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- The Bahamas, Isles of the Blue-green Sea 147  
With Maps and 52 Illustrations, 38 in Color  
CARLETON MITCHELL  
B. ANTHONY STEWART
- Marsh Dwellers of Southern Iraq 205  
With Maps and 29 Illustrations, 18 in Color  
WILFRED THESIGER  
GAVIN MAXWELL
- Arizona's Window on Wildlife 240  
With 13 Illustrations  
LEWIS WAYNE WALKER
- Huntington Library, California Treasure House 251  
With 19 Illustrations, 15 in Color  
DAVID S. BOYER
- Exploring Our Neighbor World, the Moon 277  
With 15 Illustrations  
DONALD H. MENZEL

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## The Bahamas, Isles of the Blue-green Sea

Once the Lair of Pirates and Smugglers, These Subtropical Islands Shelter Yachtsmen, Sun-seekers, and Burgeoning New Industry

BY CARLETON MITCHELL

*Illustrations by National Geographic Photographer B. Anthony Stewart*

"NATURE made the Bahamas for pirates," said Charlie Turtle, squinting out at brilliant early-spring sunshine.

Below us, in the landlocked hurricane hole of Stocking Island in the Exuma Cays, *Fini-terre* swung to her anchor in water so clear she seemed to be set in glass. Beyond, we could see sails as white triangles against a sky incredibly blue. Charlie, a lifelong Bahamian, pointed to the narrow inlet.

"Look at this one harbor. You can enter it from either end, depending on wind. Inside there are channels between coral heads and sand shoals. By the time a man-o'-war had felt her way through, the pirate would be sailing out the other end. And there are dozens of similar places in the Exumas—and the rest of the Bahamas."

### First Governor Expelled Pirates

I remembered reading that in 1696 a Mr. Randolph had written King Charles II that the Bahamas were one of the "chief places where Pyrates Resort & are Harboured," and humbly proposed "that his Majesty be pleased to send a first Rate frigate under the Command of a sober person" to deal with them.

When Woodes Rogers, the first Royal Governor, arrived in 1718, he did just that, and later he adopted as the motto of the Colony *Expulsis Piratis Restituta Commercium*—"Pirates Expelled, Commerce Restored."

"It's impossible to understand the Bahamas

except in relation to the sea," said Charlie. "We rely on the sea for everything. Through the centuries it has given us our food and our wealth. Our products and our people move by boat. This is one of the last places in the world where a large part of the population still depends on sail and the wind.

"In few places can you get away from the sight and sound of the sea. And, of course, the sea provides our greatest natural beauty."

### Building Boom Under Way

We were sitting on the veranda of a new clubhouse, part of the postwar construction boom that is rapidly transforming this old British Crown Colony. Across the blue-and-green water rose the houses of George Town, on Great Exuma, one of the "Out Islands." The Bahamian applies this term to all islands except New Providence, site of Nassau and therefore center of his world.

The Out Island Regatta was in progress, and the harbor was crowded with boats of all types and sizes, lending emphasis to the truth of my friend's words.

The Bahamas are a huge and sprawling collection of outcroppings from the sea, nearly 3,000 if you include the smaller isolated rocks (map, page 152). From the time of the first settlement the sea has been the only highway. Columbus found dugout canoes that were capable of voyaging between islands. Fish has always been the main staple of diet.



*A Study in Color: the Bahamas;  
Greens and Blues Scallop the Sea*

Three thousand islands, cays, and rocks composing the Bahamas dot an ocean area nearly as large as Great Britain, the Colony's mother country. Fringed with coral, the islands are the eroded summits of a sea-rooted mountain range. The Atlantic (right)



All Kodachromes by National Geographic Photographer H. Arthur Stewart © N.G.P.

drowns the range's valleys, creating sounds and channels. High plateaus, just failing to breach the surface, form the famed Bahama Banks (horizon at left). Here the white sails of the Out Island Regatta (page 154) speckle the passage between Stocking

Island (foreground) and Great Exuma Island. Dark-blue patches indicate channels. Large vessel at left is H.M.S. *Vidal*, which charts Bahamian waters; the last previous survey of the islands was finished more than half a century ago.



Consequently, the Bahamas have produced a sturdy race of seafarers.

That afternoon I had visual proof, as native skippers jockeyed their boats to the starting line for a race. Here were no sleek, fragile yachts but solid working vessels, taking a few days off from fishing and sponging or carrying produce. These same sloops link the scattered islands, beating "up east" or scudding "down west," sheltering during gales behind tiny cays, carrying on their decks enormous cargoes and entire families (page 167).

#### Work-boat Regatta Settles Arguments

The regatta was the idea of J. Linton Rigg, an American yachtsman who fell in love with George Town while cruising the Bahamas and built his home there. Once settled, he became interested in helping the natives. Rub two pieces of wood together and you produce a fire; do the same with two boats and you start a race (pages 148 and 154).

Listening to the arguments, Rigg conceived that a spring regatta for work boats would not only prove which skipper was champion but provide an incentive to build and maintain better vessels. Also, it would bring color and gaiety into the simple lives of the Out Islanders.

From the first event in 1954 the regatta has been a great success. A carnival atmosphere prevails. Big-eyed children wander under gay bunting, and many see their first movies on the village common at night. Through the assistance of interested yachtsmen, there is free food and music for dancing.

His Excellency the Governor of the Bahamas inspects a Royal Navy honor guard and later presents prizes. Navy ships deck themselves in flags by day and lights by night.

The Out Island Regatta is similar to no other sailing event in the world. Decorum does not exist; it is somewhat like transporting the Milwaukee Braves' bleachers to a tennis match at Wimbledon. When the boats anchor on the starting line, shouts, challenges, and insults fill the air. The crowd along the waterfront joins in.

The starting cannon can hardly be heard in the bedlam. Immediately crews heave in their anchors, hoisting sail while trying to push near-by vessels back with their feet. Once away, there is only one racing rule: if two boats are in danger of collision, both must come about. As Bahamians are individualists, sometimes each skipper waits too long for his rival to make the first move, and splinters fly. Then lanterns burn far into the night as repairs are made.

During the regatta, my wife Zib and I lived aboard *Finisterre*, as we had in many other climes and places. Only 38 feet 7 inches overall and drawing a scant 4 feet, she is able to lie snug in the byways as well as to cross the oceans. In the fullest sense she is a home afloat. We enjoyed the luxury of shower baths and ice cubes from a mechanical refrigerator; we lolled under a gay awning that was a memento of the previous summer's Mediterranean cruise, and had our meals on a table in the cockpit (opposite).

#### Food to Be Had for the Diving

We dived over the side whenever we pleased, and when fresh food got low I donned swimfins and mask to bring back grouper and spiny lobster (page 191). Visitors from other yachts stopped by, and one moonlight night we listened on the hi-fi system to Heifetz playing Bach concertos; while astern a sand beach glowed as bright as a silver bar.

For our cruise back to Nassau we were joined by friends, including Robert H. Symonette, who represents the Exuma group in the House of Assembly, one of the oldest legislative bodies in the Western Hemisphere (page 162). Together with Bermuda and Barbados, the Bahamas form the "three B's" of the British Commonwealth, retaining their original constitutions and virtually complete management of their own affairs.

For our start we were blessed with perfect weather and a moderate easterly breeze. The Bahamas lie partly in the Temperate Zone, partly in the Tropic. Somehow they seem

#### The Author's Home Afloat, *Finisterre* Rides Anchor in an Island Cove

*Finisterre*, a 38-foot yawl built at Saybrook, Connecticut, has won more trophies in ocean racing than any other boat. Carleton Mitchell and his wife lived aboard while attending the Out Island Regatta. Here, with friends, they push off for lunch on deck. Evidence of the Bahamas building boom, a new clubhouse (right) marks Stocking Island.

Sparkling blue-green water and white sail provide the background. Meat and salad come chilled from the yawl's refrigerator. The writer and his wife (left) entertain Robert H. Symonette and Helen Zieeler.

to partake of the advantages rather than the disadvantages of each: temperatures are never extreme, either way; fruits and vegetables common to both may be grown.

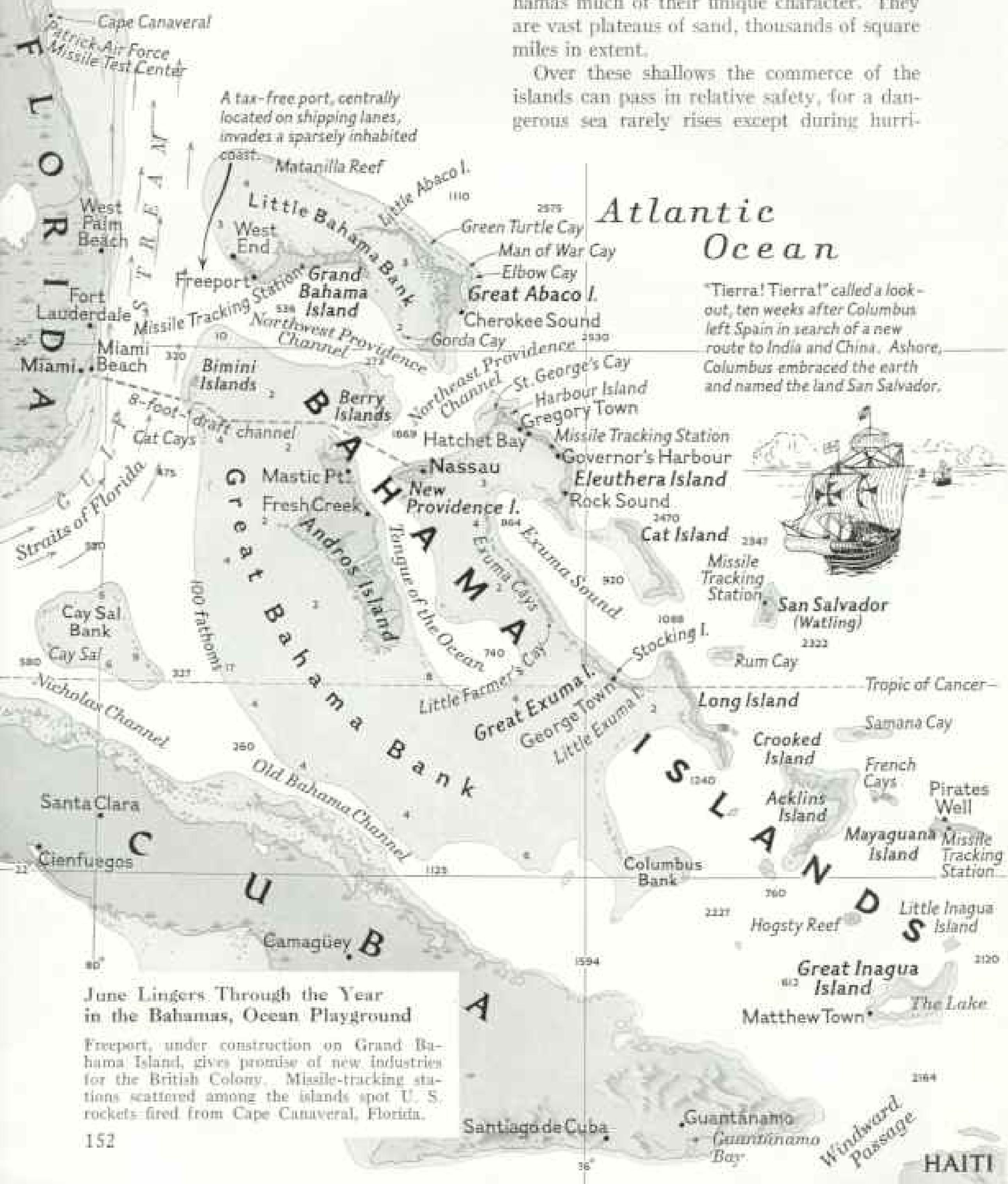
The trade wind sweeping unchecked from the coast of Africa usually provides a steady breeze, so uniformly from the east that Bahamian sailors say they are going "up" when voyaging east, and "down" when returning; to them, anything else is an "out-wind." Setting reaching sails, *Finisterre* bowled out of

the harbor to parallel the line of islands stretching away to the northwest.

To understand the Bahamas, it is necessary to know something of the surrounding sea itself. Many of the islands are visible peaks of mountains rising almost vertically for thousands of feet from the ocean floor. Yet while most of the islands are surrounded by deep water, others are hummocks of only a few feet, rising above the Banks.

To me, it is the Banks which give the Bahamas much of their unique character. They are vast plateaus of sand, thousands of square miles in extent.

Over these shallows the commerce of the islands can pass in relative safety, for a dangerous sea rarely rises except during hurri-



## Atlantic Ocean

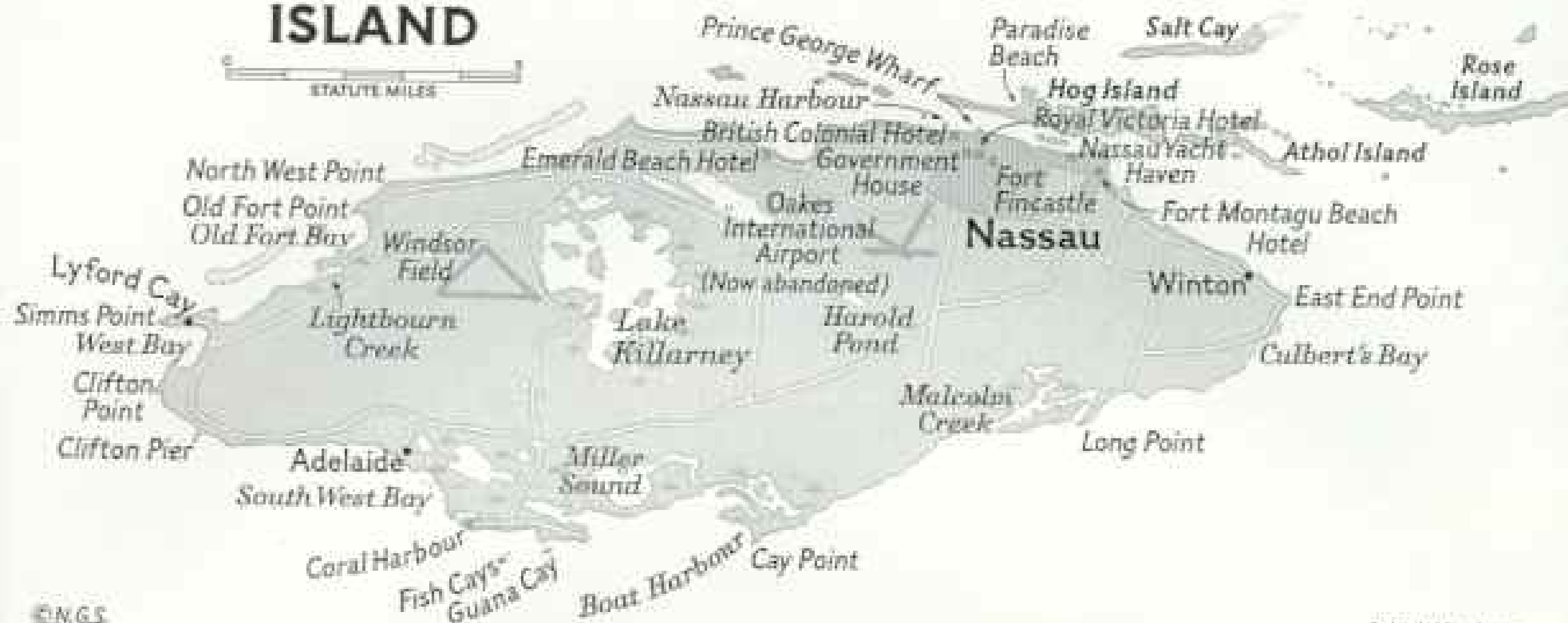
"Tierra! Tierra!" called a look-out, ten weeks after Columbus left Spain in search of a new route to India and China. Ashore, Columbus embraced the earth and named the land San Salvador.



### June Lingers Through the Year in the Bahamas, Ocean Playground

Freeport, under construction on Grand Bahama Island, gives promise of new industries for the British Colony. Missile-tracking stations scattered among the islands spot U. S. rockets fired from Cape Canaveral, Florida.

# NEW PROVIDENCE ISLAND



©N.G.S.

John W. Lochers

canes. A boat can anchor almost anywhere and take food from the bottom. The conch, a king-sized shellfish, is found there in such quantities that native-born Bahamians are sometimes called "conchs."

But equally important and almost as unusual is Bahamian water itself. It is virtually colorless. Imagine the clearest swimming pool you ever saw, or the most limpid mountain stream, and you have some idea of the sea that washes the Banks and deep passages. It is ocean water at its purest.

There are no rivers in the Bahamas to carry silt, and very little topsoil for the rain to wash away. The islands are formed principally of aeolian limestone and the beaches of ground-up shells. Since there is nothing to be carried in suspension, the water remains clear. Particles churned up by bad weather soon settle.

Having no color of its own, the water takes its hue from the depth and character of the bottom. Consequently the range of blues and

greens is infinite and incredible; in the Bahamas the term "seascape" has validity. No dappled countryside could be more varied or more lovely.

As *Finisterre* sailed through one of the cuts that lead from the deep water of Exuma Sound to the shoal water of the Banks, we had a practical demonstration of Bahamian pilotage. It is based on watching the color of the water ahead to know what is coming. Native skippers use this method, as charts have little value. Channels shift after every storm.

## Water's Color Warns of Danger

Bobby Symonette stood on the bow. Under us the deep blue of the ocean abyss rapidly changed to the paler blues of soundings. Looking over the side, we could actually see the bottom rise.

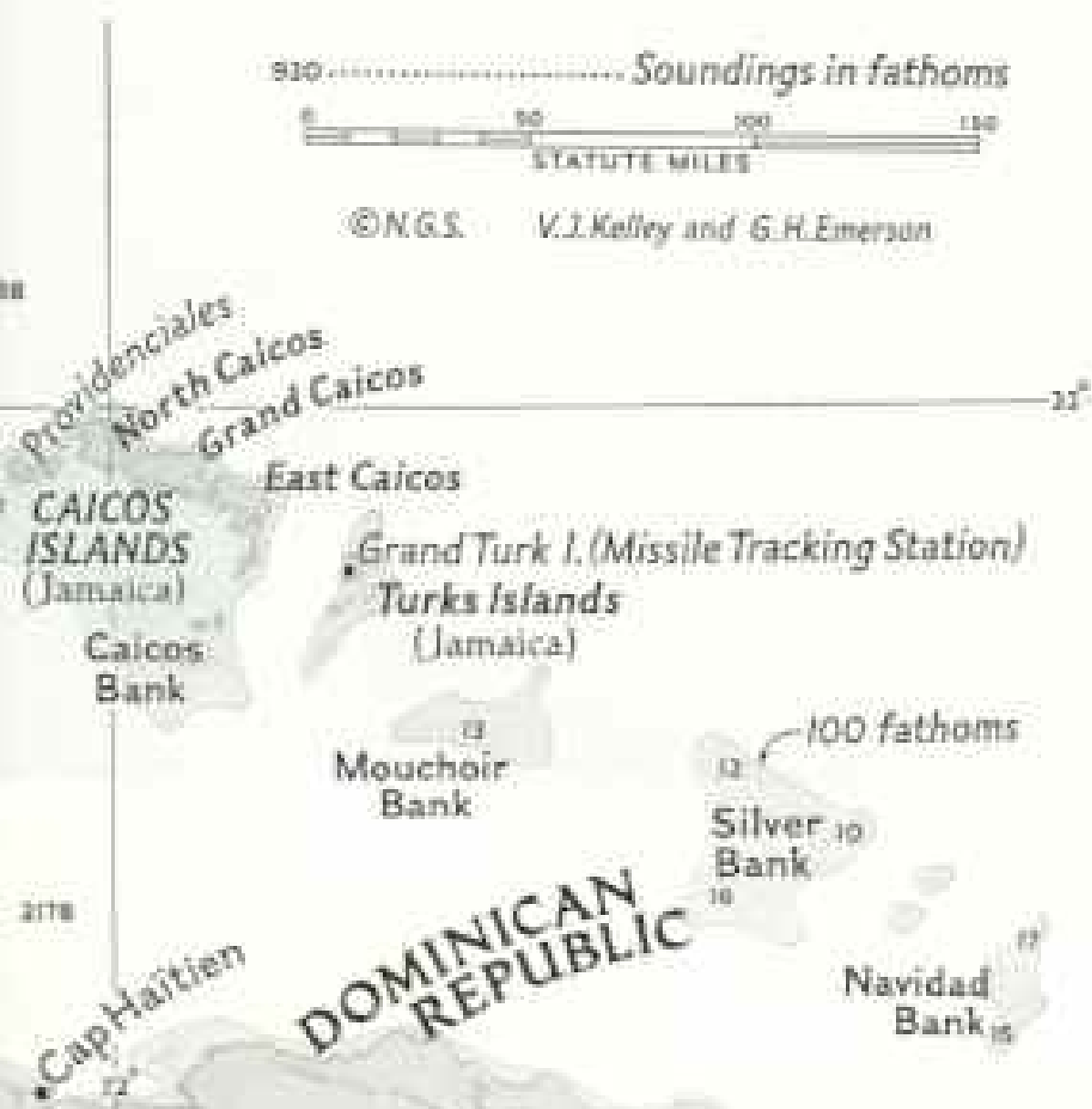
"Starboard!" called Bobby. "A little to starboard!"

As a discolored patch came abeam, I could tell from its purple-brown shade, touched with the yellow highlights of sea fans, that we had avoided a head of living coral, capable of tearing out a vessel's bottom.

"Steady."

Before us stretched a lane of blue, as clearly defined as an automobile driveway. Along the edges of the channel the water was perceptibly paler, indicating it was less deep. Dark-green areas to either side marked patches of sea grass. In other places it was nearly crystal white, showing where shoals of sand almost reached the surface. Sometimes the water is so clear it is impossible to tell from a distance where dry beach begins.

Many consider the Exuma Cays the loveliest  
(Continued on page 150)



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**Working Sloops on a Holiday  
Race Under Leaden Skies**

Bahamians consider Nassau on New Providence Island the center of their world; everything beyond they call the Out Islands. To escape isolation, Out Islanders build and sail the sturdy cargo boats that link the





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archipelago. Last year 60 working boats gathered for the three-day Out Island Regatta off Great Exuma Island. They raced under one simple rule: don't collide. These sloops appear in tandem as they run

downwind. Large crews serve as ballast on decks usually loaded with produce (page 167). The boat in foreground uses a dinghy sail as a spinnaker; its jib-headed mainsail curves loose footed.





### Police Patrol the Governor's Home with Palace-guard Dignity

White columns and broad galleries preserve the mood of Nassau's past. Half a century ago the city wore a look of "old-world leisure" and "regal tropic charm," according to Canadian poet Bliss Carman. In "White Nassau," a poem contained in his *Ballads and Lyrics* (Dodd, Mead), he wrote:

The trade winds fan her forehead; in  
everlasting June  
She reigns from deep verandas above  
her blue lagoon.

\* \* \* \* \*

Unmodern, undistracted, by grassy ramp  
and fort  
In decency and order she holds her  
modest court . . . . .

### Honor Guard Stands Inspection

Bewigged Sir Guy Henderson, Chief Justice of the Bahamas, checks policemen on the opening day of the Supreme Court. The constables serve as the Colony's only armed force; they double as the fire brigade.

*Aiguillette and mace distinguish the drum major of the Police Force Band, Constable L. K. Brathwaite. St. Edward's crown and the Royal Cypher on the helmet compose the official badge of the Police Department.*





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### **A Human Tide Washes Bay Street, Nassau's Main Thoroughfare**

Property values here rank among the world's highest. Smart shops display goods from London, Paris, and New York beside Bahamas-made accessories (page 181). A crowd gathers to greet a new governor. The British Colonial Hotel towers on the horizon.



of the Bahamas. The word "cay" (pronounced "key") derives from the Spanish *cayo*, meaning small island. Like a string of pearls lying on blue velvet, the Exumas extend for more than 100 miles. Gleaming deserted beaches and snug anchorages appear behind headlands.

The chain is uninhabited except for the homes of a few winter visitors and widely scattered native settlements. On most of them life remains simple, unchanged from colonial days.

Ashore at Little Farmer's Cay we found ourselves virtually in another century. A tremendous pile of conch shells rimmed the beach. Behind, small houses straggled up the hillside, without pattern. There were no streets, no electric wires, no faucets gushing running water.

#### School Lets Out for *Finisterre*

Never have I met friendlier or more cheerful people. When *Finisterre* appeared in the tiny harbor, usually used only by local sloops, classes had been dismissed for the occasion. We were engulfed by shy, curious children, and taken over by the village schoolmaster.

"You'd have to work hard to starve here," commented Bobby Symonette, as we walked through the settlement to the combination church and school.

Palms heavy with coconuts waved overhead. Around us were trees bearing various fruits: oranges, genips, sapodillas, tamarinds, limes, papayas, bananas, sea grapes, sugar apples, plantains, mastic berries, mangoes, and avocado pears. Chickens and goats foraged beneath them. In sprawling gardens grew thyme, peppers, tomatoes, and corn. Fish, scored and salted, hung on lines to cure in the sun.

"All a man needs besides what he can reach out and pick or take from the sea," said Bobby, "are a few matches, some cooking fat, rice, tea, and sugar. He can cut his fuel with a cutlass. His children don't need warm clothes. This is the life people dream about when they have trouble keeping up the installments on the Cadillac!"

During the afternoon the sky clouded over, our fine east wind diminished and swung "out," and all signs indicated a norther. These interruptions of the trade winds are the final flick of the tail of blizzards which may originate as far away as the icy Bering Strait. After sweeping over the continental

United States, they cross the Gulf Stream to dissipate in the Tropics.

By morning it was blowing hard. On the Banks the sea was steep and confused, and the going was wet as *Finisterre* drove through at high speed.

Standing on the bow, watching ahead for the silhouette of Nassau, I reflected that it was 25 years since I had first looked for the tall spire of the water tower above Fort Fincastle. On that cruise I had gotten sand in my shoes. Natives say that means you must come back, and return I did through the years—until now I am called "at least half Bahamian."

Now, with the sun turning the bow wave into cascading diamonds, the proud arch of the sails overhead, and the exhilaration that comes from driving a boat in shoal water, I would have traded places with no man.

As New Providence lifted, I was again amazed by the transformation that had taken place during the short span I had known Nassau. On my first visit it had been a sleepy colonial town. Carriages and occasional automobiles meandered along Bay Street. Tall schooners from Abaco and Spanish Wells anchored off the market while their crews sold fish directly from the midship wells. There were few dwellings beyond the boundaries of the town.\*

#### Nassau a Year-round Resort

Now I could see houses from water's edge to hill crest, even at the eastern extremity of the island. Nassau is no longer a town; it is a city. One-way streets are crowded with automobiles, and carriages remain only to accommodate the nostalgic tourist. Apartments and hotels have multiplied. Smart shops display the cream of the world's merchandise. Property values have soared, along with the population. Far from being crowded only during the winter season, Nassau now thrives all year (opposite).

Most of this growth has taken place since the beginning of World War II. Many Englishmen moved their families here, away from the danger of air raids, and later joined them. In Nassau were sunshine, a profusion of food and consumer goods, attractive homesites, and cheerful servants.

After the war, winter vacations for Americans and Canadians became more popular than ever. New, fast planes cut the flying

\* See "Bahama Holiday," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, February, 1936.



**Nassau Began as a Pirate Town;  
Its Site Proved a Treasure**

Early in the 18th century the buccaneer Henry Jennings and his followers discovered in this spot "a retreat and general recepticle" for their business of plunder. The harbor, convenient to ship lanes, pro-



© National Geographic Society

vided good shelter for their fleet. The island proved well watered and fruitful. Its natural advantages still intact, Nassau today replaces pirate shanties with fine homes and hotels. Harborside Bay Street, a show-

case of the world's finery, angles toward Prince George Wharf. Shirley (left) and Dowdeswell are the other two wide streets. Hog Island (right) offers Atlantic bathing on a beach called Paradise (page 179).



time between New York and Nassau to about four hours. Soon jets will halve even this "commuting" time.

But the most important reason for Nassau's growth is the system of taxation. Costs of government have always been paid almost wholly out of customs duties. In contrast with England, here there is no tax on incomes or unimproved property, and only nominal levies on improved. The inheritance tax is negligible.

People and wealth flowed in, and Nassau changed. Yet the underlying charm remained, and much of the old was untouched by the new.

"Nassau is something like an elderly lady trying very hard to be respectable, but with a closet full of skeletons," a Bahamian friend once told me. "In the past our periods of prosperity came first from piracy, then stripping and selling the cargoes of wrecked ships, then blockade-running during your Civil War, then bootlegging."

Nassau was named in 1695 in honor of England's King William III, who had been Prince of Orange-Nassau. From the begin-

ning its magnificent harbor attracted ships—and pirates. By 1730 it and the few other settlements in the Bahamas had been attacked and reduced no fewer than 30 times.

At last, in 1718, the Crown sent a detachment of soldiers under the stout sea captain Woodes Rogers. With him he brought a royal promise: pardon to the pirates who repented, death to those who did not. Several hundred surrendered, and a few were hanged later by Rogers.

#### Headquarters for Blockade-runners

That night, having dinner on the terrace of the Royal Victoria Hotel, my wife and I reminisced about other phases of Bahamas history. The hotel had been completed at the beginning of the Civil War, in time to be the focal point of Nassau's golden age.

"It must have been like *Gone With the Wind*," I remarked. "Each evening everyone of importance connected with blockade-running collected here—diplomats, steamer captains, Confederate agents, shippers, British naval officers, newspaper correspondents, and cotton





### Bahamas House of Assembly Debates by Night in Evening Attire

Dating from 1729, the Bahamian Constitution provides a form of government similar to that in the North American Colonies before the Revolution. Executive power lies in a Governor appointed by the Crown. He is advised by a Crown-nominated Executive Council of nine members. The House of Assembly, an elected body of 29, represents the islanders; no taxes may be imposed without its consent, but its acts may be vetoed by the Governor.

Here the House sits beneath a portrait of Queen Victoria. Speaker Asa Pritchard (in chair at left) confers with the Honorable R. T. Symonette, Leader for the Government in the House of Assembly. Mace on the Speaker's desk is thought to have been used in South Carolina before the Revolution and taken to Nassau by Loyalists.

**New Governor, Sir Oswald Raynor Arthur** (right), hears the Provost Marshal read his commission of appointment before a gathering of Bahamian leaders.

163





*Sailboats Unload Fruits in Nassau; Grower-Vendors Eat and Sleep on Deck*





buyers. And, of course, the Rhett Butlers and the dashing officers in gray.

"England desperately needed cotton. Her mills were closing for lack of raw material. The Confederate States equally needed the munitions, machines, and goods they could get in exchange for cotton."

