to visit (page 815).

We had established the route of the Exodus, arriving at the theory that the place where Moses and the Israelites escaped their pursuers was the Reed Sea, not the present-day Red Sea (page 802).

Data on the physical characters of scores of Bedouins had been obtained; the number was to total 223 by the time the expedition ended.

Stone Tools 100,000 Years Old!

In answer to questions, we related how we had found on the desert surface Stone Age tools which proved the existence of ancient man in the northern area beyond the Suez Canal and almost as far eastward as the Palestine border.

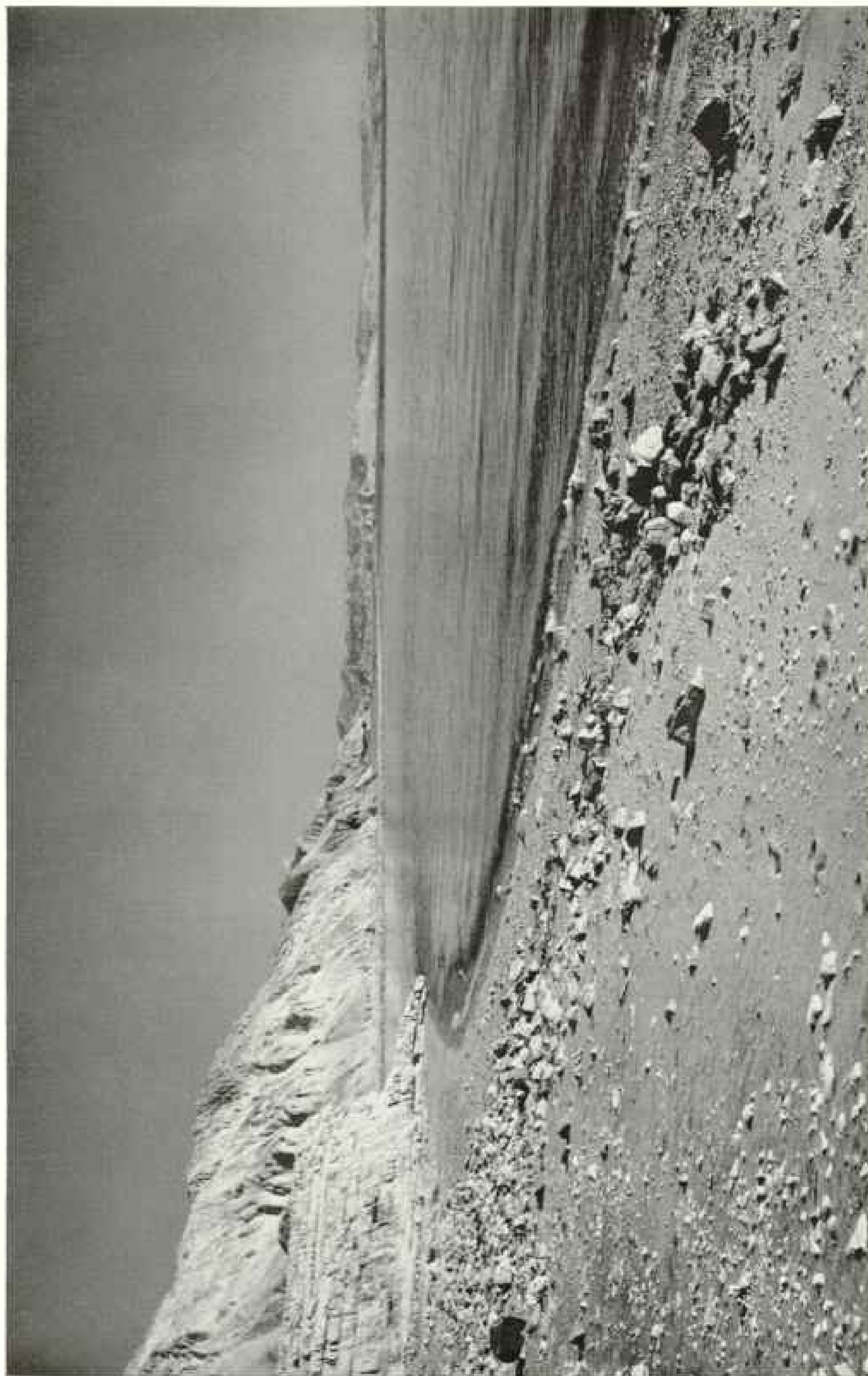
The most important site was at El Ruafa, about 30 miles southeast of El 'Arish. On this low hill, overlooking water pools, a superb series of hand axes was collected from an eroded gully.

Tentatively estimated to be 100,000 years old, these flaked stone tools form one of the most important series in southwestern Asia. They belong to the pre-Neanderthal period known as Acheuleo-Levalloisian, so called from the localities in



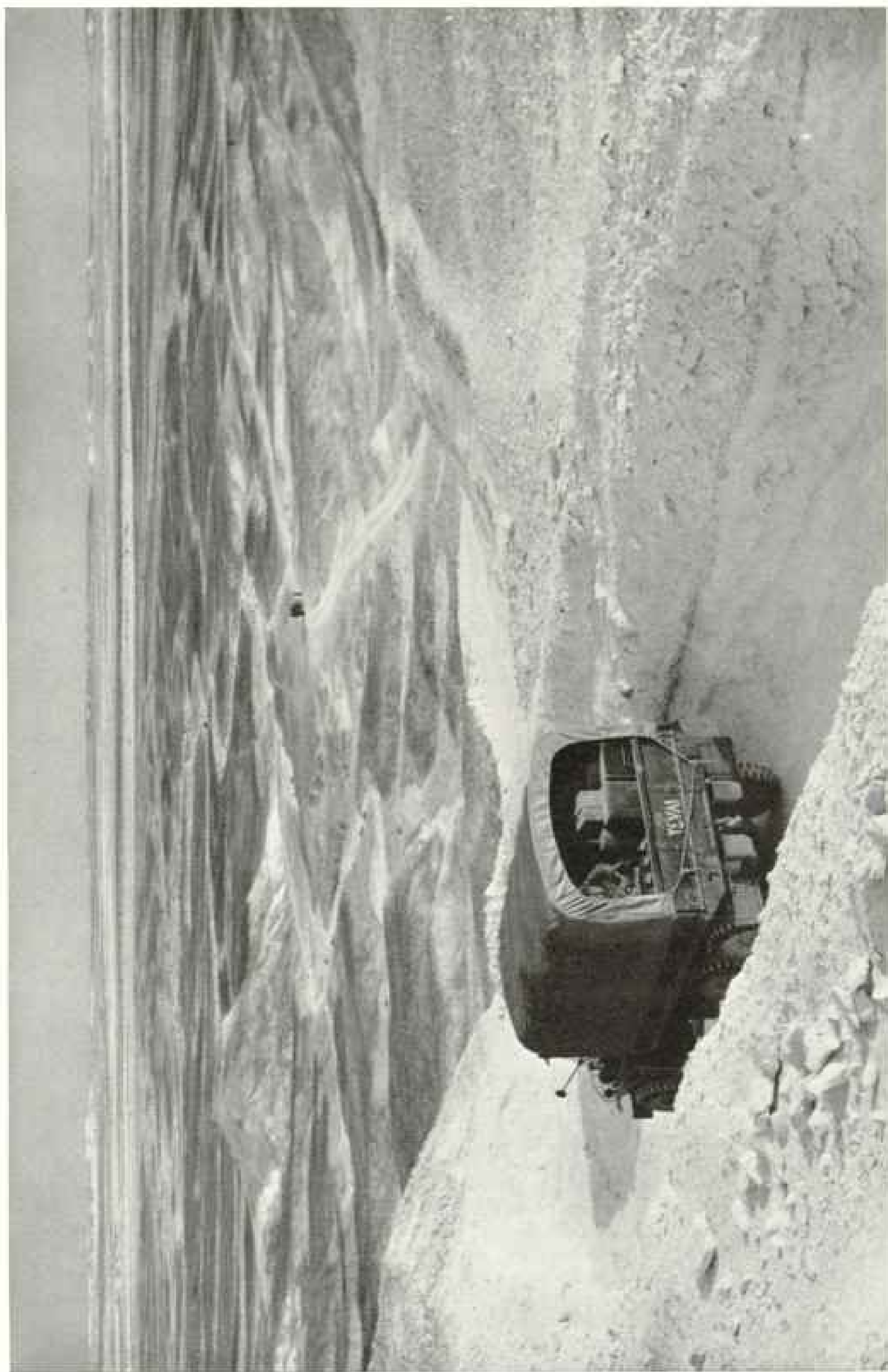
Here Scientists Sought Ancient Secrets of Sinai, Land Bridge Between Africa and Asia

In surplus United States Army trucks, the expedition crisscrossed the desolate shield-shaped land between Africa and Asia. This map illustrates the expedition's theory that Moses led his Israelites across the brackish Reed Sea, not the Red Sea (page 802). The inset enlarges the area around Mount Sinai.



On the Sinai Shore of the Gulf of Suez the Expedition Discovered the Site of an Ancient Egyptian Turquoise-shipping Port

Pottery found in the low mound on the far shore in center revealed that an embarkation point existed here about 1500 *b. c.* This made possible a new decipherment of ancient inscriptions in the Serabit el Khadim turquoise mines 17 miles away (page 815). Study of the Merikhab Port site also revealed that the Red Sea level has changed little since Moses' time, thus strengthening the theory that Pharaoh's boat was swallowed up in the Reed Sea rather than the Red Sea (page 802).



Trucks of the University of California Expedition Cross the Wilderness of Tib, One of the Most Desolate Places on Earth

Dr. Field, beside the distant truck, believes this is the Biblical "Wilderness of Zin," where the Israelites wandered for 40 years (page 807). Winds blow constantly. The road is cut through white limestone. In the distance rises the escarpment which crosses Sinai and marks the beginning of its rugged, mountainous southern half.

northern France where specimens of this technique were first found.

Even the Governor of Sinai, whom we encountered later, showed real surprise at our dating of these finds. He had no idea that men of the Old Stone Age had crossed northern Sinai, leaving evidence behind them.

To our friends at the monastery we described our journey from El 'Arish to Bir Hasana and on to Nekhl, the ancient capital, which now is a partially abandoned oasis standing astride the crossroads of Sinai.

Near this trans-desert track we had found occasional traces left by the Stone Age hunters in the Wilderness of Tih, probably the Wilderness of Zin where "the children of Israel murmured against Moses and Aaron in the wilderness . . ." (Exodus 16:2).

We were moved by the loneliness of this wilderness—scarcely any living plant or animal in all this vast expanse of sand (page 801). We could understand why the discouraged children of Israel cried out: "Wherefore is this that thou hast brought us up out of Egypt, to kill us and our children and our cattle with thirst?" (Exodus 17:3.)

Hour after hour we had driven across this deserted region, when suddenly the horror of its utter lifelessness was broken. A small gray-brown bird with bluish underwings flew from a barren rock and alighted on another boulder, the better to watch our thunderous coming.

After driving for many, many hours across this lonely wilderness, we finally came out into civilization. In the distance were palm trees and buildings and the curious illusion caused by the superstructure of a large ship seemingly gliding through the sea of golden sand. This was the Suez Canal.

Ancient Egyptian Turquoise Port Found

Professor Albright also related to the monks how we had found the site of an ancient Egyptian settlement for which archeologists had been searching half a century.

It had long been known that Egyptian expeditions used to cross the Gulf of Suez, northwestern arm of the Red Sea, to mine in Sinai the turquoise with which the Pharaohs and their ladies were adorned. Archeologists reasoned that there must have been an ancient port on the Sinai side near the Serabit el Khadim turquoise mines, which lie 17 miles inland. All efforts to find the site had been in vain, however, until our expedition discovered it through a rare stroke of luck.

While we were encamped at Abu Zenima, on the Sinai shore of the Gulf of Suez, we told Selman to inquire of everyone, including a group of Bedouins, whether they knew of any

sites where quantities of broken pottery lay upon the surface. To our surprise he returned shortly with word that an old bearded Bedouin knew of just such a place only about five miles farther along the seacoast, to the southeast.

Highly skeptical and certain that the pottery would turn out to be Turkish and relatively recent instead of the ancient remains that we sought, we nevertheless decided to have a look. The site proved to be a low mound on the edge of the Merkhah Plain, about a hundred yards from the Gulf (p. 800).

Pottery uncovered by wind erosion lay scattered over the ground, and to see the mound in cross section we did not even have to dig; the Sinai Mining Company had cut a trench through it for the tracks of a light railway connecting its Umm Bogma manganese mine with the sea.

"Heavens!" exclaimed Professor Albright after careful examination of the mound and the fragments of crude dark pottery. "This is the site that Petrie and the others have been looking for all these years!"

The pottery, he found, was unmistakably ancient Egyptian, of about 1500 B.C. Furthermore, this was the logical site for the ancient settlement, because it lay on a protected cove at the nearest possible point to the turquoise mines.

Theory Substitutes Reed Sea for Red

However, the real significance of this discovery lies in another direction. A trial trench in the part of the mound nearest to the sea showed that since 1500 B.C. its waters had not reached even to the base of the mound, which is six feet above the present Red Sea level. Thus the Red Sea has not risen appreciably during the past 3,450 years. This confirmed evidence obtained by Dr. Nelson Glueck in excavating Solomon's seaport at Ezion-geber near 'Aqaba in 1937-40.*

These findings shed important light on the story of the Exodus, which took place considerably after 1500 B.C. The route by which Moses led his people out of Egypt is north of the present Red Sea (map, page 799). Scholars previously had explained Moses' crossing of the Red Sea by assuming that its level at the time of the Exodus was some 25 feet higher than at present and that it thus extended northward all the way to the Bitter Lakes.

The work of Dr. Glueck and our discoveries at Merkhah Port, combined with our visits to Raamses, Succoth, and Pithom—all mentioned in the Book of Exodus—lead to the

* See "On the Trail of King Solomon's Mines," by Nelson Glueck, NATIONAL GEOGRAPHIC MAGAZINE, February, 1944.



Before the Gleaming, Glowing Altar, a Monastery Priest Upholds the Cross

Members of the expedition were allowed to photograph the rich Byzantine interior of the Church of St. Catherine because they carried a letter of introduction from the Greek Orthodox Archbishop at Cairo. The Byzantine Emperor Justinian founded the monastery in the 6th century. Its library is world-famed.

following theory based on Biblical studies:

Moses and the Israelites were being pursued by Pharaoh with his chariots and horses. However, Moses, being an able general, led his band on the eve of a heavy storm through the Reed Sea (Hebrew *Yam Suf*, also mentioned in 13th-century Egyptian sources as a body of water near Raamses).

According to Exodus, the Egyptians followed the Israelites into marshy ground, where the chariots became mired. Then the impending storm broke "and the Lord overthrew the Egyptians in the midst of the sea . . . there remained not so much as one of them" (Exodus 14:27-28). The miracle was complete.

In antiquity, Professor Albright observes, the Reed Sea (properly Papyrus Sea) was considered a part of the Red Sea. This, he believes, explains the discrepancy—not a typographical error of "Red" for "Reed!"

For the monks of St. Catherine's we had brought mail, their first in two months; news-

papers in Greek and Arabic; and bundles of warm woolen clothing, including several pairs of U. S. Army Air Force fleece-lined high boots from War Surplus sales in Cairo.

Monks Prize Air Force Boots

Father Nile gloated over his pair. These would keep him warm as he stood daily from 4:30 till 9 a. m. on the ice-cold and drafty floor of the church.

From Cairo we had also brought Christmas presents sent by Porphyrios III, Archbishop of Sinai since 1926. The Archbishop had given us a letter of introduction and permits to stay at the monastery.

Father Nile escorted us to call on the Superior and his three bearded councilors, who entertained us over a delicious drink resembling arrack (a sort of Near Eastern gin) and spoonfuls of quince jam. Father Nile acted as interpreter.

The Superior welcomed us heartily, offered



"St." Stephanos, Dead 1,368 Years, Still Serves as Watchman

Before he died, about 580, the monk who had guarded the way up Mount Sinai expressed the wish that he could guard the monastery forever. Monks dressed the skeleton in church vestments and stationed it at the threshold of the "bone room" (pages 806 and 807). There the eerie sentinel keeps watch.

us hospitality for as long as we might wish to stay, and extended the rare privilege of working in the monastery's world-famous library. From our host we learned the early history of the monastery, in an account similar to that which A. Mary R. Dobson, Paul Gotch, and others have quoted.

According to tradition, Queen Helena, mother of the Emperor Constantine, visited Sinai in 342, and a church was built on the site of the Burning Bush from which the angel of the Lord spoke to Moses.

