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From Sea to Sahara in French Morocco 147

Jet Planes Lace Vapor Trails over Modern Farms, but in the Markets of Marrakech You Can Buy an Evil Eye for Three Cents

BY JEAN AND FRANC SHOR

National Geographic Magazine Staff

With Illustrations from Photographs by the Authors

THE runway of the United States Air Force base at Sidi Slimane shimmered in the 100-degree African sun. Towering tails of huge 6-jet B-47 bombers cast their reflections in the shifting mirage on the broiling concrete.

"We're a long way from home," said Brig. Gen. Charles B. Dougher, commanding Strategic Air Command's 5th Air Division, "but we're very close to the heart of America's defense.

"You ask how important French Morocco is to our security. I'll put it bluntly. It is possible that the mere existence of these runways two years ago prevented a war for which the United States was not prepared!"

Air Age Links Morocco and the U. S.

The tall, slender general is a thoughtful man who weighs his statements carefully. What he said cast a new light on the 5,000-mile journey Jean and I had just made through the country the Arabs call *Maghreb el Aksa*—the Land Farthest West. In this perspective it became much more than just a fascinating area nearly the size of California, as varied in scenery and climate and rich in history.

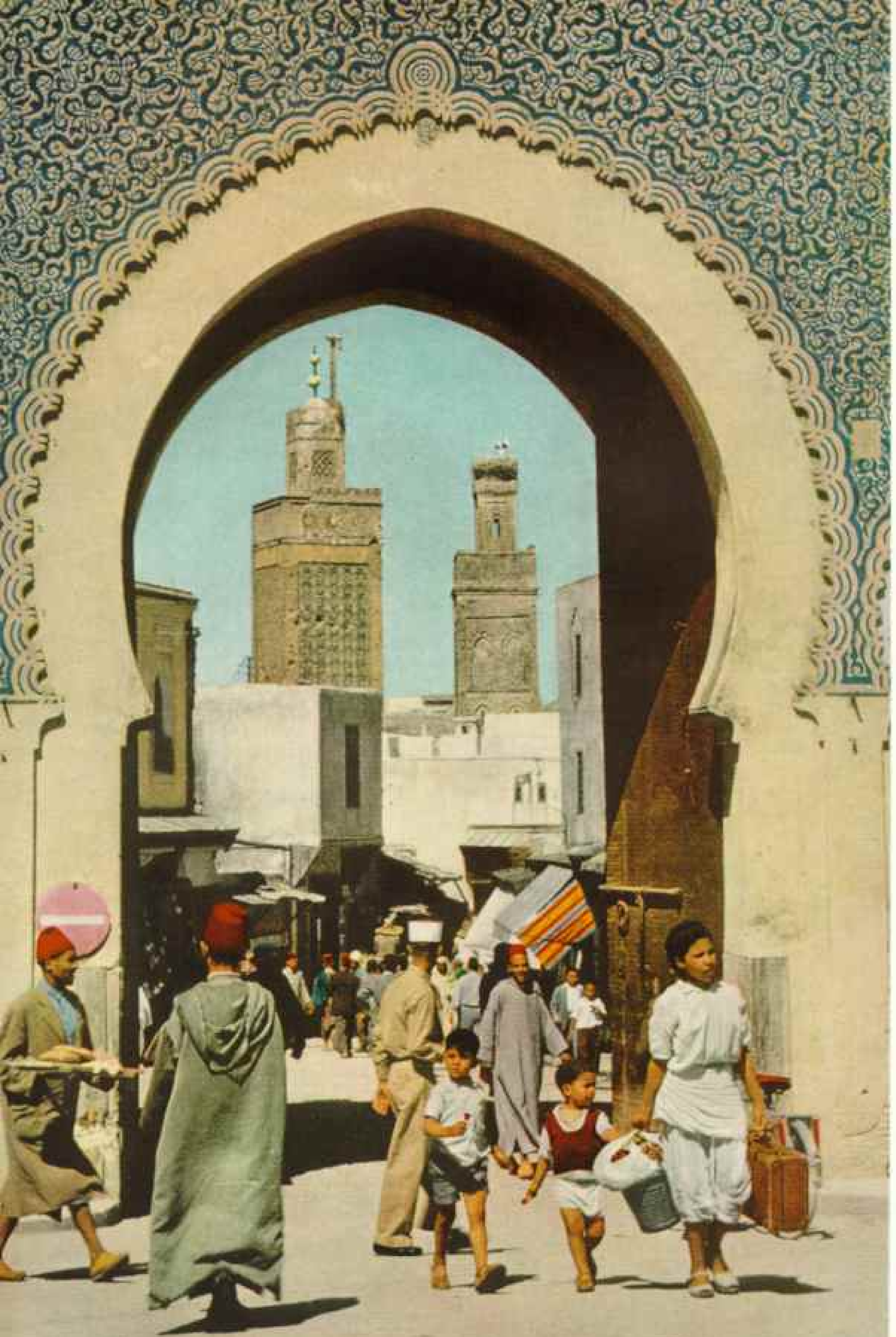
We realized that Morocco, whose Barbary Coast pirates once mocked young America's strength as a nation, was now contributing to that strength. The vapor trails that laced the cobalt skies over the cities of Fès and Marrakech no longer seemed incongruous. In a shrinking world, French Morocco has become our neighbor.*

It is, to be sure, a neighbor whose face is unknown to most Americans. And it is much misunderstood. It is not the forbidding desert of popular imagination but a land of great scenic beauty. The Sahara occupies less space in Morocco than the towering Atlas Mountains, the fertile northern plain, and the rich littoral, where sardine fishermen have found a far more profitable profession than their pirate ancestors knew.

Morocco is today a neighbor with trouble in its own house. The night we landed in Casablanca terrorists shot up a French cafe a block from our hotel, killing two Frenchmen and wounding three. In Marrakech, as we watched a parade honoring the retiring Resident General, a bomb shattered a French Army unit 50 yards from where we stood. Three soldiers died, 28 were injured. And as we drove from Meknès to Rabat, through Morocco's breadbasket, the horizon was black with smoke from burning grainfields fired by arsonists.

"There has always been trouble in Morocco," a French official told us in Rabat, the capital. "We assumed the Protectorate in 1912 at the request of a sultan who was

* See "Americans on the Barbary Coast," by Willard Price, NATIONAL GEOGRAPHIC MAGAZINE, July, 1943.



unable to keep the tribes under control. It wasn't until 1934 that the last rebels laid down their arms. Moroccan history is a parade of overthrown dynasties and internal strife.

"This time it is a nationalist movement. The Istiqlal Party has sworn to drive the French from Morocco. We are willing to give the Moors every bit of self-government they can exercise, but we won't yield to terrorism."

Two months later, in September, 1954, the violence reached a bloody climax. Street fighting brought death to hundreds of Moors, Jews, and Frenchmen. Stern military measures put down the rioting, but the peace was an uneasy one, and the fires smoldered still.

There were so many reports of terrorism in the days after our arrival that I went to the American Consulate General in Casablanca to ask an old friend stationed there if he thought it safe for us to take the trip we had planned.

"Officially, I can't give you an opinion," he said. "Speaking personally, I think you'll be about as safe as you would be driving an equal number of miles in American traffic. You and Jean aren't concerned with politics. You're interested in the land and the people. And they are just as they have always been."

He was right. We visited every section of Morocco and met with nothing but courtesy. The Moor is not an openhearted man, and he does not make friends readily, but politeness in Morocco is returned in kind.

We started our journey in Casablanca, a city that disproves Kipling's lines that East and West will never meet. This glittering, modern metropolis, where 683,000 Moors, Jews, and Europeans crowd broad palm-lined streets, is a melting pot where Africa and Europe are being fused.

Less than 50 years ago Casablanca had only 20,000 residents. Building places to put the other 660,000 has kept the "city of the white house" busy for years (page 150).

Casablanca's architecture is severe, modern, and functional. White skyscrapers punctuate the blue skyline, and its harbor is hidden behind the cranes and warehouses of one of Africa's busiest ports. And there is much that is incongruous: in our luxurious hotel a Senegalese porter in baggy red pants, short jacket, and fez stood all day beside the door which led into the lobby. But he didn't open the door—that was done by an electric eye!

"The influx of country people seeking jobs in the factories and warehouses created a terrible housing problem," a local businessman told us. "The French have built thousands of native-style homes in the New Medina. They installed running water in the early models. The women were furious. They said the only place they got to meet their friends and gossip a bit was at the community well. So the new houses, airy and modern, don't have running water. Just a well in each block."

Arab Girls Change Veils for Bikinis

It was at Casablanca's enormous Orthlieb swimming pool that we saw the most striking evidence of the contrast that is Morocco (page 151). Two veiled Arab girls, wearing flowing robes, entered a cabana beside the 525-yard tank. In five minutes out came two trim figures, one clad in a Bikini, the other in a smart one-piece bathing suit. They joined a group of French and Arab youths laughing and splashing in the water.

For the businessman, Casablanca has much to offer. There are luxurious hotels and fine office buildings, beautiful homes and excellent transportation facilities. But for the traveler there is too little of Morocco. We hired a car and drove to Marrakech.

Our route led southwest along the Atlantic coast. In Mazagan we visited the thick-walled fortress which the Portuguese began in 1506 and held until 1769. Generations of young men died defending the fortress from native attacks, but Portuguese penetration never extended beyond its thick walls.

Safi, famed for its sardines and pottery, came next, and then Mogador, its white houses and blue shutters colorful against the sea. Here we turned east, running 100 miles inland through semiarid country where goats grazed high in the branches of argan trees (page 162).

Page 148

← **A Gate Between Two Worlds: the Bab Bou Jeloud in Fès**

Outside the gaily decorated arch, motorcars park in front of European-style cafes and a bus line stops only 20 yards away. Inside the portal, narrow cobbled streets twist between walled courtyards, merchants hawk their wares from open-front shops, and turbaned Moors ride small donkeys.

The minarets of Bou Anania College and the Sidi L'asous Mosque are framed within the gate. Storks, a good-luck symbol in Morocco, nest atop the mosque's slender tower.

The Moor at left carries fresh bread home from a bakery. Most Moroccan families mix and knead their own loaves and send them to public ovens for baking.

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Kodachrome by Jean and Franc Shor, National Geographic Staff

© National Geographic Society

Kodachrome by Walter Meayers Edwards, National Geographic Staff

Gleaming New Buildings Uphold the Name of Casablanca (White House)

A mud-flat fishing village 50 years ago, Casablanca now holds some 135,000 Europeans and 548,000 Moroccans. Three-fourths of French Morocco's trade goes through its harbor. American GI's landed here in 1942.

© Kodachromes by Jean and Franc Shor, National Geographic Staff

↑ **Casablanca Youngsters Frolic in a Mammoth Oceanside Pool**

This city claims the world's biggest municipal pool—1,575 feet long and 246 feet wide. A treacherous undertow makes ocean swimming unsafe. Moorish girls often arrive at the pool in robes and veils, disappear into dressing rooms, and emerge in brief bathing suits.

↓ **Agadir: a Restaurant on a Tripod Shows How Modern Africa Can Be**

The walled native quarter on the hilltop at right overlooks a modern city edging the ocean. Attention focused on Agadir in 1911 when the German warship *Panther* anchored to "protect" the Kaiser's interest in Morocco. The incident foreshadowed World War I.

"The goat is the perfect animal to harvest that fruit," our driver laughed. "It looks like an olive, but the meat is no good for humans. The Berbers press the pits for cooking oil. So they let the goats climb the trees and eat the fruit, and later they collect the pits from the goat dung."

It was dusk when we reached Marrakech, and that was fortunate, for Marrakech is a city of the night. It lies in the center of a palm oasis covering more than 50 square miles, and above it towers the snow-capped ridge of the High Atlas. The population is listed as nearly 250,000, but in the daytime the streets are so deserted it is difficult to believe 25,000 live there. At night the great Djemaa el Fna square alone seems to be bursting with more than the whole 250,000 (page 172).

Abdul: Old Friend in Five Minutes

I am not sure exactly how we acquired Abdul ben Mohammed, but I know where. It was in the bazaar near the Djemaa el Fna, where Jean and I had stopped to take a picture of a stall filled with colorful Safi pottery. We had placed our heavy camera bags on the ground, and when we finished the picture and turned to pick them up we found them draped around a lad of about 16, dressed in a clean blue *djellaba* and knitted skullcap.

"Thank you," I said, "but we can carry those ourselves."

He bowed, and that was a mistake. The bags swung forward on his slender shoulders, and the weight nearly threw him on his face. But he recovered his upright posture and his dignity, and his smile was irresistible.

"I am Abdul," he said in surprisingly good English, "and I know everyone and everything in this *souk*, and I can help you. You pay what you wish. Abdul will be your servant in Marrakech."

"Take two of the bags, then," I said, "and I will carry the third. Now take us to the Street of the Dyers."

"I know the way well," said Abdul, "but first I will take you to the shop of a friend who sells beautiful things very cheap. He has camel chests and daggers and fine brocades. And since you are old friends of mine, he will sell them to you for nothing."

"The Street of the Dyers," I said, "or put down the bags."

"Since you insist," said Abdul. "First the Street of the Dyers. Then to the shop of my friend."

We moved down narrow lanes between tiny shops packed with the doubtful treasures of Africa. The souk of Marrakech is like a great department store. Each section carries one kind of goods. We passed the street of prayer rugs, copper lane, the block of wooden buckets, the woven-basket section, 100 yards of painted stools, and turned into an alley where all the stalls contained balls of black goat's-hair.

A shoeshine boy approached, and Jean paused to have him dust her saddle shoes.

"Give him 100 francs [about 30 cents]," said Abdul peremptorily.

"We will give him 10," said Jean, and did so.

"But tourists always give 100 francs," protested Abdul.

"We are not tourists," said Jean. "We are travelers."

"What is the difference?" Abdul demanded.

"Ninety francs," said Jean.

Abdul looked at her, and his old-young face broke into a wise smile.

"It is well," he said. "Now we understand each other."

We photographed the Street of the Dyers (page 182). Then Abdul led us to the spice bazaar. If there is odor in paradise, it must be like this. Sage and thyme and coriander and saffron, paprika, cinnamon, cloves, and bay filled the open bins. And donkeys, laden with huge bales of fresh mint, stood quietly while their masters weighed their wares. The only sweet-smelling donkeys we ever met!

Antidote for a Love Potion

Halfway to the entrance we passed a shop hung with a fantastic assortment of dead birds, animal skins, dried snakes and lizards.

"It is a medicine shop," said Abdul. "Syed Ahmed, who sells these wares, is a famous doctor."

The mention of his name brought Syed's bearded head to the door of his shop.

"You are in need of a potion?" he asked.

"Not right now," I said, "but we'd be grateful if you'd tell us the use of some of these things."

"I am sure you will need something," said Syed, "but meanwhile I will tell you what you ask. This dried eagle is very important. If a woman puts a love potion in your tea, you grind the dried flesh and drink it in water. The spell will be broken. You must take 50 grams, and it costs 150 francs per gram.

"These fox bones are for a love potion.

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Kodachrome by Jean and Franc Shor, National Geographic Staff

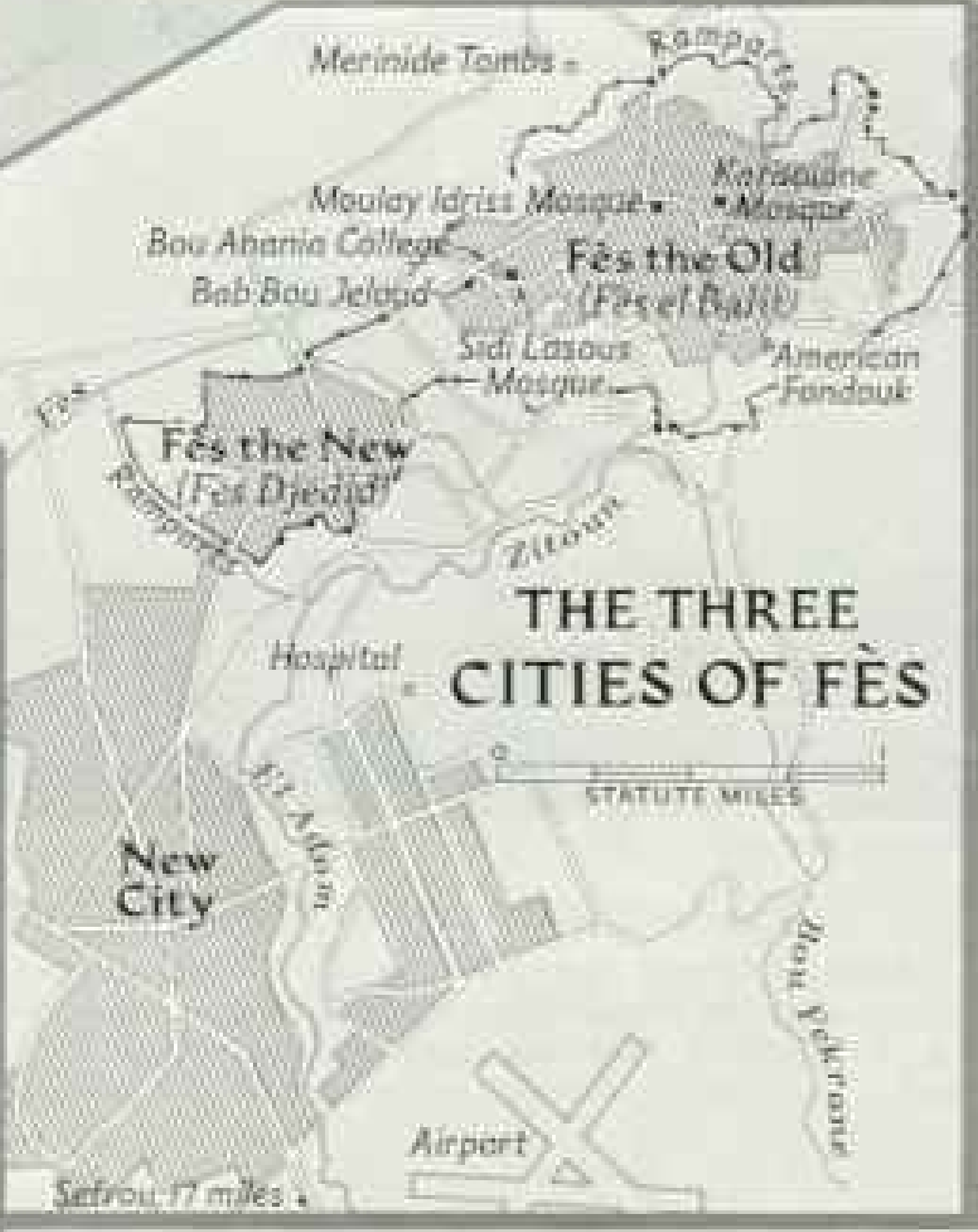
American Airmen Gaze Spellbound as a Performer Fondles a Cobra

Bouhabi Rahali (left), who claims 92 years, entertains weekly at the Casablanca USO. As his assistant beats a tambourine, he releases his serpents one at a time and dodges their strikes. When a cobra rears in question-mark pose, Rahali leans over and kisses its head. After this performance he gave Jean Shor a newly shed cobra skin as a lucky piece and cautioned her to keep it in a safe place. These airmen come from near-by Nouasseur Air Base.

PORTUGAL
SPAIN
Seville
Osuna
Granada
Utrera
Faro
Huelva
Jerez de la Frontera
Ronda
Motril
Almería
Málaga
Cádiz
Mediterranean Sea
Algeciras
La Línea
GIBRALTAR (United Kingdom)
Strait of Gibraltar
TANGIER ZONE
Tangier
Albarán (Spain)
Oran
Tetuán
Cape Tres Forcas
Arcila
SPANISH MOROCCO
Melilla
Sidi bel Abbès
Larache
Chauen
Nador
Nemours
Alcazarquivir
Berkane
Tlemcen
Ouezzane
Oujda
Taourirt
Port Lyautey
Petitjean
Moulay Idriss
Taza
Salé
El Aricha
Rabat
Meknès
Fès
Berguent
Debdou
Fedala
Sefrou
Azrou
Casablanca
Middle Atlas
Nouasseur Air Base
Matarka
Mazagan
Settat
Khouribga
Khenifra
Missour
Tendrara
Oualidia
MOROCCO
(French Protectorate)
Bou Arfa
Cape Cantin
Atlantic Ocean
Safi
Imilchil
Plateau of the Lakes
Rich
Figuig
Ben Guerir Air Base (Benguerir)
Bou Denib
Tensift
Ksar es Souk
Mogador
Marrakech
Tinerhir
Colomb Béchar
Chichaoua
High Atlas
Erfoud
Jebel Sarbo
Mount Toubkal
Ouarzazate
Taouz
Tarhit
Cape Rhir
Tizi n Test (Pass)
Tazenakht
Agadir
Sous
Taroudannt
Zagora
Frontier undefined south of Figuig
Beni Abbès
ALGERIA
Anti Atlas
Tiznit
Sidi Ifni
IFNI (Spain)
Sahara Desert
Goulimine
Dra
SOUTHERN MOROCCO (Spain)
Salt Lake
Tindouf
SPANISH SAHARA
0 50 100
STATUTE MILES
© National Geographic Map

In Morocco, High Atlas is Haut Atlas, Middle Atlas is Moyen Atlas, cape is cap, and mountain is jebel. Spanish for cape is cabo.

U.S.S.R.
British Isles
EUROPE
United States
Rabat
MOROCCO
Sahara Desert
Atlantic Ocean
Timbuktu
AFRICA
Equator
SOUTH AMERICA



Gene A. Girard

Turbaned Moor Clears Weeds from Sidi Slimane, Where B-47's Line Runways

This base is headquarters of the 5th Air Division; the plane belongs to the 44th Bombardment Wing. North Africa's perfect flying weather enables crews to train constantly. Thousands of native employees, all checked for security, perform housekeeping tasks at United States bases in French Morocco.

← Page 154. More than eight million people occupy French Morocco's 150,888 square miles of mountains, deserts, and fertile plains. A Protectorate since 1912, the country is ruled by a Sultan and his French advisers. About half the Moors are Arabs; the balance, Berbers. Nearly all are devout Moslems.

Ground and mixed with this powdered lizard skin, they are irresistible. And quite cheap. Now if another man is courting your sweetheart and you wish . . ."

"Just a moment," I interjected. "Don't we have anything but lovesickness going on here?"

Syed smiled. "But of course," he said. "When a man comes to my shop with a woman, I draw conclusions. Now here is a bit of desert wolfskin. If you have an infection, you drop the skin in the fire and hold the infected part in the smoke. This incense, burned and inhaled, will cure a cold.

"And this snakeskin—it is a genuine Taroudannt cobra—you may rent by the day. If you have a headache, wrap it around your brow. For a sore throat wear it as a scarf. It is very powerful."

We thanked Syed and started out past the baskets of dried lizards.

"Wait a minute," he said. "How many children have you?"

I told him we didn't have any.

"Ah ha!" he exclaimed. "Then you do need me. Now this dried tiger . . ."

We fled unceremoniously. Our only purchase that day was a *chu-ba*, or evil eye. It was a very small piece of translucent stone which looked suspiciously like quartz.

"It is the genuine evil eye," Abdul assured us. "You put the stone in the fire and wait until it is hot. If an eye appears in it, you know an enemy has put the chu-ba on you. The seller is a friend of mine, and will let you have it cheap. Give him 100 francs."

We bought it for 10. It isn't every day you

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Ektachrome by Emil Brunner

A Hatter Hangs His Wares Above a Windowless Stall to Lure the Street Trade in Fès

These corded caps, crocheted by young Moors, spell "Morocco" to souvenir-buying travelers. Arabs wear them beneath turbans; boys use caps alone. Debating a purchase, this father backs his son against a caravan chest, half of a camel's burden. The youthful merchant works in the doorway to catch the light.

pick up a genuine evil eye for three cents.

Many things have happened in Marrakech since Youssef ben Tachfine, first emir of the Almoravide dynasty, founded it in 1062. It has been the capital of the Almohades and the Saadians. It was the commercial center of the Maghreb in the days when the most prosperous trade routes led south to Timbuktu. And to all Moroccans, Marrakech has always been the "city of earthly delights."

The camel trader brings his caravan to the great souk held each Thursday outside the city walls. The shepherd brings his flock, the date grower his woven baskets of sticky fruit. They take their money, and they find their way to the Djemaa el Fna.

In this public square, jugglers, dancers, acrobats, storytellers, hashish dealers, gamblers, and a hundred others set up shop each evening to relieve the eager visitor from the countryside of his boredom and his cash.

There are things to see by day, of course. There are the world-famous Koutoubia minaret of El Mansour, the Bahia palace, the Saadian tombs and the lovely Menara gardens. But to us the souks were the soul of Marrakech.

The *Shergi* Drives Mad Dogs Indoors

It was hard to leave Marrakech, but summer was coming and the Sahara lay ahead. We said goodbye to Abdul, his heart gladdened by a tourist-size tip, and headed south over the Tizi n' Test pass of the High Atlas. It was cool as we climbed, cold at the 7,000-foot crest, and comfortable as we started down into the Sous, the flat plain which lies between the High Atlas and the Anti Atlas.

That was where the *shergi* caught us. We were 50 miles from Taroudannt, the temperature a comfortable 80°, when we noticed a sudden change in the air. The driver stuck his hand out the window, tested the breeze, and shook his head.

"We're in for it," he said. "It's the shergi. First of the year."

We had heard of the hot desert wind which is Africa's curse. It has many names—sirocco, mistral, khamsin, shergi—but only one meaning. Traditionally it lasts three, six, or nine days. And when it blows, even mad dogs and Englishmen stay inside.

It would take more than an hour to reach Taroudannt, and there was no nearer place to seek shelter.

"What shall we do?" I asked the driver.

"Suffer," he said. We did.

The shade temperature was 132° F. when we reached Taroudannt. We crept into a thick-walled room in the hotel and waited. On the fourth morning it was cool; people emerged from their shuttered houses, and life began once more in the Sous.

We drove back to the seacoast, to Agadir, another memento of Portugal's days of power. Agadir has a golf club, and a generous member invited me to play a round. The course is frequented by goats that sometimes mistake golf balls for the argan fruit.

"It's a club rule," said my host, "that any ball swallowed by a goat can be replaced without loss of stroke or distance."

South we rode through Tiznit, a walled desert town straight out of a Foreign Legion movie, torpid in the 114° sun. At the end of the road lay Goulimine, home of the famous Blue Men.

Ghoum Guide Finds a Blue Man

Goulimine is a tiny military outpost, and Maj. Bernard de Chilly gave us shelter and a Ghoum for a guide. I had always thought of Ghoums as the fiercest of troops, but Akbar was a smiling giant who spoke a little French and wore his big curved dagger with an almost apologetic air.

With Akbar's aid we sought out a Blue Man, and, sure enough, he was blue. His cotton robes were a dark blue, and his face and hands and wrists had a bluish tinge.

Haroon el Yakoub, his name was, and he was happy to talk about the Blue Men.

"Long ago Spanish traders from Ifni brought the first bolts of this cloth to Goulimine," he said. "Our ancestors liked the color. When they wore it, the dye came off on their skin. They liked that too."

He looked at his own lightly tinted wrists, a little ruefully, I thought.

"Unfortunately," he sighed, "they do not make cloth as they used to. This modern stuff scarcely runs at all!"

We returned to Taroudannt and made the long, hot drive eastward to Ouarzazate. Here we turned southeast to Zagora, an oasis on the edge of the Sahara. En route we passed through the Dra Valley, where we were surrounded by groves of date palm and tamarisk.

"There are more than 300 varieties of dates in the valley," a French official told us. "The average man here eats three pounds of dried dates a day."

© National Geographic Society

Kodachrome by Maynard Owen Williams

↑ In His Guarded Open Car, the Sultan of Morocco Returns from Prayer in Rabat

Friday at noon Sultan Sidi Mohammed ben Moulay Arafa sometimes journeys across a broad meadow from the palace to his private mosque to lead his subjects in prayer. Members of his bodyguard, on foot and in the saddle, form a tight cordon about the royal entourage. Wounded by an assassin's grenade while at prayers, the Sultan now usually conducts devotions within his own palace.

← A camel patrol from the desert jogs into the oasis of Mhamid, an adobe-walled fort near the Moroccan-Algerian border. A Chamba tribesman clad in white precedes three mounted Requibat soldiers.

↓ Lt. Arsine Woisard talks with a blue-robed Requibat, one of his 8-man camel patrol in the Sahara. For eight months of the year the Frenchman rides a white camel, sleeps on the sands, and serves as judge, doctor, and adviser to the Requibats on their migrations across the desert.

© Kodachromes by Jean and Franc Shor, National Geographic Staff

Zagora is the end of the road for tourists, but 60 miles south, in the Sahara, is a little fort called Mhamid. Over the bitter protests of our driver we crawled through the rippling sand to the red adobe fort, set foursquare in the empty desert like an illustration for *Beau Geste* (page 159).

Native soldiers swung open the heavy gates and Lt. Arsine Woisard, tall and handsome, the sky-blue of his kepi accented by a red beard, made us welcome.

"I'm a stranger here myself," he smiled. "Just rode in last night with my camel patrol from Tindouf, 220 miles southwest. It's certainly good to get back to civilization."

My face must have revealed my surprise. He laughed.

"Civilization is a relative thing," he said. "Here I slept in a bed and ate from a table for the first time in three months. After the desert, that's civilization."

Woisard is 29, a veteran of the French Resistance in World War II and of the fighting in Indochina. He has been in the Camel Patrol two years.

"It's a magnificent life," he said. "Our job is to look after the Requibats, a nomadic tribe of about 20,000."

Woisard is a combination judge, doctor, teacher, and counselor. His patrol consists of six native soldiers—three Requibats and three Chambas.

"We left the tribe camped south of here," he said. "It took us seven days to make the ride up. We needed supplies."

Woisard speaks fluent Arabic, is competent in the Requibat dialect and an expert on Moslem law.

"The Koran is the law book for these people," he said, "and I have to know it by heart. But most of our disputes are minor, and we try to compromise."

She-camels the Unit of Value

Recently two Requibats asked Woisard to settle an argument over the sale of a gun. One had agreed to purchase the weapon, and had called upon Allah to witness the bargain.

"That obligated him to complete the deal," Woisard explained. "But before he paid the agreed price of eight young she-camels, he had some bad luck and couldn't raise the amount. He wanted to call off the trade.

"We haggled a bit, but finally reached a compromise. He paid one young she-camel as a forfeit, and the seller kept his gun."

The young she-camel is the monetary unit of the Requibat tribe.

"They never use money," Woisard said. "Everything is bartered. A bride's dowry, for example, is 40 camels."

Woisard assembled his patrol, the Chambas in flowing white robes and the Requibats in deep-blue gowns and turbans. The lieutenant's white camel knelt, and he swung into the high red saddle.

"Au revoir," he said, and the awkward beasts shambled through the red gate beneath the tricolor of France, heading south into the trackless desert.*

Cave Dweller Throws Money Away

Our road from Zagora to Tinerhir had been open only two weeks, and it led us over the 8,000-foot Jebel Sarho mountains through country where few strangers had passed. The shepherds in this lonely land are cave dwellers, and they fled from our cameras. Anxious to get a picture of their colorful costumes, Jean handed one young mother a 100-franc coin. She looked at it curiously, obviously with no idea of what it was, tested it in her palm, and tossed it aside.

We followed the highway northeastward through Ksar es Souk. At Rich we left the well-paved highway and headed straight for the Plateau of Lakes, in the heart of the High Atlas.

The scenery changed as we ascended. We jolted up a rich valley crossed by frequent crystal streams. Snow still lay on the hillside a hundred feet above our flower-strewn track.

It grew colder as we climbed. Ash, fruit trees, and weeping willows stood beside the stream. Ahead of us Imilchil loomed on a hilltop, a sturdy kasba of reddish mud. The French flag flew above the military headquarters, where Capt. Pierre Cheneau gave us a warm welcome and a peculiar invitation.

"Come back here as soon as you're settled in your quarters," he urged. "We're about to measure some of the young tribesmen to see if they have come to manhood. I think you'll be interested in the ceremony."

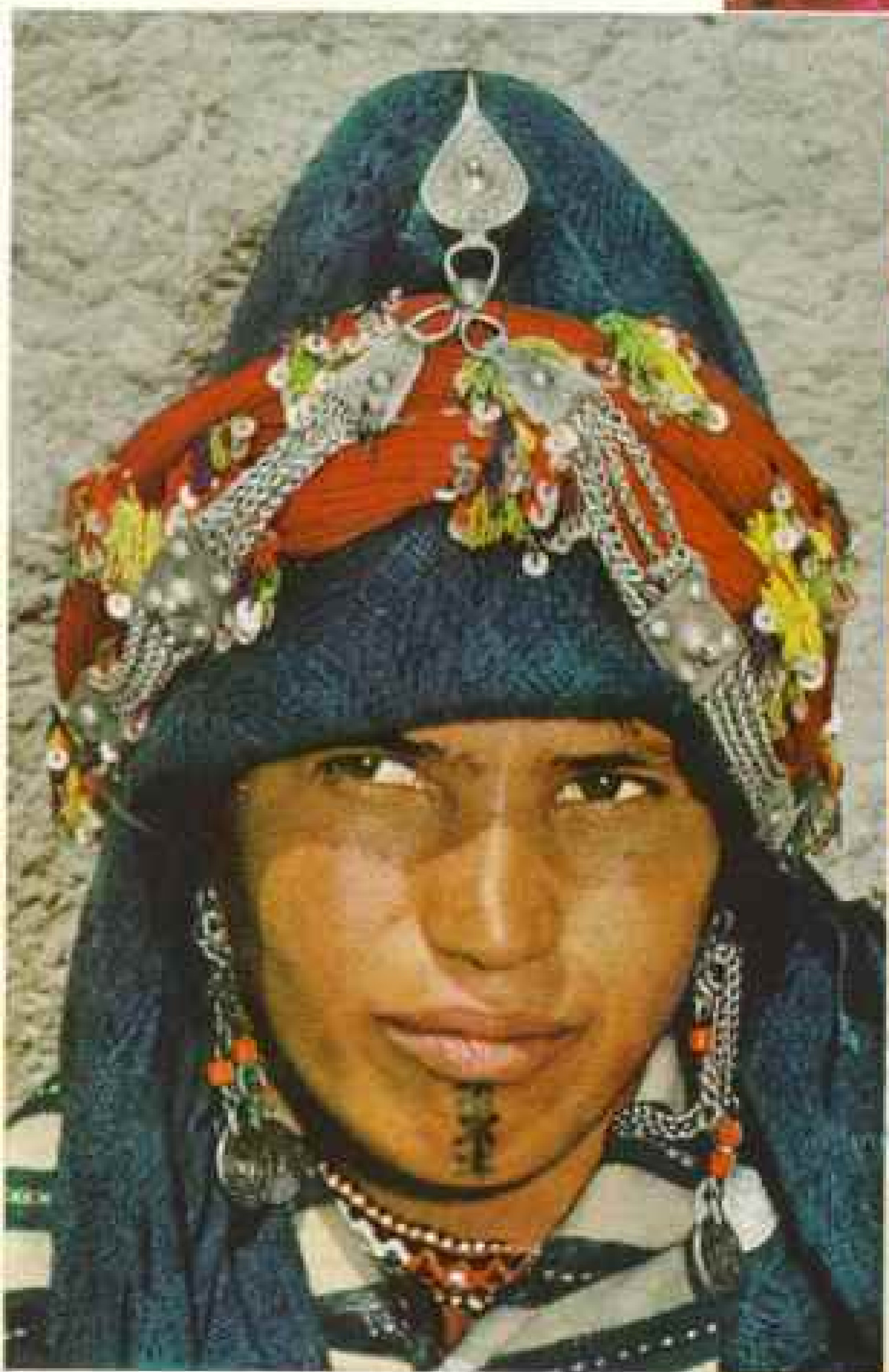
We tossed our luggage into the mud-walled guesthouse and hurried back to find a dozen teen-age youths seated before Captain Cheneau. The smiling Frenchman took a length of string and approached the nearest lad.

* See "Beyond the Grand Atlas," by V. C. Scott O'Connor, National Geographic Magazine, March, 1932.

A Berber Tattoos Her Face →

This Moslem servant girl was raised in a mud kasba south of Marrakech where women do most of the labor. A diamond-shaped mark between eyes identifies her tribe; the chin stripe is mere ornament.

↓ A Berber woman of the Aït Haddidu tribe in the High Atlas mountains enjoys amazing freedom. For only 15 cents she can legally divorce her husband. Some tribeswomen have had more than 20 husbands. Silver jewelry on the girl serves as her family's bank account.



Fès Beauty Prefers a Veil →

A Moslem like the Berber girls above, this Arab belle has little else in common with them. Daughter of a wealthy Fès aristocrat, she attends a Moslem school and wears the traditional veil. A sister enrolled at the French high school in Fès wears Western dress.

"With eyes like this," the authors remark, "a veil need not be a disadvantage."

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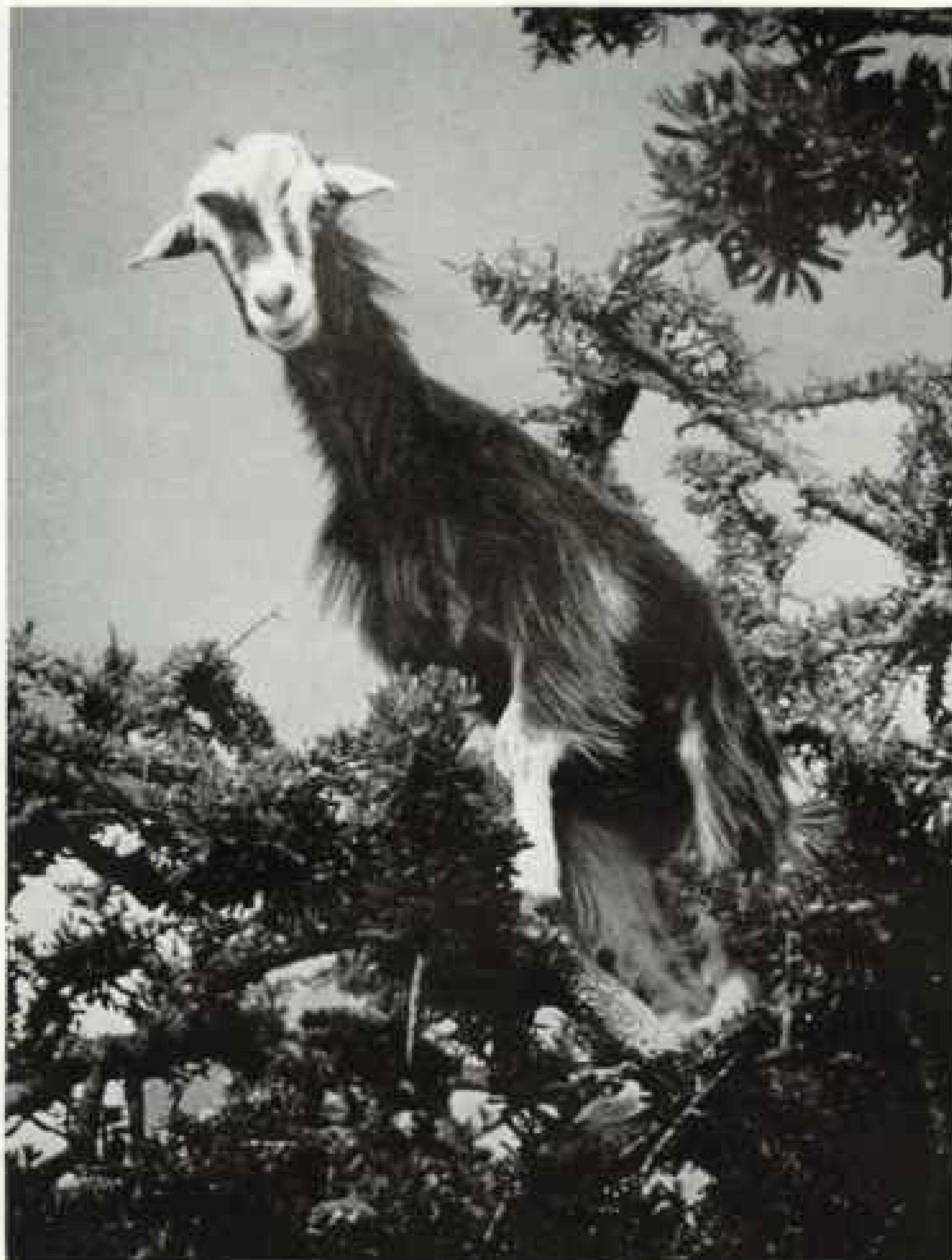
Kodachromes by Jean and Franc Shor, National Geographic Staff



162 Charles Trieschmann

A Tree-climbing Goat Harvests Argan Fruit

Berbers, who regard the bitter flesh of the argan as inedible, press the pits for cooking oil. Goats, which enjoy the olivelike fruit, often climb 20 feet to reach it (page 149). This animal banquets near Agadir.

ben Ali ben Brahim was duly entered in the book and the ceremony proceeded.

"A French anthropologist who was here last summer told me this same test was used in Europe during the Middle Ages," Captain Cheneau told me. "Would you like to try it?"

I declined with thanks. I have a very small neck and a large head, and I should hate to discover, after all these years, that I am illegally married!

The Ait Haddidu, the captain said, were among the last of the mountain tribes to surrender to the French. Today, however, they are peaceful and content, famed throughout the High Atlas for the excellence of their agriculture.