I also remembered vivid yarns of sailing craft and steamers running the Union Navy blockade. It was dangerous but fabulously rewarding work. One ship earned £7,000 from taking cargo in, and £50 a bale on 500-odd bales of cotton coming back. The *Banshee*, built for the trade by a Liverpool firm, was one of the early steel steamships to cross the Atlantic. For the eight voyages she completed before capture, her shareholders were repaid 700 percent profit.

Money, earned at great peril, was squandered freely. Men tossed \$20 gold pieces to watch native urchins scramble. "Shaping my course for hell or cotton" was the motto of the captains. Either might be waiting under the guns of Fort Sumter.

Nassau underwent transformation. Old shops expanded, and new ones were built. Bay Street was widened. Large houses replaced the humble dwellings of colonial days. Everyone had a share in the prosperity.

When the South collapsed, Nassau went to sleep for half a century, not to awaken until Prohibition and its outlaw companions, rum-running and bootlegging, came to the United States. Then once again fast, dark vessels, this time bearing valuable liquid contraband, slipped out of the harbor.

#### Nassau Has Its Own Calypso

Looking out over softly lighted gardens, it took little imagination to recapture the past, but Zib and I were brought back to the present by insistent and compelling rhythms. Blind Blake and his fellow musicians had begun playing on a corner of the terrace.

The "goombay calypso" of Nassau combines the storytelling chants of Trinidad, the drums of Haiti, and the percussion effects of Cuba (page 195). It is a recent contribution to West Indian folk music. On my earliest visits troubadours sang of local themes, with little emphasis on beat. But during the 1930's a Nassau businessman named Charles Loft-house wrote "Goombay Drum."

It had an insidious rhythm which soon found expression among musicians "over the hill," the purely African section of Nassau.

Haitians trading in small sloops and schooners from Port au Prince undoubtedly contributed, as did occasional Cuban musicians. Now goombay has swept far beyond the boundaries of the Colony as a popular music fad in England and the United States.

Everywhere in Nassau the past and present blend gracefully. Quiet avenues run back from the harbor, tree shaded and accented by the glowing colors of hibiscus and poinciana. A soft pink wash covers the stone of many houses. Behind shuttered windows and jalousied verandas is maintained a gracious way of life. Many of the newer homes on the eastern and western beaches overlook the sea and its never-ending pageant.

#### Speech Abounds in Graphic Phrases

Along the waterfront sailing vessels moor to discharge their cargo; this is one of the last wind-driven commercial fleets. The produce the fleet brings from the Out Islands is sold in a market that has changed little in decades. Women sit behind piles of fruit and vegetables, ready to gossip or bargain. Small boys and dogs wander underfoot.

Sometimes it is hard to understand the rapid flow of conversation. Pronunciation is strange, and phrases must be virtually translated. A sailor may call "tie me loose, boss," when he wants to be cast off. Inquiring about a boat, you will be told "she ain't fetched yet," if she hasn't arrived. The other side of the market is the "next side." The "bar is raging" when heavy seas break across the harbor entrance.

A superstitious person will say "don't put mouth on it," asking that something not be mentioned for fear of bringing bad luck, and might add "shut mouth catch no fly"—keep quiet and keep out of trouble. The wind "falls down" when it slackens, dawn is the "day come clean," and a boat sailing fast is "bruising God's water."

Always to me, as to a native sailor, Nassau is the center of the Bahamian world. Yet as Nassau has a character of its own, so does each of the Out Islands; and in 1957 I decided to see as many as possible.

To have visited them by boat, as I had done in the past, would have taken weeks. But now Bahamas Airways serves the important settlements on regular flights, bringing the most remote within easy reach of the capital. More than any other factor, air transport is swiftly altering the character of the group.





### Crew and Live Cargo Crowd a Sloop at Nassau Market

Men and sheep compete for space on the deck of this Out Island vessel. Meals are cooked in the open firebox beneath the boom, and crews often nap amid stems of bananas. Bahamians for generations have hauled produce to market in this manner.

A vendor dozes between sales. His baskets hold lemons, cucumbers, and sapodillas (right), a tropical fruit. Tin cups measure pigeon peas, a staple in the Bahamas (page 177).



All Kodachromes for National Geographic Productions by B. Anthony Stewart © N.G.S.

On impulse, after studying the schedules, I chose Great Inagua as a first stop. Boarding a de Havilland Heron at Oakes Field, I found as my across-the-aisle neighbor A. Wentworth Erickson, Jr., a pioneer in the development of an Out Island.\*

"Bill" Erickson is the senior member of a Boston family that came to the Bahamas in 1934 looking for a promising investment. On Great Inagua they found the crumbling stone walls of century-old pans where salt had been produced from sea water by solar evaporation.

Once it had been a flourishing industry. Fishing and coasting schooners from the Maritime Provinces of Canada came each year for salt to cure the haddock and cod caught on the Grand Banks. Matthew Town prospered. Carriages rolled along shaded streets between imposing stone houses, and in the late afternoon the men played polo. But when the Ericksons arrived, they found a ghost town, walls falling down, trees growing through rootless walls and windows.

Bill and his brothers went to work. It was pioneering in the true sense. Almost every-

thing had to be imported. Little could be grown in the sparse soil under the burning sun, for Inagua is hotter and has less rain than the rest of the Bahamas. This is ideal for salt, but hard on other crops.

"First we had to rebuild old pans," said Bill. "This meant bringing in modern equipment. Then we had to train men to use the machines, and build stores and a hospital to care for the workmen. Now we do everything, from supplying the town with electricity to making ice."

#### Half a Million Tons of Salt a Year

The Erickson company employs 250 men and includes a fleet of 11 ships. The newest, a 5,500-ton vessel especially designed to transport salt, is being completed in Japan.

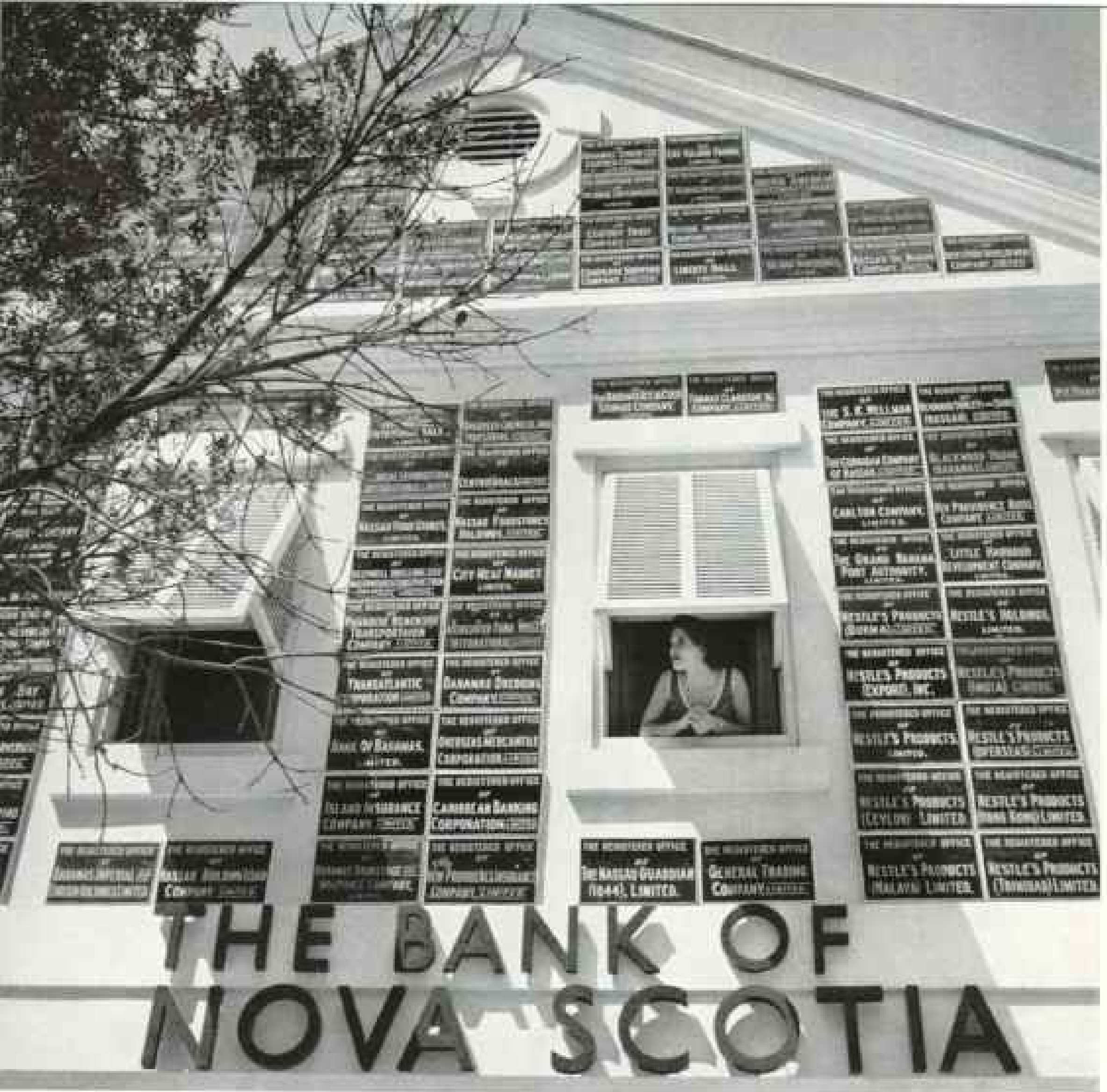
"When we arrived, the islanders were hand-raking about 500 tons of salt a year," Bill told me. "Our present annual production is more than 250,000 tons, and we are work-

\* See "Carib Cruises the West Indies," by Carleton Mitchell, NATIONAL GEOGRAPHIC MAGAZINE, January, 1948.

#### Government Buildings Cluster About a Statue of Queen Victoria

Colonial Secretary and staff occupy offices at left; the House of Assembly meets in the structure at right. Columns frame the entrance to Post Office and Legislative Council.





### Office Signs Proclaim Nassau a Headquarters City

Freedom from income and corporation taxes attracts many business firms from abroad. These plaques cover the front of a lawyer's second-floor office.

ing toward a projected maximum of half a million. Our sea salt averages 99.4 to 99.6 percent pure, against an average for mined salt of 97 to 98.5 percent. Most of it is used in commercial chemicals."

Seen from the air, the salt pans form a striking tapestry of color and design. Stone dikes bound the evaporating areas into lakes of geometric pattern. Some are laid out in neat rectangles, others are triangles, while some look like the inventions of a cubist painter (page 182).

The water within varies in color with each stage of evaporation. When water is pumped from the ocean to the brine lake where preliminary evaporation takes place, it is jade green. In successive steps it turns light brownish red, then takes on purple tints.

At intervals along the dikes huge, glittering piles of salt, whiter than any snow, are reflected in the colored water. And sometimes, if a visitor is lucky, flamingos may be stalking in the pans or flying above, looking like pink javelins tipped with black.

As we jeeped into Matthew Town, Inagua's port and chief settlement, I was struck by the changes that had taken place since I had first called here in 1946. A ship swung in the roadstead, awaiting cargo. There was a general air of prosperity, showing how the initiative of one small group can alter the destiny of an entire community.

While we lunched in a quiet, cool room that somehow managed to convey the impression of Massachusetts transported to the Tropics, I remembered that Inagua had truly become









### Youngsters Play Walk-the-plank in the Pool at Coral Harbour

Created out of marshland on New Providence Island, this new 3,000-acre resort operates as a club. In and out of doors, the clubhouse (left) keeps several areas for dining. Two wings offer luxurious suites for guests. Docks and mooring wall accommodate a fleet of pleasure craft in a harbor dug out of the coral limestone. Similarly, a big harbor is being dredged at Freeport on Grand Bahama (below).

commodate the largest merchant ships afloat.

As I stood on man-made hills looking down on a man-made harbor, I was deafened by the roar of diesel engines and pneumatic drills eating through rock (page 196). The stark arms of cranes, draglines, and structural steel made patterns against the sky. I was reminded of the wartime transformation of entire islands. But Freeport is the project of private enterprise, not of an aroused nation.

In 1955 the Bahamas House of Assembly passed an act permitting purchase of 50,000 acres of crown land on Grand Bahama, and granted certain unique privileges.

#### New Port to Be Duty-free

"Our agreement is to develop an industrial and commercial community served by suitable harbor facilities," I was told by Wallace Groves, the man who conceived and is promoting Freeport.

"Under the act, for 30 years from 1955 businesses establishing here will pay no taxes on income, capital gains, real estate, or personal property. For 99 years there will be no customs duties. We control our own immigration, and can bring in skilled labor from any part of the world. It is our hope to establish here not only an industrial complex but a permanent community with schools, hospitals, recreational facilities, and all amenities."

In Nassau I later heard the rumor that if all progresses well, inside of 10 years this state within a state might employ 60,000 workers. With their families, this would surpass the total of 85,000 inhabitants achieved by the rest of the Colony in 300 years.

First to commence business operations in Freeport was Daniel K. Ludwig, of New York, head of several United States shipping firms, including National Bulk Carriers, Inc. His shipping empire rivals those of the famous Greek magnates, Stavros Spyros Niarchos and Aristotle Socrates Onassis. Mr. Ludwig is building the harbor in return for the right to construct a shipyard where even supertankers may be built or repaired.

before the coming of Columbus. Under us passed cays showing no sign of ever having known the tread of man. On others the rubble heaps of dead houses and indistinct outlines of stone fences around overgrown fields showed where nature had triumphed. Undoubtedly there are cays in the group which are not visited once in a decade. Robinson Crusoe could still happen here.

Inagua is not the only island remote from Nassau where industrial development is taking place. Across the archipelago, on sparsely inhabited Grand Bahama Island, men and machines are changing geography. Here they are creating Freeport, designed eventually to ac-

"Remember that on a world chart Grand Bahama is centrally located in relation to shipping lanes," Mr. Groves pointed out. "We are just off the Gulf Stream, the highway between North and South America, and the way to the Panama Canal; and we're directly on the Northwest Providence Channel, a main route to Europe. By steamer we are only a day from ports in Florida; by air, an hour or so. This is equally important to the factories and assembly plants we hope will develop at Freeport."

I felt slightly dazed as I drove the 20 miles back to West End, a small Out Island settlement drowsing under palms. Anchored sloops swung off the beach. Children splashed in the shallows. Smoke climbed lazily from cooking pots behind the houses. Here was a feeling only of the past.

#### Tuna Fishermen Train Like Athletes

Later the same afternoon I was to see another of the contrasts that exist in this scattered archipelago. Looking down from my plane, I watched Bimini come into sight ahead. It had been my first island landfall, on Christmas Eve, 1932, and each view of it since has brought back something of my original excitement.

Bimini is truly an isle of the sea. The Gulf Stream flows past in front, and the Great Bahama Bank stretches away behind. One teems with giant pelagic fish, the other with small and colorful reef fish. Bimini spans the line of reefs and rocky cays that divides ocean abyss from shoal water. Tides swirl in and out of the cuts, flowing on and off the Bank. Here is a perfect feeding ground for marine life. And Bimini exists by and for fishing (page 202).

As our plane dropped out of the sky, we could see the dark-blue water off the island patterned by the wakes of sport-fishing boats. The Tuna Tournament of the Bimini Big Game Fishing Club was under way, timed to coincide with the annual northward migration of the huge fish.

Bimini-style fishing is to ordinary angling as stalking elephants is to hunting rabbits. Special tackle, techniques, and even boats have been developed to make easier the landing of fighting fish weighing hundreds of pounds. I have heard stories of anglers training for weeks, only to be carried from the boat after struggling with a monster for hours. There is sometimes doubt as to who is playing whom!

But in the Bahamas even sport fishing has a serious aspect. Behind the docks are the trim buildings of the Lerner Marine Laboratory of the American Museum of Natural History.\* Fish brought in as trophies are not only dissected for study but used to feed specimens kept in a large aquarium in the harbor. The laboratory was established by Michael Lerner of New York, one of the first sportsmen to become interested in big-game fishing and one of the earliest winter residents of Bimini.

Among other projects, the laboratory is undertaking extensive research on cancer.

"All types of tumors that afflict humans are found in fish, and for the same causes," explained Dr. Ross F. Nigrelli, a visiting pathologist from the New York Aquarium, "so it is our hope that an inhibiting chemical may also come from the sea, as antibiotics have come from organisms of the soil (page 203).

"At present we are working with a fluid generated by the Cuvierian organs—glandular tubules—of the sea cucumber, *Actinopyga agassizi*. The secretion is called holothurin, and it is a powerful poison. For centuries Pacific islanders have used it to kill fish. We have injected it into malignant tumors that normally would kill mice in 12 days, and the mice live indefinitely. The spread of the growth is arrested.

"Our problem is learning the chemistry of holothurin, so that it can be purified and modified to make it less poisonous but intensify the anticancer properties."

Around us were dozens of rectangular glass tanks. In them tiny, brilliantly colored fish swam among branches of coral or drifted over the shells of living conchs. Bright-red starfish slowly moved across white sand.

#### An Ideal Site for Research

"Bimini is the perfect place for marine biochemical research," said Dr. Nigrelli. "We have an unlimited source of specimens. Metabolic processes are exaggerated by the high temperature of the water; so tumors are more frequent and grow larger and in a greater variety of organisms."

Bimini has changed greatly since I first sailed in on the venerable ketch *Temptress*, in the '30's. Then there were few houses. The only activity took place at sundown, when a procession of powerful motorboats would

\* See "Man-of-War Fleet Attacks Bimini," by Paul A. Zahl, NATIONAL GEOGRAPHIC MAGAZINE, February, 1952.

roar out across the Gulf Stream to Florida, for the island was a rum-running center during Prohibition. Now the fishing docks are nearly as crowded as those of Miami Beach, 55 miles to the westward.

But somehow the narrow streets running the length of the settlement retain an Out Island charm. Palms arch overhead and cast a pattern of filtered sunshine across gossipers lounging against beached dinghies. Bimini is a curious combination of American energy and Bahamian languor.

Only a few miles away is an island with the same general physical characteristics and equal fame as a fishing center, yet with a completely different character. North Cat Cay is a world-famous symbol of gracious living. Originally it was planned as a winter estate by Louis R. Wasey, a New York advertising executive. Later he formed a club and allowed friends to build their own homes.

Cat Cay has been groomed through the years to a state approaching perfection. Pink-and-white cottages are framed by vistas of palms, or look down across a beach of dazzling white sand to the dark-blue Gulf Stream. A golf course occupies the center of the island. In season, guests dress formally for dinner in the Manor House, an 18th-century English country house transported to the edge of the Tropics. There are tennis courts, a swimming pool, and a skeet range. Cat Cay, first of the private island luxury resorts, possesses a charm of its own.

#### Strange Formations Mark Sea Bottom

Twenty-three miles to the west of New Providence, beyond a fantastic submarine chasm called Tongue of the Ocean, lies Andros. On my first visit it was known as the Mysterious Island. There were vague rumors of tribes of primitive people, living in hidden interior villages, who still hunted with bows and arrows. Colonies of flamingos nested behind almost impenetrable barriers of eroded limestone, tangled mangrove, and marl swamps.\* As late as 1926 the *Bahamas Handbook* noted: "It is to be hoped that the mystery of the interior of this land will someday be unfathomed by means of aviation."

Andros is a big island, more than 100 miles long and 40 miles wide, comparable to Puerto Rico. Wide cuts known as bights slice across, dividing it into three parts. Each bight in turn subdivides into smaller tidal streams, until from the air the land looks like a pattern of

lace. Here is the only place in the Bahamas where fresh water meets the sea.

Among other strange formations are "ocean holes," where perfectly round tunnels through rock bottom link the sea and subterranean springs (page 200). Swimming over one is a weird sensation; looking down through my face mask, I had exactly the feeling I have known on land when peering over the edge of a precipice. Through water almost as clear as the air above, I could see fish in swarming clouds, gradually receding into the shadowy depths. I felt dizzy and suddenly insecure, as though I might go tumbling down into a bottomless pit. Taking in a mouthful of water under my mask, I found it almost fresh.

#### Largest Island the Most Primitive

At Fresh Creek the Swedish industrialist Axel Wenner-Gren has built a modern resort, the Lighthouse Club. Despite this oasis of luxury, Andros remains the most primitive of the Bahama group. Only a few scattered settlements rim the coast to the east. The entire west coast and interior are uninhabited; modern exploration, as the *Bahamas Handbook* hoped, has disproved the existence of any mysterious Stone Age tribes.

Elgin Forsythe, for 25 years as commissioner almost the only representative of government on Andros, told me the folk legend of the Chick Charneys, birdlike creatures with large red-rimmed eyes which build nests by pulling together the tops of three pine trees.

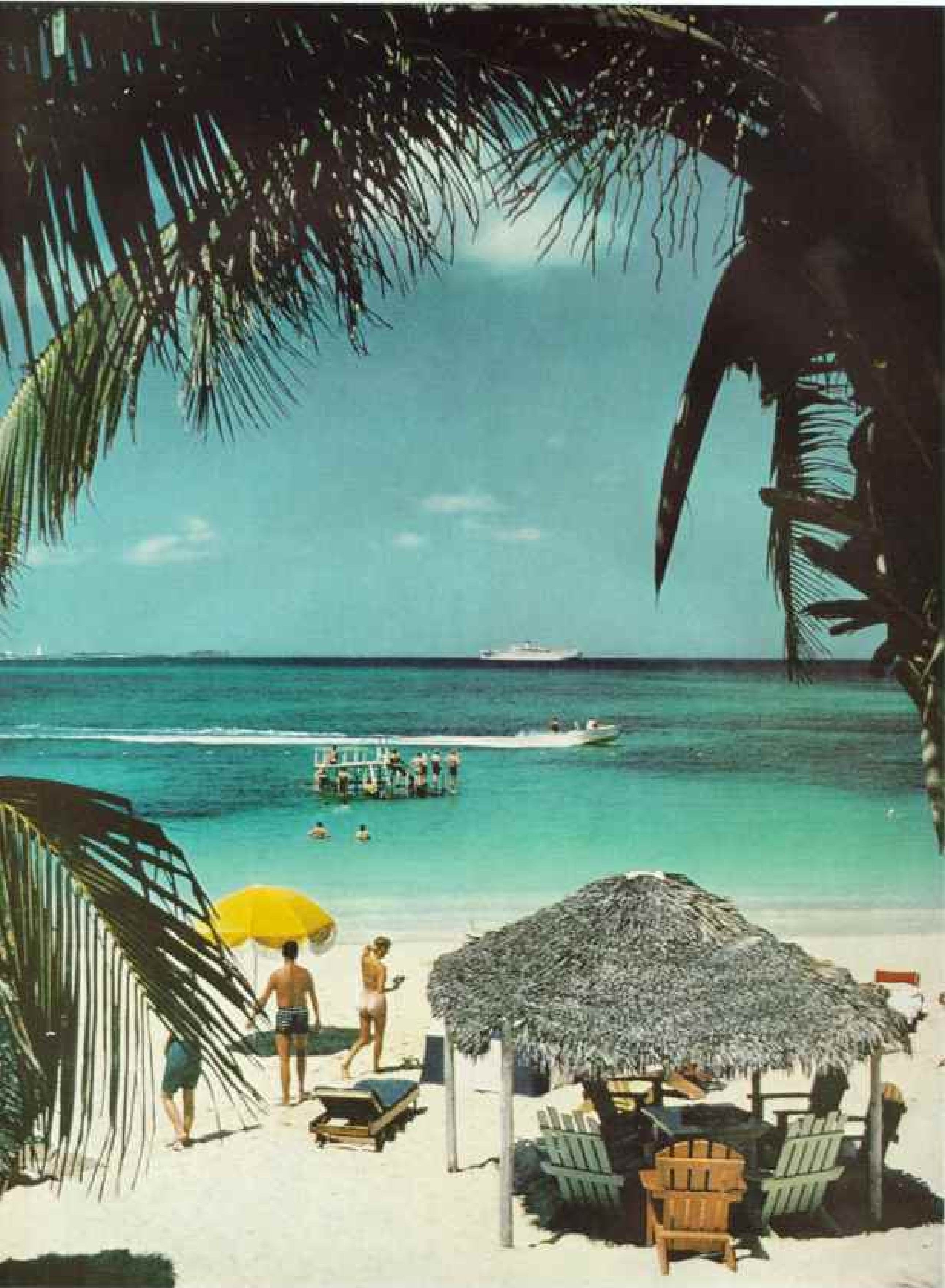
These spirits of the forest are usually gentle, never harming the people who believe in them. But if their nests are willfully disturbed, they become hostile. Natives believe if they put a curse on a man he can never recover.

"Neville Chamberlain, afterwards Prime Minister of England, managed a sisal plantation near Mastic Point when he was young," Mr. Forsythe said. "One day when he was directing the clearing of a field, the native workmen refused to cut down a cluster of trees that had a peculiar structure of sticks and rubble at the top.

"Chamberlain asked the trouble, and was told it was a Chick Charney nest. 'Nonsense!' he replied, and seizing an ax, cut down the trees himself. The Chick Charney cursed a wicked curse, and the natives fled. To this

(Continued on page 187)

\*See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Ballerinas in Pink," by Carleton Mitchell, October, 1957; and "Flamingos' Last Stand on Andros Island," by Paul A. Zahl, May, 1951.



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### Paradise Beach Drapes a Scarf of White Sand About a Turquoise Sea

Tradition says that in these waters the pirate Blackbeard played devil and gave his sailors a taste of Hades by setting fire to brimstone and forcing them to inhale the fumes. Now passengers from the distant cruise ship sample the "paradise" on Hog Island.





Surrey with a fringe on top carries a sightseer through Nassau at a horse's pace.



180

Milk fresh from a coconut quenches the thirst of a guest at the Emerald Beach Hotel near Nassau.





### Bay Street Strollers Inspect Nassau Wares at the Straw Market

During World War II, when the Duke of Windsor was Governor of the Bahamas, his American-born Duchess imported handicraft teachers for the native women. The outcome: higher-quality straw products of an intricate design (page 170).

Pink hands and gold bells adorn the hat of a spectator at the Out Island Regatta.









### Farmlike Salt Pans on Great Inagua Build a Glittering White Mountain

On this southernmost of the Bahamas the sun shines virtually the year round. Using its evaporative power, Inaguans begin producing salt from sea water in the late 1700's. They struck a bonanza during the Civil War, when the Confederacy paid six gold dollars a bushel. Hard times followed. Three Erickson brothers of an American family set out to revitalize the industry in the 1930's. This air view shows the result.

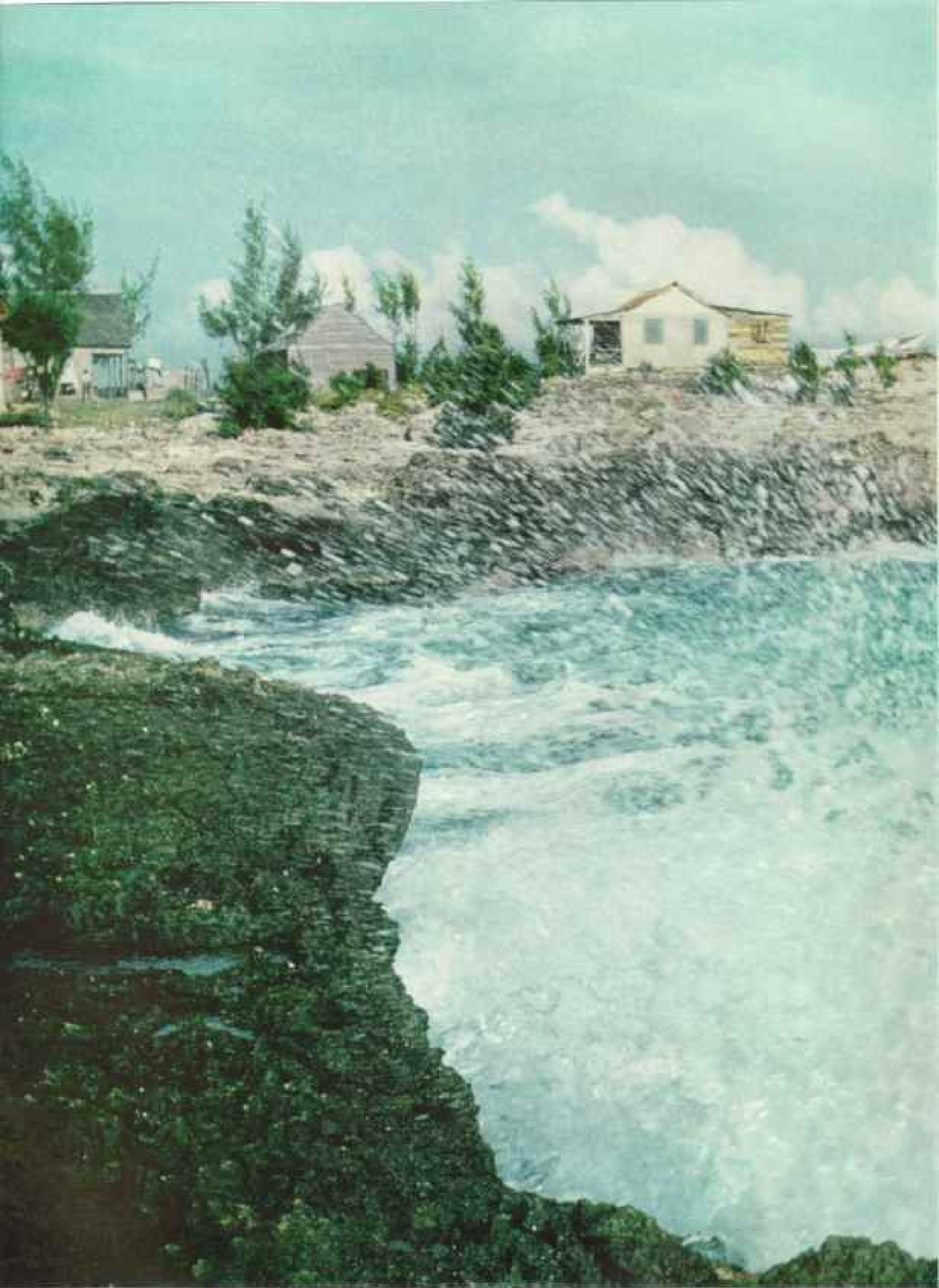
Primary evaporation takes place in the reservoir at upper left, into which pumps pour 30,000 gallons of sea water a minute. Canals and stone walls hem the 30-acre pans. Darker lavender water indicates pans nearing harvest. Plots drained and white are ready. Salt is transported to the curing pile by truck.