"And the angel of the Lord appeared unto him in a flame of fire out of the midst of a bush: and he looked, and, behold, the bush burned with fire, and the bush was not con-

sumed . . . And (the Lord) said, 'Draw not nigh hither; put off thy shoes from off thy feet, for the place whereon thou standest is holy ground'" (Exodus 3: 2, 5-6).

Story of St. Catherine

The name of St. Catherine appears to have been adopted during the eighth or ninth century. One legend is that this Christian girl defied the Emperor Maximinus II, converted the Empress, who visited her in prison, and was finally about to be broken on the wheel when it was miraculously broken itself.

She was beheaded at Alexandria, but in answer to her prayer angels transported her body to Mount Sinai. Egyptian Christians found it several centuries later. Afterwards, the monks brought it to the monastery, where it has been venerated ever since.

Upon occasion two small silver boxes are opened, one revealing her skull and the other a skeleton hand covered with rings.

Walking around the battlements of the monastery, we passed 16th-century cannon, relics of former battles for the privilege of sanctity and escape from the troubles of the world.

Above, out of the bare gray mountainside, stood a single cypress tree incongruous in its very loneliness. Below us a wooden structure housed the windlass which hoisted the early travelers in and out of the monastery. This is now used to lower supplies and the daily ration of bread to the Jebeliyeh, three hard loaves for each man, two for his wife, and one for each child. Every loaf has to be soaked in water before it can be eaten.

We walked down some stone steps, through narrow passages, some underground, past

whitewashed walls to the Basilica, built 561-565 and dedicated to "the safety of our pious Emperor Justinian" (A.D. 483-565).

Through a huge carved door we passed into the rich Byzantine interior of the Church of the Transfiguration, later renamed for St. Catherine, with its 12 gilded columns and elaborate candelabra. On the door lintel was engraved in Greek: "On this spot the Lord said unto Moses: 'I am the God of your fathers, the God of Isaac, and the God of Jacob. I am He who is. This is the gate of the Lord. May the just enter through it.'"

Father Nile then escorted us to the Chapel of St. John. Here we removed our shoes, for the place we were to enter was holy ground. Through a narrow doorway we moved in single file to stand silently before the site of the Burning Bush. Here we were following in Moses' footsteps.

Outside we passed an acacia tree growing from the wall at the back of the church. One of the novices gave each of us some leaves from this sacred tree, which, according to tradition, sprang from Aaron's rod. I pressed them carefully for my daughter Mariana's Bible. "And Moses went into the tabernacle of witness: and, behold, the rod of Aaron for the house of Levi was budded . . . And the Lord said unto Moses, Bring Aaron's rod again before the testimony, to be kept for a token against the rebels . . ." (Numbers 17: 8, 10).

At this Christian monastery we were astonished to pass a very old mosque. It was built by order of Abu Ali Mansur Anuchtakin el-Amri from A.D. 1101-06 because the Bedouins of Sinai, and later the Jebeliyeh, had no



Ancient Egyptians Cleft This Rock of Ages for Turquoise

Today, to obtain the bluish-green gems from the Wadi Mukattab mines, Bedouins blast with dynamite. With long-robed, turbaned Maghrabi (left), a Gufti excavator, Dr. Field searches for the narrow seams of hard rock in which the turquoise is embedded. His headgear is not a turban but a Florida fishing hat. Unlike the Serabit el Khadim mines, these contain no inscriptions.

place of worship. Jacques of Verona, a monk, about the year 1335, described how Saracen priests proclaimed the call to prayer from the minaret, since at that time St. Catherine's Monastery was under the Sultan's domination.

How a Priceless Book Reached Moscow

We returned through the refectory, dining hall of the monks. In a high vaulted room, perhaps 50 feet long, stood two wooden tables with a special footrest before each seat.

Upstairs we climbed through many narrow passages and stairs to the library. This was the original home of the *Codex Sinaiticus*, a Greek manuscript of the Bible and one of the

most famous books in the world. It was sold to the British Museum in 1933 by the Soviet Government for nearly \$500,000.

How this Codex reached Moscow is an interesting story, told in two versions. L. F. K. von Tischendorf, a German Biblical scholar, visited St. Catherine's in 1844 and was granted permission by the monks to look through their library. According to his version, Tischendorf found a section of the New Testament about to be burned as rubbish. At his request it was given to him.

Nine years later he returned to try to recover the rest of the manuscript, but without success. On a third visit, in 1859, a monk who had kept it in his cell gave it to him, wrapped in a red cloth. Tischendorf presented it to the Tsar, who sent a beautifully bound photographic copy as a present to the monastery. Seventy-four years later the Soviets, requiring foreign currency, sold the original to the British Museum.

In the opinion of various scholars, Tischendorf acted correctly throughout the entire transaction. He later obtained decorations and a gift of 9,000 rubles for the monastery. Moreover, he stayed on good terms with it during his lifetime.

The version which we were told by the librarian of St. Catherine's was that Tischendorf begged permission to take the *Codex Sinaiticus* to Cairo in order to copy it and that he never brought it back.

Its loss, no matter how it happened, is still a sore subject at St. Catherine's.

The librarian also told us of an Arabic psalter in which a monk had written the story of the two sons of a rich merchant. One gave away his inheritance and became a hermit; the other kept his wealth to help the needy. Which was the greater saint? The recorder ended further argument with the words: "In Paradise I saw both."

The librarian generously showed us a few treasures: The *Codex Syriac* of the Gospels, dating from the fourth or fifth century after Christ, and several illuminated manuscripts, including Cosmas Indicopleustes' *Christian Topography*, which dates from about the 12th century. There are texts in Greek, Arabic, Syriac, Slavonic, Persian, Georgian, and Ethiopic. Here is indeed a world's treasure house.

Leon Painter Unaware of World Wars

As we walked along the balustrade toward the guest rooms, we saw below a monk painting icons. Father Nile showed us examples of his work and told us that the artist had been in the monastery continuously for the last 56 years. He is fond, very fond, of cats.

Each monk receives a daily food ration. The artist shares his meager meals with his many cats, some of which follow him around wherever he goes.

He neither knows nor cares about the outside world. A few years ago a visitor engaged him in Greek. The artist was mildly surprised to hear about World War II, but not half so surprised as the visitor, who discovered the monk had not even heard of World War I.

In direct contrast is Father Nile, who has been in the monastery only since July, 1947. During the last war he was a censor for the Egyptian Government. His knowledge of five languages made him exceptionally useful—as well as his ability to read printing upside down almost as easily as right side up!

Father Nile has a radio, so that he can keep the Superior informed of major world events. A jack-of-all-trades, he is electrician, carpenter, plumber, shoemaker, and general handy man, so that his nondevotional time is more than full.

Skeleton Guards Bones of Monks

Each morning at 4:15 we were awakened by one of the young novices beating with a wooden bar between two uprights the same haunting rhythm. At 4:25 he tolled the great bell for the call to prayer, which lasted until 9 o'clock. Chanting in Greek bathed the air.

Special services are held in the afternoon. Phillips and I attended a memorial to the stoning of St. Stephen, in the little chapel dedicated to this martyr. At the conclusion we were each given a round, flat loaf of bread with a picture of the convent impressed on it. The monks seemed pleased at our attendance.

One morning we joined the service before the Burning Bush. Here we stood against the wall in the company of all the monks. The more aged members used long T-shaped sticks upon which to rest, for this 4½-hour daily service is a real test of endurance. These bearded monks chanting Greek before the place where Moses saw the Burning Bush made indeed an impressive picture.

One afternoon we saw the charnel house where the skull and bones of every monk are stored.

Inside the entrance and apparently still on guard sits "St." Stephanos, the porter, dressed in his robes of office. No watchman has stayed at his post longer than he, for in life he guarded the way up Gebel Musa (Mount Sinai) and since his death about the year 580 his robed skeleton has guarded the entrance to the charnel house (page 804).

Within, the skulls of the monks are arranged in one rather gruesome heap, long bones like



Remains of Long-dead Monks Pile High in the "Bone Room" of the Monastery

Burial ground within the confines of St. Catherine's is limited. When a monk dies, his fellows dig up the body of the one buried longest, consign his bones to the bone room, and put the newly deceased in his place. Two novices hold skulls from a separate heap. Piled like cordwood are the long bones, hands, and feet of their predecessors, some dead 1,400 years. In the dry mountain air, disintegration is slow (page 804).

cordwood in another. The skeletons of the Superiors are preserved separately in wooden trays. Bones of the few visitors who died there are kept apart.

Chain Links Brothers Even in Death

In one double box, still linked by a chain, are the remains of two brothers. Edward Henry Palmer, British orientalist, in a book published in 1871, identified them as Indian princes, but another story relates that they were two brothers from Provence, France, who had yielded to passion and murdered their uncle. As penance they were forced to visit three sacred places—Rome, Jerusalem, and Sinai.

They were also obliged to chain themselves so that both could not sleep at the same time. In Sinai they spent the rest of their days as hermits, living in adjoining mountain cells.

During the early centuries of Christianity

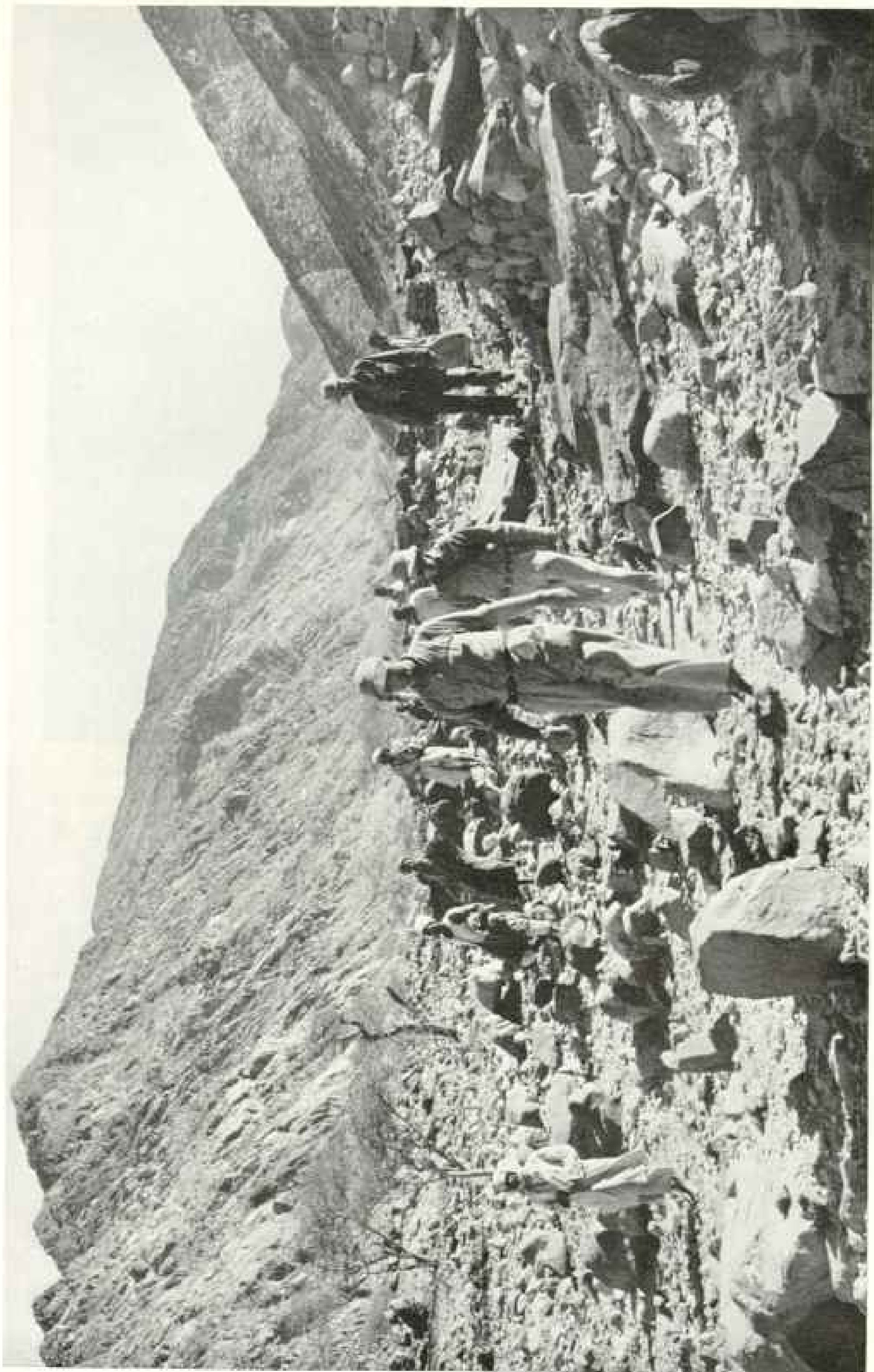
many hermits sought refuge in the inaccessible mountains of southern Sinai. Many later were victims of Saracen massacres.

At the monastery we were served by Jebeliyeh, who are said to be direct descendants of the Wallachian and Bosnian serfs sent as protection to St. Catherine's by the Emperor Justinian.

They are sometimes referred to as "Subyan ed-Deir," or "Boys of the Monastery," a term which I tried. It met with great approval, for knowledge of it implied that I was intimately acquainted with their history.

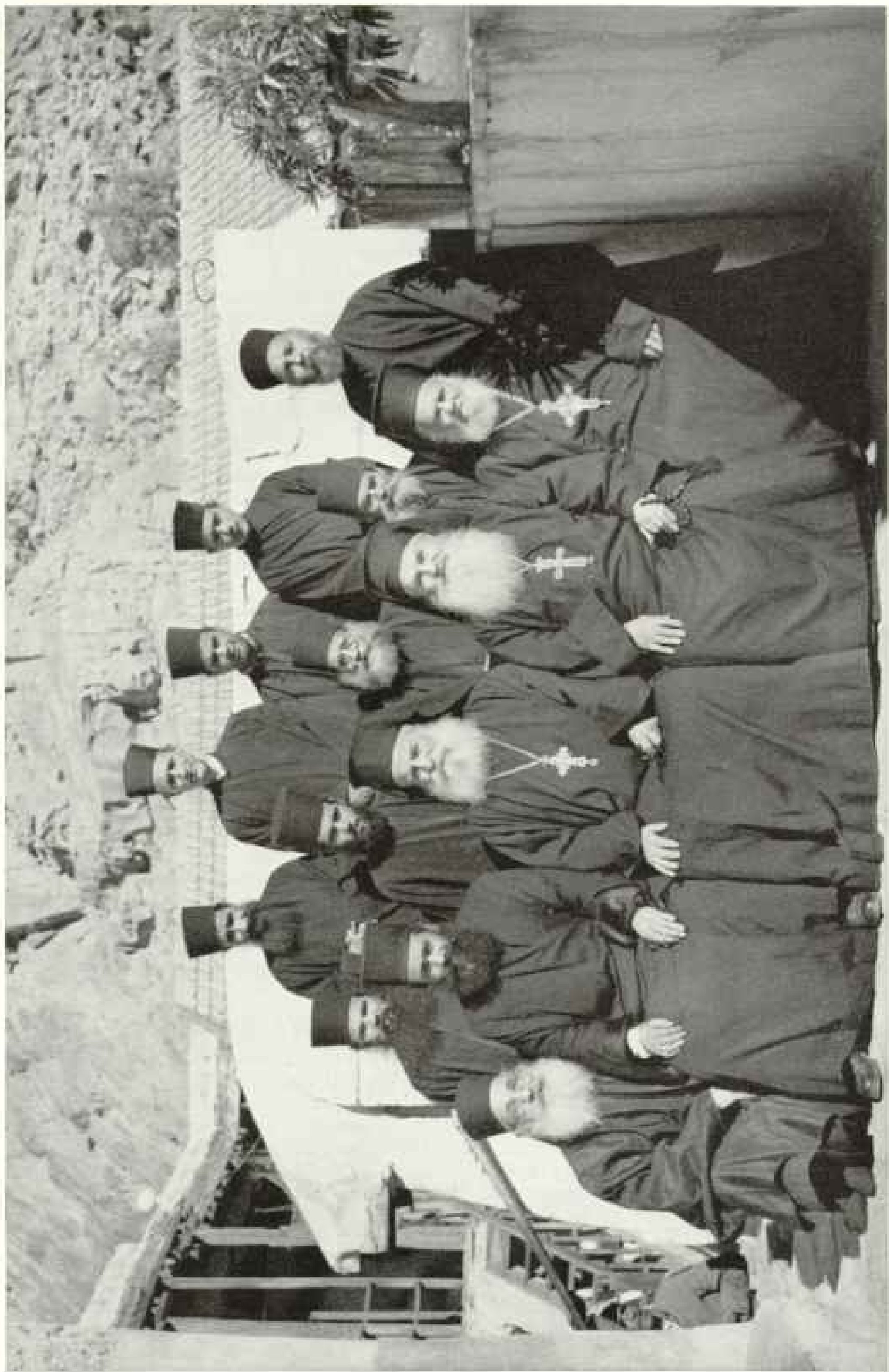
Here was an interesting anthropological problem. The Jebeliyeh had acquired many of the Bedouin ways of life, but were of almost pure Balkan stock. There had been little Bedouin racial admixture, for the true Bedouins scorn the subservient Jebeliyeh.