An attractive woman, heavily decked with silver and amber jewelry, entered the office. She spoke softly to the captain and handed him a 50-franc note. He shrugged his shoulders patiently and wrote something in his record book.

"There's another divorce for Kebira," he sighed as she went out the door. "That's the twelfth husband she's rid herself of in five years. To my mind, that's the one trouble with Customary Law."

An Ait Haddidu woman can divorce her husband at any time, without giving a reason, simply by returning her marriage settlement and paying a small registration fee.

The mountain meadows between the High and the Middle Atlas were deep in lush grasses and spring flowers, and the narrow track we traveled was deep in mud. Half a dozen times we worked the car out, but the time came when the wheels sank to the axles and it would

"Many of the tribes in Morocco are quite primitive," he explained. "The Ait Haddidu never accepted the Koran as their law book. They have their ancient tribal legal system, as have many of the mountain Berbers. We call it Customary Law."

The captain passed the length of string twice around the neck of the first boy, cutting off the excess length. He handed the cord to the lad, who placed the two ends between his front teeth. The captain took the dangling loop which resulted and passed it over the boy's head. It slipped over easily.

"Hussain, you are a man," Captain Cheneau announced. "You can now get married, and you can vote. Less happily, you can also pay taxes—and I will just inscribe your name here on the tax roll." The name of Hussain

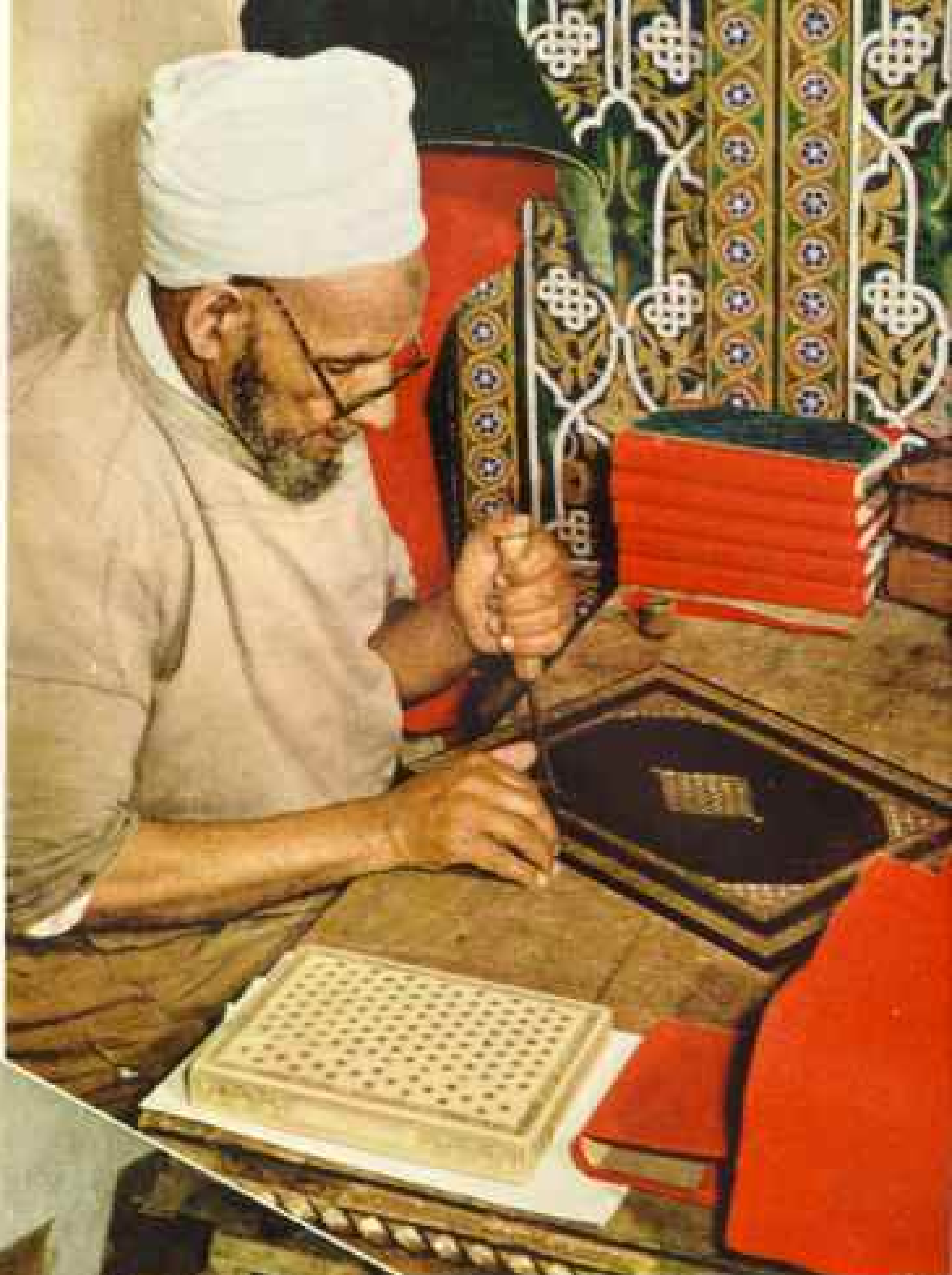
(Continued on page 171)

A Leather Craftsman Tools → Ancient Designs in Gold

Machines have displaced many Moroccan artisans, but this bearded man still plies his trade in the Kasba of the Oudaias, Rabat. Using the tools and skills passed down by his father 50 years ago, he presses intricate Arabic designs onto richly dyed bookbindings and portfolios. For a handbound book tooled in 18-carat gold he charges about $2 or $3, a tenth of its cost in the United States.

The Kasba of the Oudaias is a miniature city in itself. Centuries ago it was the equivalent of an English feudal castle, sheltering not only the owner but his retainers and their families. Artisans today occupy its living quarters and promenade atop its ramparts.

Built in the 12th century, the Kasba stands on a cliff above the Bou Regreg River and looks out over the Atlantic.



← Moroccans Prefer Heelless Slippers

Since streets are dirty and sidewalks still scarce in most Moroccan cities, people traditionally remove shoes before going indoors. Shoemakers turn down the heels so wearers can shed shoes quickly at doorways.

Shod in their open-back *babouches*, Moroccans shuffle rather than walk. Men usually wear plain yellow slippers; women's footwear is many-colored and gaily embroidered.

Working in a narrow, closet-like shop at Rabat, this craftsman fashions heavy-soled shoes for street wear. Indoors, Moors put on thin-soled slippers.

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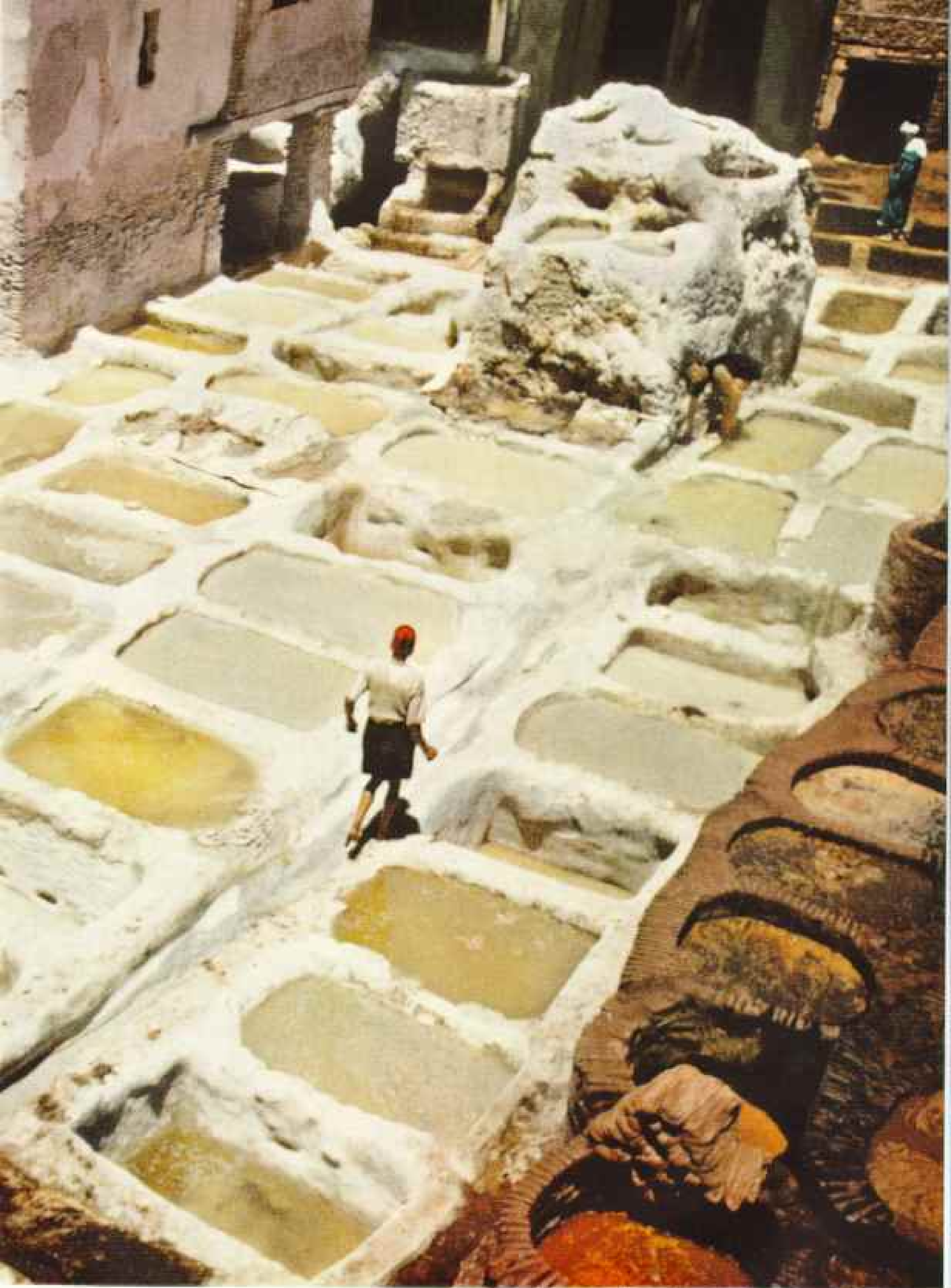
Fès Tanners Soak Sheep Hides in Vats of Tannic Acid to Make Fine Leather

Most Moroccan dyers use chemical dyes, but some still employ bark and plant pigments. Dyed skins are hand-rubbed and stretched over poles. These vermilion hides will make handbags, belts, or books.



Kodachromes by Jean and Franc Shor, National Geographic Staff

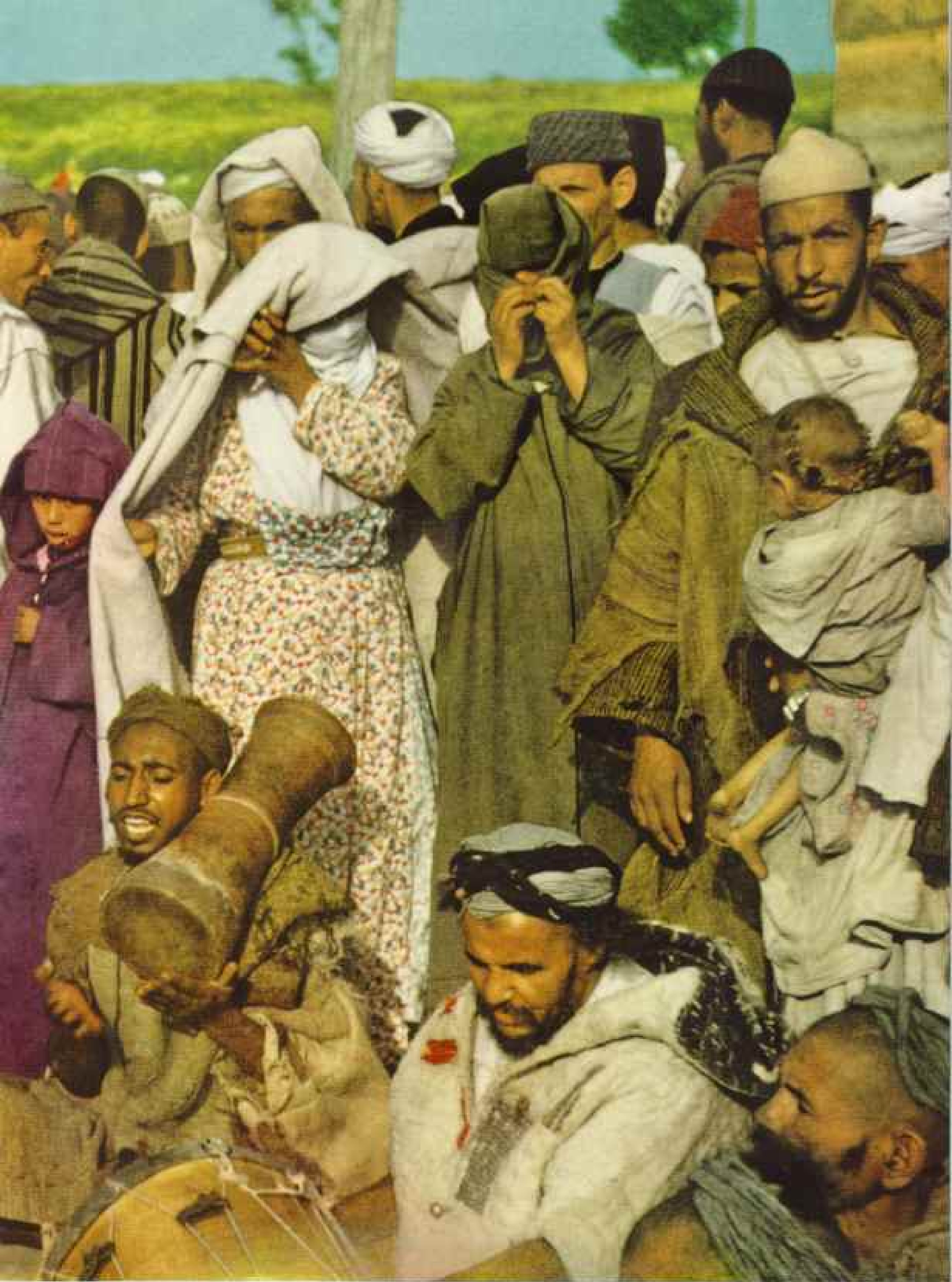
Ignoring the Tannery's Odor, Workers Pace Catwalks Among Sunken Tubs

Trained from boyhood, tanners can judge at a glance when skins are ready. Shaking out the dripping hides, they rub them with wooden blocks to remove wrinkles. Morocco's leather exports brought $3,000,000 in 1953.

© National Geographic Society

Moors Chant and Wail to Throbbing Drums at the Shrine of a Patron Saint

The Aïsaoua sect extols the memory of Sidi Mohammed ben Aïsa, 16th-century Moslem saint and miracle worker. Entire families participate in these periodic rites on a hillside outside the imperial city of Meknès.



Kodachrome by Maynard Owen Williams

Worshipers of All Ages Lay Bare Their Emotions in Frenzied Religious Rites

In former years believers devoured scorpions, snakes, and glass, beat themselves with cactus spines, and tore live sheep limb from limb in ceremonies lasting days. Moroccan authorities have suppressed these practices.

← Old and New Walk Hand in Hand in Fès

A Moslem mother wears an Eastern costume of cloaklike *djellaba* and veil above modern open-toed shoes; her son dresses in Western-type romper suit and sailor hat. "The scene is typical of the change taking place in Morocco," observe the authors. "It can be seen daily in every street in the country."

The American Fondouk → Treats a Sick Donkey

Page 169: Animals of Fès are fed and treated better than those in any other city in Morocco.

Financed by citizens of the United States, the American Fondouk helps the people to care for their beasts. Sick donkeys, camels, mules, horses, and an occasional stork and monkey get free treatment in its veterinary hospital. Pack donkeys and the Sultan's prized Arab mares receive identical care. In 1955 alone the Fondouk examined 132,612 animals.

Staff employees inspect beasts in streets and bazaars daily to enforce laws against cruelty. They give tickets to professional donkey drivers for mistreatment of pack animals. A thrice-warned driver loses his work permit.

An American visitor, Mrs. Amy Bend Bishop of Lenox, Massachusetts, established the Fondouk in 1927. Shocked by the condition of work animals in Fès, she donated funds to build the Fondouk and paid staff salaries for years. Today hundreds of individuals contribute through the American Fondouk Maintenance Committee in New York. French-born superintendent Guy Delon received the ASPCA's Medal of Honor in 1955.

Derived from Greek, "fondouk" means all-receiving; hence, an inn.

Weavers Work → in Cramped Quarters

Fès has many automobiles, but sheiks and sherifs prefer a beautifully caparisoned horse. The making of fancy saddles remains a thriving business. These men weave silken tassels for bridles and martingales. Their loom is mounted on millstones.

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Kodachromes by Jean and Franc Shor, National Geographic Staff

← Moslem Women Prefer Public Fountains to Piped Water

When the French built modern quarters with running water, Moroccan housewives protested. Without twice-a-day trips to fountains, they asked, how could they meet friends and keep up with the gossip?

Mosaic tiles decorate community fountains like this in the holy city of Moulay Idriss. Tens of thousands of Moslem pilgrims camp in tents here during the *moussem*, an annual period of worship. Christians and Jews are forbidden to pass the night within the city's walls.

↓ A Berber woman sorts grain for seed in Ouarzazate, a desert village south of the High Atlas mountains.

Baked bread is uncommon in rural Morocco. The staple article of diet is *couscous*, a wheat cereal. Broken kernels sifted out by this woman will be ground in a stone mill, mixed with water, hand-rubbed into balls, and steamed or boiled.

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Kodachromes by Homer F. Kellems (above) and Jean and Franc Shor, National Geographic Staff

not budge. Shrugging, the driver walked half a mile to a settlement of Zaian tribesmen, fiercest in Morocco. He returned with 18 men.

They pulled and shoved halfheartedly for half an hour. Then, apparently tiring of the useless game, they surrounded our sedan, lifted it clear of the ooze, and set it on solid ground.

With the French Foreign Legion

The landscape looked more like Switzerland than the usual conception of Morocco. Cows grazed in the meadows, trees covered the hillsides. Birds were everywhere—doves, red and black partridges, small woodpeckers, little owls, and swallows. In a 50-yard walk from the car Jean picked 26 varieties of wild flowers. Then suddenly we were twisting down a steep and frightening red-clay road, the mountains fell away, and we entered the hot and dusty streets of Khenifra.

It had been a rough trip, and we were hungry. The Café de France, situated only 20 yards from the gate of the Foreign Legion post at the end of the main street, looked like our best chance. We entered to find that it was payday for the legion, and the room was jammed with lean soldiers in white kepis.

Somewhere I once read that one must never ask a legionnaire his name or where he comes from. They are men with something to forget, said my long-forgotten author, and their past is their own secret.

I was somewhat surprised when a sturdy young German came to our table, introduced himself as Kurt Something from Wiesbaden, and announced he had learned English during two years as a prisoner of war in New Jersey.

Next came a red-haired Frenchman from Lyon, who was more than generous with volunteered information about himself. A former Saarlander also wanted to talk about his past. Jean and I gulped our sandwiches, paid for the legionnaires' beers, and fled from the deluge of confidences. So much for tradition.

Fès: Three Cities in One

The road north was smooth, and the mountains faded into the background. Now there were grainfields and vineyards and well-tended country estates.

Then, at Meknès, we turned east and rolled over increasingly barren country. Traffic, both animal and mechanical, grew heavier. And just before dusk we stepped from our car at the Merinide tombs and looked down upon the ancient beauty of Fès.

Founded more than 1,100 years ago by Moulay Idriss, Fès has always held a special place in Moorish hearts.* Here is the 1,000-year-old Karaouine University, where the professors teach a curriculum based entirely upon the Koran, and where scholars from all the world of Islam once came for enlightenment. Here were the greatest artisans of the Maghreb. The tomb of Moulay Idriss II, one of Morocco's holiest shrines, still draws pilgrims.

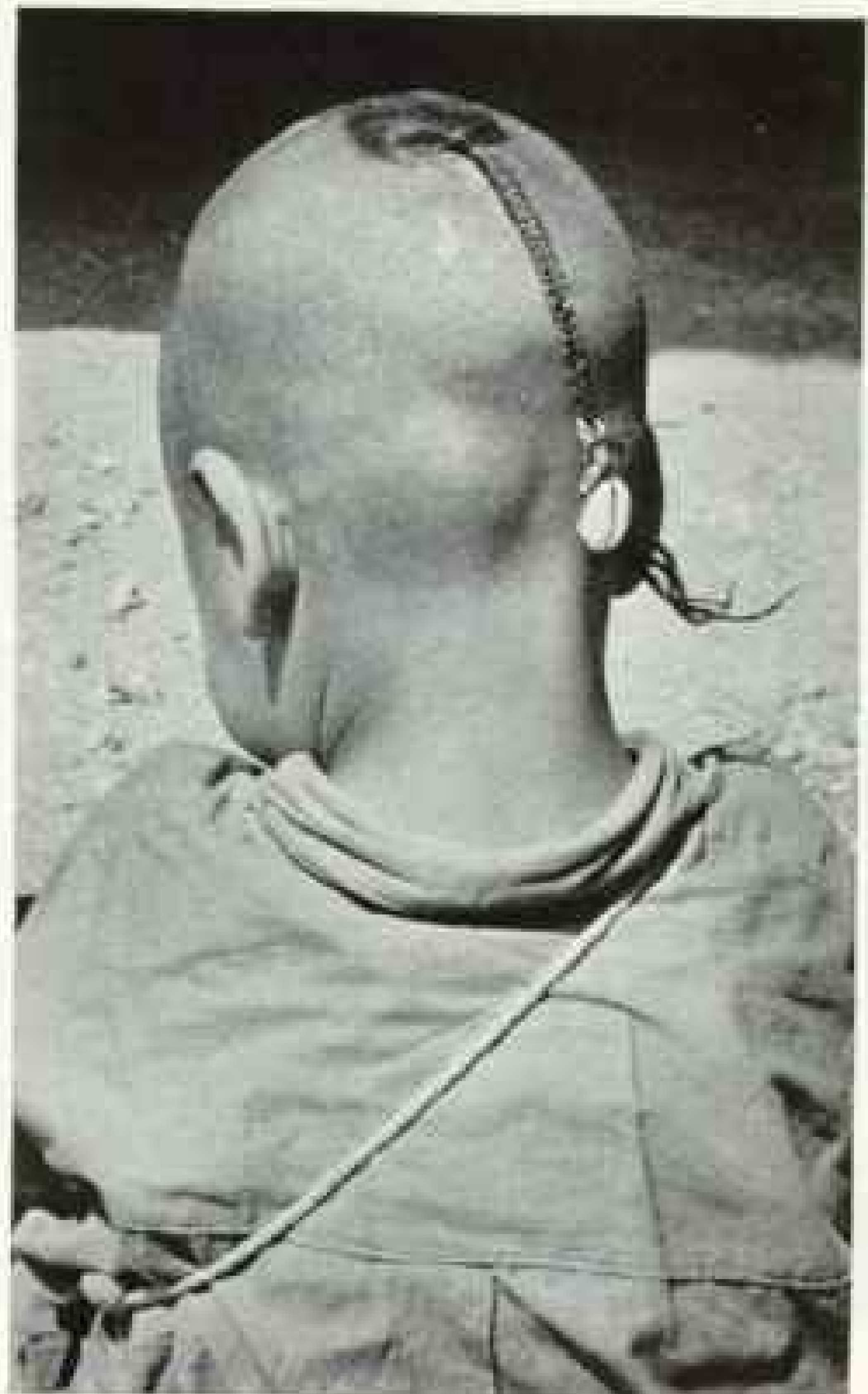
Modern Fès, with 185,000 Moroccans and 15,000 Europeans, is really three cities. There is Fès el Bali (Fès the Old), on a site probably inhabited before the 9th century, and Fès Djedid (Fès the New), so called because it is less than 700 years old.

Europeans make their homes in the Ville Nouvelle (New City). It was Marshal Lyautey, first French Resident General of Mo-

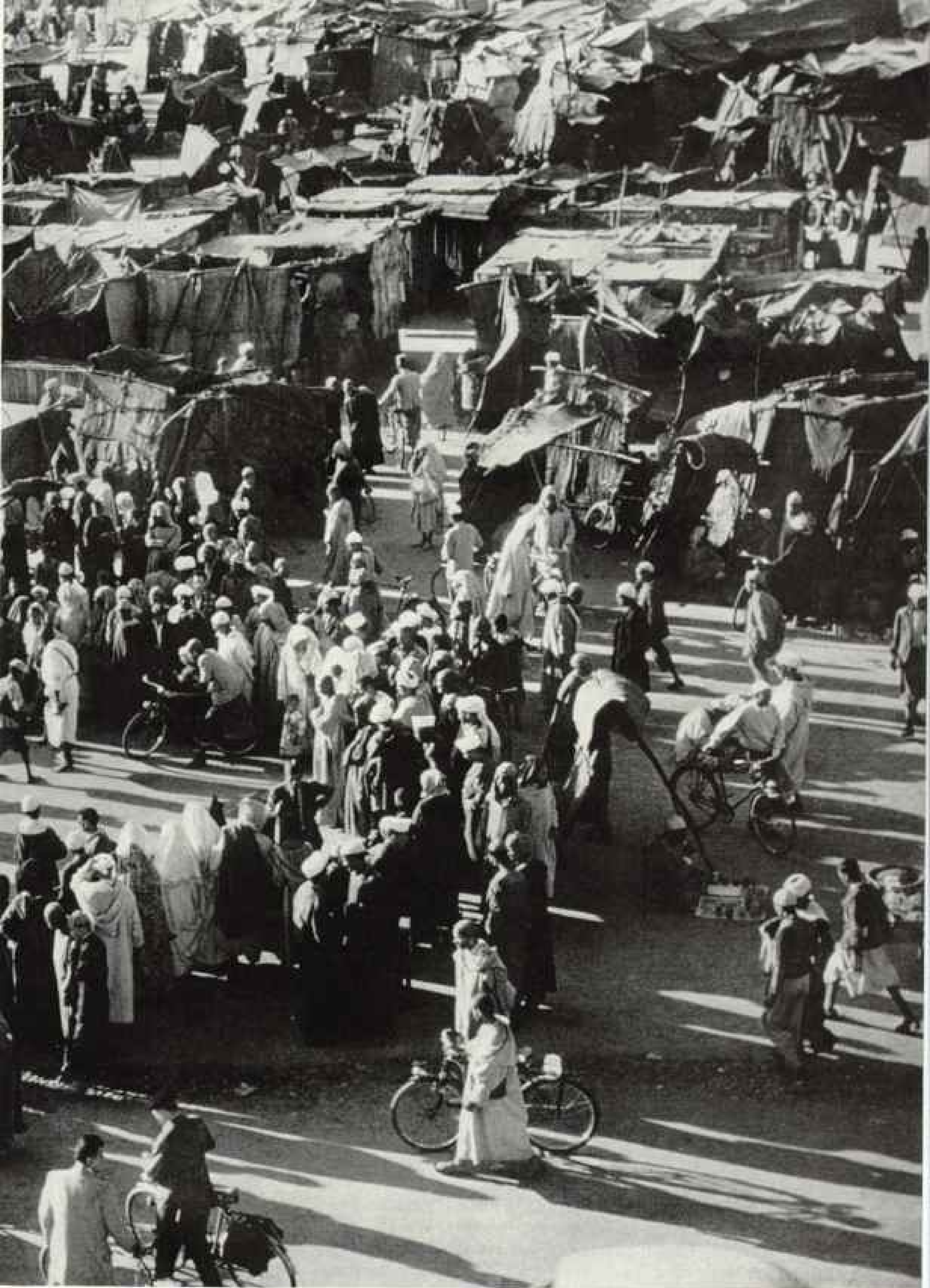
* See "Fez, Heart of Morocco," by Gordon Casserly, NATIONAL GEOGRAPHIC MAGAZINE, June, 1935.

Angels Will Yank This Boy to Heaven by His Queue, Tradition Says

Berber children among the more primitive tribes all wear pigtails. This young fellow plays in the sand at Zagora, on the edge of the Sahara.



Togaed Dancers Tread an Age-old Measure in Marrakech's Storied Djemaa el Fna



Julia Stefanik

Flimsy Stalls Offer Everything from Chewing Gum to Guaranteed Love Potions

rocco, who ordered the New City built some distance from the Moroccan areas, in order to preserve their charm.

We were invited to lunch at a Moorish home. With Richard Andersen, a Dane who came to Fès 19 years ago for a 2-week vacation and has remained ever since, we walked through the unbelievably narrow and twisted streets of the medina. There are no Western-style houses in this medieval bastion, and after we left the market area we moved through lanes so narrow we could touch both sides.

Tea Party with a Prince of Fès

Our host was a prince and a descendant of princes, Moulay Hamid el Alaoui, whose family ruled Morocco from the middle of the 17th century until the present era. Tall, hawk-faced, and black-eyed, he welcomed us wearing a cool gray djellaba, red fez, and heelless babouches of soft yellow leather.

When we had been introduced to him the previous day in the market, he had been courteous but reserved. Now, as we stepped through the arched gate into a tiled patio where blooming roses, carnations, and perennials surrounded a burbling fountain, he took our hands in both of his and greeted us as old friends.

Two girl servants took our hats and camera cases, and Moulay Hamid led us around the flower beds into a large living room which stretched the length of the patio. Low divans lined the walls; a few low tables and hassocks completed the furnishings.

Moulay Hamid presented us to his attractive, unveiled wife, a vivacious woman in her late thirties. Her sparkling eyes and friendly smile translated her soft Arabic into a warm welcome. Then proudly he presented his three teen-age daughters, one in Western dress, the others in long Moorish gowns.

"My oldest daughter studies at the French high school and speaks a little English," he said. "Aysha is one of the 12 girls studying at the Karaouine University. And Zorah here"—a lovely olive-skinned 16-year-old took my hand and smiled shyly—"is at the Arabic high school."

As we seated ourselves on soft green damask cushions, a maidservant entered with a huge brass tray. On it stood an antique English tea caddy, a copper teapot, another copper vessel filled with fresh mint leaves, and a glass jar holding walnut-size lumps of crystallized sugar.

Madame El Alaoui placed a little tea in the copper pot, then stuffed it with a generous handful of fresh mint. The servant poured boiling water into the pot. Our hostess pressed the mint into the water, then dropped at least a quarter pound of the sugar on top. Briefly she stirred the mixture, then added a sprig of lemon verbena fresh from the garden. More sugar was added while we talked.

A circle of tiny hand-painted glasses surrounded the big tray. Madame El Alaoui held the teapot high above one and poured it half full. Critically she tasted the brew, shook her head, added more sugar to the pot, and poured back what remained in her glass. She waited a moment, then poured everyone a glass.

Mint tea is the national beverage of Morocco, and it is delicious. It is sweet to the Western palate, but the pungency of the fragrant mint overcomes any tendency to be cloying. The touch of verbena is a specialty of the El Alaoui family.

The preparation of the brew is a ritual, and so is its consumption. On an afternoon call one must always remain until the third glass—no more, no less—has been drained.

Watching the brewing of the tea cleared up a mystery for me. Studying Morocco's trade statistics a few days previously, I had discovered that sugar was the largest import, both in tonnage and in value. Now I understood why!

Luncheon Starts with Soap and Water

The meal which followed was a banquet. A low table was placed before us, and a servant brought soap and warm water for washing. A number of Moulay Hamid's relatives had dropped by while we visited, and nine of us, including two of the daughters, sat on cushions around the circular table.

Moulay Hamid's clear "Bismillah" asked the blessing of Allah as the first dish was brought. It was half a young lamb, roasted with prunes and onions and olives to a delicious crispness. A plate of cold pickled potatoes, spiced with coriander, and a dish of tomatoes, onions, and green peppers, beaten into a sauce, completed the first course.

Next came a round dish containing four chickens, roasted in a rich butter sauce with piquant Moroccan lemons and green olives. We ate with only three fingers of the right hand, plucking the meat from the bones and dunking crusty fresh-baked bread in the succulent juices. Moroccan manners seem strange

(Continued on page 183)

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Kodachrome by Jean and Franc Shor, National Geographic Staff

"Safi Pottery Would Be Cheap at Twice the Price," a Marrakech Dealer Argues

Morocco is a land of specialization. Most fine leatherwork comes from Fès, silver jewelry from Tiznit, and camels from Goulimine. One village raises cobras for snake charmers (page 153); another trains acrobats for bazaars. Safi produces glazed pottery. This merchant is a Berber, his customer an Arab. Cutlery holders on edge of counter keep tablecloths clean. They are designed for foreigners, not for Arabs and Berbers, who eat with fingers.

© National Geographic Society

Kodachromes by Thomas W. McKnew (above) and Maynard Owen Williams

← Barley Blankets an Irrigated Meadow

French Morocco is not a desert. In variety of climate and scenery it resembles California. Half a million acres are irrigated.

↓ Camels serve for plowing and transport, and are also slaughtered for meat. This grain-laden caravan plods beside the Atlantic en route to Mogador.

↑ Farmers Reap Hay in a Sea of Poppies

Vast fields of wild flowers paint the Moroccan landscape in spring. Jean Shor picked 26 varieties in one mountain meadow. Berbers extract a pain-relieving medicine from the poppy. These cattle graze a valley between Fès and Meknès. Cows often serve as draft animals; sometimes a cow teams with a donkey.

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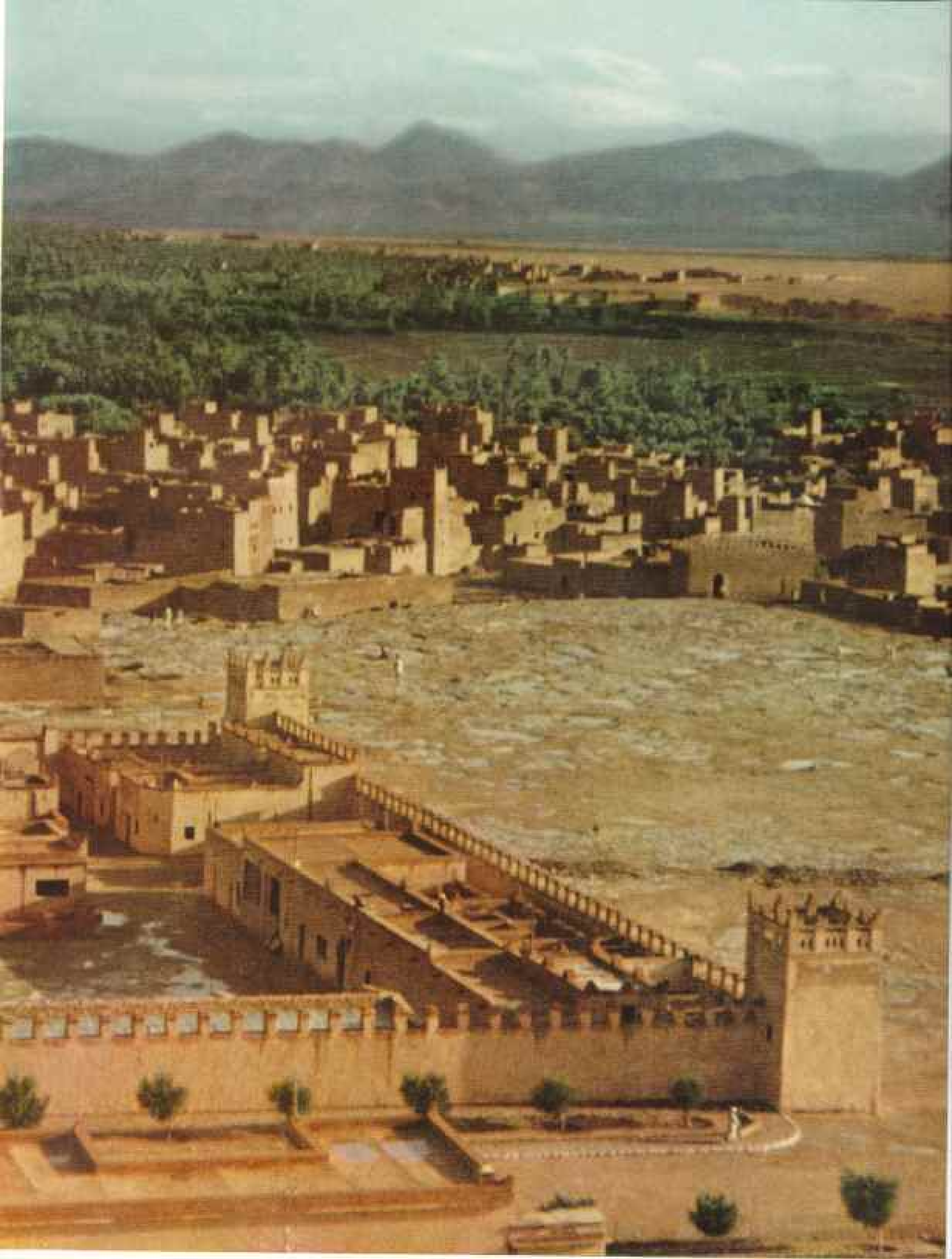
Scenery in Tinerhir Is So Dramatic that Sir Winston Churchill Loves to Paint in This Oasis

Starting at Tinerhir, the oasis cuts a green 20-mile swath through a barren land. It supports some 60 settlements, virtually every one housing a different tribe. In each kasba there is a colony of Jews, who never intermarry with the Berbers, though tradition says they sprang from the indigenous stock. Compound in the foreground garrisons French troops. Its plastered stone-and-concrete walls resemble the tribesmen's mud-and-straw dwellings.



Kodachrome by Philip Hyde

Adobe Apartments and Tenants' Daily Lives Suggest an Indian Pueblo in New Mexico

Living in cell-like quarters, the people cultivate dates, figs, apricots, peaches, olives, grain, and nuts. Many subsist almost entirely on dried dates and mint tea. This landscape is not so flat as it appears; actually the fields stand one above the other in gentle terraces. Green groves are watered by the River Todra; rainfall amounts to less than four inches a year. Sahara's forbidding wastes lie beyond the distant Jebel Sarho range.

© National Geographic Society

Kodachrome by Emil Brunner

↑ Marrakech's "Concourse of Sinners" Combines Market, Theater, and Circus

By day, vendors hawk grilled camel liver, sticky sweets, and hot mint tea, while barbers, cobblers, medicine men, and scribes solicit the trade of visiting caravaneers. Sunset, gilding the Koutoubia's tall minaret (upper left), sweeps away merchants and brings on entertainers. Dancers, singers, and acrobats then perform to throbbing drums and wailing flutes; magicians, soothsayers, and storytellers enthrall turbaned circles. The square is called Djemaa el Fna (Concourse of Sinners) because the heads of criminals used to be impaled on walls here.

→ Pajamalike suit and tasseled hat identify a water vendor, a familiar sight in Moroccan markets. He sells a cup of water for less than half a cent, but if a beggar beseeches him in the name of Allah, he is bound to give freely. Since his goatskin bag is greased to prevent leakage, the water tastes oily. A bell at the man's knees commands attention and scares "devils."

← A gift of candy coaxed this picture from the Goulimine girl, who spins wool on a hand bobbin. Her friends, spying the loot, rushed to offer themselves as models. Goulimine, in extreme southwestern Morocco, is the home of the Berber Blue Men, so called because their skins absorb dye fading off blue garments.

↓ Two young women of the Ait Haddidu tribe lead lives as primitive as their hand-turned gristmill. Striped cloaks identify a clan near Imilchil in the High Atlas.

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Vivid Skeins Festoon the Street of the Dyers in Marrakech

Newly dyed wool drips from walls (inset) and bamboo poles slung from roof to roof. On some days the street shrieks with a single color; veritable rainbows appear at other times. Dyers' arms and feet match the day's orders. Within the shops, huge vats steam with bright liquids.

to the uninitiated, but they certainly let you enjoy the full flavor of a dish.

The tattered carcasses of the chickens were replaced with the huge dish of the traditional couscous which ends the meal. Moulay Hamid searched out the choicest pieces of lamb to place on Jean's plate. With the couscous we were served spoons, the first utensils we had seen at the meal.

Soap and water appeared once more, and we washed. The maid brought cups of thick black coffee in which floated rose petals. Then she produced a silver vessel with a long neck, which she held out toward Jean. Thinking it was for the coffee, Jean extended her cup.

"*La, la*, (no, no)," the little servant laughed. She seized Jean's free hand and sprinkled it with rose water from the silver spout.

Jean Shor Tries Moorish Garb

Any strangeness had long since disappeared, and the daughters suddenly decided it would be fun to dress Jean in their own Moorish clothes. We all trooped across the patio to a huge bedroom, where they pulled bright garments from a large carved chest. They slipped off her shoes and replaced them with embroidered red slippers with pointed toes. Then a magnificent *kaftan*, a full-length gown of rich blue silk brocade, was slipped over her dress. An overdress—a *foquia*—of filmy silk covered the kaftan. A veil was draped just below her eyes (page 187).

The girls proudly led Jean into the room where Madame El Alaoui was entertaining some women friends. Shrieks of laughter rang across the courtyard.

Moulay Hamid smiled.

"They'll chatter all afternoon," he said. "Let's go to my shop."

