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## A PATRIOTIC PILGRIMAGE TO EASTERN NATIONAL PARKS

History and Beauty Live Along Paved Roads, Once Indian Trails, Through Virginia, North Carolina, Tennessee, Kentucky, and West Virginia

BY LEO A. BORAH

AUTHOR OF "WASHINGTON, THE EVERGREEN STATE," ETC., IN THE NATIONAL GEOGRAPHIC MAGAZINE

*With Illustrations from Photographs by Edwin L. Wisherd, Staff Photographer*

**T**O COMMUNE in spirit with the makers of the Nation, to recapture the poignancy of outstanding events in American history on the scenes where they were enacted, to trace again the path of Daniel Boone and the plodding ox teams that bore the pioneers to the winning of the West, and to refresh mind and body in three glorious national recreation areas, motor over the new Eastern National Park-to-Park Highway (see map, pages 666-7).

Three weeks of leisurely driving will accomplish the journey from the zero milestone in Washington, through the loveliest parts of Virginia, North Carolina, Tennessee, Kentucky, and West Virginia—from Washington's Mount Vernon to Lincoln's birthplace, near Hodgenville, Kentucky, and back to the starting point, on paved roads that unroll the scroll of history and wind through Shenandoah, Great Smoky Mountains, and Mammoth Cave National Parks. It is a trip to stir the blood of the patriot and invite the soul of the Nature lover.

### WINDING ROADS ENTWINE ROMANCE

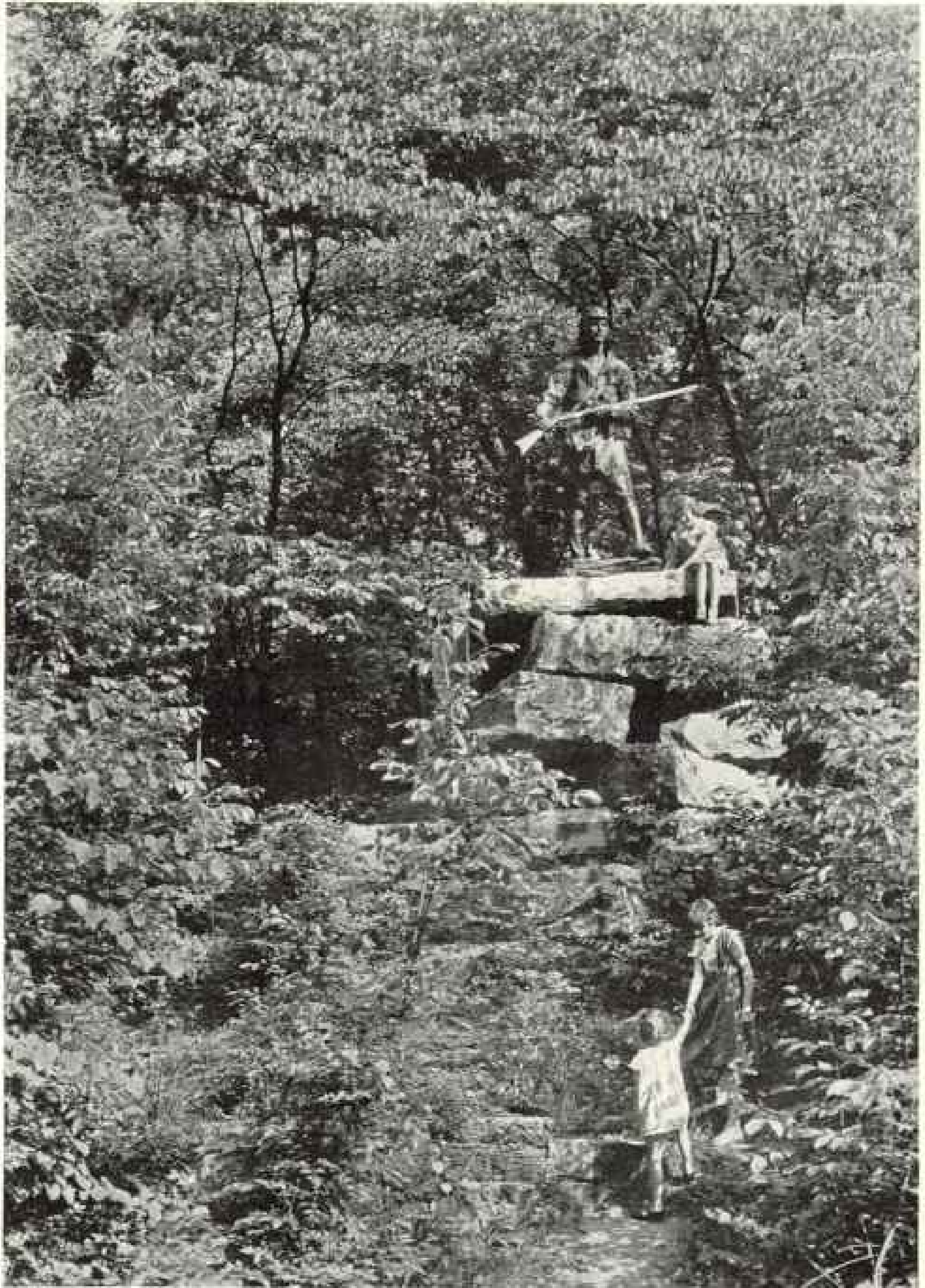
Admirably suited to lazy driving, the smooth roads vagabond in Virginia, curl in North Carolina, twist in Tennessee, corkscrew in Kentucky, and weave in West

Virginia. They follow the footpaths of roving Indians and tortuously wandering buffaloes, and afford the traveler ample opportunity for sight-seeing. They turn to sweep around mountains, to cross streams, to skirt lakes, to pass scattered houses; they turn for no reason at all. The charm of the curves is that some unexpected loveliness lies just around each of them.

Bud and I left Washington at noon of the day before Easter and sped out along the broad, straight Lee Highway (U. S. 211 and 11), which we were to follow all the way to Wytheville, Virginia. Across country rife with memories of the two campaigns of Manassas; past Bull Run, where the dreadful storm of Civil War first broke in full fury; through historic Warrenton and on to Sperryville the trail leads. Less than three hours brought us into Shenandoah National Park.

No need here to linger among the Revolutionary and Civil War shrines of Virginia; they have already been described for Geographic members.\* Only a few of them will be mentioned in passing.

\* See "Virginia—A Commonwealth That Has Come Back" and "The Travels of George Washington," by William J. Showalter, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1929, and January, 1932.



DANIEL BOONE HAS A HAPPY BACKGROUND IN CHEROKEE PARK, LOUISVILLE

In a wildwood dell the statue of the famous frontiersman, with his long rifle and fringed hunting shirt, seems almost alive. Legend says that when asked if he ever was lost in the forest, the woodsman replied, "No. But once for three days I was considerably bewildered."



#### THE PIONEER SPIRIT STILL LIVES

Rolling along the motor highway southwest of Burnside, the author and his photographer-companion came upon this old-fashioned covered wagon. It was carrying a family migrating from Kentucky to Missouri. A fair-haired little girl and her mother were riding with the grandfather, who drove the mule team. The young father walked beside the wagon. No staged performance this, but a genuine reversion to frontier days.

Stretching along the crest of the Blue Ridge, from the vicinity of Front Royal on the north nearly to Rock Fish Gap and Waynesboro on the south—65 miles long and from six to 17 miles wide—the new Shenandoah National Park embraces 327,000 acres of verdant wilderness, many of its rugged mountains and gorges still clothed with virgin timber. It is a paradise of trout streams, wildwood fastnesses, magnificent vistas—amazing proof of the vast unexplored possibilities of outdoor America; for it lies within 24 hours' motor travel of 40 million people.

#### THE NEW SKYLINE DRIVE

A new Skyline Drive along the very top of the mountain ridge was nearing completion at the time of our visit. When the wild flowers and the splendid old trees are at their best, in June, it will lure many a visitor to unsuspected delights almost at his doorstep (see Color Plates VI and VII).

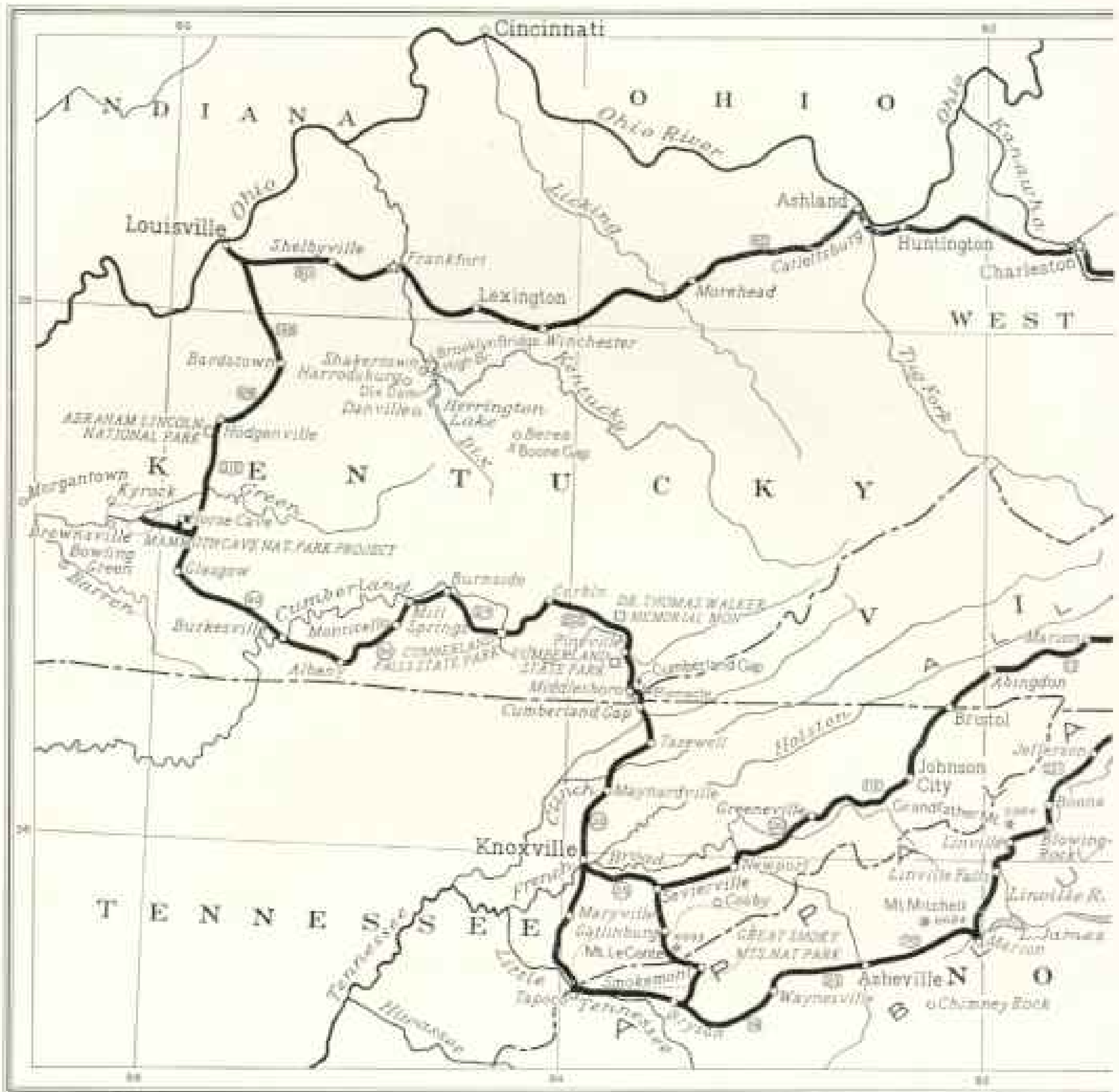
With a pang at leaving the park, already aglow with the first faint flush of coming

spring, we came by winding ways down to Luray and the cavern country of the Shenandoah Valley. Nature, not content with artistry of hill and stream, forest and meadow, has wrought there marvels of beauty underground that will repay weeks of exploration. Caves adorned with fairy-like formations thousands of years in the building beckon everywhere. To go through those that have been opened to the public is to wander in a wonderland that beggars Alice's dream.

There is much to see of both natural charm and historic interest along the highway from Luray to Lexington. We paused for a few minutes at the birthplace of Woodrow Wilson, in Staunton, having learned by inquiring of a Staunton Military Academy cadet the way to the house.

From Staunton we went on to Lexington in the gloaming; yet enough light remained for us to note the numbers on the historical markers along the road. Reference to a book obtainable in any city in the State would, we knew, supply any information.





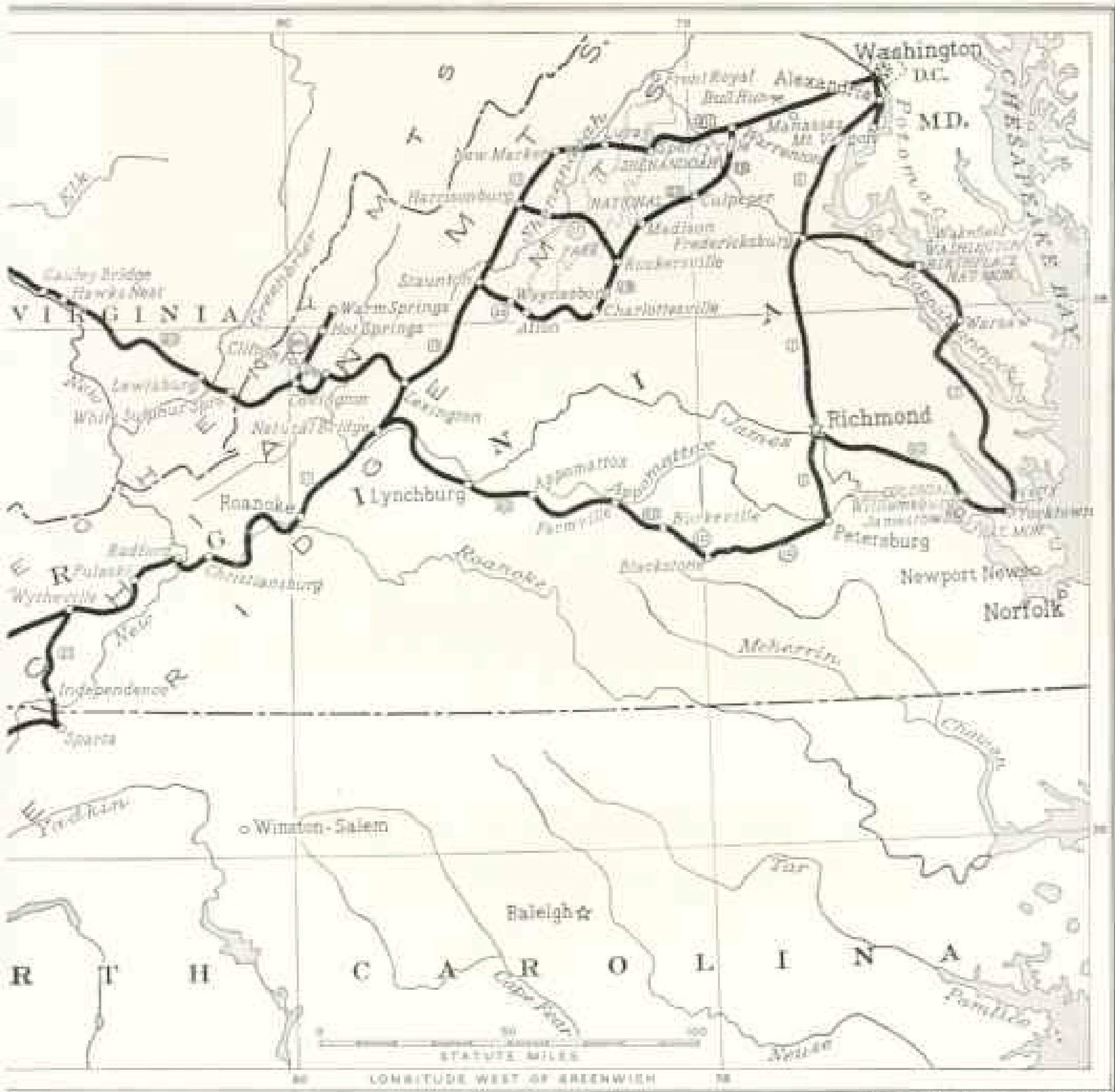
THE EASTERN NATIONAL PARK-TO-PARK HIGHWAY SKETCHES A HUGE BIRD

The beak is at Jamestown, colonial Williamsburg, and Yorktown; the eye between Fredericksburg and Wakefield, where Washington was born. Upon the head are Mount Vernon and the Nation's Capital. The old Wilderness Trail outlines the breast.

To leave Lexington without visiting Washington and Lee University, with its time-mellowed colonial Administration Hall and its gracious old Chapel, the last resting place of Robert E. Lee, "Light Horse Harry" Lee, and others of that famous family, and without driving around the drill field of Virginia Military Institute, where Stonewall Jackson taught engineering, would be sheer negligence. Campuses of both schools are redolent of the Old South. On our way out of the city we

passed the cemetery where General Jackson is buried.

The Natural Bridge of Virginia has commanded far abler pens than mine, but it had for me, nevertheless, a new thrill. As we neared the entrance, we became aware of sonorous music that echoed among the quickening hills. The music was Sir John Stainer's "Crucifixion," sung by a brilliant chorus and presented by means of a sound-reproducing device that flung the rich notes out under the arch of the bridge. The effect



Drawn by Newman Humstead

AN UNCANNY SUGGESTION OF AN AMERICAN THANKSGIVING TURKEY

The claws clutch the Great Smokies. Cumberland Gap lies tucked under the folded right wing. The tail feathers brush Lincoln's birthplace, "My Old Kentucky Home," and Louisville, city of George Rogers Clark. The entire route links famous shrines.

was unearthly—not a magnifying of the sound, but an intensification that gave an unbelievable depth and timbre to the voices. Although I disapprove usually of "painting the lily," I confess that it would be hard to imagine more impressive Easter music.

"Couldst thou not watch with me one brief hour?" The words of that touching song seemed to echo everywhere, as we swept out upon the highway through the land of American yesterdays and down to Wytheville. Spring was in the air, the

spirit of waking that brought back vividly the story not only of Calvary and the Resurrection, but of the bitter travail that attended the birth of the American Nation.

At Wytheville we came upon the first marker of the old Wilderness Trail, Daniel Boone's Path to Kentucky and the empire of the West. It is optional with the traveler whether he follows the Lee Highway along this way or turns south toward Independence and the North Carolina mountains. We chose the latter route, though



PIONEER WOMEN BRAVED INDIAN ARROWS TO GET WATER FROM THIS SPRING

Old Fort Harrod, famous haven of refuge for pioneers on the Wilderness Trail, has been restored at Harrodsburg, Kentucky (see text, page 694). The cabins were surrounded by a palisade of logs. Through loopholes in the fortification defenders fired on attacking savages. It was here that George Rogers Clark planned his campaign that saved the Northwest. The military post, established two years before the Declaration of Independence was signed, was the first permanent Anglo-Saxon settlement west of Old Fort Pitt and the Alleghenies.

for the first 36 miles the road was under construction.

It was a happy choice. Winding among and over mountains, the trail is fragrant with the clean smell of unsullied forest. Rhododendron and wild azalea crowd down to the roadside and sweep away in mounting waves to the summits of the hills. There were, of course, no flowers that Easter afternoon, but a multitude of buds gave promise of to-morrow's blaze of glory.

How I wished that our coming had been in early June instead of April! Then, from every woodland valley, from steep hillsides and swales among forest monarchs that were swaying to summer breezes while John Smith and his fellows planted their first crop at Jamestown, burst the purple, pink, and white of rhododendrons, the yellow and flame of azaleas, the sparkling hues of countless lesser flowers. Bud, on an earlier visit, had captured with his camera something of the gorgeousness of the scene the

budding bushes conjured before my fancy (see Color Plates I to VII); yet I shall never be content till I have seen the reality.

As we swung along the winding trail into North Carolina, I expected the flower shrubs to give way to less exotic growth, but to my amazement they increased in number. Fortunate the traveler who makes this journey in early June: for he will drive through a fairyland of color from Wytheville down to the Blowing Rock and Linville Falls country, across the Great Smoky Mountains, and over Cumberland Gap far into Kentucky. Such prodigality of splendor almost transcends imagination.

#### THROUGH NORTH CAROLINA MOUNTAINS BY WINDING TRAIL

Boone, North Carolina, named for the intrepid frontiersman who made his headquarters there at one time, sits in a mountain valley at an elevation of 3,332 feet. It is the home of the Appalachian Training School, for teachers. So gradual had been



KENTUCKY CHERISHES LOVELY CUMBERLAND FALLS

The river, coming to a rock cliff in a wild and beautiful gorge, drops 63 feet and rushes on in whirlpools. When the moon is full, a perfect "moonbow" appears in the mist. The recreation area was given to the Commonwealth as a State park by a native son, T. Coleman du Pont (see text, page 687).

our climb that we had not realized that we had reached such a height.

We followed New River through scenes of unspoiled grandeur to Blowing Rock, on the crest of the Blue Ridge, and there stayed the night at a rustic inn. Next morning we drove out to the towering promontory from which the village takes its name. Even one who knows and loves the eyries of the Rockies, the Cascades, and the Sierras must gaze in reverent awe at the panorama spread out below Blowing Rock (see Color Plates II and IV). Far across the forest-carpeted valley that yawns below the rock, the strange profile of Grandfather Mountain is outlined against the blue haze of distance.

Strong winds through the valley turn upward at the lip of the rock, so that hats or other light objects tossed over the edge return to the casters.

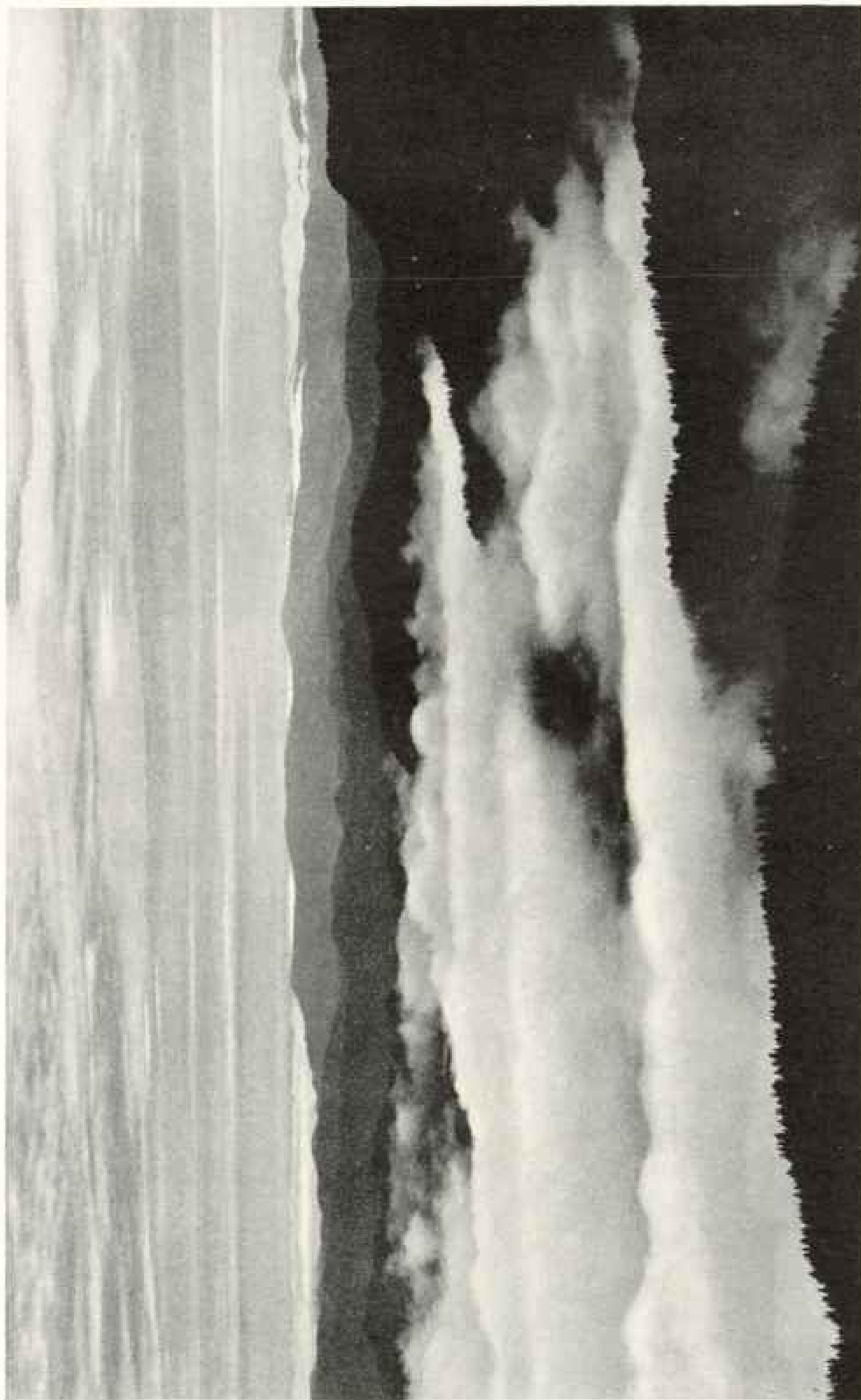
As for me, I should hesitate to risk my best hat in an attempt to prove the truth of that statement. A gentleman whom we met later on the journey said he and several companions had tossed their hats to the

breezes, and all had returned except his. The saving breeze must be high if the magic is successful.

From Blowing Rock to Linville is a succession of ever-changing views; for the road twists around high mountain shoulders, each affording an outlook more bewitching than the last. The way for the first eight miles of the 21 follows the crest of the Blue Ridge, actually surmounting it 14 times in that distance, and for the next ten miles skirts the side of the Grandfather. It is a delight to make a short side trip from Linville to Linville Falls, most graceful of the cataracts that lend charm to river scenes (see Color Plate VIII).

Mountains, as compared with the mighty peaks of the West, are not high in this part of the country, but they lack nothing in grandeur. Mount Mitchell, the "top of eastern America," thrusting its forested crown to an altitude of 6,684 feet, is clearly visible from the highway that leads from Linville to Asheville (see Color Plate VI). For a side journey, there is a passable road from the latter city to the summit.

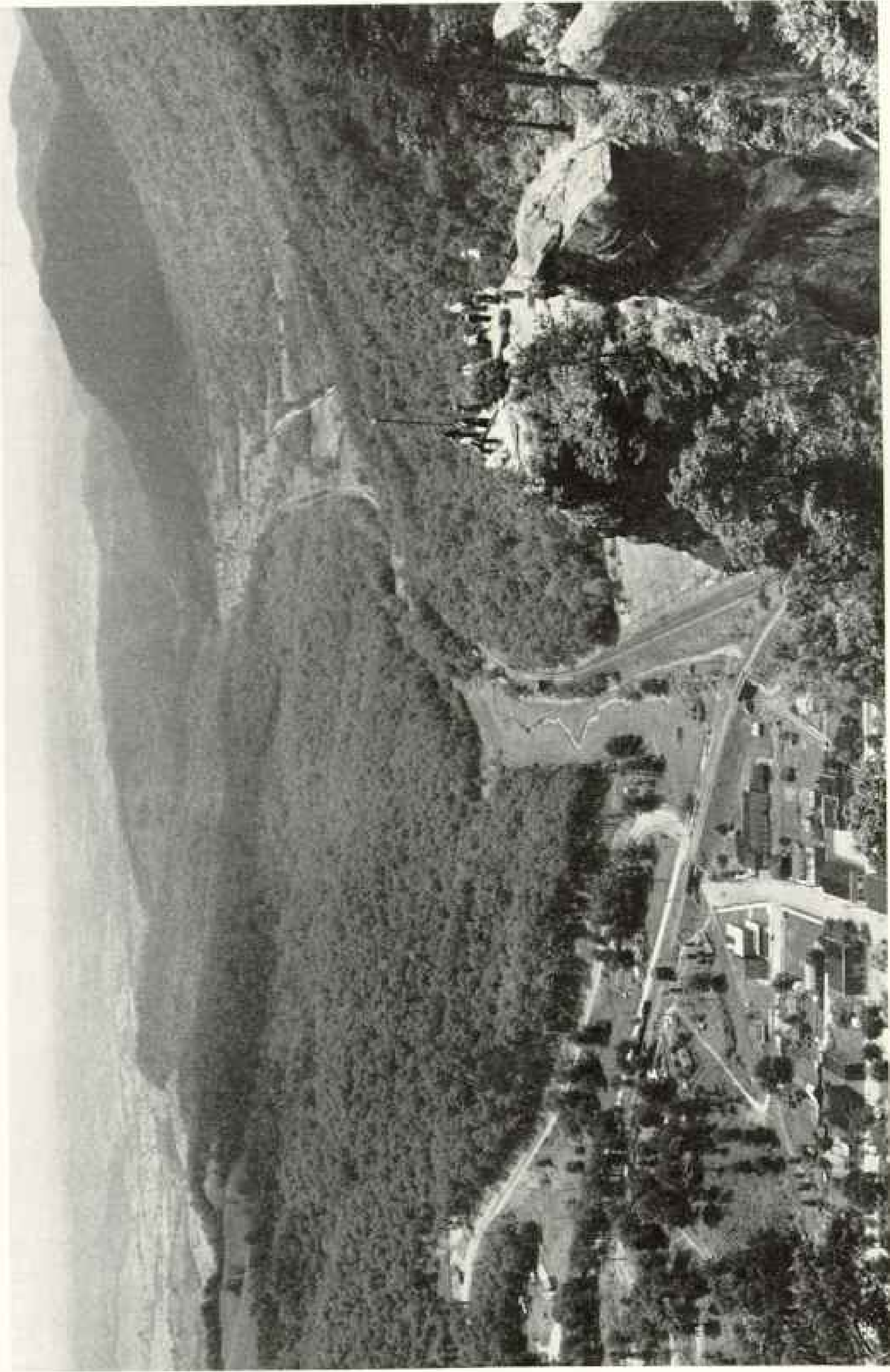




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SUNRISE AND MISTS SOFTEN THE RUGGEDNESS OF THE MOUNTAINS

From the "Grandstand of the Smokies," atop Mount Le Conte (see text, page 673), the morning view of the Tennessee portion of the park transports the beholder to fairyland. There are at least 20 forested peaks 5,000 feet or more in altitude in this region. The mystery of a blue haze constantly veils the more distant heights; hence the name Great Smokies. The far-distant ridge is in North Carolina.



THE PINNACLE COMMANDS THE KINGDOM OF THE PIONEERS

Climb up to the peak above Cumberland Gap and imagine yourself Daniel Boone blazing the trail to Kentucky (see text, page 676). You are not looking for marauding Indians, but at the town of Cumberland Gap, more than a thousand feet below, and Lincoln Memorial University (out of the picture to the left). On a clear day points in six States are visible from this cyme: Tennessee, Virginia, Kentucky, North Carolina, Georgia, and even Alabama.



THE FIRST TRAINS IN KENTUCKY RAN ON THIS TRACK

Displayed on the campus of the University at Lexington is a section of the State's earliest railroad. Its rails were steel strips laid on hand-hewn stone. In the background rises the graceful spire of the chapel.

Asheville offers a wealth of thrills for the hiker as well as the motorist. More than a hundred wilderness camps are within easy distances of the city (see illustration, page 675). Many of these are accessible only by pack train over hazardous trails.

#### RAIL FENCES HEM THE ROADS

Not the least interesting of the sights along the roads are quaint log cabins and rail fences, many of them, particularly the latter, I am happy to report, still in use and of recent construction. There are log houses and rail fences throughout the five States crossed by the Park-to-Park Highway. One old cabin we passed near Blow-

ing Rock sits secure in venerable strength; it is constructed of square-hewn timbers 24 inches wide (see opposite page).

It occurred to me on one stretch of road that the snakelike curves of rail fences offer splendid opportunities to placers of advertising signs; but the thought was unworthy, since for the most part these curious survivals of frontier civilization have escaped the attention of desecrators. The same can hardly be said of frame buildings and board fences. After reluctant contemplation of thickly scattered wayside invitations to dine, or partake of other refreshment, I am disposed to think the would-be hosts regard the motoring public as mere peripatetic appetites.

Signs are blessedly absent in the Blue Grass region of Kentucky, and it is my sincere hope that most of them will soon disappear from other parts of the trail.

From Asheville to Waynesville the road winds through country to delight the eye, but we pushed on rapidly in the hope that we might tarry a little in Great Smoky Mountains National Park and drive on to Cumberland Gap by nightfall. We planned, however, without taking into consideration the tortuous curves and detours we were to negotiate in passing over the mountains.

Civilian Conservation Corps men were at work on many stretches of the road, and I pause to pay tribute to the yeoman service they are rendering. By the time summer motor travel gets under way the highways of the Smokies will be in excellent condition.

We entered the park near the town of Bryson, North Carolina, taking the route that emerges at Gatlinburg, Tennessee. It would have been pleasant to essay the new trail which one day will follow the backbone of the ridge the length of the recreation area, but that way is not yet ready for automobiles. Enough for us to pass through the center of the wilderness.

Let no devotee of Yellowstone or Glacier scorn the Great Smokies. There are in the park area more than 20 peaks which rise to a height of 5,000 feet, offering good sport to the hardest alpinist. In climbing Mount Le Conte, 6,593 feet (see illustration, page 670), one makes a path through a tangle of wild flowers and trees, ranging from the common southern species at the foot to northern Canadian varieties at the top. There are 565 kinds of flowering trees, shrubs, and plants in the Great Smokies; of these 362 bloom before July 1 and 203 later. The list has been recorded by scientists from the University of Tennessee.

In all the maze of flowers, none is lovelier than the rhododendron, which blooms throughout the summer, flinging its rosy fire to the tops of the highest peaks. Mountain-laurel also grows in abundance, mantling gullies and steep slopes. A well-nigh impenetrable undergrowth, it furnishes hiding places for black bears and other animals.

The park contains 428,000 acres, some of it still occupied by settlers. As we rounded a curve on the North Carolina side, we were accosted by a boy of 12, a sturdy, bright-eyed youngster. He asked



MASSIVE TIMBERS WENT INTO CABIN WALLS.

Twenty-four inches wide are the hand-hewn logs of this old house near Blowing Rock, North Carolina (see opposite page). Such construction must have given pause to attacking Indians.

for money in a dialect that is well worth a coin to hear.

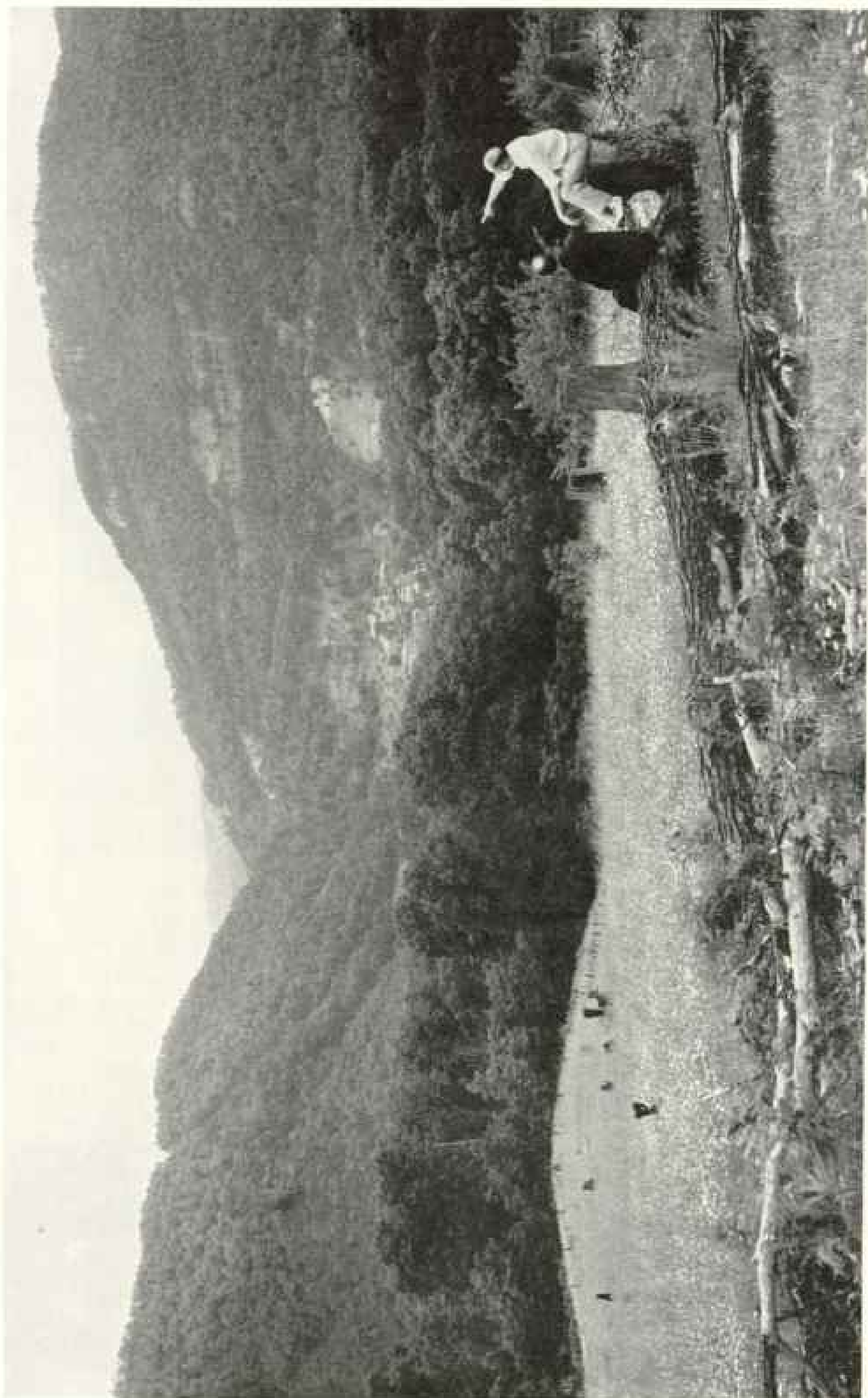
#### QUAINT SPEECH LINGERS IN THE SMOKIES

As I fished in my pocket I thought of the Elizabethan English spoken by the old folk of the Hatteras Bank islands.\* No modern slang in this boy's vocabulary, but a quaint speech that Defoe might have heard in the English hedgerows.

The boy said he and his "motheh lived aroun' the corneh yondeh"; but since Bud

\* See "A Bit of Elizabethan England in America," by Blanch Nettleton Epler, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1933.





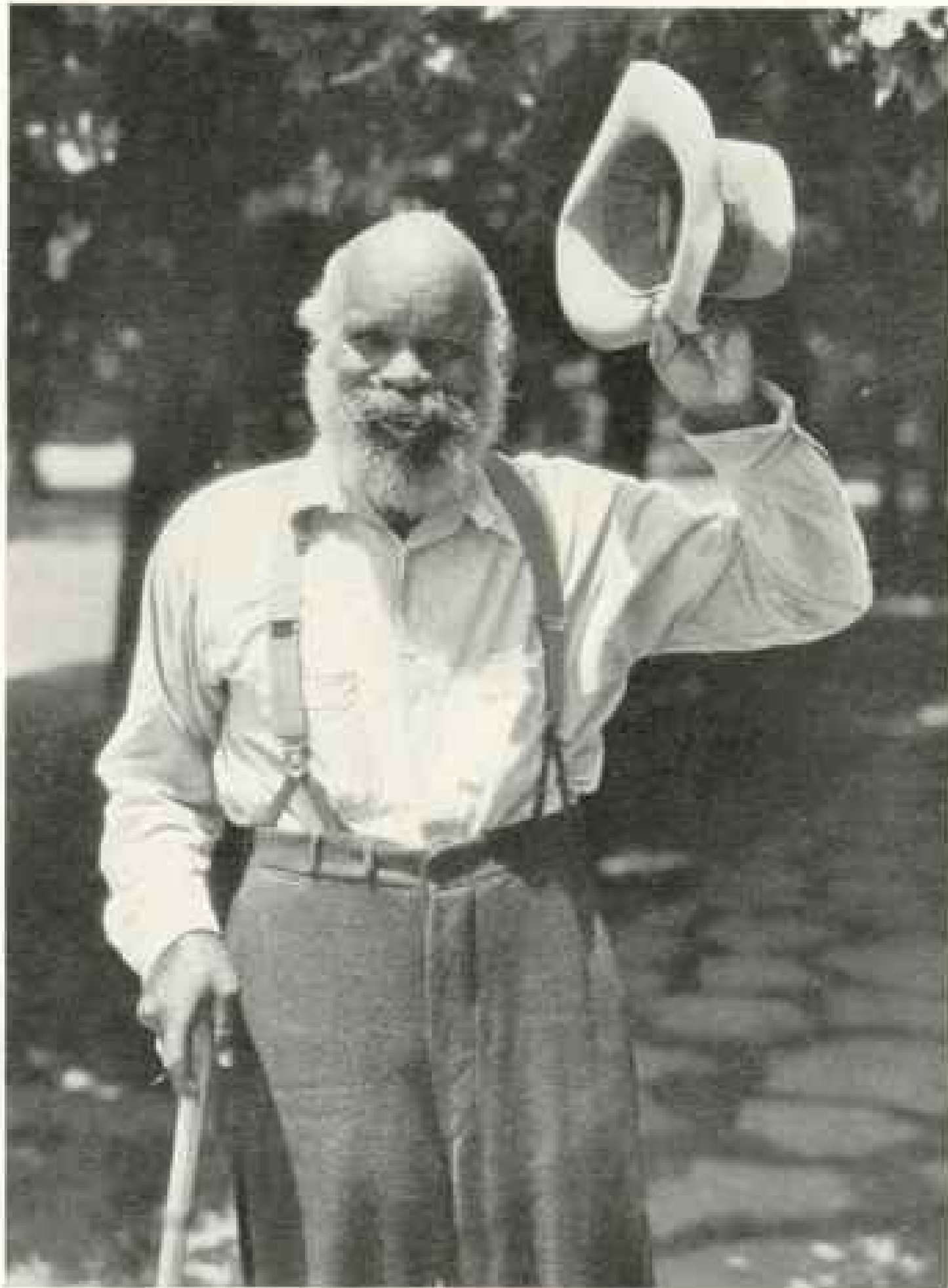
BEYOND THOSE HILLS LIES KENTUCKY

Below the saddle of Cumberland Gap nestles the town of that name. Up to this pass pioneers toiled with long trains of ox teams—the Walkers, Boomer, Todds, Clays, Lincolns, and a host of others (see text, page 677). The small notch in the tree line on the mountain at the left is where Virginia, Tennessee, and Kentucky corner (see map, pages 566-7). Perched high on the opposite side of the valley is the Pinnacle (see illustration, page 671).



WHAT A PLACE FOR A CAMP, BESIDE A TREASURE STREAM OF SPECKLED AND RAINBOW TROUT!

The Great Smoky Mountains National Park affords thousands of such delightful recreation spots. They may be reached in a day's hike or in a week's journey by pack train (see text, page 672). This idyllic scene is near Smokemont, North Carolina.



"UNCLE REMUS" BELONGED TO "MY OLD KENTUCKY HOME"

Once a slave on the Rowan estate near Bardstown (see text, page 688, and Color Plate XV), the old fellow seemed a part of the surroundings, entertaining visitors by playing Stephen Foster melodies on a harmonica. He died several months ago.

and I caught no glimpse of a habitation where he pointed, we are of the opinion that he was an old hand at the game. His blue jeans were patched, but clean. His ruddy little face wreathed in an engaging smile as he thanked us. I hope he had as much joy out of that coin as we purchased with it.

Blue distances charm the sight at every turn in the road. That glamorous veil of mystery has given to the glorious mountains their name, the Great Smokies. Easterners who have not suspected the presence of this vast area of unspoiled Nature have a treat in store for them.

Gangs of men, many of them C. C. C. crews, were toiling to straighten curves and improve the road. We bumped over a precarious detour as we crossed the line that divides North Carolina and Tennessee. The two States share about equally in the recreation area.

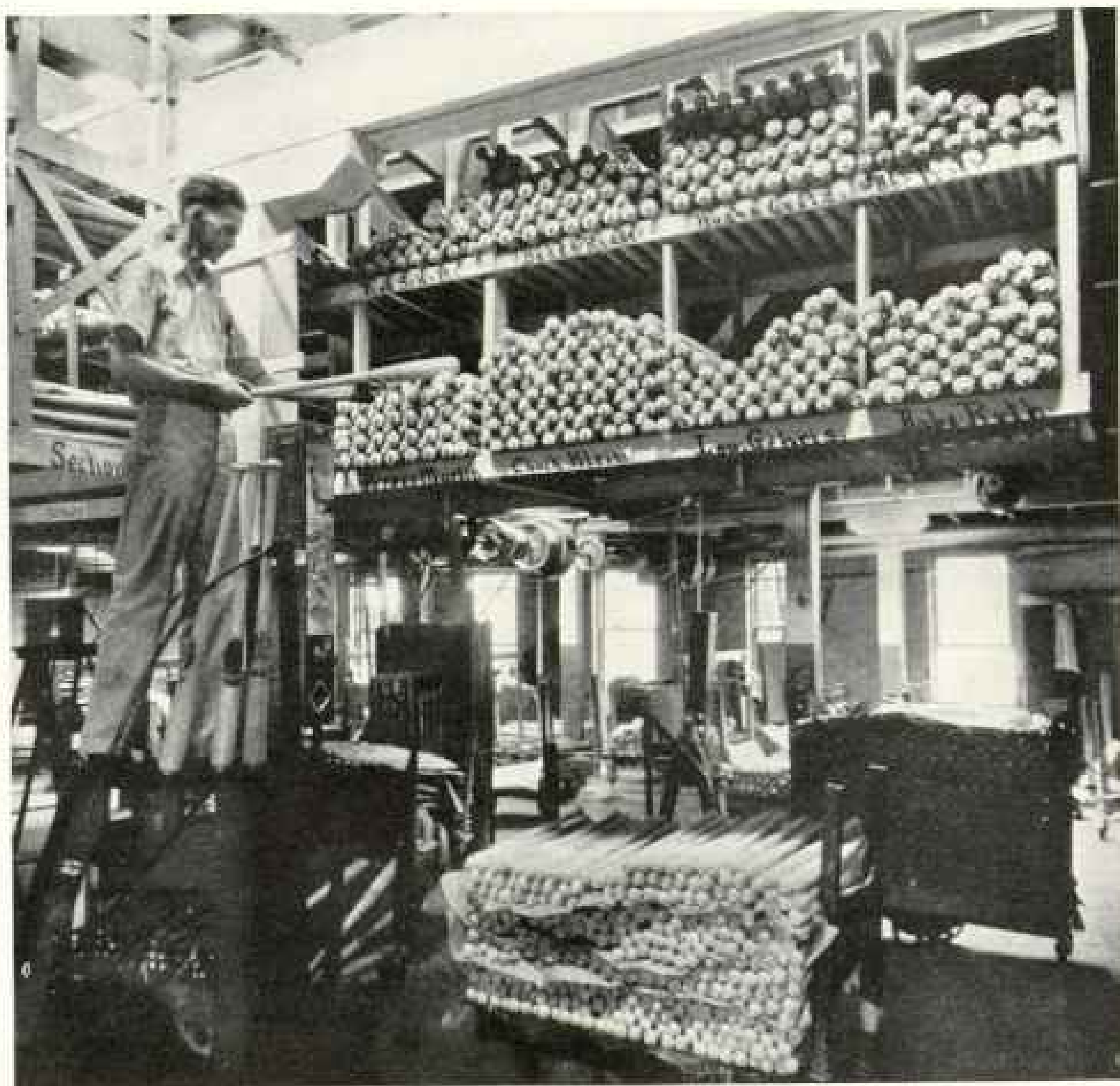
Down from the mountains we twisted, driving of necessity slowly enough to look to our hearts' content over the alluring vistas. I shall not soon forget the faint stirring of spring in the Smokies. The fulfillment of flower promise must make of the entire park a snare of loveliness.

#### THE TENNESSEE VALLEY DAM

At Knoxville I found an old college acquaintance in charge of the personnel of the Tennessee Valley Authority's projects. He had given up his educational work at Chicago University, he told me, to have a part in "the most interesting development in America today." Four miles

from the Park-to-Park Highway an hour's drive north of Knoxville, the Authority is constructing a mighty power dam which will serve the entire valley. About 20,000 workers are engaged in this enterprise.

We did not inspect the dam, but after a night in Knoxville hurried on toward Cumberland Gap, needle's-eye gateway to Kentucky. We were on the trail of the pioneers, and my pulse quickened as our road climbed toward the famous eyrie from which Dr. Thomas Walker, and after him Daniel Boone, looked into what to them was a Promised Land.



"LOUISVILLE SLUGGERS"—WHERE HOME RUNS ARE BORN

One of the best-known products of the Kentucky metropolis is the baseball bat (see text, page 690). In this factory special orders are turned out by hand for famous players and carefully segregated in separate racks labeled with their respective names. Carloads of machine-made bats go out at the beginning of each season to gladden the hearts of American youth.

Over this trail had come the Boones, the Walkers, the Todds, the Clays, the Lincolns, and a host of others. Twenty thousand settlers had passed the gap in a single summer. It was the high tide of westward expansion.

We passed, on the Tennessee side of the gap, Lincoln Memorial University, a school where mountain young folk are taught handicrafts and given other more formal education.

Lincoln, it is said, asked a friend who was eager to do good with his fortune, "Build a school for my people."

The college, like Berea in Kentucky,

ministers to the needs of the mountain people, the people of Lincoln. It is admirably situated and well endowed.

CLAY PASSED THIS WAY IN 1797 AND YEARLY THEREAFTER

From the town of Cumberland Gap, Tennessee, it is a short drive on an easy grade to the gap. However, as our car climbed the height, my thoughts were of the toiling ox teams that followed dim buffalo trails over the same way at the close of the 18th century.

About 1850, long after the first influx of settlers, Henry Clay came from his



home in the Blue Grass, Lexington, Kentucky, to speak to the mountaineers at the gap. He rode to the foot of the mountain and paused. His companion asked the cause of the halt and Clay's silence.

"I am listening," Clay is said to have replied, "to the tread of the coming millions."

Millions indeed have passed through that gateway. Before George Rogers Clark defeated the British and Indians at Vincennes (see text, page 690), the old Wilderness Trail, first traveled by Doctor Walker in 1750 and opened by Daniel Boone in 1775, was the only reasonably safe way into Kentucky. Marauding braves made the Ohio River route perilous, and the Midland Trail was little better.

The highway deviates little from the Wilderness Trail. We drove into the gap and on up a series of switch-backs to the summit of the Pinnacle (see illustration, page 671), whence on a clear day six States are visible. Kentucky, Virginia, and Tennessee corner near the gap, and glimpses may be had of mountains in North Carolina, Georgia, and Alabama.

To me our coming to Cumberland Gap was the supreme thrill of the trip thus far. I stood on the Pinnacle, perhaps on the very spot, to which, just at the beginning of the last century, my own great-grandfather had climbed to look for Indians while his family and friends waited anxiously before daring to pitch camp below.

If I may be pardoned the personal reference, I shall tell the story my father had from his grandmother.

"The cattle," she said, "couldn't go any farther when we got where the road comes into Kentucky. We had to rest. Father climbed up on a mountain to look for Indians. He didn't see any; so we built a fire and cooked supper. That night a wild cat got after one of our steers, and father took the terwolloper out of the wagon and shot the varmint off the steer's back."

The "terwolloper," I am told, was a long rifle. A gentleman in the West Virginia mountains showed me one he had obtained from an old-timer, who said it was "so long a person had to back out of the woods to turn around with it."

Daniel Boone's son James was killed within 12 miles of Cumberland Gap, in 1773, when Indians attacked a party of four families the great woodsman was leading into Kentucky. So discouraged were

the would-be settlers by this misfortune that they turned back.

Boone returned with Michael Stover in 1774, making a trip of 800 miles in 68 days and warning hunters of the approach of hostile Indians. In 1775 the Cherokees sold to the Transylvania Company for 10,000 pounds sterling their claim to Kentucky, and Boone with a party of 30 axmen blazed a path to the newly acquired land. Legend is that the Cherokee chief who accepted the purchase price spoke of the land as the "Dark and Bloody Ground," a name which has clung to that part of Kentucky to this day.

From tales of the pioneers to golf seems a far cry; yet we came down from the Pinnacle and Cumberland Gap to Middlesboro, Kentucky, which boasts next to the oldest golf course in the United States. The course was laid out by an Englishman who had made his home there.

#### EVERY MAN HAS HIS OWN COAL MINE

We stayed overnight at Middlesboro and set out betimes the following morning for Cumberland Falls State Park. Coal is so plentiful in this part of Kentucky that farmers and even some city dwellers have private mines in their own back yards. We were told in Middlesboro that plans are under way to utilize the coal for by-products. The Chamber of Commerce building in Middlesboro is built of lumps of coal laid in the wall like field stone.

The road between Middlesboro and Pineville curves so many times and so apparently without purpose that Bud was moved to sarcasm.

"I know why they wind it around," he said; "it has to go past all the neighbors' houses."

That was as good an explanation as I could offer. When we came upon a straight stretch of 20 miles, beyond Albany, we were in high fettle, but our spirits were a little dampened upon a Burkesville attorney's telling us he believed the engineer who laid the grade had been relieved of duty. It was thought he had made a mistake and run a line for a railroad.

Near Corbin stands a restoration of the cabin built by Doctor Walker in 1750, the first white man's house, it is said, west of the Alleghenies. Cumberland State Park is a recreation area now being developed between Middlesboro and Pineville.

## WILD GARDENS OF THE SOUTHERN APPALACHIANS



WEST VIRGINIA'S NEW CAPITOL NESTLES AMID THE ALLEGHENIES

As the motorist approaches Charleston on the Midland Trail and rounds the nose of a ridge, this stately structure suddenly stands revealed in all its grandeur. Designed by Cass Gilbert, it takes the place of a predecessor, burnt in 1921. The gilded dome sparkles high above the Kanawha River.



© National Geographic Society

Finlay Photographs by Edwin L. Wisner

DO YOU LOOK FOR BEAUTY? THEN GO UP INTO THE MOUNTAINS!

The new Skyline Drive, now being extended along the tops of mountains, will link these two national parks of the East, the Shenandoah and Great Smoky. For 300 miles it winds through such scenes in western North Carolina, Virginia, and Tennessee. State highways lead off to the South's sacred shrines.



AZALEAS CARPET THE HILLSIDES OF HISTORIC WATAUGA COUNTY, NORTH CAROLINA

It was in such colorful areas on the Tennessee-North Carolina frontier that hardy pioneers battled, some to set up and others to overthrow the short-lived but romantic State of Franklin, which eventually became Tennessee.



© National Geographic Society

Finlay Photographs by Edwin L. Wisard

GRANDFATHER MOUNTAIN LOOMS WHERE WILD FLOWERS BECOME GARDEN FLOWERS

Rhododendrons, which grow so profusely in this region that they lend the tree-clad hillsides a pinkish glow, are skillfully employed to give perspective to the far-reaching panorama which this summer resident near Blowing Rock enjoys from her front yard.



## WILD GARDENS OF THE SOUTHERN APPALACHIANS



FROM HIS LOFTY LOOKOUT, A YOUNG TARHEEL SCANS A FIELD OF WHITE CEDAR.

Spreading far below lies Lake James, created by damming two rivers and a creek and uniting their impounded waters by canals. Scores of such placid man-made lakes dot North Carolina's landscape and furnish power for varied industries.