**Worker will wash hands and feet upon leaving the pan because the brine solution is so strong it tends to dehydrate the skin.**

183







Eleuthera Rock Shatters the Sea;  
Island Homes Keep Lonely Vigil

In the mid-1600's a small band of Puritan "Adventurers" landed here and formed a representative government. They named the island Eleuthera, after the Greek word *eleutheros*, meaning free. Later, when the



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colony needed help, Puritan churches in New England sent money. The Adventurers repaid the gift with 10 tons of brazilletto wood, directing that proceeds from the sale be given to Harvard College. This

settlement at Governor's Harbour stands on a rock nearly surrounded by water. A causeway links it to the body of the island. Shaped like a shield, Eleuthera serves as a breakwater against Atlantic surges.



© National Geographic Society

Storm blackens the sky even as the sun spotlights a beach party on Andros Island. A calypso drummer beats rhythms beneath a sea grape tree. Prevailing winds have bent the tree trunk. In some woods, stems of trees distorted into knee-shaped crooks are eagerly sought by shipbuilders (lower).

Plank sheathing hides natural knees used in the framing of a boat on Great Abaco Island. The author examines a crook of madeira, or mahogany. Pickled in sea brine, the wood is nearly impervious to rot. Most Abaco people descend from Loyalists who left the Colonies at the time of the American Revolution.

186





day they believe that history might have been different except for that Chick Charney nest. People of Andros will tell you that the Chamberlain plantation failed and Chamberlain failed in his meeting with Hitler at Munich because of the spell cast."

On one visit I met an old native, so old he looked like a modern Methuselah. There was no way of knowing his exact age. Few records were kept in the last century. However, on Andros the great hurricane of 1866 is remembered by anyone who lived through it. The old man was once asked by a judge in court if he remembered the hurricane of '66. He nodded.

"Remember the cholera epidemic of 1851?" continued the judge.

"Yes, suh!" answered the patriarch.

"How old were you then?"

The old man scratched his head and replied: "Pretty near as old as I is now, I reckon, boss!"

Andros sailors are among the best of the Bahamas. Before a mysterious blight swept through the Caribbean and Gulf of Mexico sponging grounds in 1939, "the Mud" to the west was one of the great sponge-producing areas of the world. Sloop-rigged smacks less than 40 feet overall but carrying crews of 12 or 14 men, plus dinghies and all supplies, lived on the sponge banks for weeks at a time.

On Sundays, if the sea was smooth, several boats would tie together in a raft and the men would spend the day singing hymns and visiting. Virtually overnight the sponges died by the uncounted million, and are just now coming back in commercial quantities (page 194).

#### Subtropical Isle Boasts Greek Name

Vaulting over New Providence to the east, we found the island of Eleuthera curving like a bow into the Atlantic, forming the outer bastion of that immense plateau, the Great Bahama Bank.

Eleuthera was the first of the Bahamas to be settled by Europeans. In 1647 William Sayle, a former Governor of Bermuda, who had already visited the archipelago and even named New Providence Island, formed a "Company of Adventurers for the plantation of the Islands of Eleutheria." The name was taken from the Greek *eleutheros*, meaning free, for the new colonists were seeking a place to carry on the "independent way of worship" of their Puritan friends in New England.

The first Adventurers offered to admit to

the company persons qualified by "godliness, justice and sobriety," who could also contribute £100. Each Adventurer was to have at first 300 acres of land, and later an additional 2,000, as well as a share in the proceeds of "all wraks, mines of gold, silver, copper, brass, or lead, ambergreise, salt and all rich woods."

Curiously, when the Adventurers came, the islands were depopulated. Not one of the gentle Lucayan Indians who had greeted Columbus on San Salvador in 1492 had survived the man hunts of later Spaniards. By 1503 most of the original inhabitants of Hispaniola had perished in the mines, or had been wantonly slain; so the Spanish sent ships to the north. Systematically the Indians on each island were rounded up and carried away until, within eight years, the Bahamas were depopulated, and presumably remained thus for more than a century.

#### New England Puritans Sent Help

From the first, the Adventurers had a difficult time. Their ship was wrecked and they were forced to live in caves. Puritan friends in New England sent a gift of £800 and a shipload of provisions from Boston. In order to "avoid the foul sin of ingratitude," the Adventurers sent in return 10 tons of brazilletto wood, valuable for making dye.

They specified that the proceeds of the sale, which came to about £124, be given Harvard "as a stock for your colledge's use." In appreciation, on December 15, 1956, Harvard University "Friends of Eleuthera" presented a plaque to the Colony to commemorate three centuries of friendship.

Eleuthera has the least primitive feel of any Out Island. Dunmore Town, on Harbour Island, a detached community to the north, is in a sense a smaller Nassau, perhaps the Nassau of 25 years ago. Many homes overlook a magnificent beach of pink sand, whose color comes from bits of shell ground by the surge of the sea across outer reefs (page 188).

Farther south, on Eleuthera itself, there are resort communities at Governor's Harbour and Rock Sound (page 184). At the latter a golf course has recently been completed, with putting greens thrusting out over the ocean.

Once the main occupation was growing pineapples, introduced by German refugees from the Palatinate about 1720. I was told by an elderly man that his grandfather recalled that the first "pines" shipped to England had been



### Crushed Shells Tint Harbour Island's Sands Pale Pink

One and a half square miles in area, Harbour Island ranks second only to Nassau as a resort for Bahamians. Here, on Pink Sands Beach, sunbathers' awnings lend off Atlantic breezes.

*Bougainvillea* and *hibiscus* (opposite, below) frame a street in Dunmore Town, Harbour Island's only settlement.

Islanders in dinghies commute daily to Eleuthera for work in coconut groves and vegetable gardens.

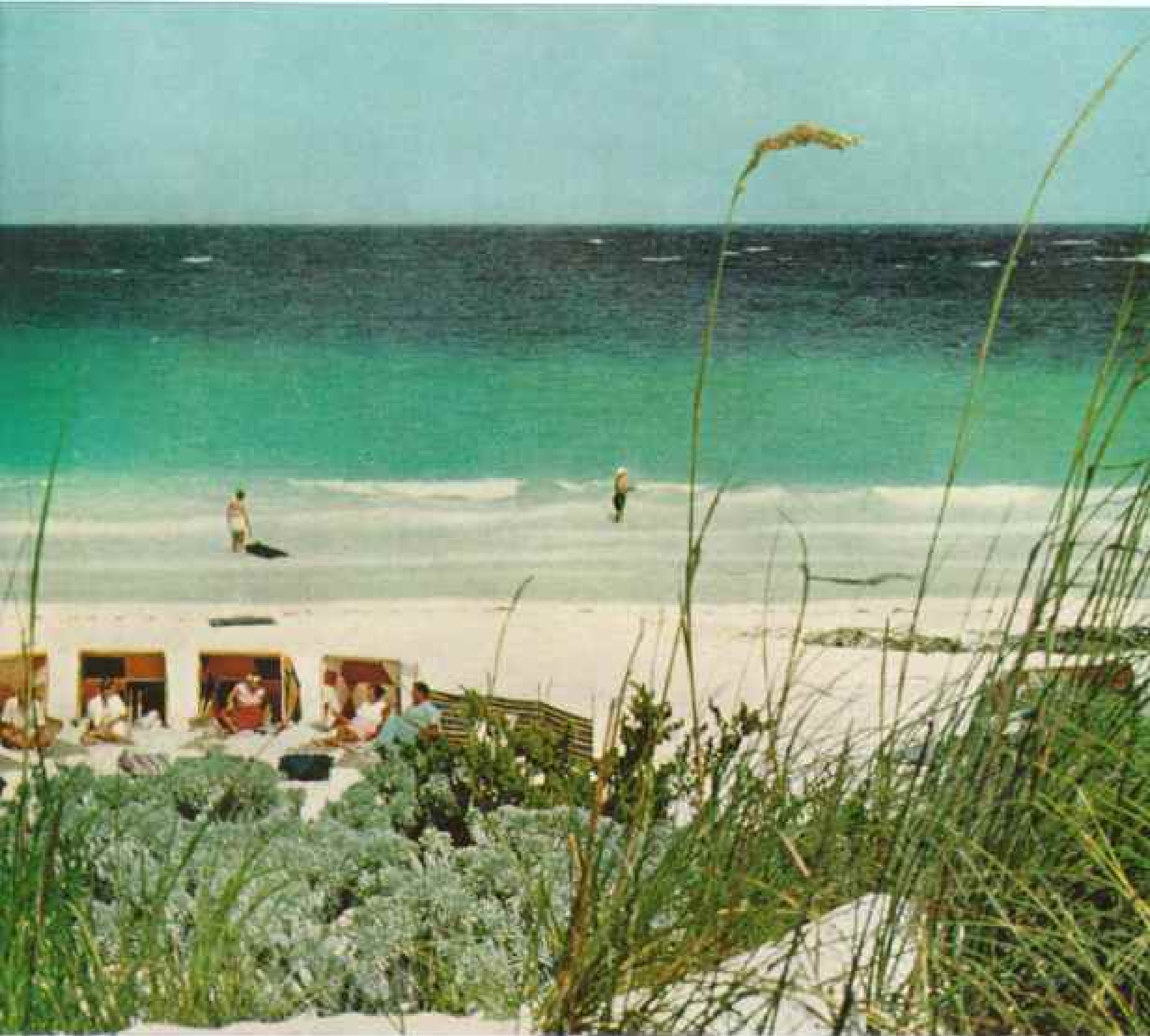
### Fisherman Weaves a Palm-rib Trap

Completed, the trap will resemble a basket. Weighted with stone and dropped to the sea bottom, it will catch grouper and snapper.

Simple frame houses compose Gregory Town, an Eleuthera community.

All illustrations by  
National Geographic Photographer  
E. Anthony Howard © N.G.S.





uprooted and carried aboard sailing vessels as complete plants, carefully tended during the long voyage, so that London gourmets could pick the fruit in their dining rooms. When Hawaii transformed the growing of pineapples into a streamlined industry, the island could no longer compete.

Eleuthera produces much of the food consumed in Nassau, and some of its output is exported to Canada. Hatchet Bay Plantation claims to be one of the largest combined poultry and dairy operations in the world. Visiting it, I found myself surrounded by a feathered population of between 90,000 and 100,000 chickens. As many as 30,000 eggs have been collected in a day, while 6,500 to 7,000 broilers are processed weekly. During the same period dairies ship nearly 3,500 gallons of milk.

#### Beef Cattle Suited to the Climate

Near by, William Wood Prince, formerly president of the Chicago stockyards, is experimenting with beef cattle. Black Angus is being crossed with Charolais, a French breed, to produce animals which become marketable at an early age and are suited to the climate. At present 450 sleek animals graze the fields of Three Bays Farms. It is the first attempt to produce Bahamas beef for local use.

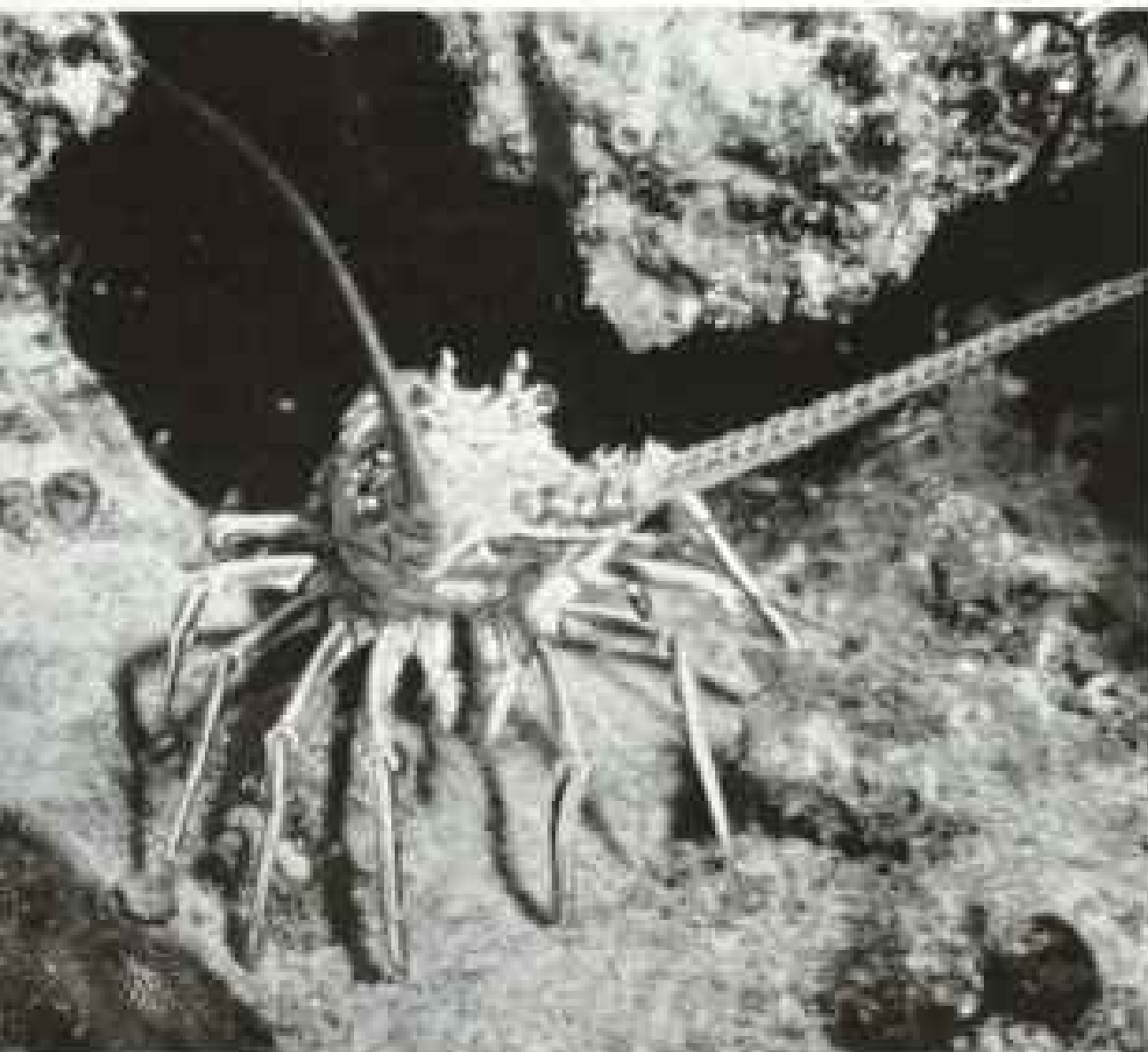
Driving along the road which runs almost the entire length of Eleuthera, I thought of the historic reason for the barren appearance of most Bahamian islands, so puzzling to tourists, who usually arrive expecting rich tropical vegetation.

At the time of the earliest voyagers the islands were lush. Flights of birds to darken the sun had plumed out of towering forests, and flowers bloomed in shaded glades. The native Lucayans lived a carefree, simple existence, not changing the primeval character of the land. The Spaniards, driven by a mad lust for gold, passed on swiftly, leaving the archipelago depopulated. For another century it was to lie fallow, until the Eleutherian Adventurers arrived. Despite the failure of the enterprise as planned, many of the original band remained, as evidenced by family surnames surviving throughout the Colony today: Bethell, Knowles, Low, Newbold, Pinder, Sands, Sawyer.

These settlers, and a few who followed, tilled the land, but their efforts did not extend far. According to the census of 1731 there were only 1,378 inhabitants in the entire Bahamas group, and more than 1,000 of these were concentrated on New Providence.

Until the latter part of the 18th century the Out Islands remained as Columbus had found them. Furniture surviving from the early colonial period contains a kind of native mahogany in widths approaching three feet, showing that huge trees still existed at that time.

The real alteration took place as a direct result of the American War of Independence. Loyalists, those remaining faithful to the Crown, left the United States with their possessions, including slaves, and the British Government undertook to resettle them in the islands.



#### Goggled Diver Bags a Spiny Lobster

Provisions ran low as *Fruitsterre* lay off Great Exuma (background). The author went to market in his swimsuit. Dropping off the deck, he searched the crystal waters through his goggles. Twenty feet down, in a clump of rock, he spotted a lobster and captured it with his spear gun. The gun stock, seen in his hand, uses rubber bands to propel the spear.

**The spiny lobster hides amid coral.** By flexing its powerful tail, the animal speeds backward to escape enemies. Two antennae warn of approaching danger. This crustacean lacks the big claws of the Maine lobster.







A great number came to the Bahamas. Forests were stripped away so that fields might be planted. Sea-island cotton was the principal crop. Within a few years a system of plantations modeled on the Southern States covered most of the eastern islands.

They prospered while the virgin topsoil lasted, but destructive methods of clearing and tillage gradually lowered production. And on August 1, 1834, slavery was abolished throughout the British Empire. Overnight the plantations were economically doomed. Fields and homes were abandoned as freed slaves moved to small settlements.

Again many islands were depopulated, or the few inhabitants concentrated in one section. But the damage had been done. There was nothing left to hold the soil, which had never been deep. Burned over in clearing and exhausted by cotton, it was blown by the wind and washed by hurricane seas. Enough remained in potholes to keep the islands from being wholly barren. Most are covered by a low second growth. Gradually soil has reaccumulated, but there are few places where the underlying limestone formation is not evident.

Loyalists arriving from America made their greatest impact on Abaco, the most northerly group of the Bahamas.

"You are seeing New York's true 'four hundred,'" my old skipper, Si Strong of *Temptress*, told me on my first cruise as we anchored among a fleet of fishing schooners from Cherokee Sound. Around us blue-eyed, blond men, untanned even after a lifetime of exposure to

#### Divers Find a Civil War Cannon Moldering in 25 Feet of Water

Before dawn on August 23, 1862, the Union's *Adirondack*, a screw-steam sloop on her maiden cruise, ran aground on a reef near Man of War Cay.

Bahamian wreckers swarmed out to rescue the crew and claim salvage rights. But *Adirondack's* Capt. Guert Gansevoort determined to save his ship. To lighten her, he jettisoned his heaviest guns and off-loaded coal and stores. Eventually he bought a wrecker's schooner to help him get off the reef, but it was too late; *Adirondack* had broken her back.

Gansevoort stayed aboard the dying ship for four days. Finally he spiked and threw overboard other guns to keep them out of the hands of *Florida*, a Confederate raider, and abandoned ship.

The captain was court-martialed but acquitted of negligence. His navigator admitted a miscalculation.

Wearing Aqua-Lungs, National Geographic writer Louis Marden and friends explored *Adirondack's* grave. They saw guns and wrought-iron boiler plates.

Louis Marden, National Geographic Staff







Boatmen hook sponges off Andros Island. Glass-bottomed bucket and a window in the boat's hull aid in spotting. Sponges in these beds are planted,

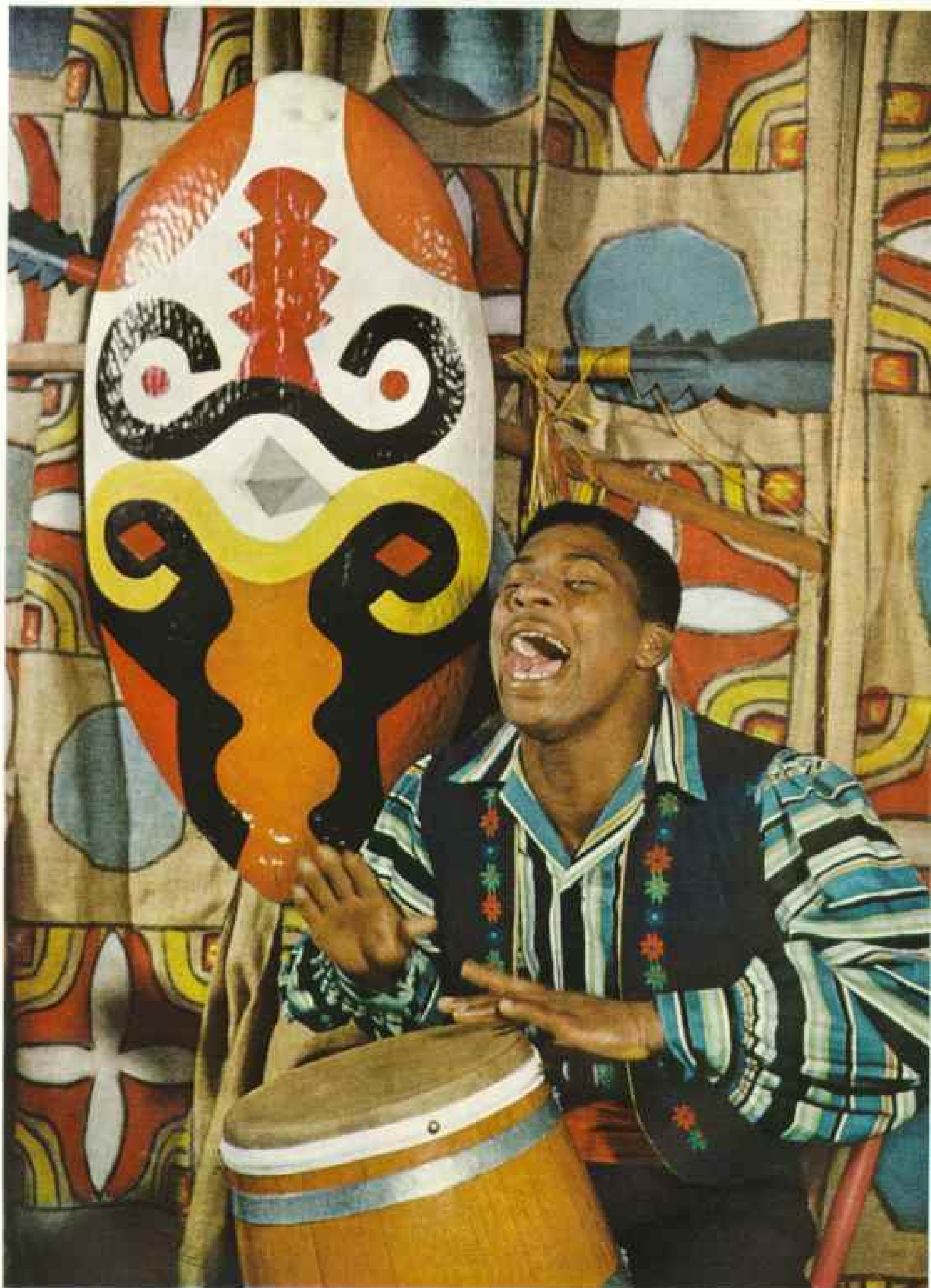
Spongers trim the harvest for shipment. In 1939 a mysterious disease killed millions of Andros sponges. They have since multiplied, permitting limited fishing,





### Jungle Beat Transports a Goombay Drummer to Ecstasy

Native music of the Bahamas, called goombay, achieves a rhythm and style of its own by merging folk songs, like Trinidad's calypso, with percussion effects known to Haiti and Cuba. Berkeley (Peanuts) Taylor pounds a drum in the Junkanoo, a Nassau night club.







### Dredges Scoop Out a Harbor for the Largest Ships Afloat: the Grand Bahama Freeport Project

Here on an island 80 miles from Florida, American capital is creating a deepwater channel, a land-locked harbor and turning basin, and numerous berths as a tax- and duty-free facility for world commerce. Shipyards and dry docks will be added. Other industries are planned for some 50,000 acres of land near by (page 175).

This air view shows a dredge at work in the channel (right). Pipe linking it to the shore carries silt to man-made hills.

**Floating crane** (above) moves a toothed cutting head designed to shear through rock. The tool is one of the largest of its kind.

*Bahama Development Board*

the sun, showed unmistakably their unblemished Anglo-Saxon heritage.

"Most of the Abaco settlers came from New York City, under the sponsorship of Sir Guy Carleton, commander of British forces in America. They were the aristocrats, the established conservatives who remained loyal to the Crown. They brought along their way of life and their point of view, as well as resistance to change. Abaco remains in the past."

Twenty-five years later, walking down the waterfront street of Man of War Cay, I remembered his words. Boatmaker William Albury and his helpers were building a large motor sailer on the beach, using the tools and methods of an earlier century. There were no elaborate slipways, no power tools (page 186).

Through the clear water off a dock I could see knees of madeira, or mahogany, cut from



trees having the desired shape so that there had to be no steam bending or sawing. Since the curve of the grain is natural, it makes much stronger framing for a boat.

While I watched, Mr. Albury used a length of string to mark a straight line along a large balk of rough-hewn timber. After him came a carpenter armed only with an ordinary small hand hatchet. Chips flew. In amazement I sighted along the line and found the tough wood as level and smooth as it might have been after coming from a planing machine. Later the workman produced paper-thin shavings with a heavy adz, the basic tool of the colonial shipwright.

"How did you learn that trick?" I inquired. He grinned. "From grandfather. An' he learned from his'n. 'Bout a hundred years ago, I guess."

After the abolition of slavery and the failure of the plantations, most of the Loyalists who had settled on Out Islands moved to Nassau or away from the Bahamas. But many of those who had come to Abaco and near-by Spanish Wells on St. George's Cay remained.

Until recent years their descendants lived in isolation, intermarried, and became increasingly proud and sensitive. They were truly men of the sea. They supplied Nassau with fish, and built magnificent schooners and





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### San Salvador's Cross Marks Columbus's First Landing in the New World

The explorer believed the 15-mile-long island was a part of the fabled Indies. Stepping ashore somewhere near this spot, he was welcomed by a people thereafter called Indians.

*Faces of the islands: an old man of the sea, a woman of the soil—Eleuthera.*

198



smaller vessels, lovely little ships with flaring bows and sweeping sheer lines.

Now the tide of change has reached even Abaco. The tall rigs have disappeared from the fishing schooners, to be replaced by diesel engines. Homes of winter residents dot several of the cays, and at Man of War has gathered a colony of American yachtsmen.

The casual visitor may find modern accommodations at Green Turtle Cay and Hope Town on Elbow Cay. Near the latter settlement is New Hope Lodge, a group of cottages rambling through trees but overlooking the water. During the summer months it becomes a children's camp, the first in the Bahamas, with an "underwater classroom" where boys and girls are introduced to the Aqua-Lung and taught to be at home in and under the water.

#### Divers Find Spanish Silver Ingot

Abaco vies with the Exumas as the favorite cruising ground of visiting yachtsmen. It might well have been the same for buccaneers. Only a few years ago Spanish treasure was found near Gorda Cay. A bar of almost pure silver weighing 72 pounds was brought up from shallow water over a reef by Howard Lightbourn and Roscoe Thompson of Nassau.

An expert on ancient coins and treasure decided from marks stamped into the ingot that it was cast in South America, probably at Santa Fé de Bogotá (now Bogotá, Colombia) in 1652. Near by were coins of Spanish origin, but it is believed the bulk of the treasure slipped into deeper water beyond the reef.

"The bar was found a long way off the route of any Spanish fleet," reported Andrew J. S. McNickle, an English numismatic expert who made the identification.

"The ship carrying it could have been driven from her course by a storm, or possibly the ingot had become part of the booty of a pirate vessel."

Mr. McNickle estimated its present value at \$20,000, but also attempted to evaluate its purchasing power three centuries ago. "In 1652...it would have paid for about 250 arquebuses, the best infantry weapons ashore or afloat. It would have paid the salary of...a pilot for one year eight months, and a ship's surgeon and a gunner each for no less than five years. At the time it was cast, the bar represented the accumulated life wages of two workmen in the Americas..."

Untold treasure must still lie hidden in the sand of lonely cays, or be strewn, coral-

encrusted, among the waving sea fans of countless reefs. But few discoveries of recent years rival that of Capt. William Phips, who in 1687 located the wreck of a galleon lost among the reefs east of Turks Island.

The approximate position was known, but after days of search the project seemed hopeless. The quest was being abandoned and the small boats were returning to the mother ship for the last time when an officer happened to look over the side. Through the crystalline water he saw a sea feather of unusual beauty. Thinking it might cheer his despondent captain, he sent down a diver. Within seconds the man came up gasping.

"Guns!" he cried. "The feather grows from among great guns!"

Thus does chance play a part in man's destiny. From the treasure ship the divers recovered pieces of eight, plate, jewels, silver bullion, and ingots of silver and gold. They were overgrown by coral, but still little damaged. The silver alone weighed 65,466 pounds troy. The fortune of Phips was made. He went on from the poverty he had always known to knighthood and the governorship of Massachusetts.

#### San Salvador, Isle of Discovery

As I have written, to me the Bahamas are isles of the sea. And while I hope I have made clear that each island has its own particular charm and character, I must admit that because I am a sailor San Salvador is to me the most romantic.

Each time I approach it, I visualize the drama of the first landfall. For 33 days three little ships, the *Niña*, the *Pinta*, and the *Santa Maria*, had scudded across an uncharted ocean. The men aboard had become terrified; their leader claimed the world was round and they would eventually reach the Indies.

They were also frightened by the wind, almost undeviatingly from the easterly quadrant, so that it would be virtually impossible to sail home.

On the 10th of October near mutiny had forced Columbus to promise he would turn back if land was not sighted within three days. So he drove relentlessly ahead on the night of the 11th, through a rising wind. There had been signs indicating they were nearing shore, and it would have been better seamanship to have hove to until dawn.