We walked to the Bab Moulay Idriss, the Alley of Sanctuary. In this narrow passageway outside the Mosque of Moulay Idriss, thieves and murderers and political refugees are traditionally safe from arrest. The mosque provides dormitories and a daily loaf of bread for those who seek refuge.

"It's really a very good business street," said Moulay Hamid as we shouldered our way through the jam of men, many of whom held wrist watches, copper pots, or bolts of cloth above their heads, crying them for sale. "No one ever commits a crime here."

I believed him, but kept a tight grip on my wallet. He unlocked a door, and we entered a cubbyhole 6 feet wide and 8 feet deep, the walls lined with bolts of cloth from France, Italy, England, and Germany. Moulay Hamid excused himself for a moment.

"How can he support that luxurious household with this little hole-in-the-wall?" I asked Andersen.

"He doesn't," laughed the Dane. "Remember that Moulay Hamid is a prince. He has inherited money and property. This shop is really his club!

"You see, in spite of what you may hear about the submission of Moslem women, they are the actual rulers of their own homes. A man has very little comfort there. If his wife has visitors, he must stay in his own room. He can't cross the patio—might meet an unveiled guest. He can't ask his men friends or business acquaintances to his house—that's his wife's domain."

Moulay Hamid returned and ordered coffee from a street vendor. Half a dozen of his friends dropped in during the afternoon to chat and sip a fragrant cup. An occasional customer entered, but the business done was most casual. We sat until the call for evening prayers—the men in the shop, the women in the home. Basically, it seemed not a bad idea.

Though there is leisure and culture and an air of remote charm in Fès, the atmosphere in near-by Meknès is quite different. Here the streets are wider, the shops more brightly lighted, and people move quickly and purposefully. This is a businessman's town.

Meknès sits massively on the high plain of northern Morocco, encircled by the Maghreb's most fertile soil. It is a trading and mercantile center and a factory city. One of the four imperial towns, it lacks the charm of Fès, Rabat, and Marrakech. But, like its more fortunate sisters, Meknès has known glory.

Meknès Built to Rival Versailles

Meknès es Zeitoun—Meknès among the Olives—it was called by the Berber Meknassa tribe when they founded it many centuries ago. But it was Moulay Ismail, the incredible "Black Sultan" of the Alaouites, who chose it for his capital in 1672 and gave it fame.

"There are 141,000 people in Meknès," a Moroccan friend told us as we walked through the massive Bab el Mansour gate, "and a fourth of them claim descent from Moulay Ismail. They may be right—he left 867 living children. Quite a family, especially when you consider that most of his daughters were strangled at birth."

It was the Black Sultan who decided to build at Meknès a city rivaling the Versailles of his contemporary, Louis XIV. With 30,000 Moroccan prisoners and 25,000 Christian slaves he built palaces and government buildings of enormous size.

"He was the most bloodthirsty ruler Morocco ever had," said our friend. "He prided himself on his swordsmanship. For practice he used to cut off the head of the slave who held his stirrup while he mounted. His harem held thousands of women, but never the one he wanted most.

"He asked Louis XIV for the hand of his widowed daughter, the Princess of Conti, known as the most beautiful princess in Europe. There is a story that Louis offered to consider the matter if Moulay Ismail would become a Christian and convert all Morocco. You can imagine how far that idea got."

Meknès is no Versailles, but it is prosperous. And a few miles north of the city we visited one of the most interesting projects in Morocco, the Dkhissa area of the Secteur de Modernisation du Paysanat, a French Government agency devoted to improving the farming methods of the Moroccan tribes.

Farmer Drives American Combine

Jean Darré, a lanky young Burgundian graduate of the French Institute of Agriculture, greeted us at the headquarters of the 10,000 acres under his control. We climbed into his jeep, and a few minutes later stood beside a field of ripe wheat, where a turbaned tribesman operated a new American combine.

"The people here love machinery," said Darré. "They learn to operate it quickly and give it excellent care. When we started here in 1945, we had trouble getting them to accept modern methods. Now our trouble is getting enough equipment for the whole tribe."

The Dkhissa, a Quech tribe numbering about 4,000, came from eastern Morocco 150 years ago. Fierce warriors, they were brought to Meknès by an Alaouite sultan to defend his imperial city. In return, they were given 15 square miles of rocky land covered with palmetto and camel thorn.

The French began their modernization program in 1951. The first year's yield from the modern methods amazed the Dkhissa. It amazed even the French experts!

"We were lucky to get good rains at the right time," Darré explained. "Made a yield of better than 35 bushels of wheat to the acre on land where even goats had found trouble grazing. When the Dkhissa saw what could be done with the soil, they flocked to learn."

With the farming revolution well established, the SMP brought in a team to work on the social side of the problem. A doctor, a nurse, and three schoolteachers set up shop. The Dkhissa took to the medical care with wild enthusiasm, but were leery of the school.

"Only a few children came the first year," a teacher told us, "but their parents were so pleased with what they learned that they became our best salesmen. Now we're building a second school."

© J. Bellis

Pilgrims Display Daring Horsemanship at Moulay Idriss, Holy Soil to Moslems

So sacred is the city that no Jew or Christian may spend the night. Typically Berber, the tent's striking pattern resembles rows of slender-necked vases, each with a crescent stopper.

We asked Abdul ben Mohammed, a 60-year-old member of the Dkhissa tribal council, how the Dkhissa liked the SMP team's work.

"They were sent by Allah," he answered. "When they came we were suspicious. And our neighboring tribes laughed at us when we signed the agreement.

"'You are fools and the sons of fools,' they said. 'Why should the French wish to improve your land if they do not plan to take it for themselves?'

"Now it is we who laugh. For this year they have asked the SMP to come to their land, but there is not yet enough equipment. So they must wait. And they will walk to the great festival at Moulay Idriss, but we will go

mounted as befits men, riding noble horses."

Possession of a horse, Darré interjected, is a symbol of prosperity among the tribesmen.

"At first we tried to discourage the Dkhissa from putting their surplus cash into horses. Mules are more practical. But it turned out to be wonderful propaganda for our program."

The annual pilgrimage to Moulay Idriss, sacred city of Morocco, is the big event in the life of the tribesmen. Each wants to put on the best possible display.

Dkhissa Gallop in Glory

"The Dkhissa have always been known as a poor tribe," said Darré. "They walked to Moulay Idriss, or rode donkeys. Last year, when more than a hundred of them galloped up on fine horses, it created a sensation. Every other tribe wanted to know what had happened. When they found out, they came to see us.

"There are 57 SMP units working in the country right now, and we have a big backlog of applications. I think we've become part of Morocco."

It is not only Government employees, however, who have become "part of Morocco." Many of the country's 363,000 non-Moorish inhabitants are French colonists.

Some of these families are now in their third generation, their children speaking Berber and Arabic as fluently as they do French. Most are in business in the cities, some are miners, but many are farmers. Their energy and hard work have created magnificent vineyards, orchards, grainfields, and dairy farms where only goats grazed 40 years ago.

Twenty miles from Rabat we visited M. and Mme. Jean Imbert. "Koudia" (The Hill), their 4,000-acre property, is regarded as a model farm in the area. We asked what first brought them to Morocco.

"The lure of creating something in a new country," said M. Imbert. "It was 1922, and I was in the steel business. We were just married, and it seemed a good time to start."

For years the Imberts spent part of their time in Morocco, learning the operation of their newly purchased farm. When they were convinced they could make a go of it, they became permanent residents.

The Imberts' farming venture has been successful beyond their hopes. Irrigation, crop rotation, and diversified farming have turned the hillside into a great garden. There are orange and plum orchards and a grove of eucalyptus for pulp. Corn, wheat, and oats are rotated in the cultivated land. A herd of 150 cows, a cross between the French Montbeliard and the Indian Zebu, produces a heavy annual crop of calves which are sold for veal.

"We built this ourselves," Mme. Imbert said proudly. "If we hadn't put our work and a lot of our lives into Koudia, it would be just another barren hillside. We belong here."

Mme. Imbert is as concerned with the 20 Moorish families who work on the farm as she is with her own property.

"Every family is given a cow and a calf, plus a piece of ground for farming. We've built a Turkish bath and hired a Moroccan teacher for the children."

There had been violence in the neighborhood recently. Settlers' fields had been set afire, and threats had been made against families. I asked Mme. Imbert if she had considered leaving Koudia.

"Certainly not," she said. "I belong here. I am not afraid. Why should anyone wish to harm us?"

We had, we decided, traveled enough to have a comprehensive picture of today's Morocco and its people. We moved into a tiny apartment in the Kasba of the Oudaias, the oldest part of Rabat. We were almost the only Westerners there. The capital spread beneath our windows, and across the Bou Regreg River the old pirate port of Salé lay white in the sunshine. Jean, doing her own shopping, found everyone friendly, eager to help bridge the language gap. I called on Moorish scholars and French Government officials, seeking facts on Morocco and its problems.

Population Doubled in 50 Years

Prof. Jean Célérier, of the Institute of Higher Moroccan Studies, told me of the remarkable growth of Morocco's population.

"There are more than 8,000,000 people in Morocco today, more than double the 1900 figure," he said. "Some 363,000 are Europeans, 200,000 are Moroccan Jews, and the rest are Moslems.

"Racially, about half the Moslem population is Berber and speaks one of the Berber dialects. The rest are Arabs. But since the arrival of the French, the Arabization of the Berber population has proceeded more rapidly than before."

A French official in the office of the Resident General explained the way in which the Protectorate operates.

Moorish Teen-agers Deck Jean Shor Fès-fashion

These dark-haired daughters of a Moroccan prince delight in creating glamorous dresses on their American sewing machine. Mrs. Shor here models a rich brocade *kaftan* beneath a lacy *foquia* (page 185). Her hostesses usually wear such head scarfs turban-style.

Lower: On the streets, Moroccan women hide beauty and plainness, youth and age, wealth and poverty beneath the all-enveloping *djellaba* and veils. In Fès, the Paris of Morocco, this striped djellaba is the equivalent of a Dior creation. Mrs. Shor conceded that her veil established an aura of mystery but found that it made breathing a little difficult.

"The important thing," he stressed, "is that this is not a colony. The French assumed the Protectorate in 1912 at the request of the Sherifian Government. That government is still in existence.

"All the most important towns are administered by pashas nominated by the Sultan. A French administrator assists each pasha, but official acts are in the Sultan's name."

More than a year ago Sultan Sidi Mohammed ben Youssef was deposed; the present ruler, Sultan Sidi Mohammed ben Moulay Arafa, replaced him. The ouster of the old ruler touched off a wave of riots throughout the country, and his restoration is still a principal demand of the Istiqlal Party.

There are thousands of American airmen in Morocco today, stationed at Sidi Slimane, Nouasseur, and Ben Guerir Air Bases. General Dougher, who first impressed on us the importance of Morocco to America's security, gave us a clearer picture of the work they do.

"The function of the Moroccan complex of bases in the event of war," he said, "is to support the air offensive launched by Strategic Air Command, of which Gen. Curtis E. Le May is Commander. Morocco is one of our most important forward areas."

Equally important, the General stressed, is

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Newlyweds Among the Ait Haddidu Receive Certificates of Marriage at Imilchil

Some tribesmen in the High Atlas accept Islam but not Koranic law. Native Customary Law, as administered by the French, permits divorce simply by a return of the marriage settlement (page 162).

the training function of the African bases.

"Sidi Slimane serves as a center for shakedown operations and intensive training for units which have completed their preliminary training at home."

Morale is no problem in Morocco, the General told us.

"I think it is as high or higher here than in the United States," he said. "This is a developing base, with a lot of interesting work. That's always good for morale."

The vapor trails of the jet bombers are a constant source of wonder to the Moorish population of the countryside. In Tazenakht, far to the south, Jean and I had squatted with a Berber family at the door of their kasba, looking up at the silvery trails.

"The Americans are trying to make rain," the Berber father informed us solemnly. "They can make clouds, but they cannot make it rain. Only Allah can do that. Still, they are trying to help us!"

He was right, but for the wrong reason. The Americans aren't trying to make it rain, but they are there to help him. Those bases help protect the entire free world. Morocco, our new neighbor, is part of that world. American and Moor are helping each other.

Cities Like Worcester Make America

From "the Village Blacksmith" to New England's Largest Inland Metropolis, This Community Has Grown with Industry and Yankee Ingenuity

By Howell Walker

National Geographic Magazine Staff

A WHITE man sat down with a few Indians and smoked a pipe of peace. For 8 square miles of land he gave them 2 coats, 4 yards of cloth, a little money. The trade cradled the city of Worcester a century before the birth of the Nation.

But that bargain went up in smoke when red men burned the first huts. Wilderness regained its grip on Massachusetts' "Far West" frontier, 40 miles from Boston; over the ruins hung the silence of subsequent years. Then daring settlers tried again.

The lure of greener fields urged colonists to push inland from the crowded coastal strip. And Worcester, like so many other New England towns, took root despite death and captivity at savage hands.

Persistence, Resistance, and Success

Hardy pioneers named the village for their English city where Cromwell fought and won the last battle against Charles II. Puritan determination developed it for "the better convenity of attending God's worship, the better education of their children, and for the better accommodation of the tradespeople." To these precepts Worcester has always subscribed.

The city's background is the Nation's. A marker near the site of the earliest log cabins sums up chapter one: "The first settlement of this lonely region called Quinsigamond was attempted in 1673, but abandoned during King Philip's War. A second settlement, attempted in 1684, soon named Worcester, was also temporarily abandoned because of Indian hostility. Permanent occupation was effected in 1713."

In a pleasant valley among the gentle hills of central Massachusetts, the city today goes about life in much the same way as any other American community its size. As an industrial and educational center, the seat of Worcester County fairly represents New England.

For weeks I watched Worcester at work. Its impressive output of high-precision machine tools, steel and wire goods, forgings of aircraft and automobile parts, grinding wheels, and plastic whatnots amounts to an industrial revelation. But it was good to find a mid-city smith hammering at an old-fashioned anvil.

Around the village blacksmith Worcester took shape as naturally as a house around its chimney. Some 700 manufacturing concerns have grown up within its municipal area. A population of 205,000 ranks the city third in New England, surpassed only by Boston and Providence, Rhode Island.

Half the employed population works in factories. Nearly everyone goes to church. Thousands attend 109 schools and six colleges.

Sleek apartments are replacing outdated three-decker tenements. Well back from elm-arched streets ramble handsome homes founded on steel, barbed wire, envelopes, looms, emery wheels, firearms, boots, brains—and honest, hard labor.

Worcester's strong tradition of craftsmanship—work expertly done by hand—has never let the Machine Age take the human touch out of its industry. This, plus a vigorous civic spirit and far more than idle interest in culture, makes Worcester tick evenly as the heart of the Commonwealth.

Yankee Ingenuity Finds a Way

In 1685 the village began its industrial career with completion of the first gristmill. For the next century it lived quietly by agriculture and simple household crafts. During long winter months farmers tanned leather, made shoes, furniture, and other necessities. Much of their handiwork they traded at fairs.

Unable to obtain tools, machinery, and technical secrets from abroad, the colonial folk worked things out with Yankee ingenuity.

The town became a key center in a system of stagecoach lines covering the eastern part of the new Republic. But universally bad roads, often impassable in winter, discouraged movement of heavy goods.

In a bold and expensive project the inland community backed the digging of a canal to

link Worcester with Providence, seaport of Rhode Island. Opened in 1828, the Blackstone Canal closed after a short but full life of 20 years. It introduced cheap transport of weighty freight and invited enterprising firms to settle in Worcester.

Railroads took over from the canal they killed; local trades gained momentum as steam heralded a new age of power.

Inventors Crowd City's Hall of Fame

Creative minds from the Worcester area revolutionized manufacturing around the world. As early as 1793 Eli Whitney invented the cotton gin; he also standardized parts of other products and opened the way for mass production in America. Elias Howe in 1846 patented the first lock-stitch sewing machine. In the 1850's a physician, Dr. Russell L. Hawes, designed machinery for folding paper into envelopes; Erastus Bigelow invented a power carpet loom; Thomas Blanchard turned out a new type of lathe for irregular forms and experimented with steam power.

The first piano wire made in America came from a Worcester mill. Here originated the steam calliope, the street lunch cart, and, some say, the first Valentine greeting card in the U. S. In 1843 Charles Thurber improved the typewriter, effecting a letter-spacing principle still copied today. A graduate of Worcester Polytechnic Institute developed one of the first American gasoline-engined automobiles. And in 1926 a Clark University physics professor, Dr. Robert H. Goddard, first successfully projected a liquid-fuel rocket.

The city's hall of fame contains names of other notables. Here was the home of George Bancroft, eminent historian and father of the United States Naval Academy. Clara Barton, mother of the American National Red Cross and its first president, was born near by in Oxford and closely identified with Worcester.

Immigrants—Swedish, Irish, French Canadians, Italian, Lithuanian, Polish, and others—supplied much-needed skills and manpower. Eventually, elements of almost all nationalities that make up America's population added their flavor to this melting pot.

Big businessmen built factory blocks and rented space and power to small concerns just getting started. This encouraged the little man. If he had an idea, he could begin a project without large outlay of capital.

Worcester still shows intrinsic respect for craftsmanship. Call it art in industry, personal pride in product, or what you will. Here it has endured from the pioneer days of Yankee ingenuity to the know-how of now.

"Worcester really is an industrial museum," the vice president of the Worcester Historical Society told me. "All our big works started here in a small way. It is rewarding to trace their progress from the first rough tools to our streamlined mass production."

Some individual factories have their own special museums. The Worcester Pressed Steel Company contains the John Woodman Higgins Armory—a remarkable exhibit of man's metal products. It demonstrates the history of the metal craft.

In one long room duplicating the great hall of a Gothic castle in Austria I admired a fabulous assembly of arms and armor (pages 194-197). An adjoining hall displays modern steel products: parts for airplanes, automobiles, typewriters, and torpedoes—all made on the premises.

Mr. John Woodman Higgins, Chairman of the Board of the Worcester Pressed Steel Company, traveled widely to collect and arrange his industrial museum. Its object, in his own words: "To inspire steel workers, to attract superior craftsmen, to stimulate functional art in industry, to improve steel craftsmanship, to inform the public regarding the history of steel, and to preserve the best examples of steel craftsmanship for future generations."

Shining Armor Shows Early Steel Craft

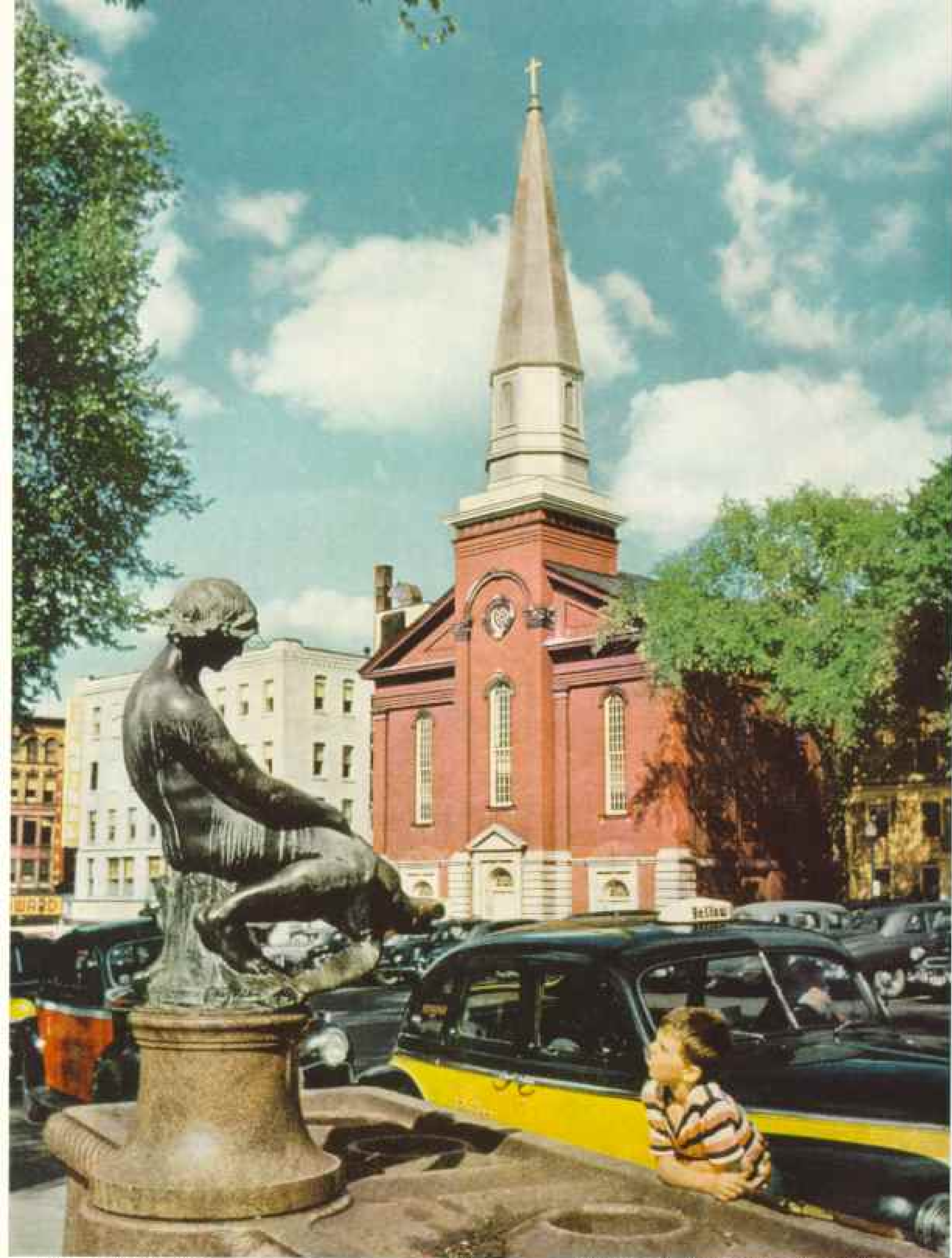
Drawn by the glittering array of armor, I visited and revisited the varied collection. I saw the foot soldier's standard uniform of 500 years ago, the ornate protection worn by a reigning prince, and a group of 16th-century knights mounted on chargers.

In the up-to-date wing a metal airplane hangs above an auto chassis, which is 90 percent pressed steel. Exhibits show the company's successive operations in the manufacture of propeller domes for battle planes.

Ordnance Department experts studied this armor collection during World War I, and the plant produced thousands of steel helmets.

Here hangs Jan Brueghel's master panel, "The Forge of Vulcan." It shows Venus and Cupid assisting Vulcan at his anvil and furnace; they make tools and products like those exhibited in the museum's cases. Walls of the 17th-century alcove carry portraits of kings in fancy parade armor, while the modern gallery

(Continued on page 199)



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Worcester Taxis Park by a Fountain Where Thirsty Dray Horses Used to Drink

Seven hundred manufacturing concerns crowd Massachusetts' second city. Worcester men are credited with many important inventions and industrial advances. Inventors Eli Whitney and Elias Howe were born close by. The city is celebrated, too, for its six universities and colleges and its notable museums. Forty-seven denominations maintain 138 places of worship. Salem Square Covenant Church (above) stands in the heart of Worcester.

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A Giant's Suit of Armor Tops a Roof Corner of Worcester Pressed Steel Company's Glassed-in Plant

Producer of parts for cars, planes, radios, and torpedoes, the factory contains a remarkable museum illustrating the history of steel (pages 194-197).

Lifesaving Rafts Shout "Help!" with Dazzling Hues

One Worcester firm makes these rubber boats; another fits them with accessories for the safety and comfort of air crews downed at sea.

←Girls at the Patten Company, Inc., show a single-seat raft. Six-man types are stacked in the background. All stow food, paddles, sea anchors, flares, and other necessities. The raft's stenciled instructions say that the sea anchor, a sort of bucket attached to the bottom, should be trailed to reduce drift and to head into wind. When paddling, the occupant collapses the anchor by pulling a cord.

→A sewing-machine operator stitches waterproof material for paulins and ponchos at the French Manufacturing Company's plant; the man models the finished product. This material can catch rain for drinking, ward off blistering sun, and break chill winds. Fluorescent lining helps survivors attract attention.

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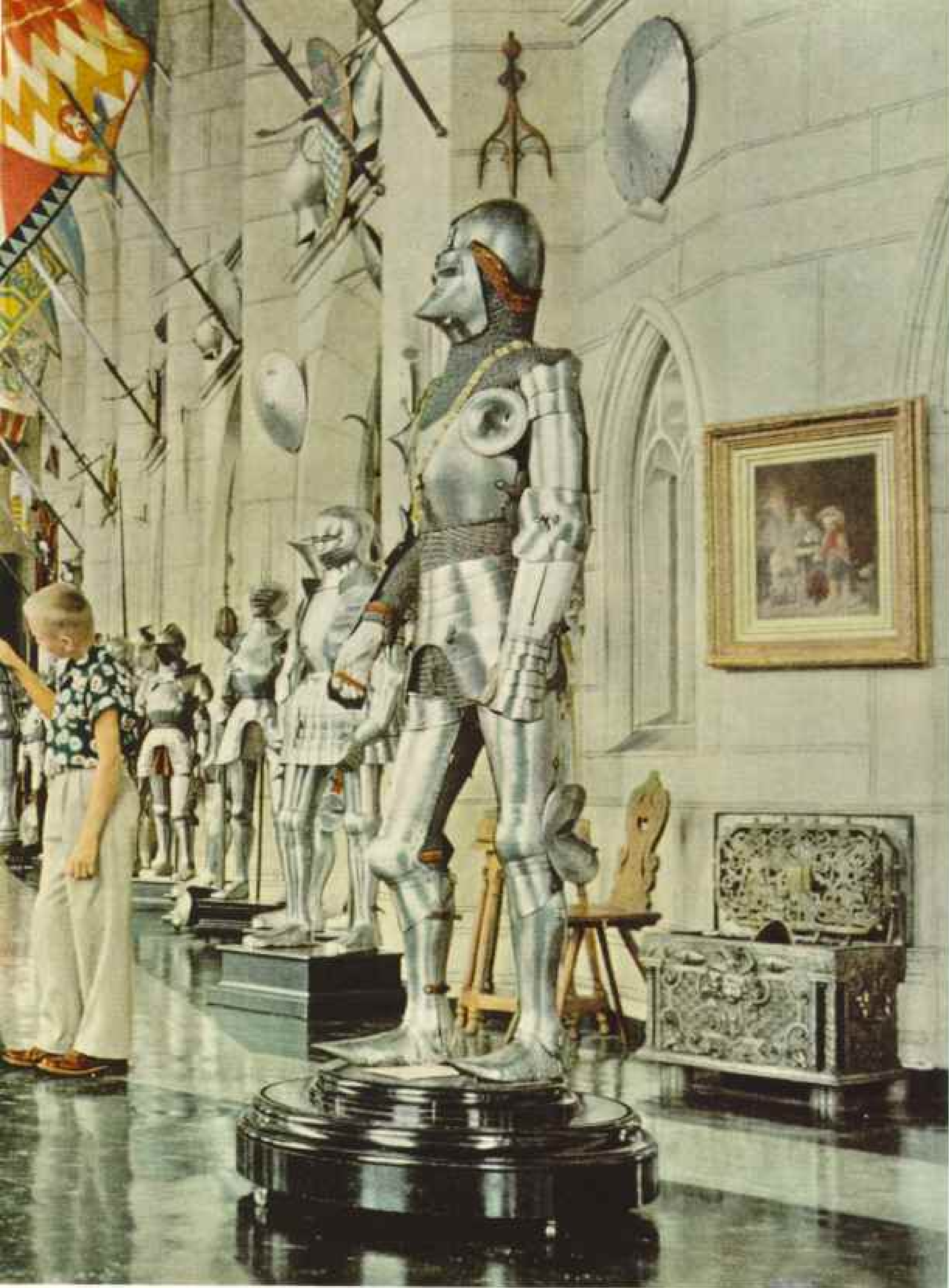
Steel Suits of Old-time Knights Seem Ready to Stir with a Trumpeter's Call to Battle

Worcester Pressed Steel Company (page 192) preserves hundreds of examples of the armorer's art. This museum within a factory duplicates the great hall of a Gothic castle in Austria.



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A Young Visitor Examines the Ceremonial Armor of an 8-year-old Noble

Knights on chargers ride to jousts (rear). Even the plumed hunting dog (left) wears steel for defense against wild boars. A fully protected knight sometimes carried up to 100 pounds of armor.

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↑ A 16th-century Cavalier of the Spanish Court Rides His Charger in Full Panoply

School children visiting the museum find no do-not-touch signs because the owner wants them to get the feel of steel. Touring the mills in an adjoining building, they watch giant power presses forge metal for modern use.

← Page 196: A warrior from India wears nose guard, mail, and breastplate for protection. The stained-glass window is in 13th-century French style. Old World weapons form the lethal collection on the wall.

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↑ Worcester Polytechnic Institute Channels Yankee Ingenuity

One of the country's foremost engineering colleges, WPI offers courses in civil, mechanical, electrical, and chemical engineering and in physics and chemistry. Higgins Mechanical Engineering Laboratories (above) were completed in 1942, the school's 77th year.

↓ "The Rest on the Flight into Egypt" Enriches Worcester Art Museum

Quentin Massys, a Flemish Renaissance artist, created this painting as one of seven panels for the altarpiece of a convent in Portugal. His Bethlehem (right) and Jerusalem (on cliff) bear a strong resemblance to medieval Europe. This work was done about 1512.

has as many pictures of contemporary craftsmen at their machines and furnaces.

Adjoining the museum, the steel factory also invites visitors. Among the mass of machinery, I watched giant power rolls and presses accomplish in seconds what medieval armorers would have taken months to finish by hand.

Worcester's diverse industries are mostly home-owned, not uncommonly managed and manpowered by generations of the same families. They usually follow the old American custom of plowing back profits. With a generous civic spirit, many direct part of their earnings to local hospitals, art museums, and educational facilities.

WPI Trains Industry's VIP's

"Industry made Worcester Polytechnic Institute possible," said its late president, Rear Adm. Wat Tyler Cluverius. "And as long as the engineering college maintains its high standard, it will hold the interest of industry."

Established in 1865, WPI rates high among the Nation's engineering colleges. Its alumni have pioneered in steel, automobiles, aircraft, machine tools, railroading, shipbuilding, electrical communications, chemical research, oil, rubber, and abrasives (opposite). An annual enrollment of 900 represents every section of the globe.

The first instructor and superintendent of the institute's machine shops designed valves for an early plunger elevator and started several highly successful manufacturing plants. These include Worcester Pressed Steel and the Norton Company. He was Milton Prince Higgins, known as the father of the public trade school movement in America.

Entering the Worcester Boys' Trade High School, I paused by a bronze plaque. Under "The Philosophy of Learning a Trade" appeared this simple wisdom: "To make a good living; to have a happy family; to make preparation for hard times; to wear overalls in the shop with the same dignity as good clothes are worn on Sunday . . . this is the wholesome philosophy of learning a trade. Milton P. Higgins."

From what Higgins began in 1910 has materialized one of the best equipped training centers of its kind in America. Its courses lessen the need for factory apprenticeships. Its shops have trained hundreds of skilled mechanics for industries like Norton Company, Worcester's biggest industrial concern and the world's largest manufacturer of abrasive products.

In April, 1953, Norton Company added to its already enormous factory a $6,000,000 precision grinding machine plant spreading over 6½ acres. Two months later a tornado swept through Worcester, leaving the newly built division roofless and littered with debris; the repair bill ran to a million dollars.

"But machines were back in production within 69 hours," said Norton's public relations manager. "And by September, 1953, the plant was as good as new."

That tornado, with twisting winds up to 350 miles an hour, left 90 persons dead, 10,000 homeless, and $50,000,000 worth of damage.

Norton Company grew out of a potter's shop that successfully bonded natural emery with clay and fired the mixture in a kiln. So began the era of the emery wheel—an improved version of the age-old grindstone. Later, the company pioneered grinding with diamond.

Norton now turns out enough grinding wheels to allow every man, woman, and child in Worcester a different type, size, or shape. They range from drills tiny as a dentist's to 10-ton pulpstone wheels 6 feet in diameter.

Pulp Wheel Grinds 40 Cords a Day

"Most mechanically produced pulp for paper is ground with our stones," said a Norton research man. "A large one can grind 40 cords of wood a day."

Another Worcester manufacturer materially helps the paper industry. Rice Barton Corporation, established 117 years ago, has probably built more machines for making newsprint than any other company in the paper machine manufacturing field. In fact, the firm forged, cast, and finished the machinery that makes and coats the pages of the very magazine you are reading.

"It takes from 9 to 18 months and about 400 workers to complete just one of the machines," said a representative. "Selling prices are as high as $2,500,000 for a large machine."

Shortly before 1850 a local doctor, Russell L. Hawes, became so interested in mechanics that he abandoned his medical practice to work for Rice Barton Corporation (then known as Goddard and Rice). A few years later he patented a device for making envelopes. Thus began an industry new to Worcester and to the United States. Prior to Hawes's achievement, Americans usually just folded a letter and sealed it with wax.

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↑ **Mother Goose Readers Crowd a Bookmobile**

Worcester Free Public Library dispatches this vehicle to all parts of the city. The library on wheels follows a schedule; both young and old watch for its arrival. It circulates 155,000 volumes annually and has shelf space for some 2,000.

← Boys and girls learn about the insect world at a nature training school sponsored by the Worcester Natural History Society. Here in summer 450 children from 9 to 14 years study reptiles, birds, mammals, flowers, trees, elementary astronomy, minerals, weather, and water conservation. During the school year the society holds classes at its museum in the city.

→ Caterer, High Sheriff, and former Mayor Andrew B. Holmstrom get together at the Worcester County Deputy Sheriffs' annual outing to examine the makings of a feast. The author was one of a thousand guests who enjoyed a New England clambake garnished with lobster, chicken, corn on the cob, and watermelon. Asked to remove his Western-style hat, Sheriff William A. Bennett indicated he'd sooner yield his badge.

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Today several divisions of the United States Envelope Company operate enormous plants in Worcester.

One of the city's oldest and largest industries is also one of the most ancient metal crafts.

"The basic process of wiremaking by pulling metal through a die dates back to the 8th century," an official of American Steel and Wire's Worcester Division explained (page 206).

Not until 1831 did anyone better the process. Then Ichabod Washburn, a blacksmith by trade, developed a machine for drawing steel rods into wire and started a timely business. Instead of expensive whalebone, women's fashions absorbed wire for hoop skirts, bonnets, and hairpins. And the expanding young West needed barbed wire for fencing livestock on boundless plains.

By 1880 Washburn's concern had grown into the world's leading wiremaker. Nineteen years later it merged with the newly formed American Steel and Wire Company, which subsequently became a division of the United States Steel Corporation.

Today the Worcester plant covers 140 acres, employing some 3,500 workers. Monthly output approximates 12,000 tons of steel and wire products.

Hot Steel Rolled at 50 Miles an Hour

The magic of wiremaking fascinated me. Like a colossal clothes wringer, the rolling mill presses a 3-ton red-hot ingot the size of a bathtub into a 6-inch bar 90 feet long. The next set of rolls squeezes it thin as your wrist while a flying shear cuts it into 30-foot lengths. These billets gather speed as they pass through subsequent rolls. Out race hot rods at 50 miles an hour to coil up like snakes, no thicker than a pencil but three-fourths of a mile long.

Cleansed in acid, rinsed in water, and coated with lime, a rod is drawn cold through a die to a prescribed diameter. A successive set of dies can reduce it to 4/1000 of an inch.

Consider the myriad uses for wire in everyday life: kitchen utensils, nails, screws, and bolts; suspension bridges and needles; hoisting apparatus or typewriter parts; springs for vehicles, guns, telephone dials, and watches; piano strings, overhead and submarine cables. Ours is a world of wire without end.

In another division of the plant, cold-rolling machines produce flat strip steel for the manufacture of such items as knives, saws, rules, gauges, razor blades, and ribs for umbrellas.

The small but significant beginnings of some early industries encouraged others to settle at Worcester. So in the 1830's William Crompton arrived—all the way from Lancashire, England—to manufacture textiles with newly patented machinery.

His son improved power looms and eventually formed the firm of Crompton and Knowles Loom Works. In normal years the company has 2,500 employees on 25 acres of floor space. It yearly ships about 10,000 looms for domestic and foreign use. These machines weave fabric from half an inch to 50 feet wide and weigh from one-half to 60 tons.

"The loom has come a long, long way down the road of progress from the looms of ancient Egypt," a former president of the factory said. "In the benefits it has bestowed upon mankind it ranks with the plow, the printing press, and the locomotive."

From Sheep's Back to Carpet

M. J. Whittall Associates, Inc., weaves a million yards a year of fine Anglo-Persian rugs and modern carpeting.

"We've still got growing pains," said manager Harry Inett, 50 years with the company.

"We buy our wool directly from the backs of sheep grazing in India, Iraq, South America, and New Zealand," Inett said, "and we process it right through to the finished carpet."

We followed the works from beginning to end: reception of raw wool, scouring, carding, yarn making, wool and worsted spinning, weaving, trimming, finishing, and rolling for shipment.

In 1883 the growing importance of textiles stepped up manufacture of loom parts. Entering the field, two WPI graduates started the Wyman-Gordon Company. They took over a photographer's tiny shop on the cheapest land in town.

Now the company employs more than 2,500 persons in its Worcester Division and another 1,500 at its western plant in Harvey, Illinois. Watching the operations in Worcester, I flinched from heavy bars of red-hot steel shifted by overhead cranes. Sturdy crews manhandled the fiery metal under steam-driven hammers to shape automobile crankshafts and important aircraft parts. The constant pounding deafened and bodily jolted me.

Imagine the buffeting endured by the actual task force, day after day! Some have stuck

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Worcester's First Newspaper Came Off This Revolutionary War Press

Fleeing enemy-held Boston, printer Isaiah Thomas in 1775 loaded his equipment on a cart, took it to Worcester, and published the *Massachusetts Spy*. American Antiquarian Society, which he founded in 1812, keeps his press.

National Geographic Photographer Bates Littlehales

↑ **An 18,000-ton Press Forges Parts for Jet Planes**

In 1883 two graduates of Worcester Polytechnic Institute leased a small shop in Worcester to make textile machinery. The Wyman-Gordon Company, as it was called, still occupies the same property, but it has expanded into one of the country's largest producers of aircraft forgings. Monster presses like this one shape engine, wheel, and structural parts in the firm's new plant at near-by North Grafton.

→ Jet engine impellers, forged in the press above, cool on the floor. An employee checks shaft sizes with calipers.

to this rugged labor for more than 30 years.

The Government selected Wyman-Gordon to develop a special project: wider use of light metals like magnesium and aluminum in aircraft forgings. England, Russia, and Germany already had facilities for similar ventures; America had to keep pace.

Accordingly, in 1946 Wyman-Gordon completed a new plant at near-by North Grafton. It included an 18,000-ton press, designed primarily for large magnesium forgings and those of aluminum alloys.

How big can a forging plant get? Under the United States Air Force's recent press expansion program, the light-metals forging plant has been increased more than 10 times its original size. Now housed in this massive factory are five presses ranging in size from 1,500 tons to 50,000 tons. Standing by the base of one of these towering presses, I had that feeling of smallness and wonder I have known at the bottom of the Grand Canyon (opposite and below).

I saw $100,000 worth of jet engine impellers hot off the press, and one of the most intricate forgings ever produced in any metal—a brake-assembly unit of a plane wheel, looking like a birthday cake, candles and all. Here also were aircraft forgings bigger than any heretofore produced in the United States.

Wyman-Gordon, a leader in research work for the industry, has played an important role in the development of techniques for forging steel, high-temperature superalloys, aluminum, magnesium, and now titanium, that new wonder metal.*

It's a relief to find in Worcester a place of business proud to produce the smallest something. As an experiment, Commonwealth Press, which prints anything from calling cards to complex catalogues, published a book it believes is the tiniest in existence. It is a translation of verses from the *Rubaiyat* of Omar Khayyam, bound in leather. Somebody once fitted 24 of the works into a thimble.