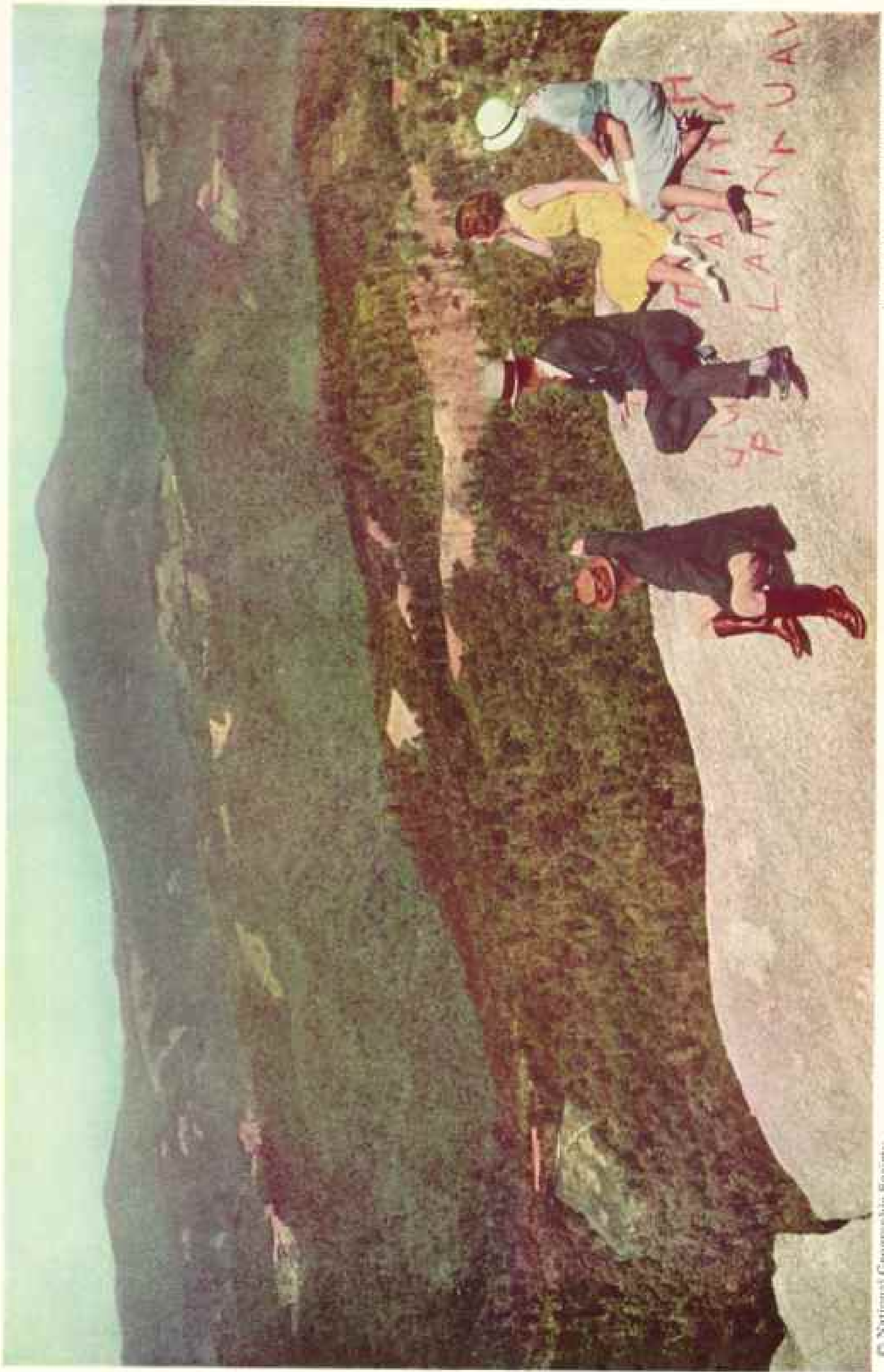
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Friday Photographs by Edwin L. Wisner

### ON THE ROAD TO RHODODENDRON LAND

When driving along these winding lanes of the southern highlands, the visitor meets in many a hidden cove the friendly descendants of that sturdy stock which produced such men as Abraham Lincoln, Daniel Boone, Andrew Jackson, and Admiral Farragut.





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FARM PATCHES MAKE A CRAZY QUILT OF NORTH CAROLINA'S ROLLING RIDGES

Victory Photograph by Edwin L. Whittell

From this high cliff, according to legend, an Indian boy threatened to hurl himself unless his sweetheart reconsidered her refusal to become his bride. In obedience to her father, the tribal chief, she rejected him again, and her lover leaped—but the winds of Blowing Rock blew him back into her arms. Declaring her choice had been made by the Great Spirit, she defied her stern father and followed her lover into the wilderness. Strong winds at times create ascending currents that blow back light articles thrown from the ledge. In the distance is Grandfather Mountain (see Plate II).



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MANY BRIDLE TRAILS OF TODAY WERE THE INDIAN WARRATHS OF LONG AGO.

Field Photograph by Robert L. Whitford.

Visiting riders marvel at the missed beauty of North Carolina's rhododendrons, but to local mountaineers these impenetrable thickets are known as "bells."



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Finlay Photograph by Edwin L. Wishard

SHOWY FLOWERS BORDER THE ROAD TO THE ROOF OF EASTERN AMERICA

From early June to late July, the mountain highways between the Great Smoky and Shenandoah National Parks are ablaze with rhododendrons. In the right background towers Mount Mitchell,



© National Geographic Society

Natural Color Photograph by Laurence V. Jolliffe

EVEN THE MOUNTAINER IN HIS LOG CABIN LOVES A GARDEN

This hand-hewn hut, with its modern roof and hollyhock setting, clings to the hillsides along Spottswood Trail. When the United States takes possession of the Shenandoah National Park, 400 families now living there will be placed in new homes outside park boundaries.



WILD GARDENS OF THE SOUTHERN APPALACHIANS



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Natural Color Photograph by Laurence V. Jolliffe

LAUREL LENDS ENCHANTMENT TO BLUE RIDGE LANDSCAPES

Contractors have already begun a new sector of the famous Skyline Drive, climbing the distant mountains, which form the northern end of the Shenandoah National Park.



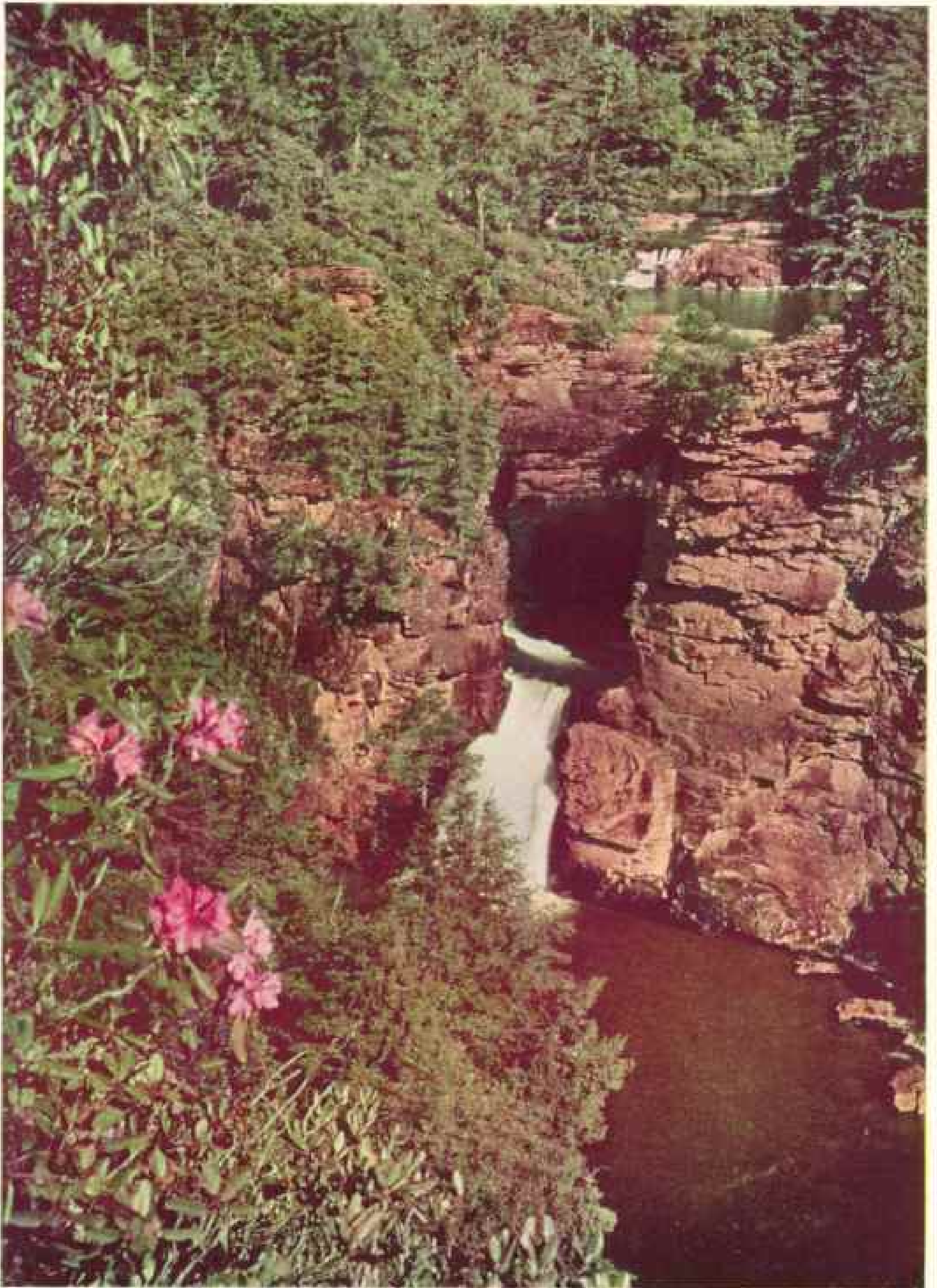
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Natural Color Photograph by Clifton Adams

DIANA WELCOMES A VISITOR IN THE NEW GARDEN OF CHATHAM

To this historic estate on the Rappahannock, George and Martha Washington came on their honeymoon and here Robert E. Lee and Mary Randolph Custis plighted their troth. Before the Battle of Fredericksburg, General Lee refused to bombard the place, although it was a Federal headquarters.





© National Geographic Society

Finlay Photographs by Edwin L. Wisland

THE LINVILLE FALLS ARE VISIBLE REMINDERS OF THE ANCIENT WARFARE OF RIVERS

Long ago, a large two-pronged river drained the canoe-shaped valley lying between the Blue Ridge and the Great Smokies. Pirate rivers, including the Linville, wore deep gorges such as this through the mountains and then parceled out all the waters of the one-time mighty stream. (See "Pirate Rivers and Their Prizes," by Dr. John Oliver La Gorce, in the National Geographic Magazine, July, 1926.)

We had not traveled far in Kentucky when we came upon a wide paved road of Kentucky rock asphalt. This product comes from quarries at Kyrock. It is dug, crushed, and shipped to paving contractors just as it comes from the ground. All that is necessary to make paving of it is to flatten it into place with heavy rollers. No heat is required.

The asphalt is mined by mountain people, many of whom are illiterate. The company responsible for the development has built schools, and the workers are eager for education.

Cumberland Falls State Park is one of the loveliest bits of scenery in Kentucky. The Cumberland River, which has cut there a deep gorge, plunges over a wide rocky bench in a cataract of remarkable beauty. Of its charms, the most unusual is a "moon-bow," a spectrum conjured in the mist below the falls by bright moonlight.

The park is a gift to the State from a native son, the late T. Coleman du Pont. It is noteworthy not only because of its natural beauty, but by reason of its being set aside as a recreation area despite the untold wealth of water power that had to be abandoned to conserve it.

#### KENTUCKIANS FOLK OF CHARACTER

That Kentuckians are capable of fine sentiment is attested by the famous Louisville editor, "Marse Henry" Watterson, who wrote:

"Ah, yes; we have our humors along with our heroics, and laugh anon at ourselves, and our mishaps and our jokes; but we are nowise a bloody-minded people; the rather a sentimental, hospitable, kindly people, caring perhaps too much for the picturesque and too little for the consequences. Though our jests be sometimes rough, they are robust and clean. We are a provincial people and we rejoice in our provincialism."

"Once a Kentuckian, always a Kentuckian" is a phrase that finds proof in the gift of Senator Du Pont, who acquired the major part of his fortune elsewhere, yet held in loving remembrance the place of his birth.

Our next overnight halt was at Mammoth Cave National Park, an area soon to be cleared of settlers and developed by the Federal Government. Some 46,000 acres of land, much of it magnificent virgin

forest, will be included in the park. In the long struggle to establish this national park, Maurice H. Thatcher, for many years U. S. Representative from Kentucky, was a prime mover. Mr. Thatcher was also originator and sponsor of the Eastern National Park-to-Park Highway project.

Discovered in 1803, Mammoth Cave was considered the largest national cavern in America until the exploration of the Carlsbad Caverns, in New Mexico. We went a little distance into the old cave, where wooden pipes and vats used in obtaining saltpeter for making powder for the War of 1812 are still intact.

The underground passages are of remarkable extent, probably undermining the entire area of the proposed park development. Almost every dweller in the neighborhood has a cave of his own, to which he seeks to attract visitors.

Underground rivers in which swim eyeless fish are a weird feature of the caves (see Color Plate X). Besides these there are vast stalactites and stalagmites, the best of which we saw in the part of the cavern reached through the New Entrance. A "frozen Niagara" of salmon-colored rock (see Color Plate XI, right) and a stalactite which, when illuminated by an electric light placed behind it, shadows the perfectly molded form of a beautiful woman stepping down as if to bathe in the subterranean river, are unique.

There are onyx caves and crystal caves; one might profitably pass weeks going through them all. It was in one of these that Floyd Collins met his death.

Beyond Mammoth Cave to the west winds the beautiful Green River, known as one of the deepest fresh-water streams in the country. Beside it my great-grandfather made his home on a Revolutionary War land grant. He established Borah's Ferry, which still operates near Morgantown.

In this neighborhood was shed the first Kentucky blood of the Civil War, when Granville Allen was shot. Families were torn asunder by the difference of allegiance. My aunt stood pleading with a man she had known as a neighbor, as that erstwhile friend, turned guerrilla, shot and killed her husband, who was attempting to escape by swimming his horse across the Green River.

Few States knew the horror of Civil War as did Kentucky. To understand what war meant to the border people, one needs only



SHAKER MEN AND WOMEN LIVED IN THE SAME HOUSE, YET APART

In the buildings erected by the sect in Shakerstown there were separate entrances and stairways for the sexes. They believed in strict celibacy (see text, page 694). The last of the colony died several years ago, but their fine old homes still stand.

to be reminded that Jefferson Davis was born near Hopkinsville, not far from Bowling Green, and that Abraham Lincoln was born at Hodgenville, a few miles to the north.

If the traveler has time for a side journey, an additional drive is suggested to link Bowling Green, Kentucky, with Nashville, Tennessee, and the Hermitage, home of Andrew Jackson. This route would permit visits to Lookout Mountain and other historic shrines and would come back to the Park-to-Park Highway at Knoxville.

#### WHERE LINCOLN WAS A BOY

The day after our too brief inspection of the caves we drove up to Hodgenville. There a stately memorial shelters the humble log cabin in which Lincoln was born (see Color Plate XIV and page 693). Simplicity marks the place as it marked the great soul it fostered. We paused for a drink from the Lincoln Spring.

Memories of Lincoln linger in the very air between Hodgenville and Bardstown. To Knob Creek the Lincoln family moved before young Abraham was two years old, and there they lived until he was eight.

His earliest recollections, he wrote, were of Knob Creek, and how he was saved from drowning there by the quick aid of a chum. Not much chance of drowning in the creek now; it is little more than a rivulet.

If there is a house in the world worthy to inspire music, it is "My Old Kentucky Home," near Bardstown (see Color Plate XV). I was caught in a spell the moment we entered the spacious grounds. While a guest in the house, then owned by his kinsfolk, the Rowan family, Stephen Collins Foster composed that deathless ballad, "My Old Kentucky Home."

He wrote the music, it is said, at a desk in the wide hall, the sun streaming through the door opening toward the slave quarters. That selfsame desk still stands in its wonted place, the most precious of Kentucky's furniture relics.

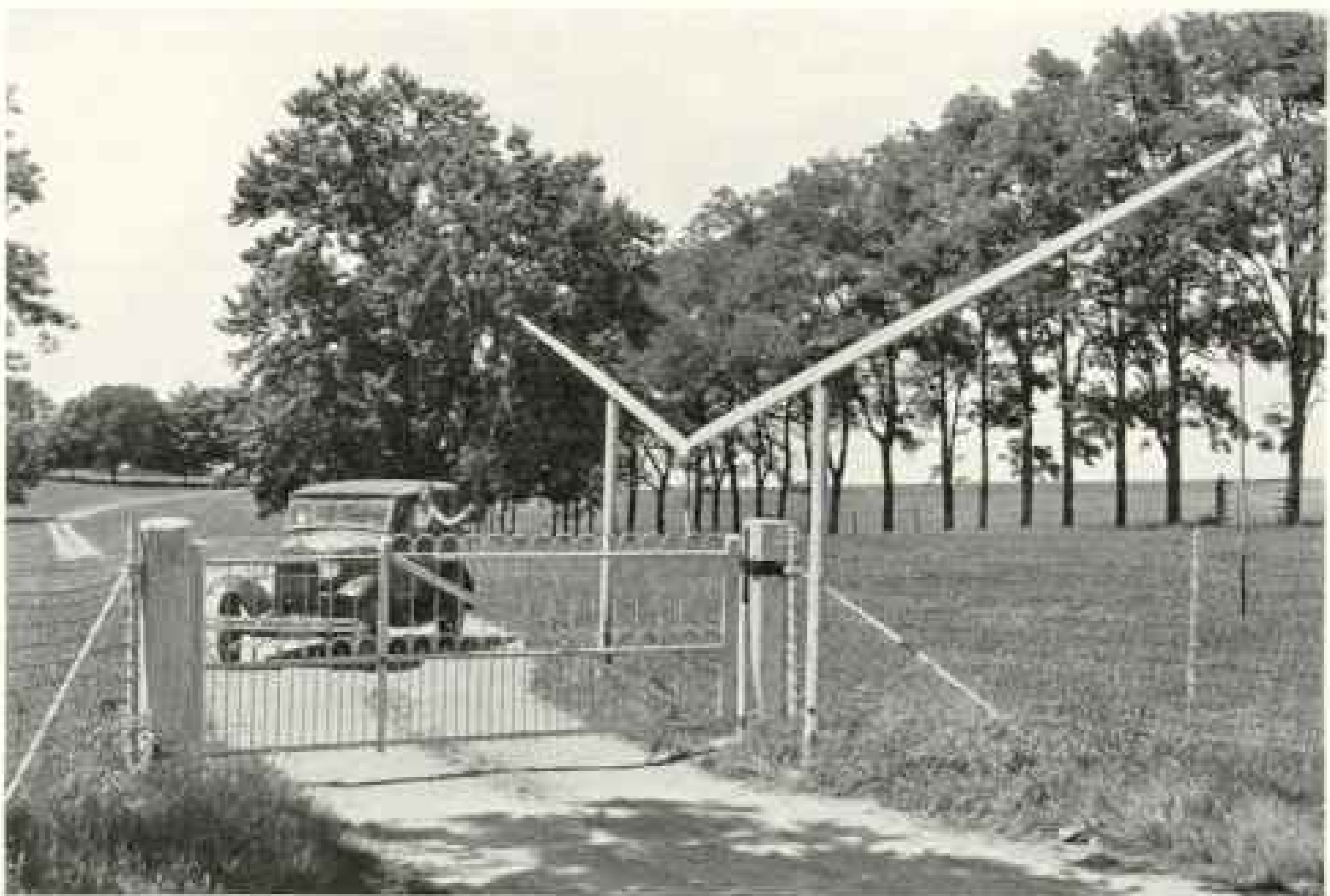
Even without the Foster tradition, the home would be priceless. It makes no attempt at ostentation, but it is peopled with ghosts of the fine Old South.

In Bardstown is St. Joseph's Cathedral, in which are displayed several original paintings by great masters. They are



KENTUCKY HONORS THOROUGHBREDS AS WELL AS PIONEERS AND STATESMEN

On the Joseph E. Widener stock farm, Elmendorf, near Lexington, an imposing bronze statue stands over the grave of Fair Play, sire of Man-o'-War. Elaborate horse graveyards are frequent in the heart of Kentucky.



THE LATCHSTRING IS ALWAYS OUT IN THE BLUE GRASS

Visitors are welcome at the famous stock farms near Lexington, but they are requested to close the gates. To obey the rule is easy; the driver simply reaches out and yanks the dangling rope, and the barrier swings open or shut. Thousands of enthusiasts go to see Man-o'-War and other champions every year (see text, page 691).



believed to have been a gift to the church by Louis Philippe.

Not far from the town is Gethsemane, a retreat of Trappist monks, one of two such monasteries in the United States.

#### TRIBUTE TO GEORGE ROGERS CLARK, SOLDIER AND EMPIRE-BUILDER

Louisville, the city of George Rogers Clark, was next on our itinerary. It was there that the doughty soldier ended his days in bitterness over the ingratitude of the Nation he had spent his all to aid.

Historians have paid belated tribute to the hero, and a fine memorial to his honor has been erected at Vincennes, Indiana; yet he lies in a simple grave in the Clark plot in a Louisville cemetery, no stately monument marking his resting place. His brother William, who later went with Meriwether Lewis to blaze the Oregon Trail, is better known to history.

Of George Rogers Clark the Hon. Maurice H. Thatcher writes:

"George Rogers Clark was a Kentuckian from Virginia, a military genius and statesman, who, though almost a youth in years, with small bodies of raw troops conquered from the British and their Indian allies a veritable empire, made up of the present-day States of Ohio, Indiana, Illinois, Michigan, Wisconsin, and eastern Minnesota. Furthermore, his successes north of the Ohio and east of the Mississippi relieved British and Indian pressure on the western front of Washington's armies, thus releasing them for operation against the enemy forces in the east.

#### THE VICTORY AT VINCENNES FOSTERED KENTUCKY SETTLEMENT

"The value of Clark's exploits to the Kentucky settlements may be judged by the fact that in 1778, because of the ravages suffered at the hands of the Indian allies of the British, they had dwindled in population almost to one hundred, whereas in the following year, after the capture of the British stronghold at Vincennes by Clark, the population increased to more than twenty thousand.

"Because the conquest of the Northwest Territory was made under the authority of Virginia, the region was treated as belonging to that State; but later, in 1784, the Old Dominion Commonwealth ceded the whole of it to the Congress of the United

States, and it thus became a part of the Federal domain.

"In the cession, Virginia retained ownership and jurisdiction of the Ohio River to the low-water mark on its northern shore.

"This lordly stream, under recently completed canalization, is now navigable in its entire length of some 1,000 miles, from Pittsburgh to Cairo. Of this total, 663 miles lie within the State of Kentucky."

At Louisville, too, are the home and tomb of President Zachary Taylor, "Old Rough and Ready." His daughter Knox was wooed and won by Jefferson Davis, then a young lieutenant in the general's command.

#### THE RACING CAPITAL OF AMERICA

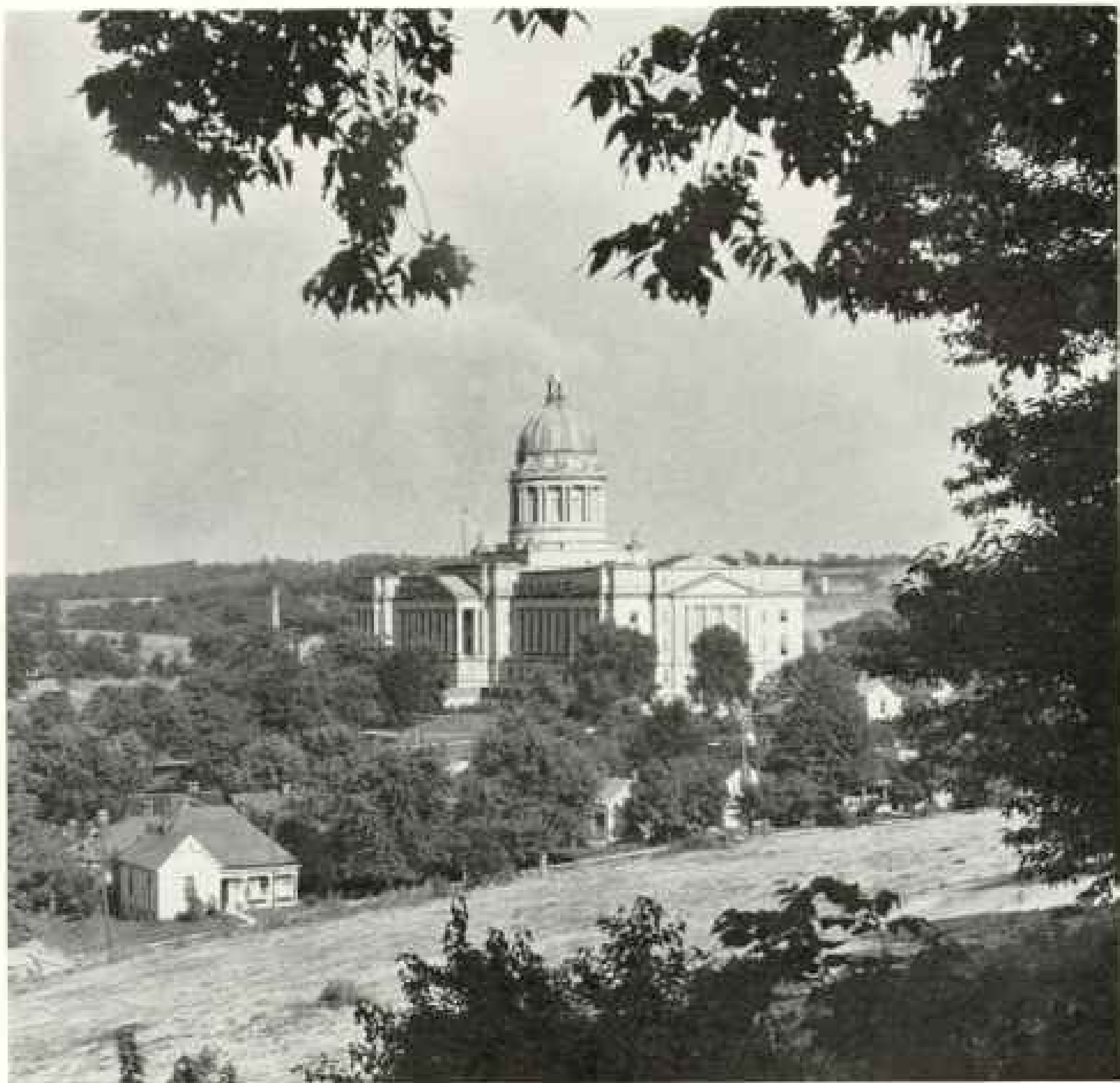
To lovers of horse-racing, Louisville is a mecca when the Kentucky Derby is run at Churchill Downs (see illustration, page 692). I hope some day to attend that race and to see more of the splendid city. While we were there we drove around the parks, some of the finest I have seen (see Color Plate IX and illustration, page 664). Redbud was just opening and the blue grass was a perfect carpet of green.

We had not long to stay in Louisville, but snatched enough time to visit the Louisville Slugger factory, where baseball bats for many of the famous players are hand-turned by skilled workmen (see illustration, page 677). The second-growth ash comes to the factory in rough billets. These billets are rounded and laid on racks to season for 17 months before they are made into bats. Because ball players are particular about the weight and balance of their bats, each step in the shaping of the sluggers requires the utmost care. Special orders are prepared by hand-workers. Thousands of bats, however, are made by machinery.

We went from Louisville to Frankfort, the hill-encircled capital of Kentucky. The old Statehouse, now a museum, is an architectural gem of pure Greek design. Within it is a self-supporting circular stairway, one of the few remaining.

The new Statehouse is a splendid structure, with a magnificent rotunda under the vaulted dome (see illustration, opposite page).

It is strangely fitting that Daniel Boone is buried in the cemetery overlooking the capital of the State he helped win from the wilderness. From the path around his tomb



KENTUCKY'S MODERN CAPITOL LOOMS NEAR THE GRAVE OF DANIEL BOONE

On a commanding site, it overlooks time-mellowed Frankfort and the Kentucky River (see text, opposite page). The old Statehouse, now a museum, stands in the center of the city.

one looks down to the broad valley of the beautiful Kentucky River.

#### HORSES OF THE BLUE GRASS

Sight of Churchill Downs in Louisville had turned our thoughts to horses and racing, and we felt some eagerness as we drove on to Lexington, the heart of the Blue Grass and the home of the thoroughbred.

To one who has striven futilely, baffled by crab grass, to encourage a lawn, the sight of those blue-grass pastures brings mixed feelings. One does not feel outraged to see splendid horses browsing on such lawns, but one is hard put to escape taking affront at cows and sheep feeding on the velvety carpets.

Horses in the Blue Grass are monarchs of the earth.

We visited several of the famous farms and gazed in amazement at the huge circular stables housing quarter-mile exercise tracks floored with tanbark.

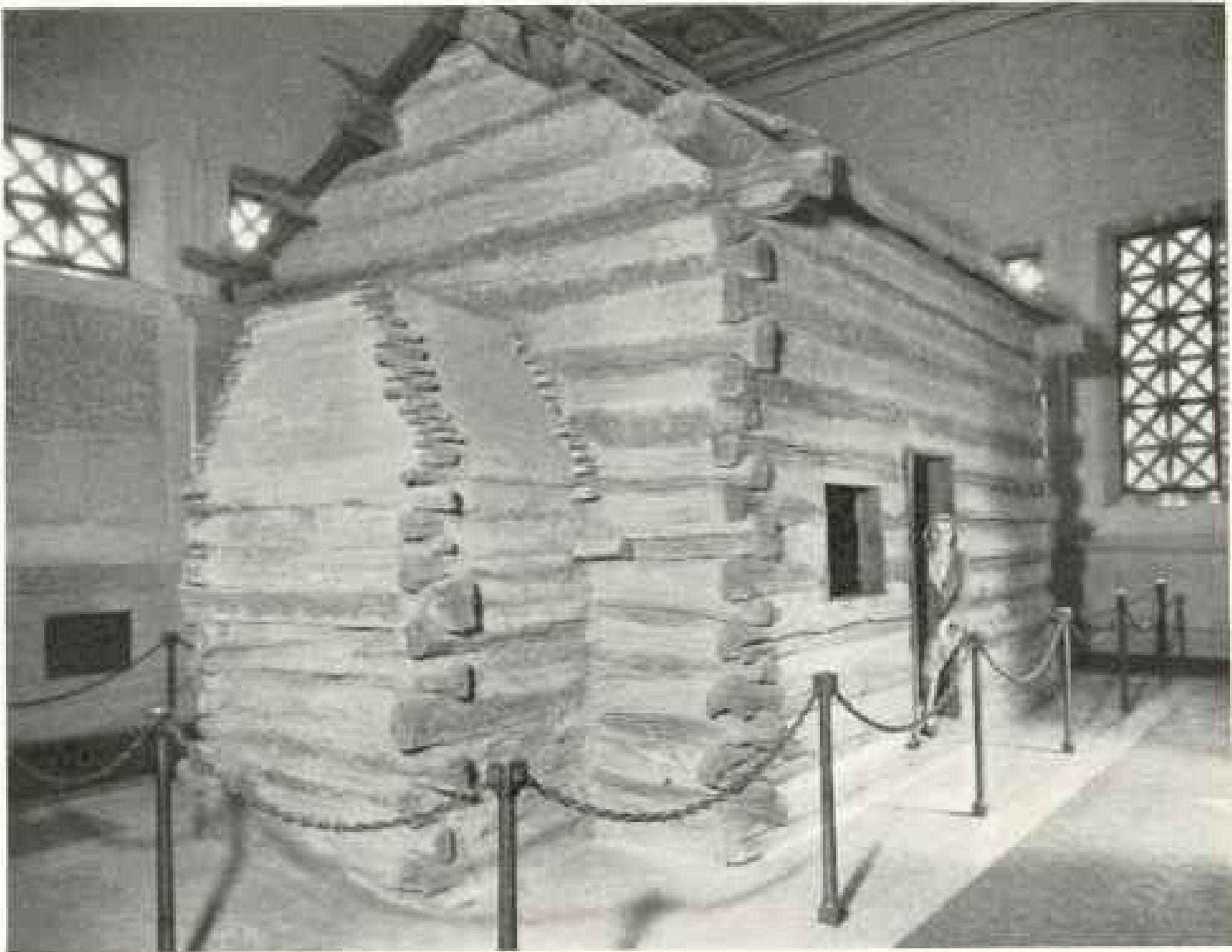
The thoroughbred is nurtured more carefully than a baby-show contender. A few hours after he is born he is fitted with a halter, that he may become used to the equipment. He is permitted out of doors only when conditions are exactly right. If he scratches his silky skin, he is plastered with antiseptic and put in hospital. He drinks only from his own special bucket and his diet would be the despair of a French chef.



© Catfield and Shock

CHURCHILL DOWNS IS THE FIELD OF GLORY OF THE SPORT OF KINGS

The Kentucky Derby, most famous race in America, attracts throngs to Louisville, but it is run too late in the afternoon for such an action photograph as this of an earlier contest on Derby Day. Not far away, at Lexington, the thoroughbreds that have made the State a horseman's paradise reach the flower of speed and beauty in lush blue-grass pastures. Whatever one wishes to know about records of the turf, he can learn by inquiring of almost any Kentuckian.



LINCOLN'S LOG CABIN IS SHELTERED BY A GRANITE MEMORIAL.

To visit this shrine near Hodgenville, Kentucky, is to feel a thrill of pride in a precious heritage of America (see text, page 688). The log building where he was born has been carried to expositions for display, but it will leave its original site no more. Although it is somewhat shorter and slightly narrower than when built, it contains the oak timbers hewn by the Emancipator's father (see Color Plate XIV).

The owner of one farm cut by a highway has a tunnel under the road through which his thoroughbreds may be led without danger from passing automobiles.

I know little about race horses, but there was a thrill in visiting the stable that houses Man-o'-War, Golden Broom, Crusader, and Mars. Man-o'-War is a magnificent old campaigner, now aged 17 years. Mr. Samuel D. Riddle, the owner, took us to the modest house he occupies when at the farm and showed us pictures of Man-o'-War and his scions in action at famous races.

#### LEXINGTON CHERISHES MEMORIES

In itself Lexington has a wealth of charm as well as historic interest. The University of Kentucky is there, its mellow old buildings scattered over a shady campus. In the study room at the College of Engineering, heavy tables, with tops fashioned of thick sections of a venerable sycamore

tree that once grew on the campus, are treasured relics covered with carved names of alumni.

Another fine educational institution in Lexington is Transylvania College, the first school for higher education west of the Alleghenies. There Jefferson Davis and Henry Clay were once students. The library of this school contains thousands of volumes so rare that scholars from all over the world come to consult them.

Ashland, restored home of Henry Clay, stands on the outskirts of the city (see Color Plate XII). On the walk behind the house the magnetic orator and statesman used to pace back and forth planning his speeches.

For half a century he was a leader in American public life. Born in Virginia, he studied law under George Wythe, the teacher of Jefferson and Marshall, and then, moving to Kentucky (1797) at the age of



20, leaped into prominence by a vigorous speech denouncing the sedition law. He was elected to the United States Senate at the age of 29 (he could not qualify until his thirtieth birthday); served altogether 15 years in that body, was Speaker of the United States House of Representatives for 13 years, the longest tenure anyone has held of that important office, and three times was the unsuccessful candidate of his party for the Presidency.

#### THE HOME OF A STRANGE SECT

From Lexington we made a side journey to some points of special interest not on the Park-to-Park Highway. Through the perfect green of the Blue Grass country we drove to High Bridge, where a railroad bridge 317 feet above the water spans the Kentucky. Crossing the river on a ferry, we drove to old Shakertown, once the home of a strange sect who believed in celibacy and the coming of the millennium (see page 688).

Another place of interest we visited in our swing south of Lexington was the old fort at Harrodsburg, where George Rogers Clark planned his campaigns (see page 668). The fort has been restored and is open as a museum.

Old Centre College at Danville attracted us because of the heroic victories of the "Praying Colonels" football team.

At Berea College we saw the remarkable results of vocational education brought to mountain whites (see Color Plate XI). One cannot escape a feeling of humility at sight of the industry of these students.

Our time was limited, and we returned to Lexington before we wished and hastened on to Ashland through the eastern Kentucky mountains. At one town on this road Bud had picked up an elderly man two years earlier and carried him to a county seat. The old chap was going to defend his son, in jail over a feud battle. Two brothers of the imprisoned boy had been killed by the rival clan and one or two of their enemies had lost their lives.

No evidence of interclan strife greeted us as we passed through the mining district to the bright city of Ashland. Soon we bade good-bye to Kentucky and entered West Virginia.

At Charleston we gazed in wonder at the gold-leaf-adorned dome of the "10-million-dollar Capitol" (see Color Plate I).

For miles our road lay between the Kanawha River and the mountains. So narrow is the strip of land between the sheer bluffs and the gorge that mining towns straggle almost together all along the way. Coke ovens of both the old and the new type were going at full blast.

Beyond Gauley Bridge we climbed up out of the narrow valley and skirted the edge of the high plateau. The scenery was glorious. We paused at Hawks Nest for a look down the stupendous New River Canyon.

As night drew on, we came to historic Lewisburg and a hotel that took us back a hundred years. The place was a find. After a delicious dinner, I went with the landlord to inspect his remarkable collection of relics of the pioneers. He had home-made rat traps, meat grinders, coffee mills—amazing products of the pioneers' resourcefulness.

That night we slept under home-made quilts in hand-fashioned bedsteads. I should have enjoyed a week's stay among the sturdy people from whom these antiques had been obtained.

#### IN THE LAND OF DAVID HARUMS

They are shrewd horse traders, the landlord told me. He said he had lived in the community for five years before they would permit him to take part in the "swapping." On certain days they forgather at a favorite spot in Lewisburg and play David Harum.

We made an early start from Lewisburg and, after a fleeting visit to the fine resort at Hot Springs, Virginia, drove on through the mountains to Lexington, Virginia.

From Lexington we returned to Washington by way of Charlottesville, seat of the University of Virginia, and Monticello, home of Thomas Jefferson.\* We might have added historic shrines to our already long list by taking the southern route through Lynchburg, Appomattox, Petersburg, Richmond, charmingly restored colonial Williamsburg, Jamestown, Yorktown, Washington's birthplace at Wakefield, Fredericksburg, and Mount Vernon.

What a galaxy of stars in the firmament of American history is represented in that list! And they can all be reached in an extra day's drive.

\* See "Jefferson's Little Mountain," by Paul Wiltach, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1929.

MODERN SCENES IN THE LAND OF LINCOLN'S BIRTH



A CAPITAL OF THE HORSE WORLD IS THE BLUE GRASS REGION OF KENTUCKY

Around Lexington there are many farms for the breeding of thoroughbreds, each with an elaborate barn for training the horses under cover, and a mansion for the owner. Stones and other objects are removed from the tree-shaded pastures, many of which are carefully rolled.

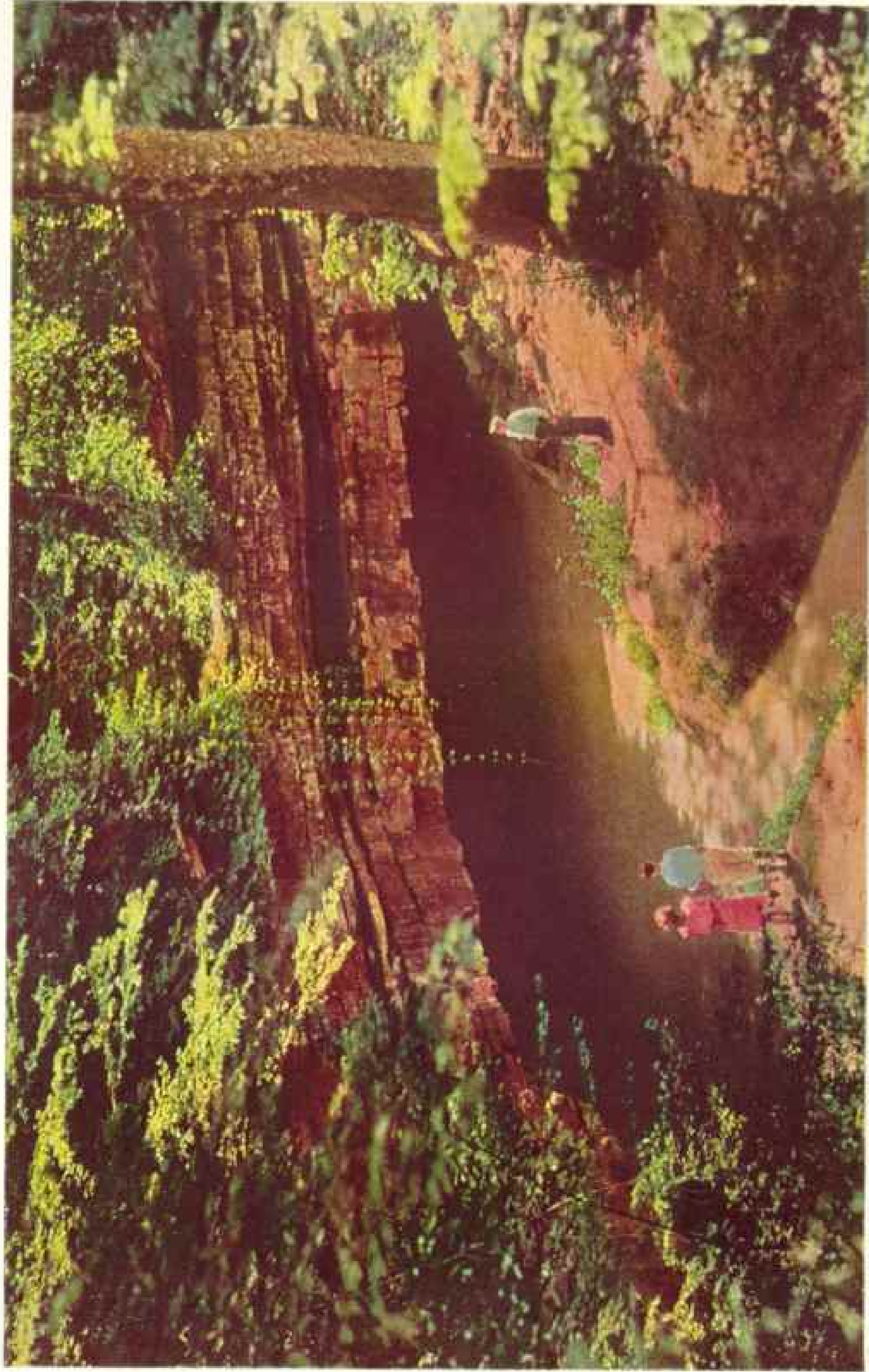


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Finlay Photographs by Edwin L. Wisnerd

EQUESTRIENNES PUMP THEIR OWN DRINKING WATER IN IROQUOIS PARK

Bridle trails wind among the trees of Louisville's many parks, while special paths are provided for riders between the sidewalk and the broad boulevards. The Kentucky Derby, a classic in American racing, annually attracts visitors from every part of the country to near-by Churchill Downs.



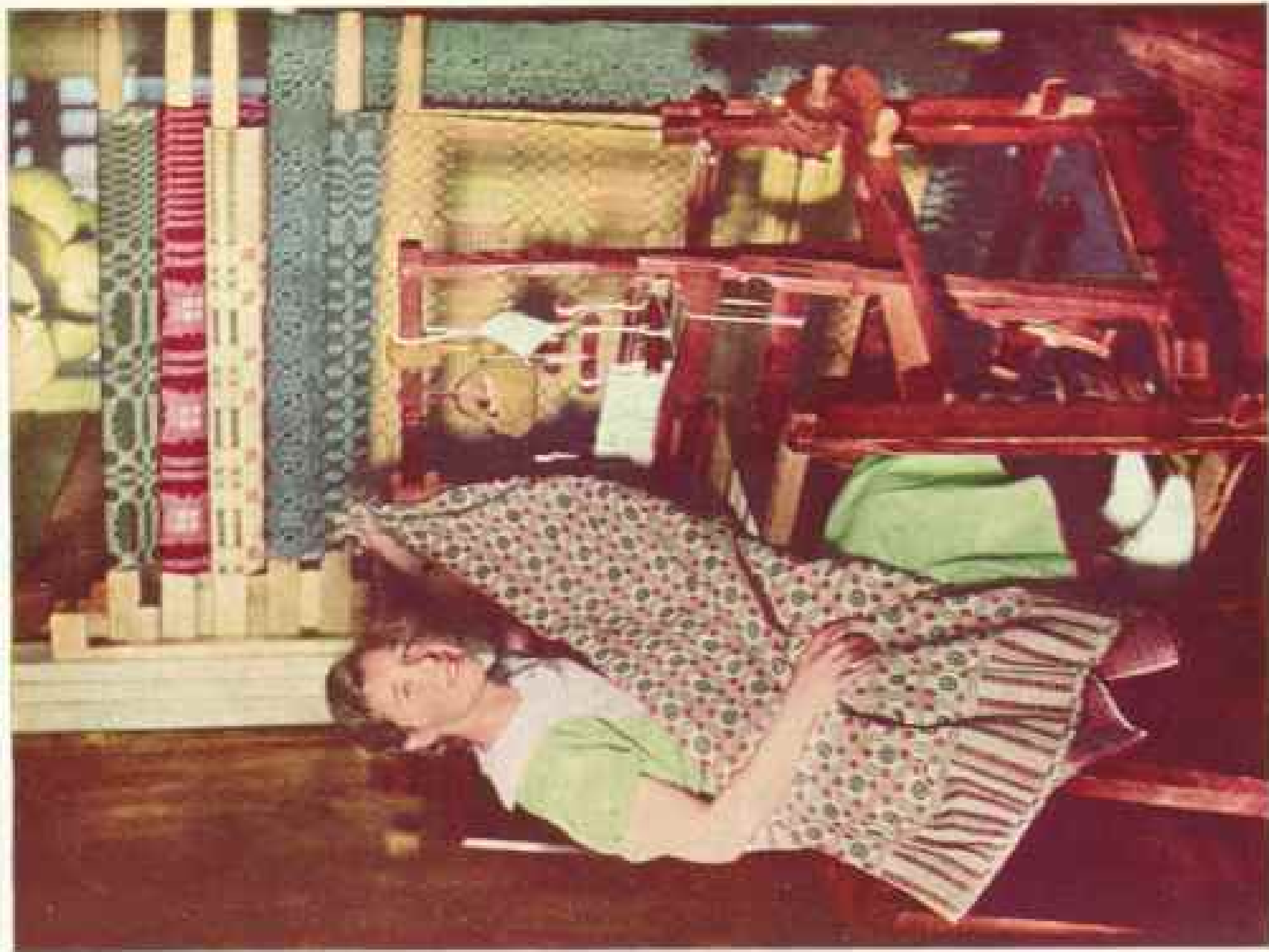
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Fishy Photograph by Edwin L. Wisland

THE STYX, A "LOST RIVER," EMERGES FROM DAMP DARKNESS INTO GLOARIOUS SUNSHINE

Visitors boat on the river, which winds through gloomy Mammoth Cave and flows into the Green River. When the latter is swollen with flood waters the Styx and other cavern streams become connected, sometimes lifting the water level within by 60 feet above the low mark.





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**AT BEREA COLLEGE MOUNTAIN FOLK LEARN USEFUL 'TRADIES**

The school pioneered in the revival of the home arts, long practiced in the State's isolated sections. The town of Berea nestles three miles north of a mountain gap over which Daniel Boone and many early settlers entered Kentucky.



Fisher Photographs by Edwin L. Wheeler

**THE GOLDEN FLEECE FESTOONS THE WALLS OF MAMMOTH CAVE**

This rosinate formation of flowing stone was deposited through the ages by billions of tiny drops of water, each of which, after dripping from the rock, left a microscopic bit of lime. The rock icicles decorate the new entrance hall.





THE ASHLAND OF TODAY IS A DUPLICATE OF HENRY CLAY'S HOME

Shortly after the death of the famous orator, the house was found unsafe and was torn down. The present structure, on the original plan, was built soon after, upon the same foundations. Here Henry Clay brought up his large family and "mended his fences" when he was not in Washington.



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Finlay Photographs by Edwin L. Wisford

BLUE MEETS GOLD IN "OLD KENTUCKY"

The silt-laden Kentucky River gouges its circuitous way through the rich burley-tobacco belt, but the blue Dix, born in the near-by highland forests, turns many wheels and carries no mud. A river steamer resembling a tiny waterbug has just turned into the mouth of the Dix.

## MODERN SCENES IN THE LAND OF LINCOLN'S BIRTH



THOROUGHBREDS OF THE AIR PAUSE AT BOWMAN FIELD

Louisville has a large, modern municipal airport and is an important aerial crossroads. Many visitors arrive by transport plane and private ship to the chief city of Kentucky for the Derby. George Rogers Clark, pioneer soldier, and President Zachary Taylor lie buried in Louisville shrines.

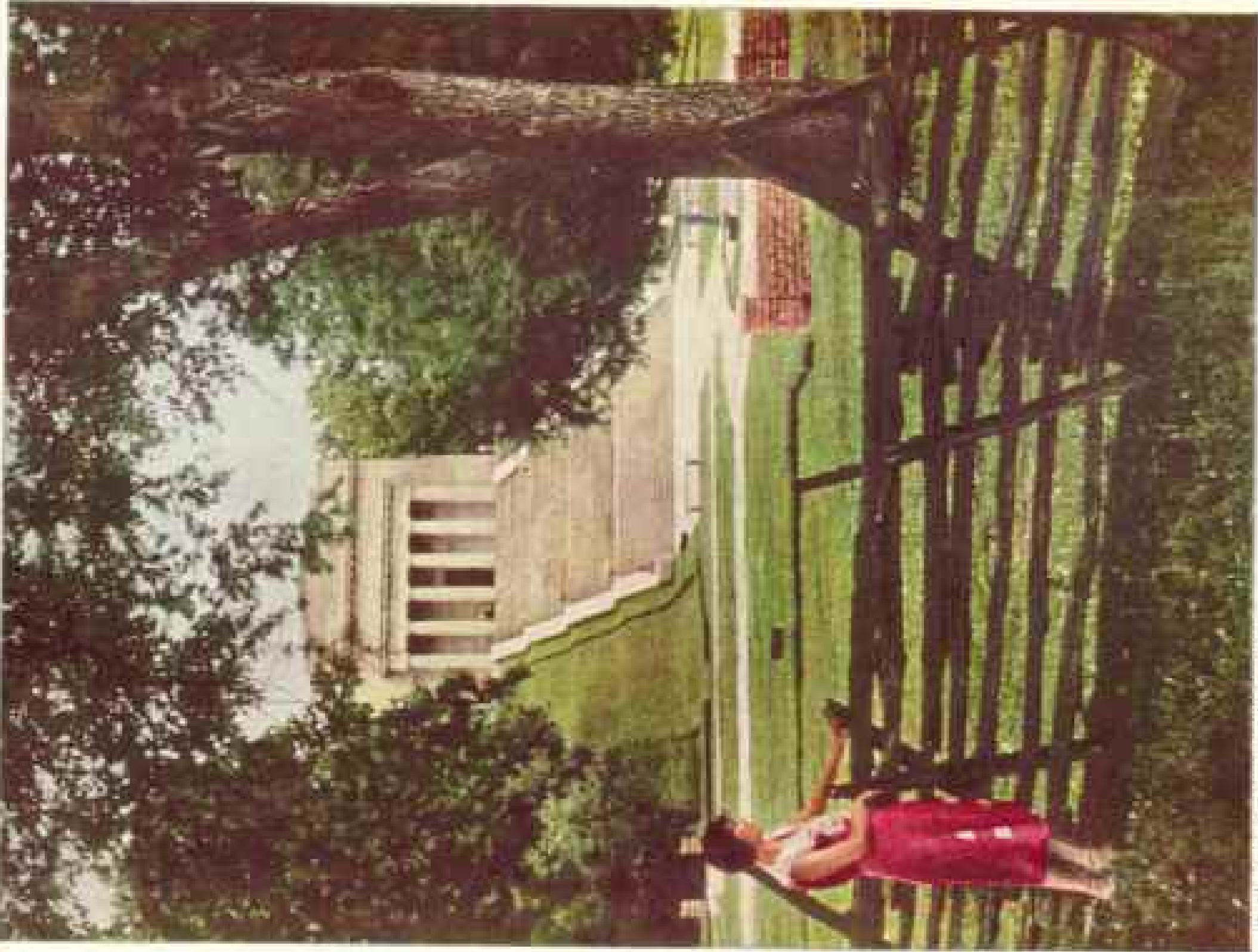


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Finlay Photographs by Edwin L. Wisner

THE SHOWBOAT IS THE GREAT WHITE WAY OF RIVER TOWNS

The old *City of Memphis* once brought the American stage to the river towns of the Mississippi Valley, but now she serves as an Ohio River excursion boat. A steam calliope lures many pleasure seekers to her gayly lighted decks, as she lies moored to Louisville's sloping quay.



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**A GRANITE MEMORIAL ENSHRINES LINCOLN'S BIRTHPLACE**

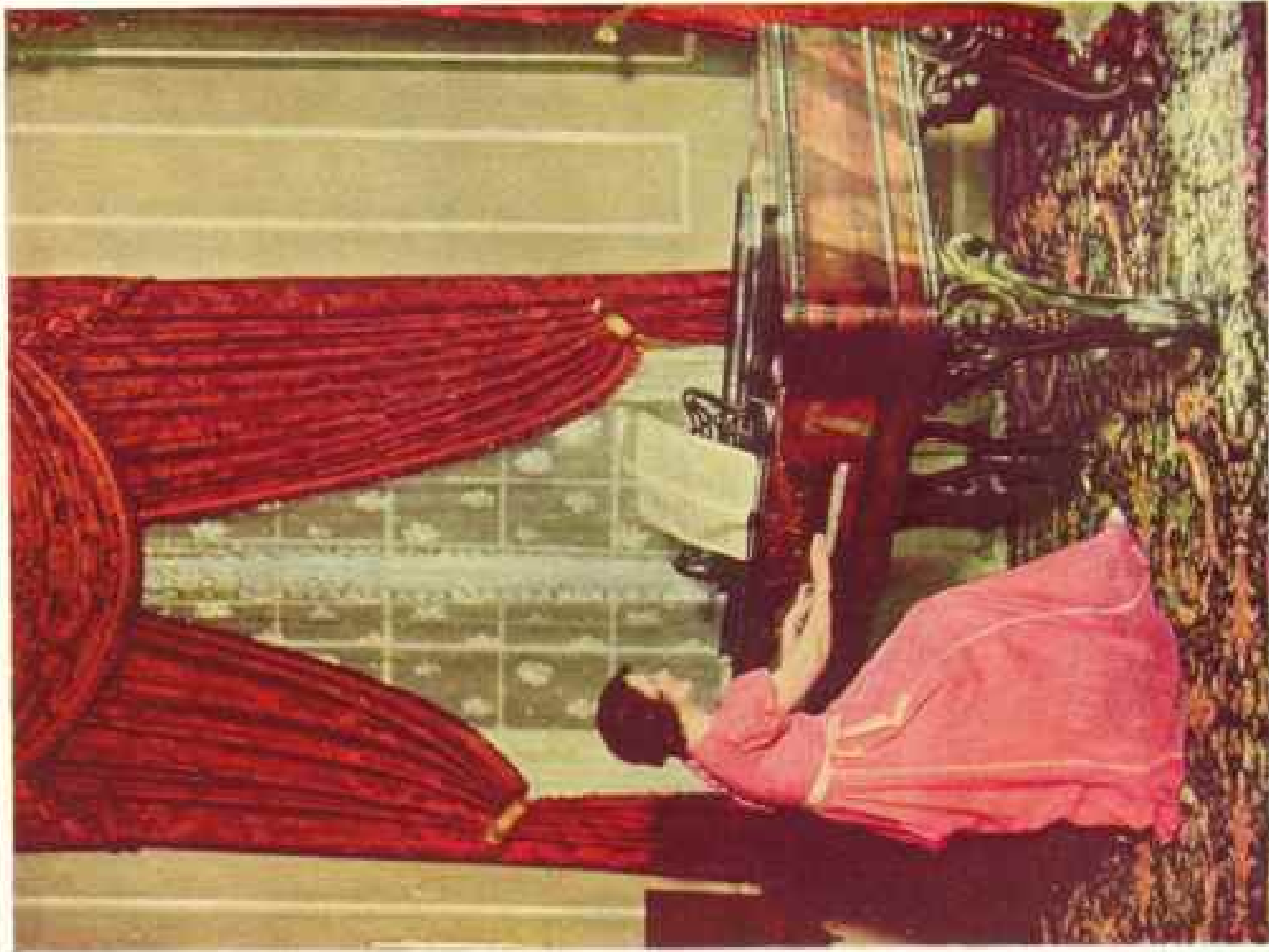
Within this impressive monument near Hodgenville is preserved the original crude log cabin in which Abraham Lincoln first saw the light of day on February 12, 1809. In the park surrounding it, hand-hewn fences of the kind the "rail-splitter" used to make when he was a boy substitute for modern wire fences.