An hour before moonrise Columbus thought he saw a light which "was like a little wax



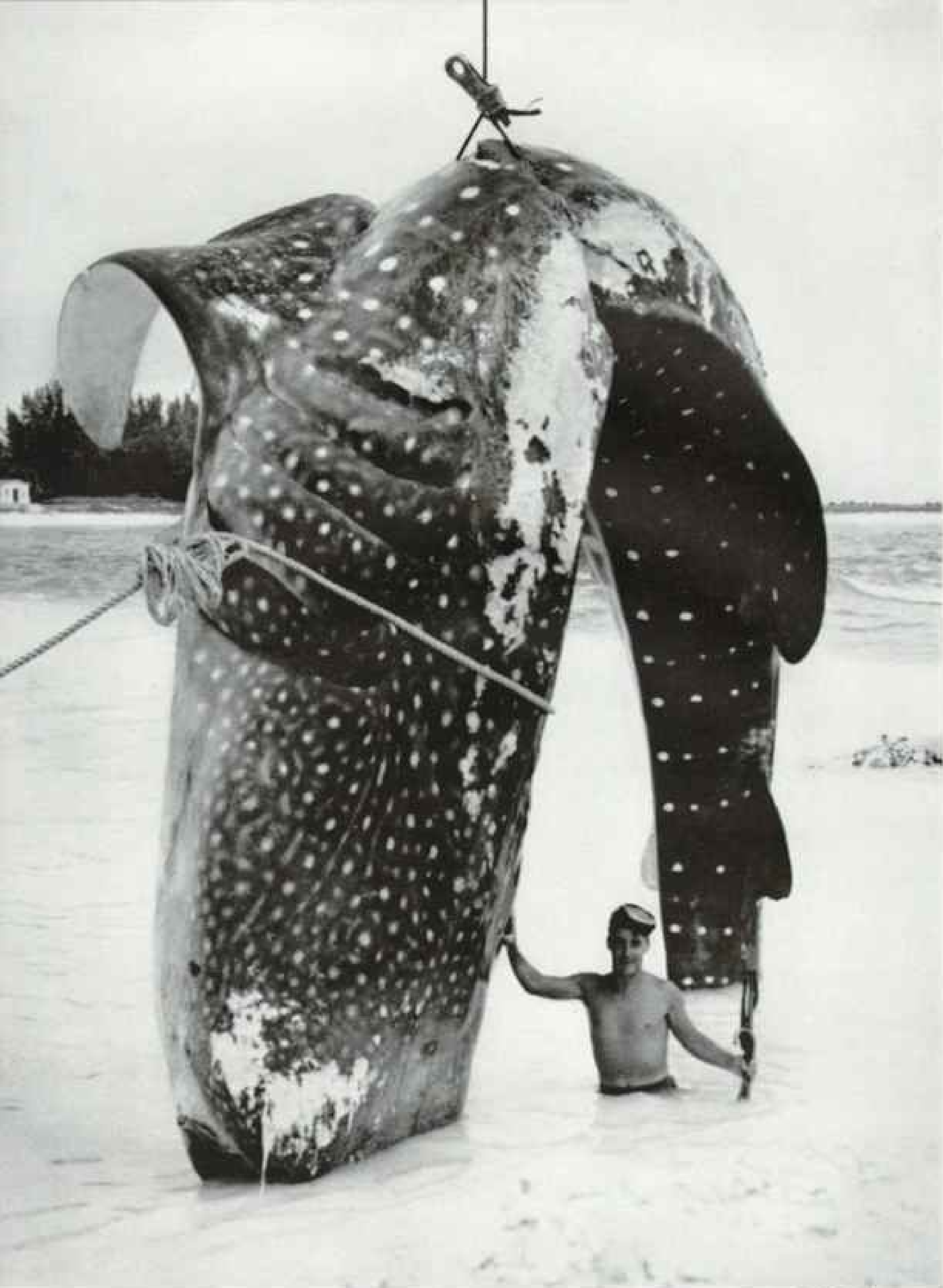


Toylake Fishing Boat Bobs in a Mysterious Ocean Hole That Plunges to Depths Unknown;  
200



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Water from Subterranean Tunnels Circulates Through This Pit in the Reef of Andros



Ralph L. Boston

### Whale Shark, World's Largest Fish, Rides a Hoist off Bimini

The 29-ton shark was hooked off Bimini's harbor, where it had frightened inexperienced fishermen. Actually this species is mild mannered and harmless to man.

### Scientist Probes a Tumor on the Back of a Snapper

Working with the knowledge that fish suffer malignancies akin to those in man, the Lerner Marine Laboratory studies sea life in a cancer-research project on Bimini Islands (page 175).

Dr. Ross F. Nigrelli here begins the dissection of a fish.



candle rising and falling." It must have been an hallucination, but it increased to an almost unbearable degree the tension aboard the fleet. The ships roared on through the night, bow waves gleaming ghostly white against the dark water, masts tracing a pattern across the sky as the vessels rolled in the long swells.

Then, suddenly, at two o'clock in the morning, Rodrigo de Triana, lookout on *Pinta's* forecastle, saw something like a white sand cliff and a dark smudge of land.

"*Tierra! tierra!*" he shouted, and Columbus had come "to a small island of the Lucayos called in the Indian tongue Guanahani."

Years of research have left little doubt Guanahani is the island now called San Salvador. After daylight the fleet sailed around the southern end to find shelter in the lee, and somewhere along the shore dropped anchor. Columbus was rowed to the beach in the armed ship's boat displaying the royal standard, while the other captains in their boats flew the other banners of the expedition.

"All having rendered thanks to Our Lord kneeling on the ground, embracing it with tears of joy for the immeasurable mercy of having reached it, the Admiral arose and gave this island the name San Salvador," wrote the missionary and historian Las Casas.

Always I picture it as one of the most dramatic spectacles in the history of mankind, and certainly among the most far reaching in its effects. Thus again the operation of chance: had light wind prevented the approach to land, the expedition might have turned back; had the ships been too far to the north or to the south, they might have

ripped their bottoms out on hidden reefs.

San Salvador is one of the few islands riding out in the open Atlantic that would be visible in darkness for some distance. Because it was a small island, the ships were not likely to be trapped on a lee shore as they lay hove to awaiting dawn.

There are three monuments on the island commemorating the first landing of Columbus (page 198). There is also a modern 400,000-candle-power light casting its beam 19 miles over the waters where Columbus thought he saw "the little wax candle."

#### "Columbus Been Here!"

Scholars have never been able to agree on the exact spot where Columbus "first set foot in the New World." One of the monuments overlooks a tangle of reefs on the windward side, which no sane seaman of any age would have attempted to cross; the other two are a few miles apart on the leeward beach, and probably come closer to being accurate.

My favorite memento of the visit of Columbus was offered me several years ago on a cruise to Eleuthera. We had dropped anchor in Rock Sound and were sitting in the cockpit. A man sculled out in a dinghy.

"Evening, boss," he said.

"Evening," I replied.

"Want to buy a turtle, boss?" he asked, lifting a small hawksbill.

"No, thanks," I answered.

"But dis a special turtle, boss," he insisted, holding it closer. "Look y'ere: see, it got 'C.B.H.' cut in de shell. Dat mean 'Columbus Been Here!' He must have cut it hisself!"





# Marsh Dwellers of Southern Iraq

Primitive Ma'dan, Building Cathedral-like Houses of Reeds, Share a Watery Domain with Buffaloes and Wild Boars

BY WILFRED THESIGER

*With Color Photographs by Gavin Maxwell*

ARABS say the Garden of Eden stood at the present site of Al Qurna, a small town at the confluence of the Tigris and Euphrates Rivers. Tourists who come there from near-by Basra are shown a thorn tree, surrounded by a palisade, which they are told is the tree of knowledge of good and evil.

Recently the old tree fell down, but the townsmen, reluctant to lose such a profitable attraction, have planted another.

## No Eden Now; More Water Than Land

All around Al Qurna lies a strange region few visitors ever penetrate—the marshes of southern Iraq, into which the Tigris and Euphrates overflow during spring floods (page 224). Anyone who has flown from Europe to the Persian Gulf, to India, or to the Far East has passed over this widespread marshland (map, page 211).

Just before the plane gets to Basra, passengers see below them a vast patchwork of reed beds, lagoons, and waterways. They can pick out small villages, and, if the plane is low enough, they may see water buffaloes and canoes. It all looks grim and desolate from the air, and that is about as close as most foreigners have been to it.

The main road from Basra to Baghdad runs northward through Al Qurna, up the west bank of the Tigris, along a narrow strip of dry land. The marshes stretch away on either side of the road—a waste of mud, water, and monotonous vegetation. Few people looking at it would think it a tempting or rewarding country. In winter it is cold and often damp; in summer it is terribly hot and sticky and there are clouds of mosquitoes, midges, and other insects. Yet people live here, following a way of life that I, dwelling among them,

found full of fascination and even charm. The houses the marsh people build of reeds are marvels of ingenuity and beauty.

During the winter the marshes are alive with wild fowl—a wonderland of birds. I have seen ducks flying onto rice fields at sunset in numbers which reminded me of swarms of locusts. I have watched, spell-bound, while seemingly endless skeins of geese passed overhead and the cold air rang with their calling. There are many sorts of birds—herons, coots, cormorants, pelicans, ibises, avocets, flamingos, eagles, ospreys, and falcons.

Sometimes you see a family of otters playing in a lagoon, and there are wild boars, among the largest in the world. I have counted 30 or 40 boars feeding in the open outside a reed bed. Truculent and immensely powerful, they are the marshman's bitter enemy. They destroy his crops and all too often attack and sometimes kill him while he is cutting reeds.

## Spring Brings Color to Marshes

There is a tranquil beauty in the marshes, especially in springtime, when the shallow water is white with flowering ranunculuses or ablaze with vivid yellow or snow-white nymphoides. Then the marshlands look like a green meadow carpeted with daisies and buttercups (page 232).

There are also the deeper lagoons where crystal-clear water, with long weeds trailing gracefully, is blue under a blue sky, and floating islands—tangled jungles of giant reeds, sedges, and brambles—drift languidly.

And there are narrow, tortuous waterways, shut in by almost impenetrable reed beds 20 feet and more in height, where the tasseled reedtops form an ever-changing pattern against the sky as you glide along in your canoe.

## Arab Marshman Scans the Iraq Horizon from a Reed Doorway

The Ma'dan, a marsh-dwelling people of southern Iraq, inhabit the vast swamps surrounding the lower Tigris and Euphrates Rivers. Feared and shunned by neighboring villagers, the marshmen roam a watery province once the refuge of rebellious slaves. Their blood includes strains of Arabian, Sumerian, Babylonian, and Persian. This Ma'di serves in the bodyguard of a landed sheik. He stands in the entrance of a *mudhif*, or guesthouse.







## Marshmen Raise a Prefabricated House; Even the Scaffold Is Made of Reeds

Migratory Ma'dan take their collapsible homes with them wherever they go. These Suaid tribesmen erect a hut in summer quarters near the Iranian border. Lacking wood, they turn for building material to the giant reed *Phragmites communis*, which grows 20 feet high in the marshes. Workers here use ropes to pull together bundles of stalks set in the ground. Man on the tripod joins the tip ends with reed twine, forming arches. Split-reed mats complete walls and roof.

The marsh is a place of many moods and colors, sometimes bright and sparkling, sometimes dark and somber. You can get lashing rain or tearing gales or a damp heat that wraps itself round you like a wet towel.

But to me the real fascination of this land is the marshmen and their way of life. I have been with them now, on and off, for the past seven years. They were not easy to get to know. They are primitive and suspicious and have a bad name among the surrounding tribes. Bedouin Arabs despise them for their dubious lineage and willingly impute to them every sort of perfidy and wickedness.

Townsmen, traveling up and down the rivers, fear the marshmen, shun them, and readily believe all they hear against them. Among the British, too, their reputation is bad. This feeling is a legacy from World War I, when, from the shelter of their marshes, they murdered and looted both sides indiscriminately as opportunity offered.

### Few People Know the Ma'dan

During the years of British administration in Iraq, the political officers were too busy with more important problems to concern themselves very much with the marshmen, or Ma'dan. Since then few people have had the time or inclination to travel among them. To know them properly, you must stay with them in their villages and live as they do for long periods of time. No one had done this before I went there.

In a small canoe paddled by a mainland Arab, I went into the marshes without kit or provisions to live with the Ma'dan, entirely dependent upon them for food, shelter, and transport. We paddled for two hours along narrow, twisting corridors among the reeds, passing occasional canoes piled high with cut reeds and poled by men or boys, often naked, who eyed us curiously.

At last we got to a village, a strange-looking place in the middle of a shallow lagoon sur-



rounded by reed beds. There were a couple of hundred houses, each on its own little artificial island: many buffaloes, some standing outside the houses and others submerged to their noses in the water; and an endless coming and going of marshmen in their canoes.

We headed for the nearest house. An elderly man, dressed in a long cotton shirt with a thin, curved dagger at his waist and a black-and-white checked cloth thrown over his head, hailed us and bade us welcome. It is this easy, informal hospitality that is so pleasant among tribal Arabs. You turn up



Walter Dillinger

at the house of someone you have never seen before, and he makes you welcome and gives you of the best he has, because you are a guest.

We pushed our way past some buffaloes and entered. Our host threw down a piece of carpet for us to sit on and busied himself brewing us some tea; and I mean "brewing," for he boiled it more than half an hour. The house was about 24 feet long, divided in two by a platform built from bundles of thick reeds on which were piled some tattered quilts, cushions, and pieces of clothing.

At the far end of the house were two women,

unveiled—no marshwoman wears a veil—three naked children, two buffalo calves, a dog, a cat, and some chickens. There were some cooking pots, grindstones, a large mortar and pestle, an earthenware pitcher, a sack of rice, and nothing else except a bundle of fishing spears, paddles, and punting poles.

We drank tea, black and sweet, out of small glasses, and then my Arab canoeman got up to go. Saying that he had work to do at home, he declined my host's pressing invitation to stay for a meal, stepped into his canoe, and was gone.

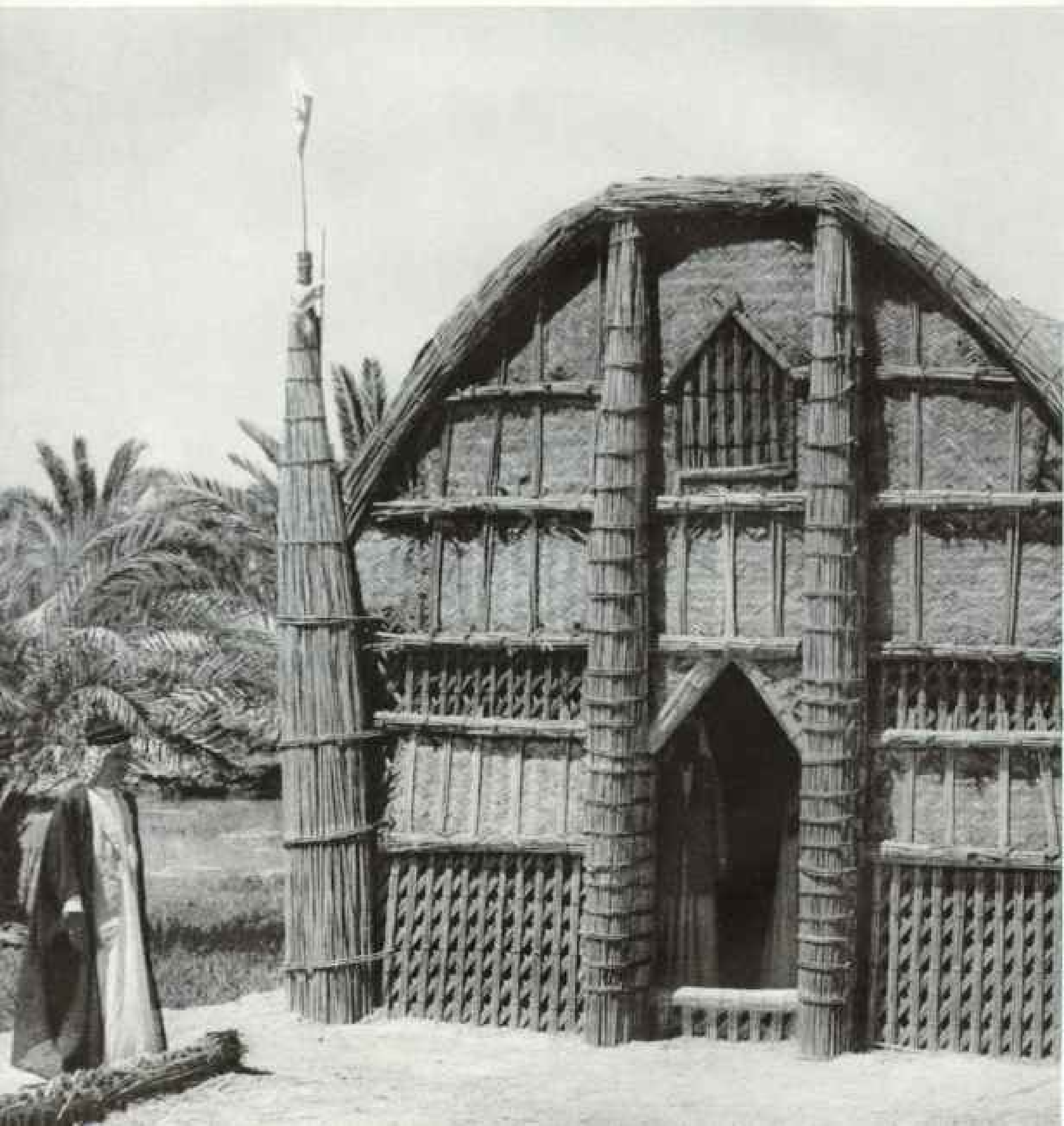
The food, when it came, was a large bowl of rice with sour milk poured over it, the marshmen's staple diet. Sometimes they eat fish or wild fowl, and often a coarse unleavened bread instead of rice (page 222).

We ate with our fingers, which is the custom among tribal Arabs—my host, his two sons, who had just got back from cutting reeds, and myself. The women and children finished what was left.

I spent the night with them, wrapped in one of their quilts. Luckily fleas don't worry me, but they kept me awake at first by weight

of numbers. After breakfast—three glasses of tea and a piece of bread—my hosts took me on and delivered me at the next village, where I started all over again, a stranger in a very strange land.

Naturally the people were suspicious of me and wondered what on earth I was up to. Most of the Europeans they had seen had come out from Basra to shoot on the edge of the marshes and had gone back in the evening to their own homes or to a sheik's guesthouse on the mainland. They could not understand why I should forsake the comfort of the towns



to live with them in the poverty of their villages, unless for some ulterior motive.

I had hoped at first to persuade some of them to travel with me around the marshes. They refused. Men from each village took me as far as the next and left me there. However, they got used to me in time. They found that I not only did them no harm but actually some good.

I shot the wild boar that plagued them. I doctored their sick. Slowly we became friends. Now I can count on as many paddlers as I need to take me where I wish to go and to



### Watery Wastelands of Southern Iraq Serve as Home to the Rugged Ma'dan

Few peoples' lives match those of the marshmen for bitter hardship and privation. Ma'dan families earn a precarious existence from their vast refuge of endless reed beds, mud flats, and waterways at the head of the Persian Gulf. Draining of the marshes, an idea being considered by the Iraqi Government, would change a way of life that has endured for centuries.

### Reed Spires and Vaulted Door Lend Cathedral Grandeur to a Mudhif

Guesthalls invariably have an odd number of arches, custom dictating the figure for each tribe. This elaborate structure with its latticed facade and tapered buttresses stands in the marsh country of the lower Euphrates River (map, above). The hall's large proportions and decorative design bespeak a well-to-do owner.





remain with me as long as I require them.

They are a genial, happy people, welcoming and friendly once they have accepted you.

English people often call the marshmen "Marsh Arabs," but I do not like the name; I am convinced that most of them are not pure Arabs but belong to earlier stock. Among the Ma'dan there is probably Sumerian, Babylonian, and Persian blood.

The Ma'dan are buffalo-owning marsh dwellers. In the same tribe, or even in the same family, living on the edge of the marshes, one man may call himself a fellah, or cultivator of the soil, another Ma'di, or marshman. The difference is not one of race but of habitat, and to some extent of occupation.

Ma'dan and fellahs both keep buffaloes, grow rice, move about in canoes, and spear fish. Among the Ma'dan the emphasis is on buffaloes. These animals are the most important things in their lives, as vital to them

as camels are to people of the desert; among the fellahs it is cultivation of the soil that matters most.

It is interesting, and I think significant, that while a Bedouin would always boast that he was a Bedouin and many Arabs proudly claim Bedouin origin, the word Ma'di outside the marshes is synonymous with "yokel." Even the marshmen boast of being Ma'dan only when they claim for themselves the technical skill proper to a marshman. I have frequently heard a Ma'di say to another marshman who was being clumsy with his canoe: "Are you a Ma'di or an Arab?"

Most of the villages are semiaquatic, but sometimes the houses are clustered together on small islands, many of them the sites of ancient villages and towns.\*

\* See "Ancient Mesopotamia: A Light That Did Not Fail," by E. A. Speiser, *NATIONAL GEOGRAPHIC MAGAZINE*, January, 1931.

The marshmen think there is buried treasure on most of these islands. Occasionally they unearth small statues or pots filled with ancient coins. I was given a small piece of lead sheeting that bore writing since identified as Phoenician.

All the marsh people believe in a mysterious island called *Hufaidh*, which they say is guarded by spirits who have the power to make it invisible or to cause anyone to go mad who visits it. On this island are reputed to be buried treasures, palm groves, and gardens filled with pomegranate and other fruit trees.

#### Flood Waters Invade Houses

In most villages the houses are built on stacks of rushes packed behind a low reed fence to form a sodden platform. This platform constantly subsides, and its level is continually being raised with new layers of rushes. During floods the water sometimes rises inside a house, and its inmates have to squat on the raised reed platform built in the middle of each house to divide the family quarters from the men's side, where guests are entertained.

Among the Ma'dan there is, however, little

#### Marshmen Waterproof Sturdy Canoes with Pitch from a Boiling Vat

**Fishermen strain** to haul their net aboard a *balam*, or heavy double-ended boat. These men are Bahara, a net-fishing people. Marshmen fish with spears (page 239).

Wittred Threlter



if any attempt to keep the women apart from the visitors. The family side of the house is used for cooking, and for this reason visitors are invited to sit at the other end. Anyone can enter from either end and sit and talk with the women, if he wishes.

The more permanent houses are built of overlapping split-reed mats laid over five or even more parallel ribs made from bundles of reeds. Each rib is constructed by setting two long, tightly bound bundles of reeds into the ground opposite each other, the width of the house apart and inclined outward. The tops of the bundles are then pulled inward and spliced one into the other to form a horseshoe arch (page 208).

#### Guesthouses Always Face Mecca

Transverse bundles of reeds, some six inches in diameter, are fastened close together along the length of these ribs, and the mats are then sewed onto this framework, with sufficient overlay to ensure a treble or quadruple thickness of matting. Four thick but tapering pillars of reeds support the two end walls, which consist of alternating matting and trelliswork.

In warm weather the house ends are left open, but in cold, wet, or windy weather they are closed with mats. From this simple type of house have evolved the spacious barrel-vaulted *mudhifs*, or guesthouses, that are such a conspicuous feature of larger villages around the marshes, especially on the lower Euphrates (pages 210 and 219).

All *mudhifs* and houses are built with an odd number of arches, either 5, 7, 9, 11, 13, and occasionally 15 or more. The number of arches in a *mudhif* is fixed for each tribe and family. Its entrance always faces Mecca.

#### Buildings Made Entirely of Reeds

A typical *mudhif*, in which I have often stayed, consists of 11 arches and is 60 feet long, 20 feet wide, and 18 feet high, but the longest *mudhif* I have seen consisted of 21 arches and was 120 feet long. The rib of each arch is nine feet in circumference at the bottom, tapers to about two and a half feet at the top, and is made from a great number of thin reeds carefully bound together.

The inside of the *mudhif* conveys the impression of great space, so that one has the curious feeling of being inside a cathedral, an effect enhanced by the ribbed vaulting and the trellis-covered windows (page 206).

This impression is not altogether lost outside the building, where the heavy tapering columns supporting the façade break the skyline at the arched roof. These beautiful reed buildings have never ceased to amaze me.

Canoes are indispensable to the Ma'dan. Without them the marshmen would be immobile, unable in many cases to move from one end of a village to the other and quite unable to gather reeds as fodder for their buffaloes or to spear fish. They call their craft by the general term *mashuf*. There is a silver model of a canoe from Ur in the Iraq Museum, Baghdad, which closely resembles a present-day *mashuf*.

These boats are built of planks meeting flush at the seams, flat-bottomed, and coated outside with bitumen. The top half of the ribs is planked on the inside; the outer planking is carried forward and upward to form a long, thin, tapering stem, which parts the reeds as the canoe is forced through the marshes. There is a thwart about a third of the way forward, and a strengthening beam across the boat two-thirds of the way forward. Passengers always sit on the bottom of the craft, never on the thwart (page 218).

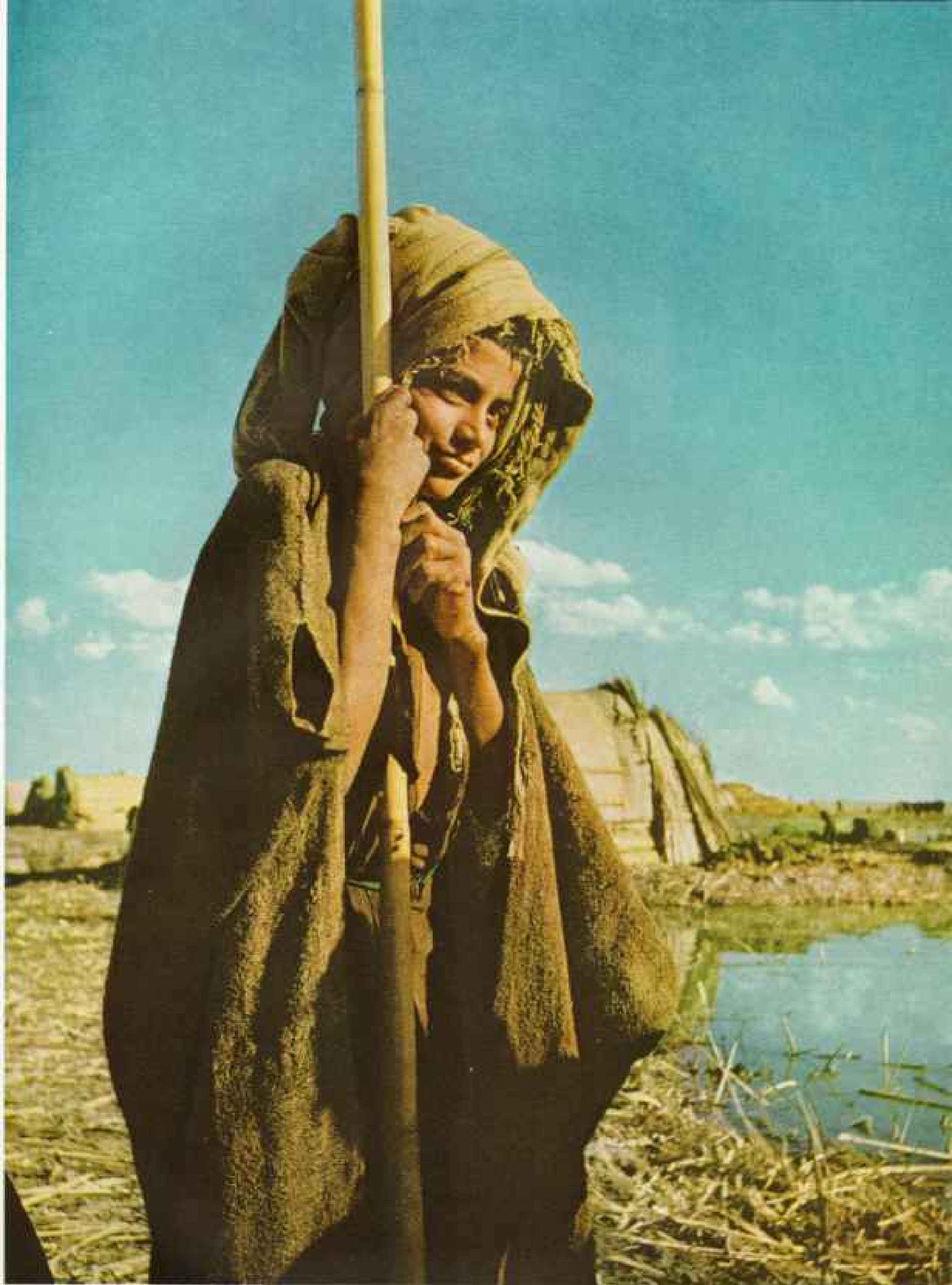
#### Canoemen Cover Great Distances

*Taradas*, which were once the war canoes of the marshes and are still used by the sheiks because of their speed and comfort, are as long as 36 feet, but only about 3½ feet across at their greatest beam. They will carry 12 people. Unlike the ordinary *mashuf*, the *taradas* have floor boards, and the inside planking is decorated with rows of iron studs two inches across (page 229).

In general the marshmen favor a broad, roomy canoe that can carry a large load of reeds. A *tarada* or a large *mashuf* usually has a crew of five, two in the bow and three in the stern, who pole or paddle in unison, first on one side and then on the other. The Ma'dan pole their canoes whenever possible, since they then travel more quickly and with less effort. They cover 50 or 60 miles in a day with ease.

Although these canoes have little freeboard, the Ma'dan move about in them freely, often jumping from them into deep water and scrambling back without swamping them. They learn to handle a canoe almost before they can walk. They are, however, afraid of venturing out upon open water in bad weather.

(Continued on page 223)



*All Photographs by Davis Maxwell © National Geographic Society*

### **Buffalo Herdboy, a Seminomad, Keeps Watch in the Marshes**

Most Ma'dan families live in permanent settlements, growing crops and tending their water buffaloes. A few tribes like the Suidi own herds numbering hundreds of animals. This boy's family migrates once or twice a year in search of grazing lands.





Sunset Bathes Canoe-borne Hunters  
Stalking a Giant Marsh Boar

Wild boars of Iraq, among the world's largest, terrorize unarmed marshmen and ravage crops. These Faraijahat tribesmen pole their craft across mirror-



© National Geographic Society

flat water toward the beast's lair, a hidden platform of reeds near open water. Wary of the boar's savage charge, hunters try to maneuver their quarry into

the water, there to be speared or shot. Two riflemen cover the boar's line of retreat. Boss-headed nails decorate the canoe's hull.



### Man on Shore Tows a Canoe Upstream

Waterways threading southern Iraq's 6,000 square miles of marshland provide the Ma'dan's only link with the world. Merchant boats use the network to reach customers within the marshes. Villagers paddle out on infrequent trips to near-by towns.