First American Novel Published

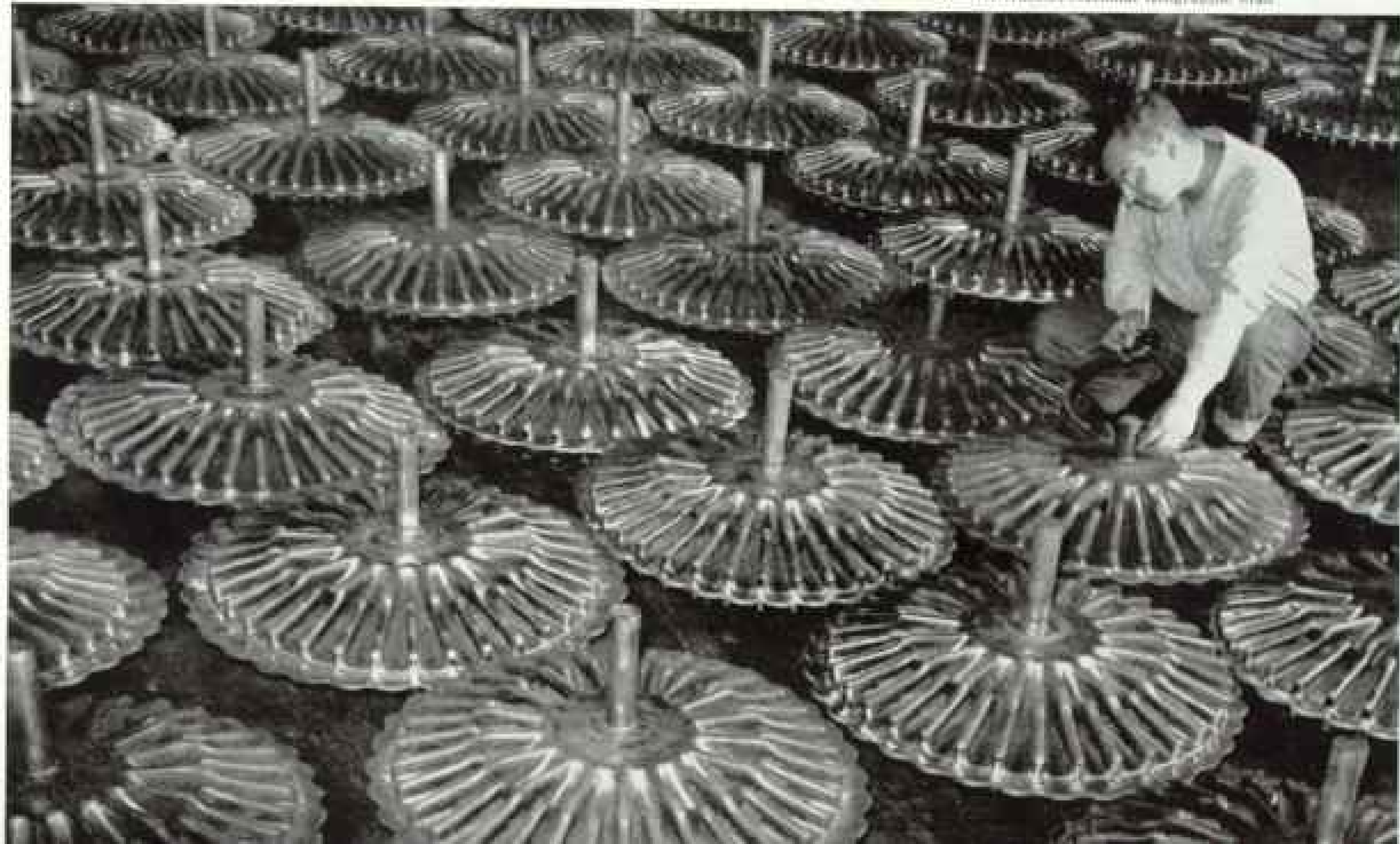
A printer was the city's first great citizen. Escaping enemy-held Boston, Isaiah Thomas smuggled his press to Worcester in 1775 and circulated its first newspaper. A successor to Benjamin Franklin in this field, he built up the foremost printing and publishing business in the young Republic.

Pioneering in mass-production methods of book publishing, Isaiah Thomas printed the first novel by an American author, *The Power of Sympathy*, by William Hill Brown; also the first medical and music volumes. One of the earliest copies of the Bible published in this country came from his press, as did spellers, primers, almanacs, and ballads of the

(Continued on page 211)

* See "Fact Finding for Tomorrow's Planes," by Hugh L. Dryden, National Geographic Magazine, December, 1953.

Howell Walker, National Geographic Staff



This Old Factory Revolutionized the Wire Industry

Large-scale manufacture of wire began at Worcester in 1831, when Ichabod Washburn invented a machine for drawing steel rods. Until that year a crude hand process could produce not more than 50 pounds of wire a day per man. Washburn's machines enabled a man to make 2,500 pounds.

As business grew, Washburn improved his wiremaking processes. For years his company was the Nation's only manufacturer of piano wire.

In 1899 the Washburn firm merged with American Steel and Wire, now part of United States Steel Corporation, which operates a 140-acre plant in another part of town. Today various small industries occupy the old Grove Street works beside the lake in Institute Park.

↓ Clark University Stresses Geography

Dr. Samuel Van Valkenburg, Director of the Graduate School of Geography, discusses the political situation in southeast Asia. Born in the Netherlands, Dr. Van Valkenburg studied at the Universities of Utrecht, Berlin, and Zürich before going to Clark in 1927.

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Glacier-dug Lake Quinsigamond Splits Worcester and Neighboring Shrewsbury

Navy Oarsmen Win the 1952 Olympic Trials at Worcester →

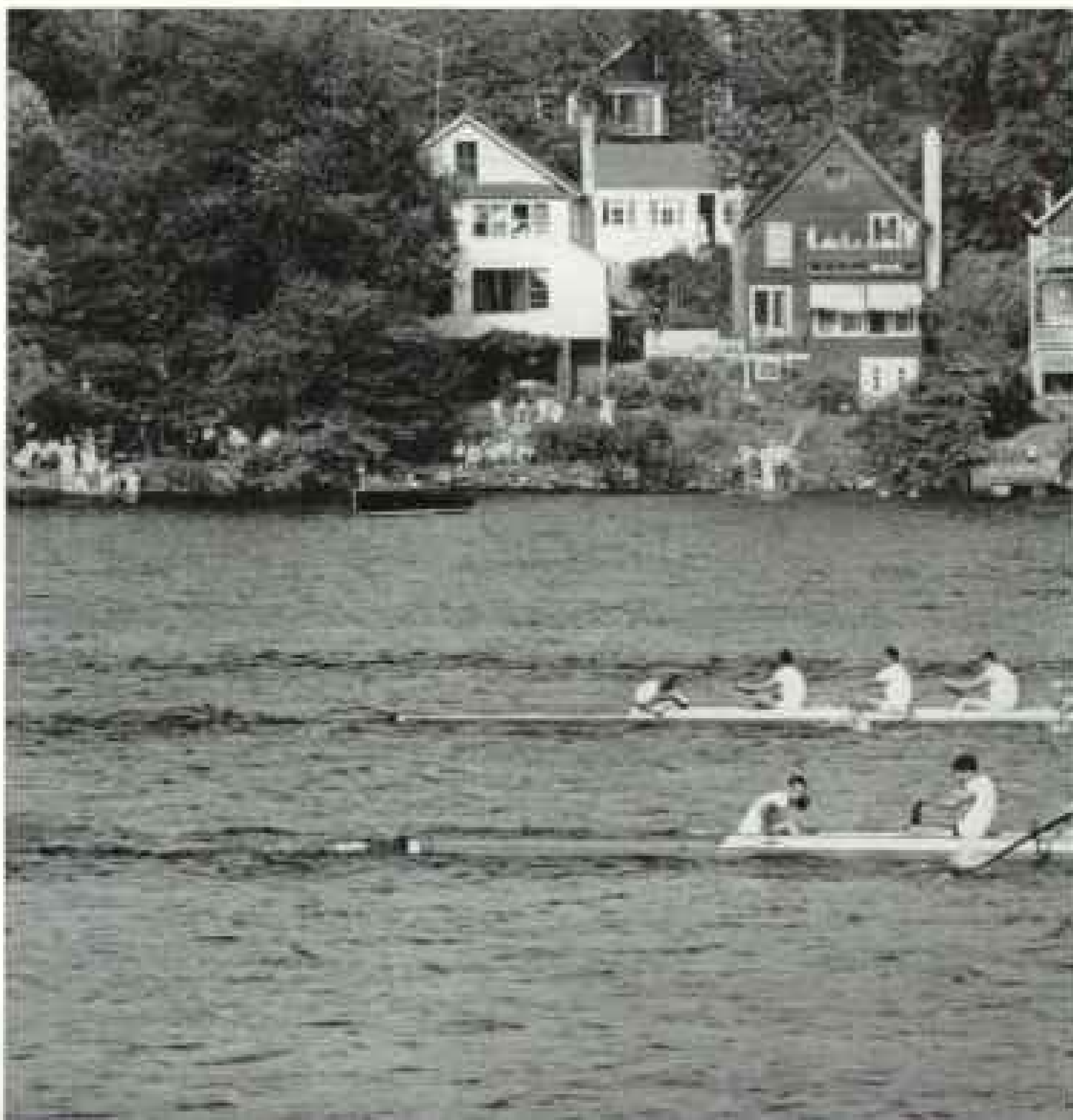
Lacking tides or currents, Lake Quinsigamond provides an ideal course for sprints. Hundreds of regattas have been held on its deep waters.

Here the United States Naval Academy's 8-oared shell noses out California (foreground) and Wisconsin (center) in the 1952 Olympic Trials at Worcester.

Shrewsbury residents witness the race from lakeside cottages. In summer, bathers and fishermen from both communities throng the lake's tree-sheltered banks.

In the aerial view above, a thin haze hovers over downtown Worcester at extreme upper left. Farmlands cultivated by patients of the State Mental Hospital edge the highway near the bridge at upper right.

Edward A. Cournoyer



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National Geographic Photographer Bates Littlehales

State Highway 9 Bridges the Placid Waters and Heads for Boston, 40 Miles East

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Kodachrome by Howell Walker, National Geographic Staff

Worcester Academy Has Prepared Young Men for College and for Life Since 1834

Gilbert Grosvenor, Chairman of the Board of the National Geographic Society, attended the academy before entering Amherst College. Lewis J. Warner Memorial Theater rises at right, F. Harold Daniels Gymnasium at left.

day. When paper got scarce, he established Worcester's first mill to make it.

To compile his thorough history of printing in America, Thomas accumulated the best source material available. Anxiously he sought to found an institution which could preserve his library and build upon it.

As a result of his efforts, the Commonwealth of Massachusetts incorporated the American Antiquarian Society for "the collection and preservation of the antiquities of our country, and of curious and valuable productions in art and nature...to enlarge the sphere of human knowledge, aid in the progress of science, to perpetuate the history of moral and political events...."

Twenty Shelf-miles of History

The society was organized during the War of 1812. At Worcester it was safe from the guns of foreign fleets, and there the society's library and offices have stayed.

On more than 20 miles of continuous shelves rest well over a million books, pamphlets, newspapers, maps, prints, and manuscripts. Fittingly, one room of the building preserves Isaiah Thomas's original printing press (page 203).

The library contains copies of 75 percent of all recorded books and pamphlets printed in the United States before 1820 (page 213). It has the Nation's most complete collection of American newspapers from 1704 to 1821, and for the years up to 1865 the newspaper files rank with those of the Library of Congress.

Distinguished American historians and 12 Presidents of the United States have been members of the society. Leading scholars, as well as the casually inquisitive, have turned often to this valuable storehouse for national knowledge.

In a conversation with Calvin Coolidge, not long out of the White House, someone referred to him as the ex-President.

"But I am still president," Coolidge replied sharply, "of the American Antiquarian Society."

"We get all sorts of queries," said the society's director, Clarence S. Brigham. "Once two elderly men came in to settle a dispute: Who played right field for Baltimore in 1896?

"We found that very easily," Dr. Brigham said, "because of our immense newspaper files. It was Willie Keeler, who ended up in baseball's hall of fame."

And in the American Antiquarian Society.

In 1829 the Worcester Natural History Society began collecting and labeling wild flowers. Today this organization stresses the need for conservation of America's natural resources. In addition to educational exhibits, the society's museum conducts classes for children and adults in natural-history subjects.

"I don't know what we'd do without the NATIONAL GEOGRAPHIC MAGAZINE," said director Richard C. Potter. "It's an invaluable and constant source of reference in our studies."

Mr. Potter arranged for me to visit his society's nature-training school outside the city. Walking over some of the school's 40 acres bordering a pond, I found groups of children studying various forms of nature: flowers, trees and flowerless plants, astronomy and weather, reptiles and birds (page 201). Since Mr. Potter became director of the Natural History Society in 1940, membership has more than quadrupled.

Among the first in the United States to purchase land for a public park, Worcester has preserved hundreds of acres for recreational purposes. Lake Quinsigamond, seven miles long, forms the city's eastern boundary; over its current-free course some of the country's topnotch oarsmen race in national regattas; here in 1952 were held United States Olympic rowing trials (page 208).

A minute's walk from a solid block of factories took me to the Worcester Art Museum. Its superb collection of masterpieces ranges from 2600 B. C. to modern times. I saw rare works of classical, medieval, and early American art in galleries that are among the Nation's best (page 198).

In the same area stands the Memorial Auditorium, where crowds swarm to hear unusually fine concerts or watch first-rate plays. For more than 90 years music lovers have annually thronged the week-long Worcester Music Festival, the country's oldest.

Biologists Study Basic Medical Problems

On the city's outskirts, in the mansion of a once-private estate and in several additional buildings, the nonprofit Worcester Foundation for Experimental Biology lives up to its name. Here scientists strive to solve problems important to mental health, arthritis, cancer, and reproduction. This work is done primarily through studies of hormones produced by the adrenal and sex glands (page 213).

In only 10 years of existence the Foundation has come up with some interesting find-

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Founded in 1843, Holy Cross Is New England's Oldest Catholic College. Broad Steps Lead from Floral Cross to Dinand Library

Named for a former president, the Most Rev. Joseph N. Dinand, the building holds 200,000 volumes. It rises on a site that Indians called Pakachoag, Hill of Pleasant Springs.

← Pumps and Pipes Copy a Process of the Human System

Seen at the Worcester Foundation for Experimental Biology, this glass perfusion apparatus circulates oxygen and blood at body temperature through glands removed from animals (usually cattle) and men, thus keeping these organs alive for several days.

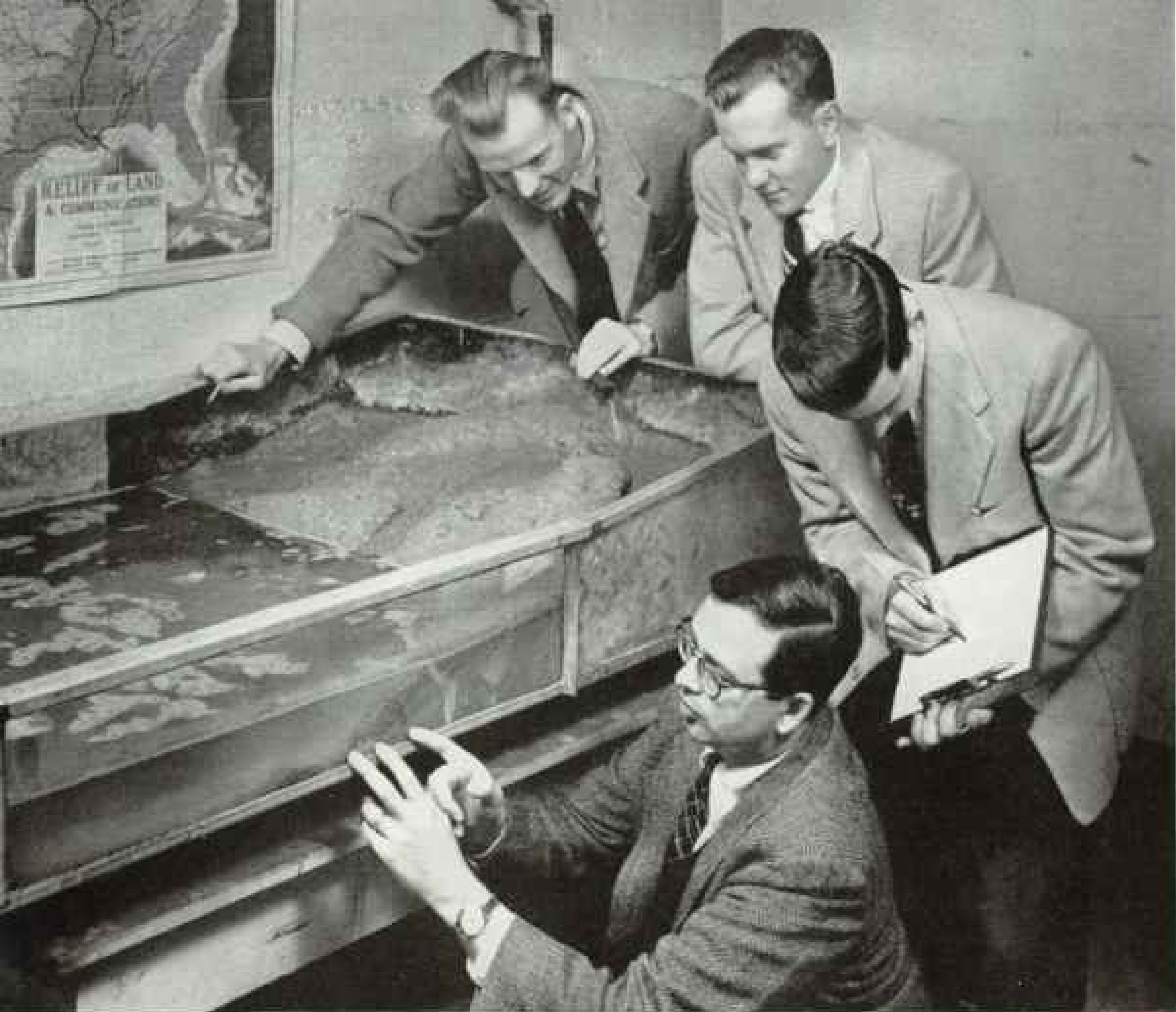
Worcester Foundation concentrates primarily on the study of hormones, the body's chemical messengers, and their effect when released into the blood stream by the endocrine glands.

Scientists have found it possible to feed into the isolated adrenal gland steroid materials that the gland converts into valuable hormones. By investigating substances that enter and leave the gland, they learn how the adrenal makes hormones like cortisone, which often relieves arthritis.

Workers at the foundation were among the first to demonstrate relationships between the steroid hormones and various disease processes.

→ Director Clarence S. Brigham examines one of the rare books in the library of the American Antiquarian Society. The library preserves copies of three-fourths of the books and pamphlets printed in the United States before 1820.

© Kodachromes by Howell Walker, National Geographic Staff



National Geographic Photographer Bates Littlehales

With Trickling Hose and Tank of Sand, Clark University Students Make a River Delta

Clark was founded in 1887. Following Johns Hopkins, it became the Nation's second university for graduate students only. Undergraduate men gained admission in 1902, and women in 1942. These graduate students watch the stream from a hose wash sand into a sedimentation tank to form a delta. Besides Clark, Holy Cross, and WPI, Worcester has three other colleges—Assumption, Anna Maria, and State Teachers.

ings. Workers discovered that cancer patients secrete an abnormal balance of sex hormones. The present research program involves a study of the chemistry of blood in persons suffering from the disease. Since cancer is a runaway growth of tissues, its causes depend on the intimate chemistry of the cells; and the relation of this chemistry to steroid substances is important to cancer research.

Big Industries from Small Crafts

Worcester's old crafts never die; they usually grow into something bigger. It happened with steel rolling and wire drawing, manufacture of railway carriages and trolley buses, fire extinguishers and firearms, and worsted materials for civilian and military clothing.

Besides the phenomenal growth of older industries, new ones are still springing up. Since World War II, 283 firms have started and stayed in business.

So Worcester grows with increasing industry. But the city's real strength, like that of the Nation, stems from the people. They started from scratch; inventive genius was their chief natural resource, and it still is.

Worcester is a city of industry made so by the character of its citizens. It began with a bargain between white man and Indians. Puritans laid the sound foundation. Then men faced hard work with strong hands, initiative, skill, and intelligence. They still do.

There are other places in the United States like Worcester. Its story is the story of the growth of industrial America. Such communities made this country what it is today.

Sonora Is Jumping

Men Hunt Strategic Minerals, Buried Treasure, Big Game Fish, and Jumping Beans in Mexico's Northwest

By Mason Sutherland

Assistant Editor, National Geographic Magazine

SUNDAY evening's promenade started just as we drove into Alamos. Brunette beauties arm in arm strolled along the Plaza de Armas (page 230). Smiles and giggles flashed recognition signals to boys sauntering in the opposite direction. Park-bench chaperons enjoyed a balmy March breeze rustling the plaza's lofty palms.

A Japanese-lantern moon skidding across the sky sprinkled so much golden magic upon the scene that I felt I had returned to an enchanted place dimly remembered and longed for all my life.

New Roads and Dams Boom Sonora

Crossing the Arizona border, I had entered Sonora by driving down Mexico's west coast highway. This road, newly paved through forests of giant cacti, takes American vacationists all the way from Nogales, Arizona, to Mexico City (map, page 219). But I turned left at Navojoa and headed into the Western Sierra Madre. Thirty miles and 50 minutes later I parked in old Alamos (page 216).

Until about a decade ago sleepy Sonora had little more than dreams of bygone glory. Today's new roads and irrigation projects have quickened the State's industrial and agricultural tempo, but the boom has stirred scarcely a ripple in Alamos. The town offers little more than a dreamy Spanish look and a tranquil way that have captured the affection of a score of resident American families.

Together with Charles W. Herbert, my partner with the cameras, I walked past the one-story houses of Alamos. Row upon row of plastered adobe bricks, these spacious and elegant mansions stood flush against one another and against front walks. Pillars joined by graceful Moorish arches supported the walks' shadowy *portales*, or arcades, and delicate iron grillwork guarded the windows. Alamos was colonial Mexico in a living museum.

A peep through inviting open doors revealed flower-bordered patios green with avocado, papaya, and mango trees, which in season yield fruit to Alamos folk dining in their cloistered gardens. More arcaded walks lined the patios, their burnt-adobe bricks scuffed thin by the brooms and footsteps of generations. All room-to-room communication proceeds along these patio walks, and some houses have as many as a dozen high-ceilinged rooms.

Founded long before the United States attained its independence, Alamos became incredibly rich. Big mines, now abandoned, poured out millions of dollars in silver ore.

Proud heirs of silver's lost fortunes dedicate their lives to keeping up the town's venerable mansions. A few preserve polished grand pianos freighted from France by ship and mule train in the boom days. An 80-year-old survivor of one large family has chalked the door to every room with the names, birth and death dates of his loved ones, a daily reminder of happier times.

Much of Alamos is little better than a ghost town. Some old homes, if not entirely deserted, are used for stables. The sun, glaring through collapsed roofs, encourages weeds in adobe floors.

Retired Americans buy abandoned houses for as little as $1,000, repair them, and settle down to relax in a 19th-century manner.

Electric Lights? Maybe Yes, Maybe No

Alamos survives as a colonial museum, encouraging restorations only in the prevailing Spanish style. The town clings to its cobbled streets as barriers to speeding but allows one compromise with modernity—the movies.

Electric power flows only between dusk and a vaguely timed midnight. One night the town's master switch was pulled at 11:30, leaving me fumbling with change in a restaurant suddenly black. Residents store water in tubs, never knowing when the town pump will fail.

Lacking refrigeration, the butcher slaughters every morning. His porterhouse and chuck sell at the same price.

In bygone days the Almadas' name stood for silver. A Sir Walter Raleigh-style legend says the Almada family once laid silver bars across a wet street when their daughter stepped from home to church to be married. Their

former town house retains a street-side ramp believed to have admitted silver-laden donkeys.

So much silver was mined, smelted, and minted at Alamos that optimists believe some of it must still be hidden. When Indians or revolutionaries raided the town, so the story goes, families buried silver and jewels and took flight, some never to return.

Mine Detectors Hunt Treasure

Last spring Americans started a treasure fever by prospecting ruins with a metal detector. This machine, a modification of the soldier's mine detector, sends out an electronic signal. Contact with metal distorts the signal and causes a buzz (page 228).

"Just the other day," said one young American, "my partner and I got a buzz from a crumbling wall belonging to one of the old mining families.

"We dug through and found an iron bedstead on the other side of the wall. Again, we got a buzz out of the ground. This time we dug up a rusting chamber pot.

"A certain merchant borrowed our machine to search his own place. When he got a strong reaction from the patio, he destroyed his shrubbery, tore up his flower beds, and dynamited his brick walks. But he found nothing—or so he told us.

"If anyone ever does find treasure, the news is not likely to get out. The lucky few don't brag about it, because the Mexican Government taxes recovered treasure."

Tale of the Four Mummies

Guarding its buried treasure, Alamos has its own crew of ghosts, skeletons, and other horrors.

"Only a few days ago," gossipers told me, "workmen cutting a passage in Señor X's house uncovered the mummy of an Indian peon dressed in coarse blue and sealed in a wall—evidently the work of a former owner. The family was not as horrified as you might think, for they had already uncovered three other bodies."

When I repeated the story to Señor X, he smiled and replied, "Well, I've heard silly tales about three other mummies, but this fourth one is news. You can search the premises with a magnifying glass, but you'll find no bodies or recent brickwork."

Mrs. Marcellene Coyle, a resident of Alamos at the time of my visit, told me her own true ghost story in the Alamos house where the incident took place.

"We believe our home is 200 years old," she said. "In Spanish days, the story goes, it was a way station where Indian workers were kept chained overnight.

"When we moved in, we found doors sagging on rusty hinges. The bedrooms were so crammed with fallen plaster that we had to sleep in the patio, and the dungeonlike quarters below the patio's portales were so dismal we turned them into a stable for Noche, the children's pony.

"If all this wasn't discouraging enough, think how we felt when people asked, 'Don't you know your house is haunted?' They said that one young Indian had slipped his chains to plead with his guards for his captive sweet-

Lowell B. Weeks

Alamos Dreams of Its Yesterdays, When Its Mountains Yielded Silver Fortunes

Despite the loss of its mines, this Sonora town refuses to die. Half a ruin, half a restoration, it is colonial Mexico in minuscule. A few magnificent old mansions treasure grand pianos freighted from France.

heart. When he appeared beneath the portales, he was shot before he could explain what he wanted. As he died, the youth put a curse on the house.

"'On some nights,' neighbors told us, 'you can hear the ghost moaning and rattling his chains.'

"Well," Mrs. Coyle continued, "my three children, R. J., Marcia, and Denny, and I were sleeping in the patio one dark night when Marcia woke up and whispered, 'Mamma, what's that noise?' We distinctly heard footsteps and the clink of chains, and I imagined I heard moans. I could feel my hair rising. I was too afraid to investigate, so I put the covers over my head.

"Then the children sighted a familiar figure. Our ghost was Noche, the pony, loose in the courtyard and rattling his halter chain."

Mexican boys love to stand outside teenage Marcia's window and serenade her. And that reminded Mrs. Coyle of another story.

"Recently," she said, "my 75-year-old mother was visiting us. One night she ex-

Justin Locke

"And There's Africa!" Teacher Takes Hermosillo Children on a Global Tour

Hermosillo, as the capital, guides the progress of booming Sonora, Arizona's neighbor to the south (map, opposite). Sonora exports shrimp, tomatoes, and minerals to the United States; it opens its gates to American travelers and heavy machinery. This huge globe with spiral ramp stands in a schoolyard.

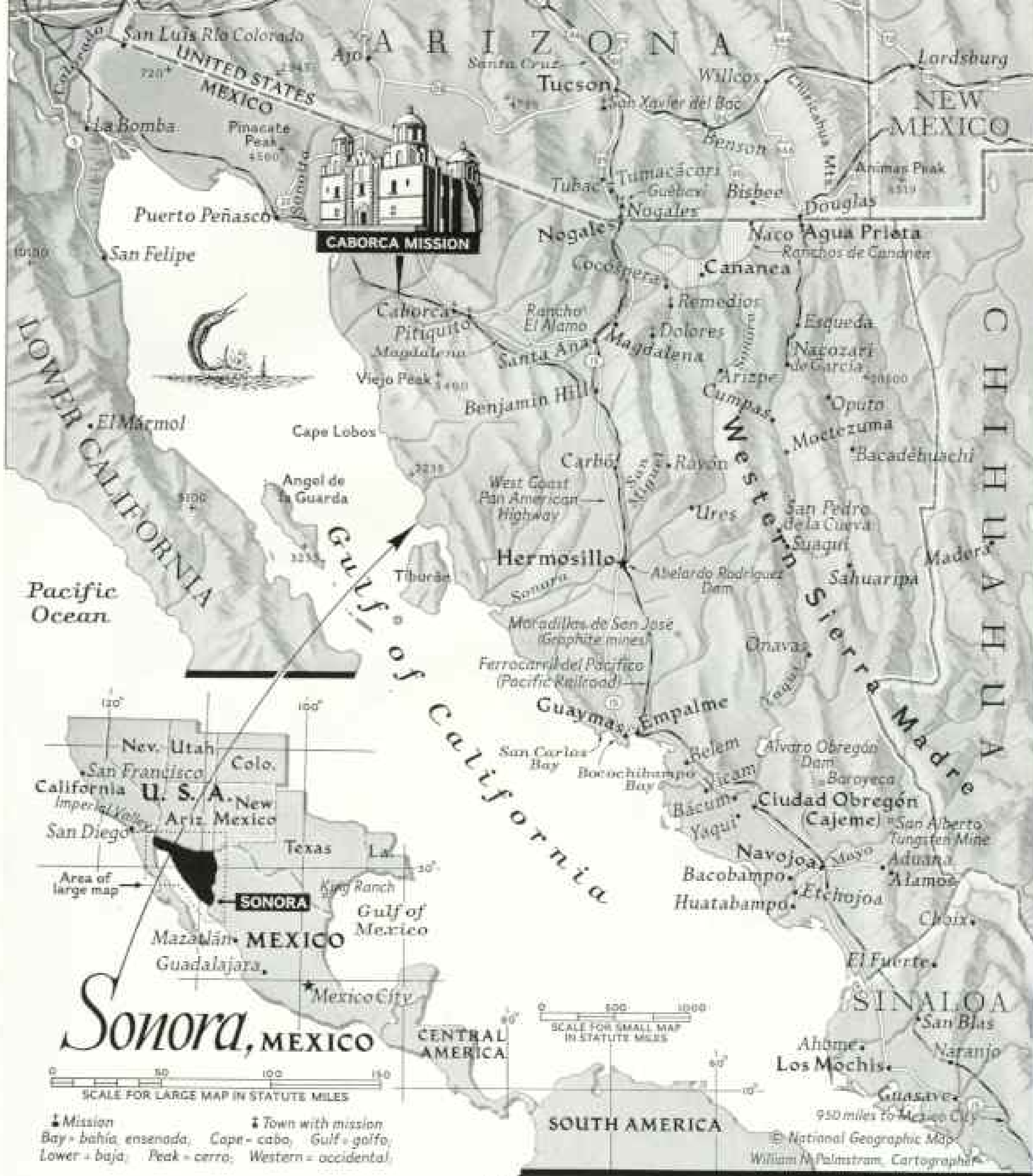
claimed, 'Marcellene, I do believe I'm being serenaded, and here I am in my nightgown!' Sure enough, there was a gang of high-school boys, friends of my children, singing in the street.

"I got Mother dressed, seated her in the window, and the boys played guitar music through the bars. That was their way of saying, 'Thank you for making those doughnuts,' something they had never tasted until they visited our house. Poor Mother! Of all the songs they played, the only one she recognized was 'Mexicali Rose.'

"That's what I like about Mexico—the friendly spirit. Visitors from the States look around, see the lack of plumbing and clothes closets, and ask, 'Why do you live here? Why put up with it?'

"I tell them this is the land of tranquillity. The tumult and treadmill life of the big cities pass us by. And where else could I afford two servants and two horses?

"I think my children have a better chance here. A movie once a week is an adventure to them. They don't go chasing off in hot rods."



Sonora, Route of San Francisco's Settlers, Offers a New Paved Road to Central Mexico

A popular figure is the Reverend Juan C. Barcelo, the Alamos parish priest until his transfer recently. In addition to his duties at the church he made a circuit of 300 miles, visiting 189 pueblos.

When Mexican Government and Church were in conflict two decades ago, Father Barcelo hid out in the hills of Sonora. Together with 11 other student priests, he concealed his theological books, studying only at night, and rode and dressed as a working *ranchero*.

"None of us shaved," Father Barcelo recalls. "We slept without blankets and had only beans to eat. Our leader was Juan Navarrete, the Bishop of Sonora, a brave and noble man. He washed his own clothes and sometimes milked cows."

Father Barcelo was my guide to the Iglesia (church) de la Purísima Concepción, an austere stone building facing the plaza (page 230).

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Western Ways Ektachrome by Ray Manley

Siesta Passes, but Fiesta Lingers in Booming Sonora

This young woman lives in Hermosillo, the State capital, whose name appropriately means "little beauty." The eagle-serpent-and-cactus motif of Mexico's flag appears on her dress. Giant cacti cover the Sonora desert.

As we climbed to the roof, the padre pointed out hundreds of bullet scars in the bell towers. Forty years ago 35 men barricaded in the church died in a battle between revolutionaries and Federal troops, Father Barcelo told me.

"The present church was finished in 1803," he said, "but our records go back to 1685. An early census shows that old-time Alamos had a population of 15,000; today we are reduced to 2,800. Anarchy resulting from the Mexican Revolution ruined our mines and impoverished rich families."

Alamos Picks Jumping Beans

Alamos today exists in a sort of genteel poverty. A freak of Nature, the Mexican jumping bean, helps keep the town alive.

Each July and August Alamos folk pick and package the world's supply of *brincadores* (jumpers). A lucky picker can make as much as 100 pesos, or $8, a day.

Joaquin Hernandez, a native of Alamos who buys almost the entire crop for export, is known as the Jumping Bean King.

"Since World War II," he told me, "the world will buy any quantity of brincadores. In years when the seasonal rains arrive on schedule, we export 10 million beans."

Shaking his head sadly at the sight of "so many letters to answer," Señor Hernandez showed me stacks of correspondence begging for deliveries.

"We need a quarter million beans," wrote a novelty dealer in the United States. "All must jump. No excuse for a bad season."

As I write these words, I hear a clicking from a tray on my desk. Office visitors observing the sound start looking for a Geiger counter or an infernal machine. Then I show them a sack of brincadores from Alamos. If I pour them out in a pile, the beans soon spread out horizontally, but none makes much of a vertical leap. The slightest touch or sound seems to frighten them and momentarily stops their jumping.

Grub Lives Within Shell

Cutting open a bean's paper-thin shell, I find a half-inch grub, the larva of *Carpocapsa saltitans*, a gray moth that lays its eggs in *Sebastiania pringlei*, a bean-growing tree.

Hatching out of their eggs, the larvae enter bean pods and live on the green seeds. When its seeds are ripe, the tree flings them to the ground, including the infested ones.

Carpocapsa's larva has 16 legs, some of which have small hooks. With these the insect catches a firm hold and, raising its body, delivers a hard blow with its head, causing the shell to move.

Some observers speculate that instinct guides the grub to escape danger by jumping until the shell becomes concealed under leaves or rocks. Once a dark, secure hiding place is found, the bean stops leaping.

When full grown, the toothed larva cuts a trap door in the shell, attaches it with a silken hinge, and transforms into a pupa. Later the winged but toothless moth crawls out the escape hatch and repeats the annual egg-laying cycle.

Together with Harvey Harris, who "came to Alamos for two days and stayed for four years because the climate helped my arthritis," Mr. Herbert and I visited La Quintera mine at Aduana, a few miles from Alamos. "Once it took 3,000 mules just to haul wood needed by the charcoal smelters," Mr. Harris said. "Today—well, look around."

Assay office and smelter stood in ghostly ruin. Tin roofing rattled in the wind; ladders sagged; goats grazed the terraces; and the gnarled, massive roots of wild fig trees strangled stone walls in a boa-constrictor embrace.

Legend of Indians' Silver Strike

Of Aduana's several hundred adobe houses, only half a dozen appeared occupied; others were crumbling back to dust. A handful of men, the caretakers of a ghost town, idled in the sun. One of them got a key and let us into the tidy church, which alone had escaped the prevailing desolation.

"This is the Church of Santa Balvanera," our guide said, "and it is named for the Virgin of Balvanera, the heroine of a remarkable story, none of it verifiable.

"Tradition says that Indians passing through a wilderness here centuries ago sighted a beautiful maiden atop a lofty pitahaya cactus. As no man cared to climb the thorny trunk to rescue her, the Indians decided to build a ramp of stones to the top of the cactus. While upending a heavy rock, they laid bare a showing of high-grade silver.

"Excited by their discovery, the Indians stopped work to explore. When they turned their attention to the cactus again, they found the girl had vanished.

"These tribesmen, who had clung to their pagan gods despite unremitting pressure by the padres, were convinced they had wit-

© National Geographic Society

Kodachrome by Jack Breed

↑ **Outriggers Aloft, a Fishing Boat Heads into the Gulf of California for a Marlin Battle**

→ Page 223. Blood gushes from a harpooned manta ray. Flippers moving like wings, the swimming manta suggests a giant bat in flight. Some rays weigh a ton and spread 22 feet between "wing" tips. Harpooned, they take Guaymas sportsmen on thrilling rides.

→ Above: An amphibious plane unloads picnic supplies in a hidden cove near Guaymas. Tommy Jamison (standing, center), who operates a fleet of fishing boats, uses the craft to haul paying guests and scout marlin.

Western Ways Ektachrome by Charles W. Herbert (opposite, above) and Kodachrome by Daniel P. Mannix

nessed a manifestation of the Virgin. From that moment they accepted Christianity.

"To enshrine the cactus, the Indians built a wall, and the cactus, it is said, promptly grew through the wall. Convinced they had seen a miracle, they erected a church around the wall. And if you don't believe the story, Santa Balvanera has the cactus to prove it."

With these words our guide led the way outdoors and pointed to a spot of green in the wall some 10 feet above the ground. There a giant cactus grew out of masonry enclosing the trunk (page *229*). The walk was greasy with the wax of votive candles.

"Thousands of people believe the cactus has endured for generations," Harris said.

"Aduana looks dead today, but you should have seen it last November, the anniversary month. Each year some 3,000 people make a pilgrimage to pay devotion to the Virgin of Balvanera. Their bonfires make an imposing display in the hills. Many, fulfilling vows, walk all the way from their homes, and some traverse the last few miles on hands and knees. If you offer a ride, they are offended."

Most pilgrims are descendants of Aduana miners. Incidentally, it should be pointed out that the Roman Catholic Church rejects the Aduana legend and the miraculous origin of the cactus, but it ministers to the pilgrims.

Strategic Minerals Attract Prospectors

Gold lured the Spanish pioneers to Sonora. When Montezuma, the Aztec emperor, paid Cortés tribute including gold and silver plates the size of chariot wheels, Spaniards wanted to know where all the metal came from. Learning that some of it came from Sonora, they marched in and extracted fortunes.

To this day prospectors stumble upon abandoned shafts, called *antiguas*, where Indians climbed notched logs with sacks of ore.

Now Sonora's bonanzas are memories. Less precious but more strategic tungsten, cobalt, graphite, lead, and copper lure prospectors.

Alberto E. Maas, a native Minnesotan living in Alamos, told me the story of his fabulous tungsten strike (page *228*).

Tungsten, which resists intense heat, is a vital element in lamp filaments, electronic devices, and high-speed cutting tools. Only limited deposits are now found in the United States. When war cut off Chinese and Korean supplies, concentrates became so scarce that the world price rose to $5.40 a pound.

Mr. Maas, a prospector for half his 54 years, bought a Mineralight during a visit to the United States. This lamp, which produces an ultraviolet light, causes scheelite, a fluorescent tungsten mineral, to shine in the dark.

"The catch is," said Mr. Maas, "that scorpions fluoresce the color of Yaqui Valley tungsten, and the nocturnal prospector reaching for a mineral sample had better make sure it is not moving.

"I was prospecting for gold, silver, and lead," he continued, "with no thought of tungsten, and I was grubstaking several Indians to scout for rock samples. One day they brought in some ore stained with copper oxide. I could tell the copper was low grade and so I threw the rocks on a dump heap in my yard.

"A few nights later I looked for fluorescent samples to entertain a visitor. I examined the dump with the Mineralight and noticed pinpoints of light. A hunch told me I had tungsten, but I wasn't sure until I powdered and panned a sample. Out came a white concentrate that I recognized as scheelite.*

"Meanwhile, my hired prospectors forgot where they had found the rocks, but they did recall three places they had visited. We retraced their route and eliminated the first and second areas.

"Late in the day we reached the third site, a hillside bordering the Mayo River 22 miles north of Alamos. Surface outcroppings matched the copper stains on our rock samples.

"We had just enough water in our canteens for a drink or some panning. Fevered with excitement, we chose the panning. Again that white concentrate. As night fell, I turned on the Mineralight. The ground glowed like a heaven of stars! You can imagine the thrill of an old prospector who had searched for a bonanza half his life.

* See "Metal Sinews of Strength," by Frederick G. Vosburgh, NATIONAL GEOGRAPHIC MAGAZINE, April, 1942.

Page 225

Indians Enacting Their Passion Play → Wear Rattles and Masks of Evil

Belem, a Yaqui village, seemed to be blowing away in a dust storm when this picture was made close to the wooden crosses in the churchyard. The author recalls the eerie tingle he got when twisting these obliging fellows' heads to suit the camera.

In obedience to a vow, the Yaquis dance the parts of the *chapayekas* (Judases) who torment Christ at the enactment of the Crucifixion. Their wooden swords represent the weapons carried by Roman soldiers. Doll on a stick symbolizes a child killed by Christ's enemies.

© National Geographic Society
Western Ways Kodachrome by Charles W. Herbert

Frank H. Day

↑ **Cowboys Round Up Cattle Beside a Circular Corral near Cananea**

Ranchos de Cananea covers 667,000 leased acres. Used for roping and branding, its round corrals enclose the maximum area with the minimum amount of fencing. Each fall scrub oaks dotting these hills drop edible acorns as a bounty to the poor.

→ "Come and get it." Hungry cow hands at Rancho el Alamo need no second urging. Their castlelike headquarters was built by the late W. Beckford Kibbey, a Harvard man turned cowboy.

↓ Vaqueros vaccinate a calf, one of Cananea's 24,000 Herefords (page 232).

Western Ways, by Panattan (below) and Charles W. Herbert (opposite)

"We worked half the night lamping the hillside.