Finley Photographs by Edwin L. Washburn  
**HERE NANCY HANKS CAME TO PLAY WITH HER INFANT "ABE"**

The pool, hidden in the cave-like opening by overhanging vines and mosses, was a marker of Thomas Lincoln's farm near Hodgenville. He purchased "a parcel of land containing 300 acres beginning near the Sinking Spring," known later as the Rock, or Lincoln, Spring. The family moved away while Abraham was still a babe.





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**FEDERAL HILL IS A TREASURE HOUSE OF ANTIQUES**

On such an instrument fashioned by Ambller, the early American master piano maker, Foster first played many of his immortal songs, although he actually composed them on a small flute. From the songs of the slaves of this mansion house, the composer drew inspiration for many of his old favorites, such as "Old Black Joe" and "Massa's in de Cold, Cold Ground."



Finlay Photographs by Edwin L. Wisberd

**THE DOORWAY OF "MY OLD KENTUCKY HOME"**

For 127 years Federal Hill, near Barboursville, was in the family of Judge John Kown, one of Kentucky's early settlers, whose son was a relative of Stephen Collins Foster. While visiting here the composer wrote his famous song which lent its familiar name to the house. The property passed to the State in 1922 to become a shrine to the musician.





THE BLUE GRASS COUNTRY IS THE LAND OF WHITE BURLEY.

Kentucky is famous for other things than thoroughbred horses, for from this State comes more than one-fourth of the tobacco grown in the United States. About two-thirds of the crop produced is white burley. To ensure a good yield each plant is dusted, often by hand, to kill leaf-destroying insects.



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Flukey Photographs by Edwin L. Wisard

EVEN POTTERY MAKERS ARE DERBY CONSCIOUS

Wayside stands display their wares in every State, but when a motorist comes upon miniature darkey jockeys holding rings in their hands, he may be sure he has arrived in the heart of Kentucky. The figures are used as hitching posts on horse farms.

# CORAL CASTLE BUILDERS OF TROPIC SEAS

BY ROY WALDO MINER

*Curator of Marine Life, American Museum of Natural History*

AMONG the marvelous mysteries concealed by the surface of the ocean are the vast stony structures built by the ceaseless activities of the tiny coral animals that ply their trade in the warm waters skirting the continents and oceanic islands of tropic seas.

These fragile, fairylike creatures multiply by millions on the sea bottom and erect castles of limestone which rise, turreted and domed, among forests of marble trees until they pierce the surface of the sea, and, lo, a coral reef is born!

Coral reefs may grow in isolated clumps or they may fringe the beach close to the shore. They often parallel the coast for miles, forming a barrier against the open sea, and enclose a strip of quiet water between it and the mainland.

Sometimes barrier reefs completely surround oceanic islands. According to Darwin and other investigators, many such islands have sunk gradually beneath the sea, carried by a subsiding sea bottom. Meanwhile, the surrounding barrier reef, through the active energy of its coral polyps, continues to build up to the surface and maintains its ring of reefs around the island. Ultimately the island may disappear completely, while the ring-shaped reef is left behind as an atoll surrounding an empty lagoon, beneath the quiet waters of which is hidden the grave of the island summit.

The longest barrier reef in the world is the Great Barrier Reef of Australia,\* which parallels the eastern shore of that continent for more than 1,200 miles, enclosing a lagoon varying in width from seven to a hundred miles.

## MOST REEFS ARE TRADE-WIND BREAKS

Most barrier reefs are located on the eastern side of the body of land which they skirt, facing the equatorial trade winds. Consequently, the sea outside is dashed violently against the barrier and breaks upon its serrated face in long rollers of white foam, in striking contrast to the smooth waters sheltered within the lagoon. In times of storm, vessels that can make the channel find a haven, but a far different fate

besets the craft driven by the tempest upon the front of the reef.

Those stern ramparts, though erected by fairy polyps of the utmost delicacy, will crush and utterly destroy the proudest ship.

The finest barrier reef in the West Indies borders the eastern shore of Andros Island, in the Bahamas. It is some 100 miles long and grows near the edge of a submerged cliff facing the trade winds. A short distance to windward the submarine precipice plunges vertically more than a mile into the depths of the Tongue of the Ocean, an arm of the sea penetrating the heart of the Bahaman archipelago.

The oceanic waters outside the reef are of the deepest ultramarine blue, contrasting with the snow-white foam of the surf dashing against the reef. Within the lagoon the shallower waters, seen against the bottom of white coral sand, are streaked with alternate bands of incredibly brilliant turquoise blue and emerald green.

## EXPLORING CORAL JUNGLES OF THE SEA

On the sea floor outside this reef we made our studies of the barrier with a view to reproducing a portion of it in the Hall of Ocean Life in the American Museum of Natural History, New York City, making five trips for that purpose during the past ten years, beginning in December, 1923. The following summer, with the aid of Mr. J. E. Williamson and his submarine tube, a chain hoist mounted on pontoons, and diving helmets, our expedition obtained 40 tons of coral, thousands of feet of undersea motion pictures, and many color sketches of the wonderful submarine forest into which we gazed entranced (see page 708).

On three subsequent expeditions, equipped with diving helmets, we made careful studies of the living reefs of Andros and other islands of the Bahamas. We wandered on the sea floor, four fathoms below the surface, through coral jungles of limestone trees which spread their grotesquely interlacing branches far above our heads, peered into vaulted caverns of eroded coral rock, and threaded our way between fantastic columns capped with domes of *Orbicella* coral, which rose like giant mushrooms about us.

Now and then we gazed through arches of living coral, buttressed with contorted

\* See "The Great Barrier Reef and Its Isles," by Charles Barrett, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1930.



Photograph from Dr. Roy Waldo Miner  
ON GOES THE 65-POUND HELMET

Then down goes Dr. Miner. At four fathoms the heavy headpiece feels light as a straw hat. Water enters the helmet where it fits loosely around the shoulders, but the pressure of air pumped through the hose keeps the level below the mouth,

subsidiary growths and adorned with brilliant encrusting sponges of scarlet, purple, and green. Huge blue parrotfishes leered at us from shadowy corners and gorgeous queen triggerfishes sailed majestically into view, their kite-shaped orange-and-green bodies slashed with irregular stripes of startlingly vivid azure.

The coral heads in the foreground were alive with clouds of small yellow fishes, which flitted about like canary birds in a tropical jungle, and everywhere sea bushes, sea plumes, and sea fans, waving back and forth above the coral terraces in beautiful masses of soft rich color, contributed a rhythmic play of stately motion to the scene.

#### A NEW WORLD AT FOUR FATHOMS

The magic of the diving helmet unlocks the wonders of this watery Paradise to our vision. Our launch is anchored fore and aft on the dancing sea close to the edge of the reef. We look over the side through wavelets like facets of a liquid crystal, so transparent that the white sand of the sea floor four fathoms below, at the edge of the coral reef, is clear in every detail, yet continually oscillating in apparent rhythmic motion. The sunlight, shining through the wave crests, projects interlacing patterns of bright lines on the ocean bottom.

I stand on the brass rope ladder with the water lapping my shoulders. On either side of the gangway above are the diving helmets, erect on their ordered coils of rubber tubing, which in turn are attached to the symmetrically placed long-handled air pumps, each presided over by a dusky attendant.

Black-faced Moxie bosses the job and lifts a copper helmet by the handle on its top. Leaning forward, he lowers it over my head and one of the pumps starts. As the heavy weight bears down on my shoulders, I hear the comforting "clank, clank" of the pump close to my ears. I descend the steps of the ladder and see the surface water climb up the window before my eyes and vanish above my head. The weight of the helmet miraculously disappears.

As I continue to descend, the pressure on my eardrums increases, but I swallow once or twice and it is immediately relieved. The keel of the launch, also screw and propeller, are momentarily and weirdly visible in profile and rise upward. I glide gently downward and suddenly feel the soft sand below my rubber-soled feet.

As I turn with foot lifted to take a step I suddenly stop short. A huge black sting-ray, with kite-shaped body fully four feet long, terminated by a slender, whiplike tail, leisurely lifts itself from the white sand close to me and swims slowly away, its flat surface undulating gracefully as it retreats. Had I put my foot down I would have stepped squarely upon it. That would have been a mistake, for the gruesome creature bears a sharp spike with saw-toothed edge near the end of its tail, and immediately the black whip would have lashed forward, catching and lacerating my leg with the spike. A wound of this kind is very painful and often results in blood-poisoning.

Breathing a sigh of relief, I half walk, half swim, out from under the shadow of the launch and glance upward. The dark shape of the boat floats above me like a sea monster. The water is as transparent as air. The under surface of the waves, in continual motion, is like liquid quicksilver.

When the breeze dies down and the sea flattens out, the surface film becomes mirrorlike and reflects everything below in inverted images. There is a splash and, amid festoons of shining bubbles, a square box-shaped object descends through the water at the end of a rope. It is my undersea camera lowered to me by Captain Joe. It strikes bottom a few steps away, sending up a cloud of soft white sand. I glide over and reach out my hand, but miss the rope, being deceived by the density of the water. At the second trial I catch it and unhook the camera box.

A short distance away there is another splash and my tripod settles irregularly down to the bottom. Soon the camera is in place on the square top of the tripod, pointed toward the top of the ladder.

#### MERMAID OR HOBGOBLIN?

A pair of legs breaks the surface and is queerly reflected upward. Then a striped bathing suit. Obviously a mermaid is about to descend! But a mermaid with a head like a hobgoblin! For, perched on the graceful shoulders, is a copper diving helmet matching my own. I press the spring of my motion-picture camera.

The figure descends the ladder, swings from a rope at its lower end, gently glides to the sea bottom, and turns to face me. Then, through the windows of the helmet, I perceive the features of my wife calmly smiling out at me. I reach out my hand to



Photographs from Dr. Roy Waldo Miner

#### LADIES' DAY IN DAVY JONES'S LOCKER

A mermaid with a hobgoblin's head and a striped bathing suit "drops in." It's Mrs. Miner. Gently she slides bottomward on the rope, re-adjusts her helmet, strolls about on the sea floor, and picks sea plumes four fathoms down.



her and we turn toward the wonderful expanse of the reef at the base of which we are standing and begin our observations.

#### PAINTING OIL COLORS UNDER SEA

Chris Olsen, my chief artist and modeler, ingenious and resourceful, was with me on three of my expeditions and was always my right-hand man. On our most recent trip he was prepared with Monel metal easel and palette, which he had contrived for the purpose, and stood 20 feet below the surface in his diving helmet, sketching the coral reef from Nature with oil colors on a specially prepared canvas stretched over plate glass and framed in his non-corrosive easel.

At first he used paint brushes with wooden handles. Once he forgot and tried to set one down. It immediately floated to the surface and we had to send out a man in a rowboat to get it. I brought it back to him, using a diving helmet for the purpose. After that he used a palette knife, which would not float and also was much handier for laying on colors under sea.

The undersea gardens were a perpetual wonder to us. It was hard to realize, as we gazed through the windows of our diving helmets at the towering pinnacles of the reef, and clambered in half-floating leaps over the rounded heads of massive coral that rose in terraces to the water surface, that these huge castellated structures were erected through the vital energy of such delicate coral polyps. Yet there they were by the millions, covering every square inch of the growing coral (see Color Plate IV).

In the mellow light of the more protected areas, their serried communities expanded with outreaching, feathery tentacles surrounding their miniature mouth slits—veritable petals of animal flowers (see Color Plate III). In patches of stronger sunlight, whole phalanxes were flattened to a mere investment of the underlying hard parts with thin gossamer films of living tissue, often embossed with close-set hemispheres, marking the location of the contracted polyps. The tapering, tawny branches of the staghorns were crowded with starlike living forms, while the waving gorgonians, rising toward the sunlit water surface in moving forest growths of vertical branchlets, showed each slender subdivision limned as with a halo of translucent white or golden polyps (see Color Plates V and VI).

These myriads of tiny creatures are the architects and builders of the coral lime-

stone structure, as well as the horny supporting substance forming the flexible gorgonian "skeleton." They, in partnership with calcareous sea plants, shell-bearing mollusks, and protozoa, are largely responsible for the amazing submerged limestone barriers so perilous to navigators of tropic seas (see Color Plate I).

The ground-up fragments of this limestone become infiltrated between larger fragments, and the mass is heaped up by storms to rise above the water surface, where, as dunes of wind-blown sand, they are once more hardened and cemented into laminated æolian limestone through weathering, partial solution by acid rains, and "setting," as the result of subsequent evaporation.

Seeds lodge in the crevices of the rock, soil is formed, and an oceanic island may be evolved, clothed with tropic verdure, often habitable for man.

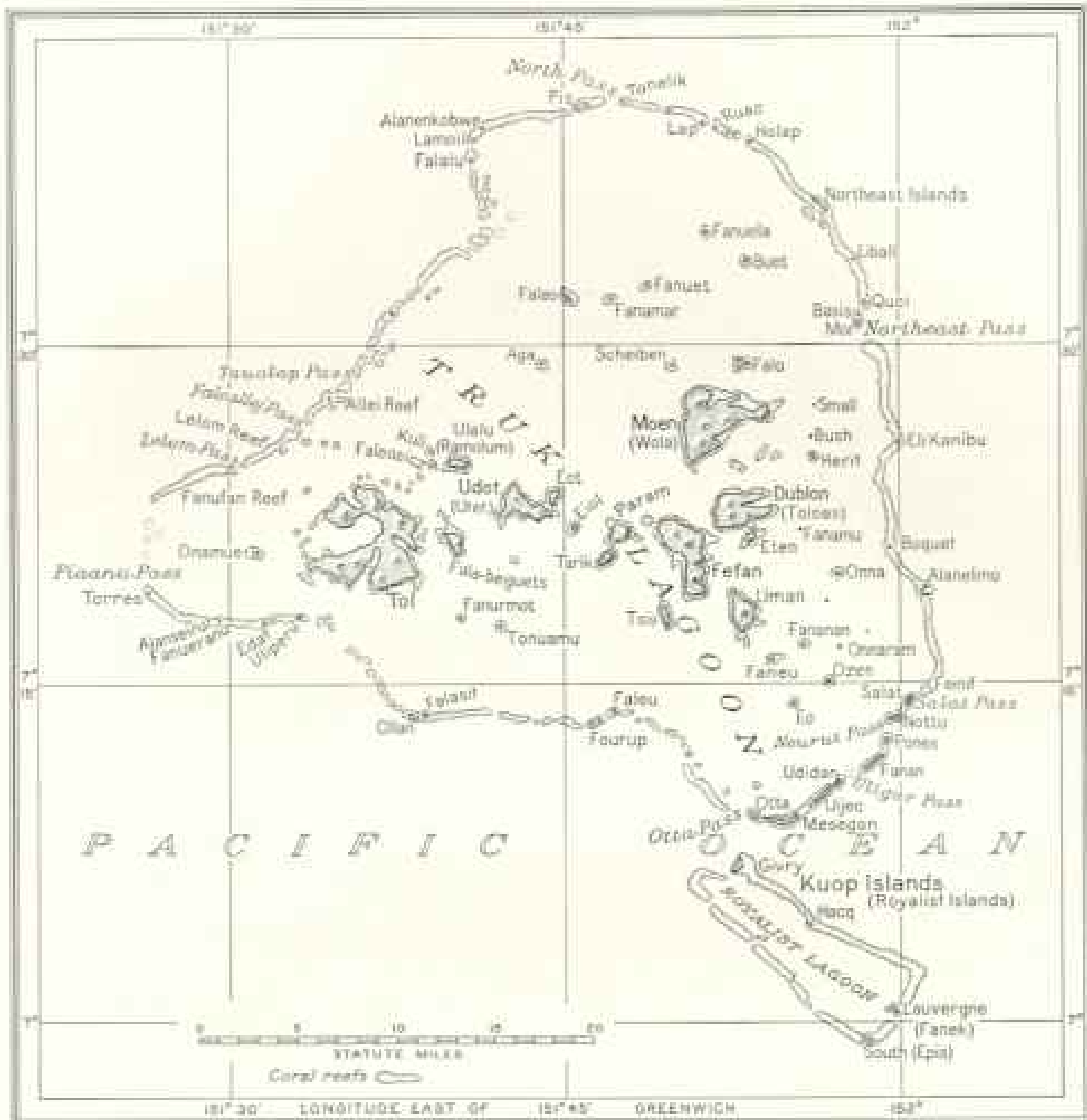
Many varying species of coral are associated to form the community of the living reef. What is the secret of their marvelous power to multiply their kind, the technique by which they construct their ramparts, and the mysterious source of their building materials?

Over here, on this submerged ledge, where the sunlight dances through the flickering waves, a beautiful lettuce coral expands its clustered polyps like a nosegay of green and lavender blossoms. A half-dozen polyps, with partially united bodies, each an inch or more in diameter, compose the colony, and display their mottled green and brown shafts, crowned with flowerlike disks of lavender and gray flecked with white.

We draw nearer and, looking through the windows of our diving helmets, examine the cluster more closely. Each individual is a cylindrical sac crowned with a circular disk, in the center of which is an oval mouth slit. A circlet of about forty-eight slender, petal-like tentacles radiates from the edge of the disk and contributes to the flowerlike appearance of the creature.

#### THE BIRTH OF A POLYP

Some of the polyps are almost separated from their fellows, while the others are still more or less united. It is obvious that a process of division is going on, the number of individuals increasing by splitting or budding from each other (see Color Plate II). As we watch, a small marine worm wriggles out from a crevice and starts to crawl with rhythmic undulations over the coral.



Drawn by Albert H. Bumstead

#### A STUPENDOUS EXAMPLE OF THE CORAL BUILDERS' ART IS TRUK

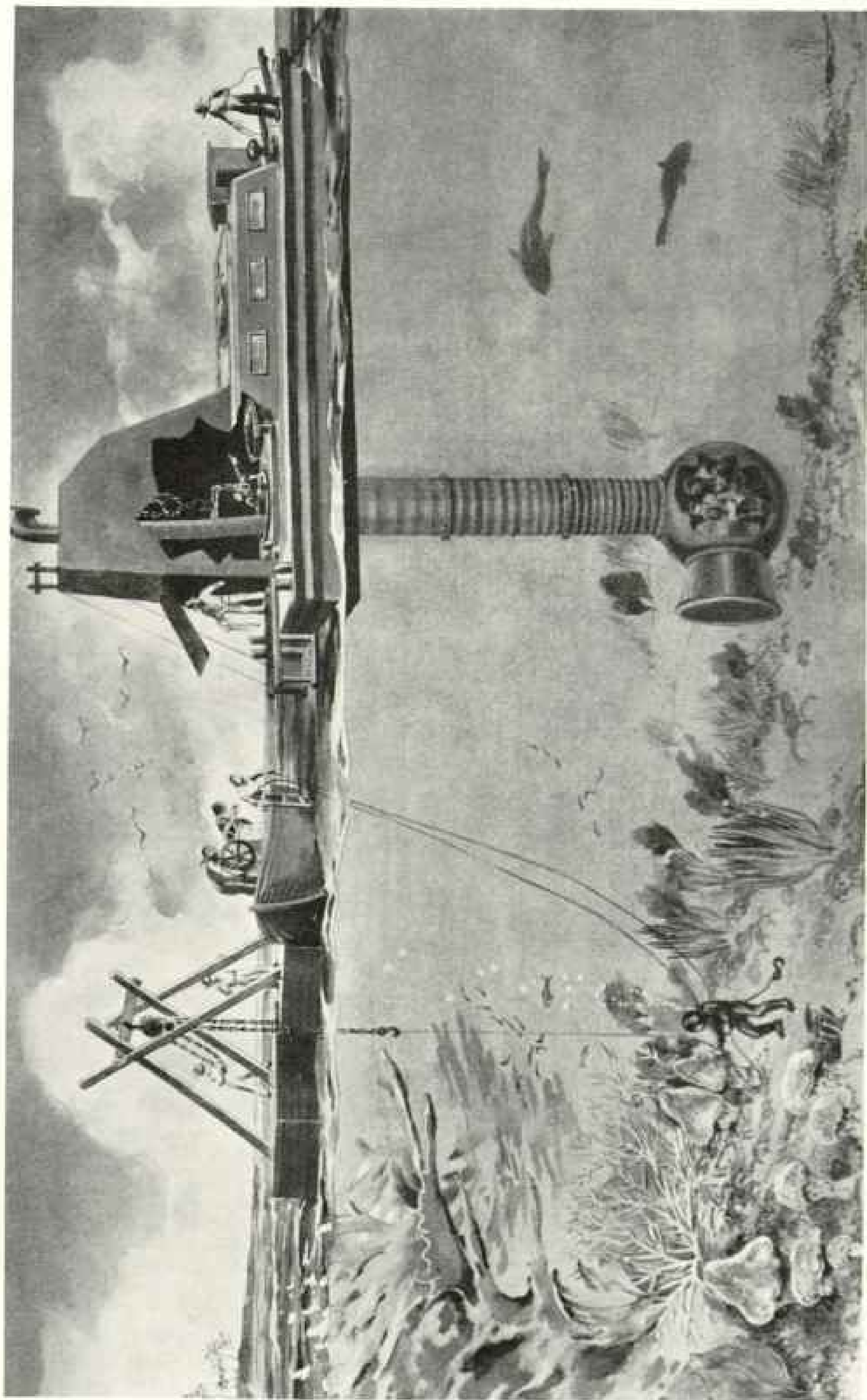
A serpentine reef encircles a huge central lagoon dotted with volcanic islands. Some peaks rise a quarter of a mile. In the treacherous lagoon waters are uncharted coral reefs. Tidal rips, roaring surf, and twisting channels endanger large ships passing through the 140-mile barrier. These islands lie in the far-western Pacific, among the Japanese-mandated Carolines.

A dozen tentacles bend over from the margin of the first polyp it touches and seize hold of it. It struggles for an instant and then becomes limp. Other tentacles reach over and grasp it, first from one polyp, then another. Neighboring mouths protrude their oval lips and start to engulf it, pulling in opposite directions until the poor creature's body is torn apart and the fragments are swallowed by the contending mouths.

The tentacles of coral polyps are equipped with batteries of minute sting cells, which, when touched, eject tiny threads like so

many lassos, armed with poison darts at their extremities. These penetrate the prey, paralyzing it, and leave it to the tender mercies of the hungry mouths with which it is immediately surrounded.

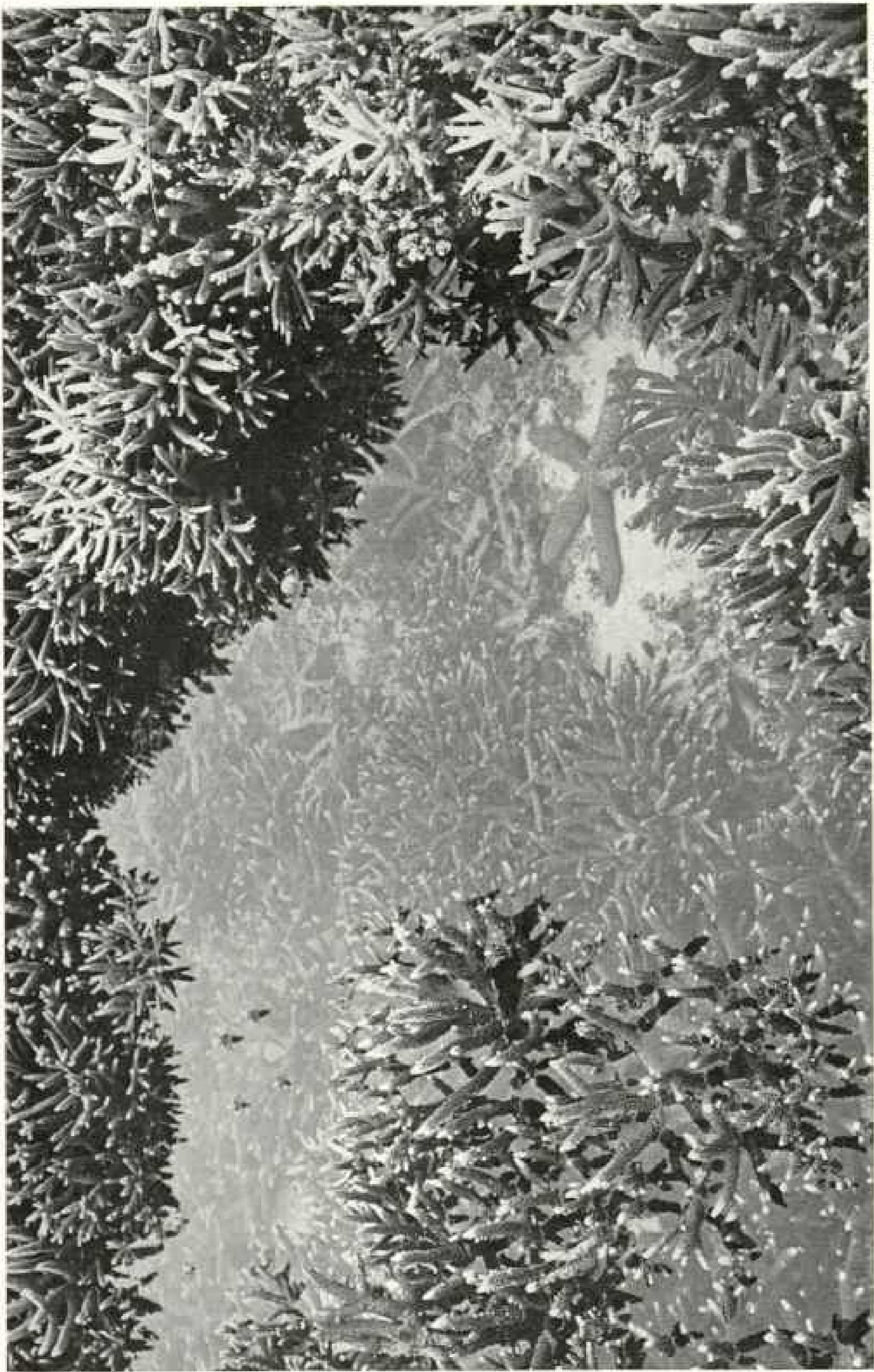
Within the body of the polyp the food passes down through a short, tubelike throat into a central cavity surrounded by a series of radiating alcoves separated by thin, flexible partition walls. The edges of these can be seen through the translucent body of the polyp, giving it a striped appearance. Digestive fluids pour out from the inner



Drawing from Dr. Roy Waldo Miner

#### JULES VERNE CHARACTERS EXPLORE THE DEPTHS OF THE SEA FOR SCIENCE

How the wonders of a coral reef were raised for "transplanting" in the American Museum of Natural History is shown in this graphic diagram. Dr. Miner and his prints are sent in their round, five-foot "studio" at the bottom of the Williamson submarine tube. At their ease they photograph and sketch the undersea life of the outer side of Andros reef, in the Bahamas, and direct the diver, who attaches slings to the coral masses desired (see text, page 303). A chain hoist on pontoons hauls them to the surface for transportation to New York.

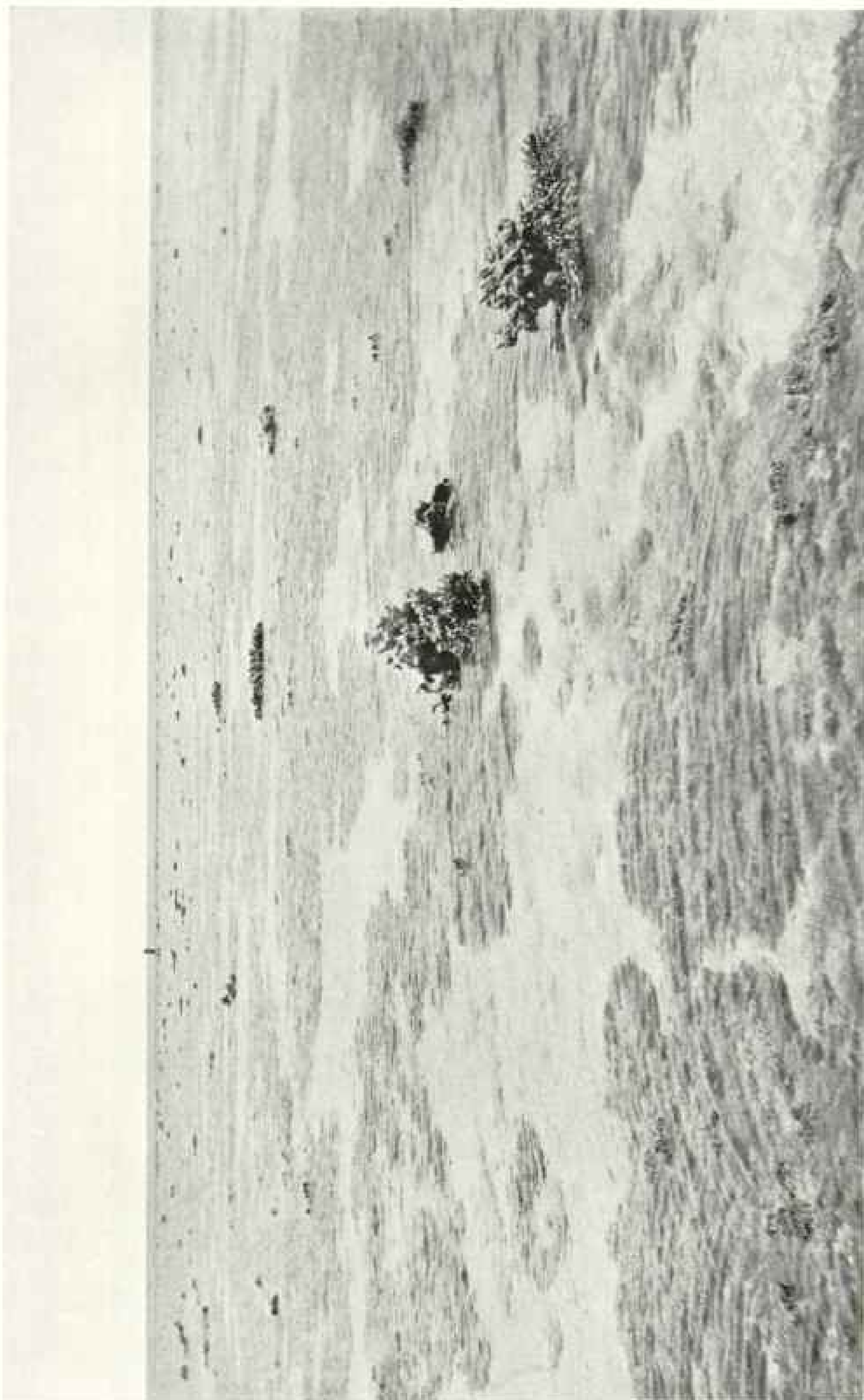


Photograph by Capt. Frank Hurley

**"WATCH YOUR STEP" IF YOU MUST TREAD THIS TEEMING TIDAL POOL!**

Naturalists wade gingerly among such rough spikes and "barbed wire" of living stone. These staghorn brittle with little coral polyps—filmy and flowerlike, but armed with tentacles, and, as rapacious as a miniature octopus, they seize and devour marine life too small for the human eye to see. The big starfish sprawled in the crystal-clear water (right foreground) feeds on juicy mollusks, forcing open their shells with the slow, relentless pull of its five strong, sucker-equipped arms.

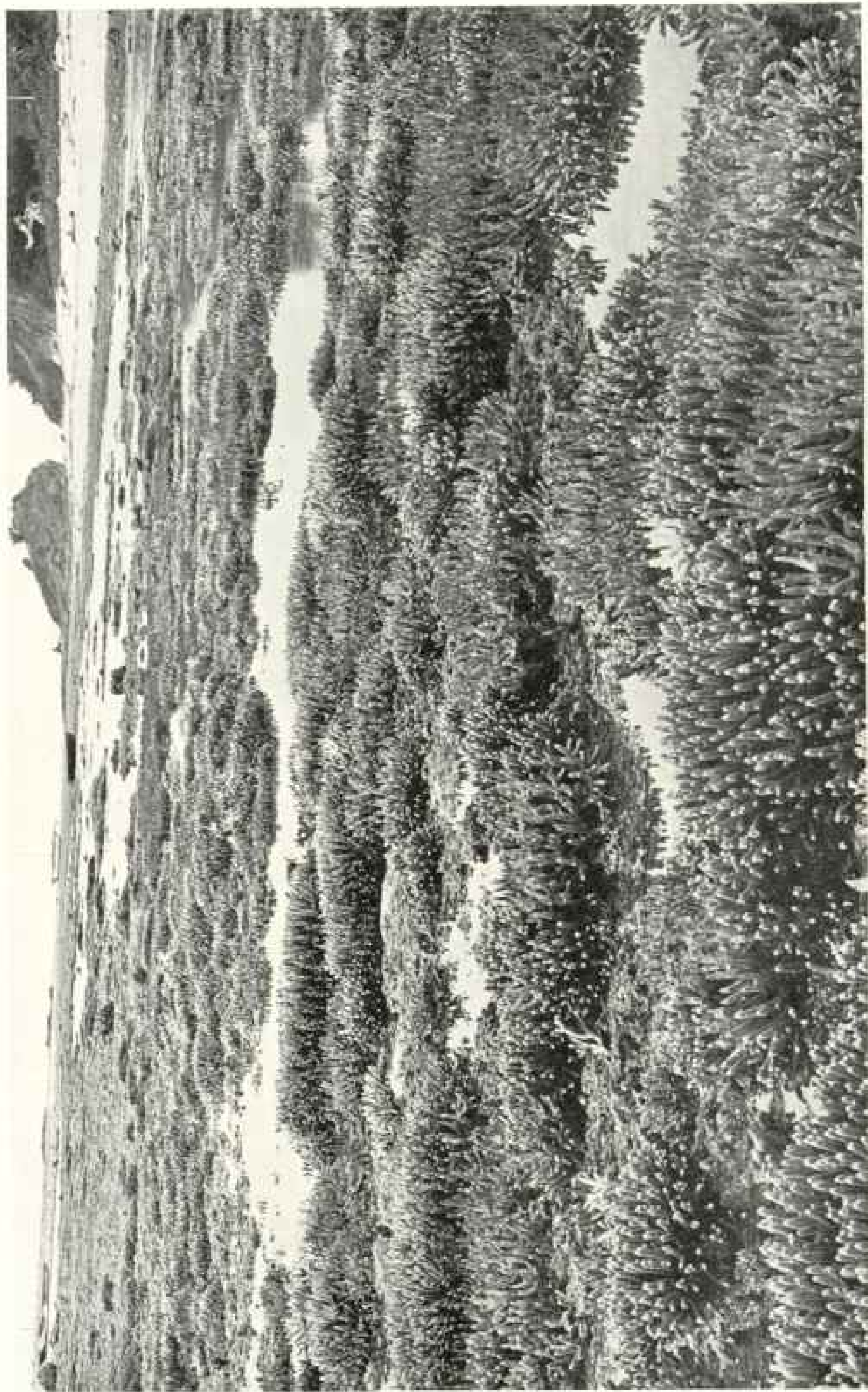




Photograph from Charles Barrett

THE LONE MAN, RAMBLING ACROSS THE CORAL BUILDERS' MASTERPIECE, IS DWARFED BY ITS IMMENSITY

Built up through the ages by the skeletons of countless coral animals, Australia's Great Barrier Reef parallels the continent's eastern coast for more than 1,300 miles—a vast chain of innumerable reefs sprinkled with islets. Between the Outer Barrier and the mainland stretches a "Grand Canal," from 7 to 100 miles wide, through which vessels ply. Capt. James Cook, in his *Endeavour*, and many another mariner since have come to grief on this great wall of the ocean.



Photograph by Capt. Frank Hurley

CONSIDER THE INFINITE POLYPS OF THE SEA AND HOW THEY BUILD THIS VAST EXPANSE OF LIVING CORAL.

Clusters of colorful colonies stand revealed by the retreating tide along the shore of Darnley Island, near Australia. Soft shades prevail—rose, golden brown, purple, emerald green. Some delicate pink corals break at a touch, but there are others that could scarcely be chipped by a hammer. With high, stout boots, naturalists explore the reef and its pools, but he who wanders too far must race the rising tide back to the beach.



Photograph by Dr. Roy Waldo Miner.

#### THE SEA YIELDS ANTLERS ENOUGH TO CROWN A HUNDRED STAGS

Two boatloads of staghorn coral fresh from the Andros reef are landed on a cay to be bleached, embedded in sponge clippings, and packed in big crates for shipment to New York. There they are coated with beeswax and their pristine colors restored by artists in oils.

borders of these walls and the food becomes assimilated. This is indeed a lowly organization for creatures capable of such effective building capacity.

The lettuce corals, however, contribute little to the building of the reef. In spite of the large size of the polyps, the colonies are always small. The bulk of the coral limestone is laid down by polyps of the same structure, but much smaller in size, varying from a sixteenth to an eighth of an inch in diameter. There are many species of these, including those which build the staghorns and the great branching elkhorns, the latter forming trees up to 15 and 20 feet in height and weighing several tons—the dominant coral of the Andros reef.

Then the massive brain corals, the orb corals, and the star corals are all laid down in solid domes, very dense in structure and extremely heavy for their size. These add greatly to the bulk of the reef. The polyps responsible for them, though relatively small, multiply with amazing rapidity. One species of the star coral, for example, builds enormous purple domes covered with minute polyps, while another closely related species

forms masses of a brownish-yellow color. The polyps are small rounded creatures which rapidly bud off new individuals between them, thus increasing the size of the colony.

New colonies are started by a method of sexual reproduction. Eggs are fertilized by sperms and develop into minute pear-shaped larvæ, which, when fully formed, are ejected suddenly from the parent polyp and swim about freely in the water by means of rapidly vibrating hairs, or cilia, which cover the outside of the larva like a coat of felt.

#### THE BIRTH OF THE RADIANT STARS

When the larvæ of the radiant star coral (*Siderastrea radians*) are born, a colony ejects clouds of its minute free-swimming young (see Color Plate I). The larvæ swim about for a time and then settle down to the sea bottom in fresh localities. Each larva becomes attached to the sea floor by its small end and is sometimes joined by others to form a group. Gradually the lower ends of the larvæ are flattened, so that each appears like a little dome with a mouth at the top.



Photograph by Dr. Roy Waldo Miner

RAINBOW FISH, NOT BIRDS, DART THROUGH THESE "WIND-BLOWN TREES"

To the diver walking on the sea bottom of Andros reef, the dense coral jungles appear to be a submerged forest turned to stone by some magic. While the branch tips are white, as seen in the picture, the colors of the coral trees as a whole range from saffron to orange.

Very soon six knobs appear at regular intervals on the top of the larva surrounding the mouth. These are the beginnings of the first six tentacles of the developing polyp. Shortly afterwards six others appear between them, and so on, as the polyp matures.

Simultaneously with the appearance of the tentacles the edges of the developing internal partitions, or mesenteries, may be seen through the transparent body wall, and soon a single adult polyp is formed.

Early in its career the young polyp starts to manufacture limestone. It first appears as six irregular radiating bars underneath the circular bottom of the polyp and outside its body. These bars increase in height, pushing the bottom of the polyp up in folds. In the meanwhile a complete floor has formed between the bars, so that the polyp is now seated upon a circular calcareous disk with six radiating partitions, or septa, belonging to the external skeletal limestone and alternating with the internal mesenteries (see page 715).

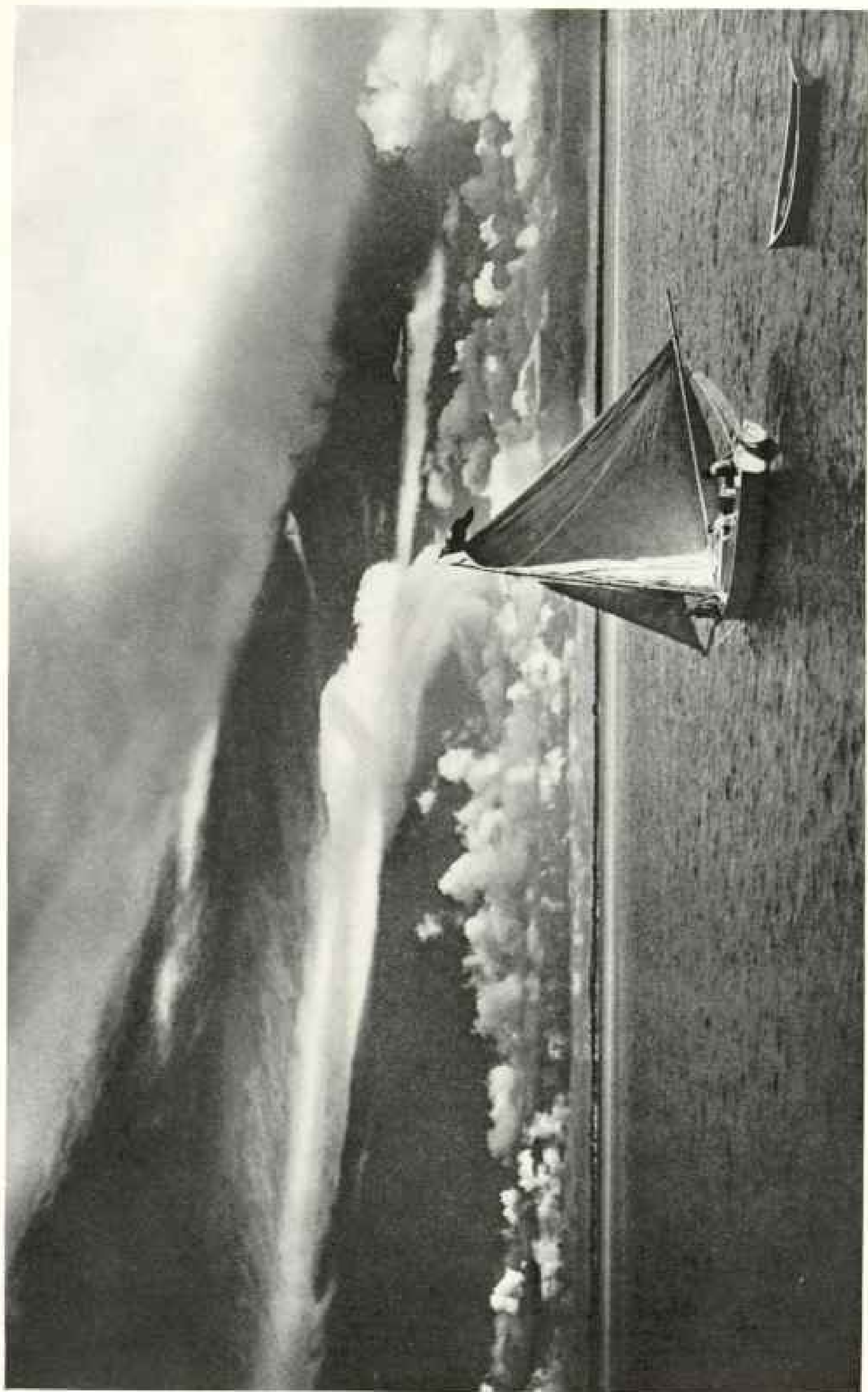
As the polyp develops, the number of mesenteries increases in regular series, keeping pace with the tentacles. At the same

time new limestone partitions are interpolated, pushing up from below into the newly forming chambers. Thus each polyp builds a stony coral skeleton, or calyx, for itself beneath and around the lower part of its body.

Each polyp, or group of polyps, originating from the free-swimming larvæ, is potentially the start of a new coral colony. Borne by the ocean currents, the rain of little pear-shaped organisms settles down on the sea bottom everywhere and undergoes the transformation described above. The resulting saclike creatures feed voraciously, grow rapidly, and, overflowing with energy, are not able to contain themselves within their original simple boundaries. So little balloonlike proliferations bud off from the sides of many of the polyps and swell up to burst forth with new mouth and tentacles and become polyps like their parents.

Many individuals, as they grow, actually split apart in the middle. This remarkable process starts with their mouths and, extending through the circlet of tentacles, gradually continues down the cylindrical body to the base. So the body of each





Photograph by F. L. Jacques

ACROSS A CORAL LAGOON AT TWILIGHT SAILS THE "GULL"

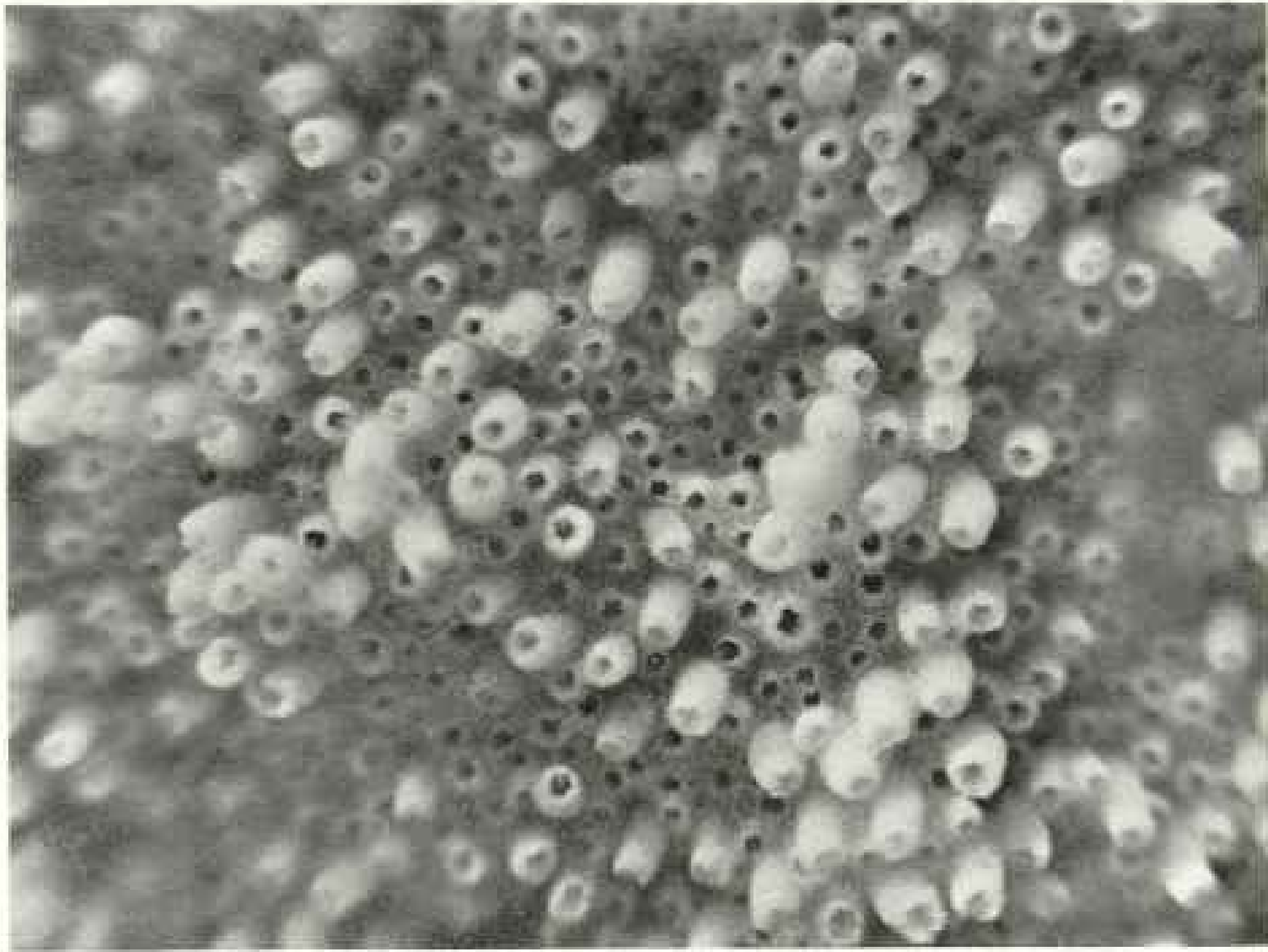
The blue British Colonial Ensign flies at the masthead of the official craft of the Commissioner of Andros Island. Parallel with the shore fringing the horizon gleams a sand bar, white as chalk. Protected by a natural 100-mile breakwater of coral, these quiet waters made an excellent harbor for the expedition's vessel. President Roosevelt sought bonefish and barracuda off this island during his recent Easter cruise aboard the *Yorwath*.



Photograph by Dr. Roy Waldo Mison

**BLEACHING A CORAL; IT WEIGHS A TON AND A HALF!**

Such purplish red domes, the densest and heaviest yet discovered, grow abundantly in the West Indies and play an important part in reef formation. After being witted, the outer layer of animal tissue sloughs off, exposing the white limestone skeleton.



© H. E. HUI

**THESE ARE THE STONY "BONES" OF BUSY WORKERS**

A piece of dead coral, here magnified, is honeycombed with cell-like structures of limestone. Each was made by a miniature chemical factory, a tiny, tentacled polyp (see text, page 713). The cuplike opening contained the polyp's entire body, with mouth and stomach cavity.



Drawing from model in American Museum of Natural History

#### HOW THE HUMBLE CORALS HELP ALTER GEOGRAPHY

The flooded valleys of the two volcanic South Sea islands, Raiatea and Tahaa, in the relief map indicate they are slowly sinking. At the same time a coral barrier is being built up around them which breaks the surface at low tide. Should the islands disappear completely, the reef would be left as a ring-shaped atoll, or belt of low islets surrounding a lagoon.

original polyp becomes transformed into two new offspring. Reproduction by budding and division, continually repeated, naturally results in a rapidly growing mass of living creatures, which in the course of time attains enormous proportions.

Groups of various species of West Indian coral polyps in successive stages of budding and division are depicted in Color Plate II. In some cases the polyps are shown almost completely parted, but attached to each other by their bases. In others the mouth has divided to form two or more openings, while the disks and circlets of tentacles have elongated horizontally, but have not as yet separated.

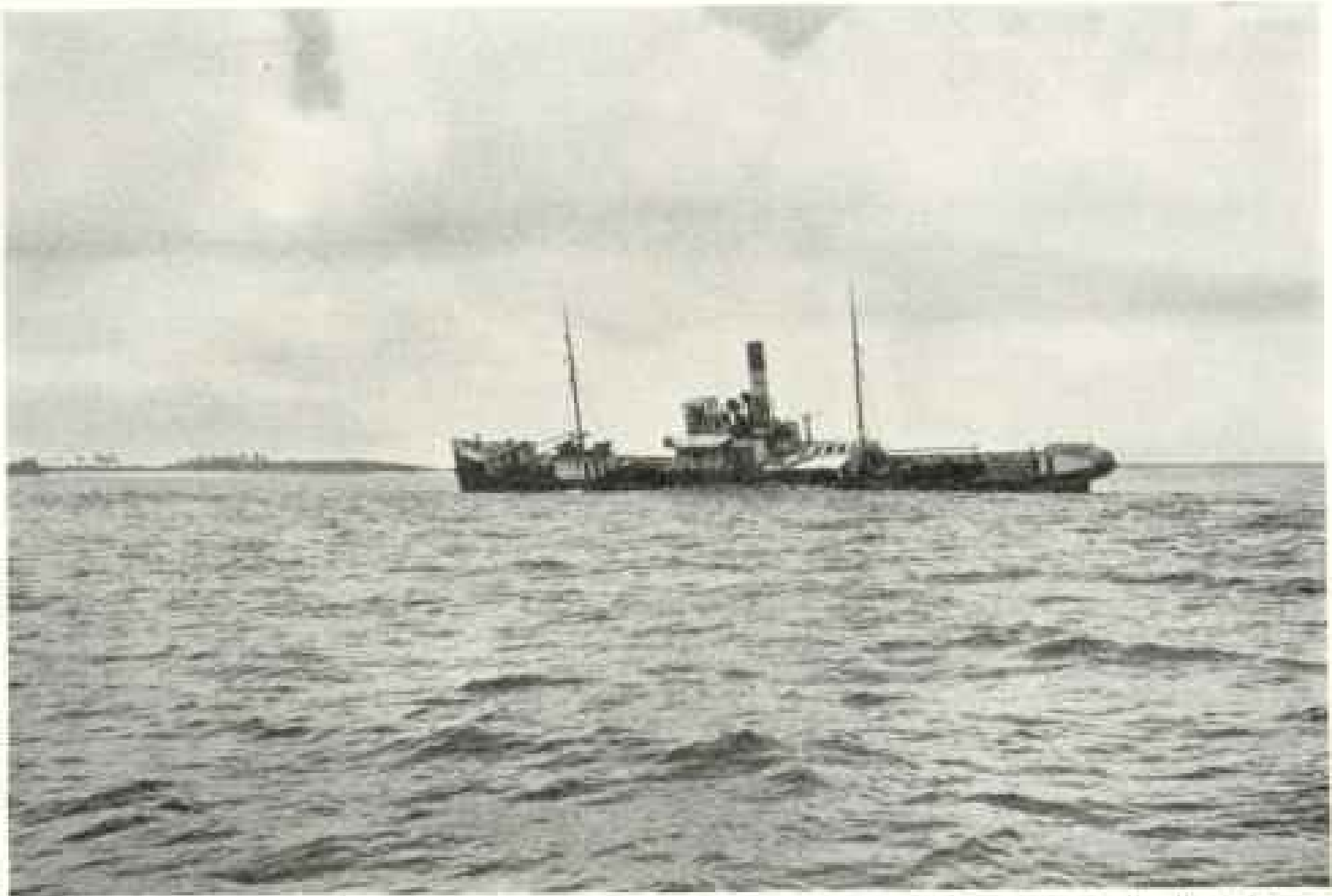
As with the bodies, so with the coral skeletons. While the original polyp is laying down its limestone calyx, it grows upward, continually adding to its height, and during the time of actual division the summit of the calyx follows the polyp's elongated outline, assuming its form.

When the division of the original animal is completed, the top of the coral structure also has separated, so that now there are two polyps mounted on the top of a Y-shaped

coral skeleton. This process finally results in a loosely branching structure, as depicted in the central part of Color Plate III. At the upper left hand, in the same plate, is shown a branching coral skeleton produced by a budding colony. In such colonies the forward growth of the skeleton is more rapid than the division of the polyps.

In certain species, however, the polyps divide so rapidly that they keep pace with the forward deposition of the coral skeleton. In this instance it is obvious that the polyps and calyces would be closely crowded together, forming colonies like that in the lower right-hand corner of Plate III (*Mussa rigida*) and the dome-shaped corals like *Orbicella* (Plate IV, lower left).