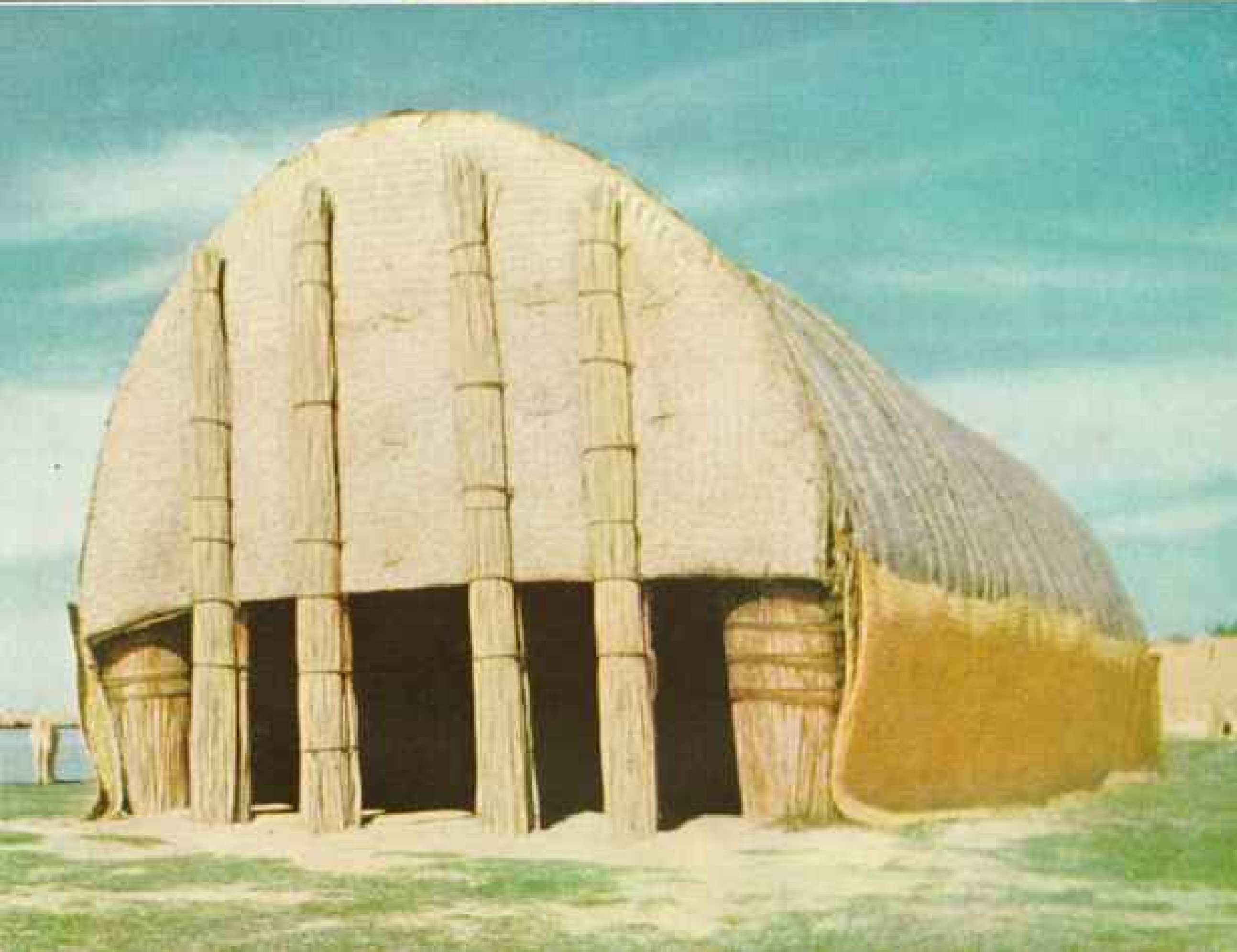
Man, rather than beast, pulls this *mashuf*, or canoe, against the current.

### House of Reeds Suggests a Blimp Hangar

Ma'dan architecture, a miracle of lashed and interwoven reeds, traces its origin back some 6,000 years to the original inhabitants of the Tigris-Euphrates region.

This riverside *mudhil* owes its design to the simple marsh hut, a rude structure of lesser size. The finished building, a three-week project for a team of men, always faces Mecca.











### Sailors Pull a Balam by a Line to the Mast

Deep-draft trading vessels, unable to reach the inner marshes except in times of flood, unload grain and cloth at mainland villages. They carry out split-reed mats, the marshmen's main cash product. Families on shore are rice cultivators.

### Ma'di Smoker Puffs a Hubble-bubble

Children often begin smoking between the ages of seven and nine. This man has an improvised water pipe whose wooden chamber and coconut-shell bowl came from the mainland. Only the reed stem is a product of the marshes.

**Sahaeans**, members of a religious sect neither Moslem nor Christian, are distinguished from the Ma'dan by their long patriarchal beards. Rites that demand running water cause Sahaeans to shun marshes and live on riverbanks. Expert boatbuilders, they supply and repair most of the marshmen's canoes.







Once I was crossing a sheet of unprotected water about eight miles across. It was a calm, still morning when we started, but when we were halfway across we heard the wind. Had there not been a large sailing boat near by to take us aboard, we should certainly have drowned, for the water here was six to eight feet deep. Many marshmen are drowned in these sudden storms.

#### Nomads and Herds Move in Summer

Some marshmen are seminomads. They spend the winter in the marshes grazing large herds of buffaloes on ground exposed by the receding water. They build themselves large temporary villages, the houses clustered close together, each house with a long annex at the entrance in which the animals shelter at night.

In the summer the nomads move outside the marshes and graze their buffaloes along the riverbanks to the north. A nomad family may own 60 or more buffaloes; a few families own as many as 200.

The majority of the Ma'dan are, however, settled in villages (page 228). Some cultivate rice, others spear fish, and yet others earn a living making reed mats and selling them to merchants, who come into the marshes to collect them.

Unlike the nomads, villagers own few buffaloes. A man with a dozen would be reckoned well off, and most of them own only five or six. The buffaloes provide milk, cream, butter, and, in some villages, cheese. The dung is used for fuel. A buffalo is never slaughtered for food unless it is already sick and its owner is afraid it will die.

#### Buffaloes Signal Day's Beginning

Some of the Ma'dan own a few small cows. Nearly every house is guarded by a watchdog, which is usually large and savage. There are a few cats in the villages, and some chickens.

The buffaloes spend the night outside the houses, and at dawn they drop into the water with resounding splashes and swim off to their grazing grounds. Then the village comes to life. After a hurried breakfast everyone, man, woman, and child, gets into a canoe and heads off into the reeds.

Some go to collect dried reeds for fuel or

for matmaking, others to spear fish with long five-pronged spears like giant toasting forks. The tribesmen never net fish; this is done only by a low-caste people known as Barbara (page 213).

Most of the villagers go to areas in the marshes where fresh, green shoots grow in recently burned reed beds. They fill their canoes with these shoots, which serve as fodder for the buffaloes at night. A great part of their lives is spent in collecting this fodder. It is hard work, especially in the terrible sticky heat of summer, but almost worse in winter, wading about waist deep in the icy water. Yet around the reed beds there is always merriment and laughter, with voices lifted in song.

In the evenings, as the sun goes down, often blood red through the distant smoke of burning reeds, the buffaloes drift back from their grazing grounds. They scramble ponderously onto the platforms in front of the houses, water dripping from their flanks. Everyone is busy, carrying armloads of young reeds to scatter in front of the slowly ruminating buffaloes, lighting smoke fires to keep the mosquitoes off them during the night, or milking the buffalo cows into wooden pails.

#### Frogs Provide Background Music

It is very peaceful. The dusk deepens, and firelight flickering through the doorways is reflected redly in the still, dark water; ducks fly over high and fast, heading for their feeding grounds near by. A boy sings, his voice clear and sweet, as he paddles back toward the village. The endless chorus of the frogs grows with the passing minutes into a vibrant background of sound.

Later, when it is dark, the villagers come paddling over in their canoes and crowd into the house where I am staying. They sit drinking tea and chatting, making room for each newcomer as he arrives. I have usually spent a busy day treating their ailments and hope that now I shall be able to rest. But often news of my presence has been carried to neighboring villages. A canoe arrives outside the house and another sick person is helped into the room.

The Ma'dan suffer much from sickness as

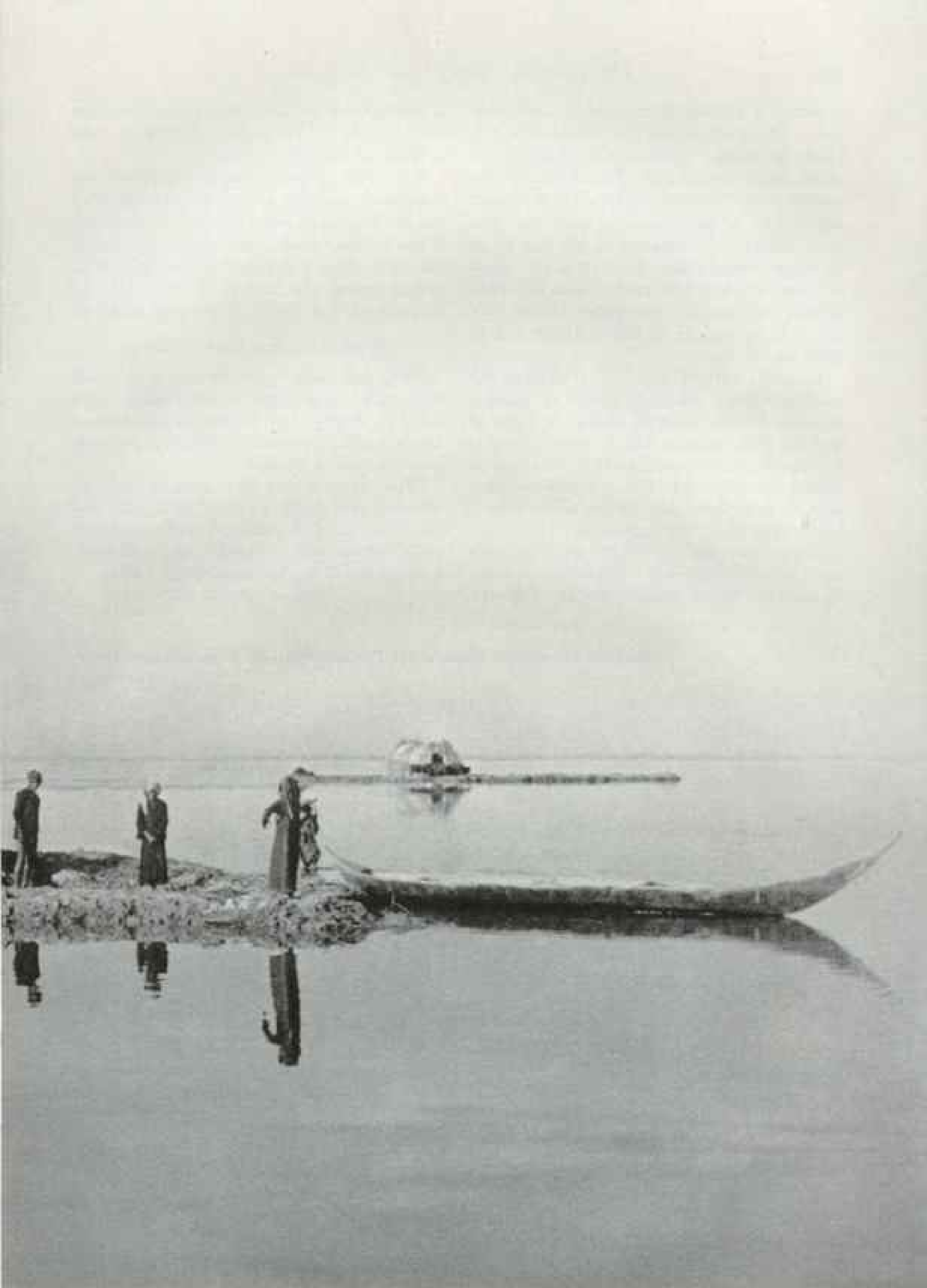
#### Doughy Fingers Fashion Wheat Cakes for an Oven Made of Clay

Fish from the marshes and milk from buffaloes give the Ma'dan a wholesome diet. Unleavened bread and rice complete the list of staples. This girl kneads dough on reed trays for baking in the urn-shaped oven. Westerners find the bread coarse and pungent.





Flood on the Tigris Turns the Marshmen's Home into a Vast and Desolate Sea.



Wilfred Thayer

Like Castaways on a Desert Island, a Marooned Family Keeps Watch Behind Dikes

a result of the conditions under which they live. The Iraqi Government maintains hospitals in Basra, 'Amara, An Nasiriya, and other large towns, and dispensaries in the smaller towns near the marshes, but it is often difficult for a marshman to spare the time from tending his buffaloes or his rice to go to one of these places for treatment. Most of them have had little contact with the world outside the marshes and prefer, when they fall sick, to remain in their villages and to hope for the best.

I always carried with me a well-stocked medicine chest. Although I have no medical training, I have acquired, during 25 years of wandering in remote places, some practical knowledge of medicine and first aid. Living among the marshmen, I have sometimes been able to help them, but all too often I have been defeated by my ignorance.

Bilharziasis and dysentery are the main scourges of the marshes. Bilharziasis, caused by parasitic worms invading the blood stream,

is endemic in the area, and nearly everyone suffers from it. Dysentery is rife in both amoebic and bacillary forms.

The water around the houses is always contaminated, and this is equally the case when the Ma'dan are crowded together on an island. When fetching water, the women seldom wade out more than a few feet to fill their pots. Living among the Ma'dan, I could take no precautions, but luckily I escaped infection.

#### Mosquitoes, but Little Malaria

There are many other diseases from which they suffer, but there is surprisingly little malaria, despite the clouds of mosquitoes. The mosquitoes prevalent here are fortunately poor carriers of disease.

Often someone has been brought in to me who has been badly wounded by a wild boar on which he had stumbled while gathering reeds. Some fail to survive the terrible injuries inflicted by the razor-sharp tusks.

*(Continued on page 235)*

#### Buffalo Herdboys, Homeward Bound, Straddle Amphibious Mounts

Wilfred Thesiger





All illustrations by Garin Maxwell. © National Geographic Society

### Water Buffalo's Fearsome Horns Serve as Handlebars for a Friend

Buffaloes, the marshman's most precious possession, dominate his economy. Only dire need can persuade him to part with his animals, the source of food, fuel, and leather. This boy and his companions live in the permanent marshes.



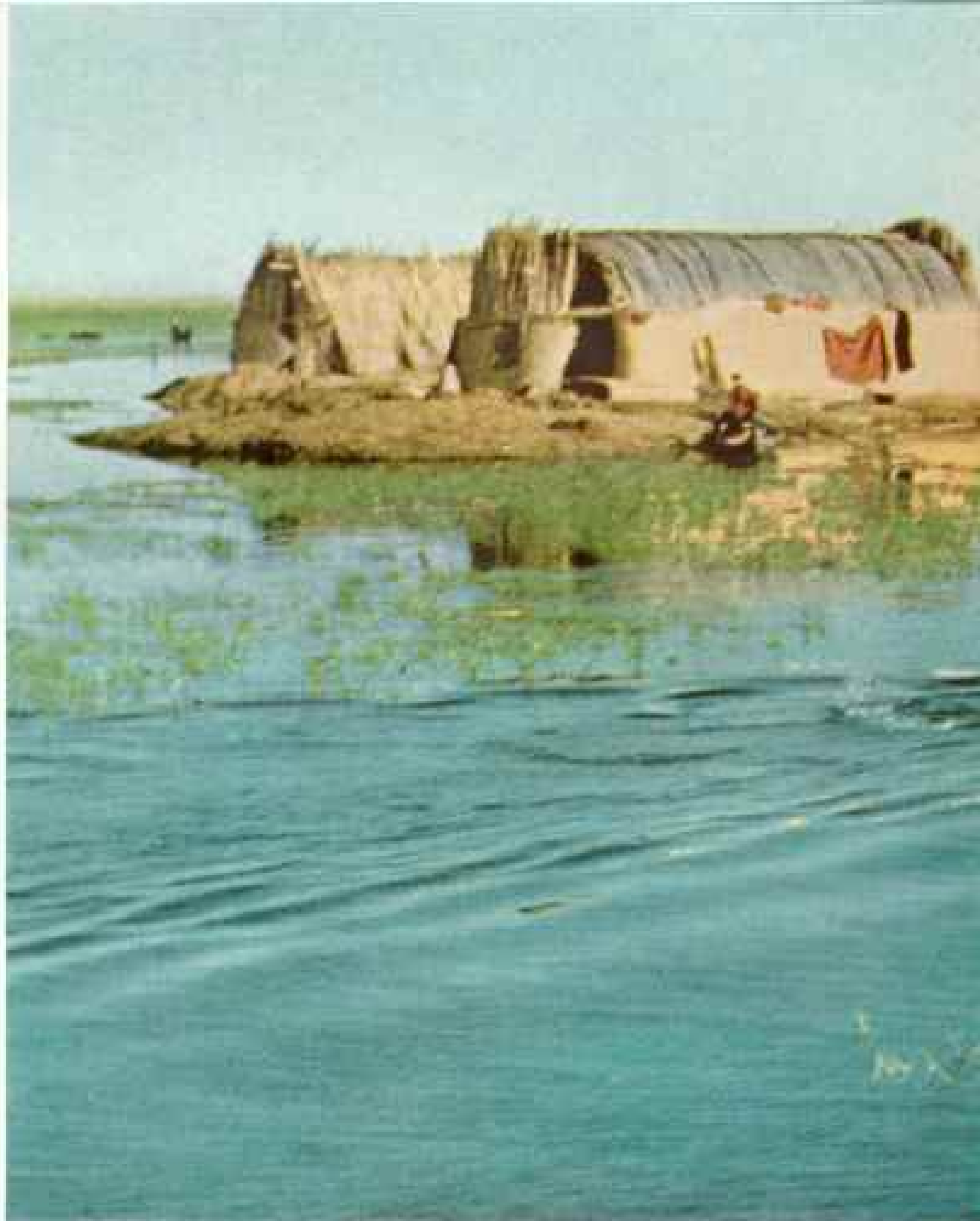
### Villagers Paddle down Main Street

Few natural islands dot the inner marshes. Families construct homes on platforms of reeds, tamping down successive layers for a foundation. For security against theft, they often build houses in groups.

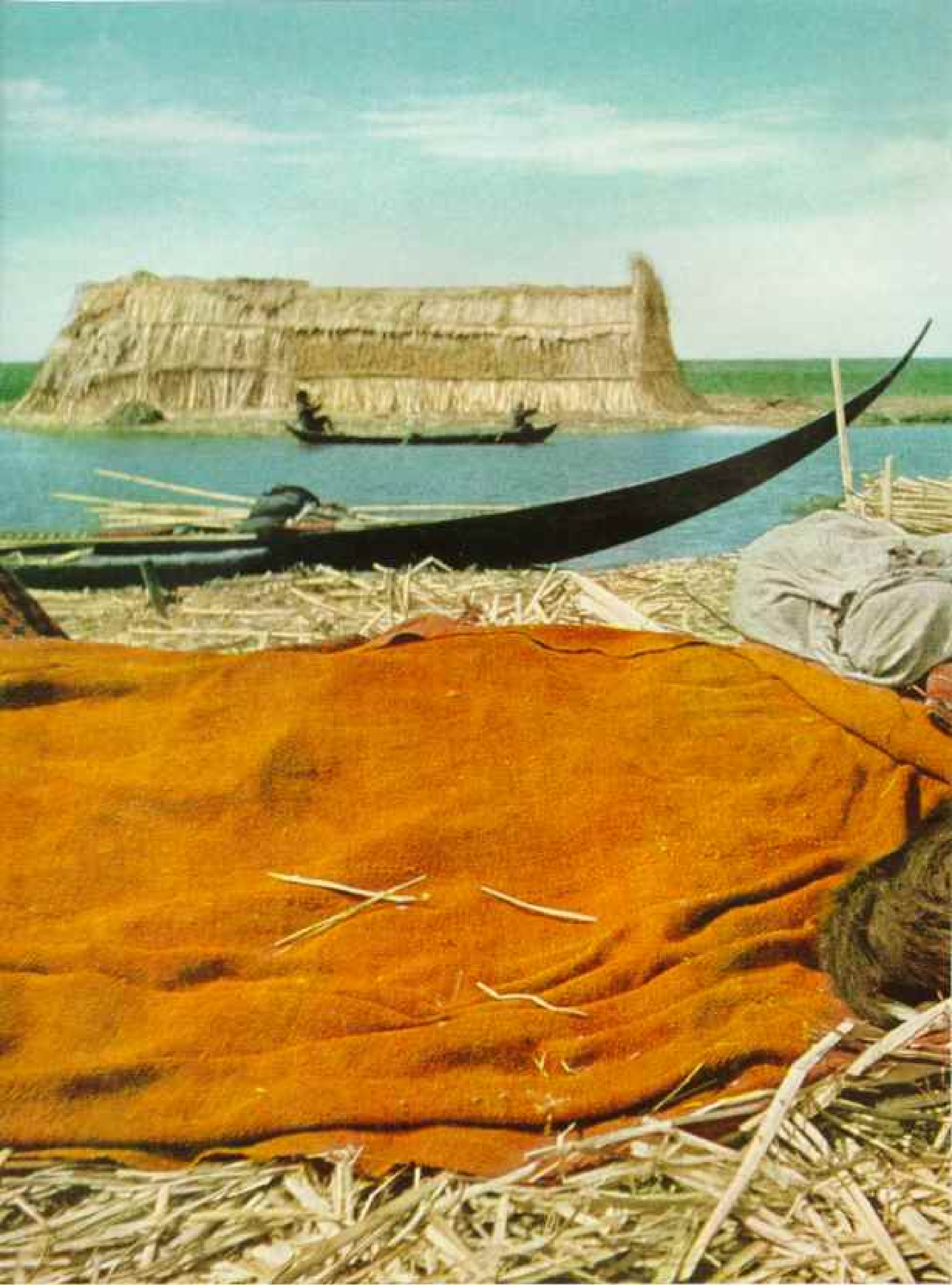
Every family owns at least one canoe. Without it, a marshman could scarcely move from one house to another.

**Networks of rice fields** (opposite, lower) ring the inner marshes, hampering access by boat. The author's crew here hauls the heavily loaded canoe across a dike. Marshmen call the 36-foot-long craft a *farada*, or war canoe. High, curved bowsprit pushes aside obstructing reeds.

**Migratory buffalo herders** build more primitive huts than settled folk. This seminomad carries his entire reed house in one boatload.







Too Young to Follow the Herd, a Buffalo Calf Dozes  
Amid the Furnishings of a Ma'dan Home





© National Geographic Society

Few possessions complicate life for the marshman. Tools may include fishing spear, reed-cutting knife, and grindstone. Most textiles come from the outside; the figured rug was woven by a neighboring tribe. This boy, whose chores include cutting reeds and tending livestock, mounts guard over his family's newest acquisition. A tarada lies beached near by. Buffalo dung for fuel dries on the house wall.





### Back Yard Serves as a Family Wharf

Few people are as dependent on boats as the marshmen. Children, reared in a world completely isolated by water, learn to paddle a canoe almost before they can walk. Adults often cover 50 or 60 miles in a day. This man and his children stand on a platform used by buffaloes at night.

### Boatmen Glide Through a Sea of Buttercups

Spring in the marshes lasts only a month. Water flowers bloom overnight, painting coves and channels with sudden color. These men push through a floating meadow of white water buttercups (*Ranunculus aquatilis*).





Ma'dan women disdain the veil, a Moslem custom based on tradition rather than religion. Wives go unveiled, even in the presence of strangers and on visits to mainland towns, where custom is more rigid. They are rarely secluded.

Marsh women served until recently as compensation for lives taken in feuds. The tribe of a slain man often demanded women from the clan of the murderer.

Mother and son belong to the Farajahat tribe.





© National Geographic Society

Gay headdresses brighten the costumes of these eastern tribesmen, who favor livelier colors than their neighbors to the west. The boys relax on a garish rug, a modern product of mainland bazaars. Arabs call the cross-wrapped headcloth a kaffiyeh.

Precious wood supports a water tank, the customary Ma'dan drinking urn; its contents cool by evaporation. Marshmen, lacking sticks and lumber, adapt the giant reed to many of the functions of wood. These boys wear Western-style jackets.





All marshmen enjoy singing and dancing. Frequently in the evening, after we have dined, someone starts to sing. A boy is sent off round the village to collect drums and tambourines. As these are warmed up at the fire to tighten the skins, and then tried out to test their tone, more men and boys come crowding into an already overcrowded room. No one minds if the floor has sunk and half of them are sitting in water.

#### News of Dance Spreads Quickly

Soon the whole village knows that there is going to be a dance at this house. More men and boys arrive. The house is surrounded by empty canoes, and latecomers, who cannot squeeze in, sit outside in their *mashufs*.

Most of the marshmen join in the singing. They keep time to the music by beating the ground with the heel of one foot and clicking their two index fingers together, which makes a surprisingly loud noise.

There are usually two or three people

pounding drums, while several others are beating a rhythmic jingle on tambourines. The drums are made of clay, shaped like vases, about 18 inches long and 8 inches across at the wider ends, and covered with skin. They are played by tapping on them with the fingers.

Boys are encouraged to get up and dance, either singly or two or three together, in the small space left in the center of the room. Their dancing varies a certain amount, since each boy develops his own distinctive style, but the broad pattern is uniform.

Most of the young men and boys, some of them quite small children, can dance, and the most virile of the lads is usually the most skillful. They enjoy dancing as they enjoy singing, but they would bitterly resent being called dancers, since this word is usually applied only to professional dancing boys.

The dances performed by the village boys and the professional dancing boys are very much the same, but the villagers do it for fun and the dancing boys for pay.

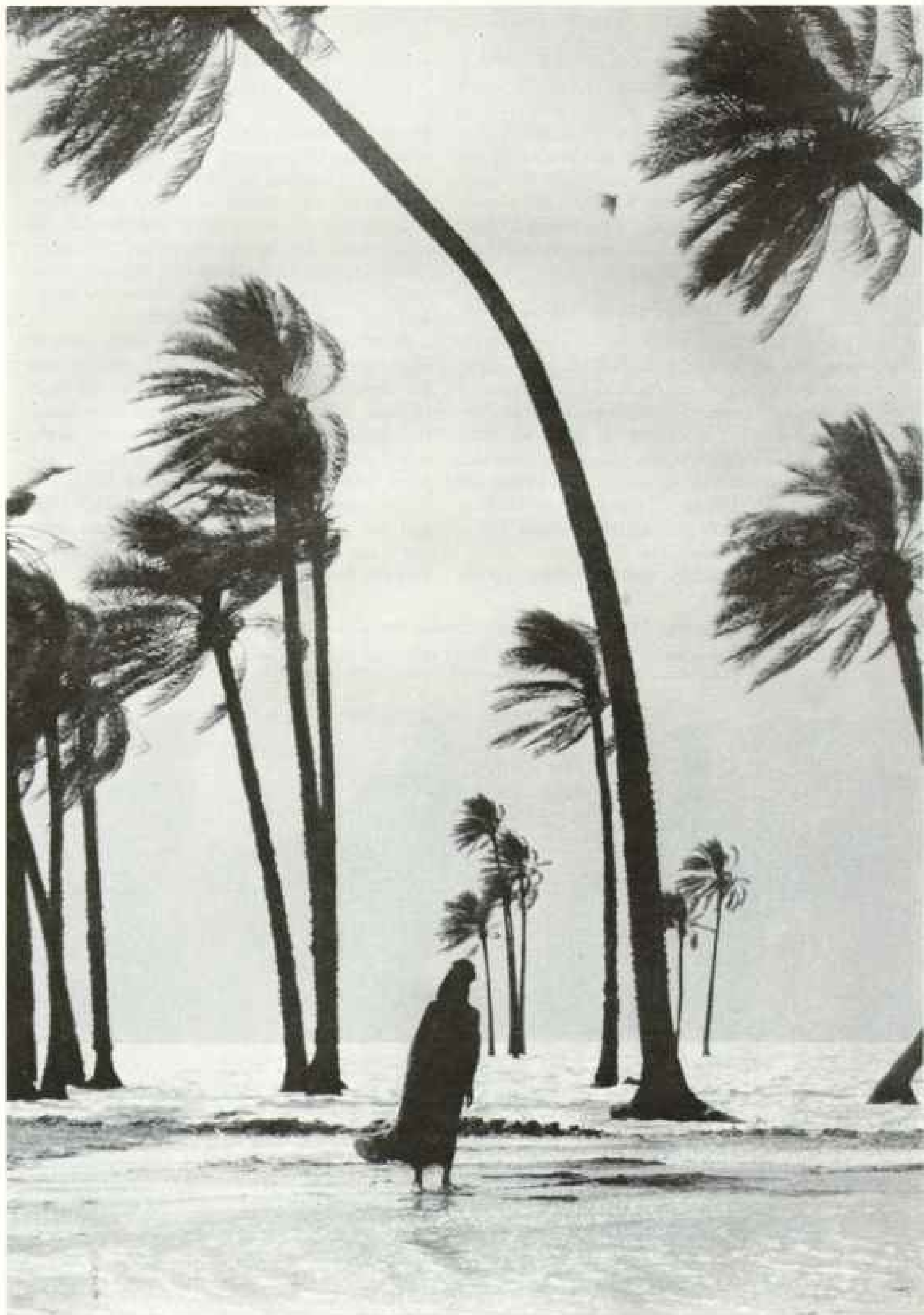
#### Snarling Marsh Dogs Fight Under the Eyes of Anxious Backers

Sport-loving Ma'dan find time for an occasional hunt or a dogfight. Villagers, valuing the animals as watchdogs, stop the fight before either contestant gains a crippling advantage.

Wilfred Thesiger









Wilfred Thesiger

Flood Waters, Relentlessly Driven by the Wind, Turn Desert into Lake

### Cargo Handler Guards a Stack of Reed Mats Stored for Export

Families sell the matting to itinerant merchants. The man holds five-pronged fishing spears.

Most of the professional entertainers live in villages and towns outside the marshes. They travel about the country to perform at important weddings and other festivities. When dancing, they use castanets, which the villagers do not.

New songs are frequently composed and sung by the Ma'dan. A song that was wildly popular a couple of months ago, sung by everybody at marriage festivals or as they paddled their canoes, cut reeds, or sat in their houses in the evening, will go out of fashion and be replaced by another.

A marriage among the marsh people is always the occasion for great festivity. If the bride belongs to another village, friends of the bridegroom set out in the morning in their canoes to fetch her. The bridegroom himself never accompanies them but remains behind in his house.

The greater part of the day is spent at the bride's village in feasting and dancing. Toward evening everyone collects at the bride's house, where they dance the *hausu*, or war dance. A man sings a couple of lines, which the others repeat in chorus as they stamp in a circle, brandishing weapons and firing rifles.

### Three Buffaloes for a Bride

The young woman is then placed in a canoe with the carpets, cushions, quilts, chests, and a few provisions that her father has presented to her as her dowry.

For his bride a man normally pays her father the equivalent of three buffaloes. The father spends as much or as little as he likes of this money on furnishings for his daughter to take with her to her new home. An important man might easily give his daughter clothes and household goods in excess of the value he had received as the bride's price.

The bride is accompanied to her new village not only by the party that has come to fetch her but also by friends from her own village. They stop in every village through which they pass to dance the *hausu*. The rejoicing reaches its climax as they approach the bridegroom's home.

On one occasion I attended the wedding of an orphaned boy called Dakhil. He had disposed of almost everything he possessed



in order to pay the bride price, for he was passionately in love with the girl and determined to marry her. He did not even own a house of his own. He erected a small red mosquito net at the end of a cousin's house as his bridal chamber. Earlier Dakhil had spent the day lengthening the house with two more arches.

Since he belonged to a different tribe from that of the rest of the village, it seemed likely that his marriage would be a small affair. He was, however, an old friend of mine. He had for a while been one of my canoe boys. I therefore turned up at his marriage with a party. We fired off a considerable number of rifle shots while we fetched the bride. This



Wilfred Thesiger

firing attracted marshmen from several surrounding villages, and the marriage became, for Dakhil's village at any rate, the event of the year.