Would anthropometric measurements and observations and also front and profile



Rocky Desolation Now, Where Stood the Christian City of Pharan

With local Bedouins of Feiran Oasis, Dr. Field, Wendell Phillips, and Prof. W. F. Albright, in that order, walk through a part of the ruined city after inspecting ancient rock-cut tombs, some of which contained skeletons (page 817). Pharan was a thriving town as early as the 2d century; about the year 400 it became the seat of a bishop. Eventually Moslems drove out the Christians and the city fell into ruins. Under the Crusaders, in the 12th century, it revived, but only briefly.



Hospitable Hosts to the Expedition Were Greek Orthodox Monks of St. Catherine's Monastery, at the Base of Mount Sinai

In the front row (center) sits the Superior, with his three councillors. At left crouches Father Nile, kindly, humorous master of five languages and many skills. Beardless, or relatively so, are the three novices in the rear. All the monks are here but the icon painter, who was unaware of two world wars (page 806).

photographs show differences from the Bedouins of Sinai? Here was a chance to find out.

Setting up a table in the lower courtyard outside the main gate, I studied about 70 Jebeliyeh for comparison with 155 Bedouins I had examined. The former seem to be taller, lighter-skinned, more straight-nosed, smaller-boned, and more oval-faced. Final statistical comparisons have not yet been completed at Harvard.

The children were photographed and also encouraged to collect all manner of small animals. The quickest method of collecting is to pay a small coin for each specimen, whether it be lizard, scorpion, or beetle. Fifty children can gather a representative collection in a few hours, and they love it. Amid wild screams and much giggling they rush up with offerings until bedlam reigns and a halt is called.

The Ascent of Mount Sinai

On our last afternoon we climbed the 3,500 steps to the top of Mount Sinai. Our first breather came at a little chapel built, according to Sir Frederick Henniker, who climbed this way more than a hundred years ago, to commemorate a miracle. He wrote:

"The monks were once driven from the convent by fleas and famine—they were proceeding up the mountain to pray, when they were met on this very spot by a supernatural figure—say St. Catherine; this good angel informed them that they would find their larders replenished, and that fleas should never exist there again."

Higher up we passed through a gate at which it was customary for the pilgrim to confess his sins. Our first real halt was made in the shade of a large cypress standing beside a spring (page 798). Near by is a chapel on the alleged spot where the ravens fed Elijah. "And it shall be, that thou shalt drink of the brook; and I have commanded the ravens to feed thee there" (I Kings 17: 4).

After nearly two hours of tedious but not difficult climbing, thanks to steps cut by one of the monks, we arrived panting at the top of Mount Sinai. A sip of water and a stick of gum were the physical rewards doled out by Gladys and Bill Ferry.

Atop a huge rock we feasted our eyes in every direction over this great mountain complex, of which we seemed to be sitting on the gigantic fulcrum. To the east beyond the mountains lay the placid gray waters of the Gulf of 'Aqaba. To the southeast was the point known as Ras Muhammad. To the northeast appeared vaguely the escarpment above 'Aqaba.

In the golden rays of the setting sun, which

picked out the blues and reds of the strata below, we sat amid mountain peaks in a sea of abomination and desolation. We recalled that Moses spent forty days and nights here alone on Mount Sinai when the Lord gave him the "tables of stone, and a law, and commandments which I have written; that thou mayest teach them" (Exodus 24: 12).

We were moved, deeply moved, by the loneliness, the beauty, and our thoughts. Without speaking we made the descent to reach St. Catherine's just before the quickly riding veil of darkness overshadowed the valley.

Trucks Again Hit Desert Trails

The next morning we bade our hosts farewell and turned our backs on this haven of refuge from the atom-bomb-fearing outer world of struggle and strife.

A last look backward showed two white-bearded patriarchs silhouetted against the blue sky as they waved to us from the highest battlement. Peace and quiet would now prevail until the next visitors appeared across the sands.

We followed a 10-foot stone wall behind which towered superb poplars, vivid green against the dun-gray rocks. Some Bedouin children were tending their long-haired black goats. Beside the track stood a small stone arranged as a Moslem prayer place facing southeast. Here a devout Moslem had bowed his head toward Mecca.

Through a narrow mountain gorge twisted the desert track. From the brilliant sunshine into this shadow was like entering the nether world. We drove down the twisting Wadi el Sheikh, stopping at likely places to search for Stone Age tools or broken pottery, but to no avail. Around one sharp bend we saw Gebel Serbal directly ahead, impressive as ever, his proud iron-gray head pointing skyward.

Measuring Skulls from a "Beehive" Tomb

Late in the afternoon we passed the juncture of the Wadi el Sheikh and the Wadi Solaf, a turn we had missed on our way to the monastery. However, a wrong turning sometimes has advantages, and this was no exception.

In the Wadi Solaf we visited two circular "beehive" tombs (*nawamis*) standing on the bank. The capstone of one was removed and the skulls were measured and photographed. Each skull was replaced and the capstone resealed. These data will throw light on the physical characteristics of the early inhabitants of this region (page 796).

Toward evening we were approaching Feiran Oasis, the halfway point to Abu Zenima

rest house, which was our base camp in southwestern Sinai. However, we met Sheikh Suleiman ibn Gurna of the Sawalha tribe. He invited us to encamp near him in the Wadi Sayah close by.

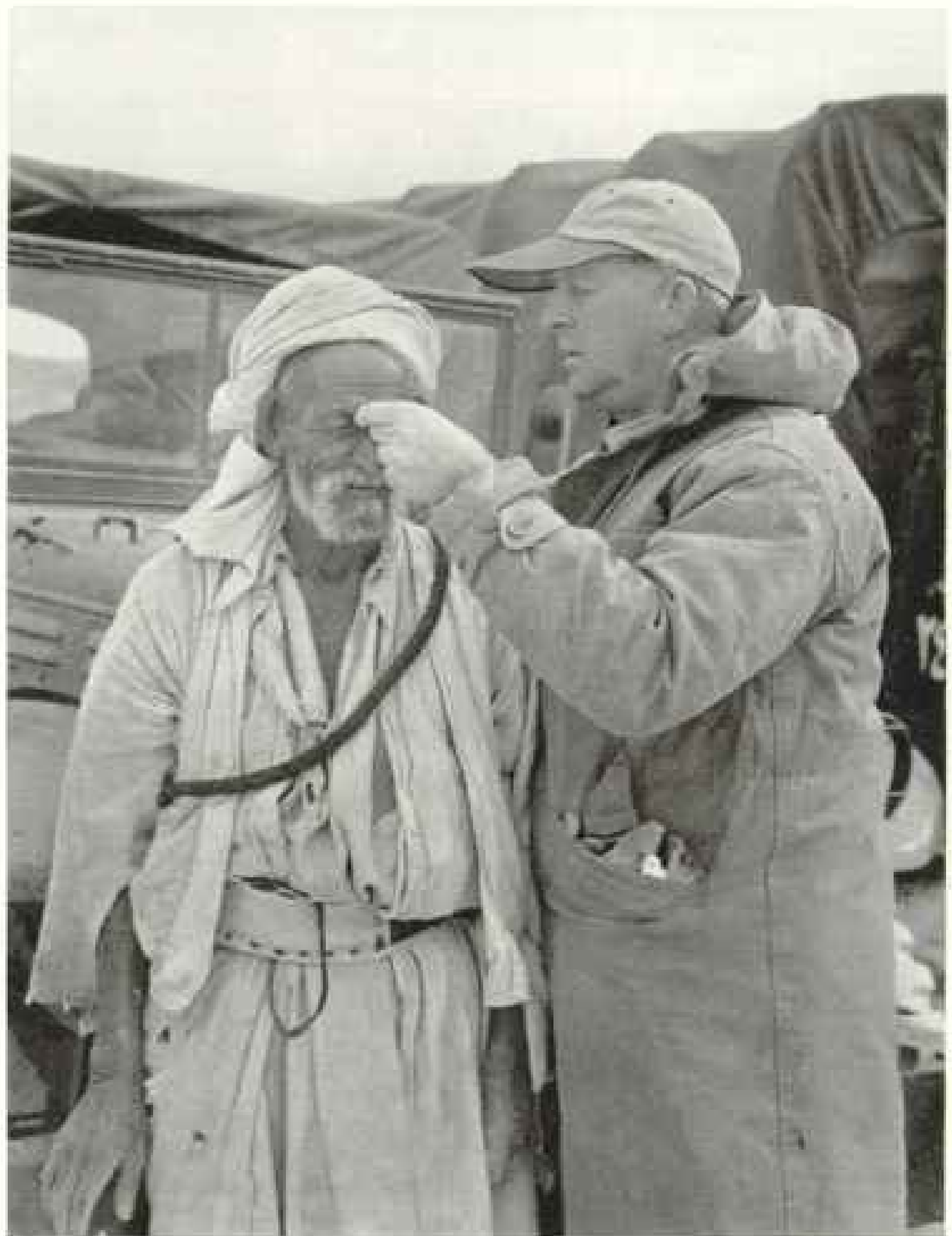
Swinging himself on to the Dodge 1½-ton truck, he guided us up a rock-strewn, twisting, narrow stream bed around a corner where pleasant and welcoming smoke arose behind four black goat's-hair tents. They were pitched on the lee side of the Wadi Sayah, as usual in the best possible location.

We camped some 300 paces to the north, so as not to be too close to the vicious barking dogs and, incidentally, to avoid the normal swarm of fleas which thrive in Bedouin camps, long known to my itching memory.

Sheikh Suleiman walked over to welcome us formally as his guests. He had ordered a young ram slaughtered in our honor. The most succulent morsels were for us, the remainder for Selman, Mohammed, our police escort, and the Guftis. At our request the Sheikh unstrapped his golden-handled sword, a present to his father from King Fuad; of this he was proud indeed.

Within a few minutes the young ram, which had scampered away at our approach, had been killed and our half was being roasted on a spit improvised by Bill Terry from a jack handle. We chewed long on the meat chunks, which tasted like tough and gamy *shish kabob* (bits of skewered lamb).

After dinner Wendell Phillips, Walt Thompson, and I were escorted by Selman, his one eye glistening with pride by the lantern's light, across to Sheikh Suleiman's tent, where we





Puzzle—How to Measure the Head Without Removing the Headcloth

A bit self-conscious about his baldness, the bearded Sawalha Bedouin declined to uncover. Nevertheless, Anthropologist Field got a good approximation. In all, he measured the heads of 223 of Sinai's estimated 5,000 to 6,000 Bedouins, as well as those of some of their long-deceased ancestors (page 796). On each individual, 40 measurements and observations were recorded in about eight minutes. Results, being tabulated at Harvard, indicate that the modern Bedouin is a descendant of the early Mediterranean race, which dwelt beside that sea.

were greeted in true Bedouin style. We sipped the bitter black coffee as noisily as possible to show our good Bedouin manners.

"Dixie" Contrasts with Desert Dirges

All, a Muzaina tribesman who lived a few rods away up a neighboring stream bed, brought out his *rababa*, a single-stringed ancestor of the violin. With his horsehair bow he accompanied himself as he sang mournful songs telling of the warriors of his tribe and then one of a lovely, luscious maiden who could dance divinely.

Sinai Script	Sinai Script Represents	Hebrew	Greek	English
	Oxhead		A	A
	House		B	B
	Fish		Δ	D
	Man Praying		E	E
	Fence		H	H
	Palm of Hand		K	K
	Oxgoad		Λ	L
	Water		M	M
	Serpent		N	N
	Eye		O	O
	Throw Stick		Π	P
	Human Head		P	R
	Bow		Σ	S
	Mark of Cross		T	T

FROM THE DEEDS OF ALI

From Crude Pictures Our Alphabet Evolved

This table is based on studies by Prof. W. F. Albright, of Johns Hopkins University, Archeological Advisor, University of California African Expedition. He has made a new decipherment of such Sinaitic writing, oldest in our alphabet (page 815).

As Ali's voice kept perfect harmony with the soulful music, it was clear that his last song brought delightful memories or anticipations to the shining deep-brown eyes of the group assembled around the glowing camel-dung fire.

Then quietly Walt produced his little harmonica. The soft strains of "Dixie" filled the tent and spilled over into the night outside. Our hosts' brows furrowed deep, for this rhythm was strange to them.

Wendell's fingers were itching. Upon an upturned coffee bowl he began to drum in time to the strains of the harmonica. Gradually the Bedouins grasped the new rhythm and at the end they clapped, something I had never heard before in a Bedouin tent.

Then Ali played a piece on the rababa and Walt another on the harmonica. The weird concert reached its finale when Wendell, drumming on two upturned basins, accompanied Ali, who first was puzzled, then enchanted.

"Sleeping" Water Pump Awakened

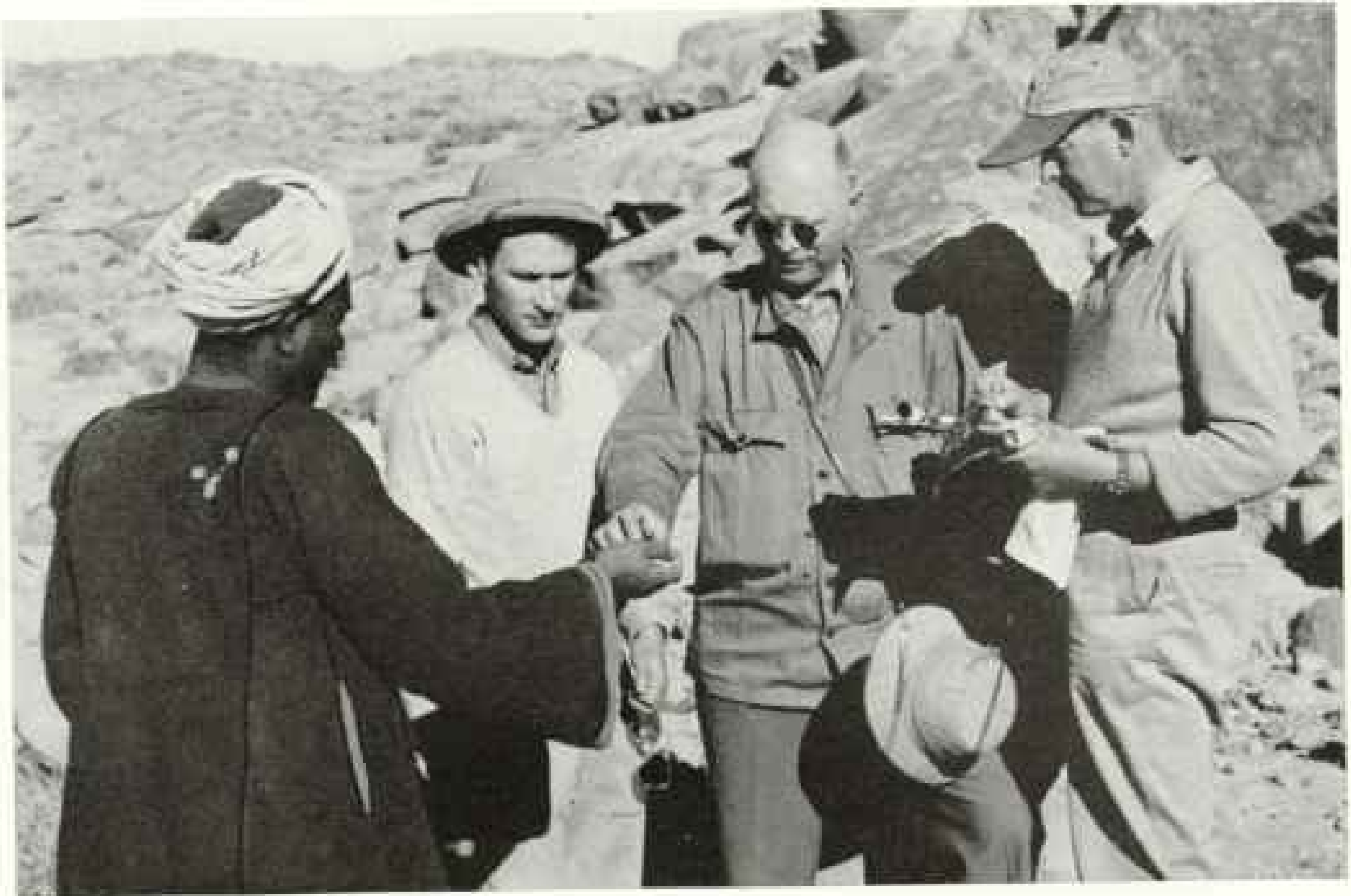
In the morning on the way to Feiran Oasis we stopped at a small mud hut while Bill Terry repaired Sheikh Suleiman's water pump. It required two hours to revive this Rube Goldberg contraption. I passed the time by measuring a series of Bedouins who were encamped near by.