"As soon as I got back to Alamos, I filed my claim and named the mine San Alberto. One expert surveyed the scene by eye and gave me his snap judgment: 'Fifty million dollars lying right on the ground!'"

Don Alberto, as he is known to Alamos folk, told his story so vividly that I asked if he ever had been a writer.

"I came to Mexico as a newspaper correspondent in 1918," he replied. "And I can add this: search and evaluation, the qualities of a good reporter, help make a prospector. If you have a nose for news, you likely have a nose for ore.

"I have become a Mexican by adoption. Occasionally I visit the States but rarely stay

more than a week. Always the spell of Mexico lures me back. A prospector's freedom, his contact with Nature, his thrill of discovery compensate for all the hardships."

There's Graphite in Those Hills

For the story of graphite, another strategic material, I went to Smith Bolton, vice president and general manager of The United States Graphite Company, owner of the Moradillas de San José mines.

"The principal sources of graphite," Mr. Bolton said, "are Mexico, Korea, Madagascar, Austria, West Germany, and Ceylon. The State of Sonora is the world's largest producer."

Graphite makes the pigment in your lead pencil; it goes into dry-cell batteries and dry lubricants. Used as a coating for sand molds, it prevents hot poured steel from sticking.

Graphite in some deposits was originally coal. Formed of decaying vegetation in ancient lakes and swamps, it was covered with silt. Eons of pressure or heat metamorphosed the sediments into graphitic carbon. Graphite and diamond are both carbon, but they never occur in the same area.

Sonora is Mexico's leading copper State. To see that industry, I visited Cananea, a city of 17,900 miners and ranchers on a dirt road 40 miles southwest of Bisbee, Arizona, itself a famous copper producer.

Cananea had copper mines as early as 1850. The late Col. William Greene bought the properties and merged them. Later he sold out to the Anaconda Copper Mining Company.

Having worked out the high-grade ore, The Cananea Consolidated Copper Company, S. A., a subsidiary of Anaconda, extracts low-grade copper from an open pit and smelts it.

"Old-timers used to sniff at 1-percent ore," Albert Mendelsohn, the general manager, told me. "Today we think it is pretty good. Owing to improvements in mining techniques, we make a profit on ore of 0.8 percent purity, provided the price is right."

Col. Greene's heirs still cling to his cattle domain, the Ranchos de Cananea (page 226).

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← Buried Treasure (Top) and Raw Ore Spur Fortune Seekers in Alamos

Much silver was mined and minted in Alamos, and optimists feel sure some of it must have been left behind by people who banked their money in holes in the ground and then fled from Revolutionaries or Indians (page 216).

Upper: Two Americans explore an adobe-brick ruin with a Goldak detector, which emits a warning buzz in the presence of metal.

"It would be fun to find a dime's worth of treasure," said student Norman Stewart (right), "but nothing can make me love a pick and shovel." George Nesbitt, who operates the instrument, is a San Diego tuna fisherman.

Lower: Beneath his spreading nopal cactus, prospector Alberto Maas pans crushed scheelite, a copper-stained tungsten ore. Sometimes called white gold, the mineral glows in the dark if subjected to the rays of an ultraviolet lamp. This characteristic gleam enabled Mr. Maas to pinpoint a fabulous tungsten outcropping 22 miles from Alamos (page 224). The author (right) takes notes.

Cactus Grows Out of a Church Wall →

Legend says the church and the old town of Aduana sprang up around this pitahaya. Pilgrims who journey to Aduana yearly believe that the Virgin of Balvanera, by sitting atop this prickly plant, pointed the way to a fabulous silver strike (page 221).

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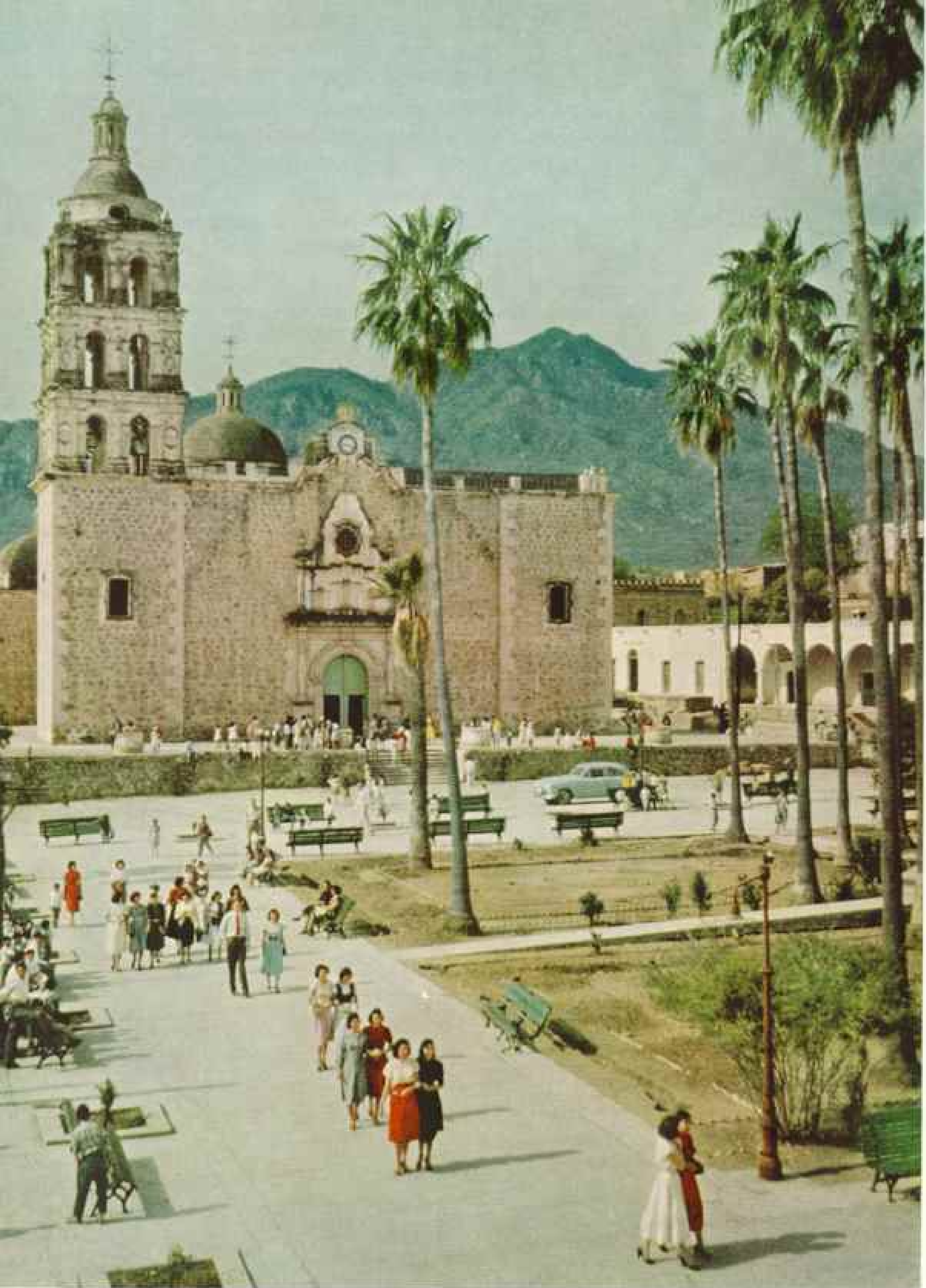

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Western Ways Ektachrome by Edward J. Sehon

Church Lets Out in Alamos. Sunday Morning's Promenade Starts in the Plaza

Life in the old silver town revolves around this square. The church clock, sometimes fast, sometimes slow, regulates "Alamos time." A Moorish-style arcade shades the front walks of homes at right.

Seven Alamos Beauties Include One American (Right)

Following the collapse of its silver mines, Alamos became a ghost town. American travelers rediscovered it within the last decade. Many have settled down to enjoy its colonial atmosphere and escape the complexities of civilization.

Here neon signs are taboo, electricity flows erratically, filling stations hide themselves, and telephone service is limited to one long-distance instrument to the outside world. New buildings and restorations conform to the town's colonial style.

In its heyday Alamos was an important station on the Camino Real, one of colonial Mexico's royal roads, and some of the town's well-worn cobbles appear old enough to have served that highway. A grove of cottonwoods *(álamos)* named the town.

One of the prettiest sights in Alamos is the bandstand occupied by these girls in their Sunday finery. Sandra Jones is the American.

Yankee Boot Gets an Alamos Shine →

Better mannered, friendlier children cannot be found than those in the interior of Mexico. Grateful for the slightest favor, this young errand runner and boy-of-all-work was a treasure.

© Western Ways Kodachromes by Charles W. Herbert

Seldom beyond sight of the copper smelter's smoking chimney, some 24,000 Herefords graze 667,000 acres of leased lands, an area two-thirds as large as the King Ranch in Texas.*

The longest distance across the property is 65 miles. Barbed-wire fences approximate 1,900 miles. Cattle drink at 400 watering places, most of them deep wells. Cowboys number 300, and another 125 men work in the company's packing plant. Five rivers drain the ranch when it rains, two of them flowing into Arizona.

The Man Who Never Heard a Radio

One of the heirs is Kirk Greene, a son of the colonel, who was mortally injured by a runaway team in 1911.

"In the days of President Porfirio Dias," Mr. Greene told me, "Father controlled not only Cananea but another big ranch just across the line in Arizona. At that time the border was unfenced and cattle strayed back and forth; only their brands told which country they came from. But today the border here is completely fenced and patrolled by both nations. The Mexican Government tells us what we can do on the ranch, and the United States embargoes our live cattle if it suspects foot-and-mouth disease anywhere in Mexico.

"This ranch used to be good hunting country," Mr. Greene continued, "but professional hunters have about wiped out the wolves, coyotes, and mountain lions.

"For deer, turkey, and boar I now fly into the Sierra Madre. Out in the mountains there are more little airstrips than you would think. Curiously, they all seem to be situated next to cemeteries, but I'm not superstitious.

"Some of the Sonora mountain country is so isolated that I have met men who never heard of a radio. Once I stopped my car, left the radio on, got out, and asked an Indian for a cup of coffee. When he served me, he asked if the 'musicians in the car' wouldn't like a cup, too. You can imagine his astonishment when I showed him there were none."

Guaymas: Home of Jumbo Shrimp

Going back to the border, Herbert and I followed Sonora's international highway until it led us to salt water. We found the new road bringing Americans and prosperity to Guaymas, a mountain-rimmed port on the Gulf of California.

A packing plant was slaughtering and freezing cattle for export to the United States. A new thermoelectric station was transmitting power across the landscape on steel towers. Ships were pumping oil into tanks atop saguaro-dotted islands. Dredges were deepening the harbor to 30 feet.

"When dredging is finished," said Mayor Florencio Zaragoza, "we'll be in a good competitive position to ship any Arizona export cotton that now goes to San Francisco by rail, a much longer haul."

Guaymas is noted for its jumbo shrimp. As it takes fewer than 15 jumbos to make a pound, the Mexican west coast is called the "land of less than 15 to a pound." Some weigh eight to a pound.

On Bocochibampo Bay, three miles from Guaymas, we found trailer camps, cottages, and two luxury hotels bulging with Mexican and American sports fishermen, swimmers, and loungers in the sun.

Some fishermen drive in from places as distant as Maine and Alaska. If marlin and sailfish are not running, they fish for dolphin, roosterfish, grouper, yellowtail, sea bass, and the 175-pound *totoaba*, or giant weakfish.

The Gulf: a Huge Fish Trap

In season Guaymas waters teem with game fish. The Gulf of California, 750 miles long and 60 to 150 miles broad, has been called a giant fish trap. Any fish moving north have to turn south if they reach the head of the Gulf.

"Thus we get a double crack at them," I was told by Tommy Jamison, director of sports fishing for the two beach hotels, the Miramar and Playa de Cortés.

Mr. Jamison, who operates 12 sports-fishing boats, had just bought a Seabee, a light amphibian plane, to scout marlin and haul guests.

"For August, 1955," he said, "we are planning an international fishing tournament for Guaymas, something like Nova Scotia's tuna contest. Participants, however, will be limited to barbless hooks and light tackle, giving marlin and sailfish a sporting chance to escape.

"Our biggest marlin weighed 596 pounds. My toughest rod-and-reel catch fought for six hours. Jimmy Aldrete, one of my fishing captains, had a marlin on the hook for 10 hours—our record."

* See "King Ranch, Cattle Empire in Texas," 26 natural-color photographs by Howell Walker and Justin Locke, National Geographic Magazine, January, 1952.

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Western Ways Kodachromes by Charles W. Herbert

↑ Red-tipped Ocotillo Sets the Desert Afire near Caborca

In drought the ocotillo appears to be the gray skeleton of a dead plant. Rain brings out tiny green leaves between the spines. In April red flowers bloom at the tip of each wandlike stalk and dance in the breeze. Cholla cactus, bane of cattle, bristles in foreground.

↓ An American Buys Firewood in Alamos. "Two Pesos a Load," Gestures the Boy

A string of donkeys creeping down a cobbled street is one of Sonora's pleasantest sights. This boy cuts wood in the hills and peddles it door to door. Mrs. Edward Schon and her husband lately remodeled this old adobe house. An iron grille guards the window.

Santiago (Jimmy) Aldrete, who was born in Douglas, Arizona, told me stories about some of Guaymas's most sensational fishing battles (page 223).

"During the summer," he said, "these waters swarm with manta rays, but people rarely fish for them. You have to harpoon mantas; they'd snap a line as if it were thread.

"One season an Italian count, his countess, and an American doctor arrived, bringing with them a Great Dane. They wanted a manta, and I was assigned to be their skipper. We equipped a motor launch with harpoons, a barrel to be used as a drag, and a rifle to kill the catch. On shoving off, I was surprised to see our party take the Great Dane on board.

"In San Carlos Bay we found dozens of mantas and threw the harpoon into one. The giant devilfish sped off, dragging line and barrel. Soon a second harpoon was attached. In 10 minutes we hauled our quarry to the boat. But the fight wasn't over. Diving, the huge, batlike fish draped its flippers around the gunwales and rocked the boat like an eggshell. Its 2-yard tail came out of the water and lashed the deck like a whip.

"You can imagine the excitement. Spray flew. The Great Dane howled and trembled. The countess fainted, and her husband splashed water in her face.

"We fired rifle bullets into the manta, and the water ran red with blood. Finally we passed a rope through the wings and towed the fish to shore. It was too big for the scales, so we cut it up and weighed it. The pieces totaled 1,600 pounds."

Yaquis Dance Their Easter Play

Sonora is the home State of the Yaquis, the Indian tribe that fought the Mexican Army to a standstill until it finally made peace late in the 1920's. Mexicans who used to shudder at the word "Yaqui" now travel without fear through Yaquiland.

On the Saturday before Easter Sunday my Mexican guide and I were hospitably received in dusty little Vicam, one of eight Indian pueblos in the fertile Yaqui Valley. Some 500 tribesmen had gathered to watch dancers perform their annual Passion play, a ceremony then going on in every Yaqui settlement (page 225). Enacting a holy drama learned from 17th-century Jesuit padres, the Indians were enlivening it with old-time pagan dances.

"We are happy to be working instead of fighting and running," a Yaqui told me.

As he spoke, an elderly Indian with palsied hands and rheumy eyes tottered up beside us.

"He's 130 years old," said the Yaqui spokesman.

"If so," I replied, "he must be the oldest man in North America."

"Oh, he's a mere boy," the Yaqui answered. "My aunt, she's 150."

I never found out whether the Yaqui calendar was confused or my informant was joking.

On this Holy Saturday the Yaquis had reached the climax of their ritual, a sham attack on the church of the newly crucified Jesus.

As guards held back the surging spectators, some 40 *chapayekas* (Judases) in bird and animal masks did a convictlike lock step in a plaza ankle-deep in dust, which a hot wind flung in our faces.

About 20 men in black garments played the *Fariseos* (Pharisees) and soldiers of Rome who persecuted Christ, and men with red-tipped lances took the part of Pontius Pilate. Boyish student officers of this legion of evil brandished toy swords emblematic of Roman soldiers. All paid mock obeisance to a straw-stuffed Judas.

Drum Heated, Gourd Cooled for Music

Elderly archers, members of the Yaqui Military Society, performed the coyote dance with rattles jingling at their belts and ankles. The deer dancer, a slender youth chosen for his graceful figure, wore above his brow an antlered head with glassy eyes; he shook gourd rattles.

An orchestra of four men rubbed hardwood rasps, beat a hide drum heated for resonance

(Continued on page 243)

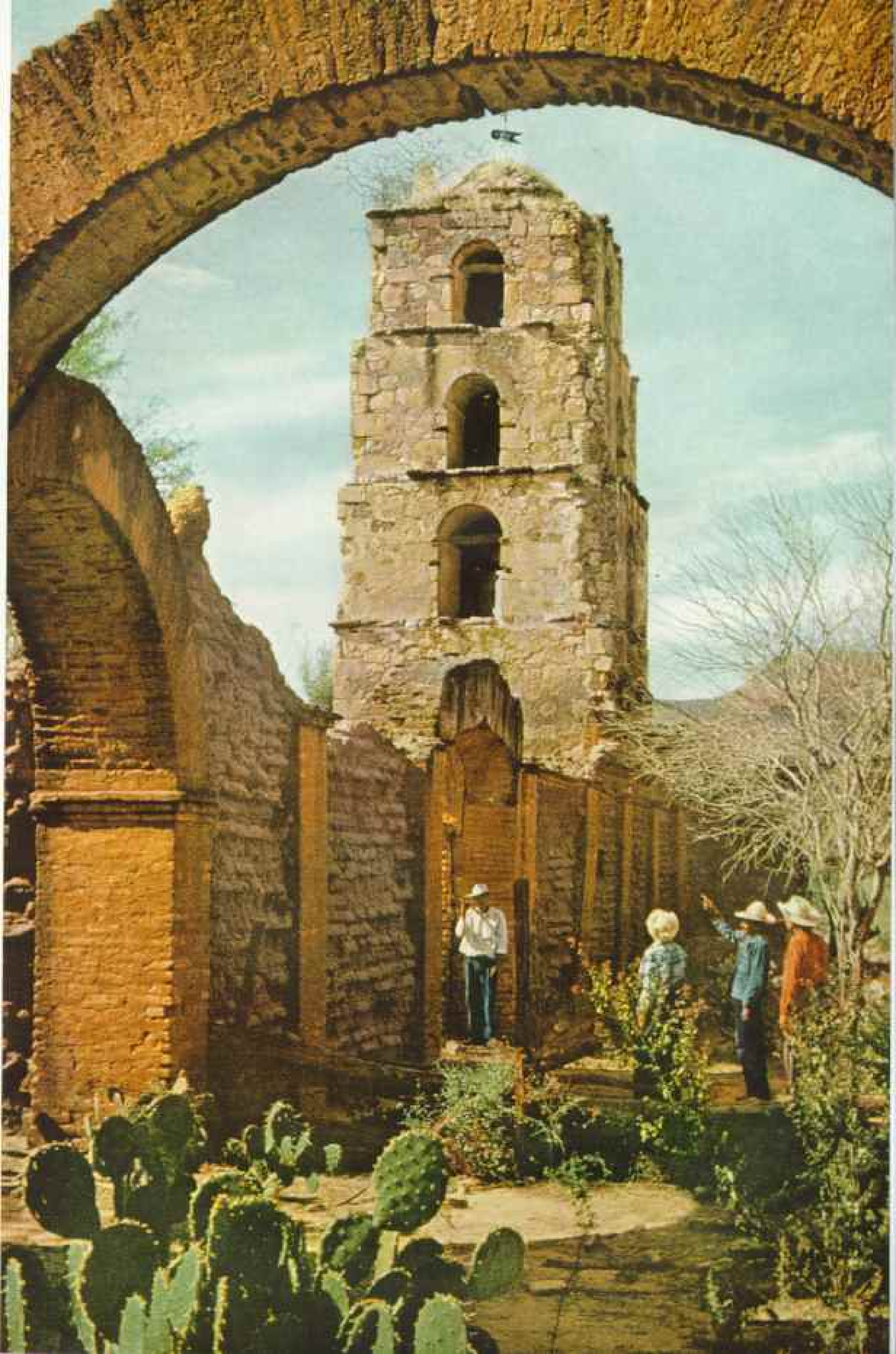
Page 235

Bell Tower in Deserted Baroyeca Wears a Crown of Thorns →

Bats and lizards guard this once rich silver city, founded by miners in 1701. Broken glass and pottery lie in silent streets, and cactus grows out of crumbling mansions. Gone are the church's bells and golden altar vessels. Sheets of solid silver that covered its 5-foot-thick walls have been looted, and treasure hunters have attacked the ruins with picks.

Baroyeca was a prosperous mining center until Indian raiders plundered the church and massacred part of the populace in 1740. For years the town lingered on, dying in 1916. Today its name is scarcely remembered. A party of Americans, scouting the lost city by plane, spotted the ruin and followed through on a truck. They cleared the abandoned Camino Real by chopping down trees.

© National Geographic Society Kodachrome by Martin Litton



University of Sonora's Coolest Spot: the Swimming Pool

Opened in 1942 at Hermosillo, the university answers the State's need for teachers. Its graduates go into Sonora's far corners to bring enlightenment to the poorest children.

Some 900 students take courses in pedagogy, engineering, law, biology, economics, agriculture, architecture, or commerce. Some of the prettiest girls in Mexico attend classes.

The view beyond the modernistic diving platform gives a glimpse of the new Hermosillo.

← Desert Gets a Transfusion

Motorists surveying mile after mile of parched and hostile landscape are surprised to hear Sonora called "the breadbasket of Mexico." It has earned the title by damming up streams flowing out of the Sierra Madre and spreading their waters across rich bottom lands. These oranges grow because the Abelardo Rodriguez Dam barricades the Sonora River at Hermosillo.

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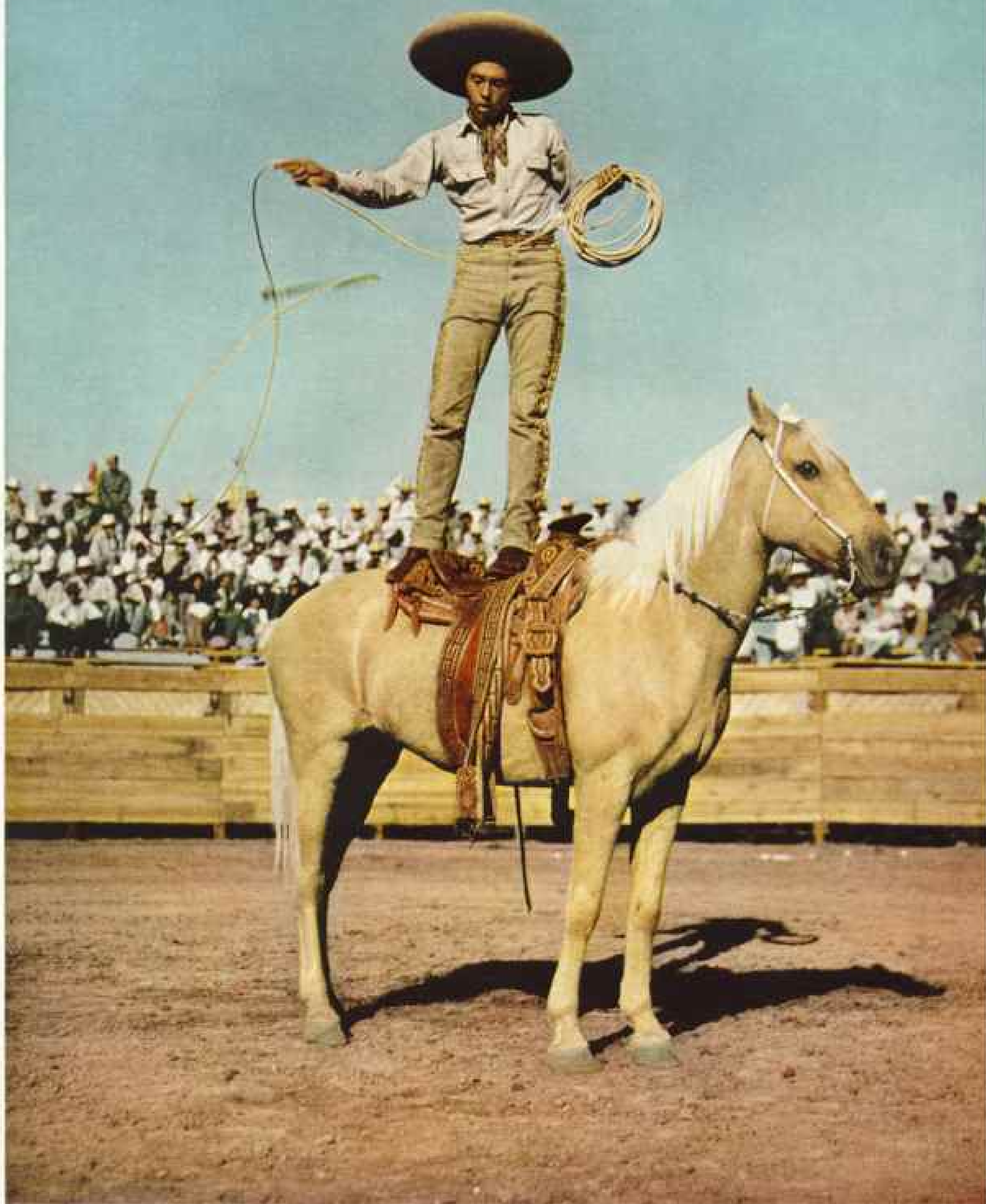
Western Ways Kodachrome by Ray Manley (above) and Kodachrome by Jack Breed



© Western Ways Kodachrome by Ray Manley

A Rope Artist and His Golden Palomino Entertain Rodeo Fans in Ciudad Obregón

United States cowboys owe much of their gear and vocabulary to Mexican *vaqueros*, who introduced longhorn cattle into the Southwest. Bronco, mustang, riata, even rodeo are Spanish gift words.

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Paraders in the Desert Celebrate the Repulse of Gringo Freebooters in 1857

Last April entertainers gathered in Caborca on the anniversary of the defeat of the Henry A. Crabb expedition that tried to wrest control of Sonora. Crabb and 83 followers were killed close to this spot.

Western Ways Kodachrome by Charles W. Herbert

Distant Caborca Is an Oasis Because Ground Water Lies Within Easy Reach of Pumps

Dancers, singers, and drill teams march from ruined Caborca Mission, from whose bell tower the picture was made. Cars and trucks belong to spectators from near-by farms.

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Using His Rose-colored Cape as a Lure, a Torero Incites the Bull to Charge

The Nogales, Sonora, ring entertains an average 3,000 fans, many of them Americans. Fighters always pray for a calm day lest a wind blow capes against their bodies, leading the bulls to gore them.

Americans "Go Abroad" in Nogales, Sonora

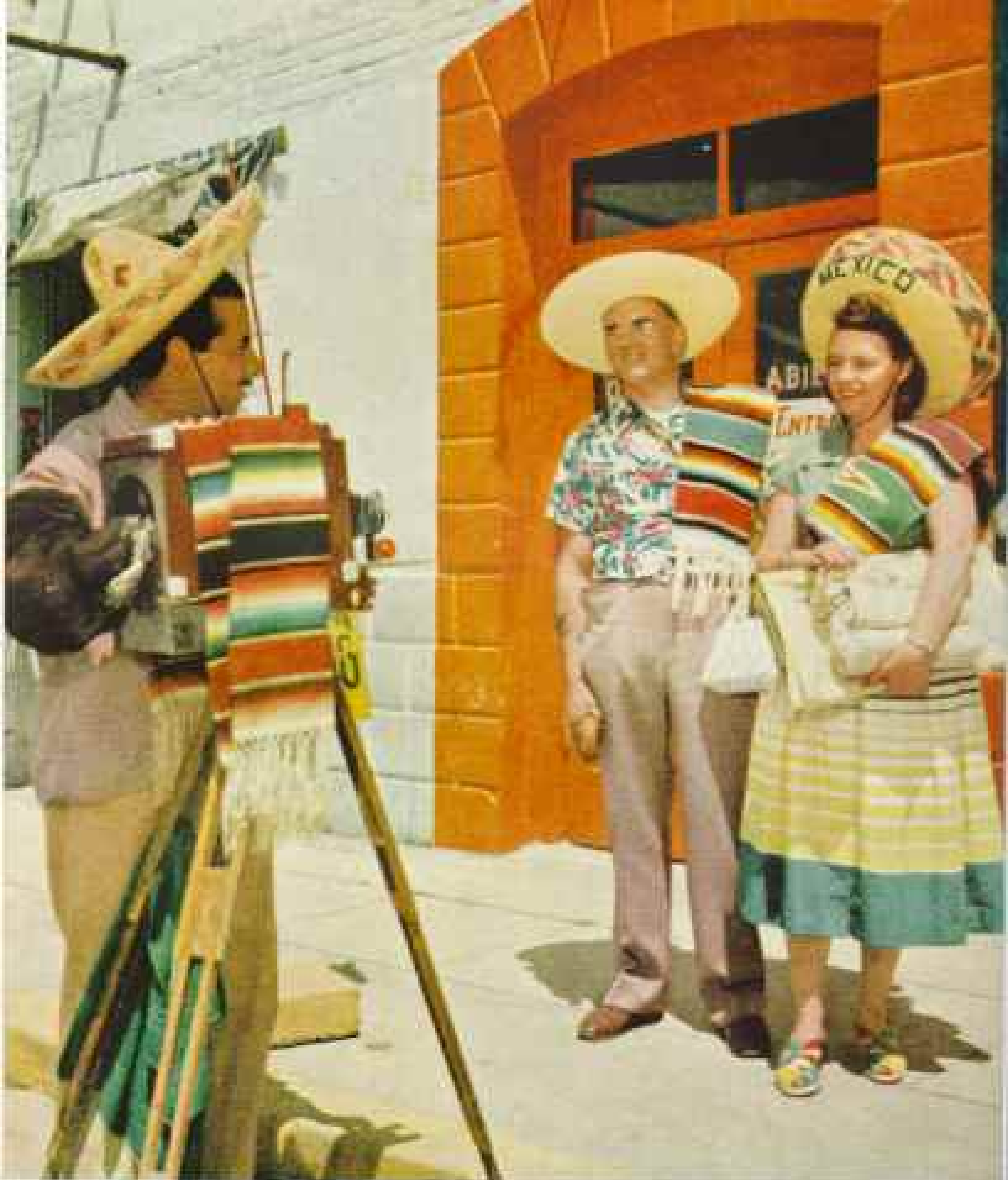
Winter vacationists at Arizona dude ranches like to go home with the boast they have visited a foreign country. Nogales, a border town, gratifies their travel urge. Here they go on shopping sprees for silverwork, purses, belts, shawls, ceramics, and other goods, most of which, like the lady's straw hat, say "Mexico."

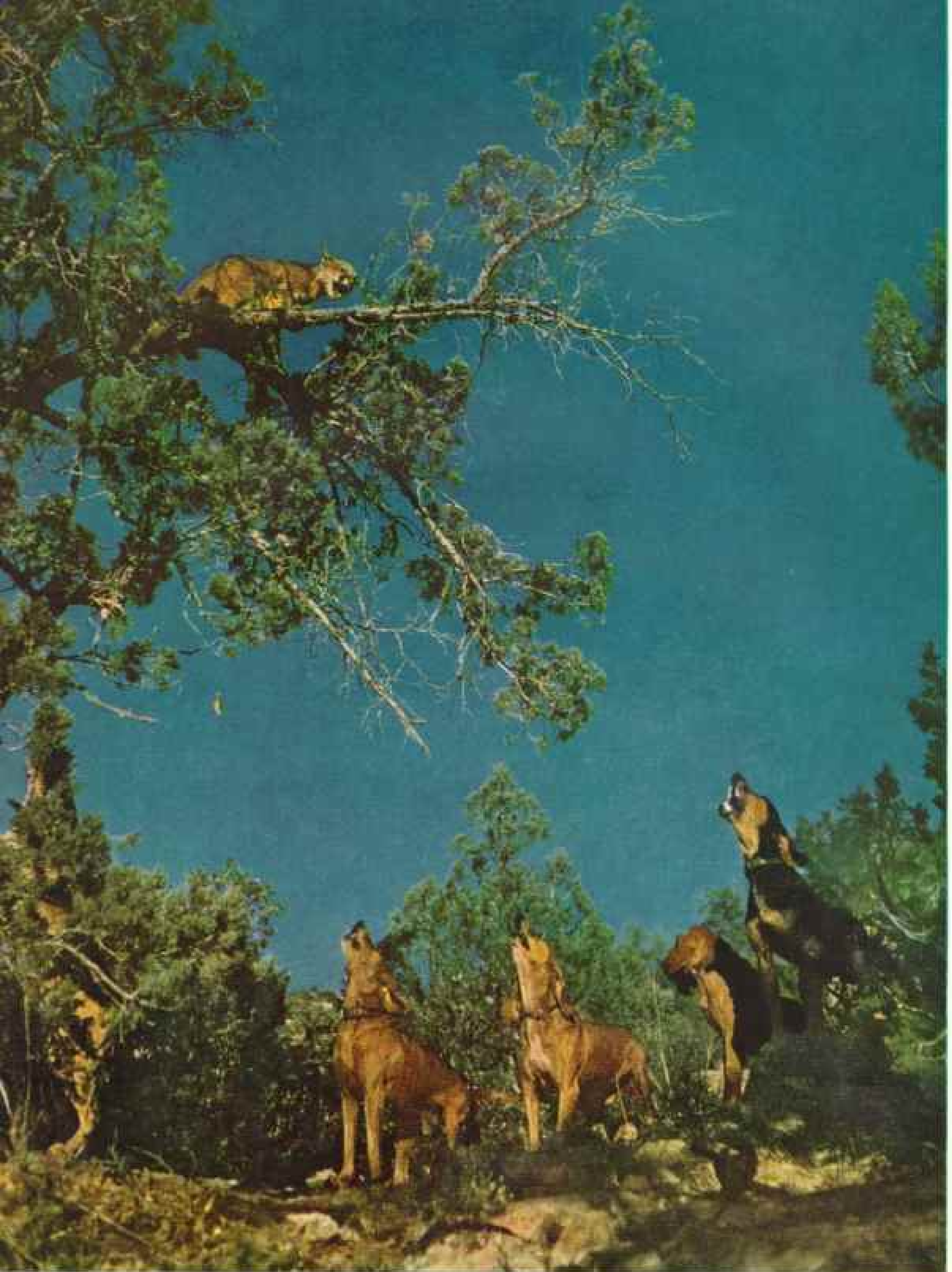
This photographer carries serapes and hats as props. He considers his own holiday attire good business, for it encourages customers to take a chance.

↓ Mexico Sends Tomatoes for Christmas

When winter vegetables are running low in the United States, Sonora and Sinaloa ship carloads of fresh tomatoes to Nogales, Arizona, for wrapping, crating, and distribution as far as Canada. These girls work in the Walter Holm & Company repackaging plant. Here green tomatoes are ripened in cool, moist air until ready for shipment.

© Western Ways Ektachromes by Ray Manley





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Western Ways Kodachrome by Tommy Lark

Treed! A Chorus of Eager Howls Tells the Distant Hunter that Mountain Lion Stands at Bay

The ideal pack of lion hounds contains five to seven—all good hunters, cold trailers, and strike dogs. Each one has speed and a clear voice. After treeing the lion they bay for hours, if necessary, until the hunter arrives. These hounds, running in the Chiricahua Mountains, are Arizonans. Señor Puma, who has crossed the line without permit, is a snarling, fighting Sonoran. Some hounds are so keen to get at treed cats they leap part way up the tree trunk.

by a charcoal brazier, and tapped a half-gourd floating upside down in water.

Maestros, Indian laymen representing the forces of good, recited a service in a bough-canopied arbor holding a candlelit altar.

Now the dancers on the dusty field changed pace, doing a hop-skip-and-jump effect. Suddenly attendants threw open the altar curtains within the ramada. In danced the forces of evil, but boy and girl "angels" beat them back with switches and handfuls of confetti made from the green leaves and yellow blossoms of paloverde trees.

A second and a third time the Fariseos stormed the chapel, but drew back. Finally defeated and "killed" by the bombardment of flowers, the Yaquis' symbol of virtue, the assailants threw away their swords and eerie bird and animal masks and burned the straw Judas, setting off explosions of firecrackers and rockets. Resuming their roles as ordinary men, they were admitted into the church.

Ciudad Obregón Sits in an Oasis

From Vicam we drove to Ciudad Obregón, itself a Yaqui pueblo called Cajeme until Mexican settlers changed its name. In a little less than a generation the population has grown from a handful to 31,000.

Ciudad Obregón wore the raw look and feverish air of a frontier town. Most of its wide streets lacked paving; trees were just starting to grow. Trucks and cars besieged filling stations. The outskirts, torn up for new projects, exposed raw earth to dust storms.

Cause of this boom is the fruitful Yaqui-Mayo Valleys, where Sonora is developing an irrigation project as big as California's Imperial Valley.

Once the rich soil produced crops only when the Yaqui River overflowed, like the Nile. Now reservoirs release water as it is needed. Dam and canal builders scar the earth for miles, and drowned trees poke ghostly limbs above lakes that were desert a few years ago.

Huge Alvaro Obregón Dam, like Ciudad Obregón, is named for assassinated General Alvaro Obregón, one of four Sonorans who became President of Mexico.

"Within the next 10 years Ciudad Obregón will be the center of 800,000 irrigated acres."

Sonora's governor, Ignacio Soto, made the prediction in his executive palace at Hermosillo.

"We Sonorans have seen a phenomenal growth in the last 20 years," Señor Soto told me. "The next 20 years will be even better. We are opening new lands, digging wells, erecting dams, building power plants, and improving equipment. New highways and railroads will open the way to minerals in the Sierra now beyond the reach of transportation. Within a few years Sonora will produce more than half of Mexico's wheat crop.

"Our handicap is our small population, but every day sees young men coming from the south to share our future."

Hermosillo Goes Modern

Hermosillo, trail's end for many tourists motoring from Arizona dude ranches, reflects Sonora's new look. Traffic flows past modern office buildings, hotel façades suggesting Hollywood movie sets, the palatial new Museum and Library, and the University of Sonora (page 236).

Colored by alfalfa, cotton, and oranges, the Hermosillo countryside depends for water on Abelardo Rodriguez Dam. This dam is named for a native Sonoran who, after serving Mexico as President, became the governor of his State. Energetic Abelardo Rodriguez laid out paving projects, started cotton gins, financed farmers and fishermen, and bullied his friends into building new plants and offices.

Sonora, the Mother of Arizona

North of Hermosillo, Herbert and I toured old Pimeria Alta, the name given to northern Sonora and southern Arizona when they were united under Spain. So many conquistadors, padres, and settlers moved north across Pimeria that Sonora was called Mother of Arizona.

In 1539 Fray Marcos de Niza, journeying through the Alamos region, became the first explorer to see what is now Arizona. In 1540 gold-hungry Coronado followed an old Camino Real out of Mexico in quest of the fabulous Seven Cities of Cibola. In 1775 Juan Bautista de Anza, a native Sonoran, left the old Spanish fort at Tubac, now in Arizona, marched to California's Golden Gate, and founded San Francisco. His party of 240 included 49 settlers from Alamos.

Of these history makers, none left so deep an impress on Sonora and Arizona as a humble and gentle Jesuit missionary named Eusebio Francisco Kino, by birth an Italian.

Father Kino founded Dolores, his first Sonora mission, on the San Miguel River in 1687. In the next 24 years he established a chain of

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↑ Green and Lofty Candelabra Grow in a Cactus Forest near Empalme

In March these giants break out in night-blooming white flowers from which humming birds sip nectar. Later they produce an inedible fruit covered with long yellow spines that primitive Indians used as combs.

The foreground cacti are classified as *Pachycereus pectin-aboriginum.* They grow extra large in a seaside hollow that apparently profits from seepage. Their tops are stained white by guano deposited by roosting birds that blithely ignore the thorns.

A few thin stems of *Lemairocereus thurberi,* the organ-pipe cactus, appear on the right. This is not the true organ pipe so widely grown in central Mexico as a living fence.

← *Cephalocereus leucocephalis* grows a Santa Claus beard. Spines on one side of the stem are modified into woolly white hairs. In this respect it resembles central Mexico's old-man cactus, a prized ornamental. This cactus grows in Alamos.

Western Ways, by Charles W. Herbert

Indian churches between the Magdalena and San Miguel Rivers: Remedios, Cocóspera, Caborca, and Pitiquito, to mention a few; their lovely names roll off the lips like music. Rebuilt by the Franciscans, some survive as living churches. Others, including Dolores, sadly crumble back to the mud from which their adobe came.

Around the year 1700 Father Kino founded San Xavier del Bac, Tumacácori, and Guébavi, all north of the present border. Arizona's pioneer rancher, the padre stocked the missions with hundreds of longhorn cattle, not for his own gain but as food for his wards, the Indians. Kino loved his charges, protected them from abuses, and baptized thousands.

Blazing trails across the pitiless desert, Father Kino explored and mapped Pimeria. Between 1687 and 1711 he made 50 horseback journeys, some almost 1,000 miles long. On one ride he traversed a waterless stretch that later killed gold-rush travelers by the scores. Unsupported by the soldier-explorers' pretentious armies, Kino often rode alone with Indians. In the saddle he averaged 25 to 40 miles a day.