In the evening the house was packed to suffocation, and many people had to sit outside in their canoes; inside, the singing and dancing were continuous. At midnight I left, thinking that Dakhil would be glad if the party broke up.

When I saw the bridegroom in the morning, he was a bedraggled sight. His headrope was missing and his new shirt was sadly torn.

Dakhil's friends, who had remained behind in the house, laughingly maintained that his bride had thrown him out of the house into

the water, a charge he indignantly denied. He never did explain his disarray.

In the seven years, off and on, that I have lived among the marsh people, they have given me the freedom of the marshes and of their homes. Naturally they were suspicious at first, but even in those early days they were never inhospitable, never made me feel unwelcome when I entered a house.

There are few corners of the marshland where I have not been and few villages in which I have not lived. I was alone among the people, except for brief periods when occasional Englishmen traveled with me, but I was never lonely. In the marshes I found friendship and peace.



Fortunately for the cause of scholarship, many medieval writings were somehow preserved."

For some of their most esteemed work, manuscript writers used squirrel or rabbit vellum, reduced to the thickness of onionskin. Skins of unborn calves and lambs also made fine vellum. On such fragile sheets, monks of the Middle Ages penned books with filigree tracery that remains as brilliant today as it was 500 years ago (page 271).

Italian craftsmen made the finest manuscript vellum. They washed, scraped, and pumiced the skins, and often used only the flesh side as a writing surface.

### A Workshop for Scholars

Mr. Schad wanted me to visit the entire library before losing myself among the fascinating first editions of the rare book stacks and among the scribblings of great authors in the manuscript files. We took a last deep breath of cool air and went out into the rare book reading room.

Here were shirt-sleeved doctors of philosophy doing research for books on English and American letters. Some were digging into the kind of material for which the Huntington Library is particularly renowned—the history and literature of the American West.

A reader from a California university was studying the dime novels of the early West. Another was researching soldier life in the Mexican war. A third was looking into the life of Jack London.

Subjects here range widely over the Anglo-American scene. Some scholars were interested in one or more of the facets of Shakespeare. The Huntington Library holds one of the world's finest collections of Shakespeare first editions and related materials. In this country only the Folger Shakespeare Library in Washington, D. C., has a larger collection.\*

Lyle H. Wright, Head of the Reference Department and Reading Room, showed me the library's extraordinary collection of Americana. On these shelves one may find copies of 20 percent of the books published in the United States before 1801—plus a large collection of books published elsewhere concerning the Americas up to that time.

With their importance to serious scholarship, the library's facilities have to be limited to those qualified readers interested in what Henry Huntington called "the advancement of learning . . . study and research in original sources. . . ." More than 600 scholars use the

library each year. Most of them produce books or doctoral theses from their researches.

The library also offers fellowships and grants to help researchers pursue their studies. In addition, books, magazine articles, and pamphlets are written by members of the library staff.

Mr. Wright showed me shelves of bound facsimiles of rare books, used as substitutes to protect extremely valuable items from excessive handling. At least a thousand volumes in the Huntington vaults are unique. In an average year the library's photographic staff makes 70,000 microprints and photographs of rare volumes, primarily for other libraries and research students.

Though shelves are not open to the casually interested public, some of the finest of the library prizes are displayed in glass cases for general view. Representing the Shakespeare collection is a copy of the First Quarto of *Hamlet*, published in 1603, twenty years before the First Folio, the earliest collected edition of Shakespeare's plays. The British Museum has the only other known copy of this *Hamlet*.

The first editions of Shakespeare's individual plays are known as the Quartos; the Huntington Library has copies of all but one (page 270).

### Gutenberg Bible a Prime Attraction

Among the most fascinating items are those venerable volumes known as incunabula—books printed before 1501. Of these the Gutenberg Bible is the primary attraction to visitors. The two volumes are printed on vellum, probably sheepskin, and bound between heavy wooden boards. Over the boards is stretched the original 15th-century stamped leather, held fast by metal bosses.

This Bible takes its name from Johann Gutenberg, the reputed inventor of printing in Europe, and is generally conceded to be the first important book printed with movable metal type. There are some 40 other surviving copies, although most of them are on paper rather than vellum.

As I photographed the wonders of the Huntington Library and Art Gallery, I began to feel the fascination that lures scholars ever deeper into secrets of the rare book and manuscript vault.

\* See "Folger: Biggest Little Library in the World," by Joseph T. Foster, NATIONAL GEOGRAPHIC MAGAZINE, September, 1951.



### Artist Brings a Tattered Manuscript Back to Life

Each year Huntington restores thousands of old manuscripts. Ronald E. Tank has washed this page from a monastery's financial accounts. Now he traces the jagged edges on a transparent backing sheet. Feather-edged and coated with paste, the sheet will reinforce the crumbling manuscript. Tweezers and knife will separate the next sheet from the bundle.

There was, for example, the strange manuscript of Edgar Allan Poe's essay, "About Critics and Criticism." It is written on pieces of paper four inches wide and fastened together in 14 places by adhesive wafers; the whole is 144 inches long. Poe's parents were actors. Possibly they used scrolls like this in rehearsal; such a rolled manuscript was called a "part." Poe may have tried adapting this theatrical device to his writing.

Even more intimate an insight into a private life was a little manuscript from the girlhood of Charlotte Brontë, author of *Jane Eyre*.

Charlotte, her brother, and her sisters (Emily wrote *Wuthering Heights*) had little contact with other children. Their amusements they found within themselves and with one another. Once they started a magazine for an audience of Lilliputian subscribers,

their own wooden soldiers. For such tiny readers they learned to write in a miniature hand.

The Brontë manuscript I saw almost requires a microscope. It is called "Corner Dishes—Being a Small Collection of Mixed and Unsubstantial Trifles in Prose and Verse," by Lord Charles Albert Florian Wellesley. The name was one of Charlotte's pseudonyms. There are—we measured them—16 lines of handwriting to the inch. As the space between her lines is of an equal depth, it means that Charlotte's penmanship is only 1/32 of an inch tall. And, when you examine her work closely, it is eminently legible!

Yes, I thought, one might easily become lost among the people whose books, manuscripts, and portraits live on in San Marino, California, in air-conditioned immortality.

# Exploring Our Neighbor World, the Moon

A Noted Astronomer Foresees the Day When Man Will Set Foot  
on Our Satellite's Eerie Moonscape

BY DONALD H. MENZEL, PH.D., D.Sc.

Director, Harvard College Observatory

Shelley's "orb'd maiden with white fire laden, whom mortals call the moon" has always been synonymous with the remote, the unattainable. Yet today the development of powerful rockets and earth satellites has brought close the time when man will send a missile to the moon—and later a human passenger.

Here a distinguished scientist describes our nearest neighbor world and tells how it will appear to the first true "man in the moon." The author, Dr. Menzel, is the Paine Professor of Practical Astronomy at Harvard University and an international authority on the sun. He has written 10 books, edited 20 others, and contributed to the *National Geographic* the notable article, "The Heavens Above," in the July, 1943, issue.—*The Editor.*

**M**AN is about to embark upon his greatest adventure, the conquest of space. Satellite launchings, particularly the Russian Sputnik II with a canine passenger, clearly forecast the imminence of manned space flight, bold forays into the realm just beyond our atmosphere.

Moreover, travel to neighbor worlds at some future time cannot be dismissed as a Jules Verne fantasy. Though many difficult problems lie ahead, we may now contemplate exploration of the nearer planets and, especially, of our moon.

The poets' lovely "Queen of Night" is by far the closest of all the heavenly bodies. Its distance from earth averages 238,857 miles—an inviting proximity for the first step into our solar system. Rockets powerful enough to reach the moon with a small payload exist today. Very likely, therefore, man will dispatch robot missiles to the moon before venturing there himself. Sensitive electronic gear will report lunar conditions.

## Moon Yields Secrets to Telescopes

Meanwhile we already know a great deal about our celestial next-door neighbor. It is not, you may be sure, a mirror in the sky that reflects earth's surface features, as many medieval scholars supposed. Instead, we see the moon for what it really is: an independent world, though one admittedly mysterious in origin and controversial in the interpretation of its surface features.

Even a small amount of optical aid—binoculars or opera glasses—reveals some of the moon's more conspicuous features. But one's first lunar view through a telescope is far more revealing, a never-to-be-forgotten ex-

perience-comparable to one's first air view of the Grand Canyon, Yellowstone National Park, or the Greenland Icecap.

Let us assume that you have access to a large telescope. Your first impression is that the moon seems to be chalky white, as if the surface were of limestone. However, careful measurements of the brightness of the moon's reflected sunlight disclose that your senses are wrong.

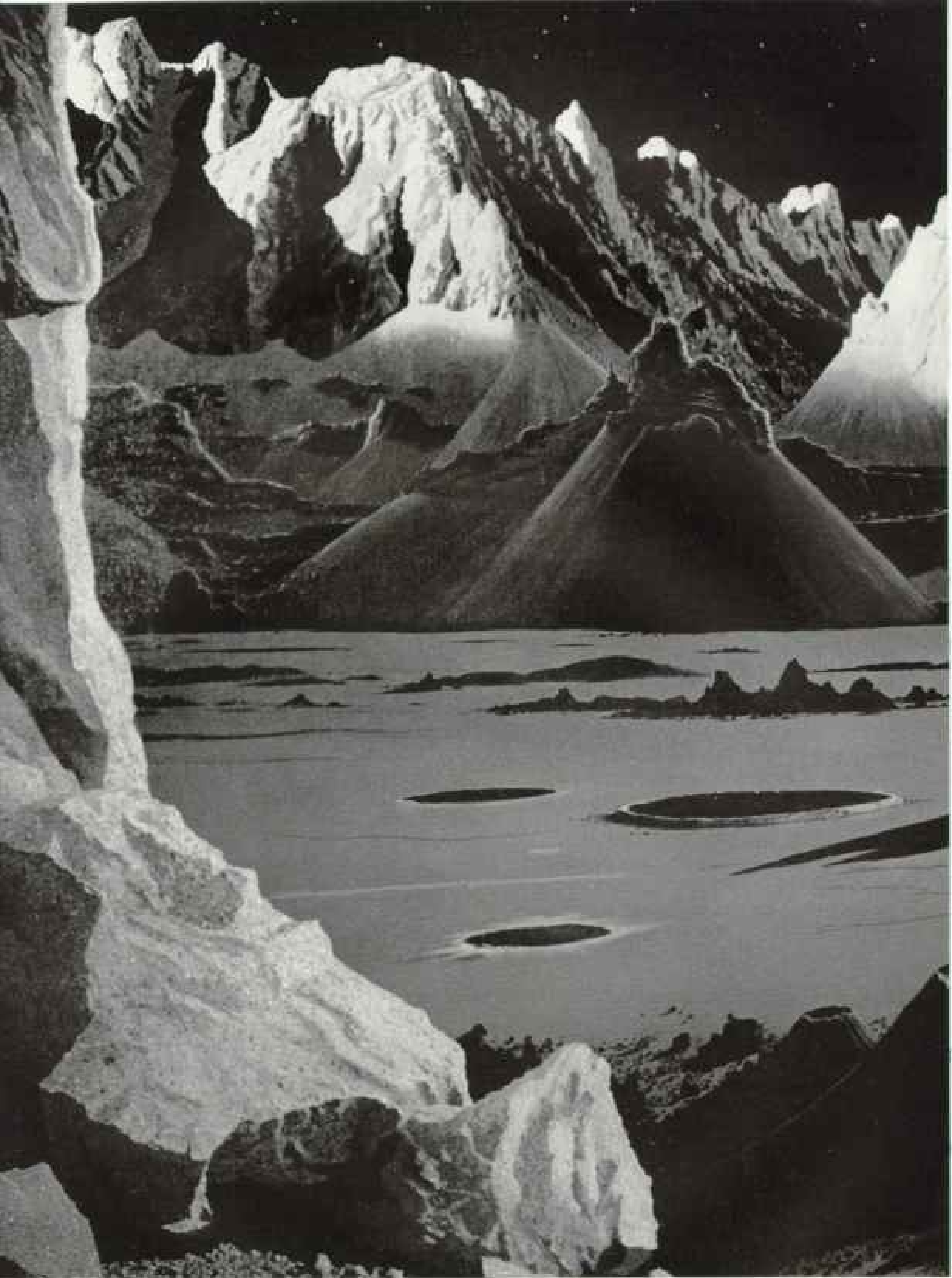
Dazzling and blinding though the moon may seem, these quantitative studies prove that the surface is a dull, even a very dark gray, with a distinctly yellow cast. The darkest areas of all—shadowy markings so familiar to the naked eye—are relatively smooth regions in an otherwise rugged and mountainous moonscape.

## "Seas" Without a Drop of Water

Early astronomers, with their imperfect telescopes, noted the lack of detail in the dark areas, and it required no great stretch of imagination for them to visualize these regions as vast expanses of sea and ocean, coastline and bay. They called them *maria*, or seas.

But your own telescopic observation readily convinces you that these "seas" comprise an extensive system of relatively smooth plains. We still call them by their 17th-century names—Mare Nubium (Sea of Clouds), Mare Serenitatis (Sea of Serenity), Mare Tranquillitatis (Sea of Tranquillity), and so on, even though we now realize that they contain no water. Our conclusion is that the maria are ancient lava flows.

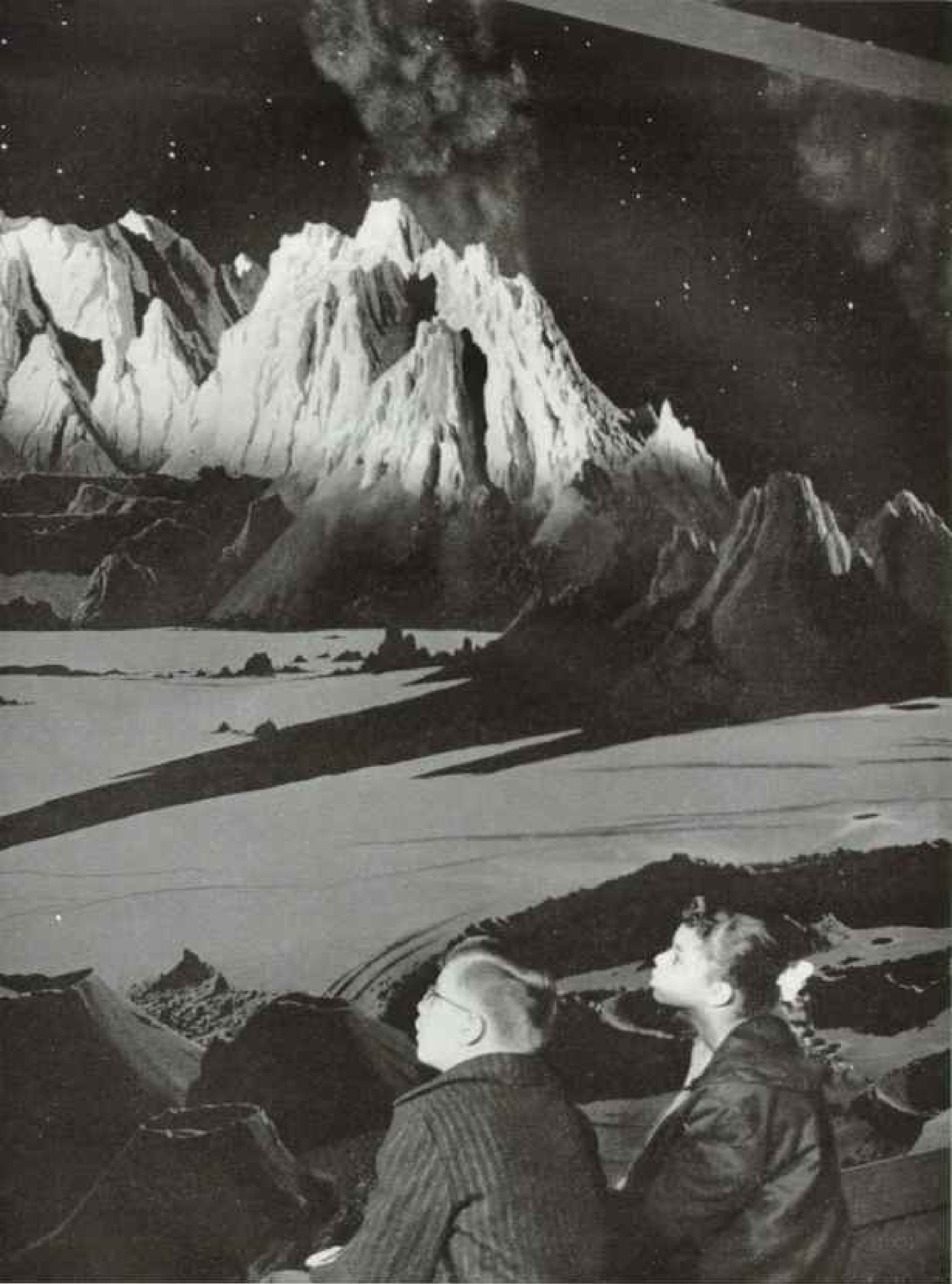
Almost equally apparent is the moon's tremendous disarray of craters. Astronomers count more than 50,000, ranging from a few



**Awed Explorers Survey a Dead World,  
the Scarred Surface of the Moon**

*These youngsters peer into the depths of an imaginary lunar crater, eons old, blasted by a giant meteorite. Sunshine bathes the distant mountaintops, some of them 16,000 feet high, that wall the tremendous depression. Eerie earthshine, much brighter than moon-*





David S. Bove, National Geographic staff

light, reveals a lava-encrusted floor pocked with smaller meteoric craters and volcanic cinder cones. Devoid of air, the sky is a black curtain sequined with the stars and planets. Our Milky Way traces a delicate embroidery. The 10-by-40-foot mural stands in the

Museum of Science, Boston, Massachusetts. Based on scientific studies, it is the work of Chesley Bonestell, a leading illustrator of space themes. The painting, copyright by the museum, is reproduced with the permission of Dr. Bradford Washburn, museum director.

thousand feet to 150 miles across and as much as four miles deep. Most of the larger craters have rough, terraced walls, both inside and out. A number, however, such as the huge pockmarks Plato and Archimedes, possess relatively smooth floors. These we call "walled plains" (page 293).

You also see distinct mountain ranges and occasional isolated peaks, at least one higher than earth's lofty Everest. Here and there you note that the lunar surface seems to have suffered from a severe moonquake, if we interpret some of the cliffs, cracks, and crevasses as caused by the breaking and sliding of one block of rock against another.

#### **Tycho's Rays Resemble Meridians**

Of all the craters Tycho is probably the most conspicuous. You may comment that this crater looks like a pole on a terrestrial globe and that the streaks radiating from it resemble meridians diverging from the pole. These streaks, or rays, possess astounding regularity, crossing high country and lowland, dark areas and light, in seemingly unbroken great-circle lines radiating from the crater. In some cases the lines extend more than a thousand miles.

Large telescopes disclose that lunar rays are not as sharply defined as they seem to the observer with a small instrument. Their edges appear somewhat indefinite, consisting of blotches or irregular, overlapping patches, not unlike the pattern from the shovel of a farmer who spreads lime with an unsteady hand (opposite and page 283).

#### **Close-up Portrait of the Moon Reveals a Pitted, Ravaged Face**

Viewed through a powerful telescope, the luminous face that has moved poets and lovers becomes a wrinkled visage. Lava flows form the dark "seas." Some 30,000 craters scar the face that the moon always shows to earth. More than a dozen jagged mountain chains, and at least one peak higher than Everest, tower above dust-covered lowlands. Unprotected by an atmosphere, the moon endures constant bombardment by meteoric material and cosmic radiation. Its diameter is 2,160 miles, as compared with the earth's 7,927 miles.

Lick Observatory's 36-inch refracting telescope obtained this view. Images are upside down in such instruments, so this photograph, and those that follow, have been "righted." They appear as they would to the naked eye or through binoculars.

When seen by telescope, the conspicuous crater Tycho (bottom) suggests the north pole of a terrestrial globe. Meridianlike rays from Tycho are believed to be splashes of rock dust from the explosive impact of a meteorite.





Although Tycho's ray system is the most extensive, several other large craters possess significant ray patterns, and literally hundreds of minute systems occur. The character of these rays gives an important clue to the origin and evolution of their craters. Most of the rays, we conclude, are splashes, material spurted radially from holes produced by meteorites that smashed explosively into the lunar surface.

Although the most outstanding irregularities in the moon's surface consist of intermingled and overlapping craters, your telescope discloses a dozen or so distinct mountain chains. Also you see a number of separate peaks and note that nowhere does the lunar surface seem to be absolutely level. Even the flattest areas are rolling, with elevations and depressions of a few hundred feet.

Photographs taken through the 200-inch telescope at Palomar Mountain show the moon as though it were only 200 miles away.\*

With this instrument and others, astronomers have photographed the entire face in great detail. They have given names to approximately 700 features (see moon maps, pages 285 and 287).

#### Moon's Far Side a Mystery

The moon requires exactly the same time to circle the earth as it does to make one complete turn on its axis. As a result it always turns toward us the same pocked, familiar face. Slight wobbles in the moon's motion, however, enable us now and then to peek first over one edge of the disk, then over another, so that actually we see about 59 percent of the total surface.

Any given point on the surface receives sunlight continuously for almost 15 days, then remains in darkness the same length of time (see phases, pages 290-291).

The earth contains approximately 81 times as much matter as the moon. Nevertheless, although we loftily refer to the moon as our "satellite," its diameter is a very impressive 2,160 miles, or more than one-quarter that of earth. Natural satellites abound in the solar system, but none bulks so large in relation to its primary planet as does our moon. If astronomers should exist on Mars, they undoubtedly would regard the earth-moon system as a "double planet."

Some scientists have suggested that the moon may have been part of earth originally and split off from it, but no credible evidence

supports one popular idea that the Pacific Ocean basin is the scar left by such a cataclysm. A more tenable theory holds that the moon, as well as earth and other bodies in the solar system, may have formed through the gradual accretion of a mass of dust and gas in space.

#### Why Go to the Moon?

To the casual observer the moon might seem an uninviting world devoid of economic value. However, a manned station on the lunar surface would have definite potentialities. For instance, it could relay world-wide television programs or perform other communications services, and, by observing earth, accurately forecast our weather to an extent now impossible.†

Conceivably the moon may contain valuable minerals, but the costs of extraction and of shipment to earth would be literally out of this world. If establishment of a sizable scientific base—perhaps in pressurized plastic buildings—should prove practicable, some exploitation of minerals might be justified for local use.

But one cannot evaluate the importance of a lunar station in terms of an immediate dollars-and-cents "pay-off." Scientific research by station personnel would yield a vast amount of knowledge, and from it would emerge new concepts and new challenges.

#### Lunar Station Would Probe Universe

Astronomers, for example, might use the moon as an observation platform in space. Free from atmospheric interference, they could get a clearer look into the depths of the universe than ever before.‡ Stars would yield secrets regarding their composition, and the atmospheres of neighboring planets, such as Mars and Venus, would be better analyzed.

Our sun also would undergo searching inspection, and the interaction of its radiation with the terrestrial atmosphere would be

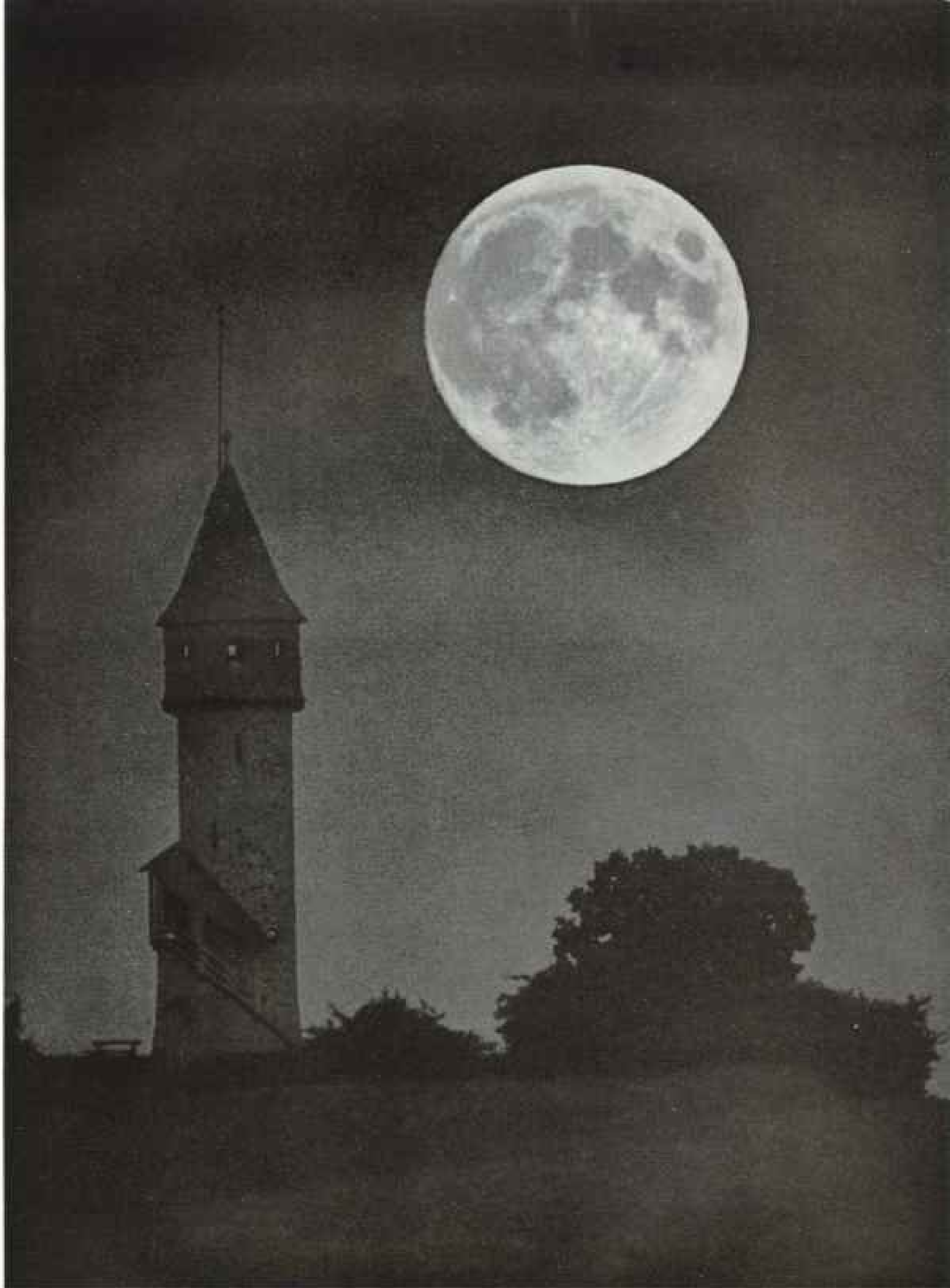
*(Continued on page 288)*

\* See "First Photographs of Planets and Moon Taken with Palomar's 200-inch Telescope," by Milton L. Humason, NATIONAL GEOGRAPHIC MAGAZINE, January, 1953.

† Similar potentialities of artificial satellites are set forth in "How Man-made Satellites Can Affect Our Lives," by Joseph Kaplan, NATIONAL GEOGRAPHIC MAGAZINE, December, 1957.

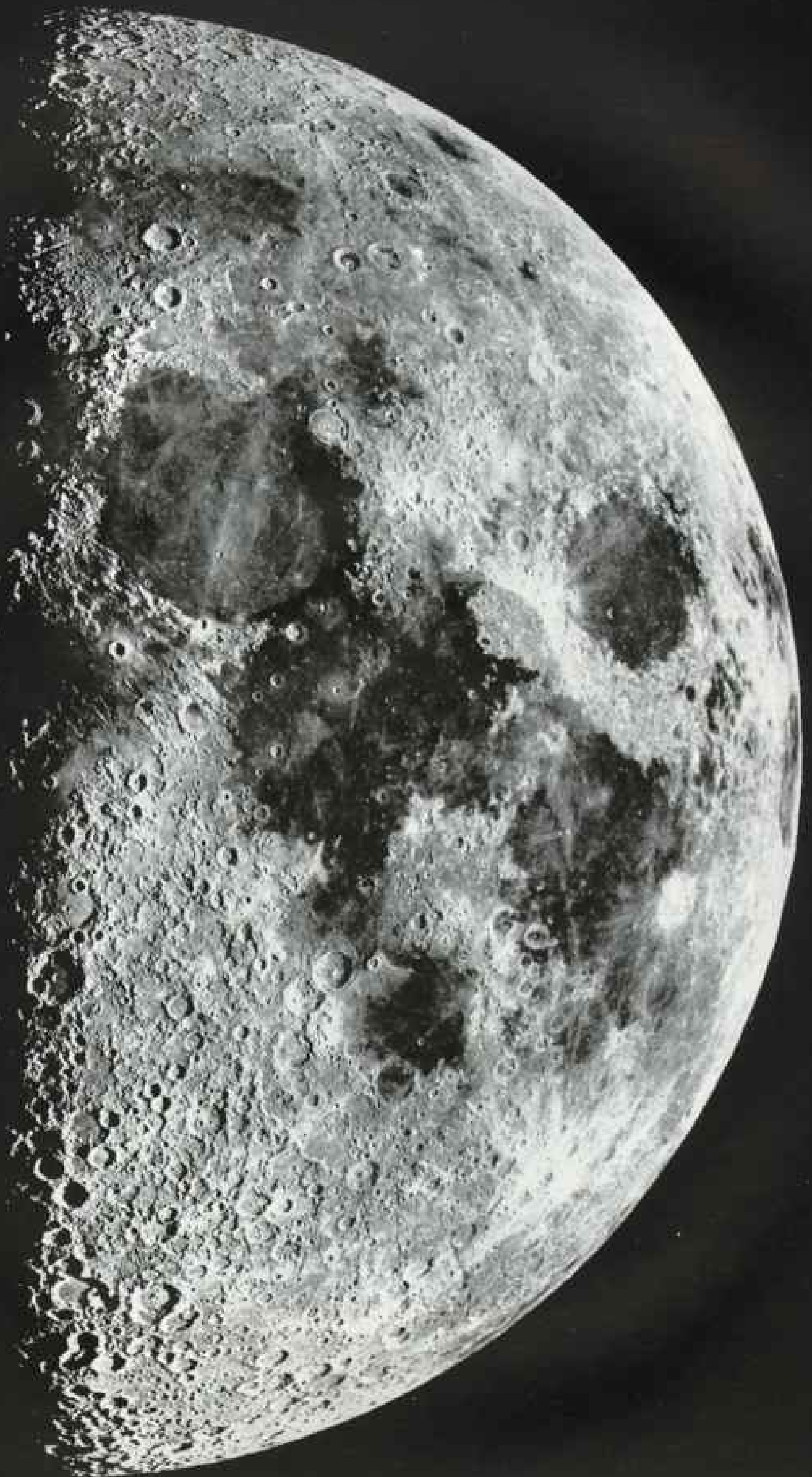
‡ See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Sky Survey Charts the Universe," by Ira Sprague Bowen, and "Exploring the Farthest Reaches of Space," by George O. Abell, both December, 1956.