Finally, in the case of the brain corals (*Macandra*), of which an example is shown at the lower left hand in Plate III, the division of the polyps is more rapid than the growth of the skeleton. No sooner does a mouth divide into two mouths than each of these divides again, before the rest of the polyp has a chance to follow suit. The result is a long tapelike colony having a series of mouth openings, but with stomachs



Photograph by Dr. Roy Waldo Minor

#### TINY CREATURES OF FAIRY DELICACY WRECKED THIS SHIP

Slowly they reared the coral reef which ripped open the bottom of the freighter *Angletorre* off Harbour Island, in the Bahamas. Behind such dangerous reefs in bygone days pirates, preying on the treasure galleons of the Spanish Main, sought refuge from pursuing men-of-war.



Photograph by Capt. Frank Hurley

#### NEPTUNE'S "ROCK GARDEN" IS COMPOSED OF TINY ANIMALS

As the tides ebb at Darnley Island, near Australia, fantastic shapes in stone are exposed, suggesting strange aquatic "plants" resembling the fungus, clover, cactus, and mushrooms of land. They are the handiwork of many kinds of coral polyps, which reproduce by budding and dividing (see text, page 713, Color Plate II, and illustration, page 711).



connected together, while the tentacles and septa now form two long parallel lines on either side. This colony, in growing, meets other elongated groups similar to it, and winds around them in sinuous undulations resembling the convolutions of the human brain; hence the name, brain coral.

Thus the many diverse species of coral composing a reef form structures, ever growing higher and higher, crowding and becoming entangled with each other in thickets of grotesque and weird beauty (Plate IV). The soft colors of their outer surface run through varied hues of rose, pink, orange, tan, yellow, green, blue, and purple—all the colors of the spectrum. These colors are partly due to pigments in the living tissues, which invest the surface of the coral limestone skeleton, and partly to another very interesting phenomenon.

Microscopic marine plants, or algæ, live in the inner tissues of the translucent polyp wall. Each individual is a disk-shaped single cell, amber yellow in color. They multiply by millions, often completely filling the cells of the endodermal layer.

Since they are plants they use the carbon dioxide excreted by the polyp in which they live, and in the presence of sunlight transform it into food for themselves, giving forth oxygen in the process. The latter gas, so essential for animal existence, is utilized in turn by the polyp in its vital processes. Hence there is maintained a partnership between the plant and the animal of equal importance to both.

#### WHY CORAL COLORS CHANGE

If the coral colony happens to be located in strong sunlight, the algæ multiply with great rapidity, giving the polyp's tissues a deep golden hue. This fact accounts for the rich tans and saffrons of the great elkhorn corals that form the extensive treelike growths in the Andros reef.

If the coral is growing in a submarine nook where the sunlight is weak, the algæ are relatively few and the coral tissues are seen in their original pigmented color. For example, the brain coral is naturally green, due to the color of its pigment, and that is the way it appears in deeper waters and shaded localities; but in moderately illuminated areas the microscopic plant partners are more numerous along the summits of the sinuous ridges of the coral, producing a yellow color in contrast with the green in the winding valleys between them. Finally,

brain corals located in the brilliant sunshine of the shallows on the top of the reef are so completely impregnated with algæ as to appear a deep chocolate brown.

#### WHEN A POLYP TURNS VEGETARIAN

Boschma, a Dutch scientist, maintains that a still more remarkable relationship exists. He says that the microscopic plants grow so abundantly in the tissues lining the stomach cavity of the polyp that at times they are actually digested as part of the creature's food.

During the day the polyp mouths are closed, no animal food is taken in, and the polyps actually feed on these internal vegetable gardens, overluxuriant as they are in the sunlight. Then, toward evening and during the night, the coral animals open their mouths wide, while their stinging tentacles expand like tiny traps to capture unwary creatures that swim within their reach and draw them down into gaping, saclike maws to be digested. So the polyps are vegetarians in the daytime and carnivores at night!

It is often asked from what source the coral polyps obtain the limestone for the manufacture of their stony coral structures. The reef-building corals exist only in the warmer waters of the ocean, on submerged banks no deeper than 120 to 150 feet below the surface, between 30 degrees north and south latitude. During past ages the limestone cliffs of continental masses have been leached out by rivers, and thus large quantities of calcium have been brought down into the oceans. The warmer waters of the Tropics, because of their greater absorptive capacity, are richly impregnated with lime, which readily dissolves in the form of calcium bicarbonate.

As coral polyps grow they excrete quantities of ammonia and carbon dioxide. A chemical exchange takes place in the water immediately surrounding the polyps, resulting in the formation of the insoluble substance, calcium carbonate, which is limestone. This encrusts the polyps beneath and around their bases, where thickened layers of their tissues are particularly rich in excretory products. Thus the limestone particles are built up to conform to the structure of the polyps.

Calcareous plants in the neighborhood of the coral reefs also become impregnated with lime in enormous quantities, and the numerous species of shell-bearing mollusks

## MULTI-HUED MARVELS OF A CORAL REEF



© National Geographic Society

### TINY MAGICIANS ARE BORN TO TURN SEA WATER TO STONE

Myriads of pear-shaped larvae of pinhead size (inset, highly magnified) are shown pouring from the mouths of a Radiant Star Coral, *Siderastrea radians* (upper left). They swim by waving their hairs, then anchor, become domelike, and grow stinging tentacles for catching and stuffing microscopic animals into hungry mouth-slits. Now each polyp—meaning “many-footed”—turns chemist. It gives off ammonia and carbon dioxide. The latter, combining with lime in the water, forms limestone for coral skeletons.



© National Geographic Society

VORACIOUS POLYPS EAT SO MUCH THEY BECOME "TWO OTHER FELLOWS"

Overflowing with life and energy, each may start a colony by budding off other individuals like itself or splitting in half. Those pictured at the bottom divide so swiftly that they produce massive, compact coral mounds. Above these mounds others build submarine "skyscrapers," because they divide less frequently and pile up limestone more rapidly. Lining its stomach cavity each worker grows "vegetable gardens" of minute plants or algae, which may be digested outright to vary a carnivorous diet.

MULTI-HUED MARVELS OF A CORAL REEF

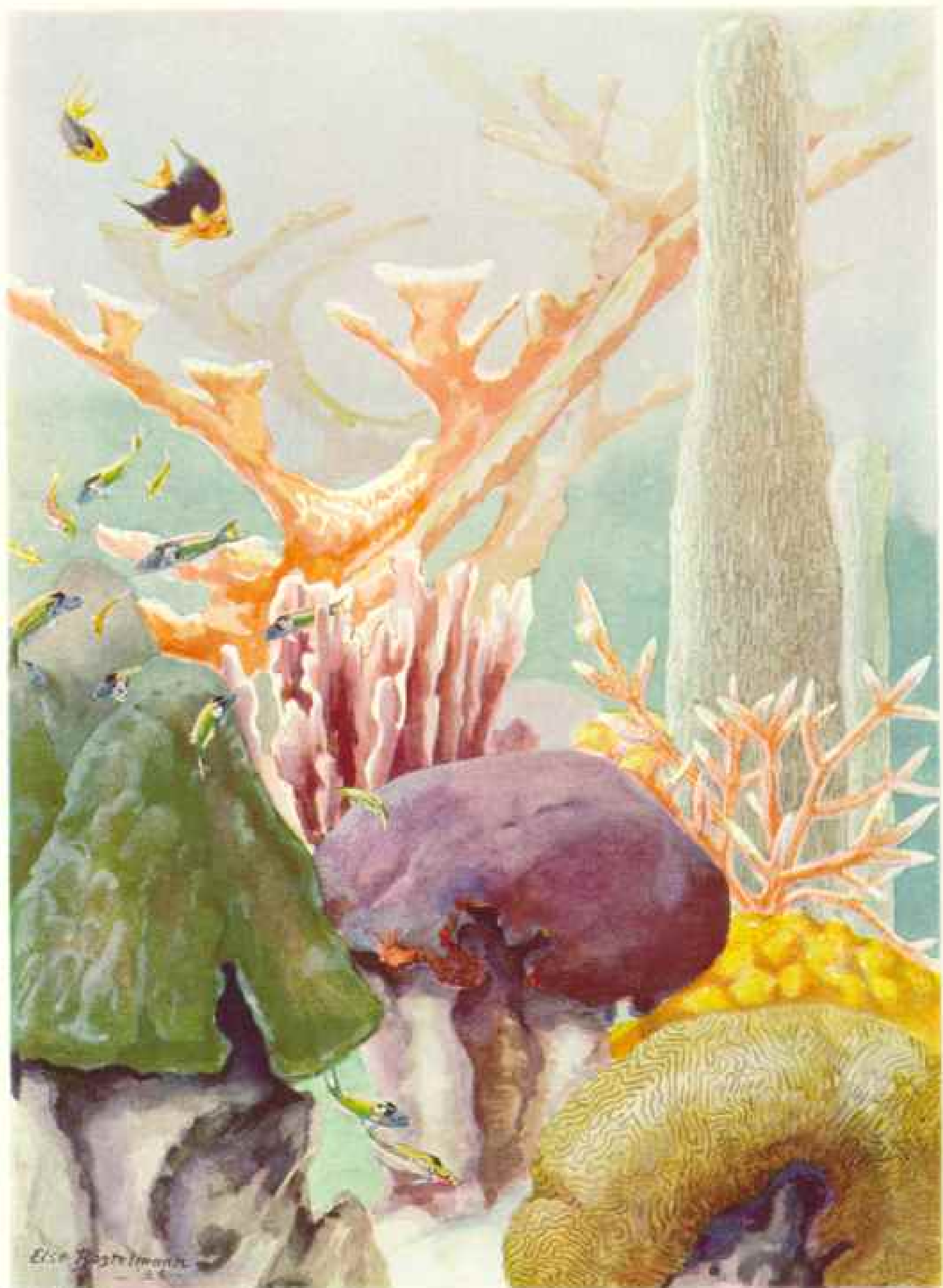


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NEW GENERATIONS ERECT THEIR CASTLES UPON THE HOMES OF THE OLD

The coral tissues are literally immortal unless the entire colony is killed by storm, silting, or prolonged exposure to the air. Each adult polyp splits to form the living bodies of its offspring. Four species are depicted, life size. The rows of slits in the green valleys of a Brain Coral (lower left), are mouths, flanked by other rows of beadlike tentacles winding over the surface. Thriving beside it are a dome-shaped colony of *Mussa* with close-set polyps, clustered doublets of *Eusmilia*, and starry-eyed soaring *Oculina*.





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SLOWLY MOUNTS THE REEF, PERHAPS TO WRECK A SHIP OR FORM AN ISLAND

Black and yellow rock beauties and blueheads wander through an immense fairy forest of unearthly shapes like mushrooms, brains, lettuce, antlers, and trees. The living mass rises possibly eight and a half feet a century. Untold thousands of years ago coral castles like these were built. Time and changes in the earth's crust upraised them to form limestone beds and cliffs which rivers dissolved and carried back to the sea. Then the rocks are re-created by coral polyps to repeat the age-long cycle.

## MULTI-HUED MARVELS OF A CORAL REEF



© National Geographic Society

### FANTASTIC GORGONIANS ARE NOT PLANTS BUT ANIMAL COLONIES

First cousins of the reef-forming corals are these sea fans (upper left), plumes (center), and bushes (lower left) of tropical sea gardens. Hanging from the lower side of the soft-spangled sea finger (lower right) are greenish extended polyps. Sometimes the polyps withdraw into the purplish stalk, leaving only their green tips protruding as in the upper and near sides. The building material of these polyps is not stone but a horny and flexible substance, so the Gorgonians sway to the rhythm of the ocean currents.



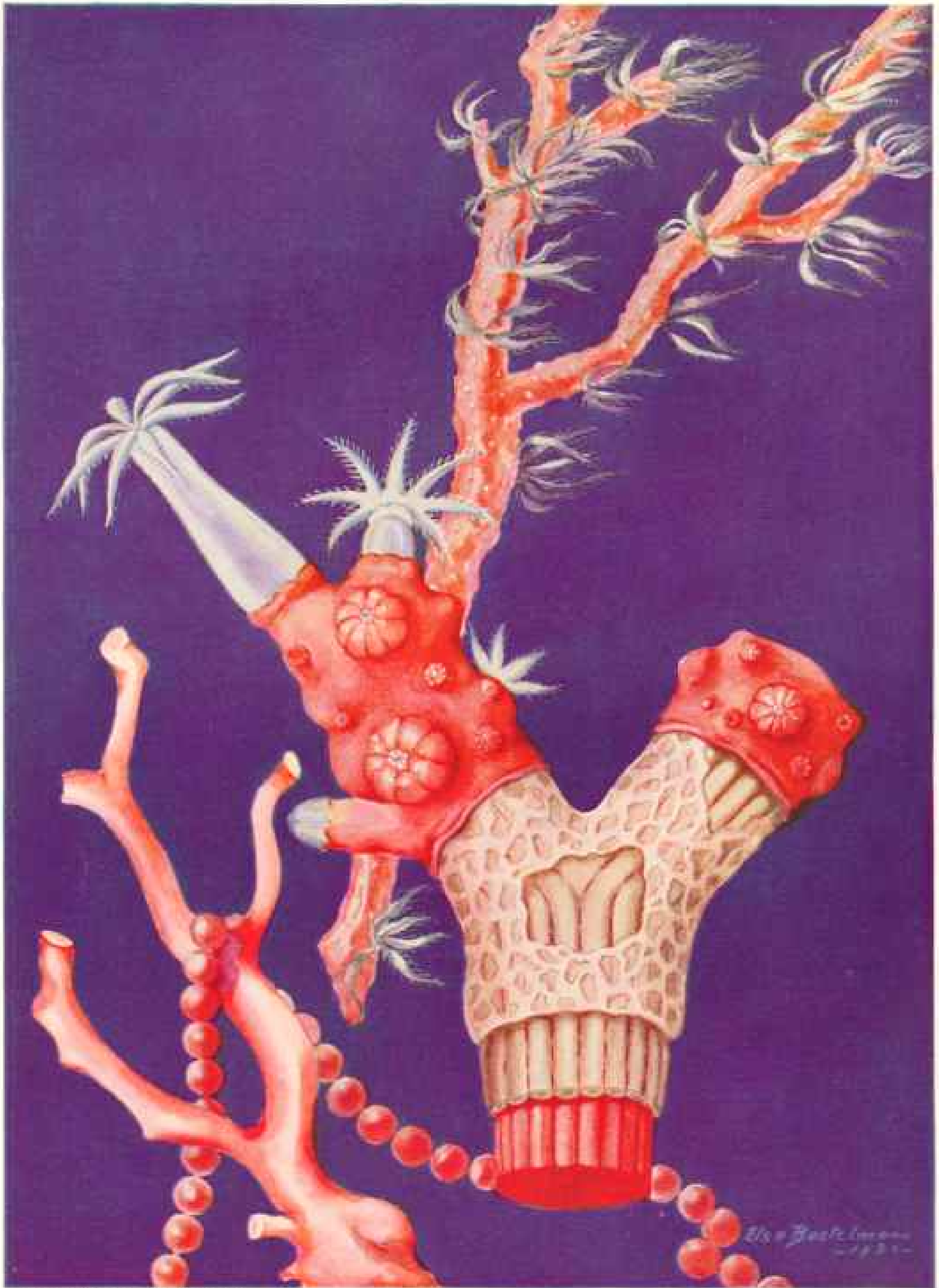
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FILMY BODIES ALONG THE STEMS REACH OUT TO FEAST

In single file they outline the ridges of a two- or three-edged Gorgonian, *Pterogorgia anceps* (left, natural size; right, enlarged). A highly magnified branch-tip (upper inset) shows the polyps, some of which are hungrily extending their tentacles around the central mouth to act as a trap, while others, sated, have sheathed them. Having eight arms like the octopus, the polyps differ from the coral reef-builders, whose tentacles are in multiples of six and lack fringes.



MULTI-HUED MARVELS OF A CORAL REEF



© National Geographic Society

FLOWERLIKE CREATURES LIVE AND DIE TO MAKE MY LADY'S NECKLACE.

The precious coral of commerce, *Corallium rubrum*—long prized as adornment and charm against evil—is found in abundance only in the Mediterranean and the Sea of Japan. At the upper right is a branch, natural size. In the center is a colony, enlarged to show expanded and contracted polyps; the three outer crusts have been partly removed to show the central part, used in jewelry making. A stripped core and the familiar beads made from it appear at the lower left.





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SEA ANEMONES MAY LOOK FRAGILE, BUT SOME LIVE 50 OR 60 YEARS

Their beauty masks a murderous nature. Their snakelike tentacles are armed with tiny nettle cells, from which, at a touch, poisoned, whiplike stingers shoot into the prey. A worm or small fish brushing against them is promptly paralyzed, swallowed, and digested. These overgrown cousins of the coral polyps form no skeleton and inhabit shallow seas from the Arctic to the Tropics. Here several West Indian species extend alluring, lethal arms.

add their quota. The protozoan animals of the group Foraminifera manufacture limestone shells, and there seems to be a certain amount of direct bacterial deposition as well.

The result is a concentration of limestone in tropical seas through the manifold activities of sea animals and plants. This increases during the ages and supersaturates the tropical sea waters with dissolved calcium, so that deposits of carbonate of lime accumulate on the sea floor.

Later on, through changes in the earth's crust, the embedded submarine limestones may be upraised to form once more parts of continental masses. In fact, the very rocks which were eroded and dissolved by the rivers to form a source of calcium in the seas were doubtless laid down on the bottom of primordial oceans millions of years ago by the corals and other sea creatures of that period.

The activities taking place before our eyes in the coral reefs of today are parts of an age-long cycle repeating itself through æons of time.

#### ANIMAL GROWTHS RESEMBLE FRONDS AND BUSHES

As one sails over the coral reefs in a glass-bottomed boat and gazes down at the sea gardens, the coral castles of the reef-builders are seen to be adorned and surrounded by thickets of waving sea growths that to the uninitiated appear to be a plant vegetation of varied hue and graceful form. As previously mentioned, these are the gorgonians (see Plate V) and, far from being plants, are in reality animal structures. Like the corals, they are colonies of polyps, but instead of building limestone habitations they have specialized in horn, or chitin, as a building material.

Descending to the ocean bottom to examine the gorgonians more closely, we see that the fernlike plumes, the flat, lacy fronds of the sea fans, and the club-shaped branches of the sea bushes are alive with close-set ranks of tiny expanded polyps, tinted green, yellow, pink, or white. Myriads of starlike forms extend radiating arms around open mouths, hungrily sweeping in their invisible prey. The delicate transparent columns, which are their bodies, rise from pitlike openings perforating the branches of their common dwelling places. There is no obvious sign of activity.

Yet beneath the outer crust their bodies unite in a network which permeates the entire structure, and the microscopic cells of

their tissues are ceaselessly engaged in laying down and cementing the central core of flexible and tough horn which supports the entire community.

Surrounding this inner skeleton, the polyps have set in a mosaic of interlocking needles of lime of most delicate workmanship and minute size, the whole forming an investment of rich color.

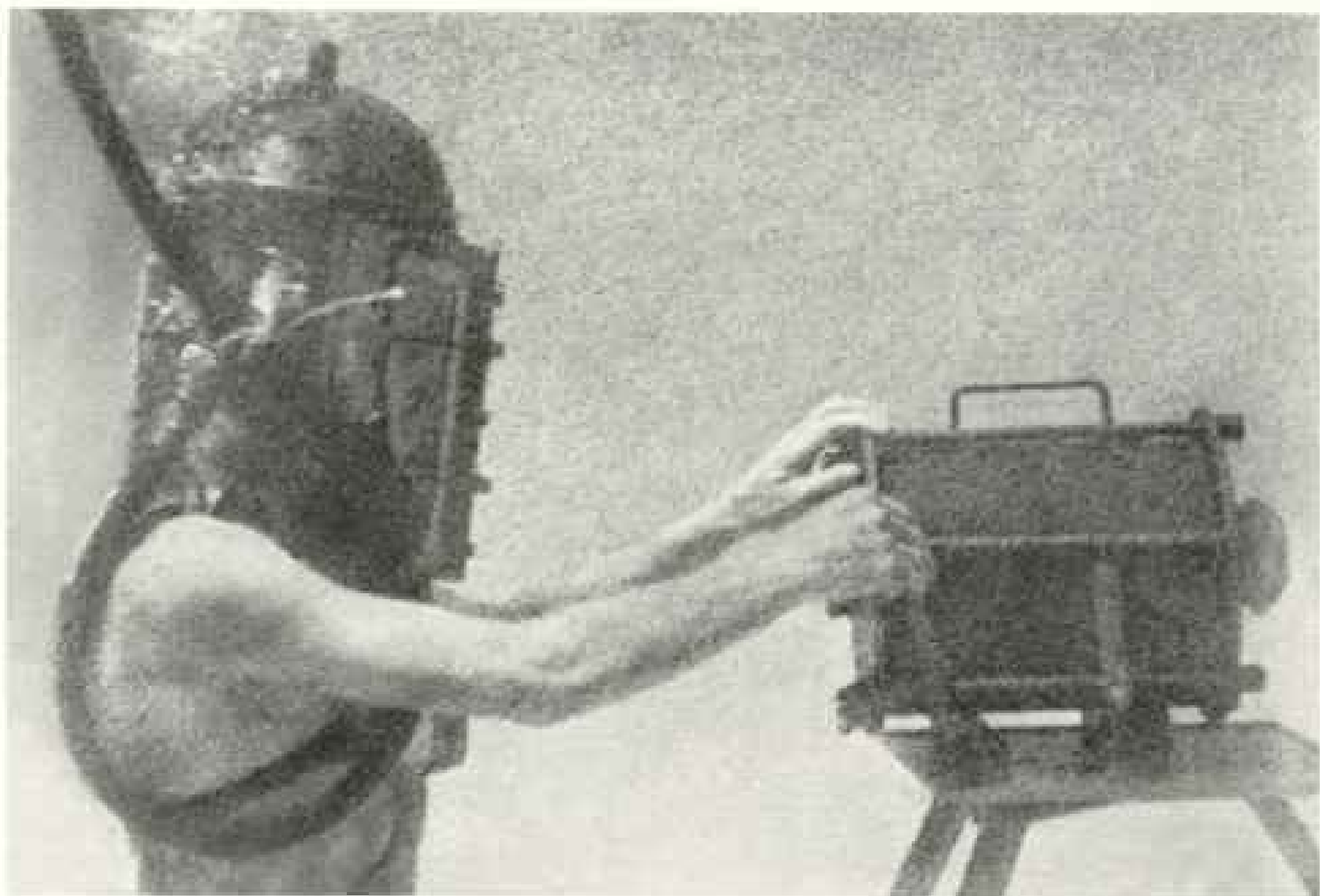
Yonder rises the reddish-purple, double-edged gorgonian (see Plate VI), its two- or three-sided branches bordered with long lines of white polyps standing in single file like soldiers. If we remove a small colony of this species from its anchorage among the coral heads and carry it with us up the ladder to the boat, we can place a portion of one branch in a dish of sea water under a microscope. In a short time the polyps expand and through the magnifying power of our lenses we can see what they are really like.

At the tip of the branch several polyps are fully open. Each translucent silvery creature erects itself full length and spreads a circlet of eight tentacles, edged with tiny toothlike projections. This number of tentacles, with their ornamentation, is characteristic of gorgonian polyps, as distinguished from their cousins, the corals. The central, circular mouth leads down to the hollow interior of the creature, which has no secrets to hide, for the filmy radiating partitions dividing the circular rotunda into eight radiating alcoves are clearly visible through the gossamer tissues of the cylindrical body wall.

#### THE SOURCE OF THE CORAL OF COMMERCE

The gorgonians of our West Indian waters are closely related to the famous precious coral (see Plate VII), which occurs in the Mediterranean and the Sea of Japan, but is entirely lacking in our American coral reefs. This species, so important in the jewelry trade, grows in small branching clusters on the sea bottom. In life the coral structure is covered with a brittle outer crust of soft reddish color, from which the delicate white polyps protrude. They are quite similar to other gorgonian polyps.

If the crust is removed, together with two other concentric whitish layers, the hard inner core is uncovered. This is the part that becomes the precious coral of commerce. It varies in color from a brilliant scarlet, in some specimens, to a delicate rosy pink, or even white, in others. It is capable of taking a high polish and, as everyone



Photograph from Dr. Roy Waldo Miner

#### A FISH-EYE VIEW OF AN UNDERSEA PHOTOGRAPHER

Twenty-five feet below the surface, Dr. Miner prepares to make "movie" actors of the rainbow-hued residents of a coral reef. With a lever and a crank on the watertight box, he starts, stops, and rewinds the film. Through these clear Bahaman waters on a bright day one can see 100 to 150 feet. Beyond that, objects melt into a luminous, pearly blue haze.

knows, may be carved into beads or other ornaments.

The relative value of the different shades depends upon the fashion of the time. A number of years ago the deep scarlet was in favor, to be supplanted later by the rose-colored coral in popular esteem.

While reef-forming corals and gorgonians are confined to tropical waters and to comparatively shallow seas, not exceeding 20 or 25 fathoms in depth, other species, which are solitary in habit, or that form small colonies, grow in deep seas, and in a few instances in more northern shallow waters.

The beautiful *Astrangia* is found along the New England coast, encrusting rocks where the tide flows freely, in patches about the size of one's hand. Its delicate rosy tints remind one of the terrestrial arbutus. Again, those first cousins of the corals, the sea anemones (see Plate VIII), adorn tide pools and wharf piles with their colorful beauty along the entire Atlantic and Pacific coasts, while in the Tropics their brilliant hues add to the glories of the coral reefs themselves.

These striking polyps differ from corals

only because they have no power to secrete limestone or other skeletal structures. Internally their soft bodies are identical in arrangement with those of corals and, like them, they are armed with sting cells.

These lowly creatures, together with other lime-forming organisms associated with them, have filled a most important place in determining the geographical and geological features of the globe. Their massive reefs penetrate the surface of tropic seas and must be recorded carefully on hydrographic charts for the safety of navigators.

Their islands dot the southern oceans, many of them the abode of men. Their huge submarine deposits, elevated by geologic changes of past ages, have been important factors in determining the outline and surface features of our continents and have entered into the structure of mountain ranges. They have furnished building stones for our houses and marble for our statuary.

Their disintegrated substance has fertilized our fields and grown our crops, finally washing down to the seas, to be worked over again by the ubiquitous polyps for future ages.

## NATURE'S MOST AMAZING MAMMAL

### Elephants, Unique Among Animals, Have Many Human Qualities When Wild That Make Them Foremost Citizens of Zoo and Circus

BY EDMUND HELLER

NATURE is forever playing jokes on animals. When, in the course of its evolution, she exercises her sense of humor on an animal, it gets a tough break—often just where Nature seems to have made it invulnerable.

Upon the elephant Nature bestowed the thickest of hides; but, just to be a bit devilish, she installed a very poor heating plant; so the elephant has to live close to the Equator to keep warm.

With its one inch of thick skin the elephant ought to be able to defy cold. Instead, the animal is as sensitive to cold as a geranium. The slightest trace of frost curls it up with severe cramps in its stomach. In our climate, it must be kept in a warm house until June arrives, and enclosed again when October frosts send shivers down its gigantic spine.

#### APPLYING A MAMMOTH MUSTARD PLASTER

The cure for stomach cramps in an elephant is a bucket of gin and ginger with a "kick" that only an elephant can survive and enjoy. With the drink usually goes a counterirritant—a gigantic mustard plaster over its belly and back. Two blankets wrapped around its wrinkled belly, with a thick layer of mustard between them, exert a pull which starts circulation toward its solar plexus.

After one or two cures the elephant often becomes a crafty alcohol addict. It feigns cramps, lying down and groaning in a pitiful way. The gin and ginger go to the spot and relieve the pain—so the keeper believes—but the next day, and the next, the trick is repeated until the keeper realizes the sham.

In a state of Nature, elephants are very sociable and live in herds, or family parties, usually from 20 to 40 animals. Herds of a hundred or more have been reported by hunters, especially in Africa. Such associations are not herds, but a number of herds living together in the same locality. I know of one place in the Lake Edward district of Uganda where numerous herds can be

seen for a month or so, scattered widely over a level, grass-covered plain.

#### "MY MOST THRILLING MOMENT"

My most thrilling moment with elephants occurred while I was following Theodore Roosevelt through the rain-soaked jungles of Mount Kenya (see page 735). The Colonel was out for big game—the biggest animal which still roams our earth, the African elephant, or *Loxodonta africana*, if you would identify him scientifically.\*

The terra firma which *Loxodonta* inhabits is not so firm at that; we often found ourselves half submerged by falling into rain-filled tracks. When going places a herd of elephants have a habit of stepping into each other's tracks. In muddy ground this "follow-the-leader" game makes holes deeper and deeper, as each six-ton pachyderm sinks his feet farther into the mud footprints of his predecessor.

These cumulative footprints often are two and a half feet deep and five feet around. Such tracks hold a barrellful of water, and on rainy days they are filled. Following elephant tracks all day during the rainy season is a man's job, and the Colonel found it good sport!

One morning we were up with the dawn, following the trail of a mud-plunging elephant herd. About noon the trail got hot—the scent was so fresh we could smell the elephants ourselves.

Our hunter and his Wandorobo tribesmen trackers tested the faintly perceptible air currents by lighting matches. The slightest human scent sniffed by any member of the herd would have caused the animals to bolt. The air currents favored us, being chiefly head winds, but so gentle we had to pussyfoot like stealthy cats.

Our procession changed to firing-line formation. In advance were Colonel Roosevelt and the hunter, carrying their heavy,

\* See "African Game Trails" and "Wild Man and Wild Beast in Africa," by Theodore Roosevelt, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1910, and January, 1911, respectively.





Photograph by Brauns De Cou from Galloway

#### A MAHOUT PUTS HIMSELF IN A TIGHT PLACE

Every circus-goer has seen such an act in the "big top," but this Singhalese, near Kandy, Ceylon, has trained his work elephant to do the trick as an everyday stunt. By touch signals the trainer directs the elephant to tighten, loosen, or let go his hold. A sudden turn of an elephant's head would break a man's neck, but even when a trapeze rigging fell in front of Yasso, a circus animal, it stopped without jerking.

double-barreled elephant rifles, followed by four gun-bearers with ammunition and extra rifles.

By careful maneuvering through the leafy jungle Colonel Roosevelt succeeded in getting a view of the biggest bull. He opened fire with his double-barreled "rain-maker." He bagged his elephant by giving him the first barrel somewhere near the medulla oblongata, which brought the huge beast to its knees. As it started to rise, the Colonel aimed again for its brain. The massive 500-grain bullet from the second barrel crashed into the cerebellum and the monster bull died instantly.

#### IN THE PATH OF A STAMPEDING HERD!

But that elephant had his whole family with him. The thunderous echoes of the second shot were still ringing through the forest aisles when another huge bull, not previously seen, loomed a few yards away,

charging onto the Colonel, who stood with his empty rifle directly in its path.

The herd stampeded. The noise they made as they tore through the undershrubs and matted vines was like the swishing of a terrific gale. I stood, terrified, scanning the wall of thick vegetation, expecting every moment to see an infuriated elephant break through and crush me in its mad flight.

Many times I have been charged in the open by lions, rhinos, and buffaloes; but, such dangers being visible, I did not have the feeling of utter helplessness that I had among these stampeding elephants in thick cover.

Although Colonel Roosevelt had just escaped with his life a few moments before, the incident already seemed forgotten by him, and he turned enthusiastically to taking measurements of the massive beast.

The animal's enormous heart soon was exposed to view by the meat-hungry Wan-



Photograph by Karl E. Knacht

#### TUSKO, THE WRECKER, DID A QUICK AND THOROUGH JOB

This colossal old fellow was called upon by a wrecking crew to help demolish a Seattle building in a hurry. Like most other males that have been brought to circus and zoo, he sometimes became ferocious and had to be heavily chained. When he died recently he was credited with being one of the largest Indian bulls in captivity.

dorobos, who opened the body cavity to drink the fresh blood. Like human vultures, they spent the rest of the afternoon gorging themselves with elephant meat.

#### STICKY ELEPHANT STEAK TASTES LIKE PASTEBOARD

Having walked all day, our appetites were ravenous, and we prepared a feast of red-hot elephant steak. The meat was beautifully red, like beef, but it tasted like no beef in the world! It had a pasteboard flavor and a glutinous quality which caused it to cling to our teeth like soft glue.

True herds of 40 or so elephants, such as we encountered, remain together for years. There are usually as many bulls as cows, but, as a rule, the herd is led by a cow. The stronger bulls do not drive out either the younger or the older and infirm bulls. A spirit of friendliness seems to exist among them, such as is found in no other gregarious animals.

Elephants of opposite sex often form strong attachments for each other which endure as long as they live. Such love matches have occurred among zoo and circus elephants. When separated, such elephants often refuse all food and show every indication of profound mourning.

Because of their fondness for one another, elephants are seldom kept solitary. Zoos usually keep them in pairs; circuses, as a rule, carry a herd consisting of females, all the same species—Indian.

When an individual breaks the laws of the herd he is driven out and becomes a so-called "rogue." He is a social outcast and becomes a savage animal. Rogues charge men or other animals on sight; they are a menace to natives and are hunted down and shot. They have even been known to raid villages by night, charging through the flimsy grass huts and trampling them in the dust.

The colossal bulk of the elephant leaves



Photograph by Edmund Heller

**IVORY HAS LONG BEEN THE GOLD OF TROPICAL AFRICA**

It required two porters to lift the heaviest of the three pairs of tusks which the men are carrying. Some African bulls grow such huge tusks that they cannot keep up with their herds, and drop behind to fall an easy prey to ivory hunters. Animals sometimes wedge their cumbersome tusks in forked trees to rest their weary necks (see text, opposite page).



Royal Air Force official photograph (Crown copyright reserved)

**THEY MAY BE TERRIFIED, BUT THEIR DEFENSE IS PERFECT**

A zooming airplane sent the herd into a stampede, but the cows quickly formed a solid barricade around their calves, while two giant bulls, with ears spread wide, took up advance guard.

him immune to attacks of all other animals except other elephants, such as the "rogues," or outlaws. In Africa the elephant is associated with the hippopotamus, the rhinoceros, the fearsome lion, and the buffalo, but there is no enmity among these jungle monarchs. Baby elephants, though quite helpless, are so energetically protected by the herd that no predatory animal is known to molest them.

The large tusks of the bull elephant are useful to him on rare occasions, when his social position is menaced by an outsider or when a herd brother starts a family quarrel. Occasionally single-tusk elephants are found in Africa, one tusk having been broken off in fighting or in prying up trees. Tusks in some individuals do not develop, and such elephants remain tuskless through life. Such bulls often attain large body size and seem able to hold their own in the herd. Tuskless bulls are especially common in India.

In old African bulls tusks average 40 pounds apiece; tusks weighing 100 pounds each are not rare, and really big tusks weigh 150 pounds each. The heaviest known single tusk weighs 235 pounds and has a circumference of 26 inches. Tusks of Indian elephants are much smaller than those of the African animal.

The tips of most tusks are much worn by use. They continue to grow throughout the life of the elephant, as do the incisor teeth of rodents, the root, or pulp cavity, remaining open as in all growing teeth. The ivory is pure dentine, the short enamel cap having been worn off in early youth.

#### TUSKS MAKE SOME ANIMALS TOP-HEAVY

The large tusks carried by some African elephants are a hardship to their owners and afford an example of how Nature sometimes carries a good thing too far. Old bulls with tusks that weigh 100 pounds or more apiece have hard work keeping up with their herds. I have seen these heavily weighted old fellows place their tusks in forks of trees and thus rest their weary neck muscles.

Bulls that have the misfortune to grow tusks of more than about 130 pounds each cannot carry their 260 pounds and keep up with the herd, so they must lead a solitary life. They fall easy victims to the ivory hunter (see opposite page).

Man is virtually the only enemy of elephants in a wild state. Since immemorial

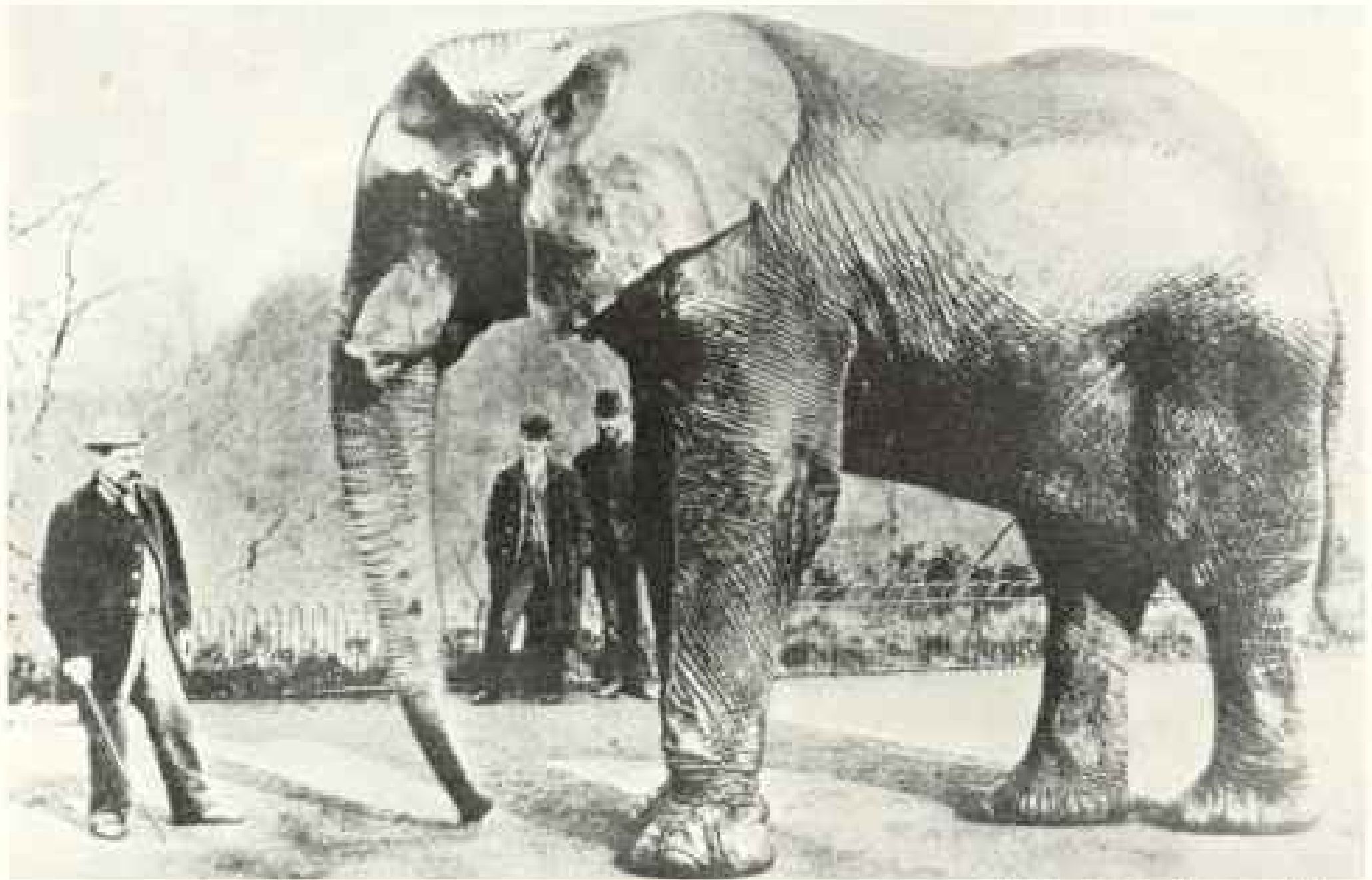


Photograph by Edmund Heller

#### TO HIM ELEPHANTS' HABITS ARE AN OPEN BOOK

This Wandorobo guide and tracker wept tears of joy when, after a specimen kill had been skinned, the huge carcass was turned over to the natives.





Photograph from Edmund Heller

**JUMBO AND HIS TRAINER, MATTHEW SCOTT, THE ONLY MAN HE WOULD OBEY**

This famous elephant, the tallest ever in captivity, was brought to America in 1882 by P. T. Barnum. The monster was captured in Ethiopia as a baby  $3\frac{1}{2}$  feet high and sent to Paris. Then he was purchased by the London Zoo, where he grew to his tremendous size and carried children on his back. After only three years with the Barnum circus, he was killed by a railway train in Canada. Jumbo measured 10 feet 7 inches at the shoulders and weighed about six tons, but was advertised as being much larger (see text, page 757).

times he has attacked the animals in their jungle home. Elephants usually fight him by trampling him with their feet or knocking him out with their trunks. Methods of capturing and killing employed by the African savages to-day probably are similar to those of prehistoric man.

The Africans hunt the elephant for its meat, which they especially relish (see page 731). I have watched many of their savage feasts because my profession, at times, has made me an elephant-skinner. When the news is spread that a white man has killed an elephant, all the natives within miles converge. With their long, swordlike knives, which are their home-made weapons, they squat about the camp fires built to roast the meat.

When the skin is off and I have signaled that the meat is theirs, pandemonium starts. Instantly the huge carcass is smothered by a fighting, howling mob, each hacking and chopping out chunks of meat and fleeing to the camp fires, where the steaks are slightly roasted and greedily eaten.

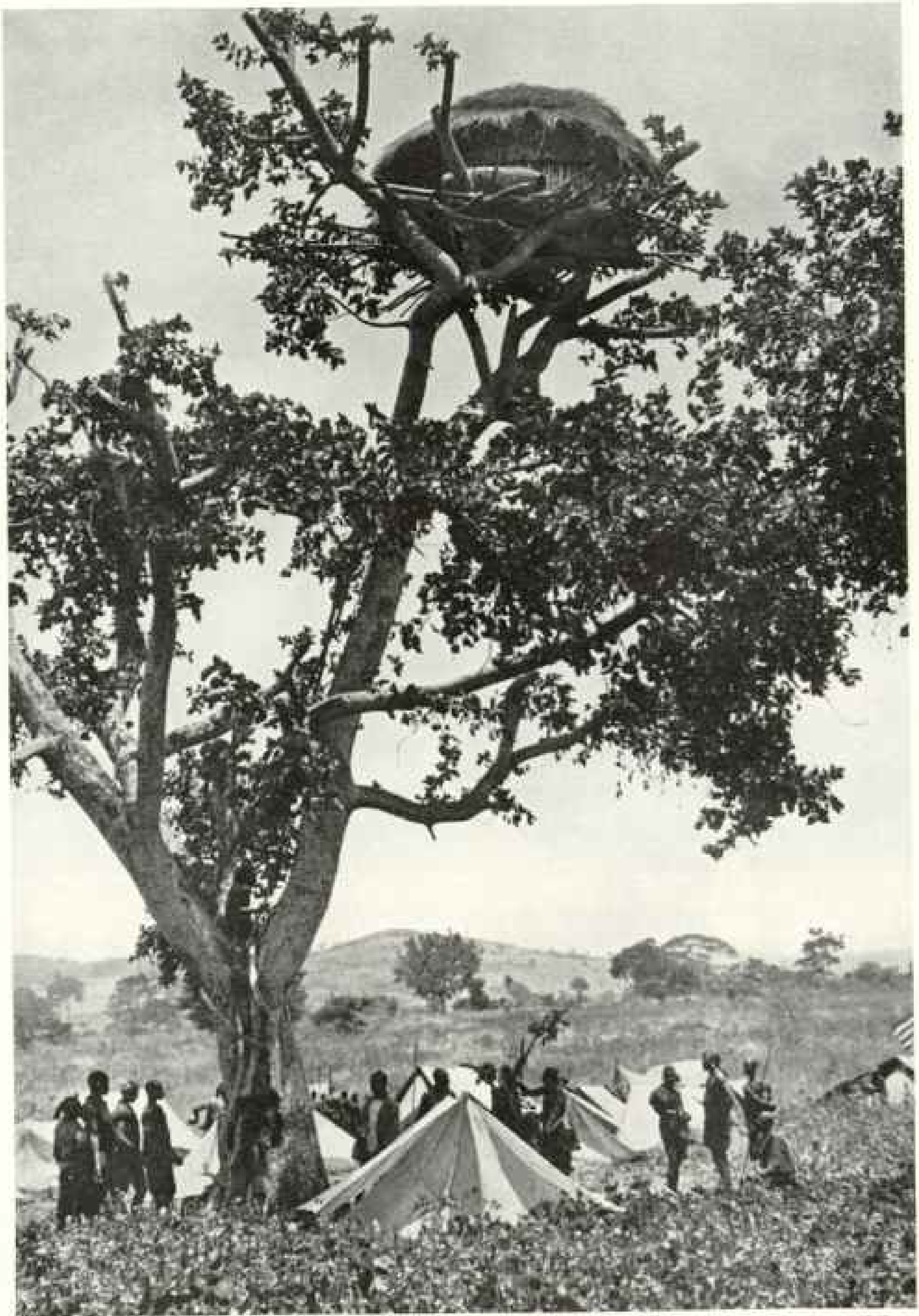
After the gorge is over the remaining meat is placed in baskets and carried to their villages, where it is "jerked" and partly sun-dried in the smoke of a slow fire, which protects it from insects.

The hunting tribes of Africa capture elephants in deep pits cleverly excavated in the elephant paths of the forest. These pits are cunningly hidden by a covering of branches and leaves, but such camouflage seldom deceives mature elephants. They detect the pits as hollows by their sensitive feet, or by some other sense unknown to us, for their sight is not nearly so keen as man's. It is the young elephants which are captured and promptly eaten.

**POISONED SPEARS PIERCE MASSIVE PREY**

Some tribes set poisoned spears above elephant paths so that they will fall and pierce a passing elephant which has tripped on the vine attached to the trigger, releasing the spear.

The powerful poison used by some tribes is derived from a small tree or shrub of the



Photograph by Edmund Heller

## A SAFARI CAMPS IN THE SHADE OF A THATCHED LOOKOUT

The picture was made on the late President Theodore Roosevelt's African Expedition, of which the author was a member (see text, page 729). From the lofty perch, overlooking the fields of the Meru country on the northern flanks of Mount Kenya, natives kept an all-night vigil for foraging elephants. When a herd approached, the animals were driven off by the din of mad shouting and lusty blasts of horns.



Photograph by Kermit Roosevelt

MIDDAY IS ELEPHANT SIESTA TIME IN THE AFRICAN BUSH

The herds sleep standing in some shady spot during the day and toward sunset they move down to the nearest river, lake, or water hole to drink and bathe, after which they start off to the feeding grounds. In captivity the beasts sometimes lie on their sides to sleep (see text, page 756). This herd of some twenty animals was photographed in the acacia bush veldt of Kenya, British East Africa.

genus *Acocanthera*, peculiar to Africa. The iron spear is smeared with a black, tarlike mass of this substance, which retains its deadly quality for months. The weapon is weighted by a heavy log, which drives the spear through the thick skin of the animal's back. This powerful poison does not affect the edible quality of the meat; only the flesh around the incision is cut out by the natives.

The lion is fearlessly speared by warriors of many tribes; some even spear the buffalo, which has twice the bulk and twice the charging force of the lion; but the elephant is too colossal to be conquered that way, even by the bravest.

In very early times, in Asia, man accomplished the miracle of domesticating the elephant. By friendship and intelligence he made a servant of the mightiest beast of all times. Probably the Asian man began with baby elephants. He, too, captured them in pits, but instead of killing them he took the captives home as pets for his children. Baby elephants are as playful as dogs and are quite as intelligent as our most clever canine friends.

As time went on and such elephants grew to adults they remained docile and finally were trained to be beasts of burden. Probably the first use of adult elephants after their early domestication was in war. Any



Photograph from R. I. Nesmith

FOR MORE THAN 1,000 YEARS THIS MOUNT HAS AWAITED HIS MASTER'S COMMAND

Other elephants, portrayed in the carvings on the famous Buddhist temple of Borobodoer, in Java, carry fans and state umbrellas in their trunks. One even flings his feet in imitation of a dancing girl near by. Usually pictured in royal processions and in war, these beasts also appear many times in the reliefs on Cambodia's Angkor Vat and on other temples throughout southeast Asia.

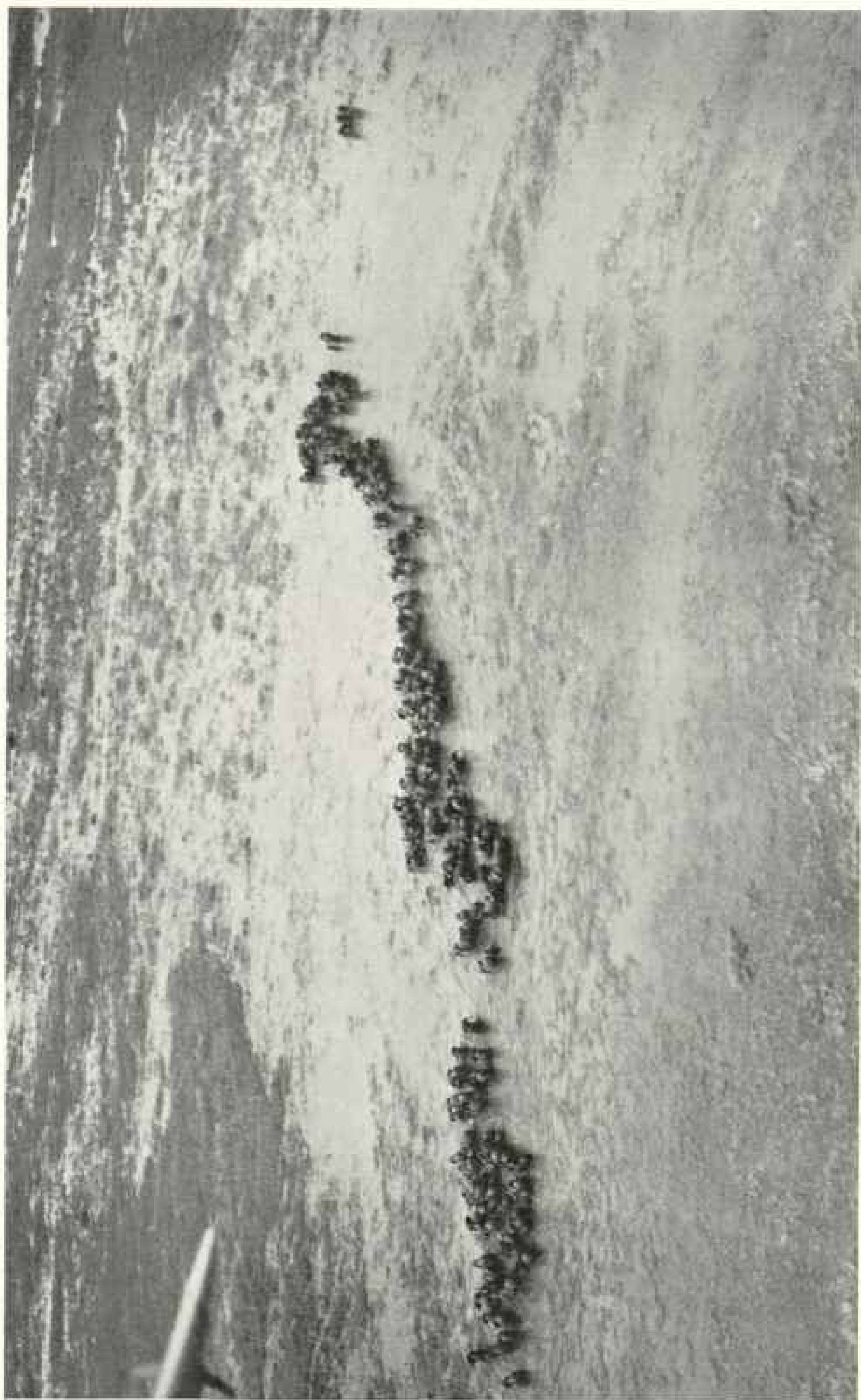


Photograph by Citrin, Central African Expedition

A WATER CARNIVAL ENDS THE DAY'S LABORS

Contrary to popular belief that African elephants cannot be trained, these animals, bathing at Api, in the Belgian Congo, have been taught to plow fields, to pile and carry logs and lumber (see text, page 750). When they leave the water they often roll in the sand to coat themselves with mud, probably as a protection against insects.

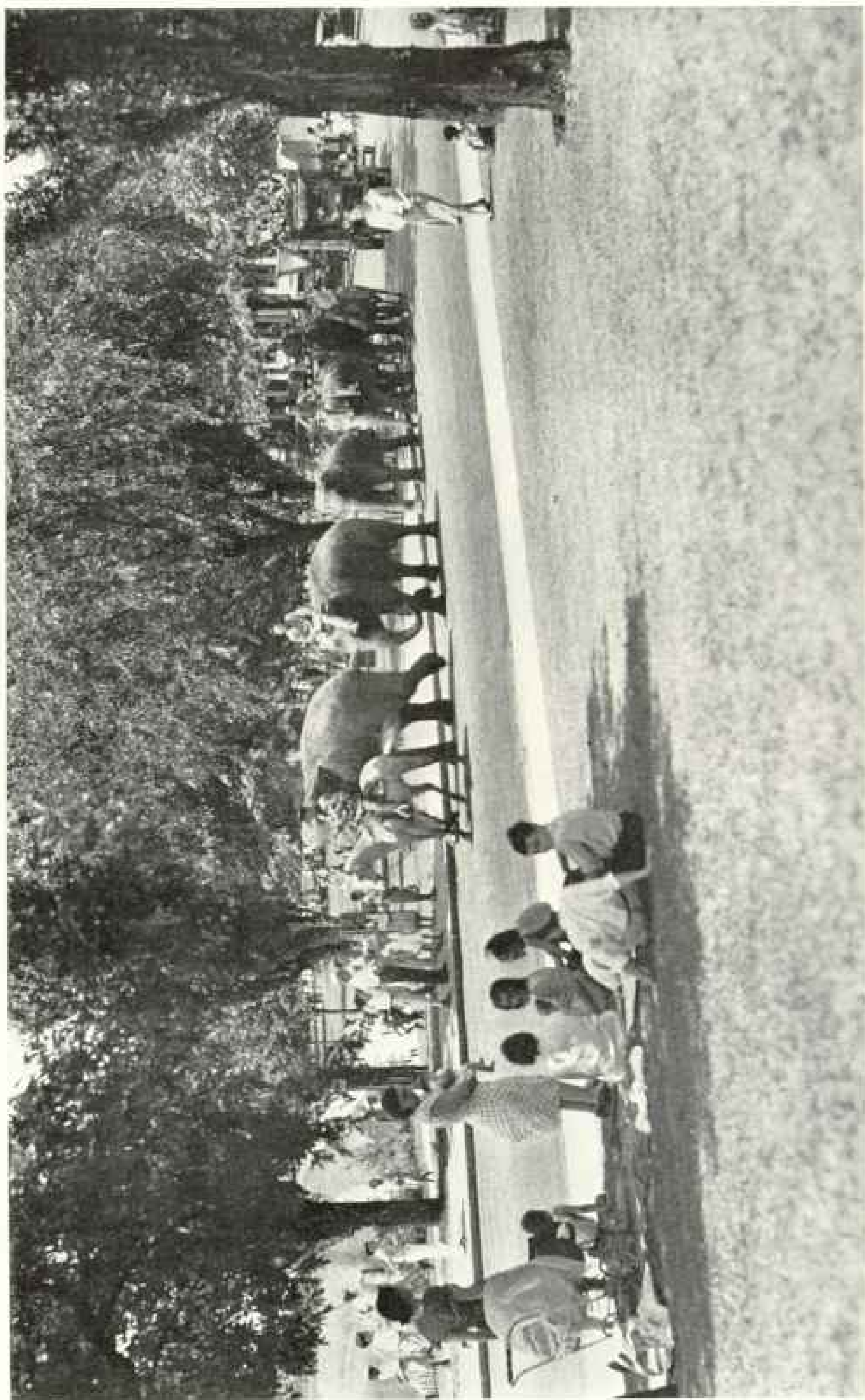




Photograph by Sir Alan Cobham from Galloway

**COMBINED HERDS TAKE TO A SUDAN SWAMP FOR REFUGE AND A BATH.**

Rarely are so many of the beasts found grouped, for usually they travel in herds of 20 to 40, with bulls and cows about equally divided (see text, page 729). To the aviator winging his way over Africa, this column of 150 or more elephants winding through the marsh looked like a vast spearhead column of giant army units.