Father Kino died at his Magdalena Mission. Rebuilt, this church stands a few blocks off the international highway.

River Eats into Caborca Mission

A dusty country road led Herbert and me to Caborca Mission, site of a ferocious battle between Mexicans and old-time American adventurers.

Built on the Kino site, Caborca resembles San Xavier del Bac near Tucson, and tradition says the architects worked on the two missions simultaneously, commuting from job to job.*

Caborca's magnificent façade, topped by twin bell towers, covers a hollow shell. Floods sweeping against the structure undermined and toppled rear walls until a jetty of logs and stones stopped the damage.

Borrowing a key, we entered the wooden door and climbed adobe steps creased 10 inches deep by centuries of footsteps. Potter wasps tenanted the deserted passageways and anterooms.

An oasis in the Sonora desert, the town of Caborca last April welcomed us gringos under strange circumstances. With the help of orators, bullfighters, and costumed dancers from all parts of Mexico, citizens were celebrating the anniversary of the defeat of a band of American freebooters (page 238).

Trouble started when Henry Alexander Crabb, a defeated California office seeker, plotted a revolutionary movement with a Mexican faction, recruited a band of adventurers and unlucky gold hunters, and marched under arms into Sonora.

Desperate Battle Fought at Mission

Arriving in Caborca April 1, 1857, Crabb and 68 followers fell into ambush but fought clear. Their Mexican enemies took cover in the mission; Crabb occupied a cluster of adobe houses across the road. In a desperate effort to dislodge the Mexican troops, Crabb and a few volunteers stormed the mission with a keg of gunpowder and vainly attempted to blow up a door.

Retreating to his own barricade, Crabb endured a barrage of lead scraps fired from Mexican cannon. Then blazing Indian arrows fired the thatched roof above his head.

Their situation hopeless, the Americans laid down their arms and marched out one by one, expecting mercy. All but a 16-year-old boy were shot the next sunrise. Crabb's head was cut off and briefly preserved as a trophy.

The Sonorans next captured and shot 16 of Crabb's men marching to his relief, routed a second rescue column, and, riding to the border, killed four freebooters left behind in Arizona.

Returning to the main highway for the last leg of my run home, I sighted a movement of large importance to the United States. Freight cars on the Ferrocarril del Pacifico, which here and there parallels the highway, were rolling north with Sonora and Sinaloa tomatoes.

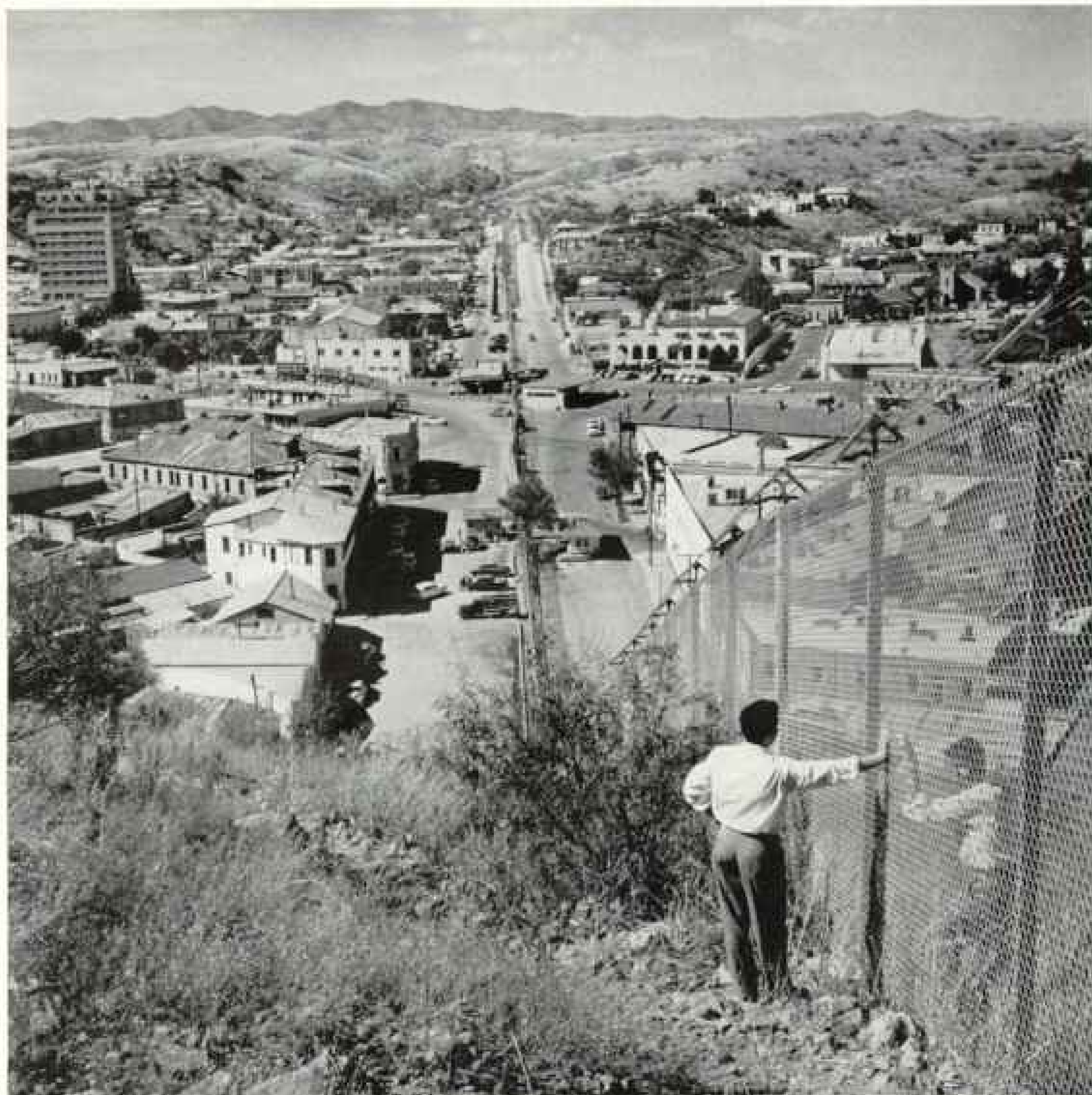
Mexican Tomatoes for U. S. Tables

In winter when United States farm production stands at low ebb, these Mexican States enrich American menus with vitamins and color. In recent years the tomato crop has been worth 20 to 25 million dollars, an important source of income to Mexico.

Packaging and distribution of Mexican vegetables is a big business in Nogales, Arizona (page 241). Each year trains arrive with 7 to 8 thousand carloads, of which a fourth go to Canada.

However, border traffic is not one-way, as Mrs. L. D. Shreve, recent secretary-manager

* See "From Tucson to Tombstone," by Mason Sutherland, National Geographic Magazine, September, 1953.



Western Ways, by Charles W. Herbert

Nogales, Sonora, Talks to Nogales, Arizona (Right), Across the International Fence

of the Nogales Chamber of Commerce, reminded me.

"I sit here in an office beside the international highway," she said, "and watch tons of earth movers, transformers, and other heavy machinery move south every day."

Border's Twin Cities Act as One

Nogales, Arizona, the home of 6,150 people, and Nogales, Sonora (25,000), call themselves the *ambos* (both) *Nogales*. To iron out border frictions, they have an unofficial but effective council consisting of the mayors, presidents of the chambers, collectors of customs, and chiefs of immigration. Once having settled a problem over coffee cups, the council then clears its decision with Washington, D. C., and Mexico, D. F.

The two police departments and fire departments operate as one. Mexican housewives shop in the Arizona five-and-tens; Americans cross the line for entertainment and curios.

The twin Nogaleses' only visible sign of separation is a high fence running across town and several miles out into the hills, opening only at central gates accommodating pedestrians, pleasure cars, trucks, and trains. With stout steel wire the fence says, "Stop for inspection!"

"If it were not for that cursed fence," a Nogales, Sonora, official told me, "we'd be one town."

Roaming India's Naga Hills

Friendly Tribesmen, Strange Birds and Animals, and Occasional Headhunters Inhabit the Rugged Assam-Burma Borderland

By S. Dillon Ripley

In the heart of Assam, the mighty Brahmaputra River flows through a broad, green valley on its long journey from Tibet to the sea. Southeast of the valley a low range of mountains stretches for 200 miles along the Assam-Burma border. These are the Naga Hills, one of the few parts of the world where there are still large, primeval forests never yet explored or studied by naturalists.

I had seen something of the Naga Hills during World War II, as did many an American fighting man. For these are part of the Hump over which United States airmen flew supplies, equipment, and personnel into Nationalist China. My visit then was in haste, but I had resolved to come back if possible to explore them as a zoologist.

Mountains Hold Zoological Riddles

This is the story of that return visit. It begins as my wife, Mary, and I cross a road barrier at the little Assam village of Nichuguard. The policeman on duty hands us back our permits with a flourish, and our truck starts up a long, winding slope toward the hills.

Ten minutes earlier we had been stifling on a hot October day in the subtropical lowland. But as we pressed up the road, the temperature quickly dropped from the 90's to the 50's; clouds we had seen in the distance as white puff balls were now all about us, gray, lowering. Finally it began to rain in cold, wet sheets. We would get used to rain before our trip ended, for Assam lies in one of the wettest areas in the world.

To a zoologist, Assam is by far the richest of India's States. The great complex of hills which form its natural borders contains one of the most varied floras and faunas in the world. It is a borderland where alpine, Chinese, Indo-Malayan, and Indochinese species all meet. It is a naturalist's paradise, an area where much yet remains to be discovered, where riddles are still unsolved.

The road barrier we had just crossed represented the so-called Inner Line, a border maintained by the Government between the lowlands and the less civilized hill country. Originally set up to protect travelers from straying among the warlike hill tribes, the line is now kept to guard the tribes and their unique culture from the damaging effect of too many civilized visitors.

We had obtained a permit to cross the line from the governor of Assam in Shillong, the State capital. Though the Naga villages are now at peace with the Government, officials there did warn us of another danger: armed Communist agitators were reported to have set up bases in the hills.

At the moment, however, our biggest danger seemed to be the road we were driving over. Our big hired truck puffed and panted up the steep hillside. To one side a chasm bordered our trail, steaming with vapor boiling up as the rain lashed the river below. The other side was a sheer rock wall from which crumbling falls of shale frequently slid onto the roadbed. The truck lurched over these loose mounds in a fearsome way.

The vegetation was luxuriant. Huge clumps of bamboo grew everywhere; some, trampled and twisted, showed where wild elephants had been feeding. Tree ferns and shiny-leaved wild gingers clung to the rocky cliffs. There were bracken ferns and clumps of tall wild grasses with red-pink fruiting heads.

Tribesmen Smile a Welcome

Around a bend we came on our first family of Nagas, a man and wife and two small children. Heedless of the cold, they sloshed with sturdy bare legs through the mud and rushing water of the gutter. Each carried a big basket on his back, piled high with a heavy load and secured by a tumpline around his forehead.

As we passed, they turned in unison and smiled broadly at us, and the man waved. We smiled back and waved in turn, astonished and warmed by the friendly sight. We liked the

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The Author

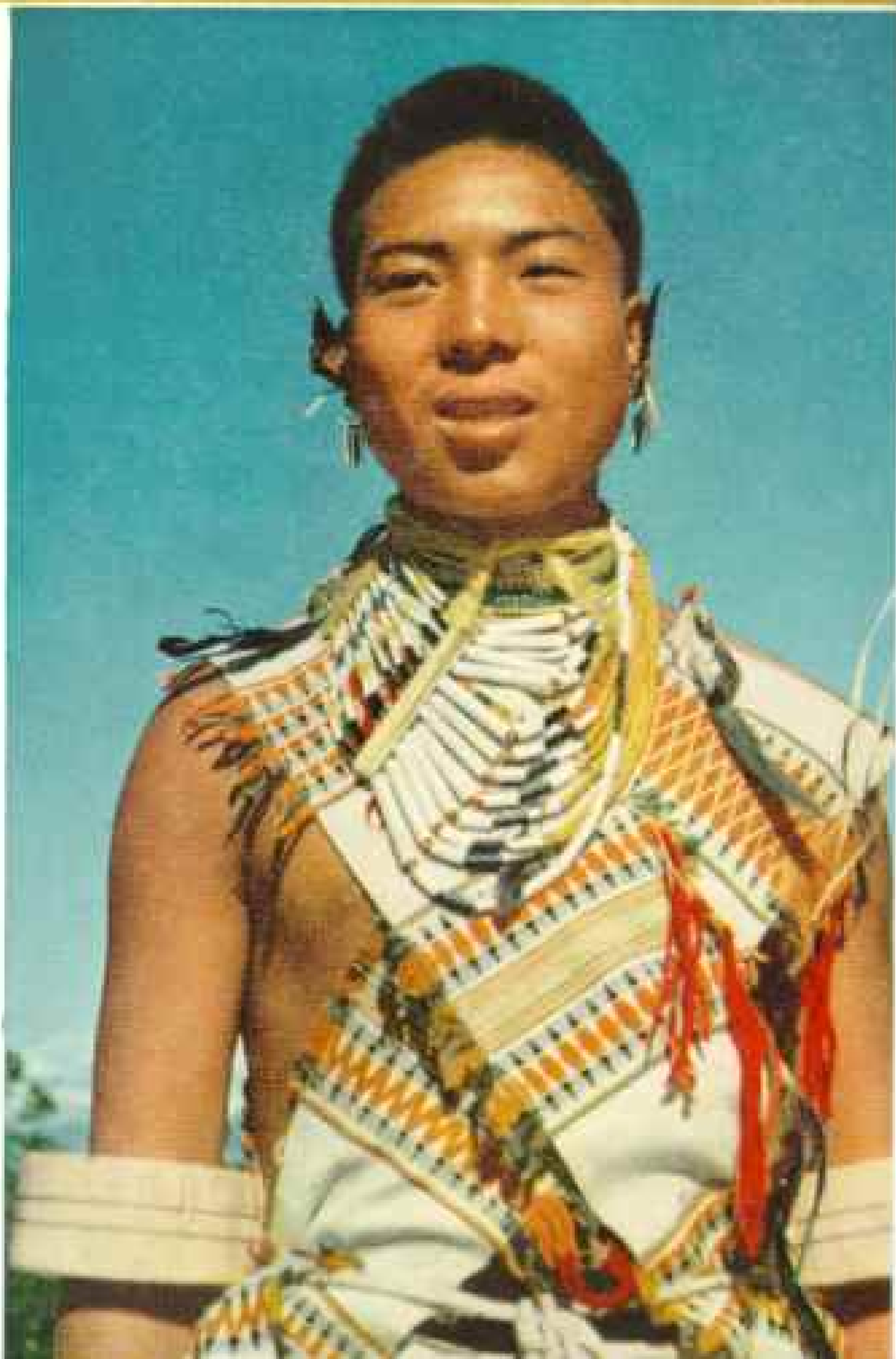
Dr. Ripley, Associate Curator of Zoology, Peabody Museum of Natural History, Yale University, has led several scientific expeditions into the remote mountain forests of southern Asia and New Guinea. Two of his earlier trips were described in the National Geographic Magazine: "Peerless Nepal—a Naturalist's Paradise," January, 1950; and "Strange Courtship of Birds of Paradise," February, 1950.

↑ Angamis Leap in the War Dance of Naga Hills Head-hunters

Along the border of India and Burma lie the high, mist-shrouded hills of Naga. There a score of tribes live as their remote ancestors did; the 20th century barely touches them.

Only yesterday tribe fought tribe for the gruesome war prize of human heads. Raids continue even now in frontier districts beyond control of the Indian Government. To the Naga, a severed head means more than an enemy slain; a head gives prosperity and "soul force."

These boys of the Baptist Mission School at Phakekedzumi wear the hand-woven baldrics and kilts of the Eastern Angami tribe. Dancing like their warrior fathers, they make spectacular jumps and cross their legs in mid-air, not unlike members of a ballet corps.



→A necklace of bone and carnelian bespeaks the wealth of this dancer's family. Pieces of horn separate the strands. Ivory armlets are three-inch-thick sections of elephant tusks. Feathers sprout from the boy's ears.

← Spear and Shield Once Won Heads

Page 248: Dyed goat hair, substituting for human hair, decks this Western Angami's weapon and bearskin-covered bamboo shield. Bands of cowrie shells stripe his black kilt; four rows once meant that the wearer had taken a head. A cast-off army shirt shows modern influence.

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Kodachromes by S. Dillon Ripley

Naga Hills Turned Back the Japanese Invasion of India

In March, 1944, Axis forces crossed the Burma border and laid siege to Kohima and Imphal. Naga tribesmen served the Allies as guerillas, runners, spies, and jungle guides. Today Nagas number 200,000. They enjoy local autonomy under the Indian Constitution. Some agitate for independence.

In search of rare birds and deer, the author passed through Nichuguard to Kohima; he visited Logtak Lake and Mounts Japvo and Zepuhu.

Nagas from the very first glimpse, so sturdy are they, so independent, yet always smiling or laughing.

These were Western Rengmas, one of the dozen or so tribes that make up the Nagas. Each tribe is distinct from the others in dress, often even in facial appearance, so the experienced eye can immediately tell a Western Rengma from a Western Angami, a Lhota from an Ao, or even a Western from an Eastern Angami.

No one knows definitely the origin of these Naga tribes, but it seems certain they have diverse origins and do not stem from a common stock.

Legends say groups of Nagas have been wandering into these hills for more than a thousand years. Some seem closely akin to similar animist tribes of the hills of northern Indochina and Formosa. Others look and act like the hill Dyaks of Borneo. Certainly there are links between the Naga tribesmen and the people of the Indonesian islands thousands of miles to the southeast.

Farther up the road we saw our first Angami. You can usually recognize Angami men by the heavy coils of thin, black cane they wear wound like string around their legs between knee and calf. This is to accentuate the calf muscle, principal sign of beauty among a people whose very existence depends on their ability to carry heavy loads of grain and other produce up from the fields to their storehouses.

The rain finally began to abate, and through the clouds we were able to get sketchy views of our distant goal, a cluster of houses clinging precariously to a ridge on the horizon ahead. This was Kohima, one of the two divisional headquarters for the Naga Hills.

Near the ridge we passed occasional houses with walls made of huge solid planks in the old Naga way. Incongruously, they had galvanized iron roofs instead of the traditional thatch. On a hill stood a big white hospital which the British Government gave to Kohima, along with a new school, as compensation for losses in World War II.

Just as we reached the final ridge and came out on the main road of Kohima, the sun peered through an angry tangle of clouds, lighting the village with color. The sudden brilliance and the gleaming smiles of the Nagas restored our spirits. We were in the Naga Hills, and we were glad we had come!

That evening, perched in a Government rest

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Hunter Aims His Crossbow, Still a Useful Weapon in the Naga Hinterland

This Sangtam archer helped author S. Dillon Ripley collect birds. Using a bamboo sliver for his arrow, he felled a red-flanked bush robin on Mount Zepuhu. His crossbow is effective up to 80 yards.

← Clouds Boil Up from a Hidden Valley Beneath the Peak of Mount Japvo

Page 252: On the climb to Japvo's 9,890-foot summit, the author found rhododendrons and roses, barberry and blackberry. Gold and red leaves of maple and birch trees reminded him of New England.

Imphal, capital of Manipur, lies beyond this rifleman's gaze on the distant plain (left).

Lower left: A Konyak Naga matron takes all her finery to the fields. She wore nothing until she was about 16 years old. Her short skirt, ending above the knees, is a symbol of womanhood. Betel chewing colors her lips as with lipstick.

Women, who farm the steep mountain slopes along with their men, carry heavy loads. To flatter a belle, a Naga man says, "What fine calf muscles you have," rather than, "What lovely brown eyes."

↓ "Stop!" Says the Gate to Nagaland

Here the author and his wife crossed the Inner Line into the Naga Hills. Originally the line was set up to keep visitors from the enclave and save their heads. Now the boundary holds back commercial exploitation and protects the singular Naga culture.

Dorien Leigh, Ltd. (lower left) S. Dillon Ripley

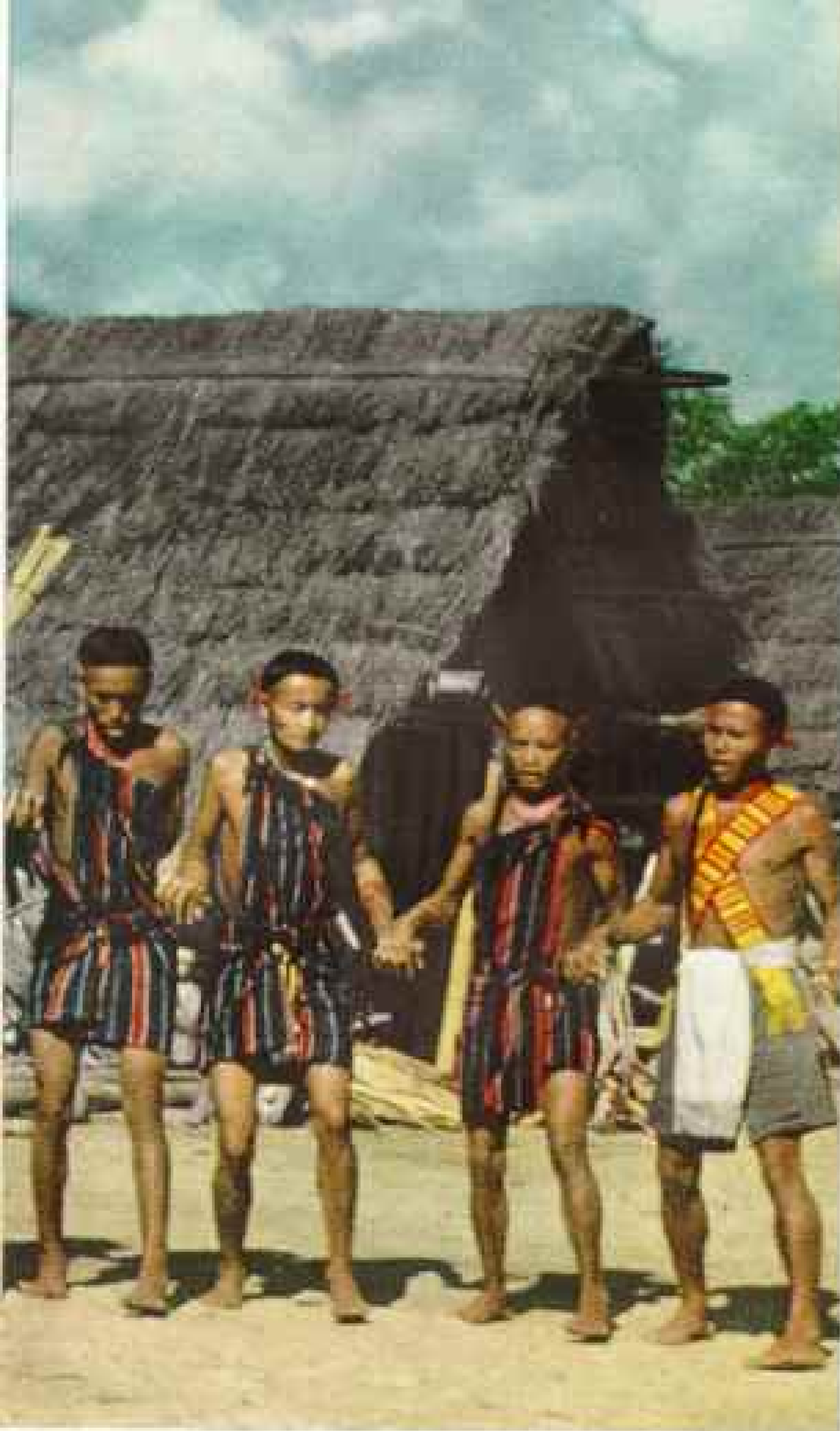
house on a hilltop, we felt secure in fresh dry clothes. With a fire in the fireplace, drinking mugs of hot tea, we sat and listened to the sounds of the hills.

It was then that we first heard the singing.

The thought of it still makes me homesick for those hills. In the evening, as the Nagas come back up to their ridge-top villages from fields in the valleys below, they sing in unison. Bent under heavy loads of grain, water, or firewood, they keep in step to the rhythm of the song.

The music is always much the same. The main theme is a sort of "Ho-ho, Ho-ho" repeated over and over, the second note lower than the first. Sometimes the "Ho-hos" will be repeated in parts, all in a minor key, a mournful song of far away and long ago.

Our first few days in Kohima were busy. Mr. S. J. Duncan, the deputy commissioner, and his wife were kind and helpful, but I found



↓ A Girl Dancer Portrays Lord Krishna, the Hindu Shepherd God

In pursuit of waterfowl, the author and his wife visited marshy Logtak Lake in the central valley of Manipur, an Indian state bordering Burma and including a part of the Naga Hills.

Here in the village of Moirang the Ripleys watched Hindus celebrating an autumn festival.

Executing a temple dance, this 12-year-old wears Krishna's princely crown and carries his shepherd flute. In poetry, Krishna's flute sounds the "Call of the Infinite," bidding men to "leave all and follow me."

Krishna is believed to have been born from a hair of Vishnu, the Hindu god who saved mankind. As the eighth of Vishnu's 10 incarnations, Krishna has millions of worshipers. He epitomizes the spirit of youth in his many miracles and marriages to 16,000 princesses.

Few Nagas are Hindus; many are Baptists as a result of American missionary efforts, but most simply believe in spirits, living without priest or prayer.

↑ Rengma Warriors Join Hands in a Gallop Through Meluri

These Eastern or Naked Rengmas, whose usual garb is nothing at all, dressed up for visitors. After charging through the dirt streets, the men chose sides and staged a mock battle.

Warrior on the extreme left wears a cone of cane and the stems of dried orchids. His hat ruff is made of dyed goat hair. The meat-axlike *dao* may serve such varied purposes as house building, head taking, and hair cutting. The barber holds the blade beneath the hair and chops off locks with blows of a wooden block.

← Earrings of Human Hair Say These Men Have Taken Heads

Page 254: Because of the government's ban on raiding, severed heads are scarce these days in the Naga Hills. They are still prized, however, and entire villages may cut up and share such a trophy.

Like the earrings, cane gauntlets and blue-and-red togas proclaim the successful head-hunter. The ears are fringed with shredded bark dyed red.

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Kodachromes by S. Dillon Ripley

that collecting natural history specimens in the Naga Hills was going to be far more difficult than it had seemed at a distance.

The agriculture of the Nagas involves a steady shifting of cultivated areas. The villagers choose a patch of virgin or near-virgin forest land, cut down the trees, and burn over the undergrowth. They plant crops in the cleared area for a few years until the soil is worn out or eroded. Then they pick another spot and repeat the same process.

In the Naga Hills today there is Government-imposed peace between tribes; medical aid is fostering the birth rate, and population is rising. There is an increased demand for firewood and lumber for houses. As a result the forests are disappearing rapidly.

Virgin Forest Is Vanishing

Real, primary forest is now confined to the tops of the higher hills, from about 7,000 feet up. Many of the native animals and plants, once widespread over the land, are now confined to small islands of vegetation on isolated hilltops. Our first problem, then, was to find a suitable spot where we could hunt specimens.

The likeliest place seemed to be the highest hill in central Assam, 9,890-foot Mount Japvo, not far from Kohima. It is part of the Barail Range, whose untapped oil and coal resources may one day bring mineral riches to the State. So we planned a 2-week expedition to the top of Japvo. Its summit, I knew, had not been visited by an ornithologist since the surveyor and naturalist, Maj. Henry H. Godwin-Austen, climbed it in the 1870's.

While arrangements were being made for the climb, my wife and I took a side trip to Logtak Lake, 86 miles south in the Manipur State of India.* Our object was to observe the waterfowl and other water birds of India which concentrate there, and, more especially, to see if we could find any Eld's deer (*Rucervus eldii*), a rare species which has been observed in the Logtak Lake area.

We camped on the lake's edge in the small village of Moirang and for a week searched the marshy shores for Eld's deer, known to the Manipuris as "sangnai." We found none. My own feeling, after our brief visit, is that the last of the sangnai in this territory have now been killed off.

* See "Manipur—Where Japan Struck at India," NATIONAL GEOGRAPHIC MAGAZINE, June, 1944.

← **Angami Barbers Share a Front-porch Shop With a Family Cow**

As everywhere else in the world, the Angami home is an index to its owner's wealth. Only a rich man could afford this house with its hand-painted rafters and hand-hewn façade carved in a stylized buffalo design.

To earn the right to build such a house, the owner gave many feasts, treating the entire village to rice beer and meat.

Sheets of corrugated tin, replacing old-time thatch, roof the house.

Unlike the more isolated Rengmas (page 255), these barbers use western-style clippers. Their customers rarely ask for a shave, as hair does not flourish on the Naga face.

S. Dillon Ripley

A Bride-to-Be Lets Her Hair Grow →

This Angami's shaggy hair style, reminiscent of the cut made fashionable not long ago by European movie queens, is as indicative of her approaching wedding as an engagement ring. Although parents may arrange a marriage, they never compel Angami girls to wed.

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Though our deer hunt failed, we had a good opportunity to observe the Manipuris. Faithful Hindus, the villagers of Moirang were celebrating the autumn festival of *Dashahara*.

We visited a straw-thatched temple one evening to watch the Manipuri dancing, one of the more distinctive styles of folk dancing in India. The male dancers carry long, cigar-shaped drums held by slings around their necks. Leaping in chorus and in perfect time, they drum as they dance to intricate rhythms.

Girls about 12 or 13 years old danced for us the next day. Theirs was a fragment from Hindu folklore, depicting Krishna, the shepherd god, the spirit of youth, dancing with the maidens, the *gopis*. The little girls performed charmingly and took their parts very seriously (page 255).

Two Weeks' Supplies Make 30 Loads

Back in Kohima several days later, we found all in readiness for our trip to Japvo. Our equipment included three tents—one for ourselves, one for our two Indian taxidermist assistants, and one for the bearer and cook obtained for us by the forestry officials of the Assam Government.

We also had to take a 2-week supply of canned and dehydrated food, clothes, bedding, shotguns with ammunition, and taxidermy equipment. All of this formed loads for 30 Naga porters.

We left the motor road five miles from Kohima and proceeded up a narrow valley terraced with small paddy fields. As we climbed up from field to field, the cultivation gradually ended. Then we came to an area where the forest was being freshly burned out and the path was ankle deep in wood ash. Gaunt skeletons of giant trees—bombax, teak, and ironwood—with their branches still shrouded in remnants of vines, showed the height of the old forest.

Now the Nagas would plant vegetables on the steep slopes for three or four years until the rains washed out all the topsoil. Then, abandoned, the slope would turn into grassland and weedy scrub like the hills for miles around.

A few more yards of climbing and we plunged through a curtain of shrubs and lower trees into the real forest. Once in the woods, we quickly saw why this land had not been cut and burned too. The hillside was as nearly vertical as it was possible to be and grow trees.

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↑ Heavy Earrings and Neckloads of Beads Are Never out of Style Among Angamis

These girls wore crew cuts until they married. Brass earrings, fitted into the upper part of the ears, are supported by strings carried across the head.

↓ Sangtams Wear Skullcap Haircuts; Pipes Burn Home-grown Tobacco

Imaginative Sangtams believe in sky folk who live beyond the heavens, chop up blocks of ice, and throw the fragments down as hail.

There was no trail except a small one made by the barking deer, commonest of the species of deer living at this altitude.* The animals had chosen the shoulder of a miniature ridge plunging into the valley. Up this we struggled from one handhold to another, roots and vines often giving way as we grasped them.

The Nagas, with bare feet, had the best of it, but even they were taxed by the climb. It had seemed warm in the sun when we started, but in the dripping darkness of the forest it was chill and damp.

Nagas Refuse to Camp Out

Finally we came to an opening where the land flattened out into a small amphitheater. The head porter was sitting here waiting for us.

"Camp," he said simply. "This is the only place where there is water."

The altitude was just short of 8,000 feet. I had hoped we could get higher, but when we talked over the water situation we decided to camp here. Quickly the Nagas set about cutting the vines and vegetation away with their long *daos*, heavy axlike knives (page 254).

As soon as the camp was set up, the Nagas departed. None of them wanted to spend the night at this altitude, whether because of cold or superstition we never knew. We made arrangements with the head porter to send up messengers every few days with provisions. In two weeks he would return with porters to take us down the mountain.

Early the next morning two local Nagas appeared and offered to help us hunt. I had just finished setting out some bird nets for trapping small specimens and was already somewhat staggered by the magnitude of the task that confronted us. Hunting birds in these trees, whose vast crowns towered like cathedral arches 100 to 200 feet above, was going to be very difficult indeed.

Much of the time it was impossible to see any birds at all. Either they kept to the forest canopy far overhead, or else they skulked in the thickest clusters of undergrowth, fallen logs, and tangles of brush, ferns, and nettles.

I gladly accepted the Nagas' offer, and on almost every succeeding morning we found one or more waiting by the fire. Sometimes they went out on their own. Often they guided us along the game trails which wound precariously along the slopes.

Above us an 8,500-foot ridge led to the top of the mountain. One day we made a special effort and climbed to the summit. The last few hundred feet were a steep slope of rock and low bushes, rhododendrons, and stunted birch trees with moss-covered trunks. Roses grew here and barberry bushes and some sort of blackberry, and a single flower which looked very much like a purple foxglove.

There had been frost the night before and the leaves of the maples and birches lower down were turning yellow, gold, and red. With its birch trees and stunted bushes, Japvo reminded me of a peak in the White Mountains of New Hampshire. It was startling, then, to see a solemn flock of rufous-headed hornbills swing out from the jungle a little lower down and sweep majestically across the gorges into a cloud bank.

Climbing down from the ridge that evening, we came across fresh tiger marks. Sambar, the red deer of India, and serow, the small, secretive goat antelope, are the principal prey of tigers in the Naga Hills.

After nearly two weeks of furiously concentrated collecting we had secured 200 birds on Japvo. Our specimens, wrapped in cotton and packed in a tin trunk, were ready for the long trip back to the Peabody Museum of Natural History at Yale.

Our head porter appeared on schedule with a fresh group of Naga bearers, and in a few hours we had slid and scrambled down to the bottom of the mountain, where a truck waited to take us to Kohima.

Head-hunters Still Roam Eastern Hills

When we had left Kohima earlier, I had requested Mr. Duncan's help in arranging a visit to the unadministered territory lying on the India-Burma border, an area outside his jurisdiction.

Mr. Duncan had said that such a trip would involve the permission of the governor. He added that we could not set foot into such an area without a patrol of Assam Rifles, the State armed police, to guard us.

Control of the Naga Hills is a matter of degree. The western hills, with administrative centers like Kohima and Mokokchung, have been settled and peaceful for many years. Most of the Nagas in the west are Baptist converts, largely through the efforts of the American Baptist Foreign Mission Society.

Go into the eastern hills, however, and the actual control is much less. A village 50 or 60

* See "Deer of the World," by Victor H. Cahalane, NATIONAL GEOGRAPHIC MAGAZINE, October, 1939.

← This Chief Gave Warning of Poison on the Trail

Nagas of the Sangtam tribe live in dread of their neighbors, the Kalyo Kengyu, who still keep slaves and hunt heads in a no man's land between India and Burma.

While the author was scouting for wildlife on Mount Zepahu, this friendly South Sangtam learned that tribesmen ahead had strewn the path with poison-tipped slivers of bamboo.

To avoid stepping on sudden death, Dr. Ripley changed his route.

↓ An Angami Woman Weaves on Her Tension Loom

The machine, so close to this weaver in life, will be buried with her in death. Here she holds the warp threads taut with a strap at her back. Angami children as young as 5 years are content to weave for hours while grownups work in the fields.

Chowlike puppy is of an old Naga breed.

South Sangtams (upper), who taboo weaving, import cloth for their simple coverings.

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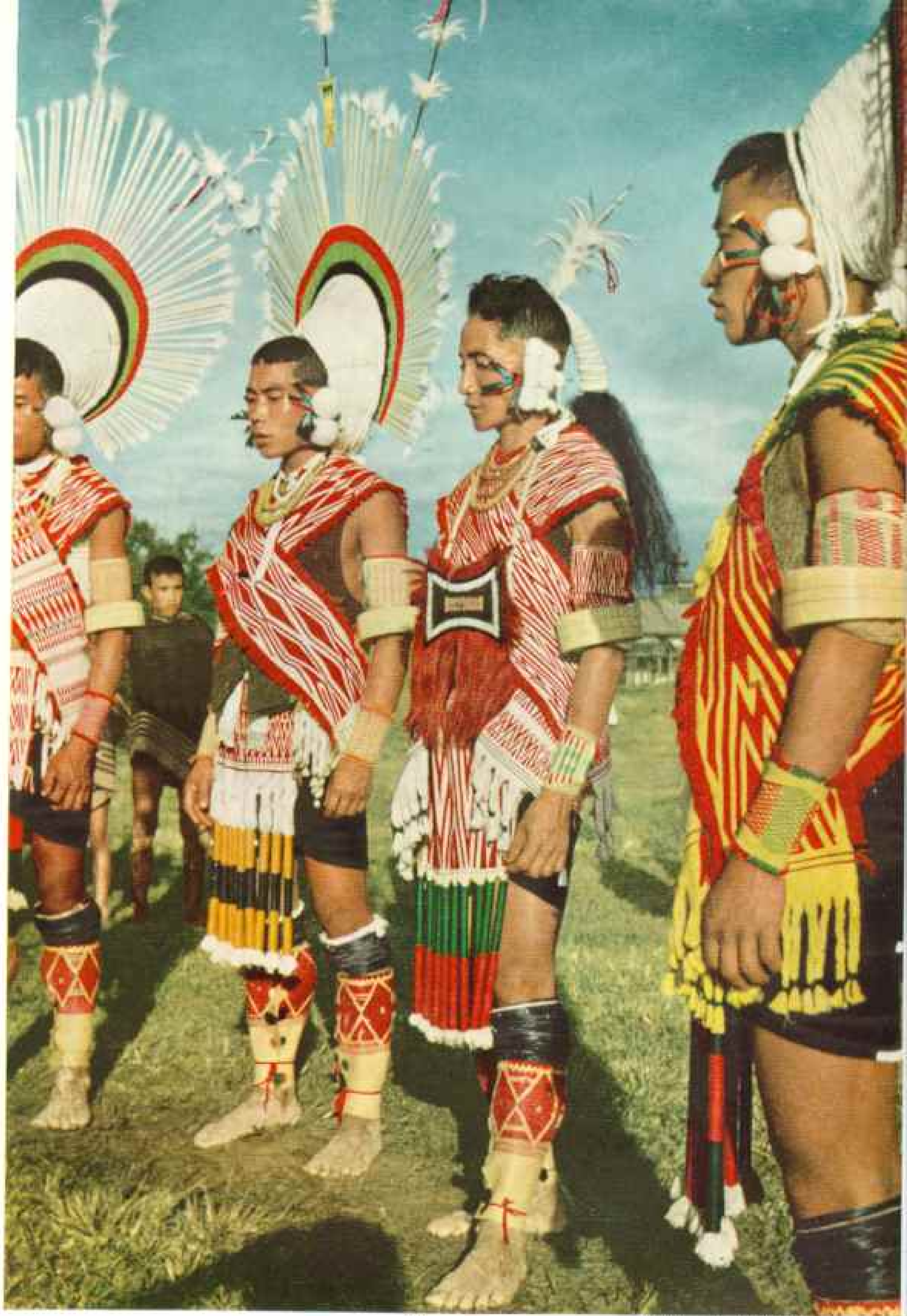

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Barbaric Princes in Sunburst Crowns and Bare Feet Are Brawny Angami Warriors

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An Angami's Topknot Anchors His Ceremonial Bonnet

Spectacular enough for the Ziegfeld Follies, the hat required three days to make. Women sewed splints of bamboo to a circlet of light wood. This warrior gives a rear view of the hats shown on page 261.

Duncan felt our keen disappointment and, looking over the map with me, pointed out one place where the border of the administered area actually reached the eastern hills I was so anxious to visit.

No naturalist had ever studied these eastern hills. Their streams drain into the Chindwin River system of Burma, and I felt sure that their animal life would be transitional between the fauna of India and Burma.

In the area Mr. Duncan indicated there was an 8,408-foot mountain called Zepuhu which might serve my purpose. Again food, tents, and all the gear we would need for such a trip was sorted out. The first 44 miles of our trip would be by truck. After that we would walk.

While we got ready for Zepuhu, Kohima held its annual autumn harvest festival. All the Naga tribes celebrate their harvest with days of singing, dancing, and—where the Baptists have not banned it—large-scale consumption of rice beer, called *zu*.

The dance was a sight to stir the blood. Some 30 men came out of the village in line carrying spears, their towering headgear—huge fans of bamboo, cotton and feathers—nodding to their slow prancing gait, the sun flashing on their polished ivory armlets, glistening rows of beads, and shining spearheads.

Each wore a kilt decorated with cowrie shells and long tassels. Completing each costume were a red waistcoat and crossed red and white baldrics.

The dance went on all day with time out

miles east of Kohima may have been under Government control only a few years. A few more miles east and there is no control.

The headmen of these remote villages have agreed to stop head-hunting, but the agreements are sometimes broken. As recently as November, 1954, reports reached the outside world of a bloody head-hunting raid in the hills near the Burma border. Fifty-seven people were killed and an entire village burned.

When we came back to Kohima, after Japvo, I found that the governor had refused to let us visit the unadministered territory. Mr.

for occasional rain squalls. (Autumn is the dry season in the Naga Hills. "Dry" here means usually not more than one heavy shower a day.) The only music was their singing, a rhythmical "Ho-ho" like the singing we had heard in the fields.