At length in the distance I heard the pump snort and sputter convulsively as if in great agony, and then run wheezily. The gratitude expressed on all faces defies description. For 40 days the pump had "slept," to use the Bedouin phrase. Now water would flow once again in the narrow irrigation channels, and this small patch of fenced-in desert would "blossom as the rose."

We lunched beneath a vine-covered pergola outside the former residence of the representative of St. Catherine's, now occupied by a Bedouin family. On the opposite peak stand the ruins of a mill; from this vantage point tradition holds that Moses watched Joshua defeat the Amalekites while Aaron and Hur "stayed up his hands . . . until the going down of the sun" (Exodus 17: 12).

Immediately behind our cool and restful spot, surrounded by rich vegetation and sheltered by palm trees, rose the ruins of ancient Pharan, mentioned as early as the second century after Christ. Later we walked over these low hills, where antique pottery fragments formed a veritable carpet. The capital of a marble column lay half exposed in the dust and sand of centuries. Parts of walls and buildings covered many acres (page 808).

On the hillside above we examined seven



"Here's a Bit of Pottery I Found on the Surface near One of the Graves"

Even the tiniest fragment was scrutinized for possible clues to the age of the burials in Wadi Solaf, where the expedition found and measured 19 skulls (page 796). Here Hamadi, one of the Guffis—professional excavators from Qift, on the Nile—hands a dark-red piece to Professor Albright, who is flanked by Expedition Leader Wendell Phillips and the author (right). It appeared to be very old but could not be definitely dated.

small tombs cut into the living rock. In one tomb were two male skulls, both bleached. Another tomb, which had been walled up, was opened by removing the pile of stones blocking the entrance. Inside lay a young adult skeleton. We felt like violators of the repose of this young man: so we reclosed the entrance.

Back in the arbor a small ocean of beads awaited my calipers. We all went to work and in a couple of hours had anthropometric data on another 25 Bedouins of Sinai. We bought some coins, found in the ruins of Pharan, which proved to belong to the Constantine period.

As the two-car convoy wended its way through the palm trees, a few Bedouin children ran out to greet us. We halted briefly near the tomb of Sheikh Suleiman Nafai, where Nabataean inscriptions of the Roman period cover the red sandstone wall. This part of Sinai is reminiscent of Petra, "the rose-red city, half as old as time."^{*}

High above us was a turquoise mine, which we had visited on our way to the monastery (page 805). Here were abundant traces of dynamiting by the Qararshe (Grashe) Bedouins. We found no turquoise, but Moham-

med Fahwi, our snake catcher with one good eye, found a small blue bead which he presented as an apology for lack of a horned viper. His excuse was that in this cold weather even his passionate entreaties could not arouse the torpid ones.

Bedouins Hope for Hidden Treasure

As we drove on, our dust attracted two Bedouins mounted on white riding camels. They turned toward us and we assumed that they wanted water or cigarettes. But as our paths met, the Bedouins dismounted, tied their camels to small thornbushes, and smilingly advanced toward the leading truck.

Muttering "Salaam aleikum" (Peace be unto you), the elder man sat down on the bumper, removed his white headcloth (*kaffiyah*) held in place with a twisted black camel-hair cord (*agal*) and waited for me to measure him.

I am accustomed to taking things as they

^{*} See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Petra, Ancient Caravan Stronghold," by John D. Whiting, February, 1935; and "Arab Land Beyond the Jordan," 18 illustrations in color by Frank Hurley, December, 1947.



"These Nabataean Inscriptions Are an Ancient Version of 'Kilroy Was Here' "

So says Dr. Field, here examining the characters hammered into the rocks of Wadi Feiran, Sinai, some 15 centuries ago. Most of them say, merely, "I, son of —, passed this way." With some inscriptions are pictured gazelles, and one shows an ostrich, a creature which has long since disappeared from this area. For centuries the region has been growing drier; Bedouin sheep herds are steadily diminishing.

come in the desert, so I showed no surprise at this voluntary, uninstructed cooperation, but proceeded to oblige him. I gave the man a small coin and three cigarettes for bak-sheesh. He looked disappointed, even crest-fallen. His companion went through the same procedure. Then, silently, they shook hands, remounted, and continued on their way.

As soon as they were out of earshot, I demanded from Selman the reason for their strange conduct. His explanation was remarkable.

He said that the Bedouins knew that Professor Albright could not be looking for broken pottery, because it was useless stuff. "Not even a camel could eat that." So he must be searching for the golden hoard which every Bedouin knew existed in the mountains of Sinai. Did not three trained excavators (Guftis) accompany us with picks and shovels?

The location of the golden hoard had been handed down from father to son in one family for generations. In some way or other, the Bedouins had connected the scientific practice of head measurement with the location of the golden hoard. They concluded that we were

measuring heads to find the man whose combination of measurements would identify him as the bearer of the secret.

When that man was found, they thought, we would ask him about the buried treasure. He would give a password—"Iftah simsim" (Open sesame)—and we would then drive to the spot, dig out the gold, and give a generous share to the lucky Bedouin—enough to enable him to support four wives and live happily ever after.

To complete the legend, Selman explained that the Bedouin who knew where the hoard was hidden did not dare to go there alone because he would be set upon and killed by other Bedouins. On the other hand, if we, foreigners, tried to take more than a just share, the Egyptian Government would stop us. Wasn't that the reason the Governor had assigned Mohammed to escort us and watch our activities?

Thus a fabricated legend may well become part of folklore!

Late that night we reached Abu Zenima, on the shore of the Gulf of Suez. Early in the morning up drove Gen. Abd el-Hamid Bey Zeki, Governor of Sinai, escorted by two jeeps.

He was in the best of spirits because the local police had captured a hashish (marijuana) smuggler in the neighboring mountains.

The evidence was produced—122 packages of hashish, each wrapped in a cloth bag and stamped with the manufacturer's trade-mark. The cash value was about \$50,000—a good haul indeed!

During our last days in Sinai we made a difficult drive to the foot of Serabit el Khadim to visit the Egyptians' ancient turquoise mines and examine the inscriptions on the walls.

For this final phase of the archeological and anthropological reconnaissance of Sinai we had been joined by Drs. John C. Trever, Willard A. Beling, and William H. Brownlee from the American School of Oriental Research in Jerusalem.

We were, therefore, quite a gang as we started our ascent of Serabit el Khadim. We were strung out along the face of the cliff, often hanging by our eyelashes with a steep 500-foot drop below our shuffling feet.

To liven up things, Wendell and Bill would detach a huge boulder, whose bouncings echoed up and down the narrow valley. As if this were not enough, they would shout, "There goes a professor!" For those of us unrelated to mountain goats or ibex, this did not make the dangerous passage any easier.

After nearly two hours of hard climbing we reached the summit. Here Egyptian miners of turquoise had built a large temple with elaborately carved stelae, a sanctuary, and cubicles for sleepers. According to Sir Flinders Petrie, who excavated here in 1905, the oldest trace of occupation is the life-size carving in gray marbly limestone of the royal hawk of Snefru, founder of the Fourth Dynasty (2680-2560 B.C.), who favored hawk figures in his temple at Maidum in the Nile Valley.

As we rested on a fallen stela, covered with hieroglyphs, it was pleasant to recall that here had come Petrie, Robert F. Blake, and Kirsopp Lake (the last two from Harvard), and many others, to recapture the ancient tale.

Earliest Writings in Our Alphabet

Albright spent some hours studying the famous proto-Sinaitic inscriptions carved in one of the near-by turquoise mines. These are the oldest group of writings in our alphabet, dating from the early 15th century B.C.

From these crude pictographs, in use 3,500 years ago, have developed the letters in which this article is written (page 812).

The approximate age of these writings in stone is indicated by the ruined Temple of Hathor, "Mistress of Turquoise," which stands on a hilltop near by and bears an inscription

showing it was built during the time of Tuthmosis III and Hatshepsut (1501-1480 B.C.). This evidence was now supported by our expedition's discovery of Merkhah Port, from which the turquoise was shipped, and the proof given by its pottery that the port existed about 1500 B.C.

Appeals to "Serpent Lady" and Foreman

With this confirmation for the dating, Albright was able to make a new decipherment of the inscriptions, which are memorials to dead miners written in Canaanite characters.

"O Serpent Lady, O Master (of Mines), give a burnt offering," says one as translated by Professor Albright.

"I am one who returned to be with the Serpent Lady, my mistress," reads another.

"A perpetual offering, O foreman of our mine! Give a burnt offering," goes a third.

Professor Albright points out that the idea behind these appeals to deities and overseers apparently was that without their aid the deceased would not receive mortuary offerings and his spirit would suffer the same miserable existence that he himself had endured in life.

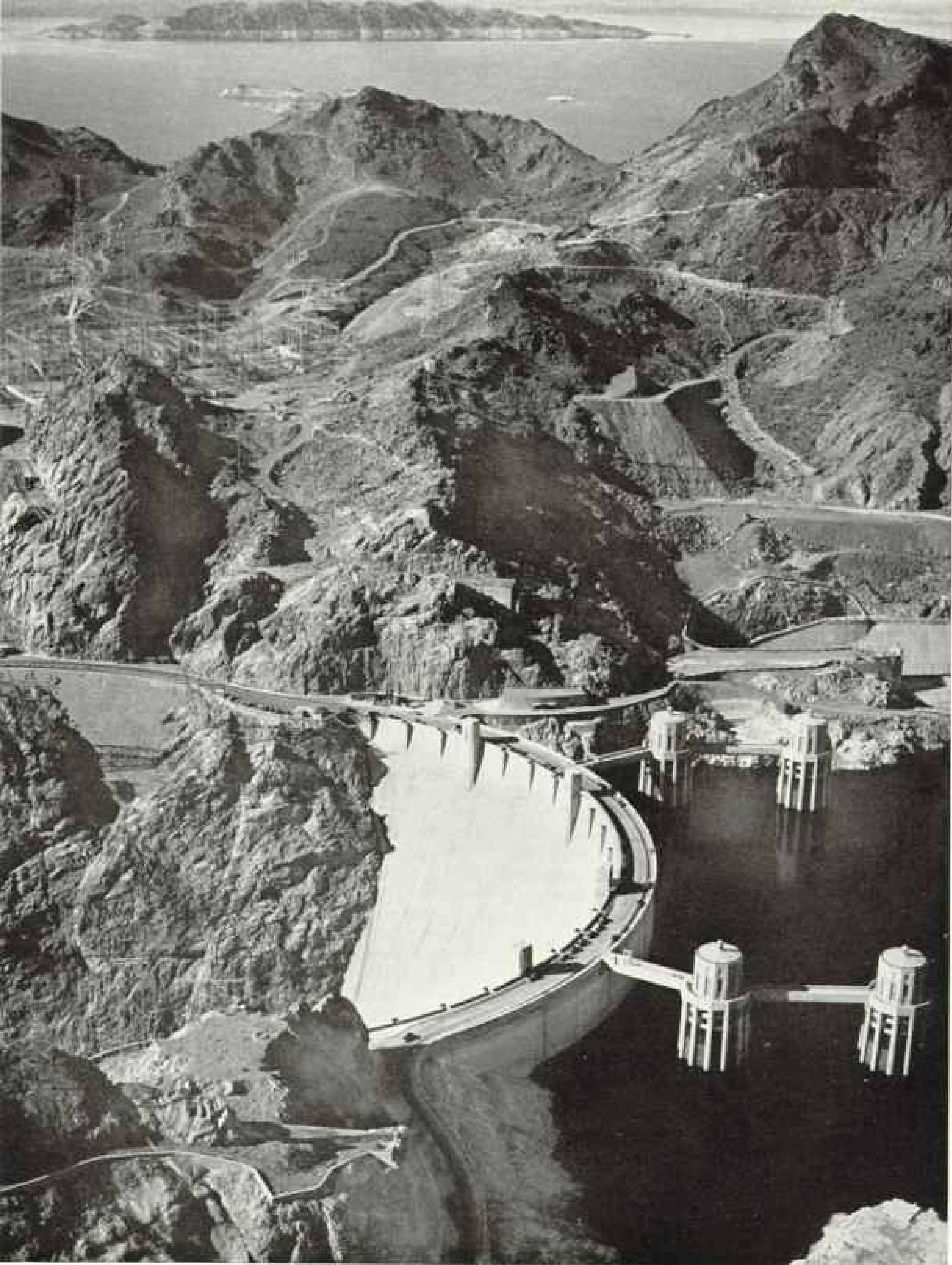
The miners were not local Bedouins but Semitic captives and slaves, brought to this hard labor from Egypt and using the language of the country of their origin, Canaan, the Holy Land. Incidentally, these 15th-century-B.C. memorials in the Canaanite linear alphabet assist scholars by showing how the parent alphabet developed before the 13th century B.C., when Canaanite inscriptions turn up in Palestine.

In the meantime, the rest of the group searched the fallen blocks and the walls of rock shelters for new inscriptions, but with no success. Selman and I collected stone picks and tools used by the miners and washed down into a stream bed just below the temple.

On the second afternoon Terry found the upper portion of a stone shaft on the ridge leading from the turquoise mines. The three Guftis went to work with a will. By the next afternoon the shaft had been opened to a depth of 14 feet. Unfortunately this was the end. The purpose of the shaft remains a mystery.

Glancing around the magnificent panorama for the last time, we scrambled down a steep short cut to camp and drove back to Abu Zenima.

By now we were anxious to shave and bathe in hot water. Leaving the shore of the Gulf of Suez just as the moon rose, we drove to Suez and through Cairo to reach our base camp at Kom Aushim, on the edge of the Faiyum, just before dawn. The Egyptian Government had proved the best of hosts.



726-foot Hoover Dam, World's Highest, Plugs the Colorado and Backs Up a Huge Reservoir

Lake Mead, in the background, stretches 115 miles and has a maximum depth of 583 feet. Steel skeletons (upper left) are switchyards from which power lines radiate to Nevada and California. The dam's 1,244-foot crest serves as an automobile highway. Until it was built, no wheels rolled across the river between Arizona (near side) and Nevada (page 827).

Mapping Our Changing Southwest

BY FREDERICK SIMPICH

EARLY MAPS show California an island. Boston was 200 years old when men still believed "Buena Ventura River" rose in Utah and flowed west to Golden Gate.

When Gen. William H. Ashley camped on Utah's Green River in 1825 men thought rafts could float from there down to St. Louis! And St. Louis itself was 60 years old before we were sure Great Salt Lake existed!

Men still living remember when the first railroad crossed our continent and when some now populous Southwest cities were mere villages.

Phoenix, Arizona, had only 3,152 inhabitants in 1890; now, with close to 100,000, it's one of our most crowded cities. Los Angeles, in 1880, had 11,183 people, and now its area population may be 4,000,000.

Yet our Southwest echoed to the tread of Spaniards in coats of mail decades before Pilgrims landed or Capt. John Smith built huts at Jamestown.*

Hernando de Alarcón explored the Colorado Delta in 1540.

Juan Rodríguez de Cabrillo landed at San Diego, California, in 1542; two years earlier Francisco Vázquez de Coronado had crossed from Mexico into what is now Arizona, hunting the fabled "golden cities" of Cibola.

No maps we know were left by Coronado, whose colleague, García López de Cárdenas, found the Grand Canyon. But modern historians, mapping Coronado's march from the narratives, show he got as far east as Kansas.

Oldest and Newest USA Abodes

With this issue of the NATIONAL GEOGRAPHIC MAGAZINE is published a new map of the Southwest.†

It shows scores of towns which didn't even exist until after transcontinental railways reached southern California in the 1880's. In contrast, it shows others, some of Pueblo Indian origin, which are among America's oldest human abodes.

This map replaces an earlier one of the Southwest and takes its place among The Society's large-scale maps of regions of the United States. Previously issued in this series were Northeastern United States; Southeastern United States; South Central United States; and North Central United States.

The new map is 34½ x 23½ inches. It charts the Southwest on the Albers conical equal-area projection on the scale of 1:2,500,000, or 39.46 miles to the inch.

Like others in the series, this map serves as an authoritative, detailed reference to the area covered.