Photograph by Clifton Adams

**CLOWNS, ELEPHANTS, GLITTERING WAGONS—THE CIRCUS HAS COME TO TOWN!**

The congestion of automobiles in large cities is rapidly driving these brilliant pageants from the streets, depriving the big top of its showy advertisement and children of their thrill. Recently, however, circus "Jumbos" shuffled through some of the residential streets of the National Capital and youngsters were heard again to exclaim: "Mamma, there go the elephants! I know, 'cause they have a tail at each end!" (See text, page 748.)



Photograph by Alice Schalek

**DECKED FOR A MAHARANA'S FESTIVAL, NOT THE CIRCUS**

Elephants from the ruler's stables at Udaipur, India, wear sandy trap-pings of gold-embroidered robes and silver neck chains. Plumed gold fans perch on coin bonnets. Faces and ears are painted and circlets of bells tinkle at their ankles.



© G. Burroughs

**A DAILY RUB DELIGHTS ELEPHANTINE HEARTS—AND HIDES**

After a hard day's work these gigantic laborers at Kandy, Ceylon, are taken down to the river for a bath. There the attendants thoroughly wash and scrub the wrinkled, inch-thick hides with a stiff brush, as the contented creatures lazily lie on their sides.



Photograph by Alice Schabalek

FRESCOES ON INDIAN PALACE WALLS PORTRAY THE MAHARANA'S FAVORITE MOUNTS

The gigantic size of the brilliant paintings is emphasized by the figures seated on the steps of the palace doorway at Udaipur.





Photograph by Acme

"COME ON IN, THE WATER'S FINE!"

Wild elephants in the heart of the Borneo jungle seem to take as much pleasure in their daily dips as any youngster at the old swimming hole. When a stream is shallow and the beasts cannot submerge completely, they spray water over their backs with their trunks. The "knobs of wisdom" on the foreheads, distinctive features of Indian elephants, are plainly visible (see text, page 755).

tribe in India possessing elephants capable of being ridden into battle was sure to win, because no primitive tribes had arms which could stop an elephant charge.

Gradually, too, must have evolved the method now used of training elephants to capture their wild brothers by walking up a trained animal upon either side of the wild elephant, squeezing him between them, and thus holding him captive until their master could hobble his feet.

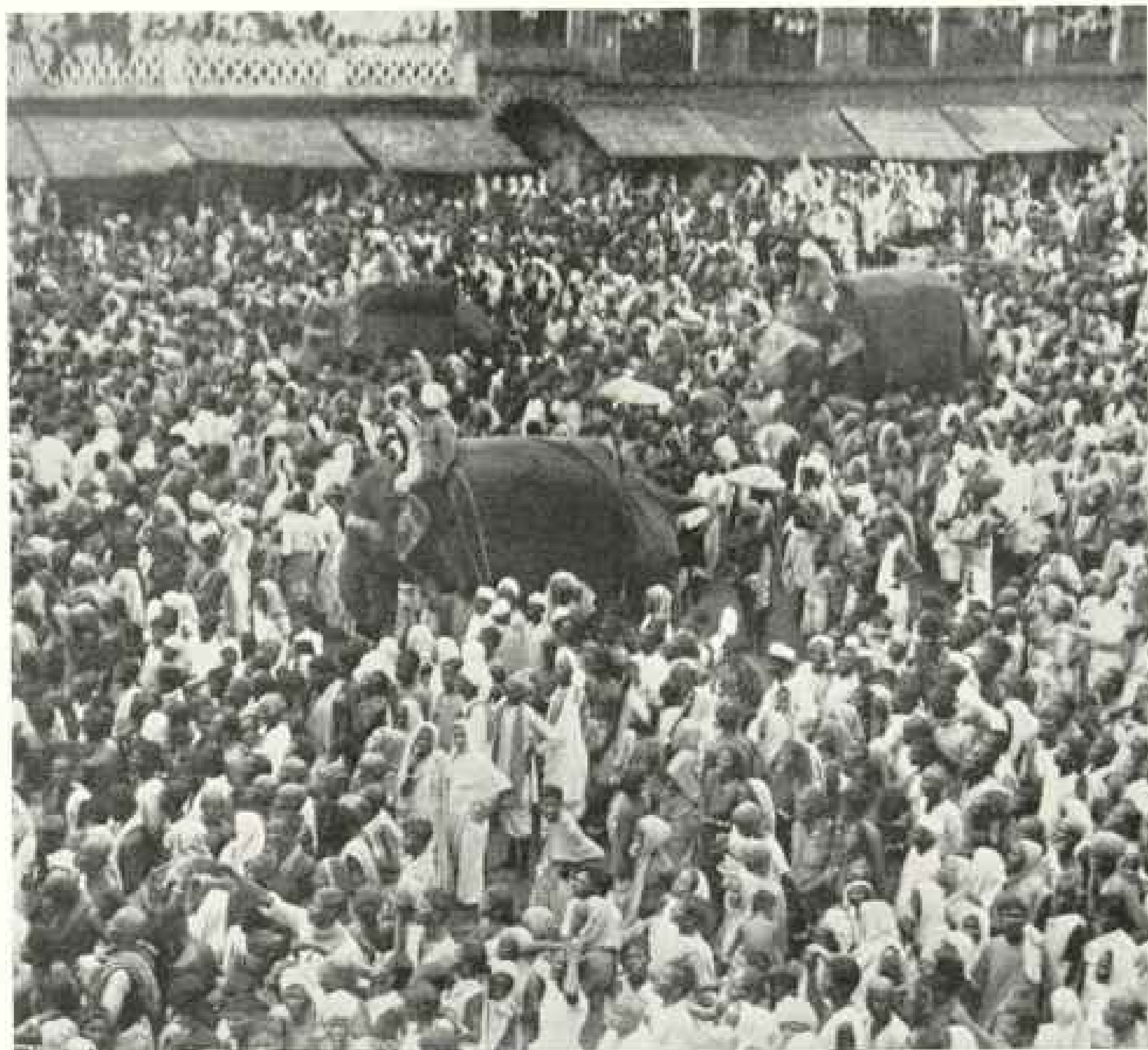
#### AN INDIAN ELEPHANT ROUND-UP

In India to-day elephants are captured by driving them into forest stockades built of logs strong enough to withstand the charges of the enraged monsters. In some districts this round-up occurs annually; in

others, every two or three years (page 744).

An astounding difference between elephants and all other animals is their submissiveness to training when adults. Mature jungle elephants, which have led a life of complete freedom in the jungle, can be trained as quickly as those reared in captivity from babyhood. No other wild animals captured in the wilderness when adult can be domesticated as can the elephant.

For this reason elephants are seldom bred in captivity. Their slowness in reaching maturity would make them much more expensive than wild-caught specimens. All the so-called "baby elephants" brought from India are wild-caught, and have been taken away from their mothers at the age of weaning, about three or four years old, when



Photograph by R. C. Rigoróy

LIKE ISLANDS IN A SEA OF PEOPLE TOWER THESE SACRED ELEPHANTS

Colorful crowds surge around the monsters, as they follow the great car of Jagannath (Juggernaut), Lord of the Universe, in a religious parade at Puri, India. The people touch the beasts and then press their hands to hearts and foreheads, for elephants are considered symbols of good luck by the Hindus. As the animals march along they suck up coin offerings with their trunks and pass them up to the mahouts.

they are able to eat solid food. Circuses usually exhibit with the baby a foster mother.

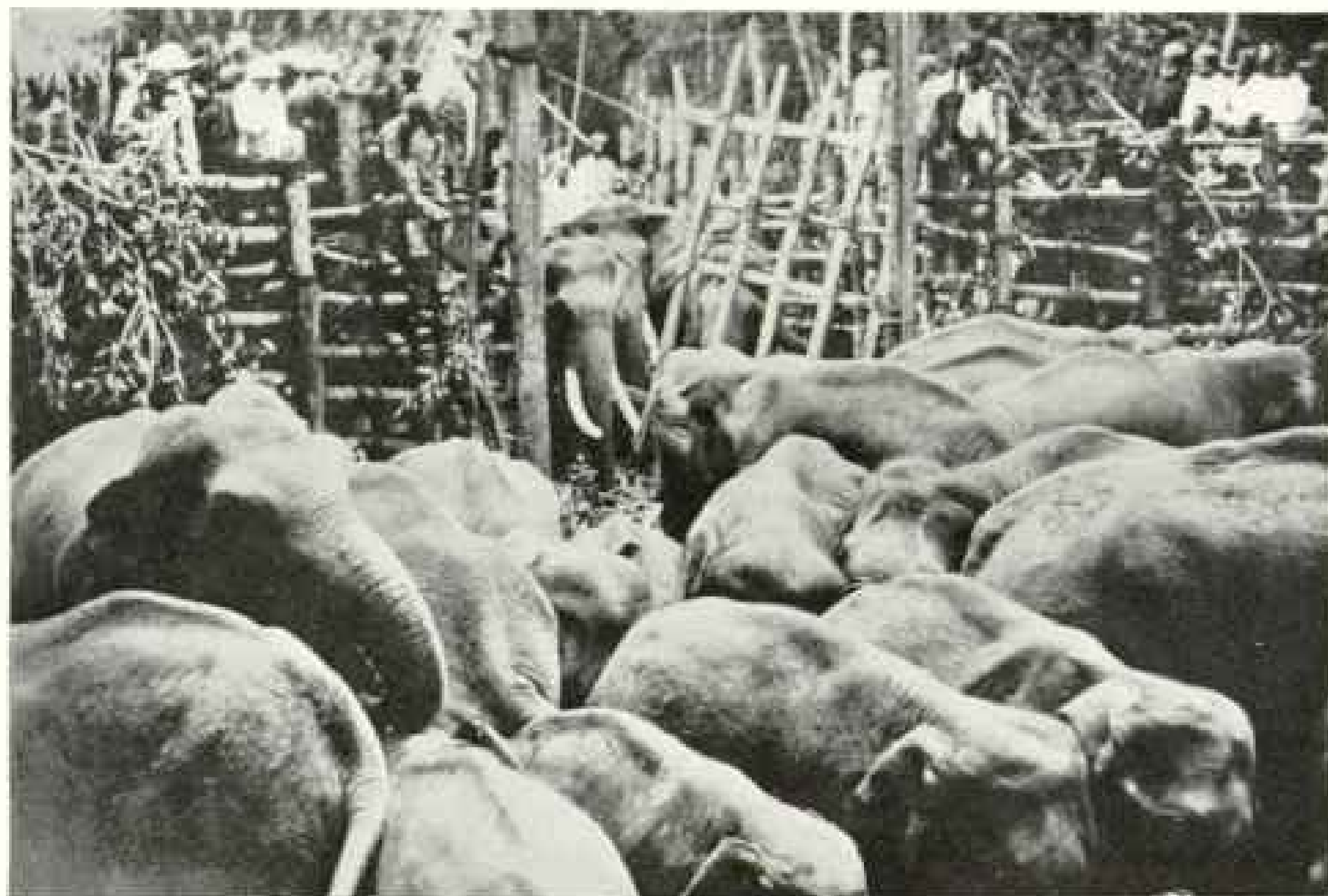
No attempt has been made to breed elephants in any of the leading American zoos; so far as I know, though European zoos have bred and are exhibiting elephants born on the premises. The first of these was in the Copenhagen Zoo, where a female Indian elephant has produced three young in a period of several years. Her first was born when she was 13 years old.

The period of gestation varies from 21 to 23 months. The young are nursed for two years or more, and, at least in the wild state, are carefully guarded by the mother until they are about four years old. Nor-

mally the mother produces one offspring every five years.

BABY ELEPHANTS MUST BE TRAINED TO USE THEIR TRUNKS

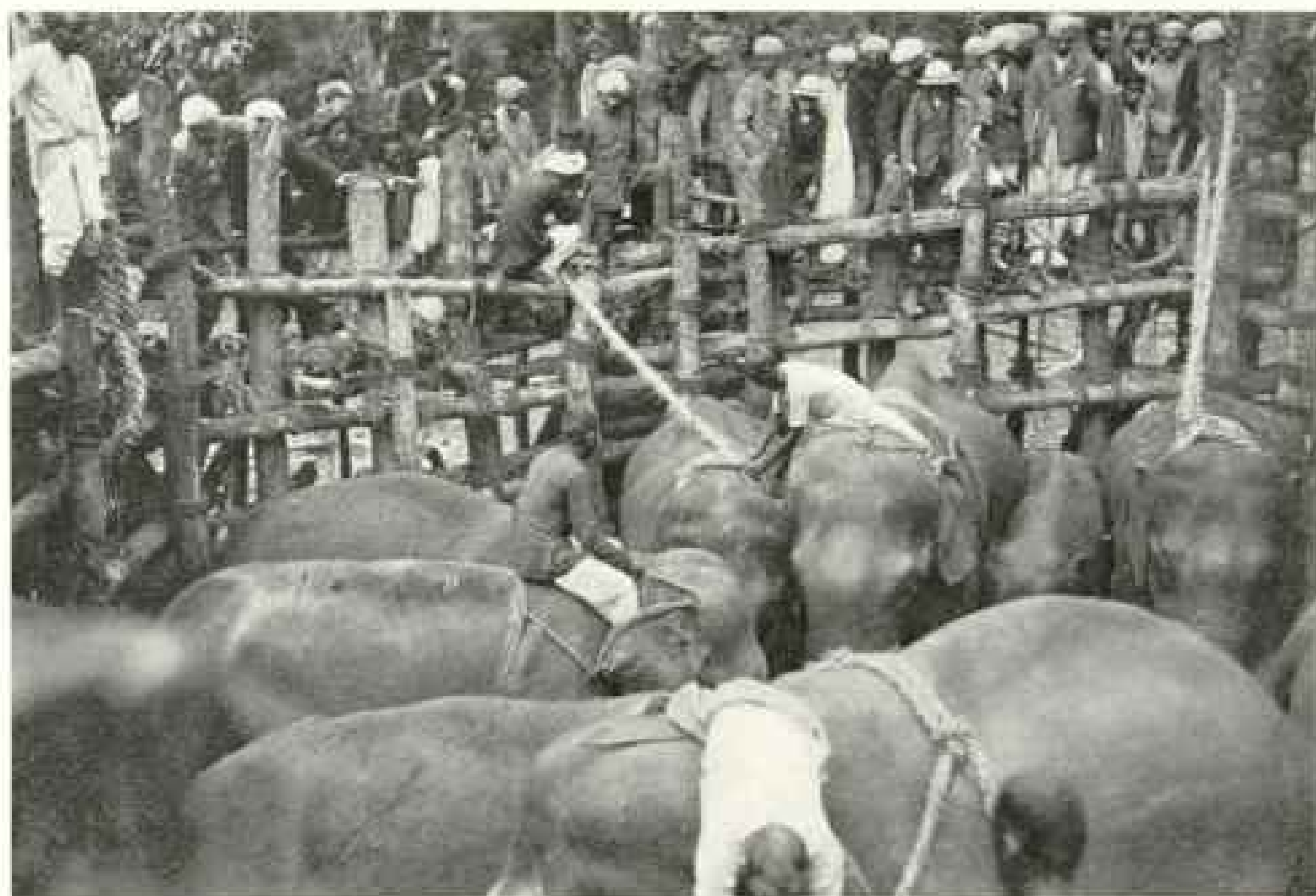
Very young baby elephants are as amusing as kittens and indulge in all sorts of mischief-making with a seeming intent to bully or frighten their indulgent mothers. I have seen them run in corners and hide, then emit squeals of distress, and when the frightened mother comes to the rescue they will rush out and butt her in the belly as hard as they can. At birth they have a woolly coat of downy hair over their grayish-pink skin. Their heads are covered with erect, coarse black hair.



Photograph by W. H. Johnson

AT THEIR LAST ROUND-UP: BANGALORE, INDIA

After days of careful driving, a wild herd has been corralled in this strong stockade. Now enter the "koonkies," or trained elephants, with their drivers, who single out the most likely prospects. Then two mounts will close in on their luckless wild brother and squeeze him between them.



Photograph from Topical Press Agency

WHERE A SLIP MIGHT MEAN INSTANT DEATH BENEATH A THREE-TON MONSTER

In the midst of the milling herd, bellowing with rage, these men calmly lean from the backs of their tame mounts to tie up the pinned captives. Later the new elephants will be chained to trees until broken and then trained. Not all drives are as successful as this, for sometimes, after hours of patient work, when the goal is near, the beasts bolt for the jungle (see text, page 742).



Photograph by Gordon Alexander

#### AN ELEPHANT IS PUT IN STOCKS TO BREAK HIM IN

In Siam the newly captured animals are trussed for a brief time, until their ferocity and fear have quieted; then actual training begins. Hundreds are employed by teakwood companies for handling heavy logs.

At first the trunk hangs limp, the baby having no control over it. Nursing is done by the mouth, and for the first few days the infant can just reach its mother's nipples, located between her forelegs. After a few months the youngster begins to lift its trunk a bit and is slowly taught by the mother how to use that appurtenance.

Then comes the amusing day when the youngster tries to drink water as its mother does, through the trunk. At first it blows bubbles in the water, or draws out the trunk and sprays the contents all over the ground.

Often a new-born elephant babe will rest by leaning against the forelegs of the mother. In a wild state the infants are pets of the herd and both cows and bulls shower affection upon them. An Indian observer tells how four elephants in a Government work herd in Burma gave birth to young about the same time. These young would go to any cow and each cow would suckle and mother them as if they were her own. Often two of the youngsters were seen nursing the same cow.

The present-day circuses usually carry only Indian elephants and only one sex—

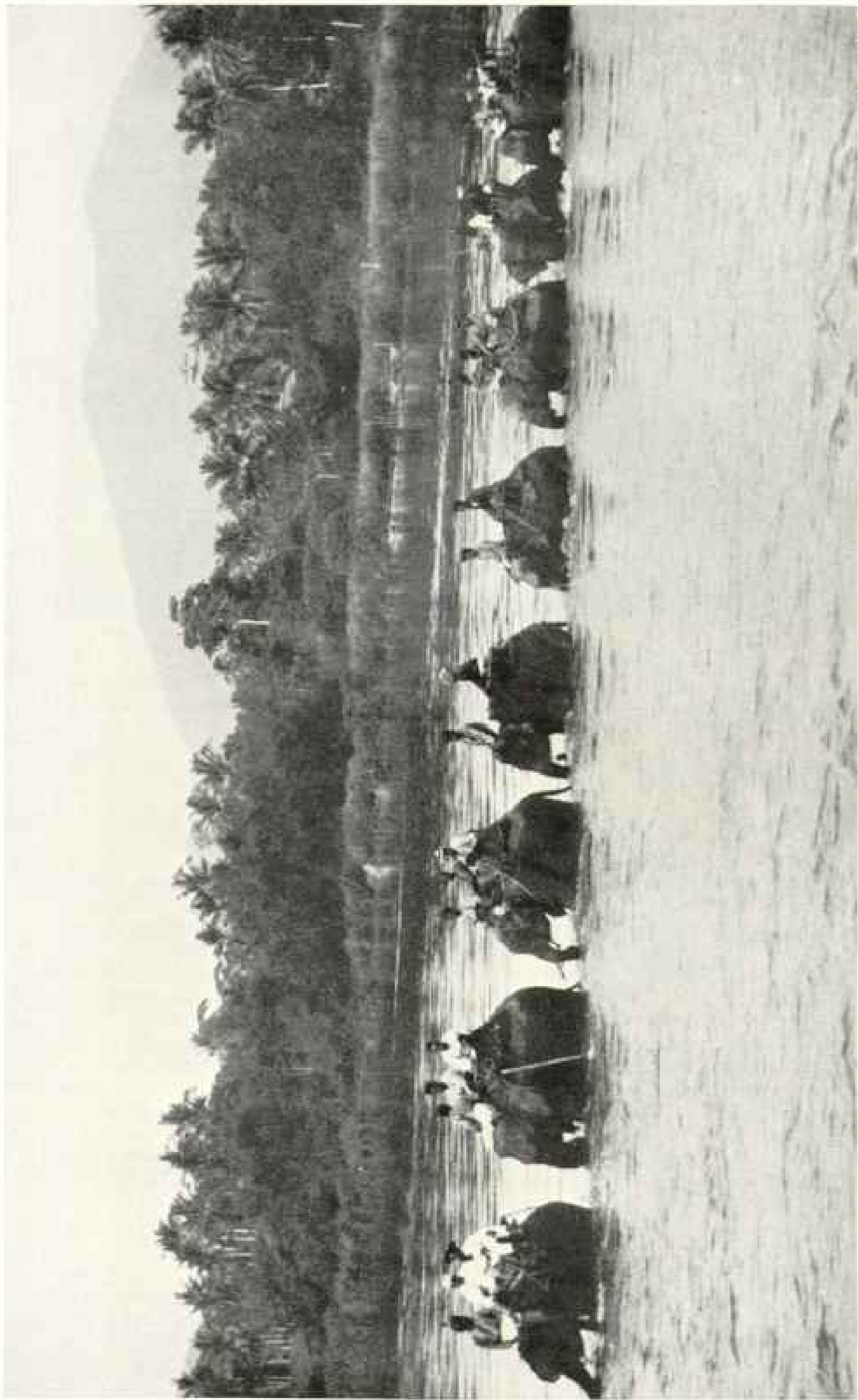
cows. In Barnum's day an occasional African male was exhibited because of his greater height and enormous, winglike ears.

#### JUMBO AND "WHITE ELEPHANTS"

The unforgettable Jumbo was a male African purchased by Barnum from the London Zoological Gardens, where he had been used for carrying children on his back through the park. Barnum advertised Jumbo so thoroughly that his name still goes marching on as a symbol of colossal size (see page 757). To-day African elephants are owned by some larger zoos.

Male Indian elephants formerly were common in circus parades. Sooner or later nearly all male elephants become periodically dangerous at the recurrence of their "must" period, during which time they are uncontrollable and must be kept heavily chained. Frequently they take violent dislikes to certain of their attendants and craftily await an opportunity to kill them unawares. So many men have been injured and killed by such treacherous male elephants that to-day the circus herds are usually made up of females only.





Photograph by Nam. Ipoh

HERE A MOTOR TRANSPORT WOULD BE SWAMPED, BUT NOT SO AN ELEPHANT CARAVAN.

After plodding hot tropical paths with their human freight, the beasts seem to enjoy crossing deep fords. These "engines" can take on water as they move, and, when in playful mood, squirt their sides and backs, to the discomfort of the passenger. The herd, belonging to His Highness the Sultan of Perak, is fording the Perak River at Kuala Kangsar, in the Malay States.



Photograph by Kerstone Underwood

#### AT THE DEATH OF HIS STRIPED MAJESTY

Completely trapped in a narrowing circle of huntsmen, the quarry sought refuge in the tall grass, where a bullet stopped short his desperate charge for freedom. This photograph was made at the end of a hunt in Nepal (see "Tiger-Hunting in India," by Brig. Gen. William Mitchell, in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1924).



Photograph courtesy New York Zoological Society

THE GIANT INDIAN-BORN ALICE ADOPTS TINY, AN AFRICAN PYGMY

A female elephant will usually accept any "baby" as her own. "Very young baby elephants are as amusing as kittens, and indulge in all sorts of mischief-making with a seeming intent to bully or frighten their indulgent mothers. At birth they have a woolly coat of downy hair over their grayish-pink skin. Their heads are covered with erect, coarse black hair" (see text, page 743).

That rare individual, the white elephant, another of Barnum's innovations, is an albino which has been found only in India and Siam. It belongs to the king when captured. The white elephant often is a drain on the royal exchequer, as feeding it is expensive. On this account, according to tradition, the king at times would force an objectionable noble to feed the royal white elephant; hence the phrase about "white elephants."

LIKE SOME MODERN CARS, THE ELEPHANT IS SIMILAR AT BOTH ENDS

The elephant is decidedly different in anatomy from all other mammals. He looks more or less alike at both ends; his trunk is shaped much like his tail, both being practically hairless, wrinkled, and of about the same length. A sleeping elephant, with ears at rest and the very small eyes closed, looks like a case of "heads I lose, tails you win." Because of this uniformity at the

terminal points of his anatomy and the wrinkled condition of his epidermis, the animal looks unfinished.

The wrinkles cover his back and sides and sag down over his straight, columnlike legs to his knees, which are always baggy. His trousers are never pressed and his clothes never fit him, because his tailor, Mother Nature, abhors elephant dudes. If you examine the epidermis minutely you will find it finely reticulated or stippled, giving it a distinctive character peculiar to the elephant.

The only really well-groomed or well-tailored elephants I have ever seen were stuffed specimens in some natural history museums, which possessed skins as smooth as rubber balls. The original skin had been covered by a coat of black enamel paint which filled up and hid every wrinkle in the skin.

Such taxidermy was changed by Carl Akeley, who knew his elephants and



AFRICAN WARRIORS CONTINUE THEIR BATTLE IN A MUSEUM

One of the finest examples of the late Carl Akeley's art is in the Field Museum of Natural History at Chicago. Over a papier-mâché model Akeley placed a tanned elephant skin, beneath which he injected a fluid. He then carefully molded the hide to produce the creases and shape of the live animal. Earlier museum specimens often had the wrinkled skin stretched taut and coated with black enamel paint (see text, opposite page).

mounted them as Nature had made them. He invented a method of tanning the skins and reducing them to the thinness of a kid glove. After the tanned skin was placed over the papier-mâché manikin Akeley skillfully modeled the skin from the top or outside by injecting fluid papier-mâché underneath the skin. In this way the fine reticulations were retained. Not a drop of paint touched the skin of his elephants.

Because of the hooflike nails on their huge feet, elephants are assumed to be related to the hoofed animals, such as horses and cattle; but this is a mere superficial resemblance. The secret of the elephant's ancestry was discovered by paleontologists some years ago in the Fayûm beds of Egypt in the Libyan Desert. In these beds of Tertiary age were found the remains of animals related to modern elephants, but less than half their size, which had short trunks, as indicated by their abbreviated nasal bones.

The elephant has a peculiar tooth arrangement. The teeth do not fit into permanent sockets or cavities in the jawbones, as teeth do in other mammals. Instead, they pass through the jaws from behind forward.

#### NATURE TAKES CARE OF DENTISTRY

The grinding teeth are often enormous in size; the crowns being 12 inches long in the older teeth and often quite as deep. These huge molar teeth are thrust upward and forward exactly in proportion to the wear on their crowns; so that when the tooth is worn down and useless it is pushed to the tip of the mouth and falls out as a mere fragment, one-thirtieth or less of the bulk of the original tooth. Six of these molars, or cheek teeth, pass thus through each jaw on each side of the mouth. Thus the elephant in his lifetime uses 24 teeth.

The only other group of mammals in which the teeth pass thus through the jaws





Photograph by Citroën-Haardt Trans-Asiatic Expedition

#### CHINA ALSO HAS HER ELEPHANTS—IN STONE

Four exquisitely carved statues, two standing and two kneeling, line the Triumphal Way leading to the tombs of the Ming emperors, some 30 miles north of Peiping. Men, lions, horses, unicorns, and mythical monsters are also represented in other pairs of guardian figures.

are the manatees. And, oddly enough, in the Fayûm beds of Egypt have been found remains of mammals intermediate between elephants and manatees. These fossil manateelike animals imply a common ancestry for the two groups, which are to-day widely diverse in anatomy and habits.

#### A COUSIN TO THE "MERMAID"

The manatees are almost as thoroughly aquatic as whales and live in the water, where they spend most of their time submerged, feeding on grasses and other vegetation growing on the bottoms of lakes and large rivers. As the manatee rises above the surface of the water to breathe, its rounded head gives it a very human appearance. It is a shy animal, difficult to approach closely in a boat. Sailors, seeing the rounded, humanlike heads of manatees at a distance, have invented tall tales of seeing mermaids. Who would ever think of linking the elephant with a mermaid ancestry!

Much of the elephant lore that is widely accepted is equally fabulous. There are stories told of how they never forget an

injury and how they always get their man and trample him to death. The elephant has a wonderful memory, but the beast does not often resent a wrong. If elephants habitually resented every wrong and revenged every beating, there would be a very high mortality among elephant trainers and attendants. They try to bully and test the "nerve" of each new trainer and attendant.

If the trainer or keeper fears the animal and does not at once subdue it with force, then that particular elephant will continue to intimidate him and he may eventually be killed. If, however, he subdues it at once by force, it will then usually submit to his authority ever afterward.

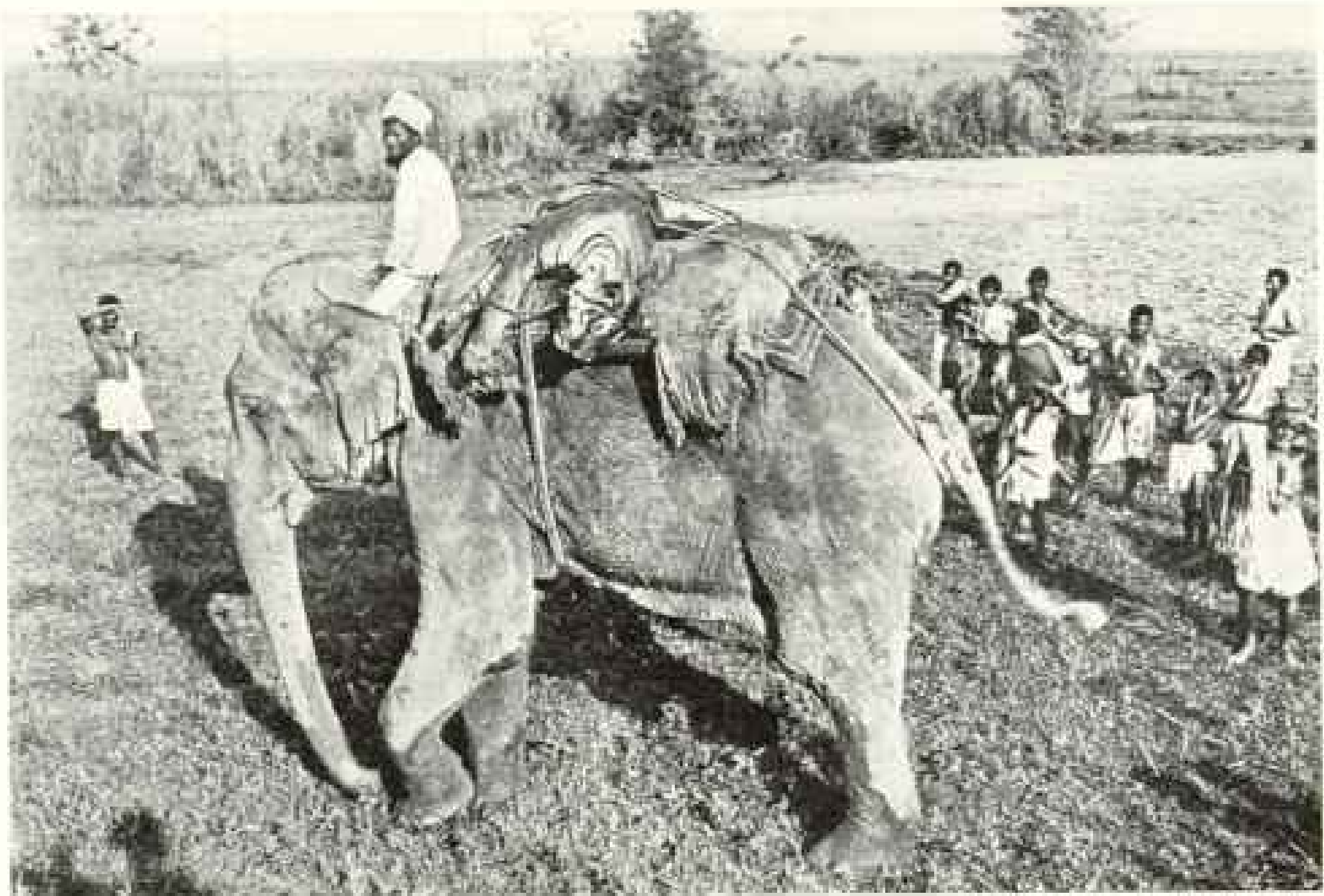
It is often said that African elephants cannot be trained, and therefore are seldom seen in circuses or zoos. The African elephant is as easily trained as the Indian. The great Jumbo was taught to carry children on his back in the London Zoo and was a docile and safe elephant. The Belgians at Api, one of their stations in the Congo, are using trained African elephants to plow fields and to pile and carry logs and lumber (see page 737).



© Lionel Green

## AN ELEPHANT ROLLER DOES HIS ROADWORK FAITHFULLY

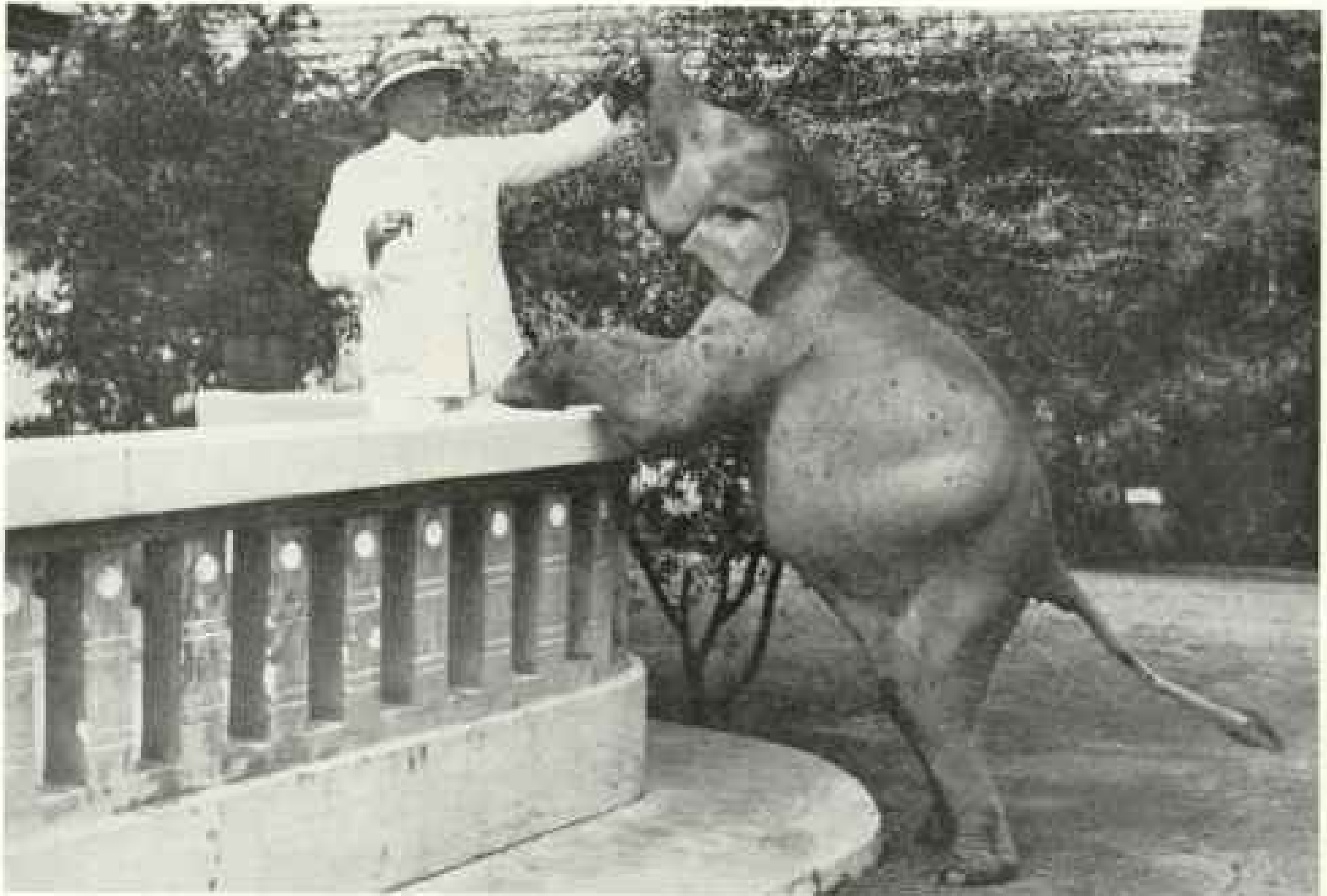
Such a task is mere child's play compared to the heavy chores the animals usually are required to perform. His ponderous feet are probably as effective in packing down the earth as the roller.



Photograph by Bernard Watkins

## A BUNDLE OF STRIPED FURY BECOMES THE TROPHY OF A HUNT

The first shot at this tiger only increased his anger, for suddenly he sprang at the elephant, striking her a vicious blow in the neck beneath the left ear; but now she has the honor of carrying the victim into camp. In India, tigers usually are hunted from elephant back (see illustration, page 747).



Photograph by Alice Schalek

"UP NOW, THAT'S A GOOD BOY"

A Dutch sportsman in Medan, Sumatra, demonstrates that baby elephants are as playful as puppies. While "you cannot teach old dogs new tricks," wild adult elephants are easily domesticated and trained to perform useful tasks (see text, page 742).

Perhaps the most frequent misconception about elephants is their age. Animals estimated by circuses to be far beyond 50 years old are usually without exact history in youth. A common error is to overestimate the age of an elephant purchased as a fully grown adult. Such an elephant is often said to be 30 or 40 years old when actually it is fully grown when only 10 or 12 years old. It then lives 30 or 35 years in captivity.

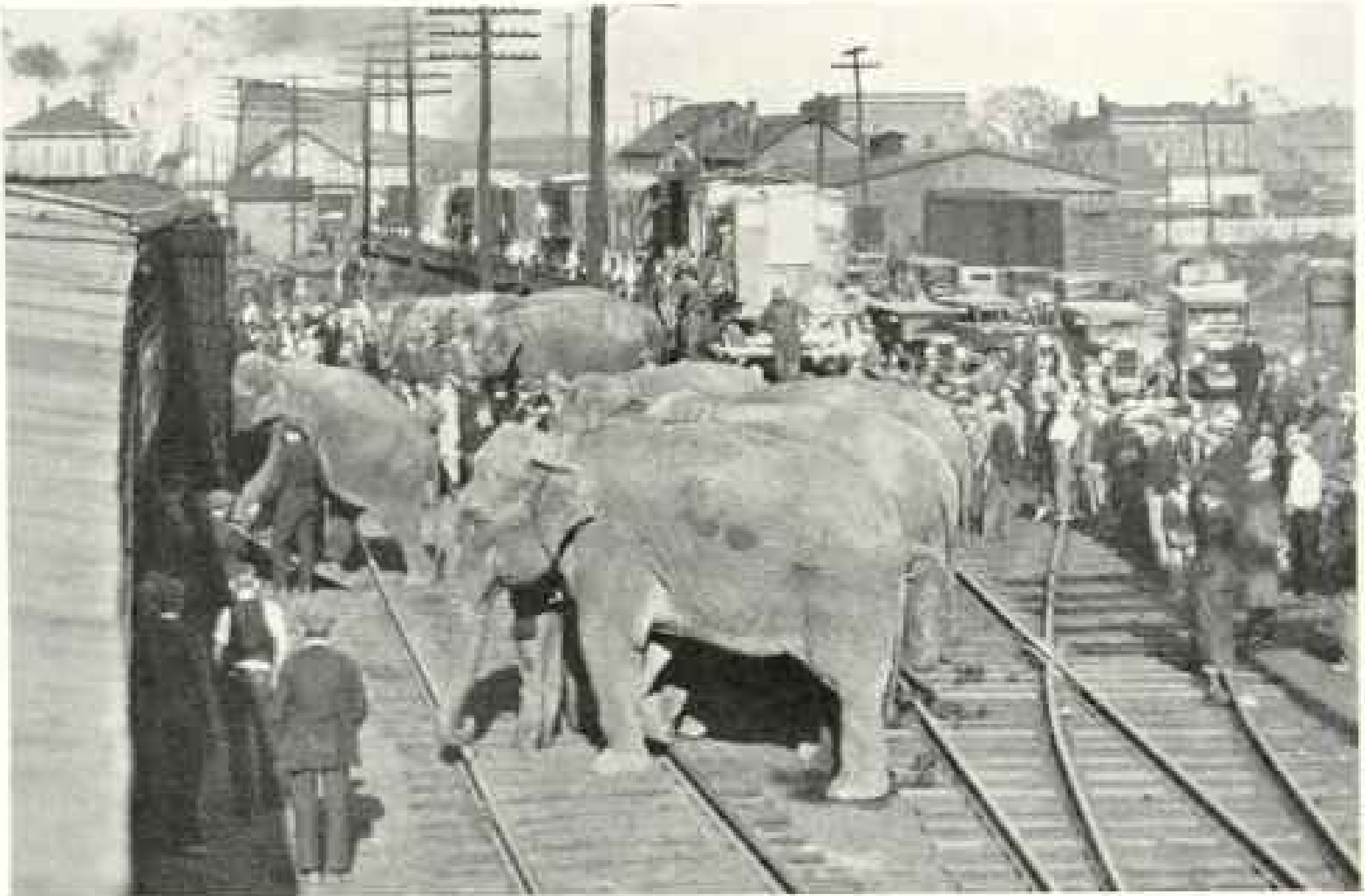
THE MYTH OF ELEPHANT GRAVEYARDS  
AND IVORY TREASURE

The story of elephant graveyards circulates in the African wilderness, where ivory hunters still entertain hopes of a find of graveyard ivory some day. The tradition runs that when they feel death coming upon them, elephants leave the herd and trek to an elephant graveyard, a remote spot in the wilderness where all the elephants of the district go to die. There the ground is supposed to be thickly strewn with the huge bones of elephants, many having died 100 years ago or more. The tusks which form a part of the skeletal remains of the beasts

in such a graveyard would be worth many thousands of dollars, as ivory does not decay or lose quality with age. Many hunters have sought for these graveyards, but none has been rewarded by the discovery of such treasures.

The Indian, or Asiatic, elephant differs physically in many particulars from the African elephant. In reality they belong to different genera, the African being an old-fashioned elephant, with fewer enamel plates in its molar teeth and with a rounded skull like that of the ancient mastodons. The Indian elephant is a much more modern type, with more complicated or complex teeth—the last word in elephants.

The chief external difference between the African and Indian animals is in the ears. In the latter they are small and only one-third the size of the African's, and the upper margin does not fold inward behind the ear where it borders the neck. The dorsal profile differs in the Indian by having the crown of the head on the same level as the back, instead of the head being held higher and the neck sloping downward to the withers, as in the African.



Photograph by Keystone-Underwood

EVEN IN A HOME TOWN OF THE CIRCUS, BOYS TURN OUT FOR LOADING DAY

The "big top's" chief attraction, the elephants, are climbing aboard their summer cottages on rails at Peru, Indiana. Formerly bulls were taken on the road, but their misbehavior caused them to be replaced by cows. Kipling's famous saying, "The female of the species is more deadly than the male," is untrue among trained elephants (see text, page 745).

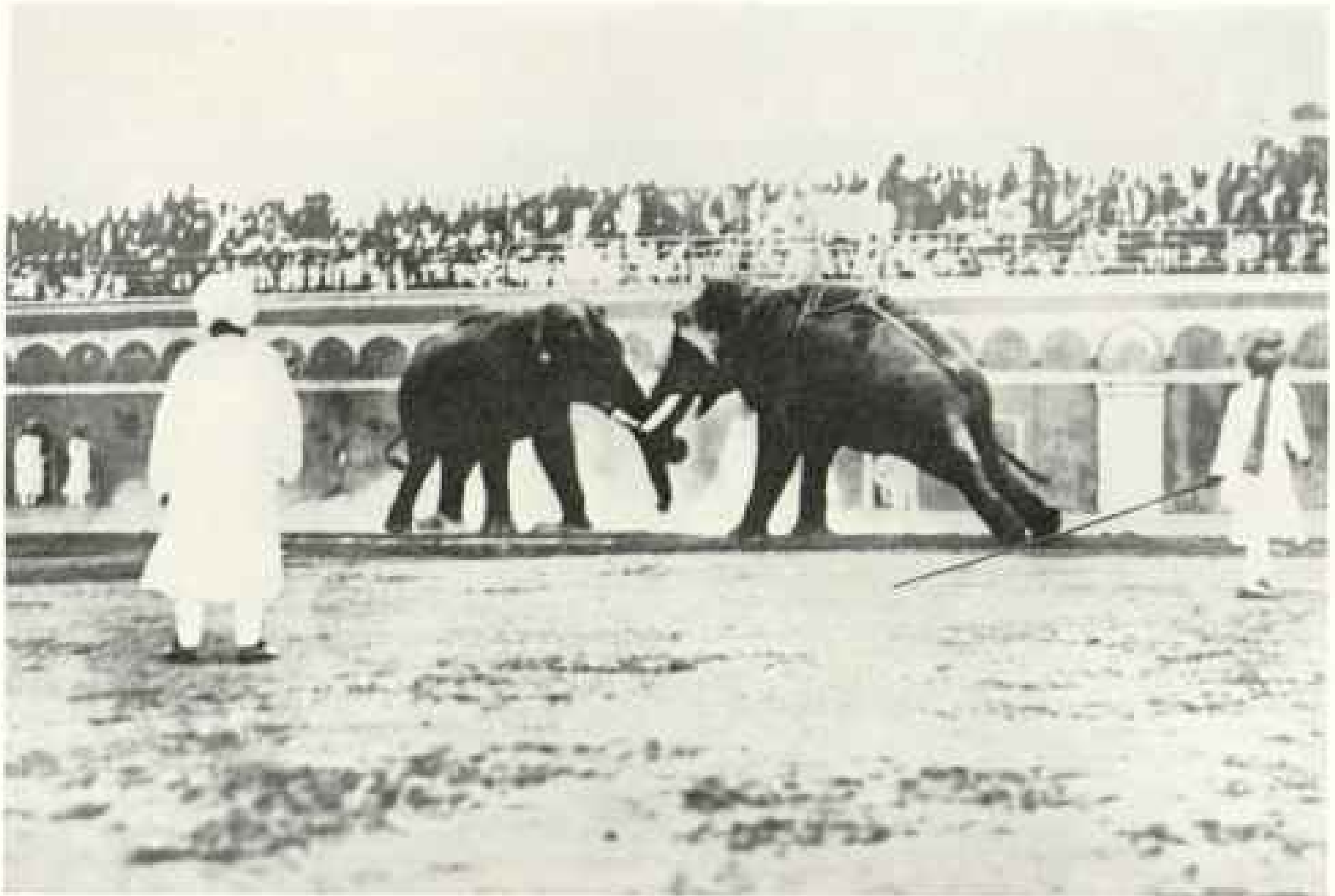


Photograph by Richard H. Stewart

CIRCUS ELEPHANTS ENJOY A PEDICURE

Attendants file and polish the animals' nails once each week and whitewash them daily. The special care not only keeps up their personal appearance, but makes them comfortable by reducing the annoyance of galling perspiration of their feet.





Photograph by Keystone-Underwood

**IN AN ELEPHANT BULLFIGHT, NO HOLDS OR BLOWS ARE BARRIED!**

These powerful warriors staged a thrilling bout for guests gathered for a state wedding in Baroda, India. In the jungles, elephants of the same herd seldom fight, but battles take place between bulls of different families and with "rogues," or outlaws (see text, page 731).



Photograph from International News

**IN THE ORIENT, EVEN ELEPHANTS BOW TO ROYALTY**

Clad in full ceremonial trappings, these big tuskers from the royal Annamese stables at Hué, French Indo-China, rehearse their lessons in court etiquette. Luxurious motorcars are rapidly replacing such state mounts.

In the Indian elephant the forehead is marked by a depression, or valley, separating two rounded knob-like bosses (bumps of wisdom) which part it along the middle line. The Indian elephant is a foot or so less in height than the African, but is thicker through the shoulders and hips and is a bulkier animal, sometimes outweighing the African (see illustration, page 742).

The Asiatic elephant ranges through the forested parts of India and is to-day more numerous in Burma or eastern India and in the island of Ceylon than elsewhere. From Burma it ranges eastward through the Malay Peninsula to Siam and also farther east to Cochin-China. Southward it extends to the island of Sumatra.

The African species originally, before white men slew it, ranged over every foot of tropical Africa, from sea level to the tops of all forested mountains, or to the upper limits of forests on the snow-capped mountains, such as Kilimanjaro, Kenya, and Ruwenzori. On these equatorial peaks timber line occurs at an altitude of approximately 10,000 feet.

On the sands of the Sahara the animal is not found, but it occurs in the bush-covered deserts and grasslands on its southern border, and from that latitude southward to the Cape of Good Hope. On the east coast or border lands of the Indian Ocean the elephant extends through Ethiopia and eastward through the deserts of Somaliland. Half at least of this vast area is still inhabited by elephants.



Photograph by Graham Romeyn Taylor

#### "GOING UP" ON AN ELEPHANT'S FOOT

From the uplifted knee the mahout can scramble to his charge's neck and there direct his activities. While most of the guiding is done by verbal command and by pressure of the feet on the neck and ears, the use of the hooked goad is sometimes necessary when the animal is contrary or slow to obey.

A third distinct species of elephant occurs in extreme western Africa, in Liberia, the land of the pygmy hippo, and eastward to the Cameroons. This elephant is also a pygmy of sorts and is usually known to the zoo public as a "pygmy elephant." The name "pygmy" will doubtless stick in the public mind and replace the older or first name bestowed on this species, of "round-eared," or *cyclotis*. The ear is different in shape from that of the large African species, being circular in outline, without the fold inward at the neck, and only half the size, proportionately, of the African elephant's.



Photograph courtesy New York Zoological Society

#### MIGHTY KHARTOUM WAS LONG A RESIDENT OF THE NEW YORK ZOO

This old favorite proudly cocked his immense African ears forward, in a charging attitude, while taking a shower. As with all his kind, Khartoum's trousers were never pressed and his clothes never fitted, because his tailor, Mother Nature, abhors dude elephants (see page 748 and opposite page).

In their native haunts elephants usually are active only after sundown, except in cloudy or cool weather. By night the herds roam the forests, breaking down trees and feeding on twigs and leaves, or else they trek out into the open meadows and feed on grass. At times they invade the growing crops of the natives and feed on beans, millet, banana trees, or any other crop. Natives post a night guard at their fields, who blows an ivory horn, or shouts, or beats tom-toms to frighten the raiders. Herds of wild elephants never enter native villages or destroy huts. Such deeds are done only by solitary rogue elephants.

Elephants sleep in the shade of forests, usually standing erect in close herd formation. In Africa instances of their being found lying down resting are unknown. Zoo elephants reverse their normal habits and are active during the day entertaining their public, but at night in the zoo they sleep soundly, and they lie on their sides at times.

As an African herd stands resting in the forest, stealthy ivory hunters can locate it by the occasional rumblings of the stomachs

of some of the animals. At the zoo or circus such sounds are seldom heard. As nearly all circus and zoo elephants belong to the Indian species, perhaps the rumble is peculiar only to the African.

#### GOOD PEDESTRIANS AND SWIMMERS

Though they move swiftly, elephants never run or gallop. Their fastest gait is a shuffle of sorts, almost a glide, and this they can keep up for many miles. Because the ankle is situated near the base of the leg, as in man, they can slide down steep banks and they can even negotiate cliffs in steep places where it would be impossible for a horse to go. Notwithstanding his colossal bulk, the elephant is one of the stealthiest stalkers among animals. The entire herd can move out of a forest and disappear without breaking a twig or making a sound.

The front feet are almost circular in outline, much larger than the hind feet, and in a large African bull the forefeet will measure as much as 68 inches in circumference. The shoulder height is always twice the circumference of the forefoot.



Photograph by Edwin L. Wisberd

#### WHAT ZOO WOULD BE COMPLETE WITHOUT AN ELEPHANT?

This monster amuses Sunday spectators in the Philadelphia Zoölogical Garden by throwing dust over his back. A good elephant sometimes becomes bad and attempts to kill his best friend, the keeper, who has a real affection for him. Such killers are not normal elephants, but individuals that have become actually insane.

Since the elephant cannot jump and his stride is only about six and a half feet, a deep ditch seven feet wide will halt his progress. The builders of modern barless zoos confine their elephants behind straight-walled moats only ten feet wide.

At swimming the elephant is adept and he loves water almost as much as does his fellow pachyderm, the hippopotamus.

Smell is the keenest sense in elephants. That is why hunters can only approach a herd upwind (see page 729). Their eyesight is so poor that they cannot make you out if you "freeze" when they are looking your way even ten yards distant. Their hearing is quite acute, but unless the elephant can get the scent of an enemy he seems hopelessly bewildered. Often in Africa I have seen the huge trunks lifted high in the air, trying to get a whiff of any hostile scent in their neighborhood.

#### FAMOUS CITIZENS OF ZOO AND CIRCUS

Most famous of the American elephant citizens of zoo and circus was the aforementioned Jumbo, whose prestige was due

not so much to his colossal size as to Barnum's clever advertising.\* For poster exploitation he was 11 feet tall and weighed 12½ tons; but the taxidermist who mounted him gave his height as 10 feet 7 inches at the shoulder and his weight was more nearly an even six tons. At that, his height and weight surpassed those of any elephant exhibited (see page 734).

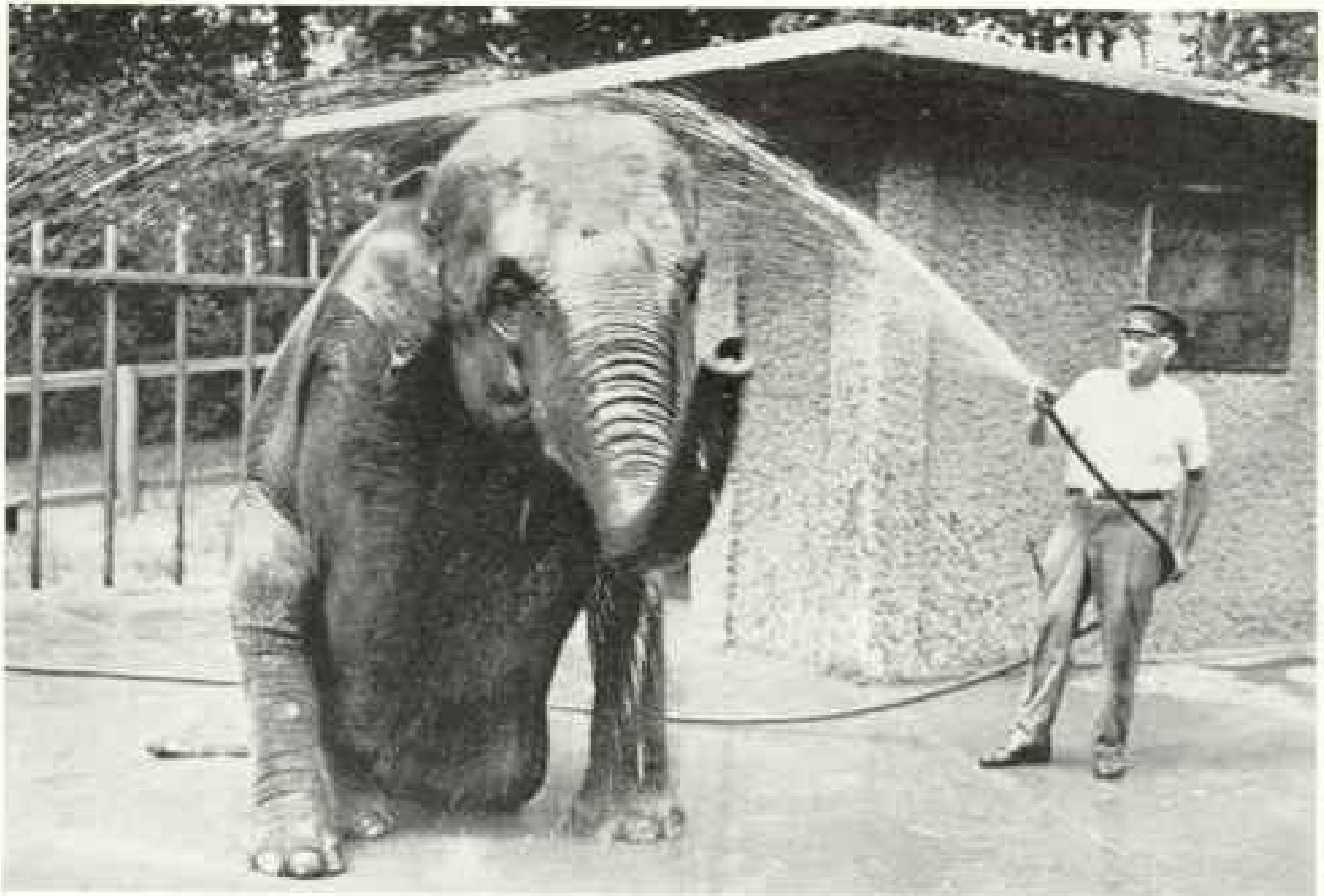
Jumbo's height, however, is exceeded by larger bull elephants killed in Africa. Major Powell-Cotton killed a bull on the upper Nile that measured 11 feet 6½ inches. There are a number of other records of animals that topped even Jumbo's publicized "eleven feet."