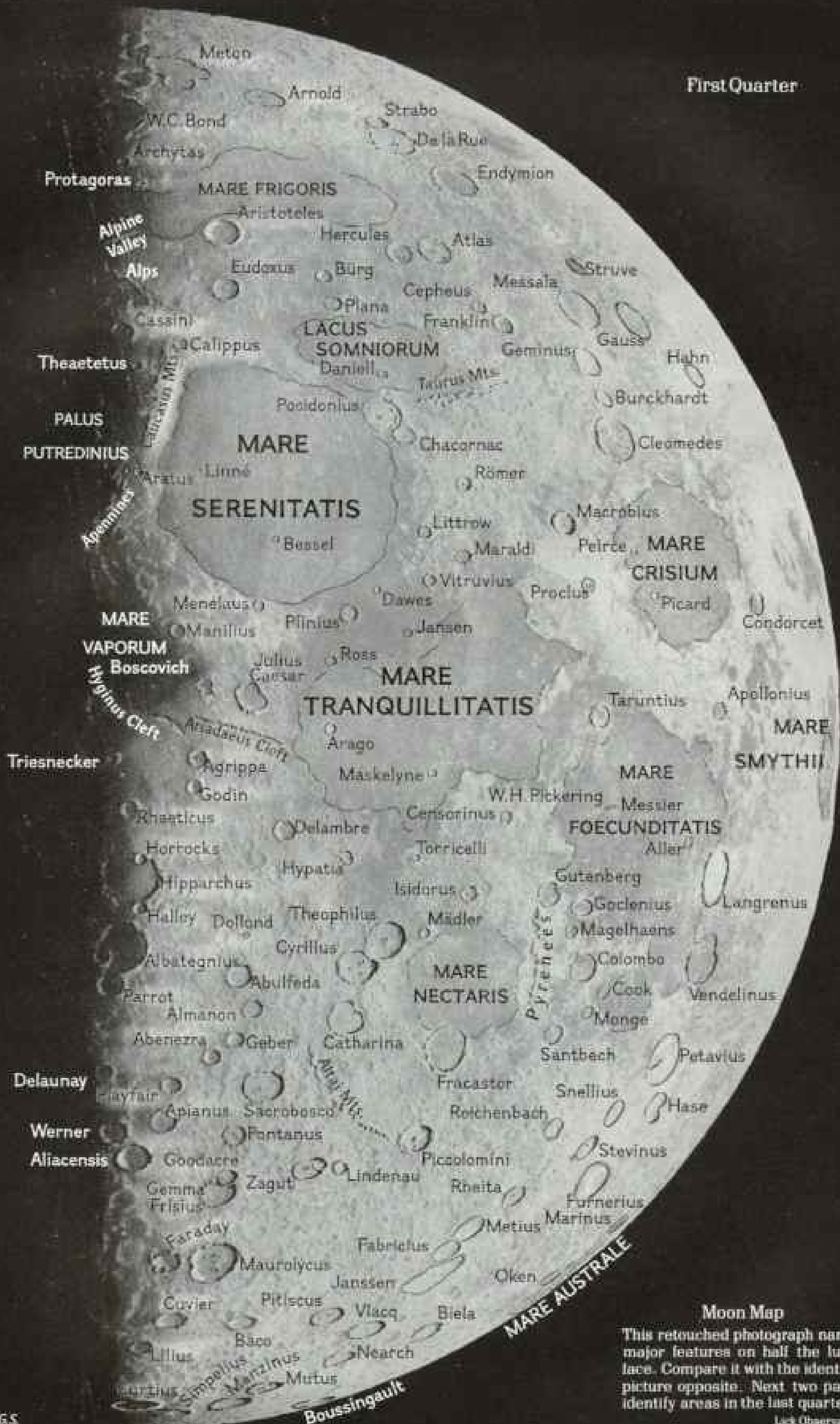




**Swollen Moon, Afire with Sunlight, Hovers over Wetzlar, Germany**

Julius Behnke waited patiently for just the right light, then made this photograph at twilight with a 600-mm. telephoto lens, which brought his subjects up close. Actually, the tower stood a mile away; in medieval times it belonged to the city fortifications. Bright streaks radiate from the crater Tycho, not far from the moon's south pole (pages 280-281).

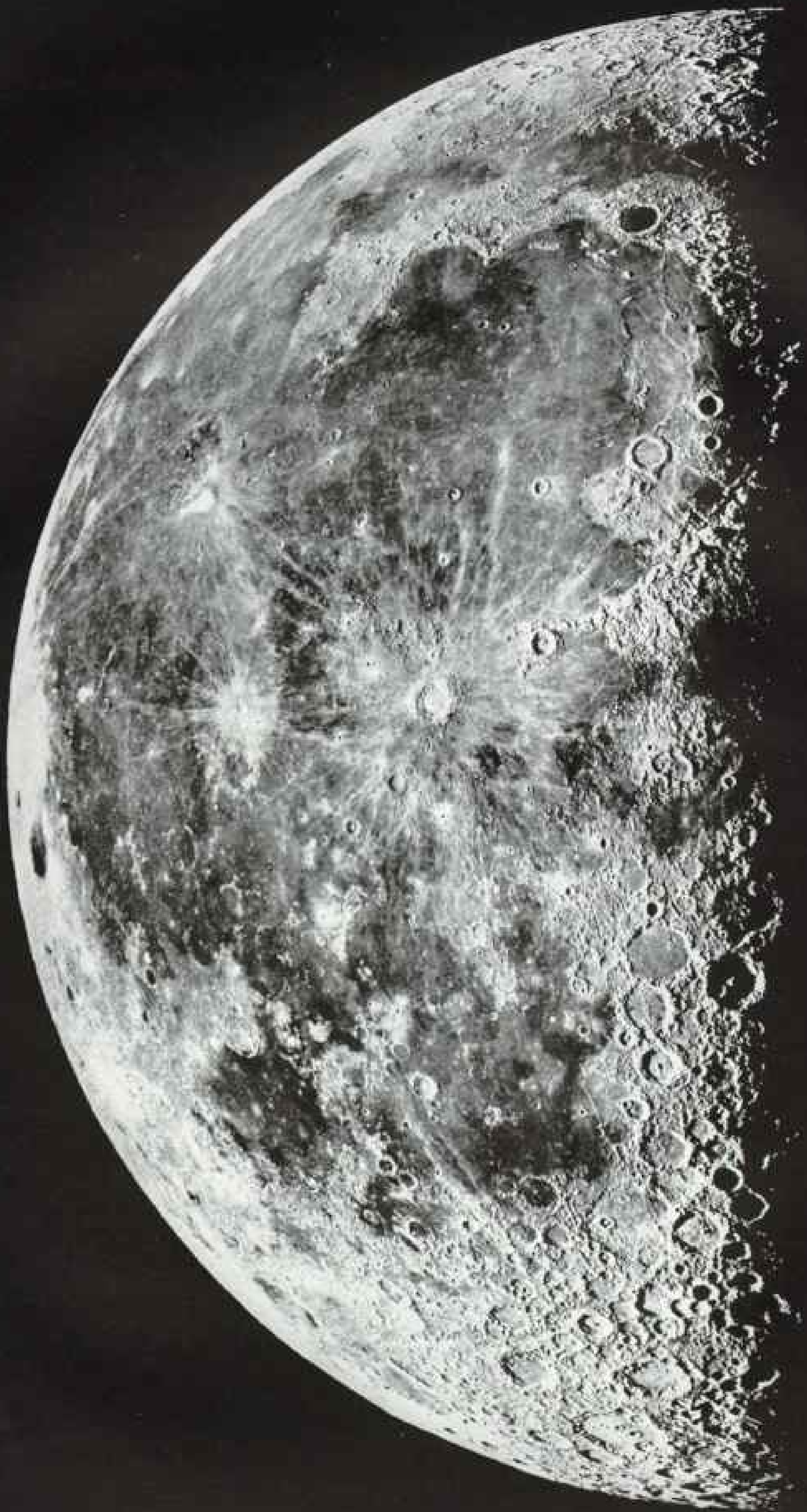




**Moon Map**

This retouched photograph names major features on half the lunar face. Compare it with the identical picture opposite. Next two pages identify areas in the last quarter.

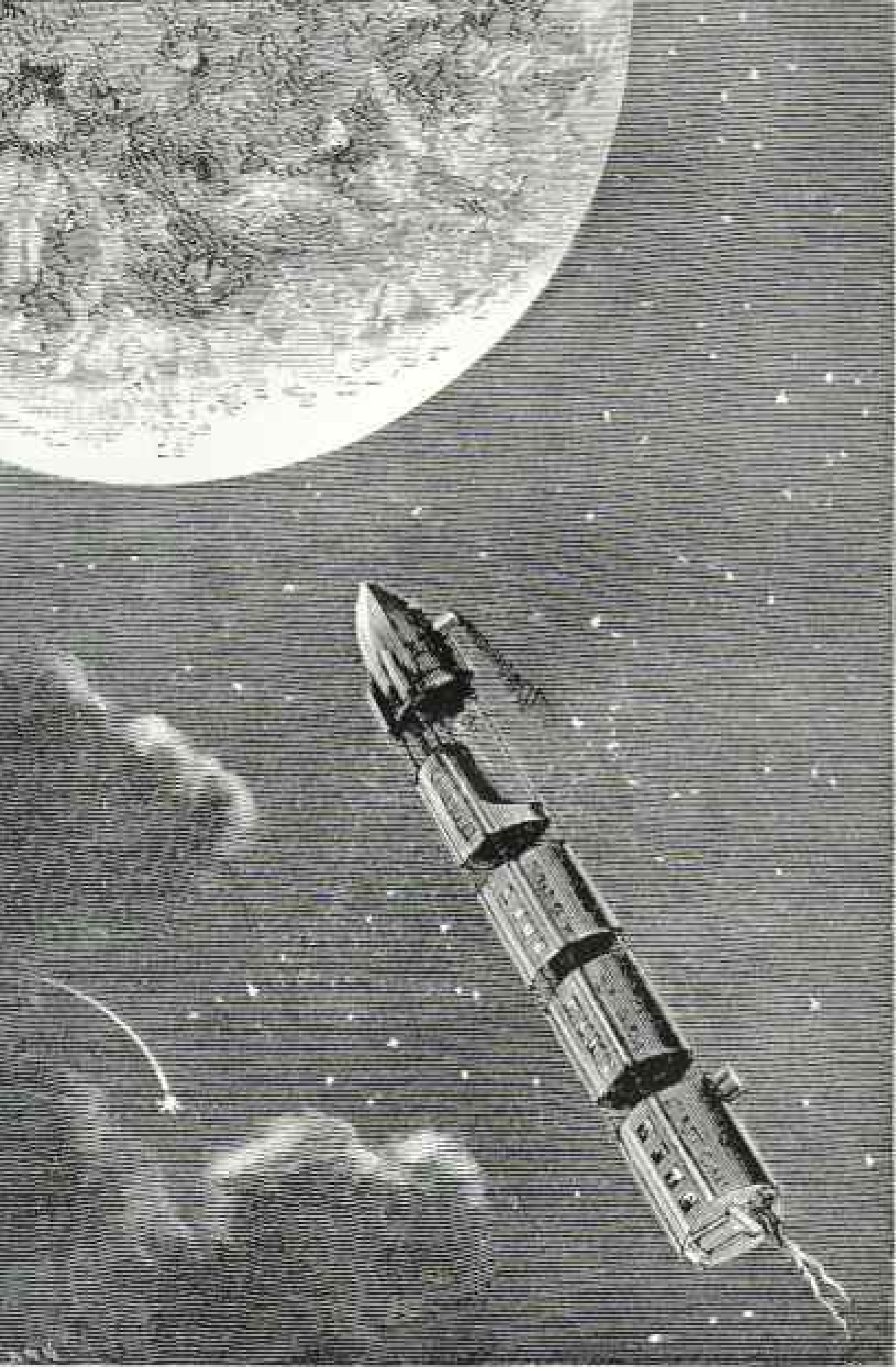
Lick Observatory





Last Quarter





RETIRED ARTIST

### "Projectile Train" to the Moon—from a Jules Verne Novel

Jules Verne, father of science fiction, visualized lunar exploration in his companion novels, *From the Earth to the Moon* and *Round the Moon*, published in the 1860's. His three heroes, encased in a 20,000-pound aluminum projectile, were fired from a massive cannon near Tampa, Florida. This space-train illustration from the book, with coaches labeled "First Class" and "2d Class," bears little relation to the text.

better understood. Meanwhile other scientists, by studying the lunar surface, might deduce new facts concerning the origin of the solar system and of the universe itself.

The moon, should a base be established, would also provide a launching platform for robot missiles dispatched to Mars. Eventually the moon might become a way station for space travelers who would follow the exploratory missiles.

Let us now consider the moon's surface as you might see it from an approaching spaceship. Your first impression is that of utter desolation. Mountains are jagged, plains rough and barren, although the sharpness of jet-black shadows tends to overemphasize the ruggedness of lunar peaks.

Landing on the surface, you perceive a host of new and weird phenomena. The sky, even in broad daylight, is black as night and crowded with stars, bright and faint. Earth's sky is blue because particles in the upper atmosphere, such as gas molecules and dust, scatter the shorter or blue wave-lengths of the light coming from the sun. However, the moon possesses no detectable atmosphere, and hence no scattering of light relieves the darkness of shadows. Above you the sun displays an iridescent halo—the solar corona.

### How Earth Would Look from the Moon

Earth is a striking sight—almost four times as large in diameter as the moon and relatively very much brighter, because clouds are far better reflectors than lunar rocks. Earth gleams a sapphire blue, with the deepest shades at the edges. It will exhibit phases like the moon, but at different times. For example, "new earth" corresponds with "full moon" and "full earth" with "new moon."

Our earth appears as a blue planet because its dominant color comes from the atmosphere—our sky seen from outside. Continent outlines show vaguely, if at all, partly because of atmospheric haze and partly because of vast storm areas obscured by clouds. Where visible, the continents add pastel shades of green in jungle or fertile country, yellow for desert areas, gray or brown for rolling,

undeveloped land, and vast expanses of white in the polar regions. Ocean areas add a slightly deeper shade to the over-all blue.

Just as the moon provides light for the terrestrial night, so does earth illuminate the lunar darkness. But since earth is bigger and more brilliant than the moon, earthshine on the scarred landscape far exceeds the intensity of moonshine on earth.

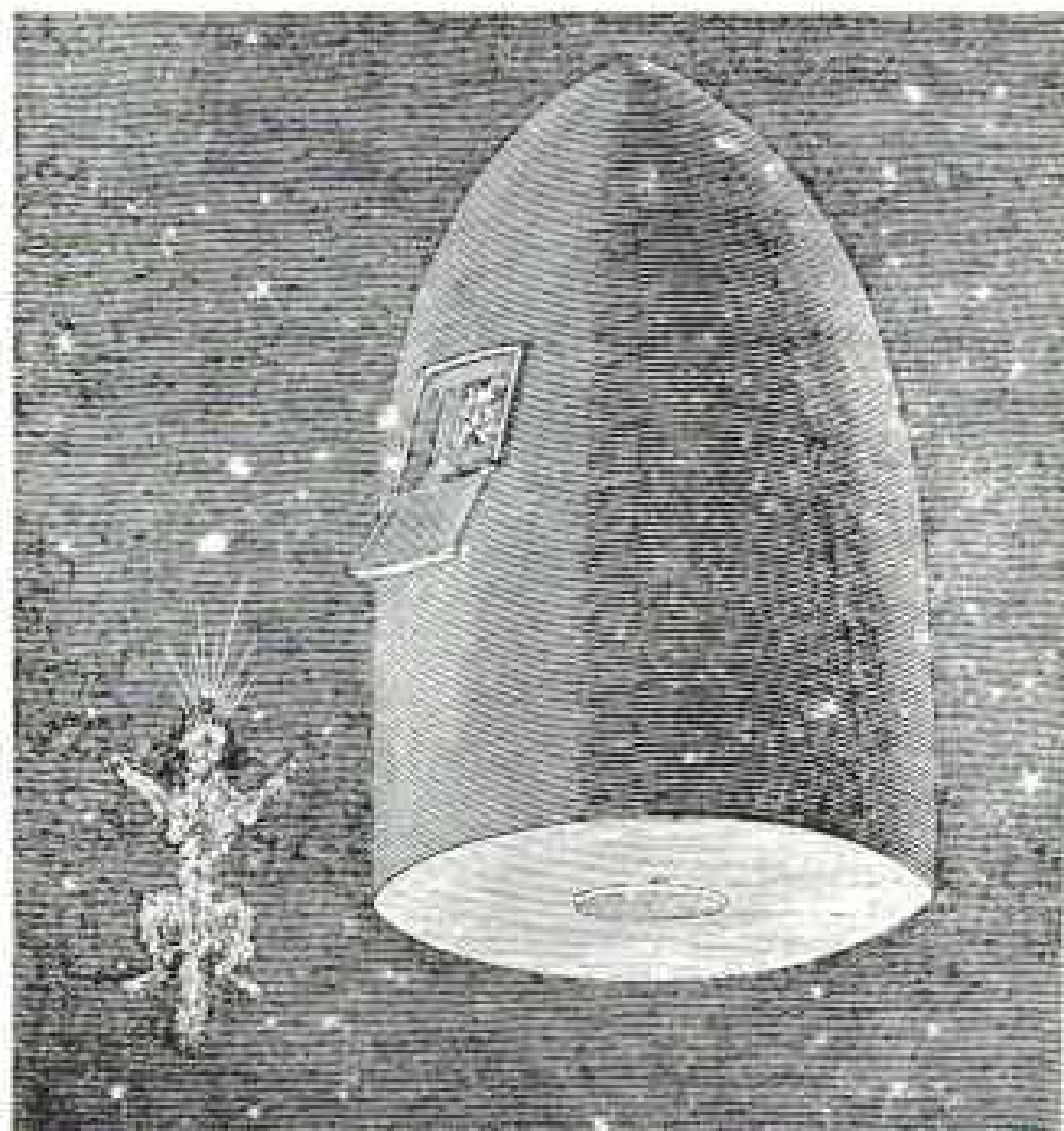
You may witness a most striking and startling phenomenon—an eclipse of the sun by the earth, the reverse of an eclipse of the moon as seen from our own planet. Lunar eclipses occur when the earth moves between sun and moon, casting its shadow on the latter. But if such an event occurred while you were exploring the surface of the moon,

### Weightless Riders Dance in Mid-air in Verne's Spaceship

Free of gravity, Captain Nicholl, Barbicane, and Ardan float about the cabin with their dog, Diana, and two chickens. Verne thought weightlessness would occur at a point of "neutral gravity" between earth and moon. Actually his heroes would have been weightless from the time they left earth's atmosphere. Since their projectile traveled a celestial orbit, the forces of inertia would have balanced the pull of gravity, rendering the passengers feather light.

**Space Debris: a Dead Dog**  
Aptly named Satellite, the ship's second canine passenger suffered a fractured skull at take-off and died. Pushed from a hatch into space, the body traveled near the ship, like a spent rocket accompanying a modern satellite. Verne's projectile circled the moon and fell back to earth, landing safely in the Pacific off Baja California.

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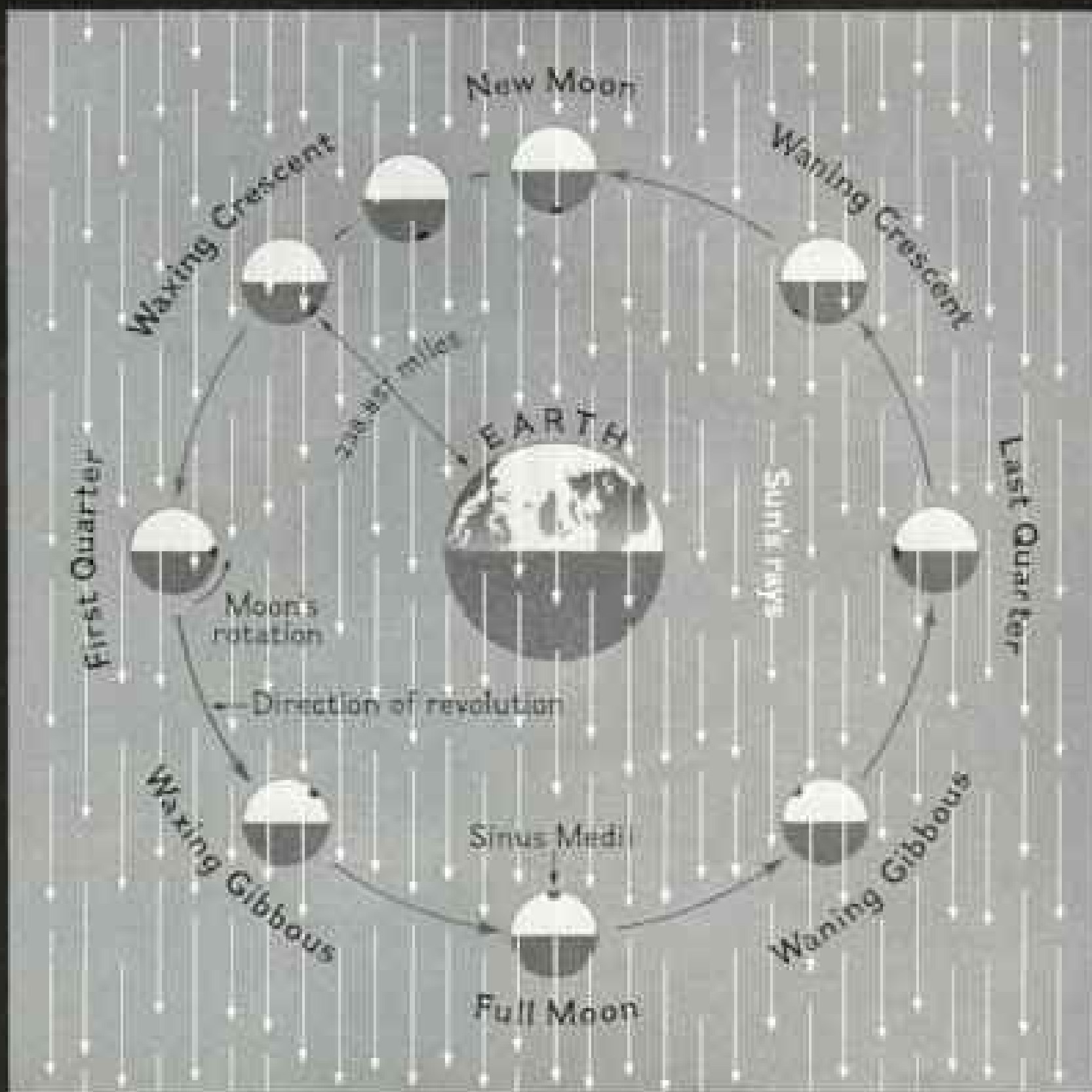
**Waxing Crescent**



**New Moon**



**First Quarter**



**Waxing Gibbous**



**Full Moon**





**Waning Crescent**



**Last Quarter**



**Waning Gibbous**

you would see the sun eclipsed by earth, a dramatic spectacle. Our planet's darkened circle would be rimmed with a coppery glow, where sunlight trickled through the earth's gaseous shell, emphasizing the red shades of sunset.

Dressed as a space traveler, burdened with oxygen tanks, space helmet, and other protective devices, you might weigh on earth as much as 300 pounds. On the moon, because of its smaller size and reduced gravity, you would weigh only one-sixth as much, or 50 pounds.

An athlete who on earth high jumps over a six-foot bar elevates his body's center of gravity an average of about three feet. On the moon he could leap 21 feet with similar effort (page 295). And, from this height, he would fall with a shock or impact no greater than that associated with the six-foot jump on earth.

To feel normal on the moon, the space traveler would have to wear leaden shoes weighing at least 300 pounds each.

#### **Powder Masks the Moon's Wrinkled Face**

A thin layer of dust covers the lunar surface from a depth of several inches to perhaps several feet. One prominent scientist has argued convincingly that the dust cover may be miles in thickness and that the craters themselves are dimples in this layer.

As you kick the dust upward, no billowing cloud remains behind, because even the finest particle, free of any atmospheric buoyancy, falls back as rapidly as it rises.

The dust surface is marred by indentations ranging in size from tiny impressions no larger than a dime to pits many feet across. These grade in turn

#### **Moon's Position Relative to Sun and Earth Determines Its Phases**

To primitive man, the waxing and waning of the moon was one of nature's most puzzling mysteries. Astronomy, oldest of sciences, long ago explained the phenomenon. Like the earth itself, half the moon is always in sunlight, half in shadow. As the moon journeys around earth, the lighted portion visible to us varies according to the moon's position. Astronomers recognize eight such variations, or phases. They occur within a period of 29½ days, the interval from new moon to new moon.

In the diagram (center) you are looking directly down on earth and moon. You see the moon in nine positions. Now note the ratio of light and shadow that the lunar face presents to earth in each phase. What astronomers call the new moon (top) is invisible to earth because it turns its back directly to the sun. About three days later the poets' new moon (slightly left) shows an ultrathin crescent of light. On the opposite side of its orbit, the moon presents its sunlit face to earth and is full.

Photographs of the phases correspond to positions shown on diagram. "Gibbous" (from the Latin *gibbus*, hump) refers to the moon's swollen aspect between the quarter and full phases. Sinus Medii (Middle Bay) is a central point on the face of the moon (see map, page 287).

into the giant craters. Such marks result from the continuous rain of meteoric material. This produces, in addition to dust, many small chips and fragments, most hazardous underfoot.

Beneath the continuous sun of the moon's two-week daylight, the top layer of dust exceeds the temperature of boiling water,  $212^{\circ}$  F. In the darkness of the long lunar night the temperature falls to minus  $243^{\circ}$  F. Extreme as these ranges are, the variation is only skin-deep. Layers of pulverized rock in a vacuum comprise excellent insulation, and the highly heated or highly cooled layers extend downward scarcely more than a few inches. Scrape away the top layer of dust, and the thermometer will read approximately minus  $40^{\circ}$  F. both day and night.

#### A Cosmic Missile Gouged Chubb Crater, Earth's Largest Meteorite Scar

Unlike the moon, earth displays few pockmarks attributed to meteorites. Our atmosphere consumes most "shooting stars," and erosion usually obliterates the scars left by those that survive the fiery plunge. There are, however, a few remarkable exceptions. Northern Quebec's Chubb Crater, 11,500 feet in diameter, has an area eight times greater than Arizona's more famous Meteor Crater. To determine its origin, the National Geographic Society and the Royal Ontario Museum sent an expedition to the site in 1951. Scientists headed by Dr. V. Ben Meen found evidence of a magnetic anomaly, indicating a buried meteorite.



No ordinary heat-measuring device of earth-bound scientists will penetrate these layers. Radio emissions from the moon, however, arise in layers a few inches below the surface and have been received on earth. The uniformity of this radio energy, from full moon to new, proves the contention that these emitting layers are constant in temperature throughout the lunar day,  $29\frac{1}{2}$  earth days long.

#### Moon Could Not Retain Air

Earth has an atmosphere because its gravity is strong enough to retain the constantly moving molecules of air. But if ever the moon possessed air or water, the molecules of these substances in time would have acquired velocities in excess of the  $1\frac{1}{2}$  miles per second necessary to escape from the moon's weak gravitational pull. Thus the moon's atmosphere and water would have literally evaporated into space in the relatively short period of 1,000 years or less.

Two other tests show the moon has no detectable atmosphere. We see no clouds floating above its surface, and when the bright orb passes in front of a star, the star disappears suddenly. If the moon had an atmosphere, the star would go out of sight gradually, because of refraction of its light passing through air at the edge of the lunar face.

Though some early students regarded the maria as dry ocean beds, and thought some worn-down craters had been eroded by water, in all probability the original lunar atmosphere, if any existed, was neither dense enough nor permanent enough to cause any perceptible aging of the rock surfaces.

A few observers have reported seeing occasional minute flashes of light against the night-darkened hemisphere of the moon. They have interpreted these flashes as meteorites or shooting stars, extremely small rocks heated to incandescence by friction with the rarefied remnants of lunar atmosphere. The observations are difficult and still not confirmed. They may be merely optical illusions.

It is by no means impossible that the moon may possess a mere vestige of an atmosphere, perhaps consisting of xenon, krypton, and other gases too heavy for escape. Detection will be difficult, but there seems to be some chance that such an atmosphere, during intense solar activity, might glow like a faint aurora borealis.

The moon must be devoid of life of all sorts, animal or vegetable. Not even bacterial organisms could survive the extreme alternations of heat and cold, the absence of water and atmosphere, the searing touch of ultraviolet light and X rays from the sun, and the continual peppering of the surface by small meteors.

Some observers have tried to interpret apparent changes in shadow or color within various lunar craters as an effect of vegetation. This phenomenon, however, must be due wholly to the variable angle of illumination from the rising and setting of the sun.

You, as our hypothetical lunar explorer, are gathering many bizarre impressions of the desolate moonscape. Early among them is an awed realization of the terrain's extreme ruggedness. You may decide that the moon, for its size, appears to be several times rougher than earth—and you are quite correct.