At the end of the dance, each warrior in turn performed a "pas seul," charging a mock enemy with his spear and leaping into the air, kicking his heels, and letting out shrill yips of triumph. It was the most spectacular and colorful of all the dances we saw in Assam.

Driving on Nightmare Road

Two dilapidated trucks had been promised us for the road to Phakekedzumi, an Assam Rifles outpost on the way to the hills.

We got away just after noon as the rain began in earnest. Neither truck had anything in the way of a cover or top, so we sat in a solid downpour, lurching over the worst motorable road I have ever seen.

It took us two days to make the 44 miles to Phakekedzumi. Only 4-wheel-drive trucks could have made it at all. Quagmires alternated with boulders; in places the road was shored up against a cliff with beams, most of which seemed to be rotting away. Parts of the road seemed to be merely a channel for small rivers coursing down the steep slopes.

But the worst nightmares were the bridges high above rushing torrents. Made simply of boards laid across suspension cables, they were very narrow and without sides of any kind. The boards buckled, bounced, and occasionally gave way under a truck. The whole bridge swayed violently from side to side as the trucks rattled over. I still don't understand how we got across. It was a special Naga miracle.

Besides an Assam Rifles outpost, Phakekedzumi has a school, a dispensary, and a large Eastern Angami village. The villagers were having a holiday here, too. The headmen were dressed in their finery—red cloaks and necklaces of china and glass and stone beads, many of them family heirlooms.

One of the headmen invited us into his house, a big, gloomy barn of a place. The front room was lined with huge bamboo baskets, each big enough to hold several men. These were for storing rice. Behind, in a separate room, were the sleeping quarters and the cooking place.

The Nagas sleep on solid plank beds ranged round the fire, an open hearth in the center of the room. The smoke escapes as best it may through chinks in the thatch roof. The

Lhota Naga Women Carry Rain Boards in Lieu of Coats While Weeding Rice

These light shields are made of broad leaves sandwiched between layers of basketwork and bound in bamboo.

Dorien Leigh, Ltd.

result is what the Nagas regard as a cozy atmosphere, so thick that the eyes smart for many minutes after emerging. (I have been told that this constant eye inflammation leaves its legacy of disease.)

The headman offered us some rice beer, a watery, clouded fluid in a bamboo container. We sipped politely and found it acrid to the taste. He was much taken with the shotgun I carried, a fine Parker 16-gauge double barrel, and announced he would like to buy it.

I told him the truth: I could not sell the gun because it belonged to my mother. This astounded the headman; I could see the thought in his mind. What a strange place America must be, where women hunt and own guns!

From Phakekedzumi the road dwindled to a track. Here again we hired Naga porters and started east. Each day we hired a new crew, since no village people wanted to go more than a day's journey from home.

Naked Rengmas Learn About Trousers

We now moved into the country of the Eastern Rengmas, the so-called "naked Rengmas," who normally do not bother to wear clothes. A few months before our arrival, however, a Naga mission teacher had arrived in their principal village and begun urging the men to don pants. Already the effect of his teaching was noticeable throughout the land.

East again of the Rengmas, we came to the territory of the South Sangtams, just barely within the border of the administered area. Their neighbors to the northeast were the dreaded Kalyo Kengyu people, who are reputed to keep slaves and raid for heads.

A stiff all-day climb from the last village took us up Mount Zepuhu, a fine, forested hill 8,408 feet high. We made a clearing near the crest. From here we had a magnificent view of ranges of blue-misted hills reaching to Burma, and just below us a deep valley cradling a small blue lake.

With binoculars I could see flights of birds passing back and forth over the water. The Sangtam guides offered to take us to it, although it was in the territory of a border tribe. We decided to work the mountain first, then try the lake later.

A bewildering galaxy of bird species inhabited our mountain, and our collection mounted day by day. Partridges abounded on Zepuhu, but to my sorrow there were no pheasants.

Besides partridges, we found warblers, bulbuls, and many species of babblers, a family of birds predominantly found in Asia. In short order we had secured well over 700 specimens.

After 10 days of collecting and exploring we decided to move on to the secluded lake. But the day before we were to leave, two excited Sangtam headmen appeared in camp. In the babel of languages I caught the significant word *panji*.

Poisoned Splinters Warn: Keep Out!

Panjis are sharpened, poison-tipped slivers of bamboo, placed where strangers are likely to step on them. Apparently panjis had been set out on the trail south of us by the neighboring village across the border. They warned, more plainly than words, "Advance at your peril! No visitors wanted."

There was nothing for it but to retrace our steps. It would have taken weeks to arrange a conference with the unfriendly tribesmen to find out what the trouble was.

We left the next day on schedule, but back by the trail we had come. We bade farewell sadly to the little gleaming lake below us so tantalizingly close, and to the great gaunt ridge of Mount Saramati looming up not far off.

Ten days later we were back in Kohima after a grueling ride from Phakekedzumi in the same two 4-wheel-drive trucks. The next morning early we started back down the Kohima road toward the steaming plains of India, and eventually home.

Beside us the sun shone bright on a great bank of scarlet poinsettia. Along the ridge beyond, banked in flowers was a World War II cemetery, the most beautiful of its kind I have ever seen.

Sturdy Nagas marched by us as we lurched in low gear around one sharp corner after another. They smiled and waved, and we waved back, full of a new awareness of the place, the hills, the rivers, the jungle, the birds, and, above all, the Naga people themselves.

As the clouds rose round us and we reached yet again for our damp jackets and windbreakers, I thought to myself how good it is that this is still a wild frontier country. It is better that way. There can still be forests and wild tribes and mysteries remaining to be solved. Those eastern mountains will beckon enigmatically for years to come.

Okinawa, the Island Rebuilt

By Hope A. Diffenderfer

Blackie Bradford

BEFORE we went to Okinawa, which has now been our home for seven years, my husband Earl and I asked ex-servicemen who had fought there what it was like. They all said, "Awful!"

With this build-up we didn't expect much of Okinawa. Perhaps it is because we expected so little that we have found so much and have so often been pleasantly surprised.

As a civil service employe, my husband had to wait his turn on the housing list; so more than a year passed before the children and I steamed into Naha Harbor aboard the United States Army transport *General R. M. Blatchford* to join him. The muggy, stifling heat of Okinawa, well publicized in the States, greeted us immediately.

While we waited in the harbor for tugs to dock our ship, we had time for a good look at Naha and its surroundings. I had heard much about the greenness of the island. It appeared green indeed, but it was the grubby greenness of masses of dusty weeds.

War Made Capital a Ghost Town

Before the war Naha, the island's capital, was a modern city of 65,000, with a few fireproof buildings, electricity, and telephones.* However, as we viewed the land that day, there was nothing in sight but bombed-out shells of buildings. It was a ghost town.

* See "Peacetime Rambles in the Ryukyus," by William Leonard Schwartz, National Geographic Magazine, May, 1945.

Helene LaPlant

Naha Is Thriving; a Stranger Would Scarcely Guess That World War II Razed the City

"Okinawa's capital has a remarkable market," says the author. "You name your need and someone can find it." Department stores and restaurants hang their banners across this street.

When at last the tugs had our ship fast to the dock, wives aboard all but fell over the rail at the first sight of their husbands in more than a year.

I had received a radio message at sea that my husband was in Japan and could not meet us. He had sent a friend to do the honors.

Dusty jeeps lined the dock waiting to take families to their homes. The roads were bad and the mud so thick that jeeps were the only satisfactory transportation.

Our home was in the Awase Housing Area, just outside the village of Awashi, some 12 miles from Naha (map, page 268). As we traveled north along the East China Sea, we passed villages of thatched-roof huts, women with huge bundles on their heads and babies on their backs, children in wooden shoes, and men carrying water pails on long shoulder poles.

Beyond Uchitomari's ridge the scene changed abruptly. The grubby vegetation of Naha gave way to tall pines, ironwood trees, blossoming red hibiscus, and azaleas. Waves splashing over coral reefs made colorful patterns in the deep blue of the sea. Myriad tiny rice paddies looked like pieces of a patchwork quilt blanketing the landscape. The island *was* beautiful.

Our Quonset home crowned a pine-covered hill overlooking Buckner Bay (page 268). We entered the living room through a large screened porch. I had expected nothing in the way of furnishings, so was agreeably surprised by the rattan and Philippine mahogany furniture.

On the dining-room table a neighbor had left a basket of oranges. I thought I'd seen my last orange when we left the States, but here these were, stamped "Sunkist."

The large kitchen had nothing in it. There was insufficient power to operate a 220-volt stove, and there were not enough refrigerators to go around; so we started housekeeping with neither of these conveniences. We did all our cooking on a gasoline camp stove until we learned to use the native charcoal *hibachi*, which looks much like a flowerpot (page 270).

In addition to three bedrooms, our home boasted a bathroom with inside plumbing and a shower, which was more than could be said for many of the Quonsets at that time. I was told that we had one of the best homes on the island, thanks to the former occupant, who had been very successful in obtaining things to make it homelike—often by somewhat devious means.

"We Won't Miss This Movie," Young Fans Vow

"Our children suffer from movie fever," Okinawan parents protest. Some 500,000 theater admissions a week bear them out. Cinema-goers prefer films made in Japan. Hollywood products with Japanese sound track are also popular. These youngsters inspect preview posters in Naha.

Helene LaPlant

OKINAWA

© National Geographic Map

Okinawa, 350 Miles from Formosa, Is a Potent U. S. Air Base

Okinawa stretches 67 miles long and 2 to 18 miles wide. It is the central link in the Ryukyu archipelago, which extends from southern Japan almost to Formosa.

Commodore Matthew Perry used the island as a base of operations while opening commerce with Japan in the 1850's. As the last great battleground of World War II, the island was all but devastated.

A Family Harvests → Sweet Potatoes

Production of sweet potatoes, rice, and sugar, the island's main crops, lags behind prewar levels. About one-third of the islanders' food must be imported.

Horace Bristol

↓ Buckner Bay Bears a Hero's Name

Americans on Okinawa renamed 10-mile-wide Nakagusuku Bay in honor of Lt. Gen. Simon Bolivar Buckner, Jr., commander of the American Tenth Army. He was killed in the Okinawa campaign.

Here the town of Baten hugs the coast. Dredges salvage sunken vessels at right.

Col. Norman D. King

After the preliminary inspection, my new friend showed me how to crack open the aerosol bombs that were to become part of daily living. Malaria is prevalent in Okinawa. To help control mosquitoes, we had to "bomb" the house every night and sleep under nets.

The bombing mission completed, I was told that our next-door neighbor expected us over. It was then that I met the Neil Becks, who helped make Okinawa a delightful adventure during those first trying months.

We found Mrs. Beck in the kitchen making strawberry jam on a little hot plate. In the same breath with which she said she was glad to meet us, she explained that she had several hundred strawberry plants. Heavens! Sunkist oranges in our house, and the aroma of strawberry jam here. This wasn't exactly what I had expected.

Okinawa Poses Problems

We sat on the Becks' screened front porch and talked of the island's hardships and how to meet them. The chief problems were mosquitoes, food shortages, the lack of cookstoves, and rats. I could face everything but the rats. I was told they were as big as cats, that all the houses were infested with them, and that they climbed in bed with people.

When we finally parted for the evening, I put the children to bed and started to take a shower, but nothing came from the showerhead. Then I remembered letters I had received from Earl. This was a land with a limited water supply. I was face to face with a new experience—no water. Anyway, I didn't want to sleep. I felt I had to sit up and wait for the rats.

Wide World

↑ Yankees Use Typhoon-proof Concrete

More than 40,000 Americans, mostly military personnel, inhabit southern Okinawa. This new community for service families resembles a Stateside suburban development. Sloping flat roofs shed torrential rains.

↓ The Diffenderfers Entertain Guests

The author pours tea while her No. 1 maid prepares the meal. Kenny straddles father's lap. Deborah and Niccole sit at mother's left, with No. 2 maid behind. Ann Freimuth and three Okinawan girls wear kimonos.

Ansei

The night of our arrival I was told that we were to have two maids. I had tried to keep one maid in the States, and that had caused a lot of grief. So when I heard about the two maids, I thought—double-trouble.

The servants came with the house. When the former occupant left, the maids stayed on; so did the gardener. As I entered the kitchen the next morning, there stood the maids in the kitchen doorway—holding hands and swaying with laughter. They were brown, barefooted little girls, about 4 feet 8 inches tall, dressed in made-over Army uniforms. They followed me everywhere, laughing at everything I did.

Seigei-the-Boy, Seigei-the-Girl

I later learned that they were not actually such little girls. They were widows whose husbands had been killed in the war, and they were trying to support children on their wages, which at that time were the equivalent of $3.25 per month. When we first met them they were living solely on a sweet-potato diet. Seigei and Toyo were their names.

The gardener, whom we called Papa-san, was 67 years of age, a very old man by Oriental standards. Because we wanted to put about half an acre under cultivation, we needed someone to help Papa-san; so we hired a young man who came to the house to talk with my husband about entering a school for mechanics. Since the school was not yet open, he agreed to turn the land and plant our first vegetable garden.

With abundant sunshine and an average annual rainfall of 80 inches, nearly every vegetable in the seed catalogue will grow on Okinawa. As our garden progressed, we got to know the young gardener better, for he could speak a little English. We found that he was a former officer in the Japanese army, and that his name was Seigei also.

For convenience we named him Seigei-the-boy, and the maid, Seigei-the-girl. The two maids and the old and young gardener used to sit on our front porch eating a meager lunch of a single cold sweet potato each (they would accept no food from us then), and their laughter rang through the house. They never seemed depressed, and I used to wonder what they had to be so happy about. With all their poverty and desperate need for many things, the Okinawans never at any time stole a thing from our house.

During the first morning on the island we surrendered all the currency we had. We could now use Military Payment currency, or we could buy the Okinawan yen.

Okinawans existed largely, however, by a system of "changey-changey." Americans needed supplies. Changey-changey women found what Americans wanted and traded with them for tea, shortening, sugar, soap, flour, or cigarettes.

On October 3, 1948, two months after my arrival, we could look out over half an acre of garden that promised abundant living for our first winter on the island. My husband, Mr. Beck, and Seigei-the-boy had driven a three-quarter-ton truck to the hills above Kadena to find banana trees for transplanting. We had decided to terrace the hill below our house and put in a banana grove.

That day I was making preparations for our daughter Niccole's birthday. We had promised her a party. The day was windy and cloudy, and there was a typhoon warning out. But we didn't know about typhoons then—nor did our neighbors, for the island hadn't been hit directly by a devastating one since 1945.

The men came home about 10:30 in the morning with the truck full of banana trees and started to get them into the ground. I carried our baby, Pieter, out into the yard to watch the planting. The maid was hanging clothes. About 11 o'clock we heard a frantic scream from the clothesline; turning, we found the maid paralyzed with fear. She was pointing out over Buckner Bay.

"Typhoon come-o!" she shrieked. "Typhoon come-o!"

Fury of a Typhoon

Seigei-the-boy rushed down the driveway to the truck and started lowering the glass windshield. Like all Okinawans, he had no faith in our Quonsets and wanted to get home to his hut. The islanders have been building their huts for centuries and know the answer to man-against-the-typhoon. The Americans had much to learn.

Earl drove Seigei home through the beginning of the raging storm. Though the boy lived but two miles away, my husband was gone nearly an hour, fighting his way through the wind.

Our Quonset had two safeguards against typhoons. The building was anchored to the ground with heavy cables that ran over the top and were cemented to a depth of 8 feet

underground on either side. Then fifty 100-pound sandbags were thrown on the roof to help hold the place down.

As the winds increased, the house bounced on its foundation. The sandbags on the tin roof bounced too, while cables strained and squeaked. The noise was like that of a freight train roaring over rough tracks.

None of us had made any preparation for the storm. The Becks knew no more about what to expect than we did. We invited them to come over. We would fix coffee, cut Niccole's birthday cake, and all bounce together.

Before we got the coffee fixed, the electricity and water went off. As we gathered around the table, the large window at the head of the dining room blew out. We couldn't hear ourselves scream above the roar of the storm. Rain, wind, and flying debris swished at us through the blown-out window. Water poured through leaks in the roof. We huddled together in amazement and watched the barometer sink. So this was a typhoon!

Two Neighbors Blow In

Suddenly there was a screaming and pounding at the front door. The men threw their weight against the door and opened it a fraction of an inch at a time. Give the door a little leeway, and it might blow right off the hinges. When space permitted, a man clutching a bundled-up child literally blew into the room.

As he emerged from rain hood, towels, and blankets, there stood Maj. Max Durham.

"What are you doing here in this storm?" we cried.

"Wouldn't it be a terrible thing if a little girl had a birthday party and nobody came to it?" he answered, calmly unwrapping his 5-year-old daughter.

We broke up the gathering soon and huddled in the darkness of our own houses. The typhoon hit its peak during the night, as winds reached 115 miles per hour. Every window blew out of one side of the house. The next day we learned how to "bail out" after a storm.

As the years have gone by, we have had a worse storm, but "Libby," as the weather bureau named our first typhoon, will always be memorable because it was our initiation.

When we arrived on Okinawa, my husband was Assistant Director of Education for the Military Government and was in charge of the reorganization and administration of Okinawan schools. Because of his work we

Baby Happily Rides Grandma's Back

Okinawan children seldom cry. Their emotional stability and sense of security may stem largely from this custom of back-strapping, some psychiatrists believe. When household or field chores occupy mother, grandmothers and the older children serve as carriers (page 267).

Helene LaPlant

Horace Bristol

Okinawans, Who Dislike Cluttered Homes, Use Floors for Sitting and Sleeping

Farmhouses usually have earth floors and few furnishings—a cooking hearth, bedding, headrests for pillows, and a few dishes and utensils. This above-average urban dwelling has handsome wood paneling, polished floors covered with mats, and bright wall prints. Okinawans usually go barefoot indoors.

were to have a more interesting life on the island than most members of the occupation.

We were on Okinawa to assist the people with the rehabilitation of their island. Assistance was given in two ways: Through direct economic aid, known as GARIOA (Government and Relief in Occupied Areas); and through advisers who were skilled in the fields of education, economics, public works, public health and welfare, government and law, and commerce and industry.

The war had wiped out almost an entire material civilization. All that remained were the land, the people, and their spirit. But as an Okinawan boy, Kozen Arasaki, wrote, "The war came to an end, and again light came to the world. We lost the war, but we were willing to welcome peace. Everyone started stepping in a new direction."

The job of rehabilitation in the field of education was tremendous. Scarcely had the echo of guns died away before the people were

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trying to reorganize their schools. Any type of shelter, even a few boards with a thatched roof, was used as a school (page 276).

The most amazing story I have heard about the place of education in the Okinawan heart is of an incident that occurred in 1945.

Graduation ceremonies had been planned at a Shuri school for the night of March 31, which was the night before the invasion. The island was blacked out. The 1,400 Allied ships taking part in the invasion were beginning to pull up to the island. The Okinawans knew the ships were there and that anything could happen at any time. Yet they decided to gather in the darkness of the school and proceed with graduation exercises as planned. And that is what they did!

As we settled down to life on Okinawa, we spent every Saturday and Sunday at native schools. The school was, and still is, the village community center. There is always something going on at the schools, especially when there is no other recreational outlet.

Shortly after I arrived we were invited to a ceremony at Koza Junior High School. The U. S. Army Director of the Education Department was leaving, and his successor had just arrived to take his place. The Okinawans were giving a joint farewell and welcoming party for the two men.

Makeshift School Has Mud Floor

We parked our jeep on one of the muddy streets of Koza. The school building had been thrown together from pieces of tin discarded from Quonset huts, packing boxes, and thatch. It had a dirt floor, and, since it had been raining, the floor was muddy.

Several hundred teachers and school leaders had gathered for the program, which was already under way when we arrived. An Okinawan gentleman was addressing the crowd in their native tongue. He looked like the old-time Oriental scholars pictured on tapestries and silk wall hangings. As he finished speaking, he bowed low for applause, and then

began to speak in flawless English, acting as his own interpreter. He was Mr. Yamashiro, Okinawan Director of Education and a former school principal.

The only islanders we had seen previously were men and women trudging along the highways, clad in rags and working like pack horses; or maids simpering, giggling, and being thoroughly subservient. The hail-and-farewell ceremony at Koza gave us the opportunity to meet some of Okinawa's educational leaders and other intellectuals.

Dances Portray Birth, Life, and Death

When the speech ended, we had our introduction to Okinawan dancing. With the first monotonous strumming of the *samisen*, a three-string, banjolike instrument, we felt as if we were face to face with the soul of Okinawa.

The dancers, in complete abandon, enacted for us stories of birth, love, marriage, death, life in the fields, life at sea, of joy and of despair. As they danced and the samisen strummed on, they sang the ancient songs of the island.

We were enchanted by the costumes. We call them costumes, but they were really the classic dress of days gone by—kimono of heavy silk with scarlet, violet, or hand-painted lining; *obi*, a heavy sash of regal tapestry with gold and silver threads woven into it; *tabi*, like socks, and *geta*, wooden shoes for feet that were now usually bare; and elaborate headdresses. All this treasured clothing had been hidden in caves along with other prized possessions during the war.

From time to time, as I looked about, I was struck by the strangeness of the scene. Around us were hundreds of people, crowded into a pitiful school building, sitting in the mud—and lost in a world of art.

Parties were long and followed the same pattern—speeches, dancing, eating, drinking, and always the presents. Even though almost all the islanders knew nothing but the direst

← Water from Nakahodo Dam Converts Barren Acres to Fertile Rice Lands

Okinawans, with U. S. aid, have built 17 large dams since World War II. Nakahodo's 11,500,000-gallon capacity enables near-by farmers to triple their cultivated acreage and increase their rice yield fivefold.

↓ Concrete flumes carry Nakahodo's life-giving waters to surrounding fields. Rice beds demand continuous flooding. Okinawa's rainfall is abundant, but inadequate reservoirs have long been a problem.

C. I. & E., USCAR

Arthur Schulz, Black Star

↑ Even Teacher Sheds His Shoes to Protect School's Wooden Floors

Truancy is no problem in Okinawa; youngsters avid for learning deem schooling a privilege. Wartime bombings demolished island schools; postwar classes were resumed in private homes, tents, and Quonset huts. Sixty-five percent of the buildings have been rebuilt.

Tennis shoes and rubber boots, reflecting American influence, outnumber cloglike *getas* at this classroom door.

↓ "It's Cold and White and They Call It Milk . . . but It Tastes Good"

Most island children never tasted milk until relief agencies shipped in tons of dried powder. These young scholars sample the strange new beverage for the first time. They had to be taught to drink it, but they soon learned to like it.

English is a required subject in Okinawan schools. Pupils also learn about America and the world.

Col. Norman D. King

poverty, they still had presents for the Americans. The gifts were treasures left from a better day—a piece of lacquer ware, an obi, or perhaps a painting.

Through all the days of hardship, Okinawan teachers never forgot that they were scholars or lost their belief that in knowledge there is dignity.

They taught with no blackboards, no pencils, no paper, no textbooks. They conducted athletic meets with one teacher directing hundreds of students. They put on one-act plays for the American children, and presented "Pinocchio" and "Little Red Ridinghood" in Japanese.

Scholars Scorn Physical Labor

Finally, after the first GARIOA purchase of textbooks and school supplies had been distributed, the United States Government offered to furnish the necessary cement for the rebuilding of schools if the islanders would gather building stone and supply the labor. That meant sturdy typhoon-resistant schools.

When my husband carried this message to Okinawa's school leaders, I thought of the joy it would mean. However, they accepted the message stoically, finally indicating they would think the matter over.

My husband knew what they were thinking. If native labor was required, teachers and older students would have to help, and, according to Oriental philosophy, a scholar thinks but he doesn't work physically. One of the most difficult concepts to establish was, and is, that of the dignity of labor.

One day a man from the island's Department of Education came into Earl's office to report that the water pipes at one of the schools were clogged and the entire area was without water.

"What do you want me to do?" asked my husband.

"We wish for you to arrange for the U. S. troops to come clean out the pipes."

"Troops?" he asked. "Don't the students and teachers use the water?"

"Yes," was the reply. "But you don't seem to understand. The students and teachers are different."

"How are they different?"

"Students and teachers," the man replied, "do not undertake work of that nature."

The man left with a big dose of the Western philosophy that if scholars and teachers need water, they cannot differ very much from other human beings; so perhaps they too can learn to clean out water pipes. Seven years later there is a much more widespread appreciation of the Western concept of labor.

The island had Japanese-language newspapers for some years prior to World War II. During the war there was only a two months' lapse in newspaper publication. The *Okinawa*—now the *Ryukyu—Shimbun* was published in a cave during the early battles.

In the spring of 1949 many of the former newspapermen met in Nago city for the first postwar press convention—to consider how to make the postwar press an effective medium of the new democracy. The meeting gave impetus to the 16 daily papers and 25 weeklies which now serve the island population.

Two hundred businessmen gathered at the convention, held on the second floor of a new geisha house. The sliding room partitions were removed to make one large meeting hall. We removed our shoes and prepared to sit on the grass mat that covered the floor. As each man reached the head of the stairway leading into the convention hall, he knelt, bowed very low to his friends, then seated himself against the wall.

The long entrance ceremony proceeded with much formality, while everyone waited in complete silence. I thought, "Where in America could one find a gathering of this size and see such order and reserve?"

Speeches and Strong *Sake*

The program opened as usual with many speeches. At Okinawan gatherings everyone wants to get into the act, and everyone comes prepared with a few notes. Next came the dances, the gifts, and the dinner—a simple repast, but beautifully served on individual red lacquer trays.

The dinner stimulated quiet conversation. However, trays of beer bottles and tiny cups, brought in next, gradually turned order into chaos. The cups meant that the bottles were not filled with beer but with *sake*, the strong rice wine of the Far East.

As the effect of the wine became more and more evident, I thought, "Where in America would one find so many people acting like this?"

I wanted to leave, but as foreigners we could not walk out on parties with propriety.

Finally Earl said, "We'd better leave before the party gets lively."

"Gets lively?" I asked.

U. S. Army Official

War Came to Okinawa on Easter Sunday, 1945, and Left a Shambles

Operation Iceberg, a fierce 93-day campaign, cost the United States nearly 50,000 dead and wounded; 111,000 Japanese were killed. Fighting centered in the heavily populated southern sector of the island. Nine-tenths of the homes were destroyed. Bombs and shells stripped away vegetation. At battle's end this battered chapel was one of the few buildings left standing in Shuri. American artillerymen survey the ruins.

"The sake has just begun to flow," he answered. It was flowing freely when we left.

When we were finally in the swing of our first year on the island, we realized that we were having countless good times with the Okinawans and that we were making many friends among them.

Our own living was pleasant. We redecorated the Quonset, and our vegetable garden groaned with produce. We transplanted 2,000 lily and gladiolus bulbs to our yard from the hills where they were growing wild. The maid service was excellent. Yes, life for us was grand!

However, one cannot exist facing a mirror. The native picture was ever-present. The Ryukyu Islands, of which Okinawa is the largest (67 miles long and from 2 to 18 miles wide), officially became part of the Japanese Empire in 1879 (map, page 268). The island had long had a deficit economy, and labor had always been its greatest salable commodity. That Okinawa could ever become self-sufficient was doubtful. Nevertheless, it was appalling to realize that the people were living in total dependence upon United States aid and that there was no way in which they could move toward self-sufficiency.

The Island Devastated

One would have had to see the island when we arrived to believe that devastation could be so complete.* Industrial and commercial facilities had been totally destroyed. War debris covered the southern end of the island; farmlands were ruined; there was lack of maintenance and no tools with which to

* See "Okinawa, Threshold to Japan," by Lt. David D. Duncan, USMC, National Geographic Magazine, October, 1945.

restore. Vast areas were necessarily occupied by United States military forces.

To add to the land problem, Okinawans had taken refuge from the battle in caves and on the northern part of the island. They returned to their former homesites to find their houses gone. The majority of the 600,000 people who populate the island were homeless.

Rebuilding on the Ruins

In addition, 200,000 Okinawans were repatriated from Japan, Korea, Formosa, and other Pacific lands at the close of the war. At the same time thousands, including 8,000 Japanese, were expatriated. This would seem to relieve the situation, but the expatriates were largely government leaders and administrators; so Okinawa was left with problems of every nature and few really experienced or trained leaders among the people.

The first critical needs of the population were satisfied with surplus U. S. Army goods—food, medical supplies, clothing, blankets, cots, tents, kitchenware, soap, tarpaulins, etc. Then GARIOA imports brought them food products, fertilizers, insecticides, seeds, and petroleum products.

During fiscal 1949 increased stress was placed on economic rehabilitation. The people were encouraged to help themselves. Raw and semifinished industrial materials, industrial machinery, motor vehicles and parts, and transportation for rehabilitation goods were provided.

With this push in the right direction, one could feel by mid-1949 that the economic structure of the island had begun to take form. There were 42,000 Okinawans employed by the occupation forces.

Industries began to develop, such as fishing, brick, tile, and pottery; manufacture of salt, bean paste, soy sauce; manufacture of straw mats; work with sandstone, limestone, travertine, gravel, and granite; weaving of silk and other cloth; making of rope; pearl culture; lacquer ware; black sugar; paper cord and hat weaving; manufacture of wooden shoes; and lily-bulb culture.

How Typhoons Prevent Ulcers

Though profits were not realized during 1949, a start was made in industrial redevelopment. As the people acquired some purchasing power, charges were levied on GARIOA

An Ultramodern Chapel, Okinawa's Largest, Rises at Kadena Airfield

Walter Meayers Edwards, National Geographic Staff

Hope A. Diffenderfer

↑ Tug of War Rope Is Three Feet Thick

Okinawa's harvest festivals feature a community tug of war with giant rice-straw rope. A heavy log joins looped ends. A team wins by pulling opponents' loop across center line. Contests often last for hours.

↓ Bullfights Pit Bull Against Bull

Animals are trained to gore and gouge one another, but there is little bloodshed and battles are seldom fatal. Trainers, working in the ring, urge their beasts on with word and rope. Midautumn is the bullfight season.

Blackie Bradford

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C. I. & E., USCAR

Spectators at a Track Meet Jump to Their Feet to Watch Runners Hit the Tape

Community life of an Okinawan village centers in the school. Sports events, dances, and parties attract crowds almost every week end. Sun and excitement made one man here break out his fan.

items. Things were looking brighter. The Okinawans were not pushing themselves hard, but the Americans were shoving, and the islanders were riding with the tide.

We were soon to learn why ulcers are unknown to the natives and why they have comparatively little drive. We found that, given time, typhoons would blow everything away again anyway.

I shall always remember July 22, 1949; it was a bright and altogether perfect day. We had just brought our third baby home from the hospital that week, a dear little girl whom we named Deborah.

The weather seemed glorious, but, as I took our new infant out for midmorning sun, I noticed the Becks' maids and gardener boarding up the windows of their Quonset.

"Typhoon," they explained.

Typhoon on such a beautiful day? By evening everyone was boarding up, and by next morning the storm was winding up for the pitch that was soon to follow. All morning the barometer dropped rapidly. At noon we began to watch the bulkheads of the Quonset to decide which part of the building might blow away first. This time Nature was fighting us in earnest.

Quonsets Blown Off the Map

We took all the mattresses in the house and made a shelter for the children on the living-room floor. When a board finally blew off the dining-room window, we could see

U. S. Air Force Official

Okinawan Workers Cut Grass by Hand Beside a B-29

Thousands of islanders take jobs with the American military command. Others serve in homes, clubs, barracks, and mess halls. A GI maintenance crew works on the disassembled tail section of plane at right.

across the valley. Three Quonsets had stood directly opposite our place. One of these was now a mere tunnel, and the other two had been blown right off the map. Another building on our grounds, a small darkroom and photo laboratory, was also gone. It had contained a sink and plumbing. Even the plumbing was gone.

Bailing Out the Living Room

We fought the storm in every way we could. We tried to stuff chair cushions into windows that were blowing out and bailed furiously to keep the water level down. We were constantly cleaning up glass and broken dishes from cupboards that were being tossed over. We kept the older children in the mattress shelter and never put the new baby down for a minute.

Finally, as gusts hit 175 miles an hour by midafternoon, the living-room and dining-room roof and the front porch blew off, all in one piece, with a deafening crash. All I remember of that split second of thunderous ripping was the maid screaming, even above the noise, "Where's Pieter?"

We never wondered where we stood with our domestic help after that.

By evening, as the barometer began to rise, an Army bus came to evacuate families from our area. We were going to typhoon-resistant barracks on the other side of the island.

Soldiers gave up their beds to the children. I put the baby down, trying to think what we had named her. I was so tired from fighting the storm that I never did recall her name that night.

In the morning we waited in the barracks while the men went to see who had a home and who didn't. Ninety-two homes in our area had been blown away, and a 6-year-old child had been killed.

Though our house was not as badly battered as many, it was a discouraging mess. We were to be without electricity for the next six weeks and without water for four days. Our maids started wringing out the grass rugs as if nothing had happened.

"Gloria" Cost a Pretty Penny

We were classed as disaster victims and, as such, received a dozen free rolls from the Chinese restaurant. Feeling sorry for myself, I sat on our front steps, munching a roll. Okinawa seemed a hopeless place in which to try to live, and I dreamed of returning to that big piece of land across the Pacific—U.S.A.-shima. Suddenly our whole personal plight seemed ridiculous. As a final touch, the American Red Cross thoughtfully sent us each a new toothbrush.

Final estimates of damage by typhoon "Gloria," as this mighty storm was named, reached $80,000,000.

Though the toll was heavy, this was the price that was paid to convince the United States that nothing less than typhoon-resistant structures would do on Okinawa.

Watching History While It's Made

Following the visits of top-flight officials and engineers, Congress approved a multi-million-dollar integrated Army, Air Force, and GARIOA construction program.

The Korean War helped to get increased appropriations for the rebuilding of Okinawa. Soon thereafter the island began to be known as the "Gibraltar of the Pacific."

Within a few days after the outbreak of the Korean conflict we watched Okinawa-based bombers take off for and return from missions in Korea.

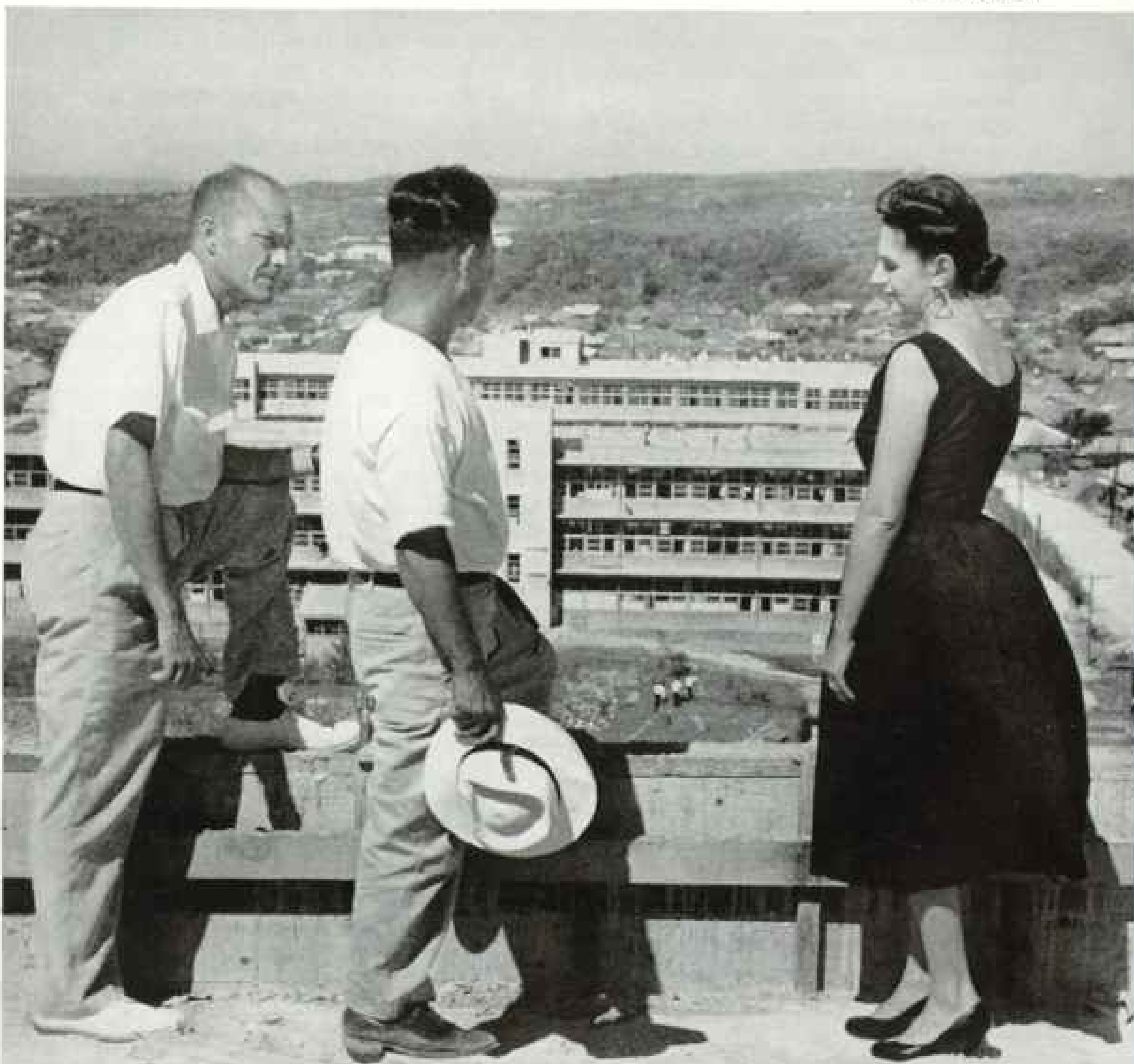
We could look down from our front porch to Buckner Bay and see the aircraft carriers *Valley Forge* and *Philippine Sea*. We could count more than a dozen destroyers anchored in our front-yard bay.

We felt as if we had a front seat for history in the making. We understood why Okinawa was being developed into one of America's key Pacific bases.

Okinawa Builds for the Future at University of the Ryukyus

Earl Diffenderfer (left) serves as Director of Civil Information and Education on Okinawa. Here, beside his author-wife and a construction foreman, he surveys two new dormitories for men.

C. I. & E., USCAR



With Okinawa's place in the world picture changing, my husband's work began to take on new meaning. If the island people and the Americans were to work side by side, the struggle for the maintenance of a free, democratic world was important to both people.*

To help achieve the goal of carrying democracy's message to the islanders, the Department of Education was converted into a larger Department of Civil Information and Education, and my husband was later to become its director. Once concerned only with the native schools, it was now also to advise the native press, theaters, libraries, information centers, motion-picture production, the University of the Ryukyus, and the radio station.

Originally we had come to Okinawa because it was an opportunity to see some of the world. We had intended to stay only a year or so. However, with the new horizons and opportunities for service offered by the enlarged department, and with the Korean conflict so near us, we postponed our departure indefinitely.

With the vast expansion of American interests on Okinawa, came sudden and amazing growth in the local economic picture. As thousands of natives were employed by the U. S. forces, GARIOA imports were sold instead of being distributed free. The money thus obtained became known as the Counterpart Fund.

Okinawans could borrow from this source for the island's economic reconstruction. Yen began to circulate freely, backed by U. S. dollars. Letters of credit were issued through the Bank of the Ryukyus for the importation of goods from Japan.

Recovery in High Gear

Like toadstools after a rainstorm, new businesses sprang up. The years since reconstruction began in earnest have seen the completion of harbor-development projects, adequate warehouses, road network and bridge construction, a water-supply system (page 274), steam power plant, electrical-transmission system, refrigerated storage warehouses, Board of Trade Building, Port Terminal Building, Executive Building, and important additions to the University of the Ryukyus (page 283).

Small stores and market places line every highway. Where there were only 300 motor vehicles in the prewar Ryukyus, there are now 4,300 owned and operated by islanders. The Okinawans operate a million-dollar sugar mill, a commercial hotel, and numerous motion-picture theaters, department stores, restaurants, and garages.

The reconstruction program emphasized housing, among other things. Quonsets were gradually torn down and replaced with two- and three-bedroom homes built of concrete blocks (page 270). Areas were also cleared for the building of hundreds of ranch-type three-bedroom homes—"mud flats," we called these sites at first.

It nearly broke our hearts when we had to vacate our Quonset home and move into one of the large housing developments of Machinato, just north of Naha.

The thought of leaving our garden was almost too much, for it supplied us the year round with tasty vegetables, from artichokes to zucchini. Climbing roses, showers of ground orchids, gladiolus of bright colors and subtle shades, and hundreds of lilies, producing up to 42 blossoms on a single stem, made our flower garden a picture we felt we could never duplicate.

Moreover, the Awashi hill seemed like a perpetual summer resort. The wind murmured through the pines by night, and Buckner Bay was always at the foot of the hill for a swim by day (page 268).

Leaky Roof Decides a Move

More could be said for the natural surroundings of our Quonset home, of course, than for the home itself. The roof had been put back together so many times after typhoons that it was full of nail holes. We used to climb up and swab the roof with tar, but nothing seemed to seal the leaks.

For six weeks we found excuses to keep from moving into our new place. Finally a night came when the Quonset roof leaked so badly we had to sleep under a shower curtain. That did it. We moved to Machinato.