The largest African elephant in any American zoo was Khartoum, a male who was at the New York Zoological Park for many years. He measured 10 feet 5½ inches at the shoulder and his weight was nearly 10,000 pounds.

At the National Zoological Park in Wash-

\* See "The Land of Sawdust and Spangles," by Francis Beverly Kelley, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1931.





Photograph by Edmund Heller

#### VENICE SITS DOWN AND RELAXES IN HER SHOWER

She loves water as much as does the city of her name, but her open summer yard in the Milwaukee zoo has no swimming pool. In winter Venice returns to her stall in the monkey house, much to the consternation of its noisy inhabitants (see below).

ington is one of the few female African elephants ever exhibited in the United States. She also is a Sudan elephant, brought to this country by William Blackburn, one of our foremost zoo keepers. But the National Capital's most famous elephant was Dunk, a former circus bull. He and another bull, Gold Dust, were the nest eggs of our National Zoo at Washington.

These animals were given to the Government by the Forepaugh Circus in 1891, and since there was no building to house them they were chained to trees until an elephant house could be erected. Dunk lived to be 51 years old and was one of the veteran elephants in America.

Were it possible to interview an elephant about her life in captivity, Venice, a female Indian of the Milwaukee Zoölogical Garden, could tell a typical story.

#### RAISING A 1,200-POUND BABY

She arrived at the zoo June 8, 1923, a so-called "baby elephant," tipping scales larger than the average bathroom at 1,200 pounds and standing 4 feet 5 inches in her padded feet. At 14 years she now is nearly

fully grown, gazes far over the heads of her tallest visitors, from her 7 feet 5 inches, and is estimated to weigh 5,700 pounds.

Venice displays no stellar interest in dieting. On her daily menu are 65 pounds of timothy hay, 15 pounds of bran and carrot or beet "salad," and ten pounds of bran bread. In summer she likes a few bushels of fresh-cut grass; in winter she relishes a bushel or two of lettuce or green vegetables.

From her yard on a hill in the summer she looks down on barless bear dens; sometimes she stands on her hind legs and throws her huge forefeet over the top rail of her yard, as she gazes benignly on the grizzlies, the black bears, the polar bears, and also the wolves, who are her neighbors.

In late October she returns to her winter home, a stall in the monkey house, and is greeted by a pandemonium of seeming protest from all the monkeys. If she wished she could utter a harsh, loud, trumpetlike sound that would rattle the windows.

When a whole herd is trumpeting in the dense forest, the ivory hunter realizes the puny insignificance of man; here the crowd



Photograph from Charles J. Golden

#### A TEMPLE ELEPHANT GIVES HIS MASTER'S SON A "LIFT"

With his left hind foot akimbo, perhaps following the example of his mabout, this beast illustrates how docile an elephant may become when properly trained and handled. Strangely, the trunks of new-born elephants hang limp and useless. As the babies grow older, the mothers teach them to manipulate their trunks, as human infants are taught to eat with a spoon.

is amused, and the keeper knows that Venice is frightened by some strange object, or perhaps by the operation of machinery in the vicinity.

If you stand close to Venice when she is pleased you will hear another sort of noise—a low, throaty rumble. That is the same sort of sound she would emit in the wild to reassure her offspring that mother is near and that it need fear no harm.

Venice is a big friend to all the world and likes to watch it go by; she has never made a hostile movement against any keeper, or against any of her public who test her cupidity and her temper by offering her all sorts of edible and inedible trash. Chemistry, perforce, is her special study, because all day long she must analyze, with her trunk, many strange specimens of

candy, cookies, fruits and vegetables, chewing gum and peanuts, even tobacco, which are jokingly offered her.

With her amazing sense of smell she identifies most of the edible substances instantly. Her sense of taste is almost equally acute, and her sense of touch at the sensitive tip of her trunk is very nearly equal to that of human fingers.

It is this trunk that helps make the elephant Nature's most amazing mammal. It is an organ far superior to our own nostrils, since it functions as a hand and as a delicate instrument of touch. The trunk, in effect, is the elephant's huge test tube or a small laboratory, and for chemical reagents the animal brings into play the three senses that are contained therein—those of touch, taste, and smell.





A SAMBUK, WITH LATEEN SAILS, TAKES PILGRIMS ASHORE AT JIDDA, THE OPULENT  
SHADED BY OPEN UMBRELLAS

During the Hadj season many pilgrim ships anchor off Jidda. The ride ashore, in sambuks and launches, is through shallow, blue water, over wonderful coral beds. Myriad multicolored fish, fleeing for shelter, hide in the holes in the various coral forms (see "Coral Castle Builders of Tropic Seas," page 703).

## AN UNBELIEVER JOINS THE HADJ

On the Age-Old Pilgrimage to Mecca, Babies Are Born,  
Elders Die, and Families May Halt a Year  
to Earn Funds in Distant Lands

BY OWEN TWEEDY

*With Illustrations from Photographs by the Author*

**A**N INFALLIBLE method to insure original and unorthodox travel is to imagine the world a plate and oneself a tiny globule of mercury on it. Then let the plate tilt itself, and the oddest and the jolliest things do happen!

I had just arrived in Khartoum and my host, a prosperous Arab cultivator on the vast cotton fields of the Gezira, was entertaining me in his mud and wattle abode, which at first sight, with its tall, pointed, straw-thatched roof, reminded me of a mammoth candle-extinguisher of my Victorian youth. He was keenly interested in my travels.

"And where are you going next?" he asked.

I had no fixed plans and told him so; then he tilted the plate and I, the tiny globule of mercury, was off.

"Why not join the pilgrims?" he said. "You are on the Pilgrimage Road, the Darb el-Hadj (Haj), across Africa and over the Red Sea to the Holy Cities. Join them. They are travelers like you—good travelers; and from them you will learn much."

"But I am an Unbeliever."

He smiled. "Maybe," he said; "so of course you will not reach their goal. But you can share their spirit of the road; for, although for us Moslems the Hadj, or Pilgrimage, is a supreme religious duty, it is also, and in fact primarily, a memorable historical pageant, which is annually staged to keep alive in the minds of the True Believers the memories of the important events of the past.

"Your companions of the road will tell you all about it. How, after the expulsion from Eden, Adam again met Eve at 'Arafat, outside Mecca. How, later, Abraham came there with Hagar and Ishmael, and eventually rebuilt the Kaaba which covers the great Black Stone, which is the center of the town. How Hagar, when Ishmael was dying of thirst, discovered the miraculous

well of Zamzam (Zemzem). And how, later, near by at Mina, Abraham was spared the horror of the sacrifice of his son by the timely discovery of the ram caught by his horns in the thicket.

"All that is as much history for you as it is for us Moslems. The pity is that, though you will take the Pilgrims' Way, you cannot tour these holy sites with them and enjoy their full delight. That pleasure is ours alone."

He sighed and was silent for a while. Then, "A real pity," he ruminated, "for you would make a good Moslem."

### EBONY PILGRIMS PAUSE TO PICK COTTON

Later I went out with him into his cultivation. The day's cotton had been picked and was being packed by a team of coal-black Negroes for dispatch in huge jute sacks hung high on a gallowslike frame (p. 764).

"You see these packers," he said. "They are also pilgrims working their way east to the Holy Cities. Some are from Senegal, others from Nigeria, others from Lake Chad and the Congo. They and their families have been, maybe, three years on the road, and it will be perhaps three more years before they attain their goal. Thousands yearly stop here a while for the harvest, to replenish their purses for the road ahead. And then one day they are gone—gone into the east to Mecca, and next season others will drift in out of the west to take their place. The lure of pilgrimage is very real and very strong."

Ten days later I, too, had faded away into the east. The lure of pilgrimage had been too strong for me, the tiny globule of mercury.

My road lay to Kassala, on the Sudan border, east of Khartoum, and from there I purposed to work through the mountains of Eritrea, which lead up to the highlands of Ethiopia, and thence down to the old Arab seaport of Massaua, on the Red Sea.





LORD KITCHENER LIVED IN THIS SUAKIN HOUSE WHEN LEADING BRITISH TROOPS AGAINST THE DERVISHES

On the west coast of the Red Sea the walled city of Suakin is the port of departure for Sudanese pilgrims Mecca-bound. Founded in early Egyptian times, it was long a busy slave market. A railway connects it with Sudan cities of the interior.

There I would take boat for Jidda, in Arabia, by way of Suakin. It was a fine plan if it worked (see map, page 765).

#### "LUXURIOUS" NIGHTS IN THE DESERT

As far as Kassala, I was in luck's way. A motor convoy with stores and equipment for a new railway bridge over the Athara offered me welcome transport, and the 400 winding desert miles were easy, unanxious miles. Our ample camp equipment made the three nights which we spent under the stars almost luxurious. But never did the atmosphere of pilgrimage fade. Now the bleached bones of a camel which had fallen by the way; now the remains of a wayside camp; now a party of long-striding natives festooned with the equipment of pilgrim travel—blankets, pots, sacks, and, of course, waterskins—hastening to reach the next well (see page 768).

Some of the wells were in the scrub country, others in the sheer desert. All were life itself, often the only life within a 60-mile radius, and around them animation reigned, but ordered animation; for at each the rule

was "one by one and the latest comer goes to the end of the queue." And finally our turn would come.

The well, 60 feet deep, had masonry walls, and on the top was laid a well-grooved palm bole over which ran the draw rope. Four wild, bronze-colored Hadendoa men—Rudyard Kipling's Fuzzy-Wuzzies,\* with thick mops of hair inches deep, and in each mop a sharp ivory skewer to enable the owner to investigate troublesome life in the neighborhood of his scalp—comprised the well team. Three hauled on the rope, while the fourth sought for truth at the bottom of the well and filled the goatskin.

We made our bargain, four goatskins full for a stone of flour and a bunch of onions, and the team got going. Down went the rope, hand over hand, and suddenly a subterranean yell that the skin had reached water level; then a peering into the depths and much roaring both above and below ground. The three haulers, slinging the rope

\* See "Two Fighting Tribes of the Sudan," by Merian C. Cooper, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1919.



## AN EGYPTIAN NILE FARMER'S MUD AND WATTLE HOME

The camel, tradition says, has 100 names. Arabs know 99; only the camel knows the hundredth. Pride in this secret may make this animal hold his head so high!



## FUZZY-WUZZIES, IN THE BURNING WASTES OF THE SUDAN, DRAW LIFE-SAVING WATER

Over the palm trunk, worn with grooves, they pull their rope, bringing up the only water within two or three days' march. The author traded a bunch of onions and some flour for four goatskins of water (see text, opposite page, and illustration, page 767).



BLACK MOSLEMS PICK COTTON AT KHARTOUM TO EARN EXPENSES ON THE HADJ

This highly modernized and prosperous city is vividly remembered in the history of British rule in Egypt. Here, in 1885, General Gordon was slain during the Mahdist uprising, two days before the arrival of a British relief force. At that time the Mahdists destroyed Khartoum and made near-by Omdurman their headquarters.

over their shoulders, marched carefully and evenly into the desert while the skin slowly rose to earth. It was beautiful drill, perfected from long practice down the ages.

Kassala, covering under its extraordinary domed mountains, whose smoothness has defeated so many mountaineers, was very complicated (see illustration, page 766). The only available motor belonged, of course, to the local Greek. He was not "bearing gifts," while I refused to be fleeced.

But just as I was beginning to feel desperate, a pre-war Model T Ford, driven and owned by a woolly-pated Negro in a

nightgown, arrived in very staccato fashion from over the Eritrean border.

As the owner-driver had to return, I made a fine bargain with him. He would take me the 200 miles, as far as the terminus of the Eritrean mountain railway, for \$20, provided I gave him extra money to buy two new tires in Kassala. This provision immediately appealed to me, as two of his tires were already irremediably flat. So I gave him \$15 on account and a day's grace, and he stood to his bond.

#### TWO PASSENGERS AND A LAMB

But my departure was not dignified. My luggage filled the back seat so high that the top had to be pulled over to hold the cargo in place; and then, just as we were ready to start, there arrived a youth in half a nightgown with a very noisy lamb hung around his neck, much as a woman wears a fur. They were also for the road, and to my fury, without so much as a "by your leave,"

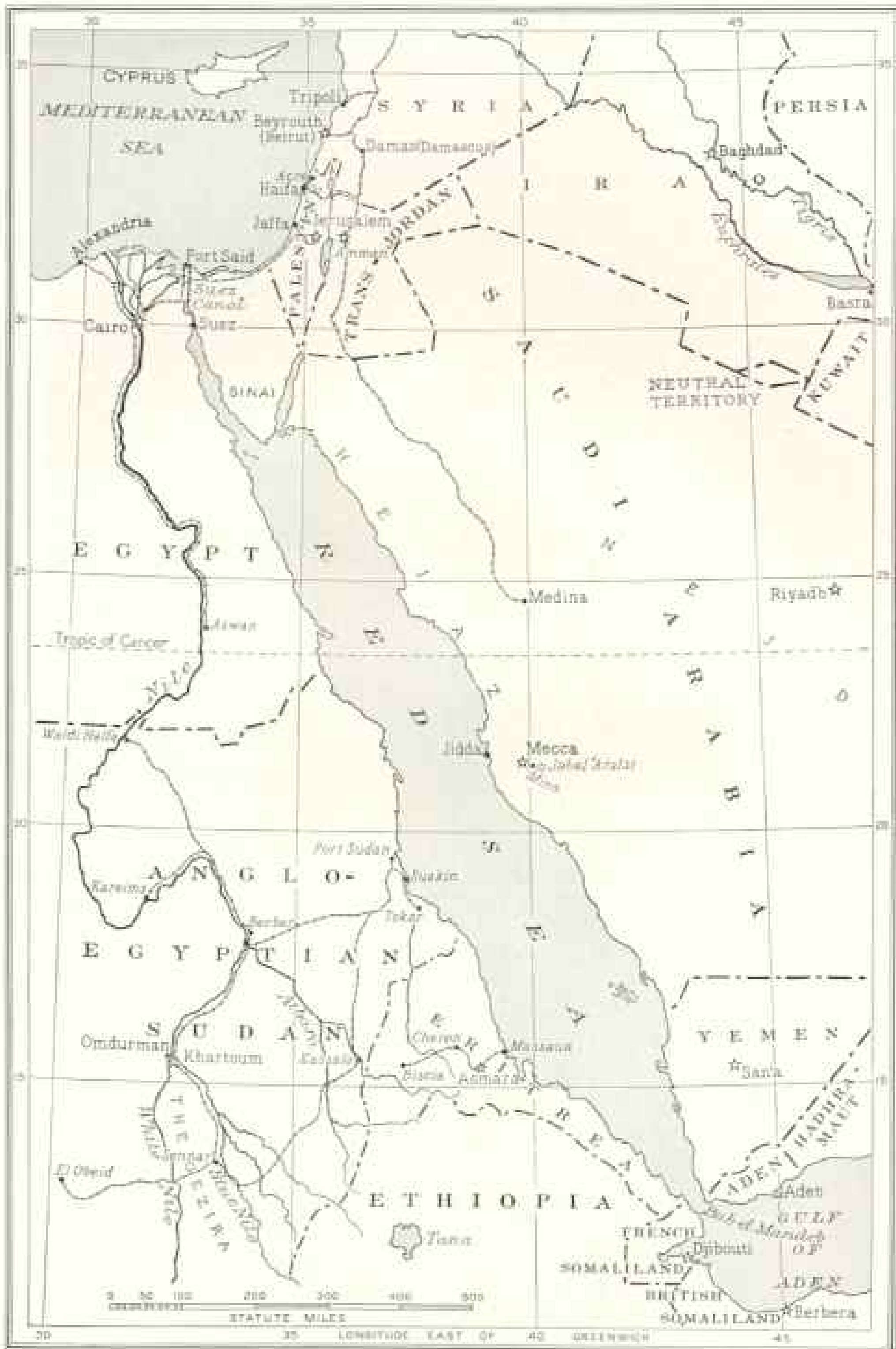
they settled themselves in the driver's seat.

"In the name of Allah!" I screamed at the owner. "Am I to pay you for carrying a lamb and a boy in the front seat while I cower among my own baggage like a servant? By Mohammed, I am very angry!" And I clapped my hands loudly.

The lamb and the boy were out in one and the proprietor seized my sleeve to propitiate me.

"But both are young," he pleaded.

"Nevertheless, they are passengers—my passengers, too, not yours—as I have paid for the car."

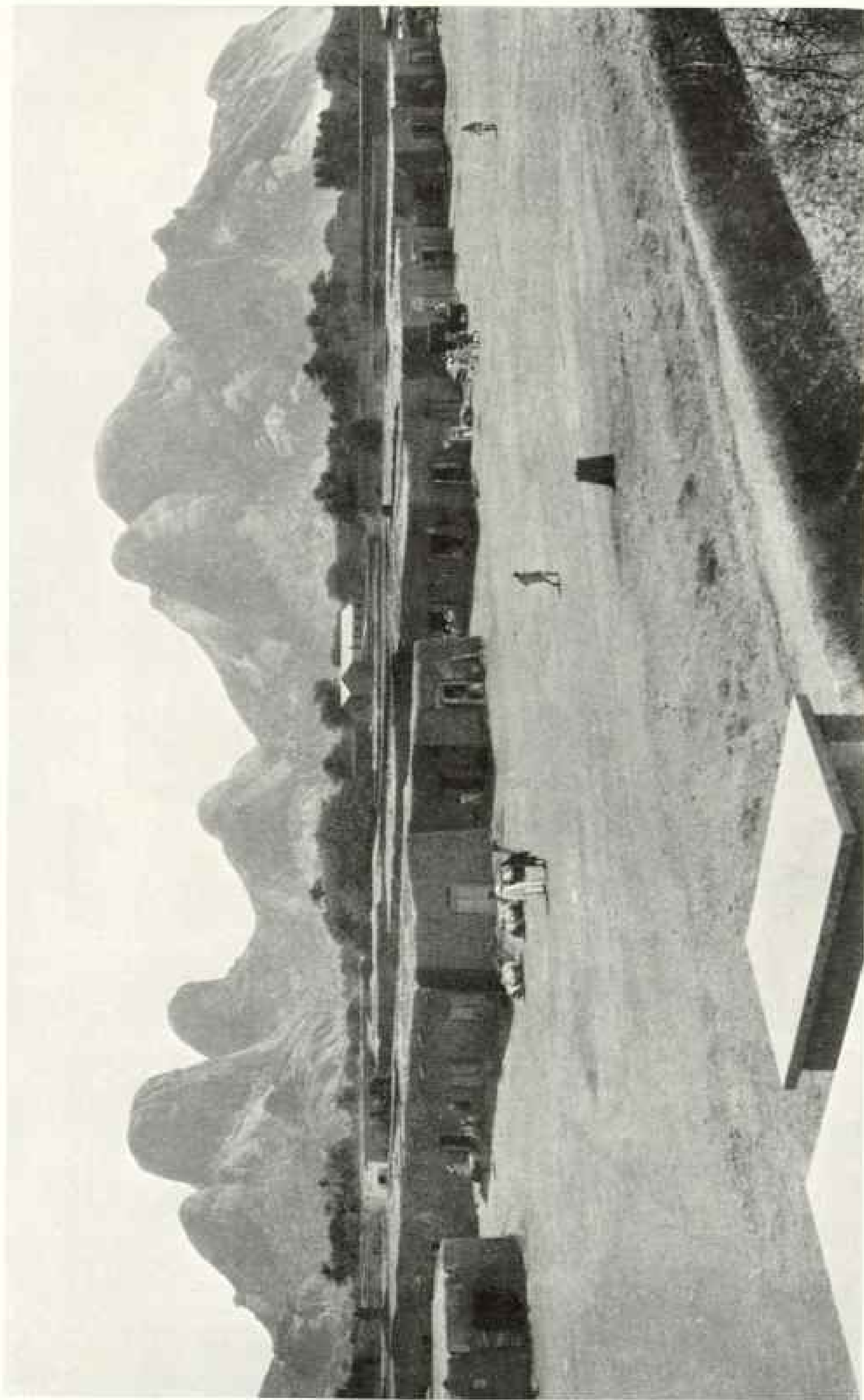


Drawn by A. E. Holdstock

MECCA DRAWS MOSLEM PILGRIMS FROM ALL EASTERN LANDS

The author followed the pilgrimage route of the faithful from Khartoum to Jidda, observing the life of the people and the ceremonial customs of the famous Hadj. Red Sea regions are saturated with Old Testament as well as Moslem history. Many Mecca pilgrims also visit Medina, where Mohammed is buried.

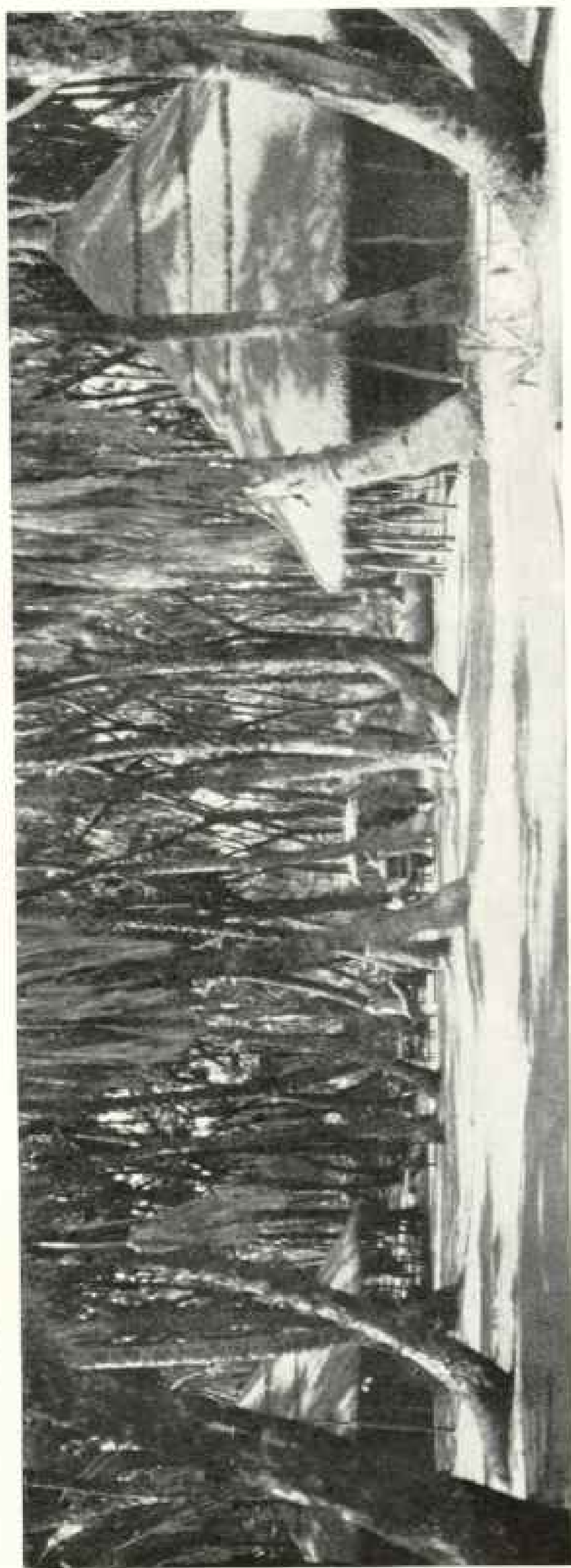




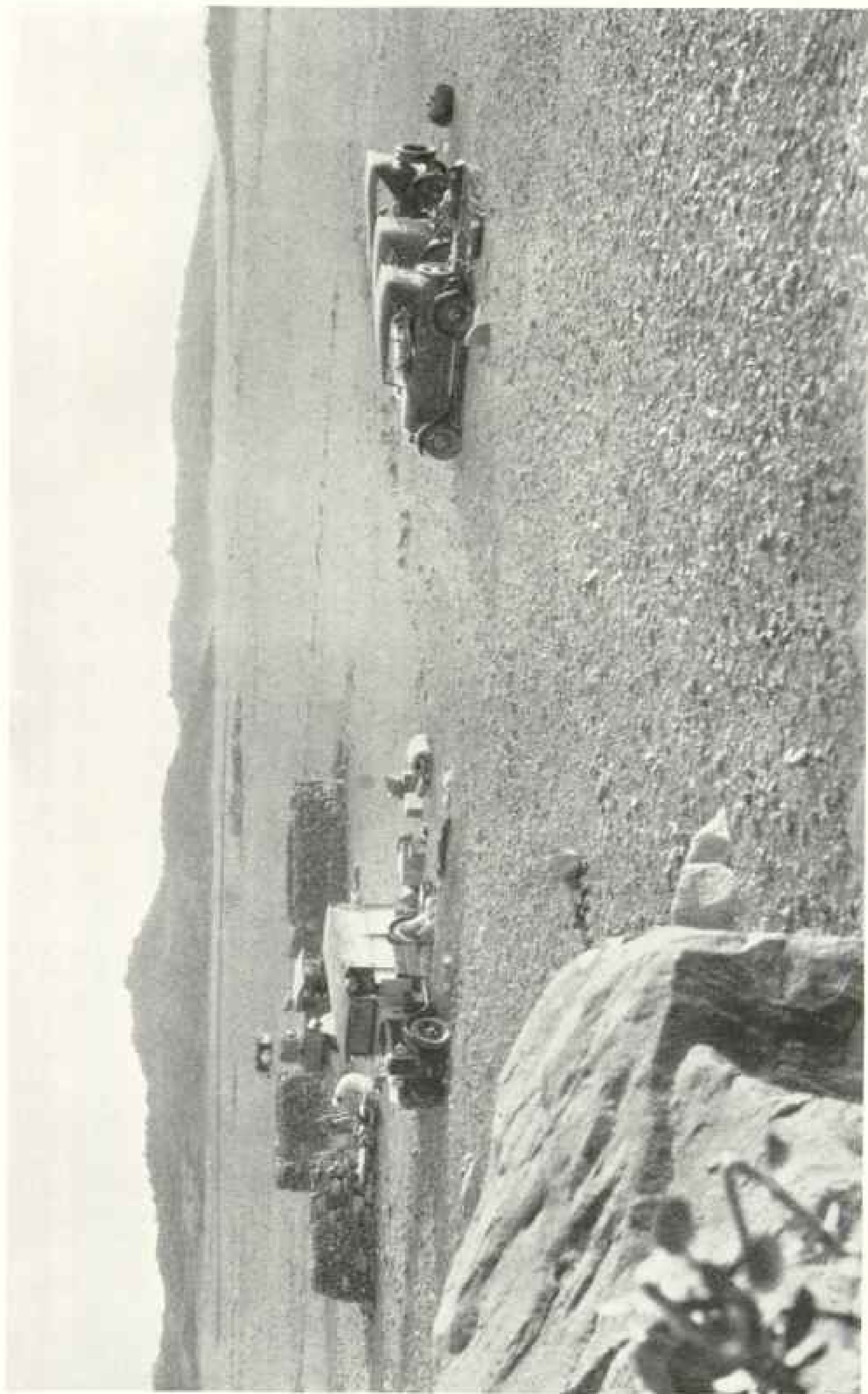
SOME OF THE QUEER, DOME-SHAPED MOUNTAINS NEAR KASSALA HAVE SUCH STEEP, SMOOTH SIDES THAT NOBODY HAS CLIMBED THEM. An Arab town of 20,000, Kassala was an important Egyptian military post during the Dervish wars. To-day the outside world hardly knows it exists. Here the author found a surviving "Model T" and pressed on to a mountain railway which colonizing Italians are building in Eritrea (see text, page 764).



SIXTY FEET DOWN INTO THESE SUDAN DESERT WELLS PILGRIMS SOMETIMES CLIMB TO FILL THEIR GOATSKINS



YELPING HYENAS GATHERED ONE NIGHT WHEN THE AUTHOR CAMPED IN THIS SUDAN GROVE AND WORRIED A LAMB CARRIED BY HIS FELLOW PASSENGER



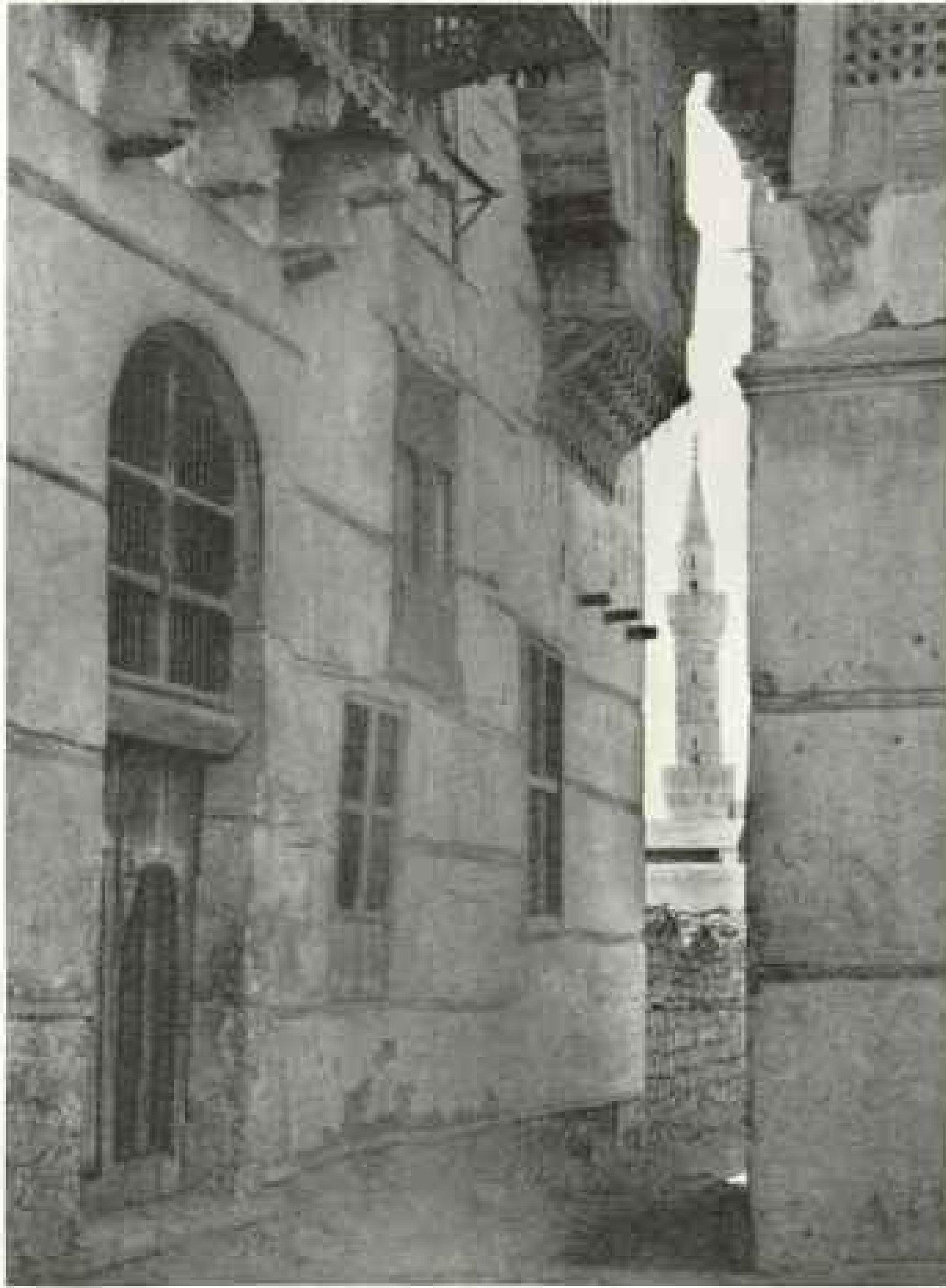
THE AUTHOR TRAVELED 400 ROUNDABOUT MILES FROM KHARTOUM TO KASSALA WITH THIS AUTOMOBILE PARTY

The motorcars were hauling supplies to men building a railway bridge over the Atbara River (see text, page 762). Along the desert trail were signs of the tireless pilgrim trek: men carrying pots, sacks, blankets, and waterkins, pushing doggedly on to the next well, and now and then bleaching camel bones and ruins of abandoned camps.



PILGRIMS COOK, EAT, SLEEP, AND WASH NAKED BABIES ON DECK





THE NARROW JIDDA STREET FRAMES A SLENDER MINARET

From its high balcony, the Muezzin calls the faithful to prayers. Whenever a devout Moslem hears the voice of the crier he must stop and make the appropriate answers; or, if in bed within his home, sit up. Often the towers are faced with brightly colored tiles and are distinctive of most Moslem cities.

This was just the horse sense every Arab loves, for it started a bargain, and in the end we came to terms, whereby the boy and the lamb were stuffed under the top while I was excused \$2 of the original bargain. Then we shook hands, all three of us laughed, and off we went. That night, in a rustling date grove, we camped together in perfect amity, save for the lamb. It bleated nervously toward midnight, when two hyenas smelt it out and came and laughed at it hungrily for an hour out of the dark forest, beyond the range of our palm-wood fire (see page 767).

The Italians, who are colonizing Eritrea, have built a marvelous mountain railway

out of the foothills up to the capital, Asmara, which stands some 7,700 feet high at the beginning of the Ethiopian plateau. My carriage was an omnibus type, first class at one end, second class at the other, and my companions were all Ethiopians. The owner of my Ford car bade me an affectionate farewell.

"Godspeed," he said, "and may your journey be blessed. But those men are not on pilgrimage," he added with contempt. "They are Christians and dirty people. Only at Massaua will you meet the pilgrims again. But may your life be long, for you are a good man and a wise man and," he added with almost a wink, "a generous man." Whereupon I tardily realized that I had certainly paid him at least treble what he had expected to receive.

It was a ten-hour journey up and around and back again through wild, sun-baked scrub mountains, climbing all the time, and as we climbed my heart reacted to the altitude. When we reached Asmara, it was pounding like a trip hammer. Such a change was far too abrupt for me, and all the time I remained at those heights I was ill and out of sorts. After a week I decided I could no longer bear it. So I looked up a train for Massaua and hastened to the station. But Eritrean time-tables are printed with a wise proviso—"subject to the exigencies of service." What the exigencies were on that particular Sunday I do not know.

Anyhow, the "express" would not run, and it was only after a long and agitated conversation with the Italian station master that I was at length given permission to

travel down to Massaua on a goods, or fourth-class train. I shared the van with an elderly Turk from Aden and a charming Arab, who with his young son was making his way to Mecca, having been four years on the road from the western Sudan. He had started with a wife, but she had died when the boy was born: so when he and the baby reached Asmara he had delayed a season, working in the fields, until the child was old enough to face the sea.

He was delighted to talk Arabic. When I spoke of his Nile, his face lighted up, and while the aged Turk snored in a corner on a heap of fagots, he talked and talked. His father and his grandfather had been to the Holy Cities, and, when their time came to die, had gone to Paradise. Now he and his son would become Hadji (pilgrims) in their turn, and after them the generations unborn.

Islam does inspire enormous conviction.

I took his photograph while we were stopped in a station. When the old Turk woke up, I suggested I should also take his. But he refused the indignity and was momentarily highly offended until he suddenly realized that my luggage probably meant that I had money. Whereupon he opened a box and produced large bunches of ostrich feathers which he told me would make my wife the most envied woman in my village in England. He was disappointed and surprised to hear that I was unmarried, and after some half-hearted suggestions that the feathers would be equally becoming to my sisters, he slammed down his box, sat on it, and went to sleep again.



NEARING JIDDA, MECCA-BOUND PILGRIMS BEGIN TO PRAY

An odd fact about this *ihram*, or formal dress, which these faithful are donning, is that it must be made without seams, lest some "infidel" tailor have a hand in sewing it and thus contaminate it (see page 772).

I met my Arab companion next day on the boat, which was to take us both to Jidda; but he had no eyes for me. He was in the peak-hold, engrossed in conversation with the medley of other pilgrim deck passengers, while I was well astern in the first class. For me, too, the boat had fresh and equally intriguing interests.

#### MEETING A FRIEND FROM HOME, THE BOAT

I clambered down the companionway into the gloomy saloon and there I had the surprise of my life. The paneling of the walls was studded with carved medallions—the Rose of England, the Thistle of Scotland, and, dearest of all to me, the Shamrock of my own country. Over the clock were the

Arms of the City of Dublin. Like myself, my boat was an exile from the West and, what was more, an old friend. Before she had drifted into Red Sea coasting trade she had plied as the *Lady Hudson Kinahan* between Dublin and Liverpool and had been the favorite boat of my brother and me on our way back to school in England.

Outside the coral reefs of Massaua the sea was high, and in the succeeding 24 hours I had all I wanted of the saloon. I have always been a poor sailor, and only when we were at last within the reefs off Suakin did I struggle up on deck.

#### THE DERVISHES AND FUZZY-WUZZIES

We anchored out in the harbor. While more pilgrims were being embarked, I went ashore and for two enthralling hours walked through the old Arab town which, fifty years before, had been Lord Kitchener's headquarters against the Mahdists under the wily Osman Digna (see page 762).

My guide was a smart Sudanese sergeant whose father had fought with the Dervishes and he made some Hadendoa Fuzzy-Wuzzies pose for me outside the old fort. Later, just as the sun was sinking behind the grim Red Sea hills to the west, we had our tea on a balcony overhanging the sea. It was my last meal in Africa, and I was full of excitement with the prospect of Arabia and Jidda on the morrow.

The wind had died down and we had a lovely crossing. Early next afternoon my fellow pilgrims and I were all on deck straining our eyes into the east for a first view of the promised land. From the captain's bridge I looked down on to the foredeck, which was full of the tense bustle of an imminent arrival.

The pilgrim arriving in Jidda has much to think about. Once the coast is sighted, he enters the Sacred Zone and his ceremonial initiation as a full-blown Hadji has to be performed. The men were already bareheaded and shoeless. Suddenly from the masthead crow's nest there was a loud shout: "El Belad!" (The City!)

With a sort of gasp all hastened to the ship's side and stood in excited silence gazing deep into the horizon. Slowly they turned and joined their womenfolk and children squatting on top of the main hatch.

Then as slowly, with ceremony and reverence, they took off their ordinary clothes and put on the prescribed dress of pilgrimage, the *ihram*. It consists of two lengths

of white calico or toweling, purposely seamless to avoid any possible contamination from the touch of an "unbeliever" tailor. One length they wore knotted round the waist, the other over the head and shoulders like a shawl.

Once dressed, life became normal again, and pandemonium ruled while fathers collected the family luggage and agitated mothers tidied and polished their jolly pot-bellied babies.

Two hours later we were anchored safely inside the reefs. Across two miles of glass-like sea Jidda shimmered at us, a vivid contrast of white walls and black shadows against the pale pink of the gently rising desert behind. Leaving the bridge, I went down among the pilgrims to find my friend of the Massaua goods van. But easier said than done. In the *ihram* all the men looked exactly alike—tall, ghostly figures in the terrific sunlight—and in the end it was he who spotted me. He came running up with the boy pattering at his heels. His face was almost beautiful with excitement.

"Soon we shall be ashore," he said, "and I shall seek out my cousin, who arrived two years ago and has stayed here. He will see after us, and tomorrow or the next day we shall be on the way to Mecca."

For ten minutes he talked plans and how he had told the boy of everything—the prayers at the Kaaba, the prayers and sermon at 'Arafât, the stoning of the Devils at Mina, the whole routine of the pageant of the pilgrimage—and while he talked the *sambuks*, large, wide-bottomed, single-sailed barges, were slanting through the reefs to take us ashore.

#### THE HADJ HAS A STRICT RITUAL

Then the fun began, the disembarkation. First, over went the luggage, slung over anyhow, and next, panting with excitement, the pilgrim families. Once in the *sambuks*, each family was taken over by a licensed guide, who would be responsible for its lodging in one of the pilgrim hostels ashore and would later arrange for its transport by camel to Mecca. The Hadj, one of the oldest ceremonies in the world, has a ritual of organization dating from centuries back. Once the pilgrim reaches Jidda, there are conventions which he must follow as strictly as rules of dress.

The last I saw of my Arab friend was when his guide, rather roughly, I thought, stowed him and the child at the bottom of



PILGRIM SHIPS ARE CROWDED LIKE ARMY TRANSPORTS

Bringing their own bedding and food, pilgrims crowd the decks, talking and praying incessantly. Sometimes disease breaks out; men who die are thrown overboard. But that is nothing to grieve over, since those who die on the Hadj go straight to Paradise! Here Moslems from Java lean over the rail and dicker with Jidda boatmen for the short sail to shore and a night's lodging.



their sambuk between two enormous sacks of cotton. But he still smiled. His day was being indeed "blessed."

An hour later I was ashore. My host's house stood by the walls, for Jidda is a walled town, and from his living room I looked out west over the sea and south into the cruel, broken desert stretching blankly into a misty horizon. My bedroom was as large as a golf green. It had six windows, unglazed but beautifully latticed with *mush-rabeyeh* tracery. With the sun dropping into the west, the cool stone floor was patterned with entrancing shadows. In days before the war, it had been part of a Turkish pasha's harem.

And so to a European tea and then a long walk through the town, past numerous hostels cluttered with pilgrims' baggage awaiting distribution among its owners, out along the northern wall past the Consular Quarter, past the odd and extremely dangerous-looking leaning minaret of one of Jidda's principal mosques (see page 776), and so out through the Medina Gate and into the open desert.

The sun was low and our shadows ran long ahead of us as we walked into the east. Flocks of goats were being shepherded back into the town for a night's safety, and we met a few Arabs swinging past on their way home, with the long, slow strides of the men of the desert.

#### THE START OF A MONTH OF FASTING

There was absolute silence, but it was somehow no ordinary silence. It was far too tense. The reason was that the day was the eve of Ramadan. All the good folk of Jidda were waiting for word that the young moon had been seen which would inaugurate their annual month of fasting. During this month no morsel of food and no drop of drink might pass the True Believer's lips between sunrise and sunset.

That night we dined in the Consular Quarter—a happy gathering of the local diplomats. They could not have been kinder to me, the stranger. Just as we were sitting down to table, there came to us through the stillness of the night the roar of the Ramadan salvo of guns fired from the harbor fort. The sickle moon of the month had been seen by some keen Arab eye a thousand miles away, in the desert of Nejd.

The good news had at once been borne to the King at Riyadh, his ancestral capital in Nejd; hence it had been relayed by wireless to Mecca, his Hejaz capital, and now

we had it. So the fast would begin at tomorrow's dawn and all good Moslems must at once prepare for a night of feasting against the hunger of the coming day.

We sat long over our meal, and the talk was all of the new Saudi Arabia Kingdom; how much better it was than the incompetence of the last Hashimite régime; how much was being accomplished; how much there still remained to do.

#### NEW WAYS IN THE NEW KINGDOM

Two things struck me. These diplomats knew where they stood with the new King, whereas with his predecessor life had been one long wrangle and haggle on the orthodox lines of bazar bargaining. Again, and still more meritorious, Ibn Saud's law now ran to the four corners of his kingdom. Gone were the days when there was no king in the land and every man did what seemed good in his own eyes. Ibn Saud's law is strict, narrow, and essentially harsh. But the country knows him and he administers justice according to that law and strictly within its limits.

Nowhere has this improvement been more welcomed than in the arrangements of the Mecca pilgrimage. In other days the guides bought their licenses from the emir and proceeded to make as much money as could be squeezed out of the unfortunate pilgrims. Ibn Saud has changed all that. The guides, the camel owners, and the hostel keepers now work on scheduled prices, and to-day the pilgrim newcomer knows that he can get redress in the courts in cases of extortion or negligence.

#### THE SOUNDS AND THE SCENT OF THE EAST

We broke up in the early hours of the morning, and through narrow, overhung streets my host and I made our way to the market.

There the appearance of Ramadan's sickle moon had turned night into day. The shops, tiny arched recesses in the walls, were all open and glaring with roaring petrol lamps; meals were being busily prepared in the cafés against dawn and the morrow's strict fast; Arabs chattered with Arabs and every purchase was an argument and every argument a commotion; agile money-changers poured the new Saudi dollars like streams from hand to hand and invited me to exchange my Egyptian notes.

Strings of camels and donkeys, preparing for the trek to Mecca, barged their way heavily through the teeming crowds, and



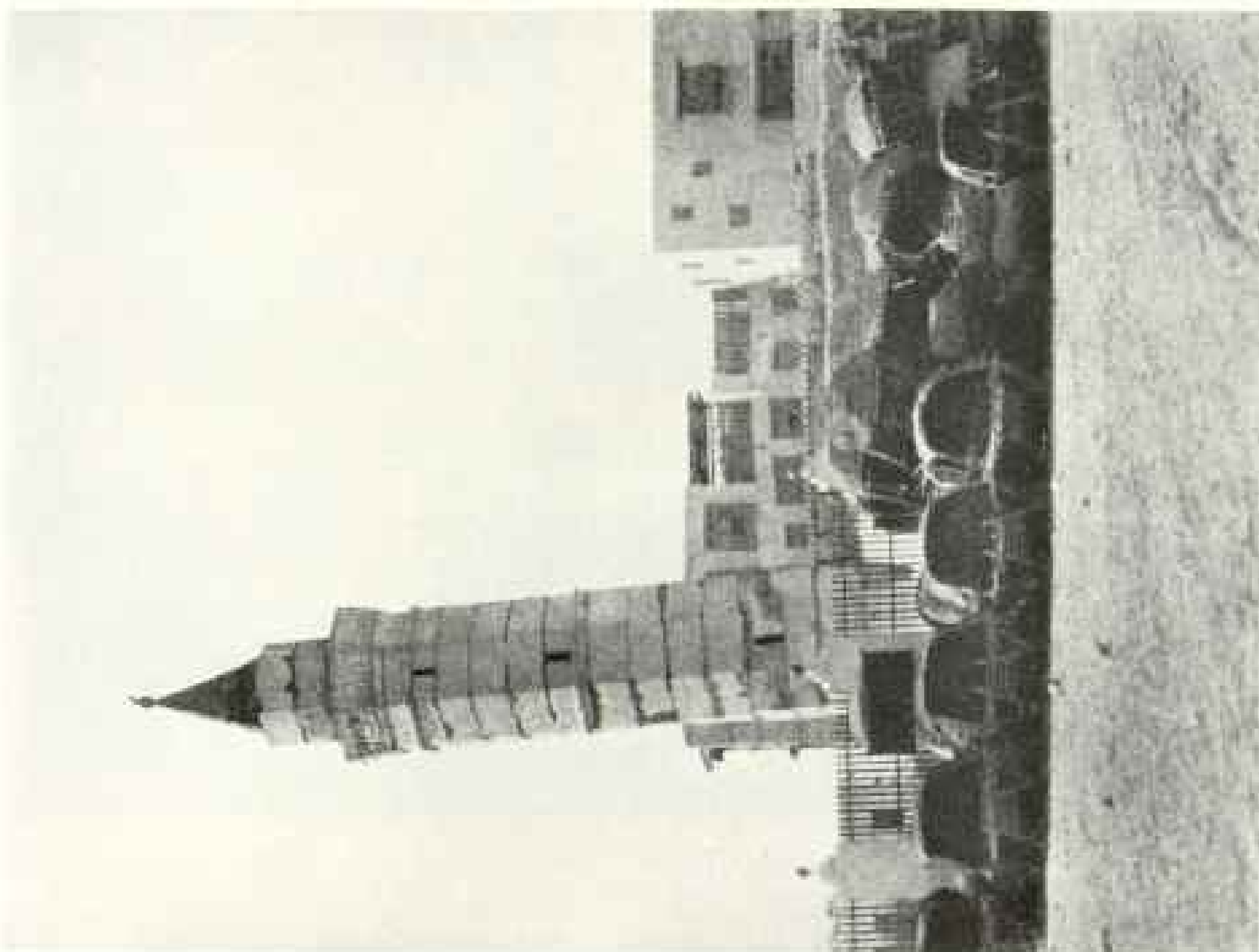
GUIDES MEET PILGRIM SHIPS AT JIDDA TO SHOW THE CITY'S SIGHTS

Like megaphone conductors on sight-seeing busses, these men, when leading a pilgrim band through Jidda streets, impart a steady babble of information. Often they walk backward, facing their charges, the better to hold attention. They also cheer tired pilgrims with tales of delights to come in Mecca (see text, page 764).

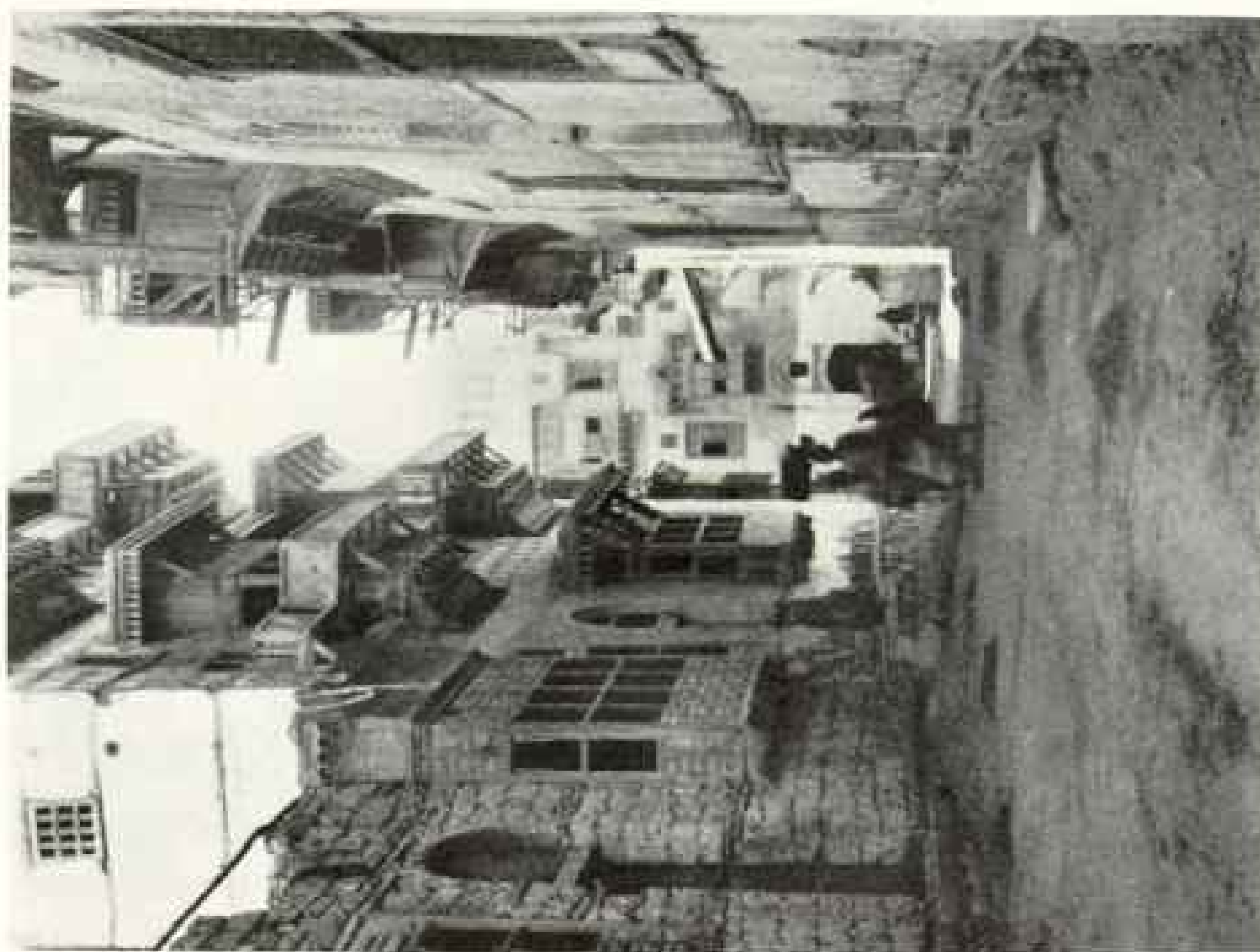


"EL BELAD!" (THE CITY!) THE FAITHFUL CRY WHEN THE JIDDA COAST IS SIGHTED

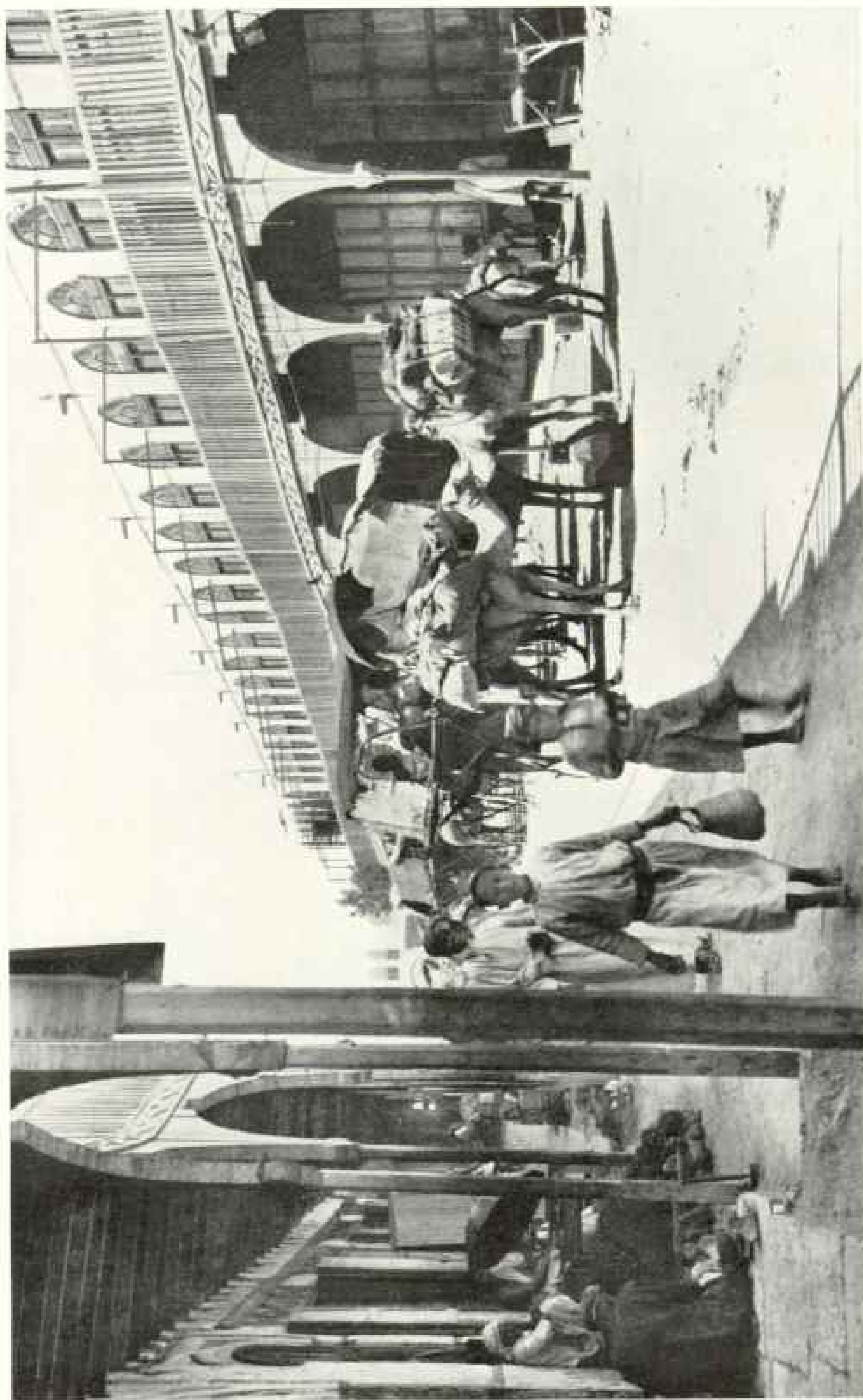
Putting baggage into sambuks, sorting out women and children, bring pandemonium, as in another Red Sea drama, when, by Bible history, its waters opened to let the Israelites walk across, then closed to drown the hosts of Pharaoh (see text, page 783).