New Works of Man Shown

The up-to-the-minute road compilation in red digests information given by recent official State road maps and includes the best routes into Mexico. Latest census figures and estimates governed the selection of towns shown. Railroads, canals, dams, and other colossal works of man, numerous here, are marked.

The Southwest region includes the Rockies of Colorado and New Mexico, the Sierras of California, the Grand Canyon of Arizona, and the Basin Region of Utah and Nevada, with its Great Salt Lake and Humboldt River. Its incomparable topography is shown in blue line and brown shading.

Together with the other regional United States maps, this sheet makes an important contribution toward the never-ending endeavor to map the ever-changing, rapidly growing United States.

This new chart includes Arizona, New Mexico, Colorado, Utah, Nevada, and California.

These six States have a total of 21,000 miles of railways and some 313,000 miles of highways.

More than 13,226,000 people, or about nine percent of our total population, now live in this area. Nevada, least settled of all our States, with fewer than two human beings per square mile, has 139,000 of these, and California has about 10,000,000.

More startling than amazing population growth are the changes men steadily make in the aspect of this arid empire.

Warnings to "Take Plenty of Water with You" are posted along highways that lead into some dry, desolate regions; on the other hand, many once-dreaded deserts now yield enormous shares of our food and fatten much of our livestock. Salt River Valley, Arizona, and Imperial Valley, California, are good examples. Behind big dams vast lakes rise

* See "Seeing Our Spanish Southwest," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, JUNE, 1940.

† Members may obtain additional copies of the new map of Southwestern United States (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices, in United States and Possessions, 50¢ each on paper; \$1 on linen; Index, 25¢. Outside United States and Possessions, 75¢ on paper; \$1.25 on linen; Index, 50¢. All remittances payable in U. S. funds. Postage prepaid.



Edward Stevens

Like a Flying Fish, a Water Skier Hurdles His Friend's Towrope in San Diego Bay

With equable climate and serene blue bays, San Diego enjoys water sports the year around. From its water front, tuna fleets range far down the Pacific, bringing back fish to the city's big canneries.

over what was for centuries dry canyon wastes of cactus and scrub trees.

Modern Wealth Surpasses Dreams of "Golden Cities"

Mines that pit the hills from Colorado west to the Cascades have given up staggering fortunes in gold, silver, copper, and coal. From Nevada's Comstock Lode alone came about \$400,000,000 in treasure.

Southwest's vast oil fields help run the Nation's Navy, its trains, motor vehicles, and power plants, and supply petroleum and natural gas for infinite other uses.

One of the world's best potash deposits is worked in New Mexico. Here also are colos-

sal gypsum beds; with scores of known uses; this versatile material has been employed to plaster man's walls for at least 4,000 years.

Here in view of snow-capped Sangre de Cristo Mountains lies that secret city of Los Alamos, mysterious to us as were Cibola's Seven Cities to Coronado. It began as a shabby place of shacks, trailers, and jerry-built homes, all dominated by sprawling atomic-bomb laboratories and factories. In the rush and frenzy of war it could grow no other way.

Crowded still, it is hemmed in by Indian reservations. No private person can buy a lot here or buy any land from Indians.

But to make it more habitable for Uncle



Jack J. Zolner

In Colorado, the Medano Drains into the Sands and Becomes a Lost River

At Indian Springs, a few miles to the west, the stream abruptly reappears. Headwaters flow out of the Sangre de Cristo Mountains (background). Great Sand Dunes National Monument is near by.

Sam's sworn-to-secrecy staff, the Atomic Energy Commission works now to make the city a decent, habitable place. Now come better housing, schools, playgrounds, a shopping center, a 1,000-seat movie theater, a radio station, bowling alleys, and beauty parlors.

Manner of migration into our Southwest, since traders and trappers opened the Santa Fe and California Trails,* was unique. California's 1849 gold rush lured most migrants straight west. In an odd way this human tide figuratively jumped from the Missouri country to the coast.

Indian dangers helped delay settlement of some Southwest States.

Gold fever had already cooled in California, settlers had turned to growing wheat, and land booms were beginning when Indians still killed Union Pacific construction gangs and scalped Arizona and New Mexico miners and freight wagon teamsters.

Fabulous Pioneer Days

Philadelphia was preparing for the Republic's Centennial when the Tucson *Citizen* was still full of stories of Indian depredations.

Not till 1886, when the notorious Apache warrior, Geronimo, was taken by Gen. Nelson

* See "Santa Fe Trail, Path to Empire," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, August, 1929.



MILTON S. HORN FROM U. S. BULL. CONSERVATION SERVICE

Navajo Medicine Man Looks More Like a Farmer than a Doctor

Often for his song-ceremonial, performed in hope of a cure, the medicine man receives his fee in blankets, livestock, or implements instead of cash. This Arizonian has acquired singletree, rope, and gloves. He started "practice" as a boy, learning songs and sand-painting patterns.

A. Miles, did Arizona and New Mexico become fairly safe for whites. Leonard Wood, then a young Army doctor, was in this campaign; later Geronimo, long an Army prisoner, was exhibited at the St. Louis World's Fair in 1904.

Today Greeley, Colorado, is a striking example of how eastern settlers carved towns from a dry wilderness. Named for Horace Greeley, it was laid out by Nathan C. Meeker, farm editor of Greeley's *New York Tribune*. Indians killed Meeker, too, but not before he had pioneered in irrigation work.

It was Colorado's discovery of gold in 1858 that brought settlers here in numbers; for years that State, formed from Mexico, the Louisiana Purchase, and land once claimed

by Texas, produced dizzy millions in gold and silver.

From Denver we rode west to historic Georgetown, once a famous gold camp. For miles the canyon road that winds to it is lined with abandoned mines where old-timers say 50,000 men once dug for treasure.

Colorado, a leader in beet sugar, is famous for its cantaloupes, and grows trainloads of tomatoes, peaches, and other fruits and crops, all because Meeker and people like him learned to capture cold trout streams where they pour from mountain canyons and spread them over dry valleys to make farms.

The Continental Divide

Audaciously, men here bored a 13-mile hole under the Continental Divide, to take water from the Colorado River Basin, pass it under the Rockies, and thus bring power and more irrigation to their eastern slopes.

As our map shows, the Continental Divide through Colorado separates Pacific watersheds

on the west from slopes on the east which drain into the Mississippi system.

Rich, powerful Denver, noted for green lawns, stands on what was a bare, treeless plain.

Colorado is a spectacular State. In its Royal Gorge the Arkansas River, eastbound, foams through a canyon nearly 2,000 feet deep. Over it, 1,053 feet above its bed, hangs the world's highest bridge.

Here, too, winds our highest auto road, Mount Evans highway in Clear Creek County; it climbs to 14,126 feet. At that point most airplane passengers are calling for oxygen!

Here in Colorado giant dinosaurs left their big tracks in old rocks. Other natural won-

ders range from ever-moving dunes in Great Sand Dunes* National Monument to majestic Mesa Verde, among America's best-preserved ruined villages of a bygone people.*

Colorado baffled early westbound migrants: through it they found no passes. Some went west over the Mormon Trail to the north. Others took the Santa Fe Trail, which autoists still follow over winding, historic Raton Pass from southeastern Colorado to Santa Fe, goal for years of freighters from Missouri, including my sons' bullwhacking great-grandfather.

Later, railroad engineers studied the map, sighted through transits, lit another cigarette, and said, "Let's go!" So they bored Moffat Tunnel through the backbone of our continent. Today this 6-mile tunnel puts Denver on a short, straight transcontinental railroad run.

Engineers are tough. They may have hairy ears and wear leather breeches, as the song says, but they've certainly changed Colorado topography.

Once there wasn't enough water in Uncompahgre River to irrigate its valley. Then men drilled what was said at the time to be the world's longest irrigation tunnel through miles of rock and robbed the Gunnison River and poured captive waters through that under-the-mountain mole hole into the Uncompahgre!

Abundant water, soil, and sun give the State its chief income, from farms and livestock. Its tourist trade makes it more profitable to sell beef and wheat as sandwiches than by the carload. And that name "Colorado" is a big asset, it says; so please don't abbreviate it, but spell it out!

People, moving west, take their markets with them. Stores and factories grow with



J. W. Jackson

If Prairie Dogs Paid Head Tax, How the Cash Would Roll In!

From New Mexico to the Dakotas these cute little rodents dig subway systems under pastures and fields, destroying grass and grain. Man poisons "dogs" by the truckload, but still cannot cope with their numbers. Prairie dogs like big families, not "planned" parenthood or "spaced" children.

population. Now the State makes scores of different things, ranging from rubber tires, incubators, explosives, mining machinery, clay and wood products to leather goods and advertising films.

It mines coal, gold, silver, copper, lead, zinc, and more than half of our molybdenum. Its less common minerals include tungsten and uranium, the latter a source of power for atomic bombs. In its northwest it finds new oil fields.

To this high, cool, captivating Colorado country summer visitors flock from the sizzling Midwest. They climb Pikes Peak, romp

*See "Ancient Cliff Dwellers of Mesa Verde," by Don Watson, NATIONAL GEOGRAPHIC MAGAZINE, September, 1948.

through Estes Park, buy soft drinks, and maybe "roll the bones" in such once-rowdy gold camps as Creede and Cripple Creek.

Finally they join that tourist stream through Durango to where canyons hide those mysterious abandoned homes of cliff dwellers.

Empty Homes of Vanished Americans

These empty houses of vanished Americans stretch from Colorado to Arizona.*

Our cross-country motorcars shuttle this Southwest, mostly on U. S. Route No. 66. From two to three million a year ride these trails in New Mexico and Arizona, and to and from California.

Many stop at light-hearted, fiesta-loving Santa Fe. Remember Willa Cather's *Death Comes for the Archbishop*? From there up the Rio Grande an Indian-village-bordered road leads to ancient Taos. "Mountain men" met there to carouse, dance fandangos with swarthy señoritas, and trade furs for traps and ammunition. Kit Carson's grave is there, and an art colony which began more than fifty years ago when pioneer painters came and started using Indian models.

It was after the close of the War with Mexico in 1848 that we got most of this Southwest. One cause of that war was disputes between us and Mexicans over southwestern trail and trade problems.

Much of today's vast Santa Fe Railway system closely parallels the Santa Fe Trail, just as much of the Southern Pacific system follows the early-day Butterfield stage road that kept 1,500 horses and mules galloping between St. Louis and San Francisco via warmer, more level Southwest pathways.

But what a lopsided United States map ours would still be if all our western trade routes now ended at Mexican customhouses on that international border as roughly drawn between us and Mexico 100 years ago!

What a fateful day for all Americans when Gen. Stephen W. Kearny raised the Stars and Stripes over the ancient Palace of the Governors at Santa Fe and said:

"New Mexicans! We have come among you to take possession of New Mexico, which we do in the name of the Government of the United States. We have come as friends, to better your condition and to make you a part of the Republic of the United States . . ."

Taking Kearny at his word, New Mexicans from that day became patriotic, useful American citizens, as witness their fine record in our World Wars and in public life.

Mexican brawn to this day largely works the Southwest mines and forests, maintains its highways and railroads, herds its cattle,

shears its sheep, and harvests its crops.

In that sunny, pleasant land today are around 1,000,000 people of Spanish-Mexican racial origin, and in some areas you still hear more Spanish than English, as in Rio Arriba County, in northern New Mexico.

This was Spaniards' country for more than 300 years. Among their oldest-known written records is the Spanish explorer Juan de Oñate's lines etched on Inscription Rock, in El Morro National Monument in western New Mexico. In translation it reads:

Passed by here the officer Don Juan de Oñate from the discovery of the sea of the south on the 16th of April, 1605 [sometimes read 1606].

Oñate meant he had seen the Gulf of California.

To reach this rock you ride southeast from Gallup, New Mexico, where each year is held the great Intertribal Indian Ceremonial with sand painters, rug weavers, Navajo silver-smiths, dancers, and broncobusters.

This colossal rock rises beside an early Indian trail, and on it are scratched the names of many pioneer Americans who also "passed by here."

Another famous New Mexico rock is historic Acoma, with an ancient Indian village on top of it. From here Spaniards once jumped to save their lives. No "battle above the clouds" was ever more astounding!

Spanish soldiers who climbed this rock were set upon by Indian villagers.

Seeing their brothers being brained, surviving Spaniards leaped from the parapets of this sky city and dropped into soft, sloping sands drifted about the foot of 357-foot cliffs. Of the five who jumped, four lived!

Our First State History

In Albuquerque I talked with Gilberto Espinosa, one of whose ancestors came with the Conquerors; for the Quivira Society he translated Gaspar Pérez de Villagrà's *History of New Mexico*, first published in Spain in 1610.

Villagrà's is a "rhyming history"—the first of all our State stories—and it details the horrible butchery high atop Acoma Rock. You can reach it now by automobile, and have a goat meat and corn meal lunch with present-day Indians for a dollar!

It's on the sandy waste, not far from here, that Uncle Sam now fires guided rockets.

This Southwest is still Indian country; here you will find thousands of Apaches, Pimas,

* See "Indian Tribes of Pueblo Land," by Matthew W. Stirling, NATIONAL GEOGRAPHIC MAGAZINE, November, 1940.



MICK DWAIN

A Victim of Greed Teaches the Lesson, "Don't Bite Off More than You Can Chew"

The National Park Service naturalist holds a cormorant found in Lake Mead (page 816). The bird died because it could neither swallow nor disgorge its fish dinner.

Pueblos, Hopis, Utes, and Navajos (p. 820).*

The Navajos, most numerous, are a pastoral people whose ways of life have changed little. Though poor and hungry, they bear the ills they have rather than flee to those they know not. What makes calamity of such long life for them is barren reservation lands, lack of water, and tuberculosis.

Life Along the Mexican Border

Pimas, on the other hand, and some others, find it nobler in the mind and more filling to the stomach to copy more closely the white man's way of farming. One Ute, in Nevada, got himself elected to the State legislature.

Our Southwest frontier forms that famed Mexican border of song and story. I followed

this line from the Texas Gulf coast 2,000 miles west to where it hits the Pacific beach south of San Diego.†

From the Gulf up to El Paso, the Rio Grande forms the border. But just where is the "line," after a big flood? To answer that, we long ago joined with Mexico to set up a boundary commission. Named by cowboys the "world's dustiest river," which "runs with its shirttail out," this wild stream has been known to change its course so quickly that

* See "Indians of the Far West," by Matthew W. Stirling, NATIONAL GEOGRAPHIC MAGAZINE, February, 1948.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE, "How We Use the Gulf of Mexico," January, 1944; and "Along Our Side of the Mexican Border," July, 1970, both by Frederick Simpich.



A Woolly Army in Single File Follows Its Leaders into a New Mexico Canyon . . .

This herd, photographed six miles east of Gallup, ekes out a living on ranges so dry that cattle or horses might go hungry.

farmers who thought they lived in Mexico woke up to find themselves in Texas, or vice versa.

On our map you see this Rio Grande rising away up on the Continental Divide, in southwestern Colorado, near where 11 members of Col. John C. Frémont's party froze to death in 1848 when hunting a pass through which a railroad might be built to California.

The whole tortuous course of this troubled river was traced in 1938 by the National Geographic Society.* From a rocky land of trembling aspens, beavers, blizzards, and mountain sheep the party worked its long way down to the hot, lush lowlands of Matamoros bullfights, Brownsville orange groves, Gulf hurricanes, pelicans, and tarpon. On their way, Indian guides killed three mountain lions, which we helped eat.

You don't realize how wild much of America still is till you explore certain remote areas of this Southwest. Parts of Utah are so overrun with crop-robbing deer that farmers are frantic. In other places you may ride 50 miles and never see a house.

Mountain lions are so numerous that in some rougher regions it's almost impossible

to raise colts. Often you see full-grown horses with their backs all scratched up from attacks by these big cats. Many cross over from Mexico to hunt meat on our border cow ranches.

You see their tracks along stream beds. On a few mountain paths, as in the Texas Big Bend, you should watch your step, lest you put your foot in a lion trap which some outraged rancher has set for a bold marauder that has been killing his stock.

Each year Uncle Sam's official hunters of these predators kill them by dozens.

A Frontier That Made History

In southern New Mexico, near El Paso, the international line crawls from the Rio Grande and starts west, overland. Here stands Monument Number One, the first in a long string of stone and iron obelisks which marks the land boundary extending westward. So that smugglers, customs guards, cowboys, and Immigration Service "line riders" may know just where the border runs, these monuments are set at frequent intervals.

* See "Down the Rio Grande," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, October, 1939.