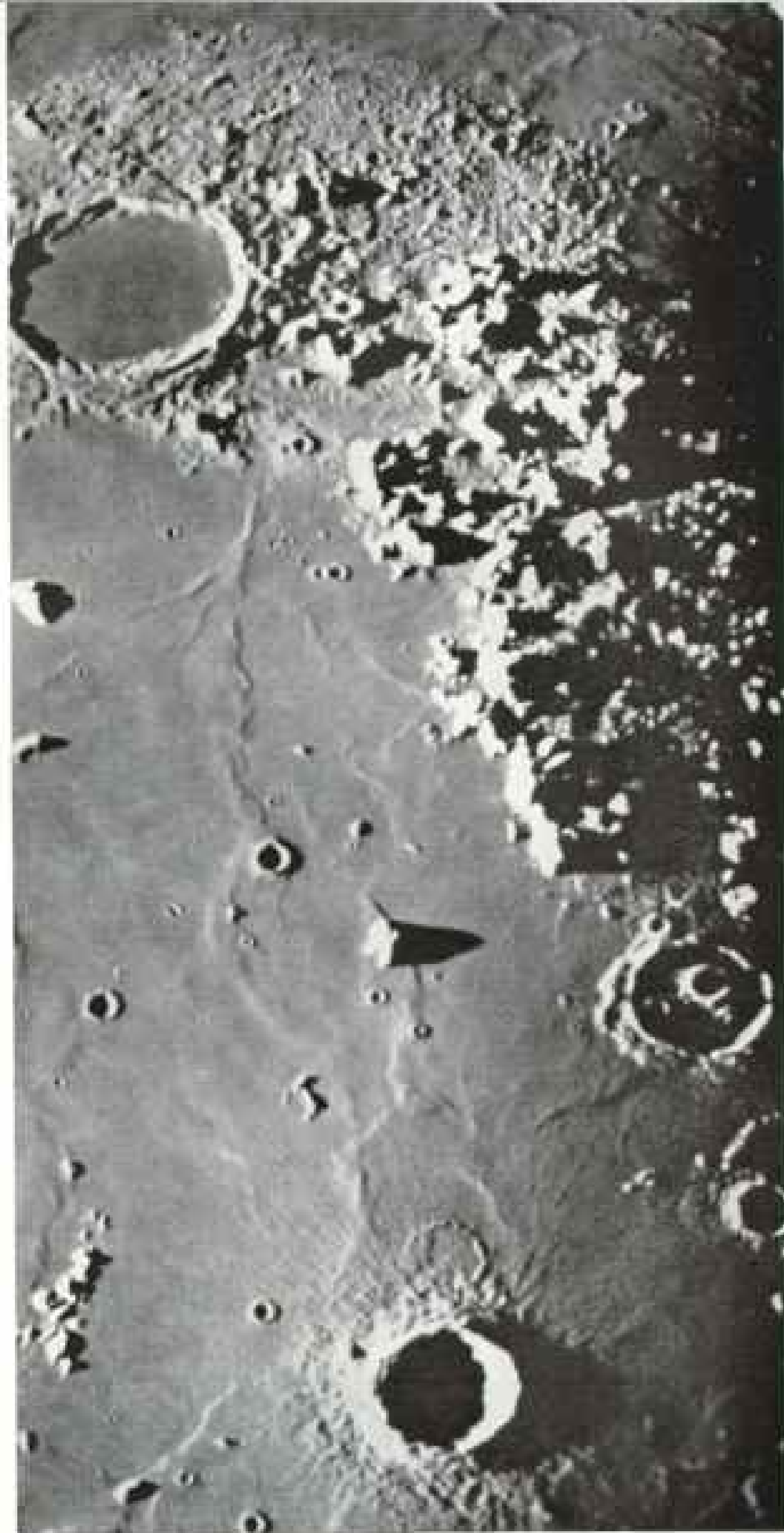
#### One Peak Towers Six Miles High

Principal lunar mountain ranges take their names from a fancied resemblance to terrestrial counterparts: the Alps, the Caucasus, and the Apennines. Some points in these ranges attain 12,000 to 18,000 feet above the neighboring plains. The Doerfel Mountains, on the moon's extreme southern edge, may contain peaks in excess of 20,000 feet. Moreover, recent measurements of the moon's profile, by Dr. C. B. Watts of the U. S. Naval Observatory, have revealed a mountain standing six miles above a near-by valley.

It may seem mystifying that we can measure the altitudes of lunar peaks, but the principle involved is simple. On the moon, as on earth, mountains cast their longest shadows at dawn and dusk, and we calculate heights from the shadows (see photograph at right).

Sunlight probably never penetrates into the depths of a few craters or some other regions surrounded by high mountains near the lunar poles. These are the coldest areas on the surface. Although liquid water doubtless does not exist on the moon, "ices" composed of frozen water, methane, or carbon dioxide conceivably might lie in these sunless depths.

Craters hold the key to the moon's surface features, including the dark seas as well as the bright rays. Even the most casual study of the surface convinces observers that craters differ greatly in age. Some are crumbling like ancient ruins; others appear as crisp and new as a modern apartment building.



Lick Observatory

#### Like Bomb Blasts in a Desert, Meteoric Craters Pit the Sea of Showers

Lunar craters visible to astronomers range from a few thousand feet to 150 miles in diameter and as much as four miles in depth. This dramatic view shows two major depressions, Plato (top) and Aristillus (bottom). Plato's floor, unlike the debris-cluttered interiors of most moon craters, is relatively smooth—a "walled plain." Waves of congealed lava from Mare Imbrium, the Sea of Showers, ripple to the base of the lunar Alps.

Piton (center), a rocky rampart rising 7,000 feet from the "sea," casts a spearhead shadow in oblique rays from the sun.

Astronomers see the moon to best advantage when sunlight strikes at an angle and craters and mountains stand out in bold relief. Measurement of the resulting shadows enables the scientist to gauge the height of mountains and of crater walls and to estimate their steepness.



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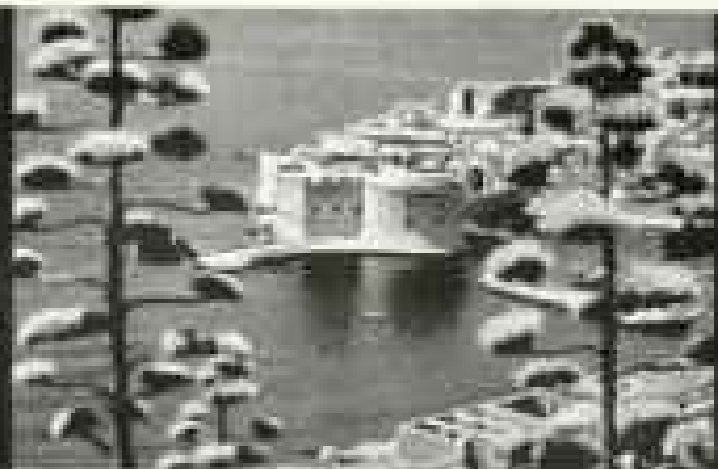
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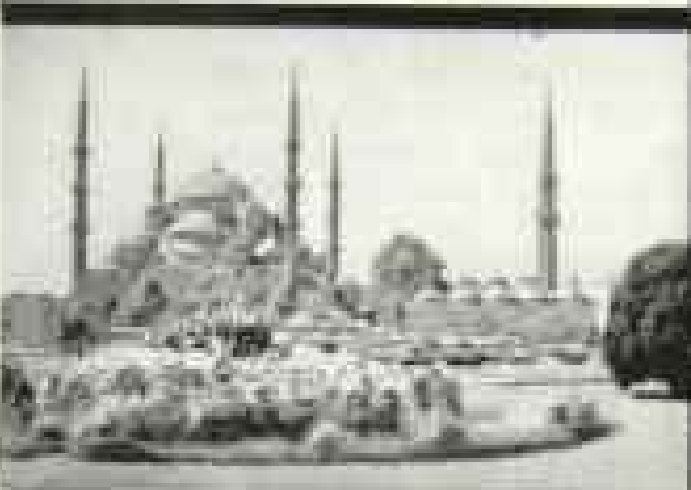


3.  View of Hardanger, Norway  
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 Tower of Belim, River Tagus, Portugal

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 "Little Mermaid", Copenhagen, Denmark

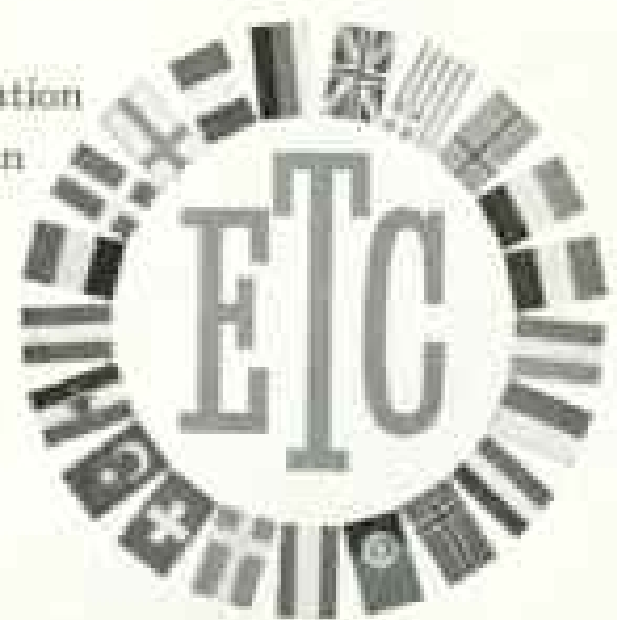
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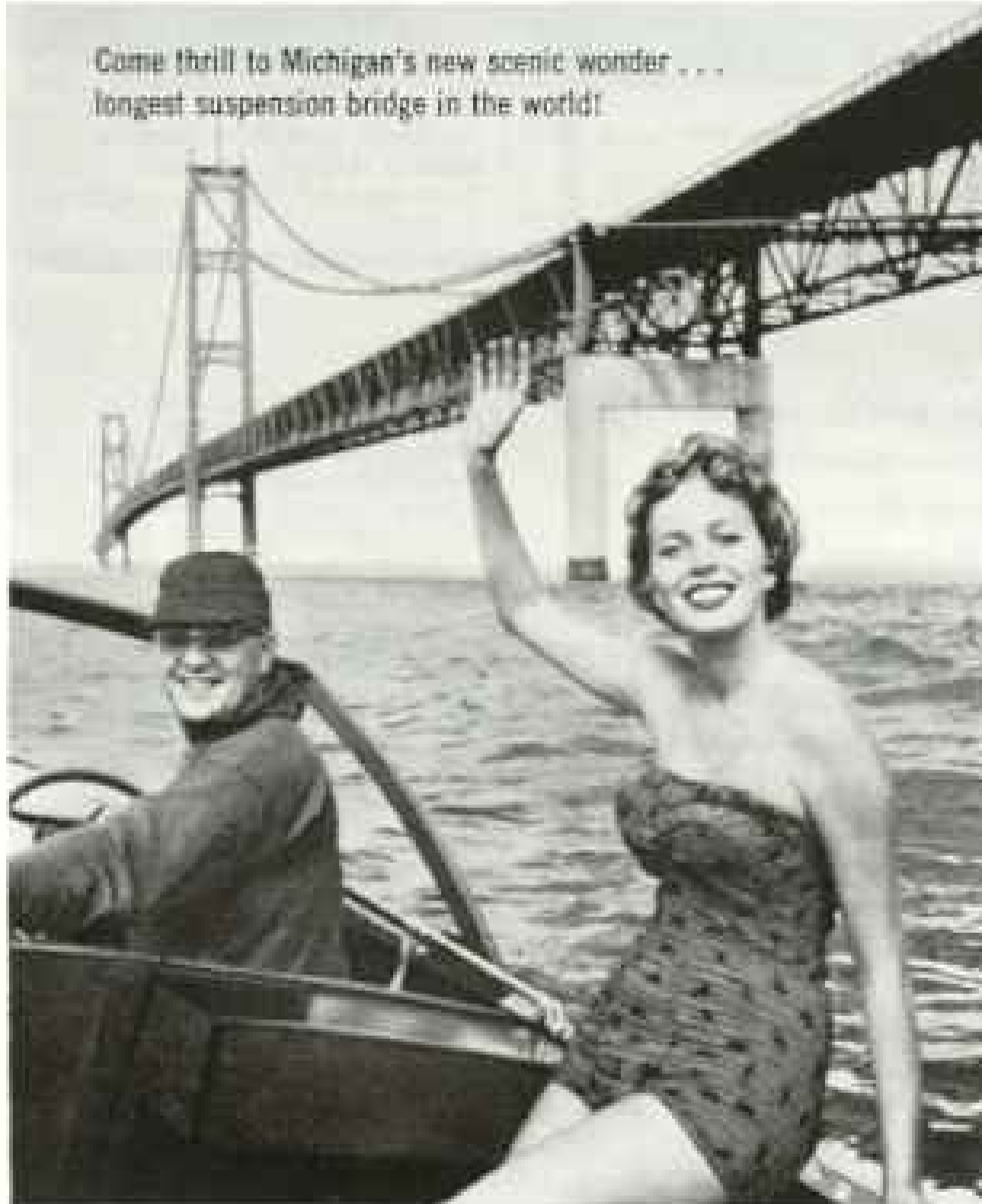
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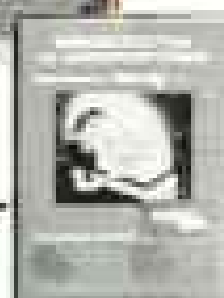
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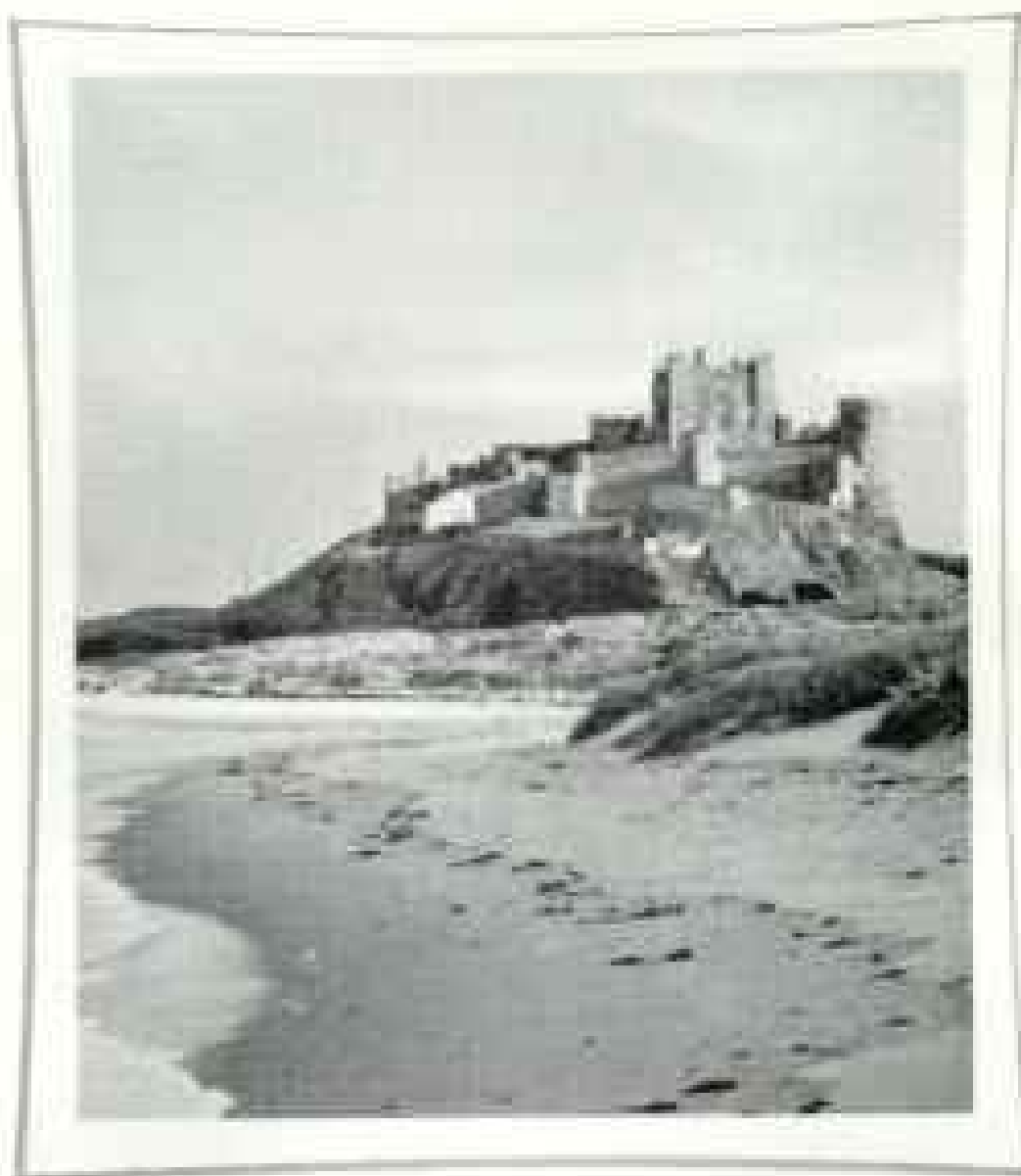
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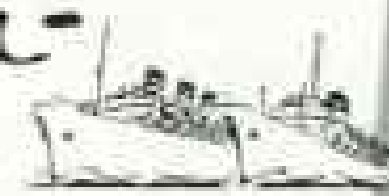
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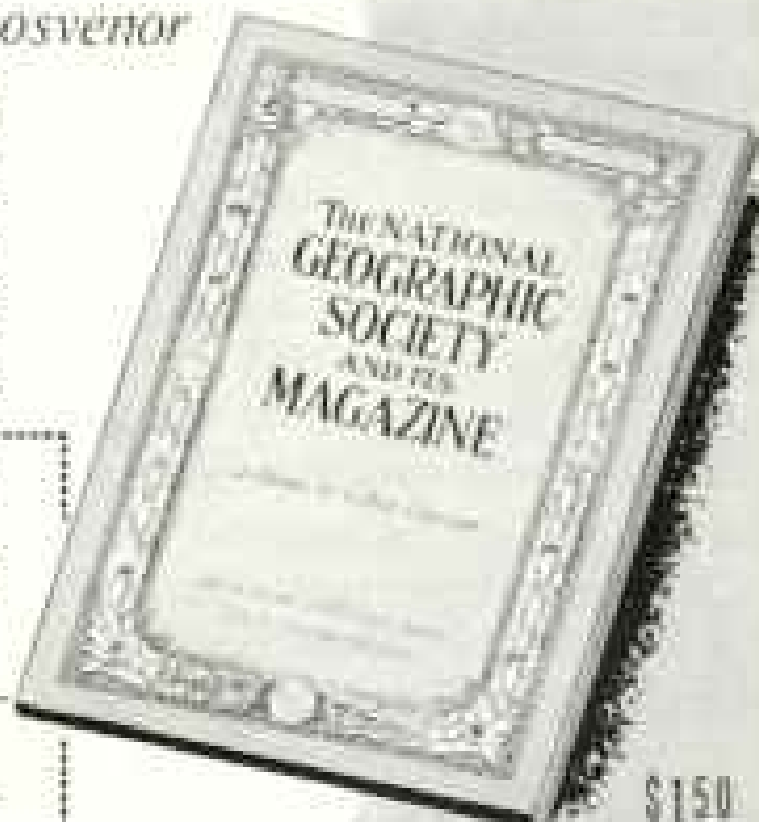
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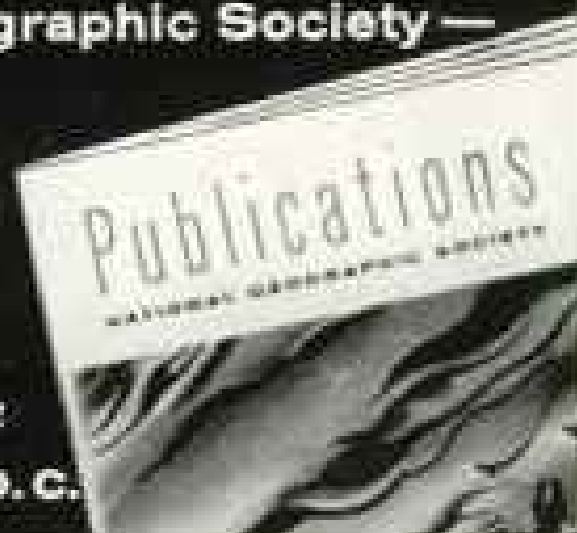
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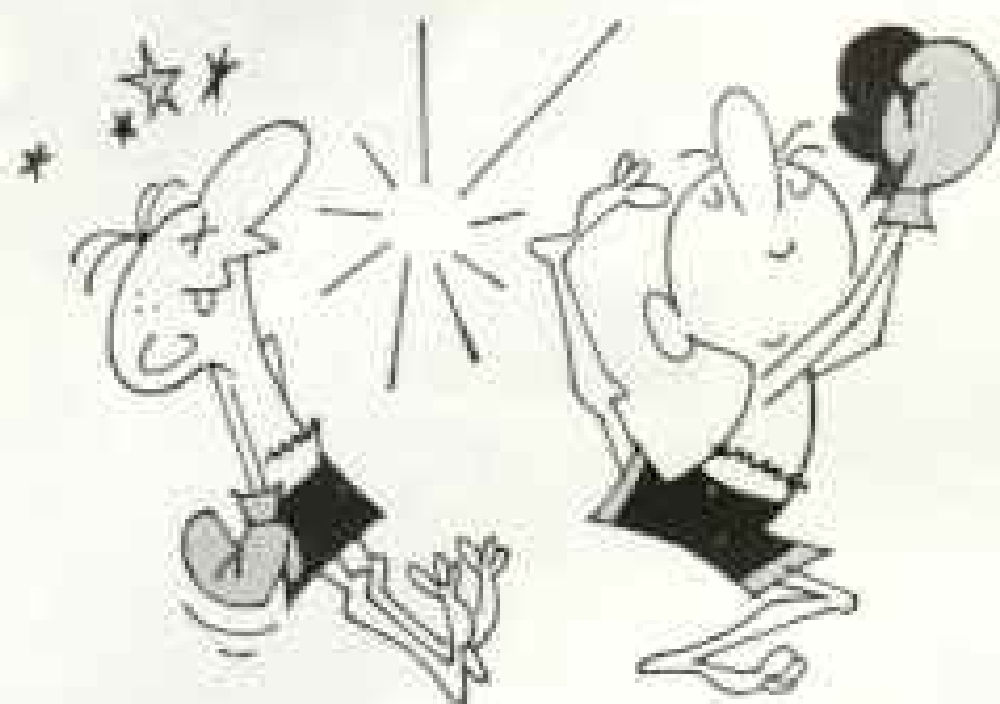
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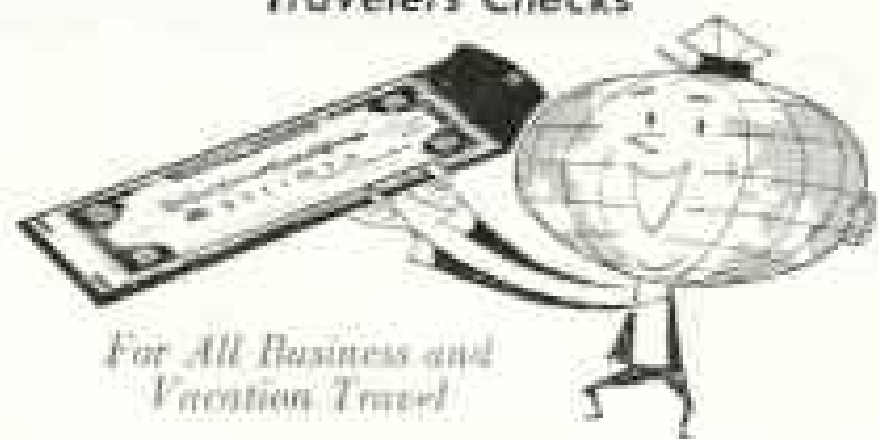
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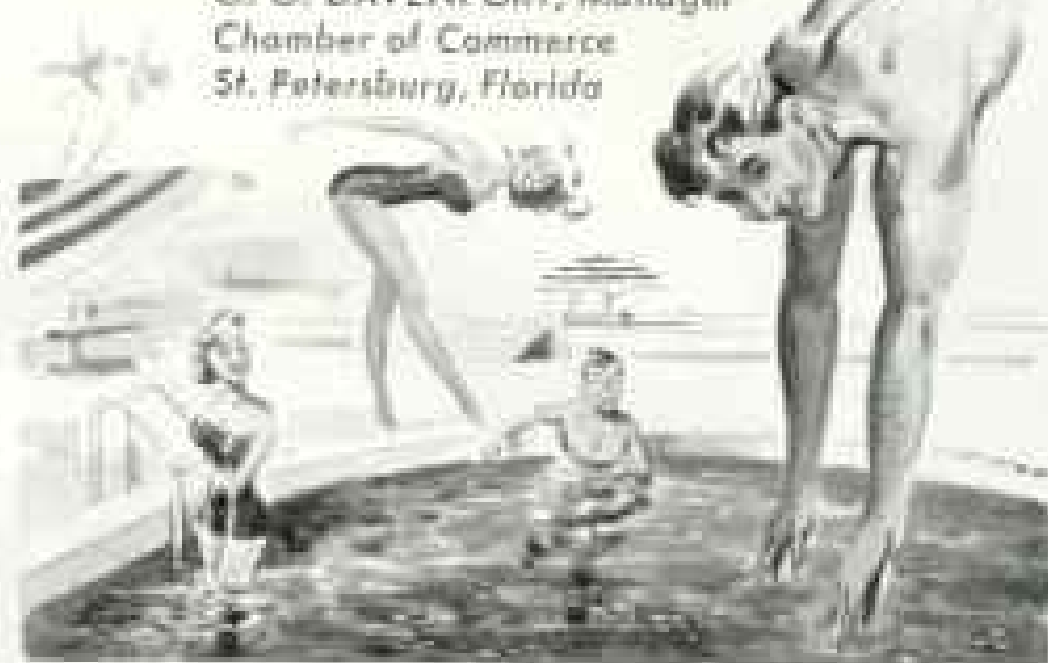
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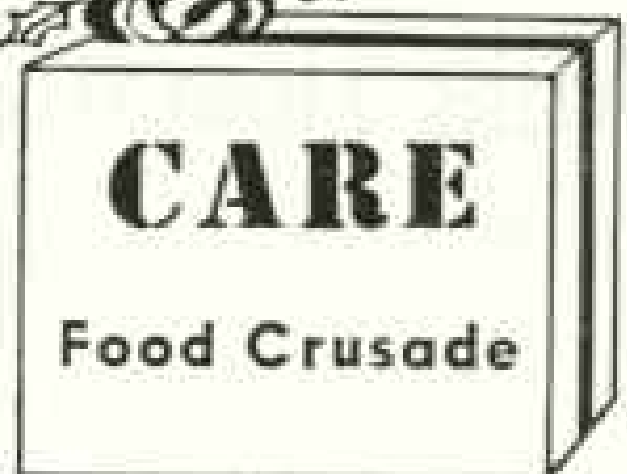


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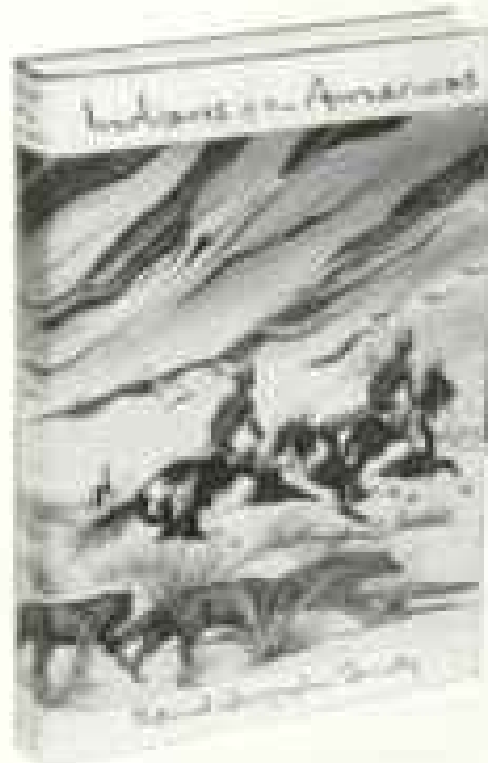
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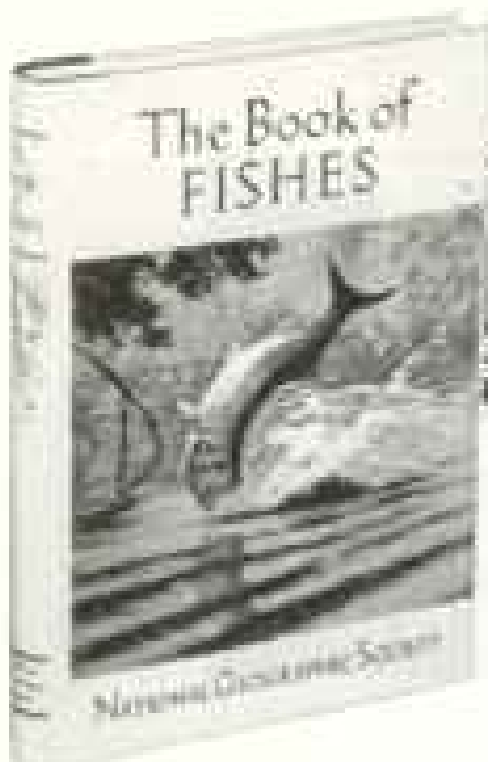
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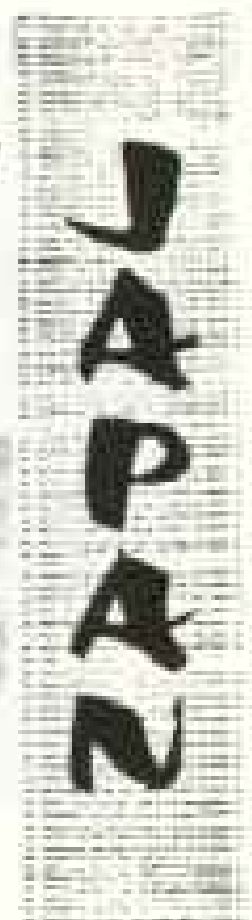
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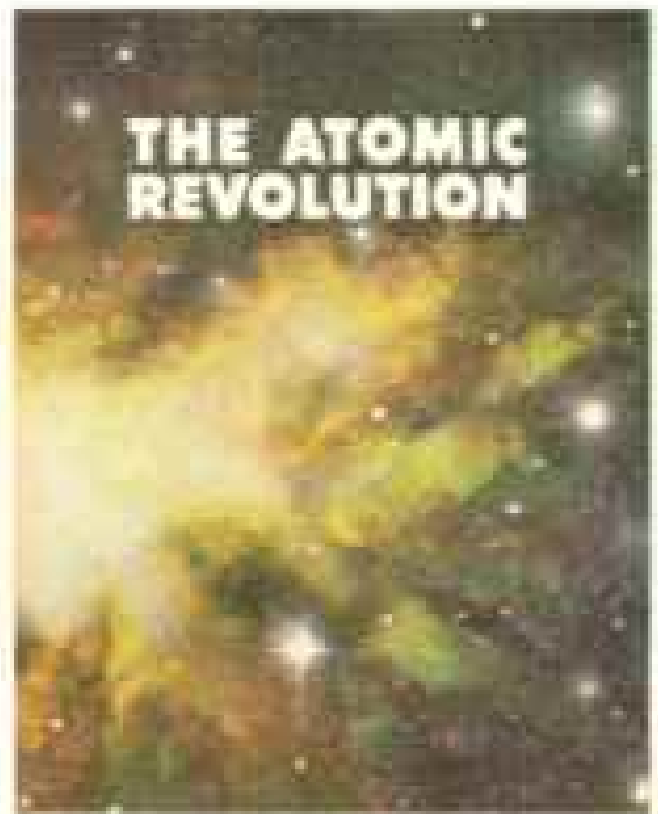
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