CAMEL PALANQUINS SURROUND THE LEANING MINARET OF JIDDA



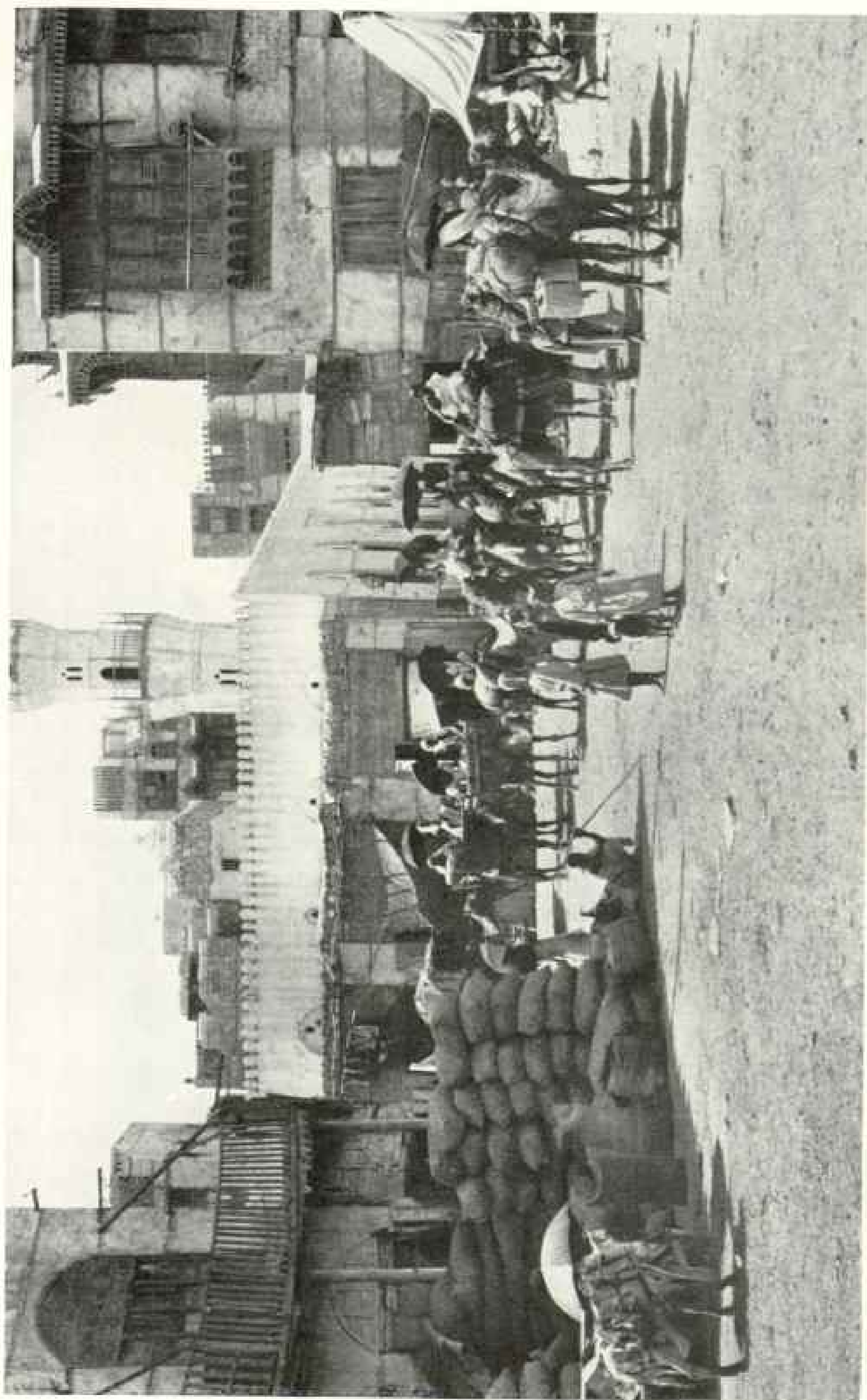
LATTICED BALCONIES ARE BOX SEATS FOR VEILED WOMEN



"MAIN STREET" IN JIDDA IS A MIDLLEY OF MIXED RACES OF MEN, VARIOUS ARCHITECTURE, AND CONTRASTS IN TRANSPORT

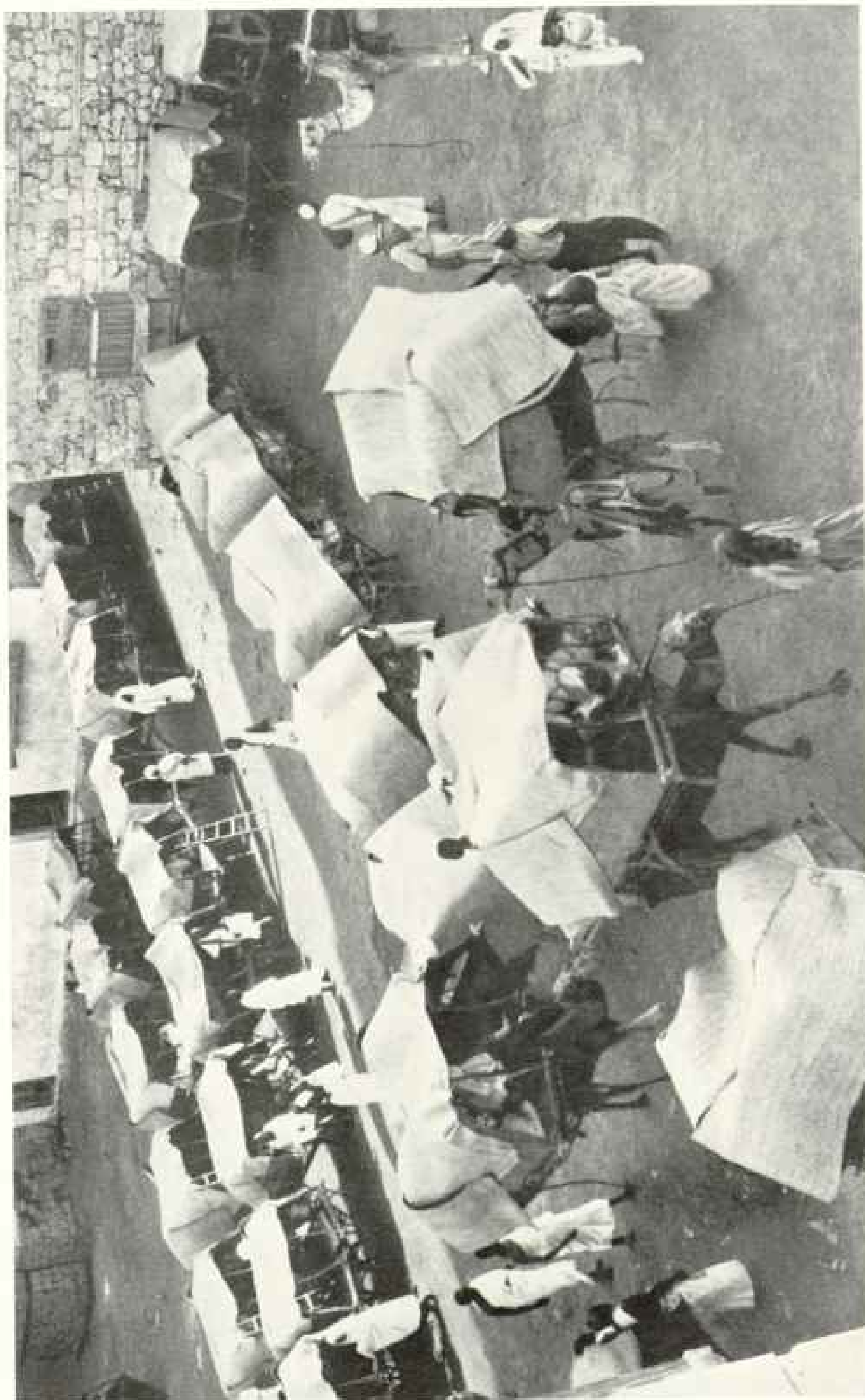
Flimsy, weather-beaten wood balconies hang on the fronts of stone buildings centuries old. Men dressed as in Bible times, who still observe the covenants of bread and salt and slay sheep to seal vows, rub elbows with foreign consuls, while radio crackles in a land that once knew only the camel courier.





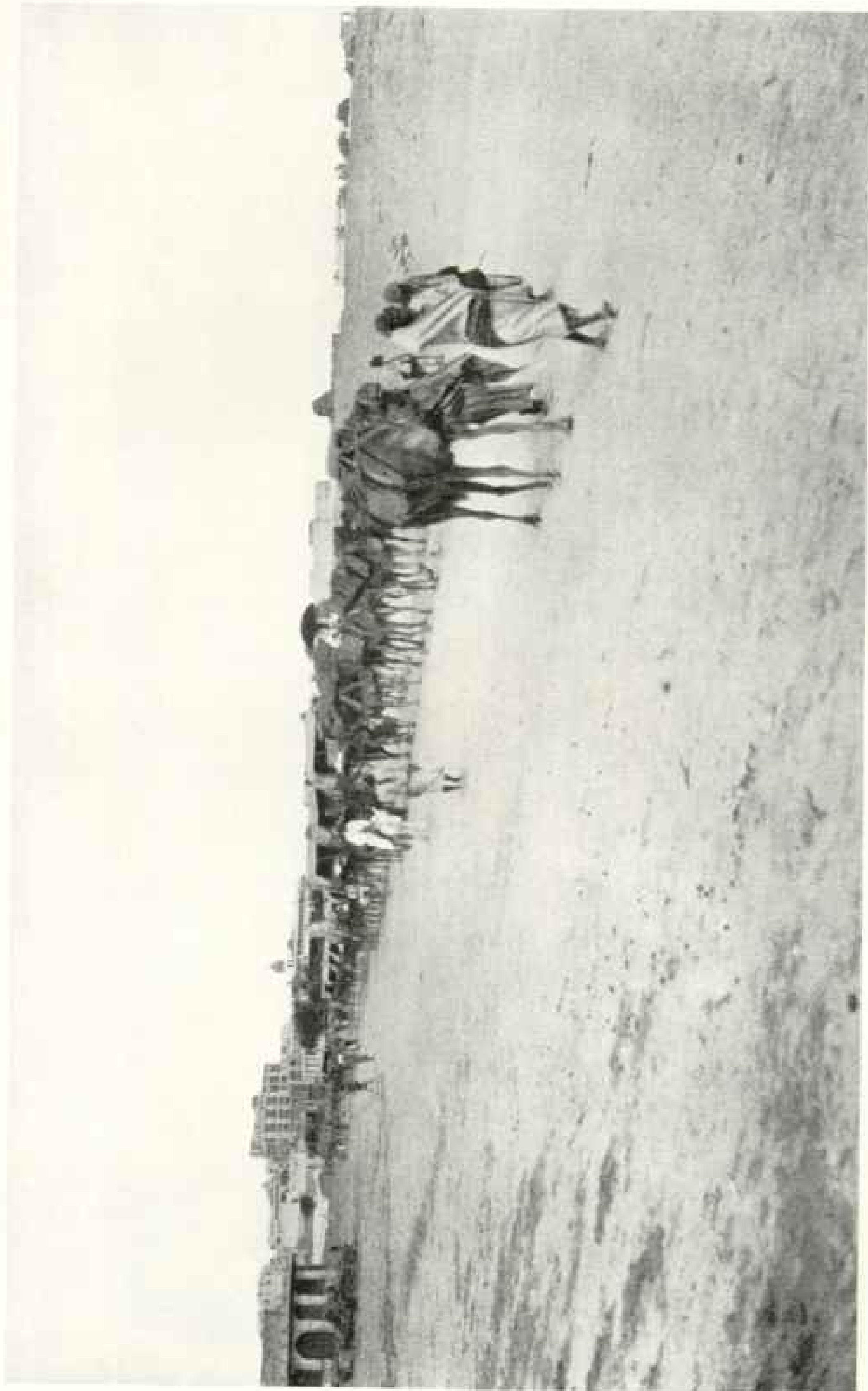
SOME SOLITARY PILGRIMS FOR MECCA LEAVE JIDDA ALL ALONE, RIDING ON CAMELS AND CARRYING UMBRELLAS

Coffee shops, piles of sacked grain, fowls, goats, fruit, and vegetables for sale, all abound about the city gates. Some 30,000 Arabs, Negroes, Somalis, along with Hindu and Greek traders, comprise Jidda's population. At the height of the pilgrim season this number may be doubled. Crime is rare, for punishment is severe.



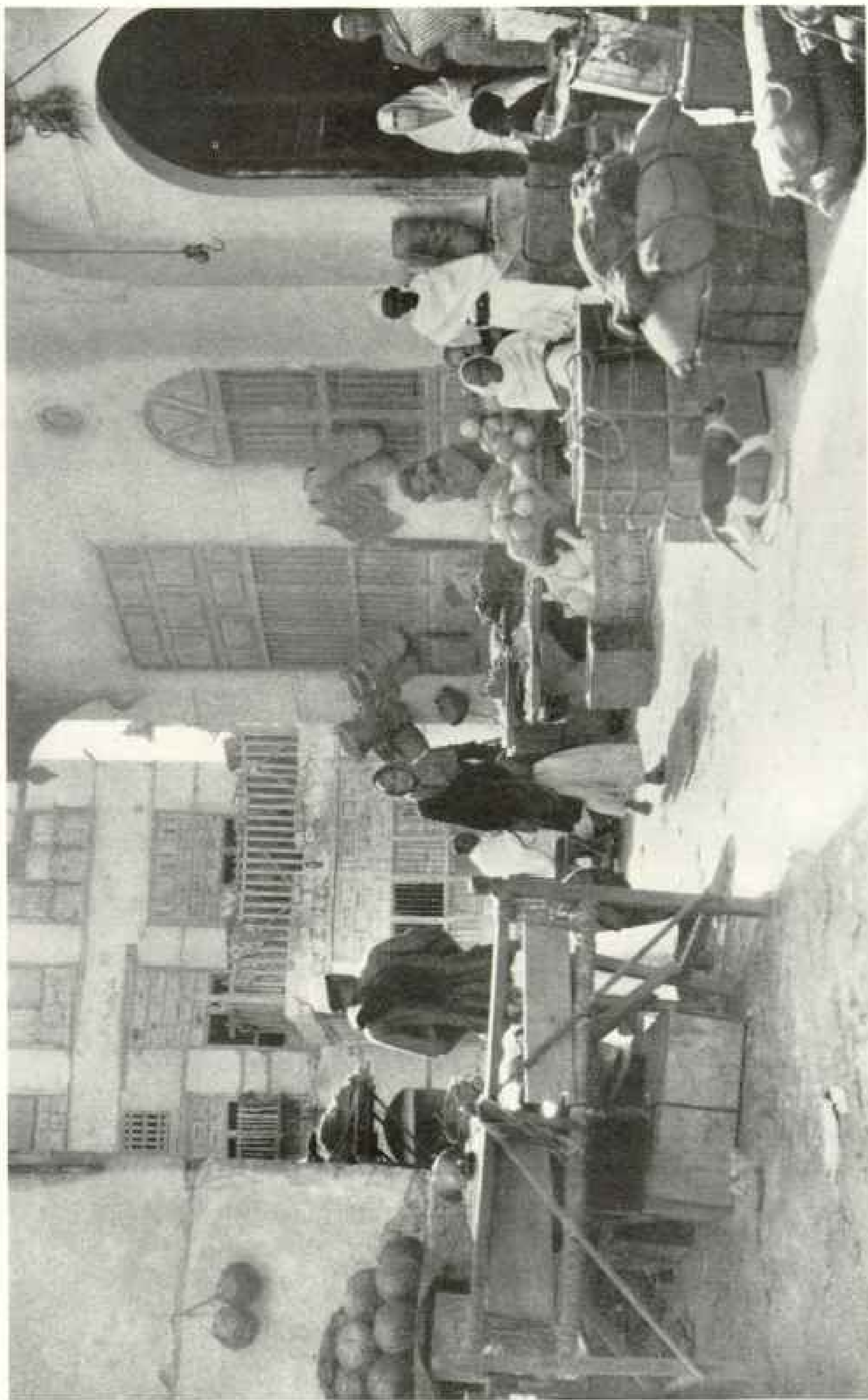
AMID CAMEL GRUNTS AND BLASPHEMOUS DRIVERS' YELLS, A MECCA CARAVAN GETS READY FOR AN EARLY MORNING START

Pilgrims are all in white, being now on holy ground, but guides and cameliers do not wear the ceremonial robes of the Hajj. Up short ladders passengers clamber into the palanquins, covered with canopies for protection against heat and dust.



A PILGRIM CARAVAN LEAVES JUDDA FOR THE HOT, DUSTY TWO-DAY MARCH TO MECCA

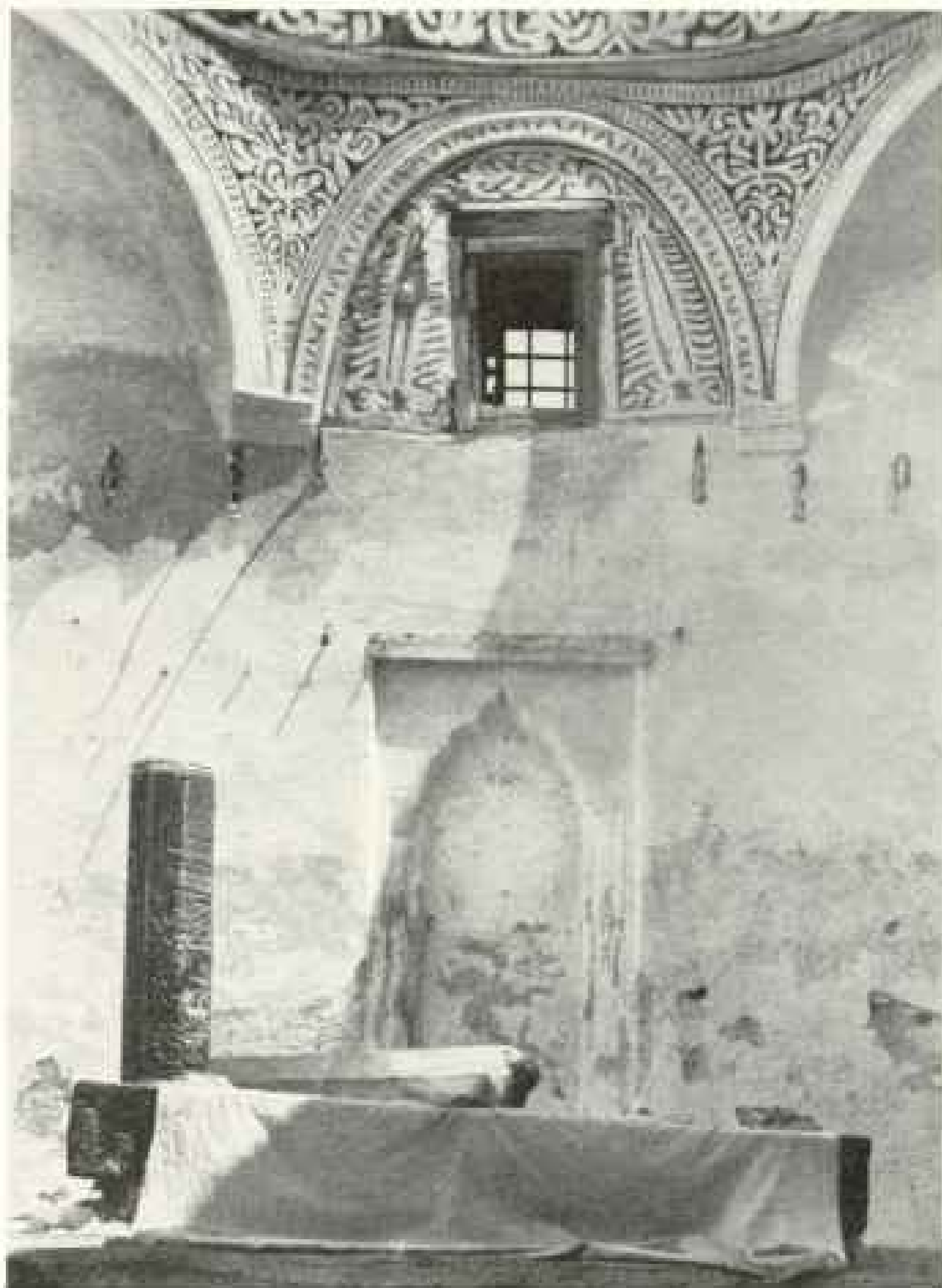
Just outside the Mecca Gate the cameliers halt to buy hay, which is twisted into a sort of rope and sold by the yard. One caravan observed by the author wrangled here for an hour. Again and again a pilgrim, already cramped from sitting in the swaying palanquin on the camel's back, would stick his head out and complain, "Why don't we start?" (See text, page 788.)



BAGGAGE OF THE FAITHFUL PILED IN THE "LOBBY" OF A JIDDA PILGRIM HOTEL.

More than 100,000 Javanese, Turkomans, Afghans, Sirdanese, and other Moslems pour through Jidda each pilgrim season. Some camp in open pens facing the Red Sea; others lodge in such seventh-century hotels as this, where big black rats defy the cats.





#### IT TOOK A DOME TO SHELTER EVE'S NAVEL!

In a desert graveyard outside Jidda's gates was a walled enclosure wherein, Moslems believe, Eve was buried. She was of giant stature, they say; her tomb, recently destroyed, was some 200 paces long by 15 broad. She might have fondled elephants as we fondle cats and puppies!

everywhere was the scent of the East, which I love—a scent that cannot and should not be analyzed—part human, part earthy, part spice and musk, and wholly intoxicating.

My sleep was short. Below my latticed windows was a large open space where camels were nightly assembled and equipped for the road to Mecca; so, after perhaps two hours' sleep, I found myself stirring uneasily and listening sleepily to unknown sounds. Then suddenly the guns boomed and the first day of Ramadan had dawned.

In a moment I was at my window. Below, in the half light, I could just make out the shadowy figures of men and camels. Their voices, the guttural tones of the

Bedouin mingled with the rough snarls of the ungainly beasts, came up to me faintly, and for an hour I watched enthralled.

#### A SIX-CAMEL PILGRIM TRAIN

The equipping of the animals was a perfect drill. Six at a time, tied head to tail, with a wild Bedouin leading them, they slunk out of a side street into the square where they were "barracked" down in a line in front of a long row of palanquins, flimsy bamboo saddle structures for the accommodation of pilgrim passengers. Then one by one these were hoisted on to a snarling camel's back, and, with the handler holding the animal's head, the camel was made to stand up, and the girths were bound into place. Off the six would lurch to some pilgrims' hostel for loading with their human freight, and another six would come and take their place.

It looked terribly haphazard—endless, raucous orders given and contradicted; but,

as a matter of fact, it was all oddly efficient, and moving. When each string went off in turn, the man leading the head camel shouted out, "Lil Belad!" (To the City!) and all the guides echoed his words in loud unison.

#### LINER ARRIVES WITH JAVA PILGRIMS

Two mornings later I was awakened early by shouts below my window. It was a friendly Dutch shipping agent, asking me whether I would care to go out with him in his launch to meet an incoming pilgrim ship from Java. I needed no second invitation; and twenty minutes later we were zigzagging our way through the reefs,

with the sun blazing down on us and the water as blue as it always is in the Red Sea. The ship was a huge liner specially chartered for the pilgrim service, and never have I seen a boat which seemed to contain more people or which produced such curious noises.

Most of the Javanese are small; they seemed rather like birds to me, and, to complete the parallel, they had almost birdlike voices. They had been chirruping for hours. At dawn that day every one of them—fathers, grandfathers, mothers, grandmothers, and children of all ages—had been on deck watching for the coast, and as I found them they were all gleaming white in their spotless ihrams.

#### THE KORAN DID NOT BAN THE UMBRELLA

Normally, owing to the sun, all wear thick, heavy turbans, but when they had donned the ihram these had perforce been discarded (see text, page 772). However, the Koran did not ban the protective sunshade, so umbrellas are not tabu to-day. From the top deck I looked down on a sea of parasols and umbrellas—black ones from Birmingham and Berlin, pink, green, and crimson ones from Tokyo and Hong Kong.

The wives, in appearance, were far more interesting than the men. Not only had they to wear the ihram, but they had also to remain veiled. Most of them had combined the two articles of dress into what looked like a Ku-Klux Klan shroud, save that the opening for the face was blocked up with a woven mask of thin grass matting, out of which, through two holes, their funny



PILGRIM BAGGAGE GLUTS THE NARROW STREETS OF JIDDA

The city became a center of trade, in the fifteenth century, between Egypt and India. The advent of steamers diverted this commerce, but compensated by bringing pilgrims. Besides food and bedding in their baggage, the faithful bring rugs for trade along the route.

little black eyes peered like pairs of boot buttons.

All the Jidda sambuks were in attendance, warped on to the side of the ship, and in each was a guide, shouting to the families on deck that he was the best guide in Jidda, that his prices were very moderate, and that if they came with him their pilgrimage would in truth be blessed.

Each guide took about five families, perhaps thirty people, under his care, and, once the bargain had been struck, over went the luggage into the waiting sambuks. There were masses of it—cane baskets, sacks, flimsy suitcases, wooden boxes done up with string, and, of course, at least one



LITTLE MUSA (MOSES) AND ISHTAR (STAR—A GIRL'S NAME) SCRAMBLE UP INTO THE PALANQUIN

Observe the camelcer holding his camel's jaw, lest it reach around to bite Musa on the leg. This is the commonest of the camel's many vicious tricks against men he dislikes, which usually means any man in reach.

nondescript bundle containing everything that the owners had been unable to put into something else.

Suddenly a bugle blew, a gangway was lowered out of the side of the ship, and down went the families pell-mell for disembarkation. The problem was first to find one's guide, and the ensuing noise was for all the world like feeding time in a monkey house. Despite the shouting and the screaming, there was order, and in a surprisingly short time the miracle of sorting the families into their own sambuks was achieved and their luggage had been counted and checked. Then the crew of each sambuk hoisted the huge lateen sail, the wealthier pilgrims hoisted their umbrellas, and they were off for shore to begin the first stage of their land pilgrimage.

#### SIGHT-SEEING IN THE HOLY CITY

After watching for a while I decided that what I must do next was to see an arrival on land. So I got my friend to lend me his launch to take me ashore, and there, after giving a guide a good tip, I joined his party of families and off I went with them

through the town. They were curiously shy. As they pattered breathlessly after their guide, all held hands and clustered together. The guide was a perfect showman. He walked backwards so that none of his party should miss anything that he said, and as they wended their way through the narrow alleys, he described to them in almost hysterical terms the fortune that was theirs to be on holy ground, and the great days that awaited them (page 775).

And so at last to the hostel and a hearty if somewhat violent greeting from the hostel keeper, who ensured his instructions being carried out by pushing the people to where they were to go. When he had them safely out of harm's way, he set the fathers to claiming what luggage belonged to them and theirs, as it arrived from the wharf on the backs of pattering donkeys.

Later in the day I went down to the same hostel to see how my parties had settled in. All the luggage was neatly stacked by the doorway, and on each heap sat the complete family to which it belonged, chirruping to themselves softly and contentedly, eating enormous mouthfuls out of slices of



JAVANESE, IN SPOTLESS, GLEAMING-WHITE CEREMONIAL ROBES, FLOCK TO MECCA  
BY THE THOUSANDS

These islanders are now nominally Moslems, although their ancestors were Buddhists and Brahmans. Arabs migrating to Java have been active in teaching the Koran and in encouraging the Hadj to Mecca.

watermelons. The guide, still hoarse from his labors of the morning, took me aside and showed me an itching palm.

"If you want to see them loaded and to start with us out of the town and up the road tomorrow, you must be here at the third hour and you will be welcome and under my care."

For a second I blanched, as 3 a. m. seemed a very early hour, keen though I was. Then I remembered I was in Jidda and that in the month of Ramadan the hours are counted from the firing of the dawn gun. The third hour would be 8 a. m., which was well within my compass; so I gave him two more Saudi dollars and we shook hands over an agreed bargain.

Next morning I actually got to the hostel at the second hour, to find the guide just leaving his charges in order to collect the camels which were still feeding. He invited me to accompany him.

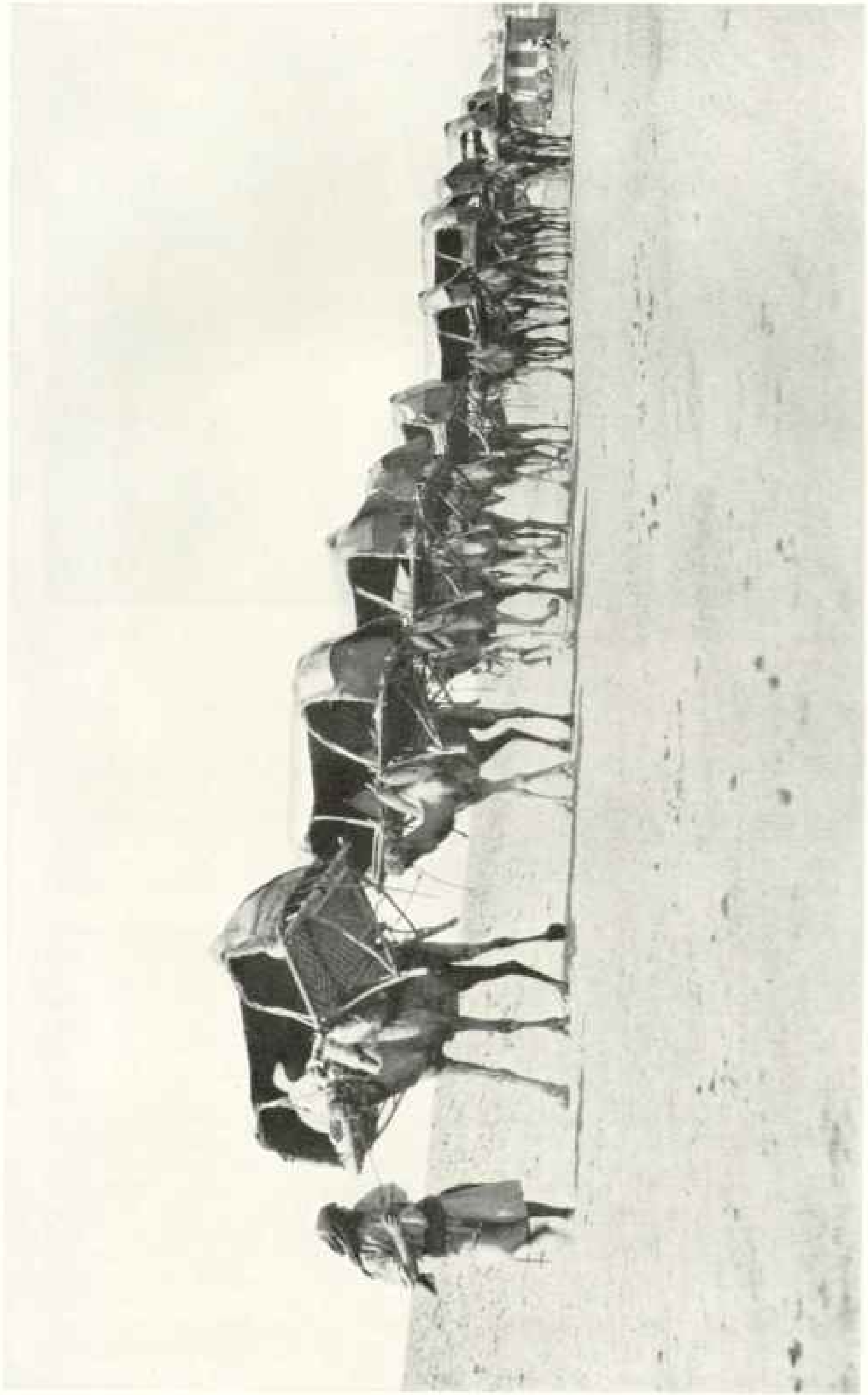
Camel-feeding, like everything else connected with the Hadj, is a ritual. Five animals, always the same five, barrack around a large, circular, woven mat on which the grain is heaped. Their heads

point inward and their tails where the figures would be on the dial of a clock. They seemed to me to eat with the exaggerated delicacy of Victorian matrons, never bumping each other's noses and each giving way to the other with deference (see page 789).

When we arrived they were just finishing their meal and were about to be equipped for the road. As I had already seen this performed, I returned to the hostel, opposite which was a convenient coffeehouse, where I drank four tiny glasses of Mecca coffee—bitter, aromatic stuff, but very quenching for the thirst. Back came the guide with his twenty camels, roped head and tail in four groups, and all were fitted with canopies, over each of which had been drawn strips of grass matting to protect the pilgrims from the heat of the noonday sun.

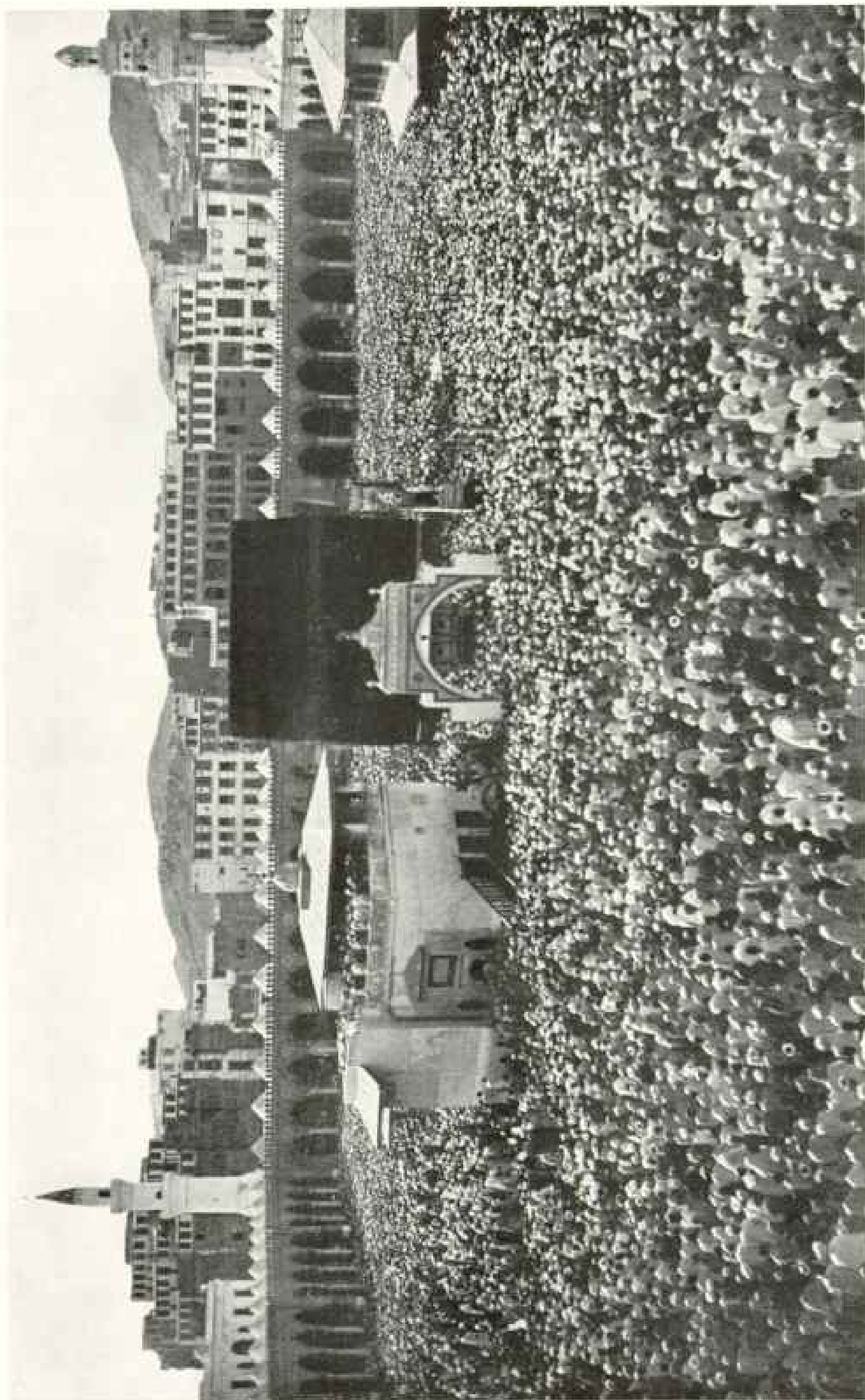
Once assembled, they were untied and barracked in a long line ready for loading. First, in went the baggage, all heaped at the tail end of the canopy, after which the guide portioned out the waiting pilgrims among the animals. One by one the huge beasts were urged to their feet. First, up





THE PILGRIM'S "CLOSED CAR" IS A CANOPIED SADDLE SIT ON THE CAMEL'S POOP DECK

Viewed from a distance, a line of camels walking under these tentlike compartments sways and wobbles along like a file of giant armadillos. Along this route, from Jidda to Mecca, buses also run and a railway is planned (see text, page 789).



Photograph from G. T. Kenjewski

REALIZING A LIFELONG AMBITION, PILGRIM HORDES FROM EVERY MOSELEM LAND MASS ABOUT THE SACRED KAABA AT MECCA

They have come to kiss the sacred "Black Stone," an idolite built at a convenient height into one corner of the cubical building, and to perform other religious rites. In this vast court within the Great Mosque, thousands of the faithful are gathered for noontime prayers on a Friday, the Moslem Sabbath. The Kaaba, covered each year with a black cloth and often rebuilt, originally sheltered pagan idols, of which it was purged by Mohammed. Few unbelievers have ever reached this goal of the Hadj.



WHERE MOTOR BUSES COMPETE WITH CAMELS

The 45-mile desert trail from Jidda east to Mecca is worn to fine, powdery dust by centuries of travel. Only richer pilgrims can afford the fantastic fares charged by bus owners, whose monopoly in rapid transit will fade when a railway is built.

went the rump; then, with a terrific heave, each camel struggled from its knees.

The loading of the human freight was a revelation to me. The hostel keeper produced a flimsy ladder, which was leaned up against the animal's neck. Then, with many birdlike screams, up scrambled father and mother and perhaps a baby or two, while the camel-man pulled the camel's indignant head as far away from the ladder as possible, so as to remove from the beast all temptation to bite the climbers (see page 784).

Once inside the canopy, the pilgrims behaved exactly like dogs settling into their baskets for the night, twisting and turning among their baggage to make comfortable beds for the long journey ahead. Finally they looked for all the world like so many Roman emperors and empresses reclining after a particularly large meal.

It was nearly an hour before all were safely aboard, but at last the cavalcade had been retied into teams, head to tail. Off it lurched in a long sagging string, which had meantime been reinforced by sundry other stray pilgrims riding camels, under umbrellas, in solitary state.

The assembly point was the main street of Jidda—a long, straight thoroughfare, arcaded on both sides, rather like the Rue de Rivoli. There we waited for more guides with more parties to join us, until we were perhaps sixty camels strong. Then off again, out into the east, and at the Mecca Gate, a fine piece of battlemented architecture set in the walls, the pilgrims bade farewell to Jidda, which they would not see for at least another two months (page 780).

Then ensued an intolerable halt. Just outside the gate was the fodder market of the town, and each cameleer stopped opposite the hay depot and bought so many yards of hay; for here hay is twisted loosely into a sort of rope and sold by the length. The transaction, *à l'Arabe*, took at least an hour, during which the sun and the pilgrims became hotter and hotter; and every now and then a father or a grandfather would put his head out of the canopy, much as a dog puts his head out of a kennel, and shout to the guide, "When *are* we going to start?"

The answer was always the same: "After a little time." Only when the guides and the cameleers had drunk all the coffee they



CAMEL-FERDING IS A PART OF THE HADJ RITUAL

Five camels at a time, and always the same five, are made to kneel around a large circular woven mat on which their grain is spread. Their heads point inward and their tails out, as if to numerals on the dial of a clock.

wanted did the cavalcade once more get on the move.

#### RICHER PILGRIMS USE MOTOR BUSESSES

The road from Jidda to Mecca is a sand track, worn to a thin powder by the passage of countless plodding camels. When I was there they had the place almost to themselves, save for a few very decrepit motor busses, which, for a fantastic fee, took the richer pilgrims to Mecca with quite as many bumps and alarms as they would have experienced had they been on camel-back. The guides were loud in protest and abuse of the motors, which flung choking clouds of dust all over the pilgrims.

"Away, thou son of a dog! By Allah! What an invention of the Devil! May your bones break and be burnt to cinders by the sun!"

But in another few years the poor camelers may have still more cause to protest, for the road along which I was walking will probably be the route of the proposed Jidda-Mecca railway.

But neither I nor my fellow pilgrims were thinking of such anachronisms in the future. They were bound for Holy Mecca, and I

was entirely enthralled by the spectacle of this long cavalcade snaking its way silently and relentlessly toward its goal.

After three miles, the heat and the welcome appearance of the last coffeehouse along the road told me that I would be wise to halt. Its Bedouin proprietor was thrilled to have a European customer, a phenomenon which he assured me had never occurred in his business career before. At once I began to ply him with questions about the Hadj. But he answered without interest, and I quickly realized that what he wanted to talk about was England. Soon I found myself trying to explain to him the size of London in terms of Jidda, and telling him of railways and airplanes, of horse races and cinemas. His last words when I rose to trudge back to Jidda were eloquent of changed times in the East.

"I wish," I had said, "that I, the Unbeliever, could go on the Hadj and see Mecca and enjoy all the great festival."

He shrugged his shoulders.

"As for me," he answered, "I have seen enough of Mecca. After what you have told me, the place which I shall next visit will be London."





Photograph by Charles Martia

OFFICERS OF THE NATIONAL GEOGRAPHIC SOCIETY HONOR ANNE MORROW LINDBERGH

Grouped about Mrs. Lindbergh are, seated, left to right, John Joy Edson, Treasurer; J. Howard Gore, Vice President; John Oliver La Gorer, Vice President; Gilbert Grosvenor, President; C. Hart Merriam, and Frederick V. Coville, Chairman, Committee on Research; standing, Robert V. Fleming, George W. Hutchinson, Secretary; Lyman J. Briggs, and Raymond S. Patton.

## THE SOCIETY AWARDS HUBBARD MEDAL TO ANNE MORROW LINDBERGH

FOR the first time the highest honor within the gift of the National Geographic Society, the Hubbard Gold Medal, has been conferred upon a woman—Anne Morrow Lindbergh.

The presentation was made at a simple, impressive ceremony in Explorers' Hall, at the headquarters of The Society, in Washington, on Saturday afternoon, March 31. By Mrs. Lindbergh's modest request, no invited guests were present other than her mother, Mrs. Dwight W. Morrow; her younger sister, Miss Constance Morrow; her husband, Col. Charles A. Lindbergh; the trustees of The Society and staff members of the NATIONAL GEOGRAPHIC MAGAZINE and their families.

Only nine other times has the Hubbard Gold Medal been awarded in the 46 years of the National Geographic Society. Colonel Lindbergh himself was one of the nine other recipients, and some who attended the presentation to Mrs. Lindbergh recalled the brilliant ceremony of 1927, in Washington's largest auditorium, when, fresh from his first international laurels in crossing the Atlantic, he stepped forward to receive The Society's medal from the hands of President Coolidge before one of the most distinguished audiences of statesmen, officials, diplomats, and scientists ever assembled in Washington.\*

COLONEL LINDBERGH INSISTS THAT IT BE  
"ANNE'S DAY"

This time Colonel Lindbergh, obviously proud of his star pupil and flying companion, stood against a pillar in the back of the Hall, smiling encouragement at his wife and nodding assent when President Grosvenor referred to "hard, persistent work" by which she had "mastered the intricate problems of aerial navigation and radio communication from airplanes." He declined a seat with the trustees; he declined to be photographed; he declined even a seat among the small group of spectators.

The medal was conferred upon Mrs. Lindbergh for her part in helping blaze 40,000 miles of new sky trails, as her famous husband's copilot and radio operator on two flights—that to the Orient, in 1931,

\* See "President Coolidge Bestows Lindbergh Award," in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1928.

and that around the inner rim of four continents that border the Atlantic, in 1933.

As the presentation was made, the medal shone like a magnified gold coin against the blue velvet of its case. An enlarged photograph placed upon the wall behind the official group showed the two faces of the medal, one face tracing the Lindberghs' route in circumnavigating the Atlantic Ocean last year, the other outlining the flight of 1931 from Washington to Japan and China, and bearing the official citation of the award.

MEDAL PRESENTED BY DR. GROSVENOR

In presenting the tenth Hubbard Gold Medal to Mrs. Lindbergh, Dr. Gilbert Grosvenor, President of The Society, said:

"The Board of Trustees and staff of the National Geographic Society are very proud and happy to welcome you and Colonel Lindbergh to our home to-day.

"The National Geographic Society has long encouraged aviation by recognizing and recording outstanding events in the progress of the art. Twenty-seven years ago The Society published in its Magazine an article on the history of aerial locomotion by its former President, Alexander Graham Bell, whose personal experiments and researches and whose generous financial support of Professor Langley, Glenn Curtiss, and others contributed immensely to the development of aviation. In ensuing years the NATIONAL GEOGRAPHIC MAGAZINE has devoted many hundreds of pages to describing the new geographical knowledge gained by pioneer explorers of the world's airways. Its bound volumes are a rich reservoir of adventure and information recorded by them.

"Our Society has watched with especial admiration what you, Mrs. Lindbergh, have dared and achieved in the few short years since you made your first flight in Mexico. By hard, persistent work you mastered the intricate problems of aerial navigation and radio communication from airplanes. By venturing as copilot and radio operator on long flights across unmarked regions with Colonel Lindbergh, you greatly increased public interest in and public support of an important industry and encouraged millions of people to appreciate that air travel can be safe, comfortable, and enchanting.

"May I also remark that you have demonstrated that your distinguished husband,



Photograph by Keystone-Underwood

"IN RECOGNITION OF YOUR COURAGEOUS AND SKILLFUL WORK"

Anne Morrow Lindbergh receives from President Gilbert Grosvenor the Hubbard Gold Medal, highest honor of the National Geographic Society. She is the first woman to be awarded the medal. Nine men, including Colonel Lindbergh, have received it for extraordinary geographic achievements, since it was first struck, in 1906, for Admiral Robert E. Peary. In the background is the historic flag which has been carried on numerous expeditions sent by The Society to far places of the world. Its colors are green, brown, and blue, representing the sea, the earth, and the sky.

whose extraordinary genius in aviation, in aerial research, aerial planning, and engineering have long been acclaimed, is also a peerless teacher of the art.

"In recognition of your courageous and skillful work as copilot and radio operator during 40,000 miles of flight over five continents and many seas, the Board of Trustees have awarded you the highest honor The Society can confer, the Hubbard Gold Medal.

"This medal was presented to Colonel Lindbergh in 1927, and also to Robert E.

Peary, Richard E. Byrd, Robert A. Bartlett, Roald Amundsen, Vilhjalmur Stefansson, Sir Ernest H. Shackleton, Grove Karl Gilbert, and Roy Chapman Andrews.

"On behalf of the one million members of the National Geographic Society, with their congratulations and best wishes for many more successful journeys, I have the honor to present to you the Hubbard Medal, on which is inscribed:

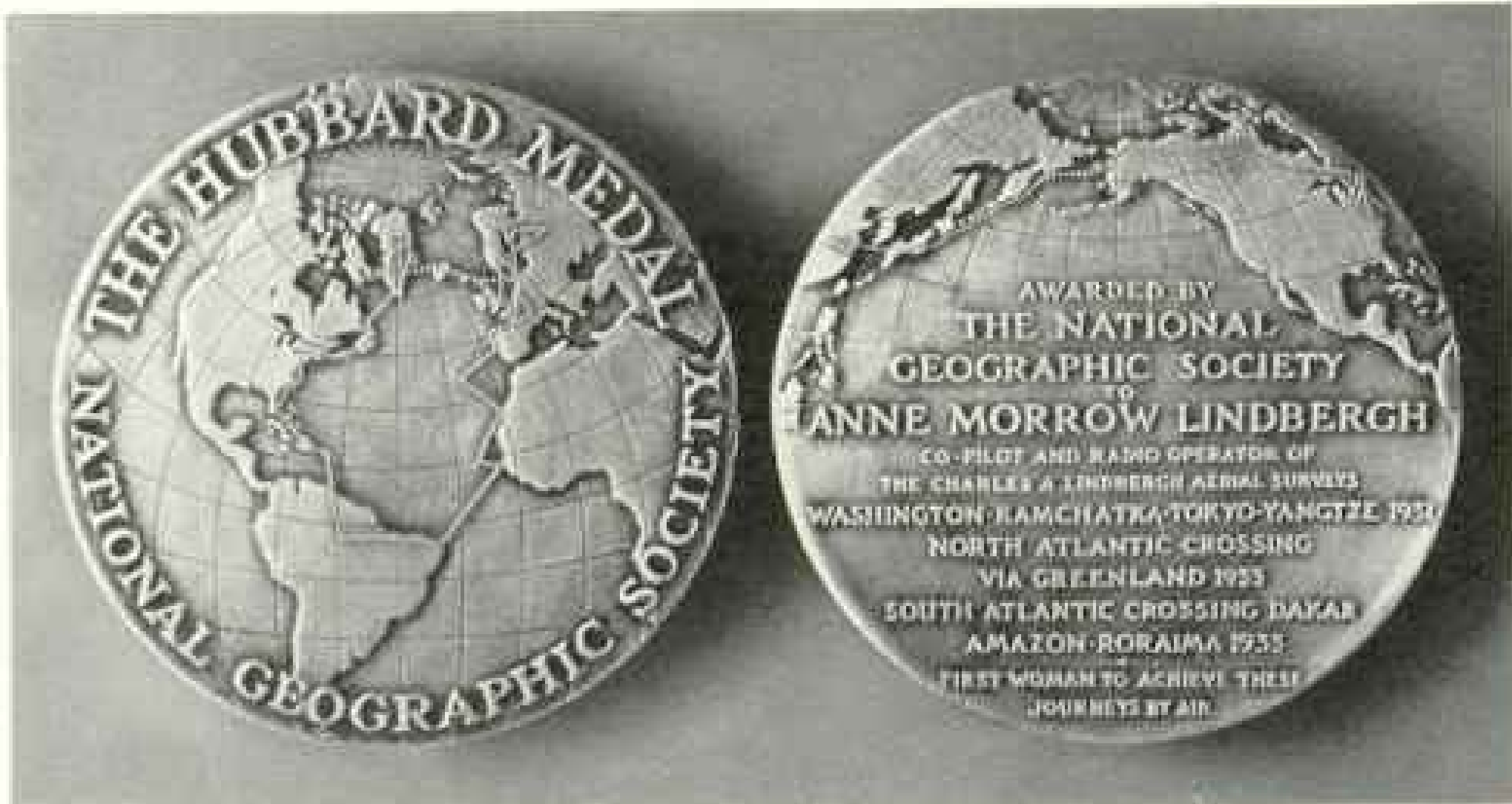
"Awarded by the National Geographic Society to Anne Morrow Lindbergh, co-pilot and radio operator of the Charles A. Lindbergh Aerial Surveys, Washington—Kamchatka—Tokyo—Yangtze 1931. North Atlantic Crossing via Greenland 1933. South Atlantic Crossing: Dakar—Amazon—Roraima 1933. First Woman to Achieve these Journeys by Air."

#### MAPS MADE FLIGHTS POSSIBLE

In reply Mrs. Lindbergh said:

"I want to tell you how very deeply, how very sincerely, I appreciate this. I really feel I have not made any contribution to geography. Instead, the contributions of others have helped us. All our work, all our flights, have been based on maps such as the Geographic Society makes. I do thank you very much."

The first to congratulate Mrs. Lindbergh was Chief Justice Charles Evans Hughes, of The Society's Board of Trustees. Among her distinguished hosts were two trustees who 46 years ago signed the charter incorporating The Society and have served continuously on its Board, Dr. C. Hart



Medal designed by Albert H. Bumstead

## TWO FAMOUS FLIGHTS CHARTED IN SOLID GOLD

On the face of the medal (left) is outlined the Lindberghs' circumnavigation of the Atlantic in 1933, during which they flew 29,000 miles over tossing seas, Greenland's ice cap, the European continent, the African coast, and the teeming jungles of South America. On the reverse, above the inscription, is depicted the flight of 1931, across the northern wilds of Canada and Alaska, over the Bering Sea, and down the Siberian coast to Japan and China.

Merriam and Dr. James Howard Gore. Two other charter members were unable to attend because of the inclement weather, Maj. Gen. A. W. Greely, leader of the Greely International Polar Expedition of 1881-'84, and Dr. O. H. Tittmann, for many years Director of the U. S. Coast and Geodetic Survey.

## MESSAGES OF CONGRATULATION

Messages of congratulation were presented from Gen. John J. Pershing, the Hon. Charles G. Dawes, Rear Admiral William V. Pratt, John Barton Payne, Chairman of the American Red Cross; Walter S. Gifford, and George Shiras, 3d, trustees of The Society, who were out of the city.

At Dr. Grosvenor's invitation, Colonel Lindbergh then came to the front of the room and, standing side by side, the two famous flyers shook hands with those present. Colonel Lindbergh asked numerous questions about The Society's projected stratosphere flight this summer in cooperation with the U. S. Army Air Corps.\*

Mrs. Lindbergh, keenly interested in charts and navigation, inquired about the

\* See "The Geographic's Stratosphere Expedition," in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1934, and "The Society Takes Part in Three Geographic Expeditions," May, 1934.

projection used for the map appearing upon her medal. Albert H. Bumstead, chief cartographer of The Society, who designed the medal, prepared for her the following explanation:

"The projection used is technically known as the azimuthal equidistant projection, the same projection used for The Society's large wall maps of North America, Europe, Asia, and the North and South Polar regions.

"This projection has a central point, called the pole of projection, and from this central point all other points on the map are in their true direction and distance.

"While there is a uniform scale along all lines radiating from the center, there is an increasing scale at right angles to these lines. This increase of scale reaches a maximum at the edge of the medal, where it amounts to 1.57 times the scale along a radius.

"The projection on the face of the medal has its pole at latitude 30° north, longitude 45° west. The projection on the reverse side has its pole on the Equator in longitude 160° west. Each projection shows exactly half of the earth's surface. The two are on exactly the same scale, 5,000 miles to 1 inch."

Colonel Lindbergh and Mrs. Lindbergh also commented upon the memories aroused by the place-name markers of their routes





THE EDITORIAL AND EXECUTIVE HEADQUARTERS OF THE NATIONAL GEOGRAPHIC SOCIETY. THE SOCIETY'S LIBRARY IS ON THE EXTREME RIGHT

on the medal: Kamchatka, the tundra-grown peninsula, buttressed by icy mountains, which was their first sight of Asia; Tokyo, where, tired but triumphant, they ended the 7,000-mile air trail from Washington; Yangtze, where they flew over teeming Chinese provinces desolated by floods and made relief surveys for China's Government.