Militar H. Stone from U. S. Soil Conservation Service

... Drinks at a Drying Water Hole, and Scales the Mesa's Ramparts for Meager Grass
Southwestern sheep were introduced by Spaniards. Multiplying on Indian lands, they create a tremendous erosion problem.

Near Nogales, Arizona, as our new map shows, the boundary breaks off northwest by west. Had it run straight west, we would now own all the Colorado River Delta and some of Baja, or Mexican California. Some claim this was originally meant to be ours, under the Gadsden Purchase, but that somehow the ruler "slipped" when the new border was being marked!

Always, since Mexico invaded Texas and Santa Anna fought Sam Houston at San Jacinto, and Gen. Zachary Taylor marched for Monterrey, Mexico, in 1846, events along this line have made front-page news.

Lusty Annals of the Border

American troops swarmed here after 35,000 French invaded Mexico, and Emperor Maximilian took the old Aztec throne, only to be shot and have his Empress Carlotta go mad.

Adventurous border annals show how time and again filibusters have crossed the line, either to found colonies or foment revolution. Some were comic-opera farces; some were tragic.

Spectacular was the attempt of Henry A. Crabb to settle his party of Californians in

Sonora in 1857. Crossing from Arizona, his party was attacked at Caborca, 60 miles south of the border, conquered, and all except one boy were executed. Crabb's head was cut off and exhibited in a jar of alcohol. On the bullet-scarred walls of the old Caborca Mission you can see a metal tablet, set up by the Mexicans, marking the site of the battle.

Bandit leader Pancho Villa jumped the line to raid Columbus, New Mexico. Gen. John J. Pershing's punitive expedition chased him deep into Mexico, only to lose him. But what a night! Fine American 10th Cavalry officers I knew died on that dash down into Chihuahua.

As American consul I was stationed at Nogales, Sonora, just across the line from the Arizona town of the same name, during the Carranza revolution.

Once fighting got so hot that Gen. Alvaro Obregón buried his dead where they fell, some on my tennis court!

To get some sleep, I borrowed a baggage car from the railroad company, put my staff and archives on board, and a switch engine pushed us across to Arizona. Gen. Fred Funston, coming to call, said, "This is the first



William Beckman, Jr.

With Evil Eyes and Bone-crushing Hoofs, a Wild Horse Fights His Wary Saddlers

Contestants in the Hellorado Rodeo at Las Vegas, Nevada, rope, saddle, and try to ride a wild horse 100 yards. Stiff-legged, bone-broken, limping rodeo veterans say this race is the most dangerous horse event. Here one cowpoke pinches the mustang's nose while his partner throws on the saddle.

time I ever saw a Yankee consulate on wheels!"

Since Aztec times a north-south path for men and goods has led through Nogales. Today streams of motorcars and airplanes cross the line here, and through this historic pass Southern Pacific Railway traffic moves on its way between the Southwest and Mexico City.

Through stormy years border towns saw one rebel chieftain after another rise and fall till today's Mexican government emerged.

Always the border makes news. Today it's the long wire fences they're building, and the dramatic quarantine work that has involved the shooting of thousands of Mexican cattle to keep the dread foot-and-mouth disease from spreading over into our own big cow ranches, that makes front pages.

Since Spaniards drove cattle from Sonora overland to California to stock their ranches there, vast armies of animals have moved up and down this Southwest.

At one time horses kept 5,000 freight wag-

ons rolling between Utah and California. Sheep by the tens of thousands walked from New Mexico to California, and trainloads of cattle, for fattening, move every year now into such rich feeding spots as Imperial County, California.

In normal times, one of the border's most exciting scenes is the arrival of a vast herd of Mexican cattle, say at some Arizona port of entry, where shouting Mexican vaqueros drive the animals through long dipping tanks to disinfect them.

Desert Setting for Sahara Movies

Out Yuma way, Saharalike sand dunes drift over the border. Don't get upset here if, riding through, you suddenly glimpse a white-robed Arab sheik galloping away over the dunes, kidnapping a fair Fatima in veil and harem-style pantaloons; or if you hear the rattle of rifle fire and behold a desperate Foreign Legion band fighting to the last man against the fanatic Riffs!

That will be a company of motion-picture actors working out here on the desert—which is good African scenery.

"Naked as Adam and Eve." That's how Yuma Indians looked to early Spaniards, as when Father Eusebio Francisco Kino passed this way and was convinced California was *not* an island.

They're still here, these Yumas. And still their bucks may kill rabbits with sticks and plaster their hair with mud to kill the lice. But squaws wear petticoats now and squat on Yuma's railway station platform, peddling their crude wares to tourists.

The Colorado River separates Arizona from Nevada and from California, as the map shows. Till men tamed it, this river ran wild. Once, in flood, it slipped off the ridge on which its lower reaches run and scoured deep channels into Imperial Valley to fill Salton Sea. Hereabouts people live 200 feet below sea level.

Hoover Dam, world's highest, blocks this river between Arizona and Nevada to form 115-mile-long Lake Mead, whose big fish explore water-filled caves in submerged canyon walls (page 816). Over the dam's crest runs a highway; till it was built, no wheel ever rolled across the Colorado River portion of the Nevada-Arizona border.

Water for Seven States

Equitable division of this river's water among the seven States it drains is one of the riddles of the West. But that's another story—a long, hard one.

Throngs of people would have to move out of southern California today were it not for water taken from the Colorado near Parker Dam (below Hoover Dam) and carried over deserts and under mountains to serve farms and cities. Even the Colorado is insufficient; now the Golden State talks of bringing water from Columbia River sources in faraway Idaho, and even of taking water from the Pacific and de-salting it!

California! That very name evokes an image: Yosemite, Golden Gate, Big Trees, oranges. Sir Francis Drake's *Golden Hind* anchored off its coast, and Drake came ashore to claim the land for his Queen.

What geological confusion! Mount Whitney, United States' highest; in its shadow, Death Valley, our deepest depression.

Highways, rails, airlines run into California from north and east and from Mexico, and air and steamer lines tie it to Pacific ports.

It still mines gold and saws timber, but its infinite factories, its oil and gas, its colossal farm, orchard, and vineyard areas yield now

many times all the wealth that ever came from its gold mines.

Flying east from its Edenlike valleys, as from Sacramento to Reno, you see another world unfold—an empty world of dried-up lakes, happily broken by irrigated valleys green with alfalfa and watered canyons choked with verdure and musical with the song of birds. Ghost towns totter around some worked-out bonanza mines that made men rich beyond their dreams.

Every year Nevada State chemists still assay 5,000 to 6,000 ore specimens, and nearly every one of the 12,500 people in the Ely area earn a living, one way or another, working the giant copper mines. One of earth's biggest man-made holes is the open-pit mine near Ruth, from which more than 230 million tons of material have been hauled! All the trucks in the world couldn't hold that pile!

Gay, glittering, and rolling in money is open-all-night and carefree Las Vegas, "City of Chance," in southern Nevada. It says it has sun by day and fun by night. It's old. It was a fort, a Mormon outpost, a way-side stop for water, but it boomed when near-by Hoover Dam was being built. Now it's Nevada's second city. Visitors flock to see the great dam, to bask in this Cairolike climate, or to flirt with fortune at the gaming tables along "Glitter Gulch" and neon-lighted "Sunset Strip."

Wealth of a "Wilderness"

Enlarged photographs of moon valleys and craters come to mind when you fly back over empty areas on the way to Utah. As your plane's shadow sweeps over vast dry flats left by receding Great Salt Lake, where racing drivers set world records and etch speeding motor tracks in league-long straight lines, you may reflect, "What a worthless wilderness!"

But come back later, on the ground, and look! Mountains of potash are recovered, as around Wendover; and the strange dead sea itself is virtually an inexhaustible source of salt, taken from its bitter waters by solar evaporation.

It's like flying over the Sahara and coming suddenly upon Cairo and the Pyramids to cross this salty waste, late on a summer afternoon, and glimpse the glistening towers and temples of Salt Lake City reflecting the sunset. Truly it seems a dream city then, like some imaginary New Jerusalem of the ballads, or maybe such a golden city as Coronado went seeking.

High mountains form a backdrop where ski fans frolic in snowy times, where sheep

climb up to graze in summer, and where Salt Lakers build cottages and whip the rushing brooks for trout. All up and down scenic Salt Lake Valley fat cattle feed in green pastures, and water flows through neat irrigation ditches, as laid out when Brigham Young brought his Latter-day Saints here and said, "This is the place."

The mysterious Temple, the sea gull monument, the Lion House where Brigham Young and his large family lived, the many Mormon cooperatives—including their great department store—and the vast high-domed Tabernacle with its amazing acoustics and great pipe organ, have all been objects of interest to decades of visitors.

But few transients realize the economic power of Utah or its strategic place in our changing Southwest.

Farming was the State's first business. Its orchards are fragrant; its barnyards are musical with soft moos and excited cackles. But today half its people make a living, one way or another, from the mines.

Moving a Mountain—for Copper

America's largest surface copper mine is that of the Kennecott Copper Corporation at Bingham Canyon. Here puny man has literally moved a Gibraltarlike mass of earth; he moved what *was* a mountain and left a hole in its place.

Miles of road grades run around the inside slopes of this hole, making ridges that look like the terraced rice fields of Luzon Igorots. Terraces are laced together by a switchback railway for ore trains.

In late afternoon, powdermen blast more ore from the sides of the big hole. Then smoke, dust, and rocks fly high in the air, workers run for cover, and the roar of the great explosions echoes back and forth among the peaks like artillery fire between opposing armies.

Greatest known concentration of coal in the United States lies under southwest Wyoming, western Colorado, and eastern Utah. Salt Lake Valley is now our chief smelter center for copper and lead.

With such abundant coal, as well as iron ore, copper, lead, zinc, gypsum, and limestone, Utah is the convenient source of pig iron, coke, cast-iron pipe, steel and steel shapes, as well as copper ingots and gypsum plasterboard for the factories and foundries and builders on the Pacific coast. On our new map railway lines show how well Utah is located as a pivotal center for shipments of these materials to any port from Seattle to San Diego.

The so-called "colonial status" which our west coast long held, with relation to the

more mature industrial development of our East, is largely changed since the war.

This came when Uncle Sam spent billions on munitions plants, chemical works, airplane factories, and shipyards west of the Rockies. Here in Utah he built plants to make arms, gasoline, parachutes, radar tubes, chemicals—many things. Here, too, he built one of Navy's largest supply depots, Air Force repair shops, and great ammunition storage dumps (because this was a safe place). Here, also, he built giant steelworks.

Since Union Pacific Railroad came in 1869, Utah has produced more than two billion dollars in base and precious metals, but it was the war boom which brought such works as the \$200,000,000 steel plant at Provo. Now privately owned, this plant yields some 1,200,000 tons a year of billets, plates, shapes, and strips in coils. This product is also being shipped, in part, to the steel mills in California.

What changes! There wasn't loose iron enough in the whole Rocky Mountains even to shoe their teams or make a keg of nails when the forty-niners passed this way.

Some one little California city, say Palo Alto or Eureka, probably holds more whites now than lived in that whole State when gold seekers first staked claims and shot the claim jumpers, or when Commodore John D. Sloat of the U. S. Navy dropped his mudhook at Monterey and ran up the American flag on July 7, 1846.

There's as much snow now in Sierra Nevada gorges as when the starving snowbound Donner party was trapped there; but today the shouting ski jumpers rejoice in drifts.

Pioneer immigrants hated and feared the desert, as when lost Jayhawkers suffered the thirsty horrors of dreadful Death Valley. Now, as at Palm Springs, where main-street city lots have sold for \$1,000 a front foot, winter visitors pay \$30 a night at ritzy hotels merely to *sleep* on the desert!

New Names Appear on Map

Mountains are where they were. So are rivers' rocky gorges and the ancient pueblos. But still more deserts turn to gardens. Mushrooming new towns surprise even the Southwest. Each year new place names appear on the map; new factories belch fresh smoke, new generators whirl at new power dams, and still the migrant tide pours in.

Sit quietly in any roadside motor court when the day's rush has ebbed, and in fancy you hear the tramp of westbound millions.

For additional articles on the States covered, see "NATIONAL GEOGRAPHIC MAGAZINE Cumulative Index, 1899-1947."

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ORGANIZED FOR "THE INCREASE AND DIFFUSION OF GEOGRAPHIC KNOWLEDGE"

To carry out the purposes for which it was founded sixty years ago, the National Geographic Society publishes this Magazine monthly. All receipts are invested in The Magazine itself or expended directly to promote geographic knowledge.

Articles and photographs are desired. For material The Magazine uses, generous remuneration is made.

In addition to the editorial and photographic surveys constantly being made, The Society has sponsored more than 100 scientific expeditions, some of which required years of field work to achieve their objectives.

The Society's notable expeditions have pushed back the historic horizons of the southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for three hundred years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1930, discovered the oldest work of man in the Americas for which we have a date. This slab of stone is engraved in Mayan characters with a date which means November 4, 301 B. C. (Spinden Correlation). It antedates by 200 years anything heretofore dated in America, and reveals a great center of early American culture, previously unknown.

On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, *Explorer II*, ascended to the world altitude record of 72,495 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took with them the gondola nearly a ton of scientific instruments, and obtained results of extraordinary value.

The National Geographic Society-U. S. Army Air Forces Expedition, from a camp in southern Brazil, photographed and observed the solar eclipse of 1947. This was the seventh expedition of The Society to observe a total eclipse of the sun.

The Society cooperated with Dr. William Beebe in deep-sea explorations off Bermuda, during which a world record depth of 3,028 feet was attained.

The Society granted \$25,000, and in addition \$75,000 was given by individual members, to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees in the Giant Forest of Sequoia National Park of California were thereby saved for the American people.

One of the world's largest icefields and glacial systems outside the polar regions was discovered in Alaska and Yukon by Bradford Washburn while exploring for The Society and the Harvard Institute of Exploration, 1938.



To Peggy—

for marrying me
in the first place . . .

- for bringing up our children—while I mostly sat back and gave advice.
- for the 2,000 pairs of socks you've darned.
- for finding my umbrella and my rubbers Heaven knows how often!
- for tying innumerable dress ties.
- for being the family chauffeur, years on end.
- for never getting sore at my always getting sore at your bridge playing.
- for planning a thousand meals a year—and having them taken for granted.
- for a constant tenderness I rarely notice but am sure I couldn't live without.
- for wanting a good watch ever so long . . . and letting your slow-moving husband think he'd hit on it all by himself.
- for just being you . . . Darling, here's your Hamilton with all my love!