By that time we had been on the island three and a half years, and Toyo and Seigei were no longer with us. Our No. 1 maid, Haruko, was a skilled seamstress, well educated, and a member of a previously well-to-do family. She had lost her husband and only child in the war. Her purpose in working for us, I believe, was to keep herself busy

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Our Navy in the Far East," by Adm. Arthur W. Radford, October, 1953; and "Okinawa, Pacific Outpost," 20 illustrations, April, 1950.

Rycom PIO

↑ Smiling Geishas Welcome GI's to the August Moon Teahouse

The Teahouse of the August Moon, an American novel that became a Broadway hit, existed only in the author's imagination. Eieko Uehara, an enterprising Okinawan geisha, capitalized on the name when she opened this Oriental-American restaurant near Naha.

↓ Poise, Charm, and Talent Make the Geisha a Superb Hostess

Geishas, professional entertainers, are schooled in arts and manners. Here, in the Japanese-style section of the August Moon, they converse with a dinner party of Okinawan men. At intervals the girls sing, dance, and play stringed instruments.

Horace Bristol

C. I. & E., USCAR

Student Teachers Dish Up Savory Chicken Domburi at University of the Ryukyus

Okinawa's university occupies the site of the former royal palace in Shuri. More than 1,200 students are enrolled. These domestic-science instructors take a summer course in preparation of meals.

and so not have time to dwell on the past.

There was no problem in asking Haruko to move with us to Machinato. However, we had a young second maid whose mother would not permit her to go with us. We were to live on the outskirts of Naha, and the girl's mother had heard of the evils of city life. We also had to part with Papa-san.

The first day in the new house Haruko found a new gardener—Ojiisan (old man), we called him. At first he seemed like a gem around the yard.

Gardener Prefers Nursemaid's Role

However, our fourth baby, Kenny, was born shortly after we were settled in the new home. Ojiisan became so fond of the baby that Earl said trying to keep him in the garden was hopeless. We would have to let him be a baby sitter.

Soon Ojiisan was giving Kenny his bottles, patting his back until he fell asleep, taking him for long walks in the sun, and being very fussy about letting anyone else touch him.

Because Ojiisan speaks no English, Kenny started speaking Japanese. In time the two of them had long arguments in Japanese. One day last week I asked Haruko, who interprets for me when Kenny speaks Japanese, "What did Kenny say?"

She said, "He say to Ojiisan, 'Ojiisan, your Japanese is no good.'"

When people of diverse cultures live side by side, the results are always interesting. Before World War II most Americans had never heard of Okinawa. The islanders were content with their island and had little interest in foreign lands or people. Inevitably, some of our culture has rubbed off on them, and some of theirs on us.

Now we find ourselves removing our shoes before entering the house, wearing the kimono,

using chopsticks for certain dishes. I've even decided that strapping the baby to my back isn't such a bad idea when he is fussy and wants to be carried (page 272).

Okinawan women have mass visiting days, usually organized by their local women's clubs, when they come to inspect our houses. They are curious to know how Americans live, just as we are curious to know what goes on inside their thatched-roof huts.

Plumbing Mystifies Visitors

When they tell us they wish to "inspect" our places, that is exactly what they mean. Perhaps 40 to 50 women come to visit. They are likely to open any drawer or closet that catches their interest. Possibly every one of the women will flush the toilet, just to see how it works. The hostess may as well turn on the shower and let it run, for everyone wants to understand that mystery too.

"Ah, so!" they say as they watch this wonder of the Western World.

It is useless to try to entertain the visitors in the living room when we have an automatic washer and drier on the service porch. Such mechanical marvels are entertainment in themselves. In fact, the only way we can lure the women into the living room is with the vacuum cleaner.

When the Okinawans first requested the visiting days, we were doubtful that placing our homes on display would promote good-neighbor feeling. They were still in desperate financial straits, and we thought they might feel bitter about our higher living standards.

On the contrary, we found they were only curious to see how the other half lives. Now that they can meet us more as financial equals, I think some of them leave our homes reflecting on those strange American women who live in such a clutter of furniture.

The Okinawan home may be of several types, but the interior is always bare. The floors of the well to do are polished wood, often covered with a straw mat (page 273). The Okinawans sit on the floor, sleep on the floor, and seldom have furnishings.

Okinawan Wives Stay Home

The only common exception I have seen to the no-furniture custom is the sewing machine. When we first arrived and found the people living under miserable conditions, we often came across Singer sewing machines in their huts. These possessions had been carefully hidden away in caves during the war.

Now that some of the women have become accustomed to visiting our homes, they have begun to ask questions, through an interpreter, about our family life. An Okinawan man seldom takes his wife out. If we invite one to dinner at our home and ask him to bring his wife, he either declines for her immediately or arrives alone and explains that she has had an attack of asthma.

As our cultural paths cross, many amusing things happen. On Okinawa the service station with its convenient rest room is unknown. In fact, since there are no rest rooms, the side of the road is an accepted substitute.

My husband's office sends selected Okinawan students and leaders to the United States for university study and observation, first briefing them on the American way of life. With the first group he covered everything he felt essential—but one point slipped his mind. When the students arrived in America they were taken to Mills College—a rather exclusive school in Oakland, California—for six weeks of orientation. With an evaluation of the project came a request from college officials: please instruct future Okinawan students that the side of a road is no substitute for a rest room.

Local Artists Make Good

Close association has made Americans impatient with the Okinawans' lack of drive. In turn the islanders, who work slowly and when the mood strikes them, think the Americans a bit peculiar because they rush.

Last year several native art colonies put on an exhibition for the Americans. There are many fine artists on the island. Some have studied locally, some in Japan or China, while others have gone as far as Paris. The show was successful, and nearly everything exhibited was purchased.

After a story from Okinawa, *The Teahouse of the August Moon*, became popular on the New York stage, a few Americans tried to promote a plan whereby these same artists could display and sell their works in the lobby of the theater where the play was showing.

Committees worked out every detail of shipment, display, and sale. The idea was a good one and would have worked—except that the native artists were so busy celebrating the success of the first exhibition that none of them got around to painting another picture for the remainder of the year.

Col. Norman D. King

Santa Claus Wears Sandallike Getas When He Drops Down on Sunny Okinawa

Each Christmas the Naha branch of the United Seamen's Service plays host to the underprivileged. Here Santa referees an apple-bobbing contest. He is the man of the hour to some children; others he frightens.

The humor that we see in each others' ways has helped nurture a strong affection between the Americans and Okinawans. As we borrow habits of dress, food, and shelter, we also are exchanging more meaningful parts of our respective cultures.

Last autumn, for instance, the Okinawans knew that we were curious about their O-Bon holidays, and the week after O-Bon they re-enacted and explained parts of the ceremonies.

Few of the islanders are Christians; however, we have noticed that each year they have become more enthusiastic over Christmas.

Last year we attended a Yuletide party for the University of the Ryukyus faculty and their families. Everyone enjoyed the tree, the gifts, and the carols. Beyond the frills, we sensed that some Christmas associations are held in common by all people. A desire for peace on earth and good will toward men is a cry from the hearts of all.

Though we have many differences, where the important aspects of life are concerned we have mostly similarities. We share with the Okinawans a love for and interest in our children. We both want satisfactory food, clothing, and shelter. We demand open roads to knowledge. We desire employment opportunity to provide for the needs of life. We must have good health. We wish a respect for religion. And after the devastation we have seen and they have known—we want peace.

Notice of change of address for your NATIONAL GEOGRAPHIC MAGAZINE *should be received in the offices of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your April number, The Society should be notified of your new address not later than March first. Please give BOTH your OLD and NEW addresses, including your postal-zone number.*

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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. By dating the ruins of vast communal dwellings in that region, The Society's researches solved secrets that had puzzled historians for 300 years.

In Mexico, The Society and the Smithsonian Institution, January 16, 1939, discovered the oldest dated work of man in the Americas. This stone is engraved, in Mayan characters, November 4, 291 B. C. (Spinden Correlation). It antedates by 200 years anything else dated in America and reveals a great center of early American culture, previously unknown.

On November 11, 1935, the stratosphere flight of the world's largest balloon, *Explorer II*, sponsored by The Society and the U. S. Army Air Corps, reached a world-record altitude of 72,395 feet. Capts. Albert W. Stevens and Orvil A. Anderson took aloft a ton of scientific instruments and obtained results of extraordinary value.

A notable undertaking in astronomy was launched in 1949 by The Society and Palomar Observatory of the California Institute of Technology. This project is photomapping the vast reaches of space and will provide observatories all over the world with the most extensive sky atlas yet made.

In 1948 The Society sent seven expeditions to study the sun's eclipse on a 5,320-mile arc from Burma to the Aleutians.

A Greek cargo ship sunk in the Mediterranean 2,200 years ago was found in 1952 and is being excavated by the National Geographic Society-*Calypso* Marine Archeological Expedition led by Capt. J.-Y. Cousteau of the French Navy.

The National Geographic Society and the Royal Ontario Museum in 1951 explored and measured newly found Chubb meteor crater, 11,500 feet in diameter, in northern Quebec.

The Society and individual members contributed $100,000 to help preserve for the American people the finest of California's sequoias, the Giant Forest in Sequoia National Park.

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 in 1938.

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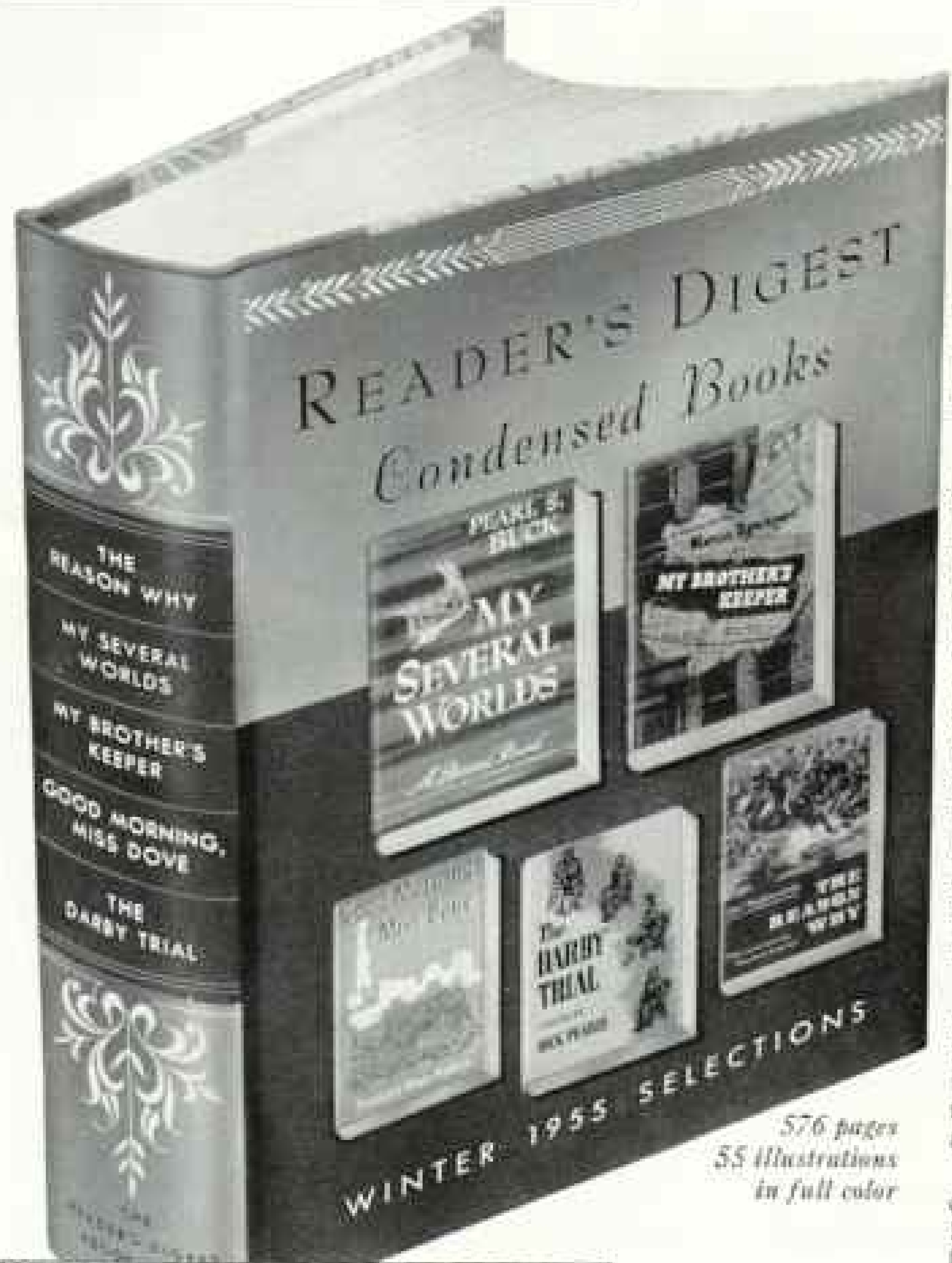

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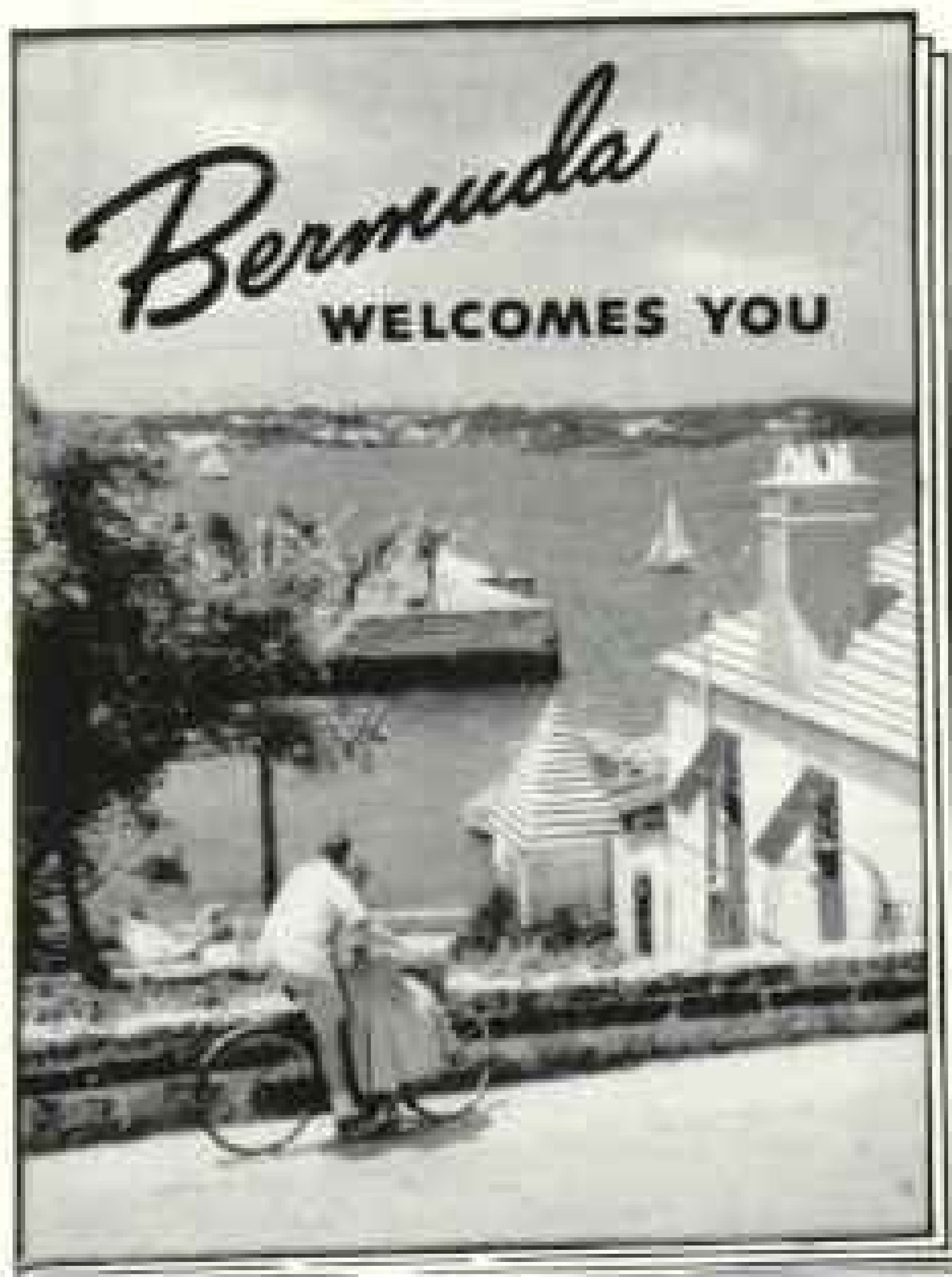

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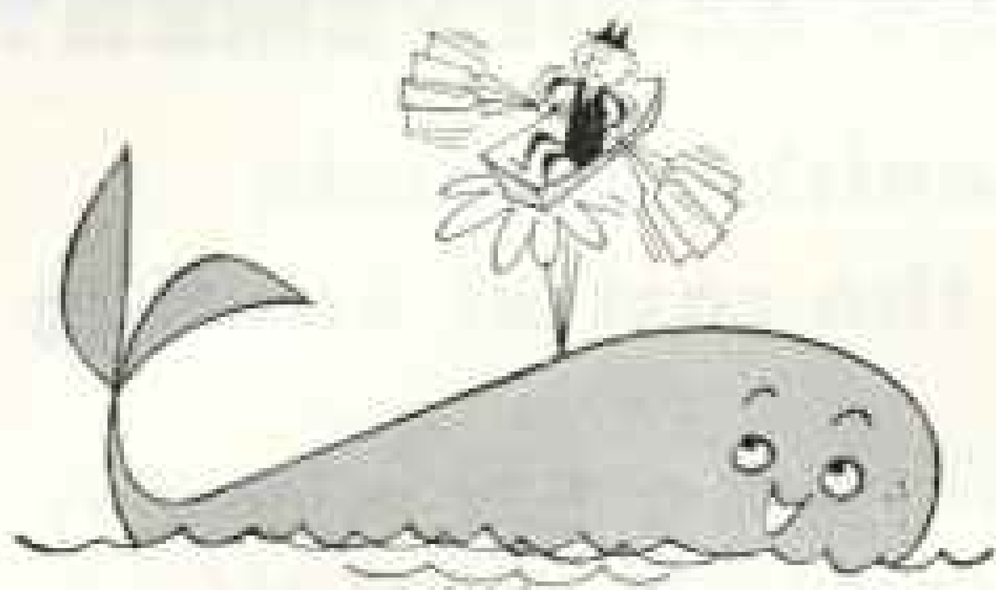

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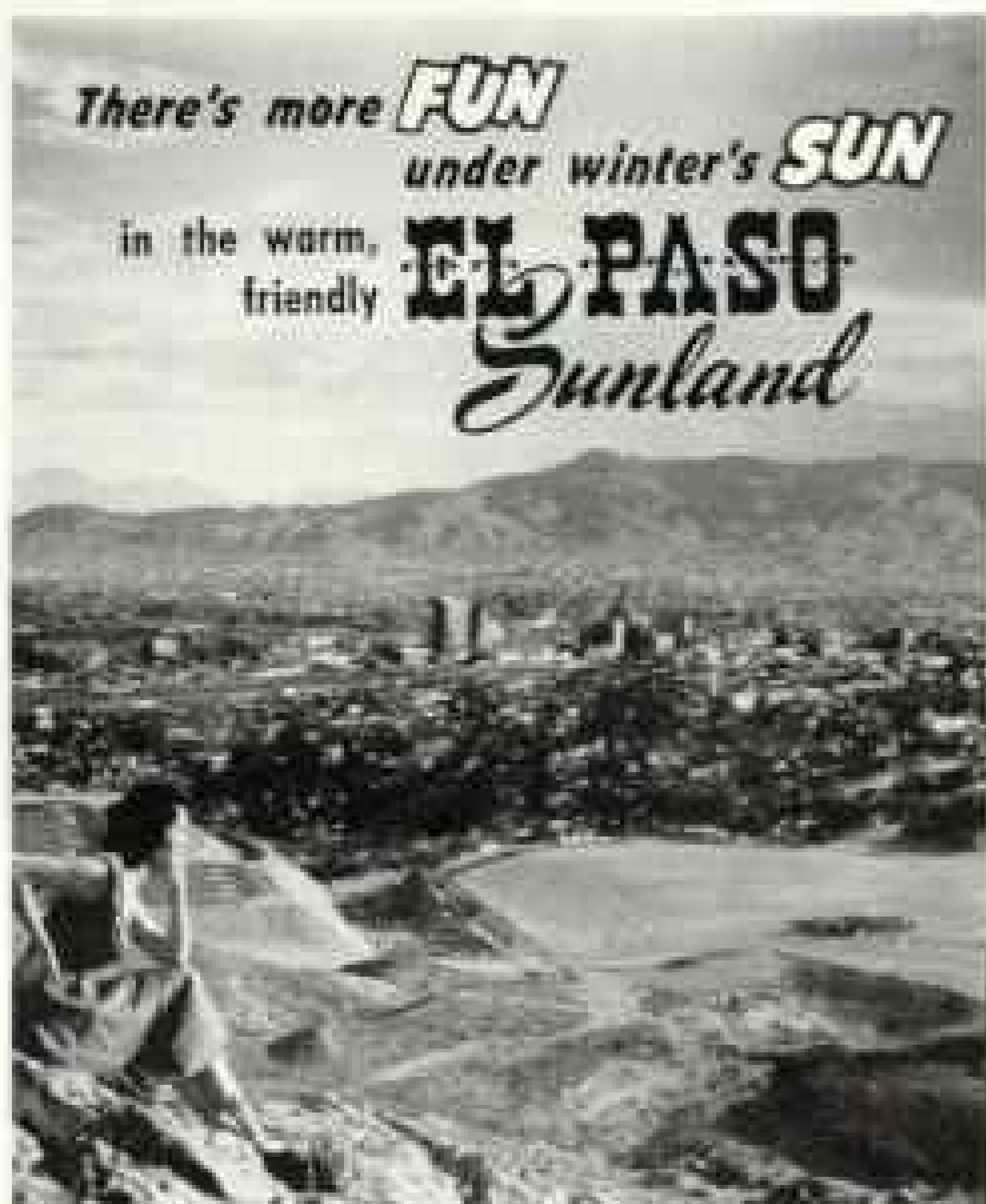

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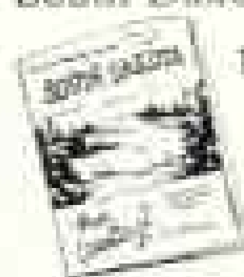

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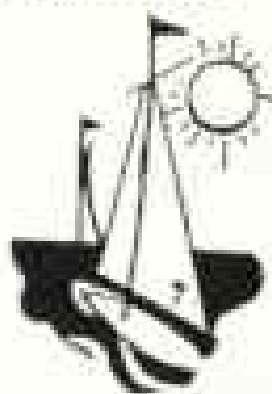

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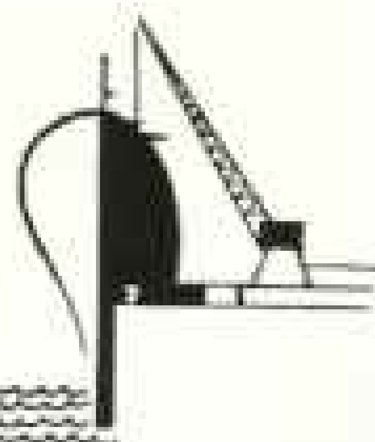

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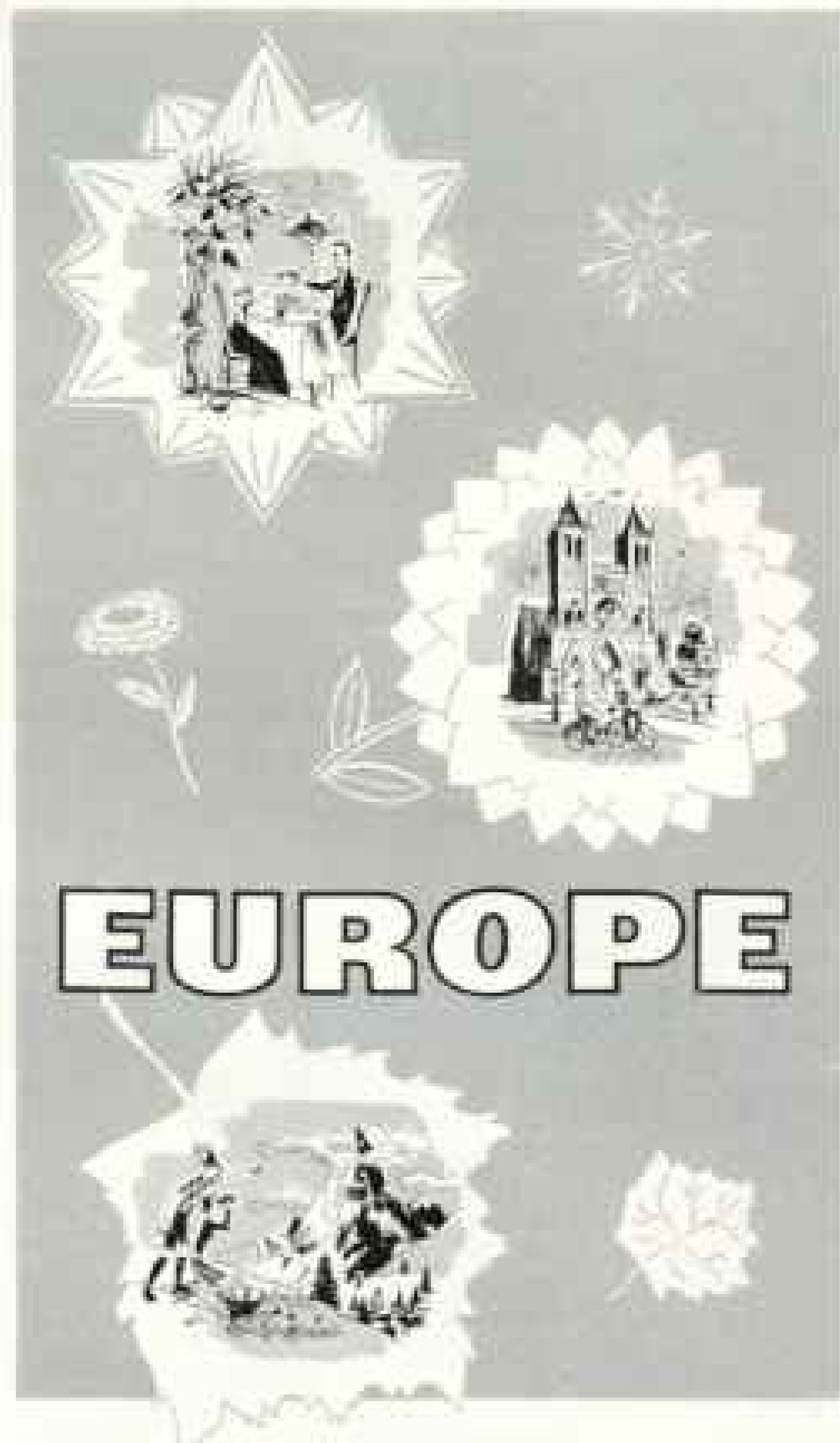

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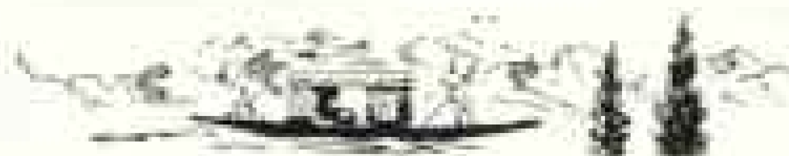

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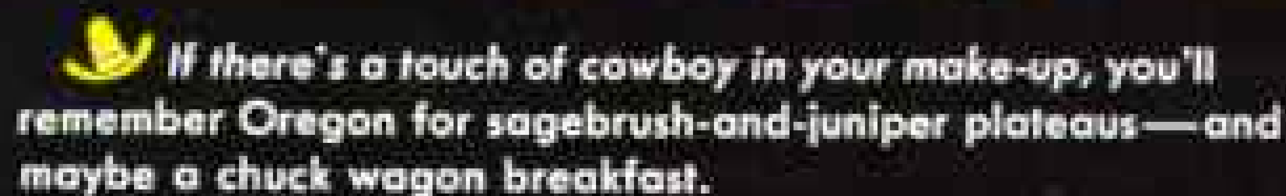
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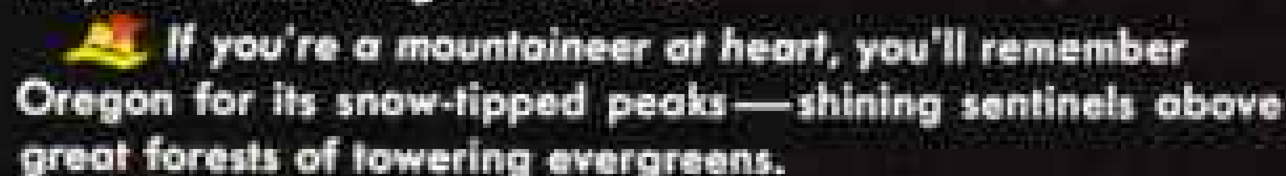
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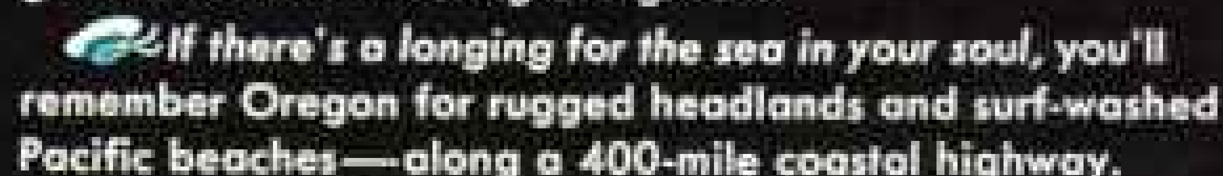
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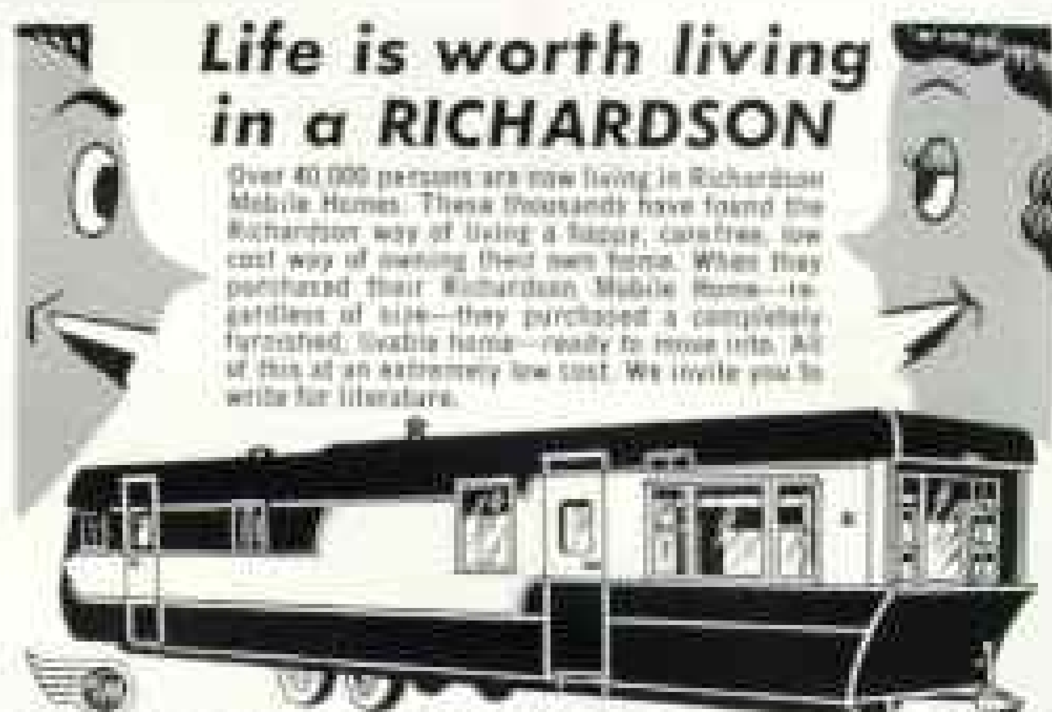

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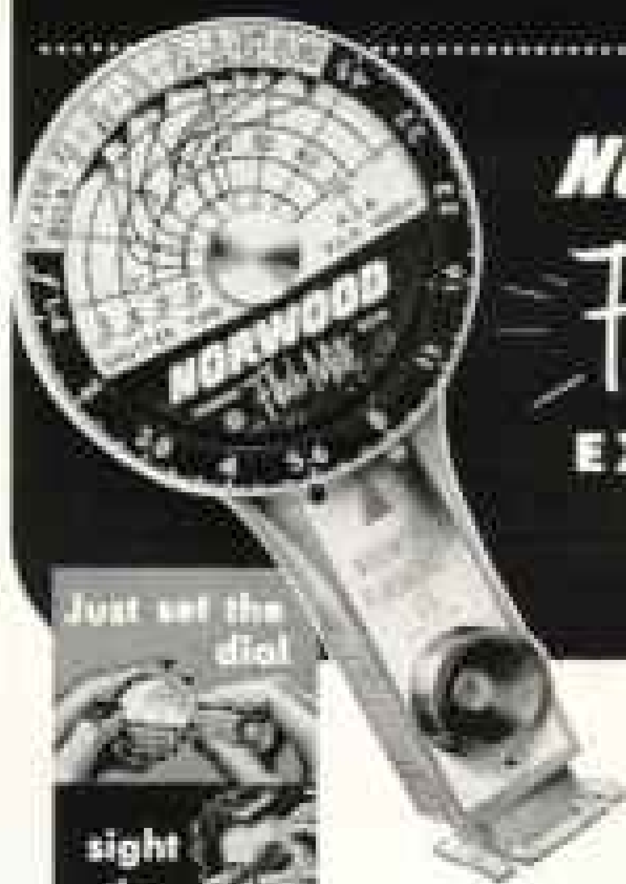

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Multiply the heart's hourly output of work by the days, months and years that it functions during an average lifetime, and you will realize how wonderfully sturdy and efficient the healthy heart is.

The heart also has remarkable reserves of strength and recuperative powers. Even after it has been seriously impaired, the heart is often capable of continuing its work for years . . . *if care is taken not to overburden it.*

Yet, despite the strength of the heart, diseases of this organ lead all other causes of death. There are many reasons why fatalities from heart disease have mounted. For example, more and more people are living to older ages when hearts naturally lose their ability to carry on.

If you would keep your heart working efficiently throughout life, never wait for symptoms to jolt you into giving it the consideration it deserves. Indeed, if you are approaching middle age, *now* is the time to help your heart by following such safeguards as these:

1. **Have regular, thorough health examinations.** These are important not only for detecting heart trouble early, but also for detecting other diseases that could affect the heart.
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4. **Get the rest you need.** Plenty of sleep and relaxation contribute much to both your physical and mental health. When you relax, so does your heart.

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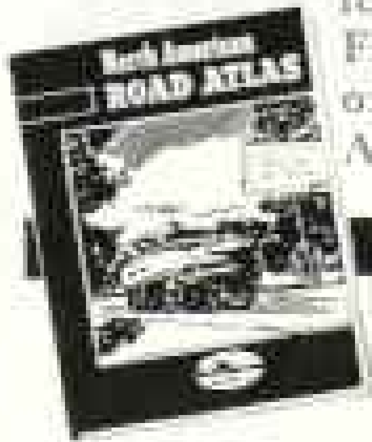

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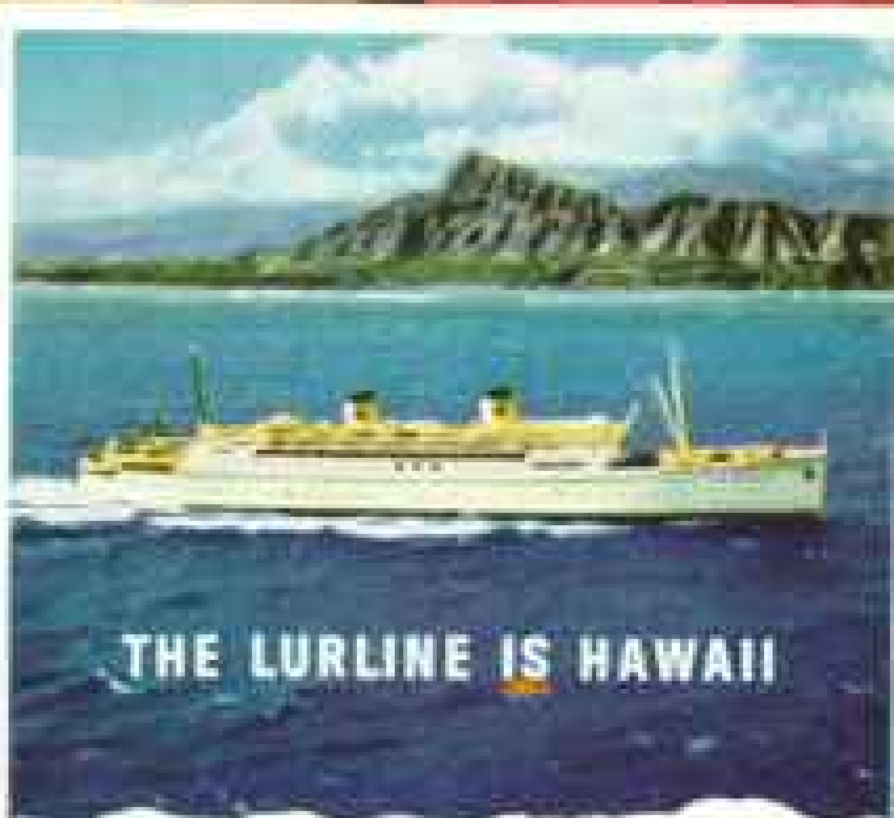

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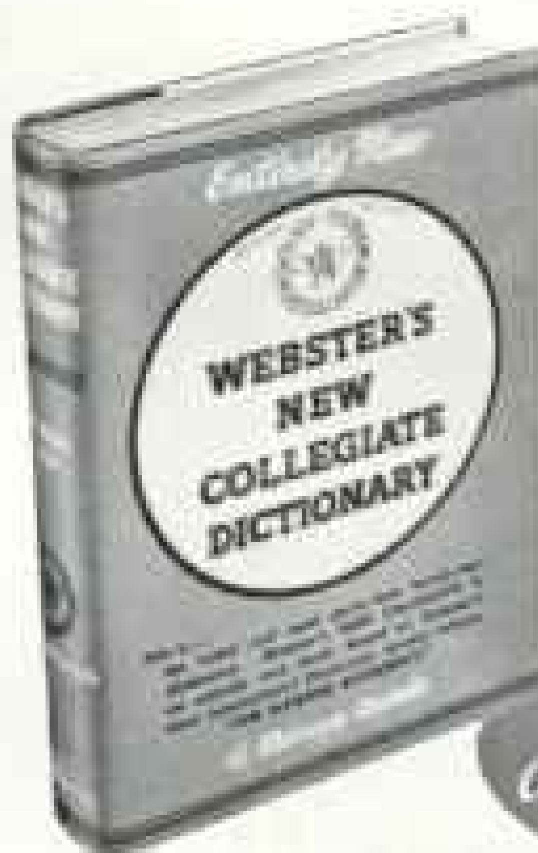

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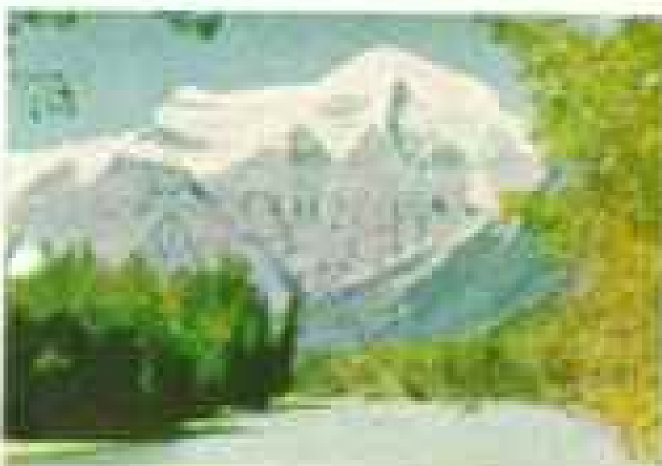

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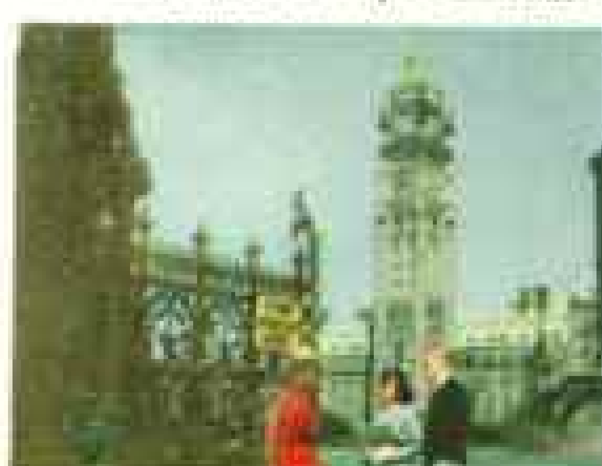

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