Juni




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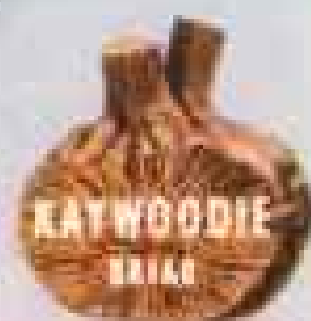
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BROY WOOL SOCKS
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100% NEW BROY
WOOL—WILL NOT
SHRINK—BELOW
KNITTED SIZE
WIDE RIBBED
SOFT-COTTON
NEW DUPONT
SHRINK-CONTROLLED
NYLON
SOFT COTTON—
LINED—SHRINK-
CONTROLLED NEW
WOOL

—RIGHT—
SOFT COTTON—
LINED NEW WOOL
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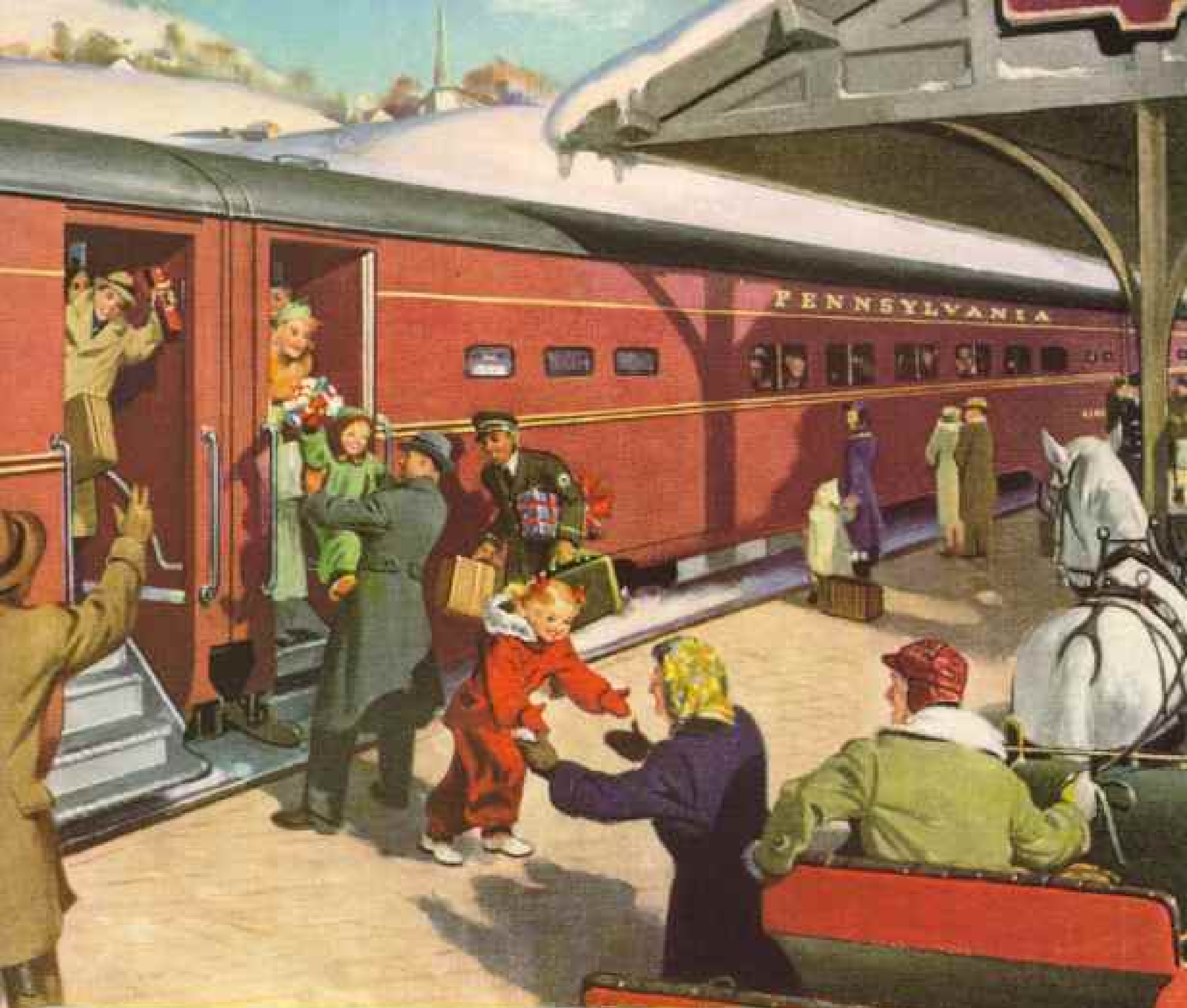
Automatically, the G-E Dishwasher washes, rinses, and dries a whole day's dishes for a family of four, at one time. Separate racks hold china, glassware, silver safely. Dishwasher does pots and pans too. Even cleans and dries itself. Your hands never touch hot, harsh soapy water. And dishes are cleaner than if done by hand!



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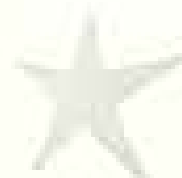
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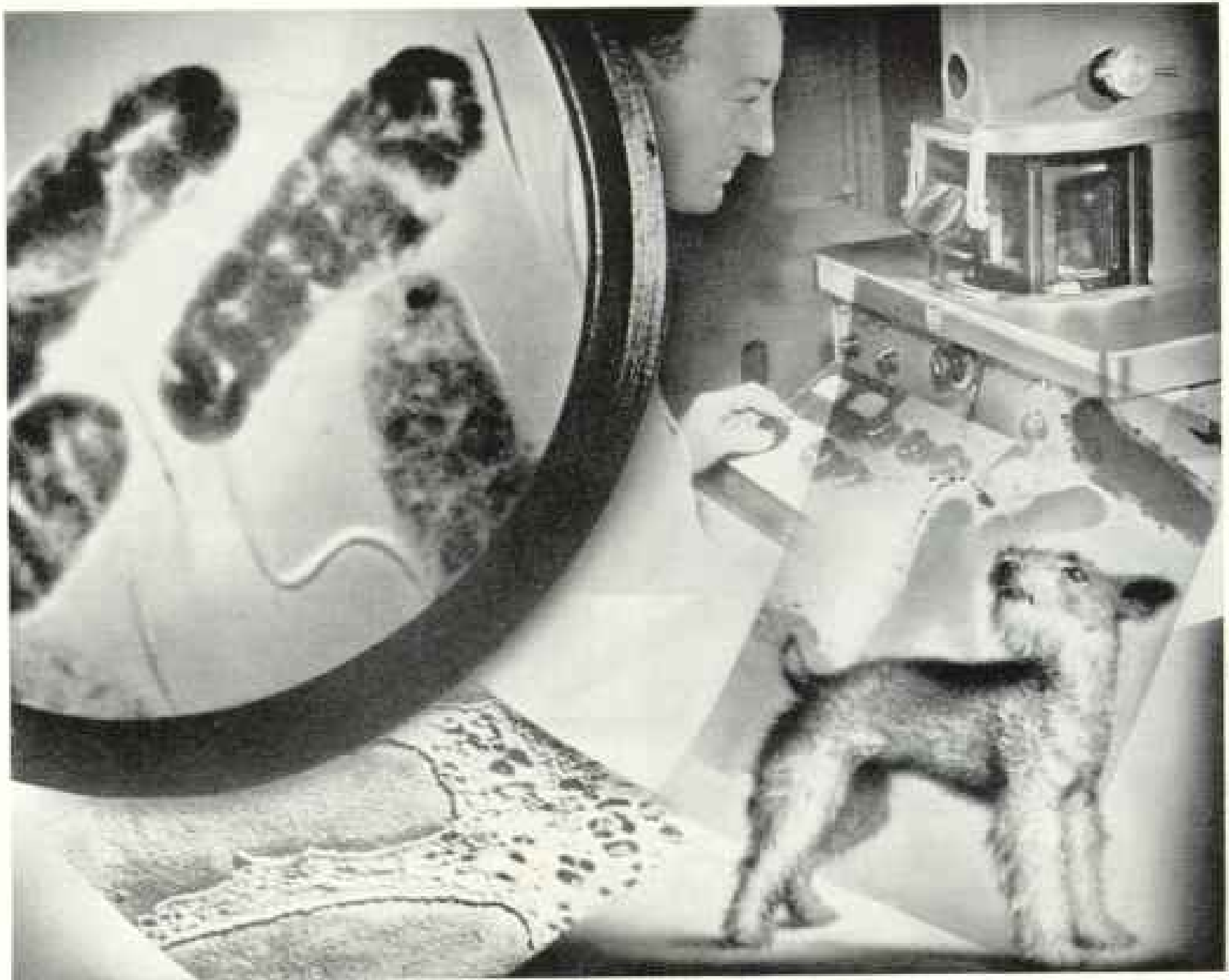
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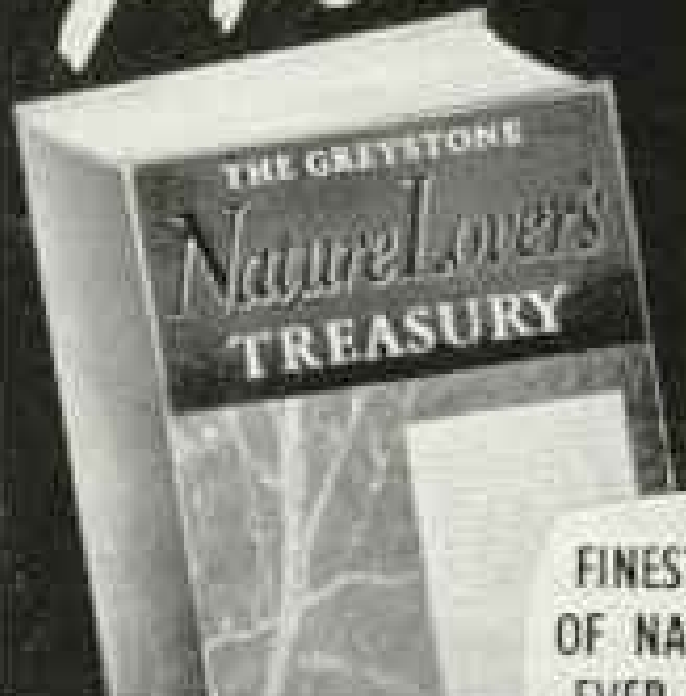
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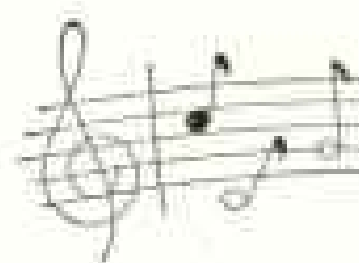
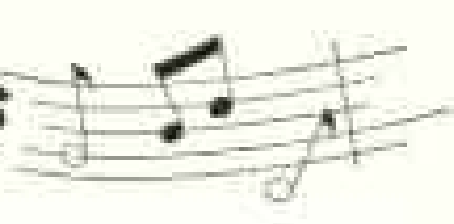
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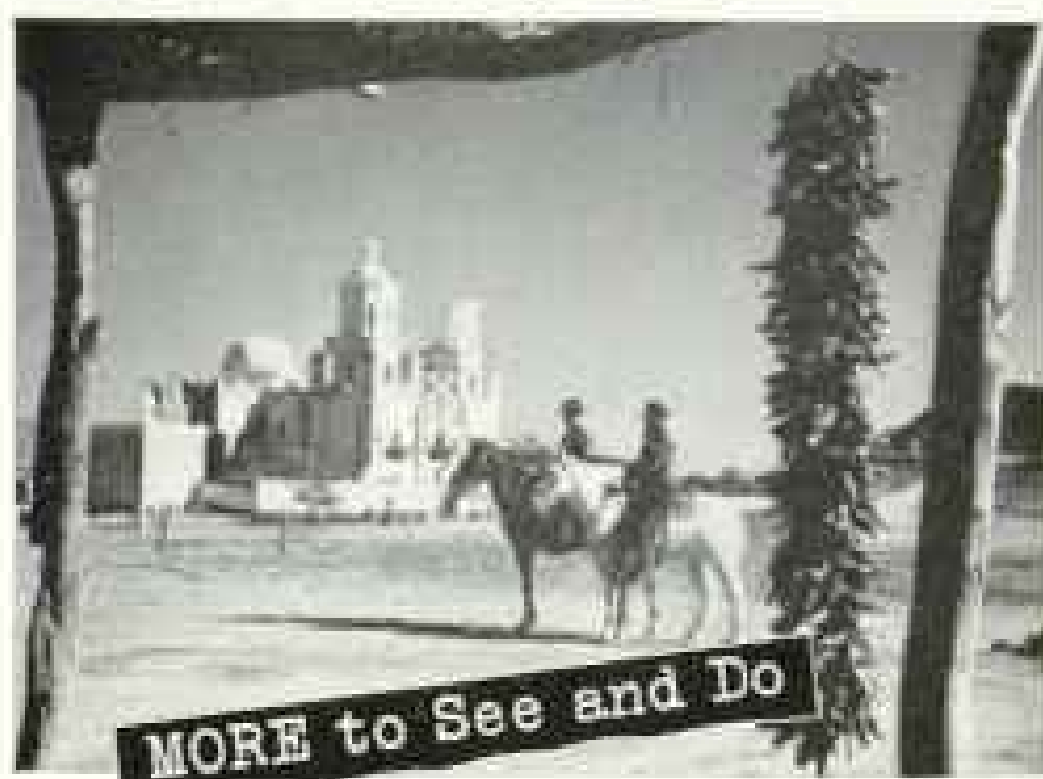


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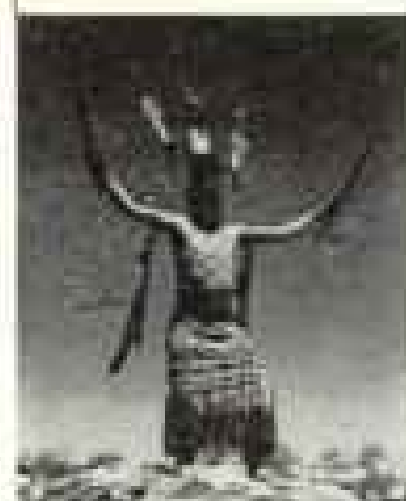
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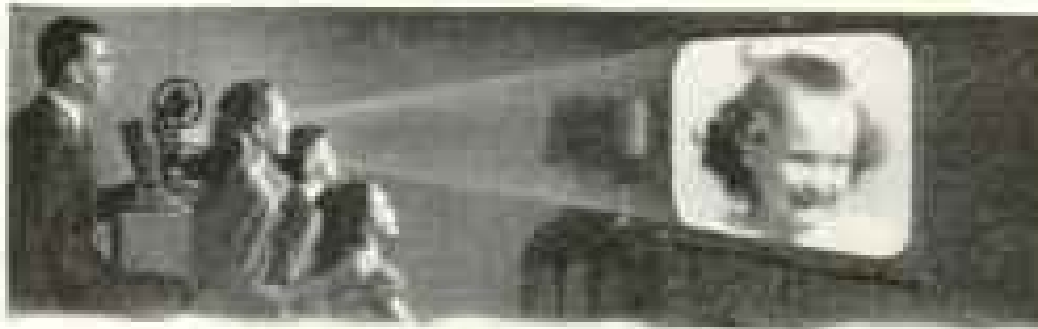


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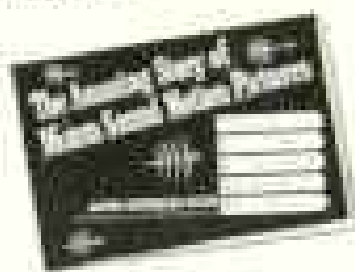
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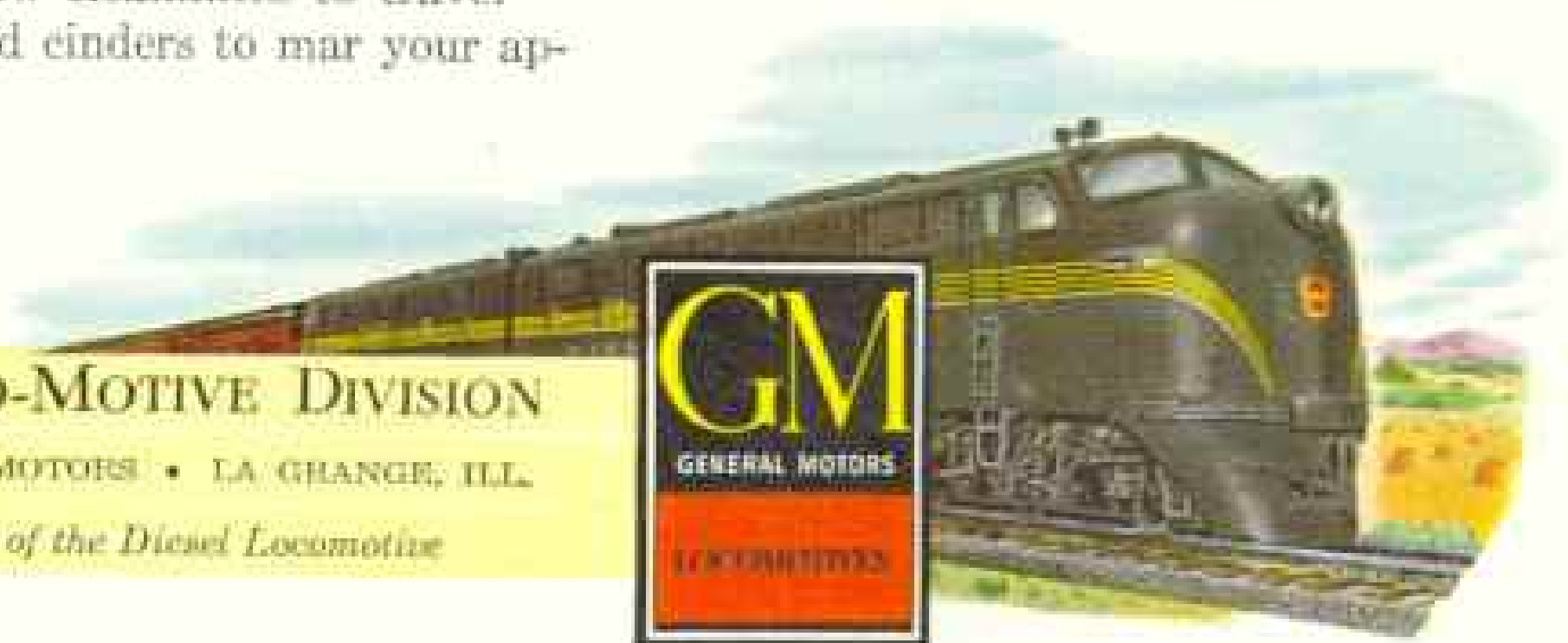
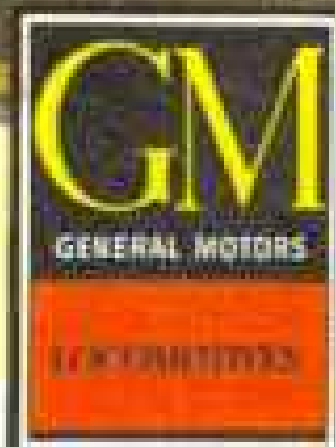
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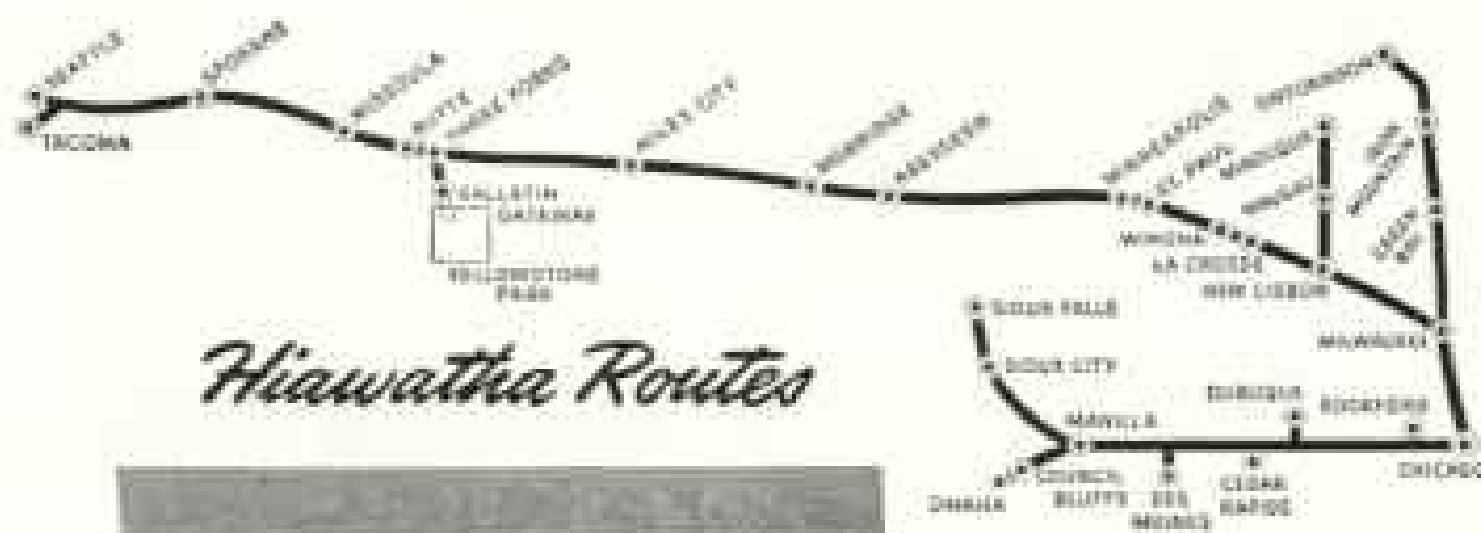
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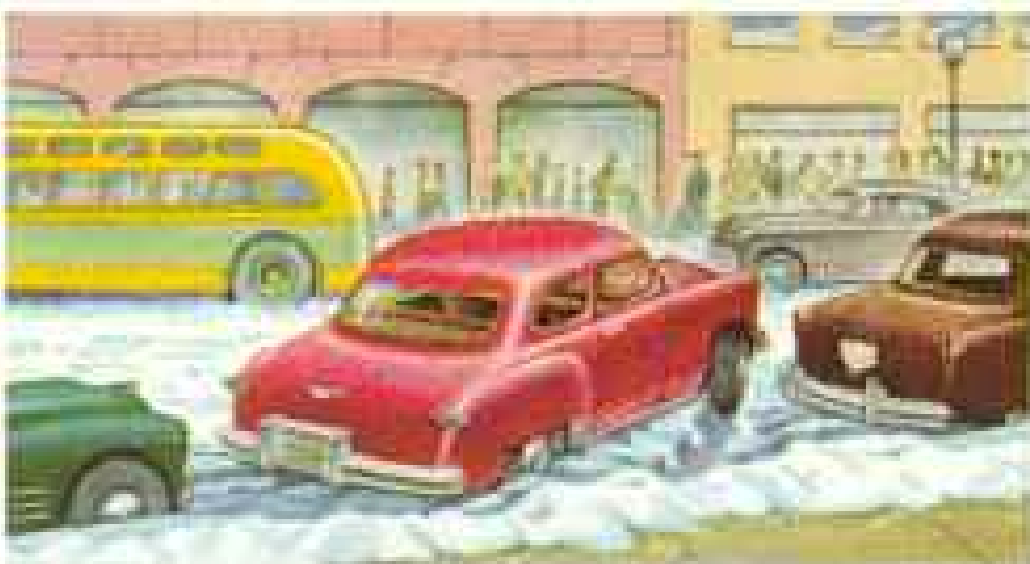
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8-cu-ft model (NII-8), illustrated. Also available in 10-cu-ft size. Butter conditioner in door . . . ample bottle space . . . sliding shelves . . . two deep fruit and vegetable drawers. Freezer compartment has 3 ice trays and covered dessert pan.

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You might not appreciate all that it means to have this most advanced refrigerator.

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And she'll thrill over the moisture-conditioned refrigerator compartment that gives as much refrigerated

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And she'll know, of course, that the General Electric trademark means utmost dependability . . . dependability based on an unexcelled record for performance.

So do this: Take your wife to the nearest General Electric retailer. Get a demonstration of the General Electric Refrigerator-Home Freezer Combination.

Then when your wife gets through talking about how much she'd like one of these great refrigerators, just say quietly: "I'm giving you one for Christmas, darling!"

General Electric Company, Bridgeport 2, Conn.

More than 1,700,000 General Electric Refrigerators in service ten years or longer.

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I WEAR FALSE TEETH
yet my mouth feels fresh, clean
and cool—thanks to Polident!*



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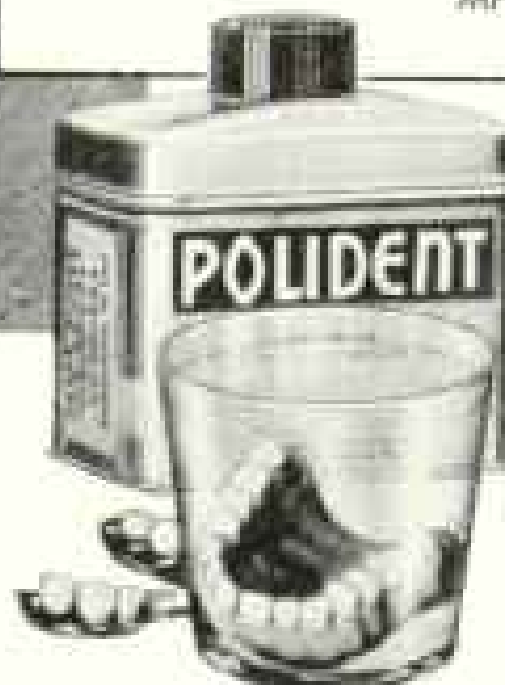
When plates taste bad—feel hot and heavy in your mouth, watch out for "Denture Breath", the oral disturbance that comes from improper cleansing. False teeth need the care of a special denture cleanser—POLIDENT. Safe, easy, quick, Polident leaves your plates clean, cool and fresh. No fear of offensive "Denture Breath".

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Polident comes in two sizes—regular and large economy size—available at all drug-stores. It costs only about a cent a day to use, so get a can of Polident tomorrow, sure.

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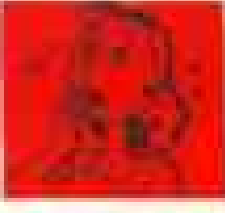
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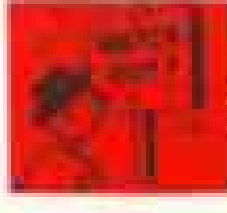
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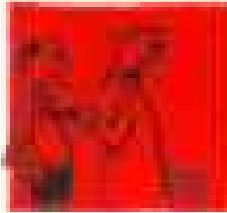
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Sometimes, however, “indigestion” may be a warning sign  of certain diseases.

So, if you have “indigestion” frequently, you should see your doctor.  Remember

...better digestion is a step toward better health!

Good living habits can be an aid to good digestion

When the digestive system fails to function properly, “indigestion” usually results. Fortunately, this condition can generally be corrected by following a few common-sense rules, under the guidance of your physician. He may suggest changes in your diet, eating moderately, keeping in good physical condition, and avoiding mental or emotional tensions.

Whatever may be the cause of your “indigestion,” prompt diagnosis and any necessary treatment offer the best chance for cure. Today, new drugs and new surgical methods hold promise for better control of physical diseases of the digestive system. In certain types of cases, some doctors are finding psychotherapy

increasingly important.

If you have frequent attacks of “indigestion,” don’t try to be your own doctor. The continued use of home remedies may do more harm than good, and may delay the start of proper medical care.

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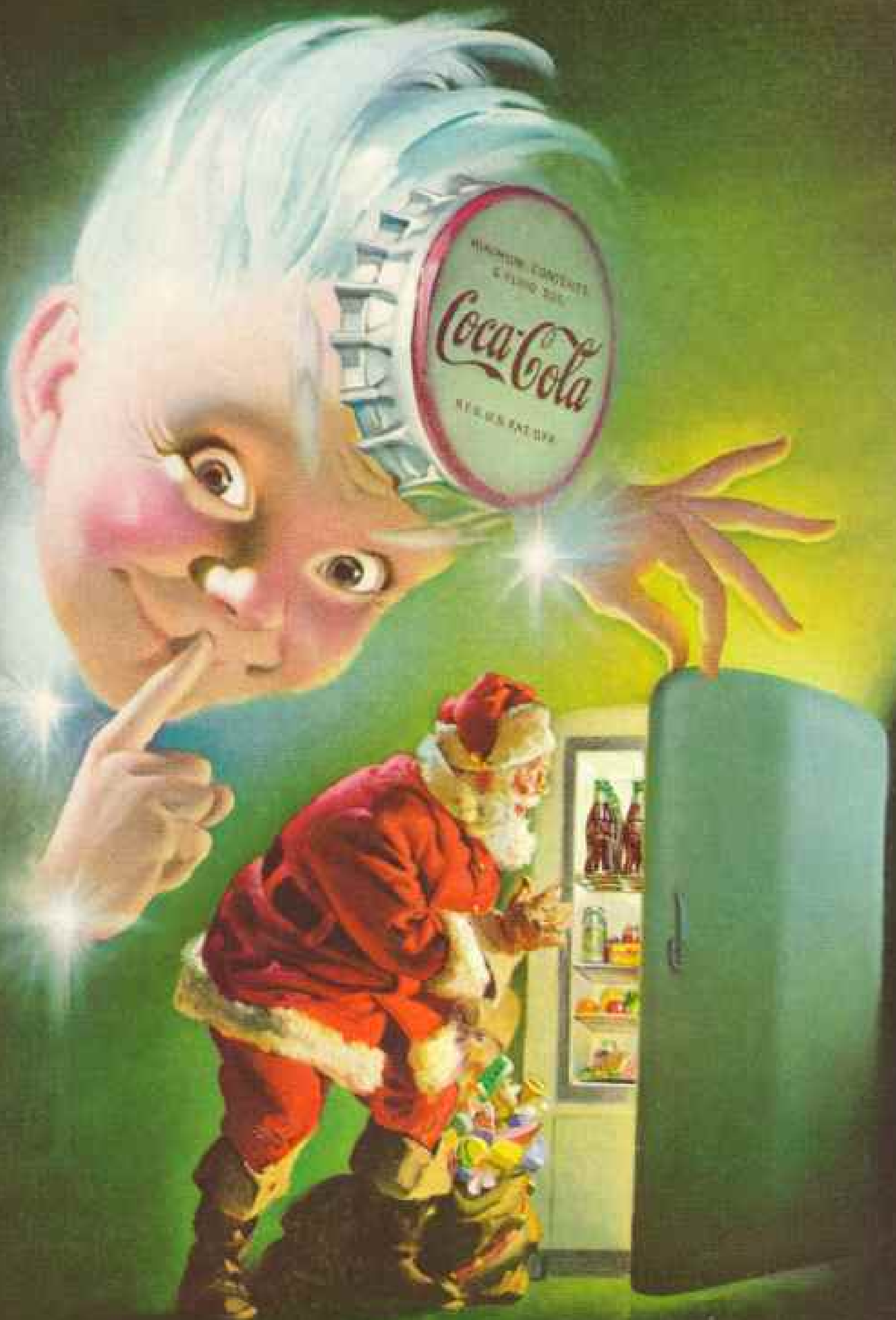
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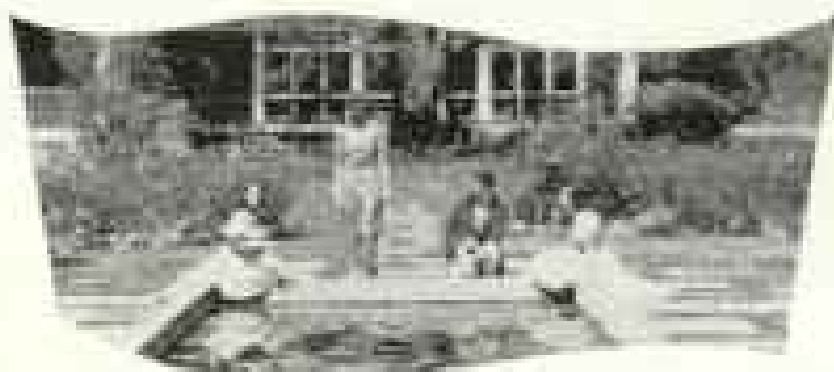
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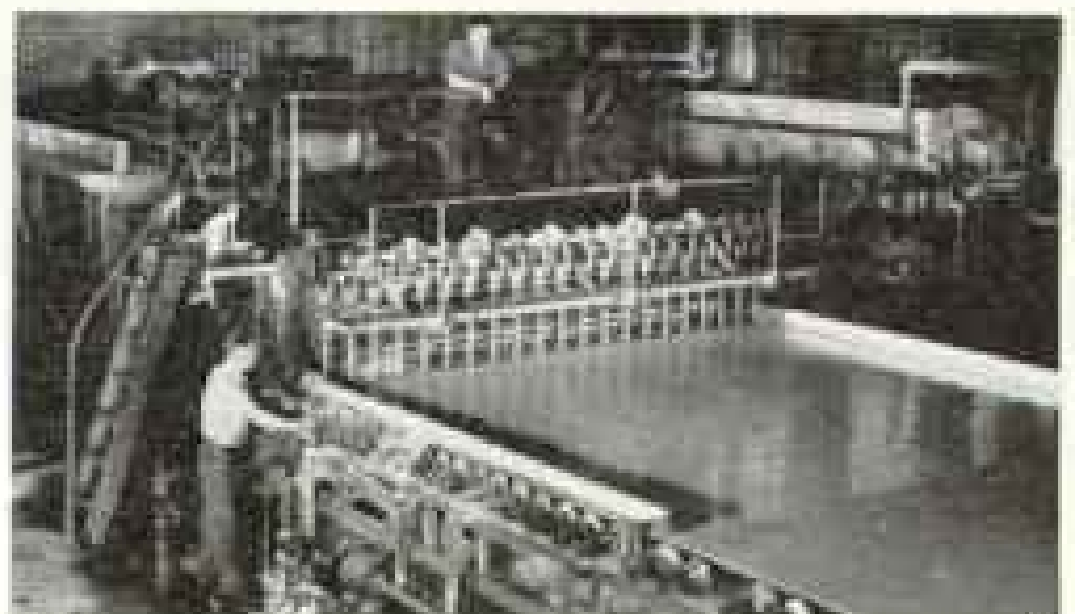
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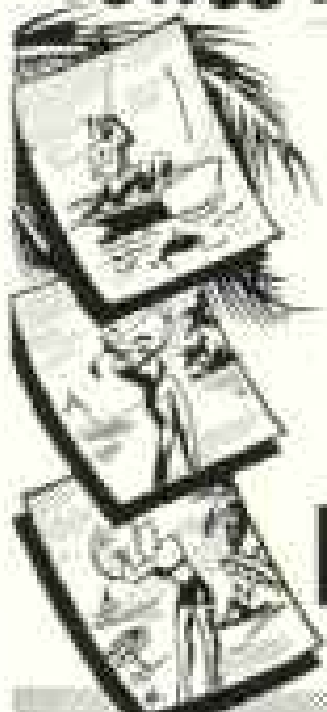
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