On the 1933 flight they winged their way over the snowy wastes and interior ice cap of Greenland. Soaring south from Europe, they learned by radio that yellow fever was rife at Dakar; so, flying over it, they landed instead at Bathurst, there struggling to raise their heavy plane for the take-off to South America, and finally unloading 40 gallons of gasoline to lighten ship.

Then the mighty Amazon, bordered by miles of thick green jungle, with no clearing for forced landings, and finally Roraima, famous mountain of three countries, marking a boundary point for Brazil, Venezuela, and British Guiana.

On the long journey to the Orient Mrs. Lindbergh put to severe test her skill in radio operation, navigation, and piloting, which she had patiently acquired under her husband's tutelage. Her clear signals kept the big black and red pontoon plane in almost constant touch with civilization. Upon their safe arrival in Tokyo by the hitherto-untried northern "back-door" route, Mrs. Lindbergh had won her place in the world's most famous flying team.

Two years later Mrs. Lindbergh helped make possible an even greater achievement—the circumnavigation of the Atlantic—and as the flight progressed her radio reports telling of their progress recalled, by contrast, the anxious hours with no word during her husband's lone flight across that same ocean.

#### A GALLERY OF ENLARGED GEOGRAPHIC PHOTOGRAPHS

Following the reception and tea, Colonel and Mrs. Lindbergh inspected the notable gallery of pictures in Explorers' Hall—enlarged photographs which typify the exploration, adventure, hardship, and sometimes months of travel involved in obtaining illustrations for the NATIONAL GEOGRAPHIC MAGAZINE.

They paused long before the triumphs of aerial photography achieved by Capt. Albert W. Stevens—the first photograph of a waterspout made from an airplane, the famous picture of the advancing shadow of the moon during The Society's sun eclipse expedition, a unique photograph of the National Capital, which shows also Baltimore, Annapolis, and the head of Chesapeake Bay, 85 miles distant.

Other views in the gallery of photographic masterpieces, some not duplicated anywhere else and costing much time and dangerous hours of difficult travel to obtain, suggested many far-away places the Lindberghs had visited.

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TO carry out the purposes for which it was founded forty-six years ago the National Geographic Society publishes this Magazine monthly. All receipts are invested in the Magazine itself or expended directly to promote geographic knowledge.

ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over \$50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole, and contributed \$55,000 to Admiral Byrd's Antarctic Expedition.

NOT long ago The Society granted \$25,000, and in addition \$75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society's notable expeditions to New Mexico have pushed back the historic horizons of the Southwestern United States to a period nearly eight centuries before Columbus crossed the Atlantic. By dating the ruins of the vast communal dwellings in that region The Society's researches have solved secrets that have puzzled historians for three hundred years. The Society is sponsoring an ornithological survey of Venezuela.

TO further the study of solar radiation in relation to long range weather forecastings, The Society has appropriated \$65,000 to enable the Smithsonian Institution to establish a station for six years on Mt. Brukkaros, in South West Africa.



# "Where do we go from here?"



## "I'm TAKING UP AVIATION"

His tiny plane was a familiar sight around his Pacific Coast university. You can't help but admire lads of his sort. His courage brought many a gridiron victory. His aim in basketball was sensational. In aviation, life itself may depend on accuracy. That's why he wants a Hamilton—the watch of proven ACCURACY.

FOR THE YOUNG AVIATOR. "Streamlined" in the modern manner, accurate as the stars—the Dixon. 17 jewels. 14k filled gold, white or natural yellow . . . . . \$37.50



## "I'm GOING TO GET MARRIED"

The most sought-after girl at her Middle Western university. You've known girls like her. Dramatic Club leading lady, Girls' Tennis Team, Class Poet. To her way of thinking, getting married is a career too. That's why she wants a Hamilton. They're lovely—but just as important to her is dependable Hamilton ACCURACY.

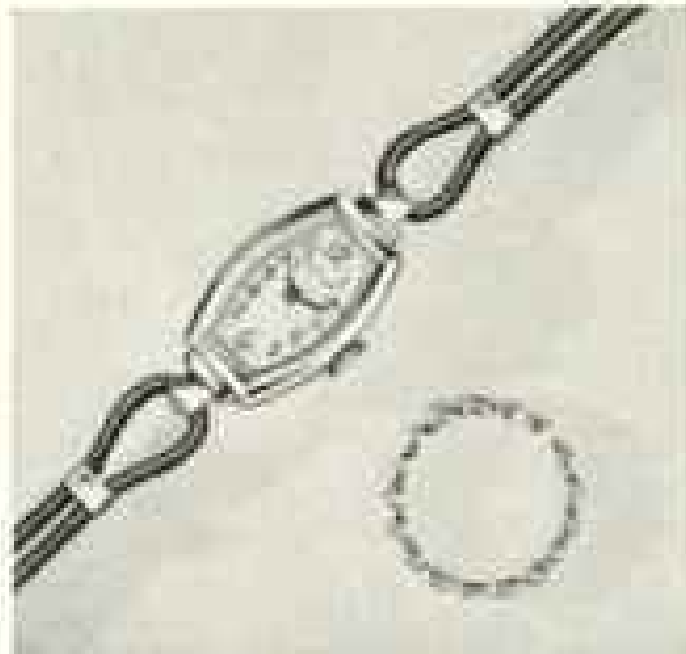
FOR THE BRIDE. Lovely as a jewel, yet worthy of the Hamilton name for long-lived accuracy—the Favourite. 17 jewels. 14k filled gold, white or natural yellow . . . . . \$52.50



## "I'm HEADED FOR LAW"

A graduate from an Eastern law school. You know the type. He was voted "Most Likely to Succeed." Honors in scholarship, editor of the school's paper, Class Orator. He knows the Law is no easy path to riches. But he will make every minute count. That's why he wants a Hamilton—ever faithful guardian of TIME.

FOR THE YOUNG LAWYER. Slightly modern, yet dignified for the man of affairs—the Carter. 19 jewels. 14k filled gold, white or natural yellow. \$60. 17 jewels . . . . . \$45



**START THEM OUT WITH THE WORLD'S BEST LOVED GRADUATION GIFT**

**T**O PARENTS: A Hamilton will be a true and lasting friend. New 1934 Hamiltons include many at prices lower than ever. Send for our special folder, "Life Begins at Graduation," illustrating and

describing many new Hamiltons. Also SEE these watches at your jeweler's. Hamilton Watch Company, 882 Columbia Ave., Lancaster, Pa. *Only Hamiltons Are Time-Microscope-Tested.* (Reg. U. S. Pat. Off.)

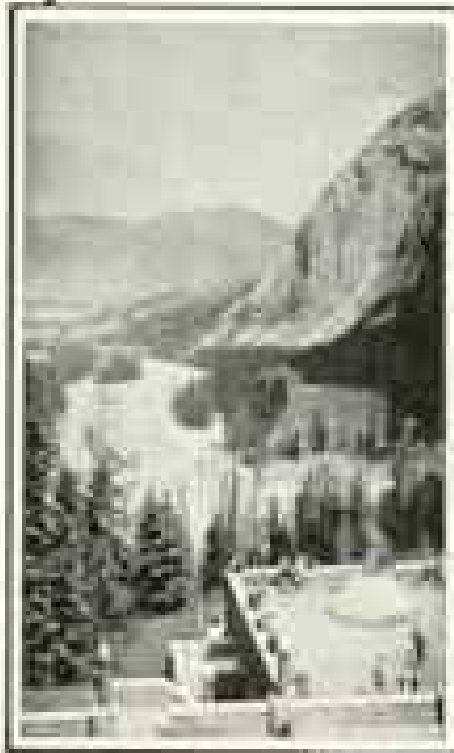
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**HAMILTON** *The Watch of Railroad* **ACCURACY**

# Visit Canada this Summer!

## Tour the High Peaks

at ALL-EXPENSE  
**LOW PRICES**



DOW VALLEY—  
FROM BANFF  
SPRINGS HOTEL

AT LAKE LOUISE



## Banff

Lake Louise—Emerald Lake

IN THE CANADIAN ROCKIES! . . . Join the All-Expense Tours that give you millionaire scenery at man-in-the-street prices . . . Diamond peaks and opal lakes, spectacular motoring, Baronial hotels, with mile-high golf, swimming, tennis, trail ponies, cowboy guides, hiking, boating, fishing, dreamy dance orchestras—famous chefs . . . Indian Days—August 17-18-19. These are tours that you'll never forget! Including famous Banff Springs Hotel . . . You should take one!

Purchasers of an All-Expense Tour may cancel Stop-Overs by paying for Room—Meals per Day—Banff Springs Hotel—\$9.00; Chateau Lake Louise—\$8.00; Emerald Lake Chalet—\$7.00. Hotels open June 22 to Sept. 10.

Low Summer Round Trip Rail Fares Also 45-Day Round Trip Fares. Include an All-Expense Tour on your way to North Pacific Coast, California, Alaska. See Local Agent or Offices listed below, or write Manager-Banff Springs Hotel, Banff, Alta.

<b>6 DAYS</b> . . . 2 days Banff, 2 days Lake Louise, 2 Emerald Lake . . . All Expenses	<b>\$70</b>
<b>5 DAYS</b> . . . 1 day Banff, 2 days Lake Louise, 2 Emerald Lake . . . All Expenses	<b>\$60</b>
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Each includes 100 miles motoring . . . also Motor Transport, Meals, Buses, Touring Inexp. Inexp. or Fuel. Add Rail Fares.

IN OLD

## QUEBEC



CHATEAU FRONTENAC, QUEBEC

Stay at a Regal Chateau  
with Scaled Down Prices

WOULDN'T it be fun to visit quaint Quebec and live in a real Chateau towering over a mile-wide river, with French 17th century houses at its feet? . . . To shop for furs, homespun, Indian baskets, beadwork, English muslins, tweeds . . . To play golf beside Montmorency Falls, higher than Niagara . . . To take the boat to *Ile d'Orleans*, where the *habitants* till the soil with ancient ox-ploughs . . . To motor to *Ste. Anne de Beaupre* and Indian Lorette. And you are close by Canada's Maritime Provinces of New Brunswick and Nova Scotia, when you visit Quebec and stay at the *Chateau Frontenac*—Fit for a Prince, and Fitting Your Pocketbook!

Rates—European Plan. Single Room—\$4.00 up; Double—\$7.00 up. Open all year. Reduced Summer Round Trip Rail Fares from all points. See Local Agents or Offices listed below, or write manager Chateau Frontenac, Quebec, Canada.

## Chateau Frontenac

A CANADIAN PACIFIC HOTEL

For a sea-side holiday, visit Canada's Maritime Provinces: *Algonquin Hotel, St. Andrews; The Prince Digby, Cornwallis; Inn, Kentville; Lakeside Inn, Yarmouth* . . . All of High Standard at Low Cost.

## Canadian Pacific Hotels

For reservations, see Local Travel Agents—or Canadian Pacific Offices in Large Cities including—

344 Madison Ave. NEW YORK	405 Beakton St. BOSTON	One Court & Pearl BUFFALO	1100 Locust St. PHILADELPHIA	100 & N. Y. Ave. N. W. WASHINGTON, D. C.	441 Seventh Ave. PITTSBURGH	C. & D. Nat. Bldg. ATLANTA	1000 Clifton Ave. CLEVELAND
174½ Tremont Bldg. CINCINNATI	11 E. Jackson Bldg. CHICAGO	415 Locust St. ST. LOUIS	1211 Washington Blvd. DETROIT	Marquette Bldg. INDIANAPOLIS	100 E. Wisconsin Ave. MILWAUKEE	611 5th Ave. Bldg. MINNEAPOLIS	700 Walnut St. KANSAS CITY
Fourth & Cedar ST. PAUL	608 W. O. W. Bldg. OMAHA	1215 Kirby Bldg. DALLAS	621 So. Grand Ave. LOS ANGELES	132 Geary St. SAN FRANCISCO	620 S. W. Broadway PORTLAND, ORE.	1329 Fourth Ave. SEATTLE	1111 Pacific Ave. TAOSMA



"THE *Real Fun* STARTS  
WHEN YOU DRIVE A CAR  
THAT'S SAFE!"



*"Plymouth alone has everything for happy driving . . . with safety"*

WHEN WE STEP OUT in our Plymouth, there's nothing to think about but having a good time. Even the kids enjoy it without tiring. And we know they're perfectly safe."

This family might be yours. They wanted the most for their money. So they looked at "All Three" and found what they wanted:

We urge you to do the same . . . to convince yourself that Plymouth alone, in the low-price field, has all four of the vital features you need.

It gives you both *safety* and *comfort*. For it

has self-equalized Hydraulic Brakes . . . a Safety-Steel Body . . . Floating Power engine mountings . . . Individual Wheel Springing.

You'll find but one of these features in any of the other lowest-priced cars. Only Plymouth has them *all*. Any Dodge, DeSoto or Chrysler dealer will demonstrate its extra value.

PICTURED ABOVE—the De Luxe Plymouth Sedan. Plymouth prices begin at \$530 at the factory, Detroit, subject to change without notice. Duplate Safety Plate Glass throughout for low extra charge.

**THE NEW PLYMOUTH**

THE BEST ENGINEERED CAR  
IN THE LOW-PRICE FIELD

Listen...you can't  
fire me for that!



# Keep Clean Shaven if you want to hold your job!

WARNS NOTED EMPLOYMENT EXPERT



"You can't fire me for that—not for a little stubble on my face!" . . . But he is fired for that. Neglect of personal appearance has cost him his job. Do you think this situation is overdrawn? We'll leave it to Wm. L. Fletcher of Boston, one of America's greatest employment specialists.

WM. L. FLETCHER

Mr. Fletcher has serviced 1500 employers—placed thousands of men in new positions. He knows how men get jobs—why men lose jobs. Says Mr. Fletcher, "I know of many cases where failure to shave often and well has led to a man's dismissal. Most

employers judge by appearance and will not tolerate stubble. In my experience, a fresh, clean shave is vital."

Today, thanks to the Gillette "Blue Blade," no man need neglect shaving. This blade is especially made to shave tender skin without irritation. No razor can be entirely satisfactory unless adjustable for the requirements of your beard. The Gillette Razor with its flexible blade provides this essential feature. Automatic honing and stropping produce edges whose sharpness will amaze you. With this blade you can shave every day and twice a day when necessary in perfect comfort. Prove this. Get Gillette "Blue Blades" today.

Hear Gene and Glenn on the air every night except Sat. and Sun. WEAF and coast-to-coast hook-up 6:15 E.S.T., or 9:15 C.S.T.

# Gillette

## BLUE BLADES

Now 5 FOR 25¢-10 FOR 49¢

Gold-Plated Gillette Razor and 5 Gillette "Blue Blades" 49c

• Heavily gold-plated with new-style "bucky" handle. Comes in handsome red and black case with 5 Gillette "Blue Blades." If your dealer cannot supply you, send coupon and 49 cents to—

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City \_\_\_\_\_

State \_\_\_\_\_



NOV-2

# Not a sound but Praise

...THINK OF A TIRE THAT IS ABSOLUTELY SILENT,  
SKID-SAFE AND BLOWOUT-PROOF

That's the new General Dual-Balloon for 1934. General's new silent safety has received the praise of engineers and car owners alike. General not only eliminated noise but provided non-skid action in all directions, forward as well as sidewise. This new safety factor greatly reduces tread wear, adds materially to General's already famous big mileage. There is nothing left to be

desired in the New General Dual-Balloon. It has the patented low pressure construction—the new silent safety tread—the smartest style in tires—and of first importance in these days of fast cars, it is The Blowout-Proof Tire. Let the General Tire dealer tell you how easy it is to get these silent safety tires for your car. The General Tire & Rubber Company, Akron, Ohio.

**TUNE IN**... General Tire program starring Jack Benny every Friday night, 10:30 E.D.S.T. coast-to-coast NBC



THE NEW *Silence* Safety TREAD

THE *New* **GENERAL** **DUAL BALLOON**  
THE BLOWOUT-PROOF TIRE

REG. U. S. PAT. OFF. - U. S. DEPT. OF COM.



# Wherever you go this *SUMMER*



WHEREVER you take your family on vacation, you can give them the wholesome goodness of Kellogg's Corn Flakes. You'll find Kellogg's everywhere—in the mountains, in the country, at the seashore. Grocers, even in remote places, keep a fresh stock of the world's most popular ready-to-eat cereal.

And you can be certain that Kellogg's Corn Flakes, wherever you buy them, have the same matchless flavor, the same appetizing crispness.

Served with milk or cream and a bit of fruit, these golden flakes make an ideal summer meal for children. Cooling and

refreshing. Delicious for breakfast, luncheon or supper. Rich in energy, yet wonderfully easy to digest.

Kellogg's Corn Flakes are ready to serve. No cooking. Economical in time as well as in money. Kept oven-fresh by the heat-sealed WAXTITE inner bag — an exclusive Kellogg feature. Made by Kellogg in Battle Creek.

*Kellogg's* CORN  
FLAKES





*It's a*  
**WHISPERING CAMPAIGN**

*from lip to lip the story flashes*



ONE OF THE  
**57**

**S**oup has actually become a national topic of conversation! It started a year ago when Heinz Cream of Mushroom Soup was introduced. Whispers of approval quickly grew into outspoken paeans of praise. And today you hear people discussing the deliciousness of Heinz Homestyle Soups almost wherever you go.

The significant thing about this "whispering campaign" has been its effect on customs in the American home. Housewives who never before

served canned soup are now doing so with pride. They even call their guests' attention to it . . . as a matter of interesting news.

Frankly, Heinz Homestyle Soups have awakened an entirely new appreciation of the importance of soup as the first course for luncheon



or dinner. And women are delighted to find that they can serve soup far oftener without the trouble and expense of making it themselves.

Just try Heinz Noodle Soup tonight! Like all Heinz Soups its famous home-recipe flavor is brewed in by slowly cooking a little at a time in shining kettles. It comes to you thoroughly prepared—perfectly seasoned—ready to heat and serve. Absolutely nothing has to be added—you will not want to alter or weaken its tasty goodness. There is a wide choice of these delicious soups at your grocer's. Order a selection today!

**H. J. HEINZ COMPANY**  
 PITTSBURGH, U.S.A. TORONTO, CAN. LONDON, ENGL.



**SIXTEEN VARIETIES**

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| Noodle            | Vegetable          | Bean Soup          |
| Beef Broth        | Pepper Pot         | Mock Turtle        |
| Cream of Tomato   | Cream of Celery    | Clam Chowder       |
| Cream of Mushroom | Cream of Asparagus | Cream of Green Pea |
| Cream of Oyster   | Cassoulet          | Scotch Broth       |
|                   |                    | Gambouze           |

**HEINZ** *Homemade Style* **SOUPS**



*"We're going places"*

And half the fun of the open road depends on a lively, smooth-running car—an engine as eager to go places as you are.

You can enjoy fire-engine performance mile after mile, day after day, with Texaco *Fire-Chief* in your tank. This powerful gasoline surpasses highest U. S. Government specifications for an "emergency" motor fuel, yet it is yours from coast to coast

at the price of ordinary gasolines.

It will pay you to start your trip with a stop at your neighborhood Texaco Station. The Texaco man will furnish you with up-to-the-minute road maps and give you many hints about the care of your car.

And when you are on the road remember that the Texaco Red Star with the Green T means "welcome"—means quality products plus the helpful, friendly service.



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# TEXACO *FIRE-CHIEF*

**BOUGHT BY MORE TOURISTS THAN ANY OTHER GASOLINE!**

# THEY CREATED A NEW Style Sensation in Electric Refrigerators!

BEAUTY OF DESIGN now complements the refrigerator mechanism famous for its performance record throughout the world.

Seven years ago General Electric introduced the first Monitor Top refrigerator. 15 previous years of research in the famous General Electric House of Magic had perfected a matchless mechanism that was to set a new standard for quiet, dependable, trouble-free refrigeration service at low cost. In less than five years 1 out of every 3 electric refrigerators in America's homes was a General Electric Monitor Top. It became universally recognized as the standard of excellence. Even in the movies you will note a General Electric Monitor Top refrigerator is almost invariably shown when the scene presents a modern kitchen.

There is the refrigerator that carries 5 years protection . . . the standard 1 year warranty plus 4 more years protection on its famous sealed-in-steel mechanism for \$5 . . . only \$1 a year! To perfected mechanical performance General Electric now

adds brilliant beauty and distinguished cabinet styling. The skill and genius of America's foremost designers has been drawn upon, and in these new models General Electric offers you the aristocrats of all refrigerators . . . the style sensation of 1934!

There are only two styles of electric refrigerators . . . Monitor Top and flat-top. You can see them *both* at your General Electric dealer's display room.

In G-E refrigerators you will, of course, find all the modern features: All-steel cabinets, porcelain inside and out. Sliding shelves. Foot pedal door opener. Interior lighting. Control for fast or slow freezing. Stainless steel quick freezing chamber. Automatic defrosting. Removable vegetable compartment.

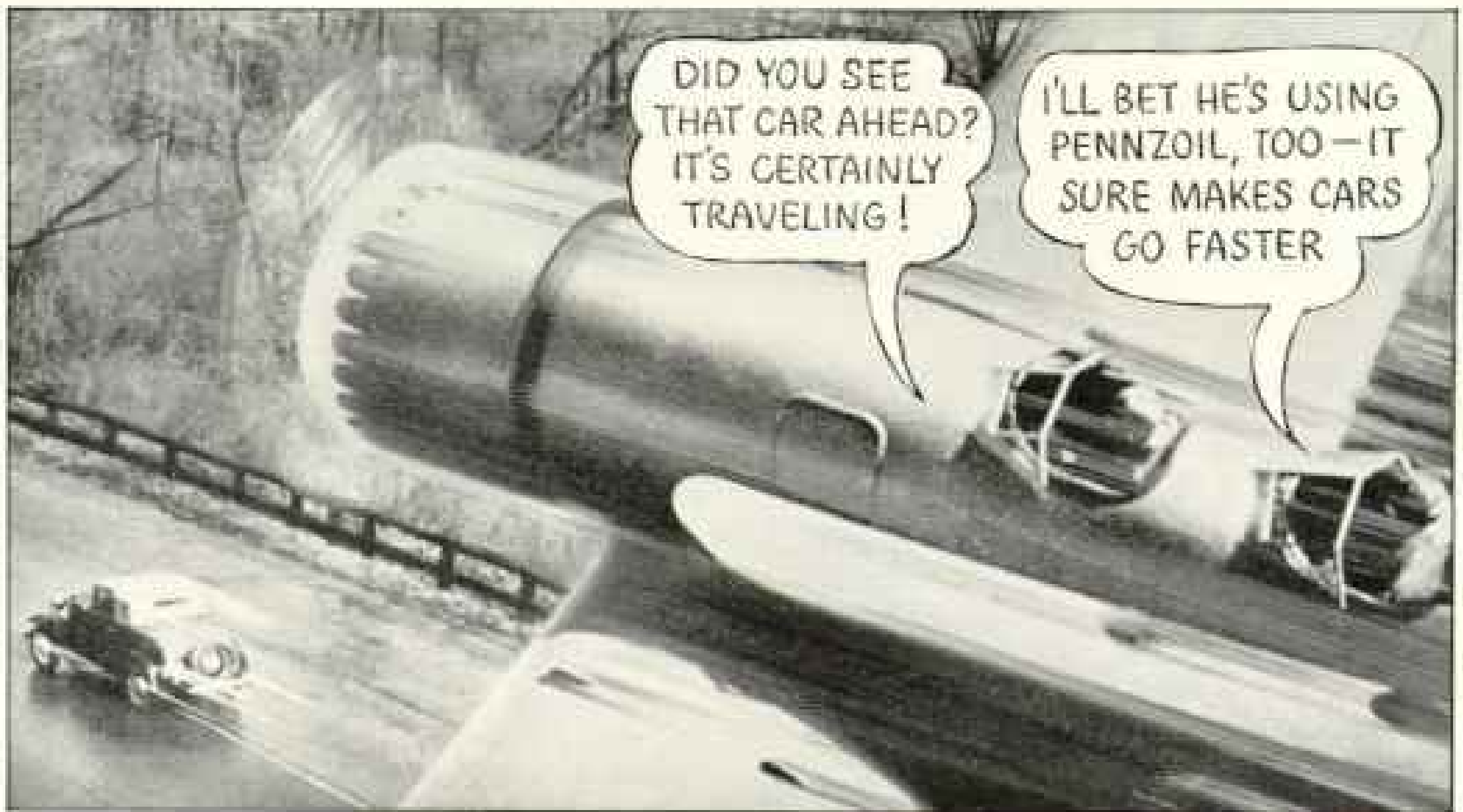
For your nearest General Electric dealer see "Refrigeration Electric" in classified pages of your 'phone book. General Electric Company, Section R-6, Appliance Sales Department, Nela Park, Cleveland, O.

*Two new de luxe models!  
Now, distinguished style  
joins matchless mechanism.*



GENERAL  ELECTRIC *All-Steel Refrigerator*

# NEW WAY TO MAKE CARS GO FASTER



**USE THIS SPECIAL OIL TO GET MORE SPEED—TO INCREASE PICK-UP 10 TO 25% TO SAVE UP TO 12% ON GASOLINE ALONE—available at no extra cost!**

**T**HOUSANDS of motorists have already discovered this new way to make their cars go faster—this new way to increase pick-up and save on gasoline!

Try it in your car. Just say "Pennzoil—the correct grade for my car!" That's all!

### Here's the Reason

Pennzoil is refined by a special process from the finest Pennsylvania crude. It is 3 times concentrated to give it a tough film—so that even the lightest grades of Pennzoil can stand the terrific punishment of record-breaking speeds.

With Pennzoil the non-lubricating elements found in many plain oils are entirely removed. This cuts down engine drag. Lets your motor run smoother, easier, faster. Enables you to get more speed and quicker pick-up—and saves you money on gas as well.

### A Record-Breaking Oil

Remember, Pennzoil is the same tough-film oil that Ab Jenkins used in his Pierce-Arrow when he broke

14 major world speed records from 200 to 3000 miles! Driving continuously for 25½ hours, Jenkins averaged just a split-second under 2 miles-a-minute in the most blistering test of all time! No other oil—not even the most costly grades of racing-castor oil—had ever gone so far so fast.

And now you can buy this same record-breaking oil for your car for not a penny more than the price of any other quality oil.

### Get Pennzoil Today

Is plain oil still good enough when you can get this special oil that makes cars go faster? That gives quicker pick-up? That saves you up to 12% on gasoline? That gives far better lubrication and cuts repair bills 30 to 60%? Then make sure you get Pennzoil. Go to any bonded Pennzoil dealer . . . today!

### THE PENNZOIL COMPANY

Executive Offices: Oil City, Pa.  
Los Angeles, Calif.

British-American Oil Co., Ltd., Canada



**TOUGH-FILM  
PENNZOIL**

**MAKES CARS GO FASTER . . . SAVES GAS**



Member Penn. Grade Crude Oil Ass'n., Permit No. 2



REFINERY-SEALED CANS now available. Both cans and bulk Pennzoil are SOLD UNDER BOND to guard you from substitutes.





*"Better pick the one with Body by Fisher"*

HERE is a wife who is looking at motor cars—she has found the one SHE likes, and wants to be sure her husband agrees . . . She has told him of the cars she looked at, and he is confirming her judgment with the soundest, briefest, safest advice a buyer can have: "Better pick the one with Body by Fisher" . . . He knows that means a General Motors car, which tells him all he needs to know about the chassis . . . He knows that means not only the alluring style and smartness that his wife admires—but also time-tested and owner-approved Fisher No Draft Ventilation—and the comfort of spacious ROOM, generous leg-room, elbow-room, headroom—for every person in the car. In eight words he has shrewdly compressed the sum of the nation's experience with motor cars . . . Seek as you will, there's no better advice for you.



ON GENERAL MOTORS CARS ONLY:  
CHEVROLET • OLDSMOBILE • PONTIAC  
BUICK • LA SALLE • CADILLAC



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**JUNE 30**

**83-DAY CRUISE**

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**RESOLUTE**

from New York June 30th, 83 days, 21,121 miles: Trinidad, Brazil, St. Helena, South and East Africa, Arabia, seven Mediterranean countries, Portugal, Cherbourg, including return passage to New York.

**\$750 up**

Shore excursions optional

B.T.

Any authorized Hamburg-American or Lloyd agent in your locality will furnish you with valuable travel information and illustrated folders featuring this cruise.

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NORTH GERMAN LLOYD**

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## SCOTLAND and IRELAND *an ever-changing pageant*

For a pageantry of history, abbeys and castles, golf, shrines and glorious scenery visit Scotland. • The world famous trains, the "Flying Scotsman" and the "Royal Scot" take you direct between London and Scotland—in unimagined comfort. Go one way and return the other. • Luxurious modern steamers take you swiftly and comfortably across the Irish Channel—via Holyhead, Liverpool, Heysham and Stranraer—to the incomparable scenery of Eriks Isle and lovely Killarney. • Many all-expense trips to choose from, including steamship, rail, hotel accommodations, meals and sightseeing—*everything*. Here's a sampler:

**35-DAY TOUR—ALL EXPENSES—\$500**

New York, Southampton, London, Shakespeare Land, Mt. Snowdon, Windermere, English Lakes, Edinburgh, Scot country, Trossachs, Burns country, Kyles of Bute, Iona & Staffa, Belfast, Giant's Causeway, Dublin, Killarney, Cork, Blarney Castle, Cobh, New York.

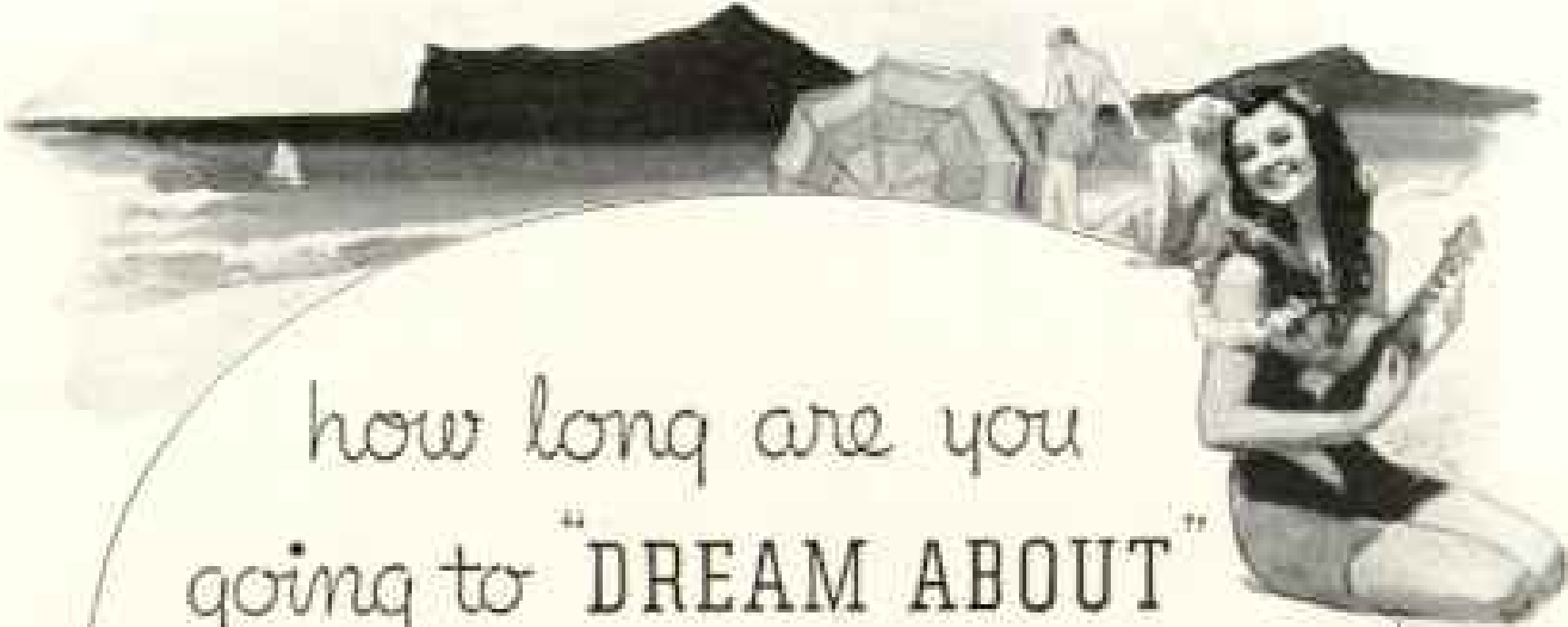
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T. R. DESTER, *General Traffic Manager*

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351 Fifth Avenue, New York

FLYING SCOTSMAN ROYAL SCOT GOLDEN ARROW

**ASSOCIATED BRITISH  
RAILWAYS Inc.**



how long are you  
going to "DREAM ABOUT"

Hawaii



You can't be blamed for dreaming about Hawaii. You've doubtless read much and heard much about the islands of year-round-May. In fact, Waikiki has become a symbol of smart beach pageantry, languorous ease, and colorful sports found only on its coral shores. Plaintive Hawaiian melodies have stolen into the heart of the world.

Men and women everywhere turn longing eyes towards these flower-garlanded isles of the mid-Pacific, and plan to go there some day. Every good reason to make that "some day" *now . . . this summer.*

The best time of the year, in the opinion of those who live in Hawaii, is summer. To be sure, always there are flowers, as always Hawaii is beautiful. But when summer comes, the islands fairly bury themselves in blossoms of every hue and scent, as the mingled fragrance of the cooling trade winds reminds you.

The time of getting there is now reduced to five pleasure-crowned days . . . from San Francisco, Los Angeles or Vancouver, B. C. And world-famous ships provide unusually low fares.

The cost as low as \$110 First Class! . . . \$75 Cabin Class! one way from the Pacific Coast. Rail fares are reduced

and Pullman surcharges (Western) discarded. Furthermore, no passports, exchange, or customs annoyances.

And, let us remind, there are four acts to thrilling Hawaii . . . the islands of *Oahu, Hawaii, Maui, and Kauai* . . . with superb inter-island communications by airplane and steamer. Each island has excellent motor highways. Ample hotel accommodations at reasonable figures.

Stop mere dreaming about Hawaii. Around the corner is your travel agent. He has a new free booklet\* whose statistics even will urge you to *do some dreaming in Hawaii this summer.* Or kindly address

#### HAWAII TOURIST BUREAU

201 Market Street, San Francisco  
242 Pac. Soc. Bldg., Los Angeles

A community organization with headquarters in Honolulu, for the dissemination of free, authoritative information about the entire Territory of Hawaii, U.S.A.



\*For a larger book, copiously colored, with maps and pictures, send 10¢ to cover mailing costs.

HOW LONG ARE YOU GOING TO "DREAM ABOUT" HAWAII

# YOU CAN'T FOOL THE WEATHER

## ...with a 'CHEAP' paint!



**RAIN:** Months of excessive rains mean destruction to exposed wood. Dutch Boy White-Lead paint keeps rain and dampness out.



**SNOW:** When the winter's snow melts in cracks and crevices, moisture gets in wood. Keep it damp and wet with Dutch Boy.



**SUN:** The heating rays of the summer's sun dry and warp unprotected wood. Dutch Boy shields the wood from the sun's attack.

...why spend your money to **PROVE** it can't be done?

**L**OOK ahead to months of sun, rain and snow and you'll never decide on a "cheap" paint job... it's far too costly in the end. You can't afford the extra dollars it will take out of your pocket. And you don't need to pay good money to find that such a job doesn't stand up.



Look at the examples shown at the left, *actual photographs*.

See how "cheap" paint quickly cracks and scales... and lays bare surfaces it was meant to protect. Such a job must be burned and scraped before it can be repainted. And it will also require a new priming coat before the finish coats are spread.

Contrast that performance with the Dutch Boy White-Lead job. Paint made with Dutch Boy doesn't crack or scale, but wears down stubbornly by gradual chalking and leaves a perfect foundation for the new coats. There is no costly burning off... and consequently no extra coat... to pay for.

Does money-saving appeal to you? Call in an experienced painter and when he says "Dutch Boy, of course?" answer him "You bet!" Then stand back and watch him mix the paint until its composition is just right for your particular house. Watch him tint it to the exact color you've specified. No one knows paint like a painter.

**"CHEAP" PAINT**  
after 1 year



This job one year ago cost \$100. Today it will cost \$30 more... for burning and scraping. Total \$130 for one year, without cost of new priming coat.

**DUTCH BOY**  
after 5 years



This job five years ago cost \$215. Same room in Ohio. Paint is still in good condition... still protecting the wood. Truly paint cost to date only \$45.

**NATIONAL LEAD COMPANY**  
111 Broadway, New York; 118 Oak St., Buffalo; 909 West 18th St., Chicago; 639 Freeman Ave., Cincinnati; 829 West Superior Ave., Cleveland; 722 Chestnut St., St. Louis; 2240 24th St., San Francisco; National-Boston Lead Co., 809 Albany St., Boston; National Lead & Oil Co. of Penna., 316 4th Ave., Pittsburgh; John T. Lewis & Bros. Co., Widener Bldg., Phila.



"The House We Live In" helps you save money. Free. Write to Dept. 143 care of nearest branch.



# DUTCH BOY WHITE-LEAD

Good Paint's Other Name





# WANTED---

## Junior Safety Volunteers!



"Oh, dad, here's something I want to do."

**W**OULD you like to be a Junior Safety Volunteer and have a booklet with pictures in it showing how you can help to prevent accidents? Your booklet will have a place on it for your name.

Of course you are smart enough to take care of yourself on the street, and you surely know how to keep an eye on kids who forget to look where they are going—especially the little ones.

If you save someone from being killed or having his bones broken you will remember it as long as you live. And you will be on the lookout for just such a chance.

More than a thousand children a month are killed by accident in our country and more than a hundred thousand are hurt—many of them seriously—in spite of all that has been done by fathers and mothers, teachers and traffic officers to keep boys and girls from being injured.



The Metropolitan hopes that when Junior Safety Volunteers are on the alert, all over the country, there will be a very different story to tell about accidents next month and the months to follow.

Print your name and address on the coupon and be one of the first Junior Safety Volunteers in your neighborhood. While being careful about yourself you can do a grand job looking after schoolmates, or possibly grown people who will not know so much about accidents as you will after you get your free booklet. Who will be the first to volunteer?

Metropolitan Life Insurance Co., Dept. 634-N  
One Madison Avenue, New York, N. Y.

I want to help prevent accidents. Please send my copy of "The Junior Safety Volunteer."

Name \_\_\_\_\_  
(Print plainly)

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# METROPOLITAN LIFE INSURANCE COMPANY

FREDERICK H. ECKER, PRESIDENT

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*Body by Fisher*

*I*t would greet you with a Smile . . .



If your motoring has become a sort of humdrum transportation, there is that in the Buick which will bring back the zest of driving your first car.

Just to see the Buick is to realize how vivacious and new it is in its smart beauty. To drive it and ride in it but once is to recognize that it brings to modern motoring something new and all its own.

For there is a difference that goes beyond the gliding ride as only Buick

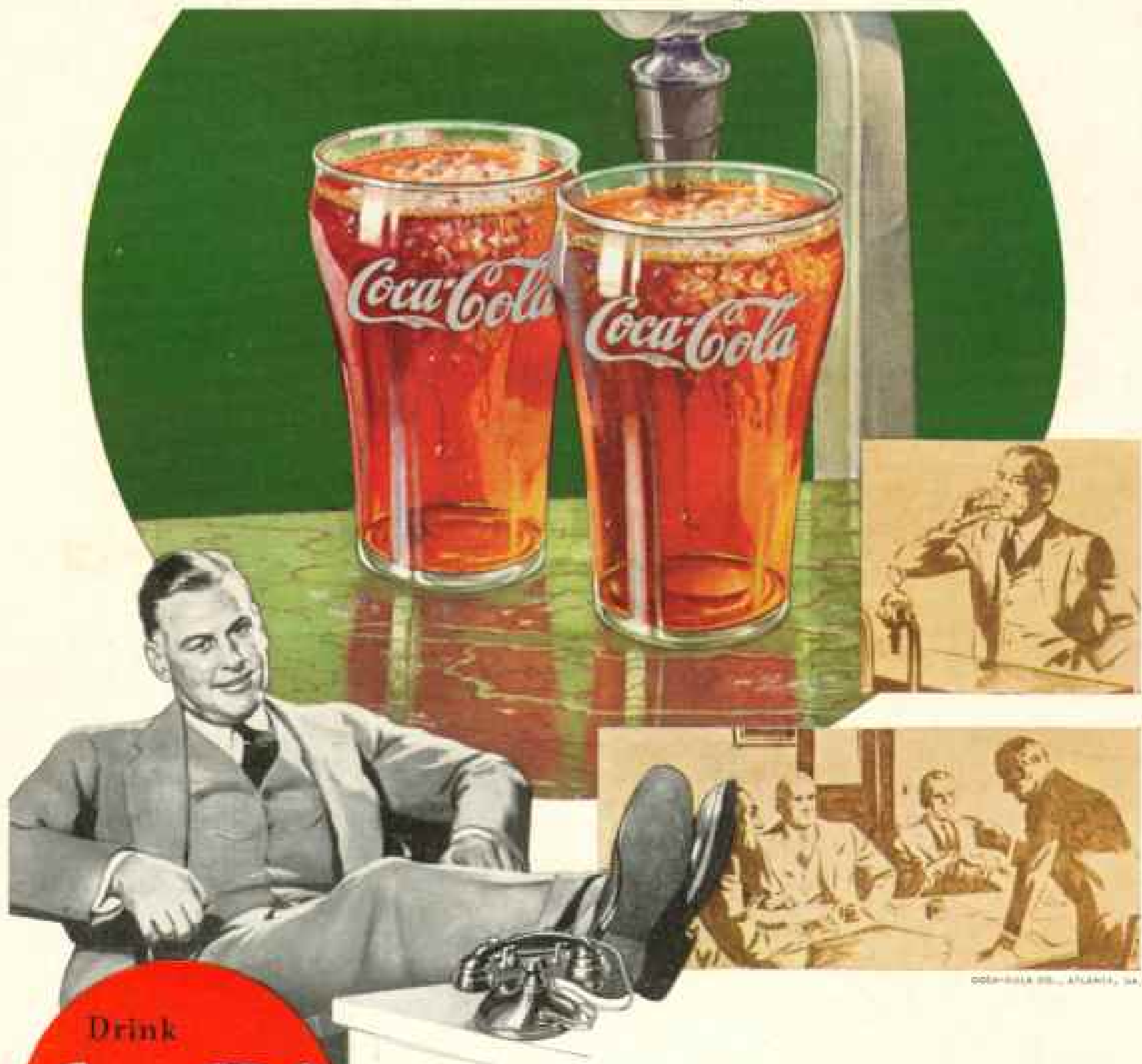
gives it, beyond the matchless ease of superb performance and the convenience of automatic features. There seems to be the vigor and exuberance of youth in all that Buick does; and it is not difficult to imagine that, if it were human, it would always greet you with a smile.

You can take that kind of car to your heart—which perhaps explains the undying loyalty of Buick owners, and the even more wide-spread favor which Buick is winning today among motorists of all classes.

• **BUICK** •

WHEN • BETTER • AUTOMOBILES • ARE • BUILT—BUICK • WILL • BUILD • THEM

# When it's hard to get started



Drink  
**Coca-Cola**  
Delicious and  
Refreshing

5¢



• You can be sure it is pure and wholesome. Coca-Cola is a pure drink of natural products, with no artificial flavor or coloring. Complying with pure food laws all over the world.

## Start with a Coca-Cola

There's a cool, cheerful soda fountain around the corner from anywhere. Go there! Get a fresh start with an ice-cold Coca-Cola. Its life and sparkle go quickly into energy. Refreshed, you feel fit for what's ahead . . . There's a scientific reason for it. Coca-Cola is a blend of those pleasant, wholesome substances which foremost authorities say do most in restoring you to your normal self.

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CREAM of MUSHROOM

*chef d'oeuvre of the soup-making art*

When next you plan for a dinner-party and lament the fact that you haven't a special soup-chef in your kitchen to make your Mushroom Soup—just order Campbell's! Their new Cream of Mushroom relieves you for all time of any anxiety about the perfection of this course on your table.

Luxurious and sumptuous richness in soup! The choicest of fresh, whole, cultivated mushrooms—richly puréed—blended with sweet cream so thick it will hardly pour. Delicious mushroom tidbits as the liberal garnish.

So double-thick is the cream in Campbell's that when an equal quantity of water is added in your kitchen, just the right, rich, creamy mushroom goodness is obtained.

The price—the same as other Campbell's Soups!

*New*



CAMPBELL'S *Cream of* MUSHROOM  
*Containing sweet, double-thick cream*



LOOK FOR THE  
RED-AND-WHITE LABEL





© 1934, E. R. Squibb & Sons

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Your boy—dreaming of worlds to conquer—aggressive and shy by turns. A trying time, for him—this period of his fastest growth. Physical changes come so rapidly. Consult your physician about his diet, so that it will keep up with his body's need for the vitamins and minerals to build sturdy bones, strong teeth.

Double your watchfulness about the care of his teeth. Don't let him relax the early habit of brushing his teeth, after each meal, when convenient. At least, morning and night. Your dentist will explain how it should be done, how important it is for his teeth and gums—now and all his life.

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THE telephone was invented in this country and it has reached its highest development here. There are six times as many telephones in relation to population in the United States as in Europe and the service is better.

This high efficiency did not just happen. It is the result of American initiative and a sincere desire to serve the public. Back of it all you see the value of the structure and the fundamental policies of the Bell System.

This system functions in the best

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The general plan of the Bell System is the cumulation of more than fifty years' experience, resulting in one policy, one system and universal service.



BELL TELEPHONE SYSTEM

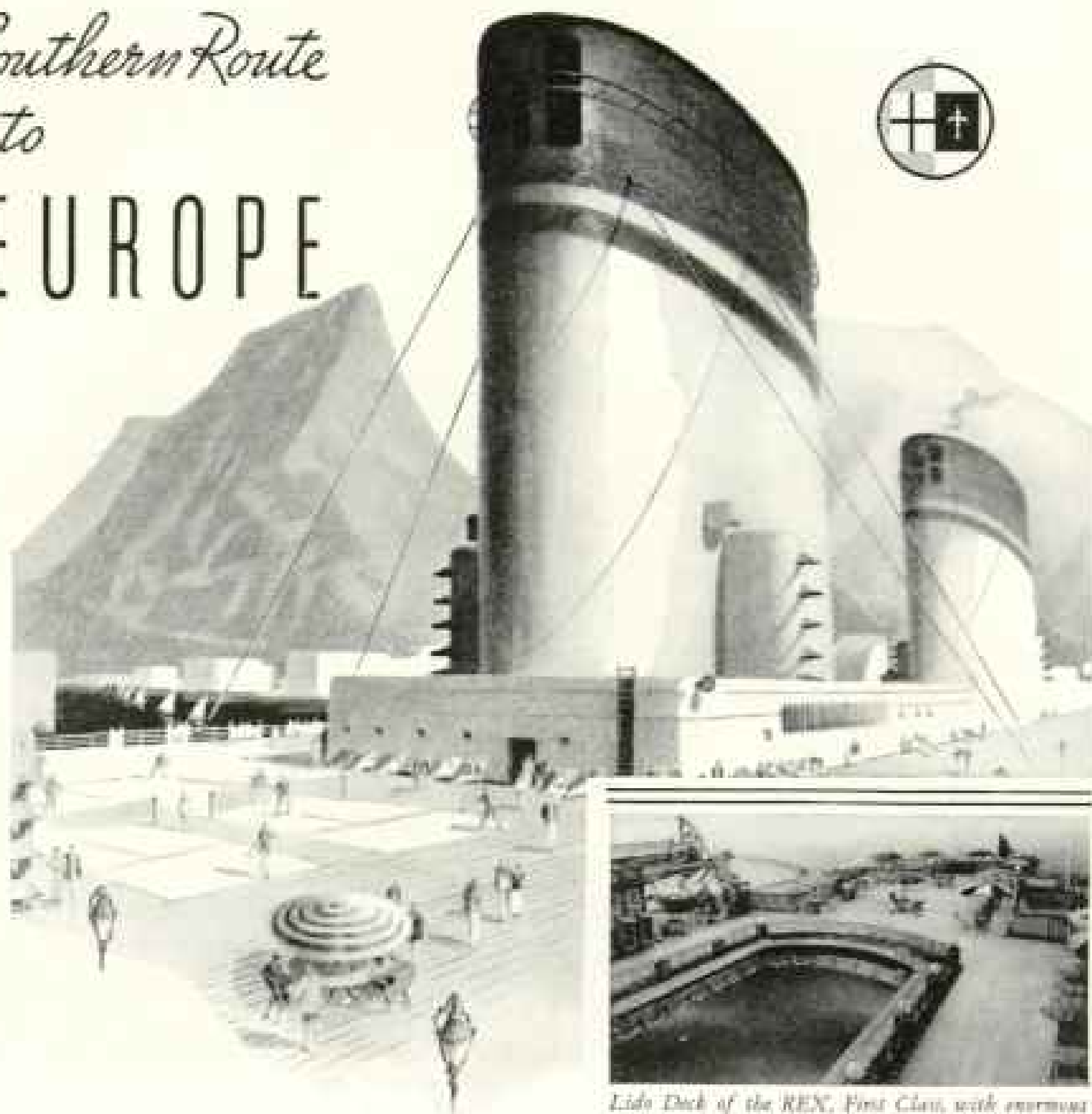
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*via the Southern Route  
to*

## ALL EUROPE



*Gibraltar comes all too soon! But there's still a short run across the Mediterranean—another two days of Lido sports ahead.*



*Lido Deck of the REX, First Class, with enormous pool, cabanas, table umbrellas, and bath chairs.*

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*SPECIAL CLASS—An ideal combination of luxury, privacy, economy—exists only on the REX and Conte di SAVOIA.*



*TOURIST—Includes entire former Second Class on the ROMA, SATURNIA, VULCANIA; specially designed quarters on the REX and Conte di SAVOIA.*

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**"Our Vacation Movies  
actually cost less than  
we spent for tips"**

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Make them with CINÉ-KODAK EIGHT, Eastman's *new-principle* movie camera that costs only \$34.50. With the Eight, you get finished movies, ready to throw on your screen, for less than 10¢ a "shot."

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# Ciné-Kodak EIGHT





**" MINE IS THE FIFTH ELGIN IN OUR FAMILY "**

*says charming* **EVELYN CAMERON WATTS** *of*  
*New York and Baltimore*

*Have you a daughter graduating soon?  
She, too, may wear the lovely time-  
piece this Finch School girl has chosen*

● "My great granduncle started a tradition for us when he chose his ELGIN," declares this vivacious daughter of the Harry Dorsey Watts, a leader among New York's smart younger set.

And your own eyes will tell you many reasons beyond tradition for choosing for your graduate to be one of the new ELGINS shown here.

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★ 17 jewel baguette with solid gold case. Black figure dial. Cord attachment. Model 2016, white gold; model 2010, natural gold. \$55

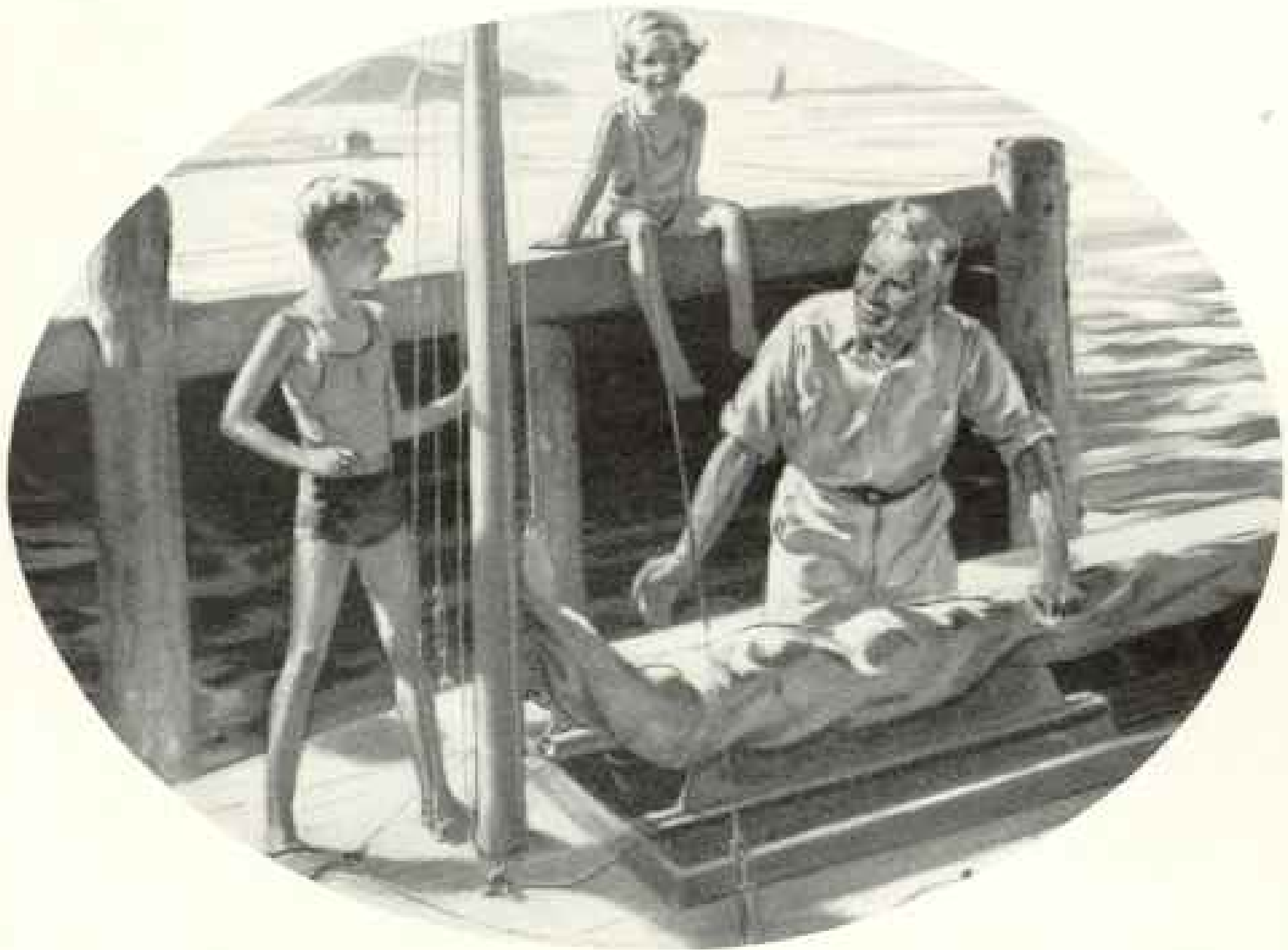
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THIS man of sixty-five looks with sympathy upon the aims of the New Deal. He agrees that living conditions should be better for many of the people. Opportunities for self-improvement, for healthful living, for the sane employment of leisure, should be increased. The individual should have a chance to build financial independence. And worry should be banished from the minds of men.

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Ask the Penn Mutual representative about the details of the Endowment Income Plan. Put it to work for you—and your own New Deal!

May we send you a copy of  
"Investing for Income," by Wm. A. Law?

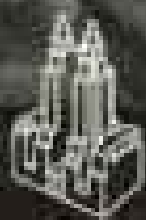
*Two attitudes, as distinct as black from white, may govern the investing of money, by an individual or by a great insurance company. The president of The Penn Mutual in this booklet defines the principles that guide his company's investments. It will interest all who own life insurance. It will help all who strive towards financial independence.*

## THE PENN MUTUAL LIFE INSURANCE COMPANY

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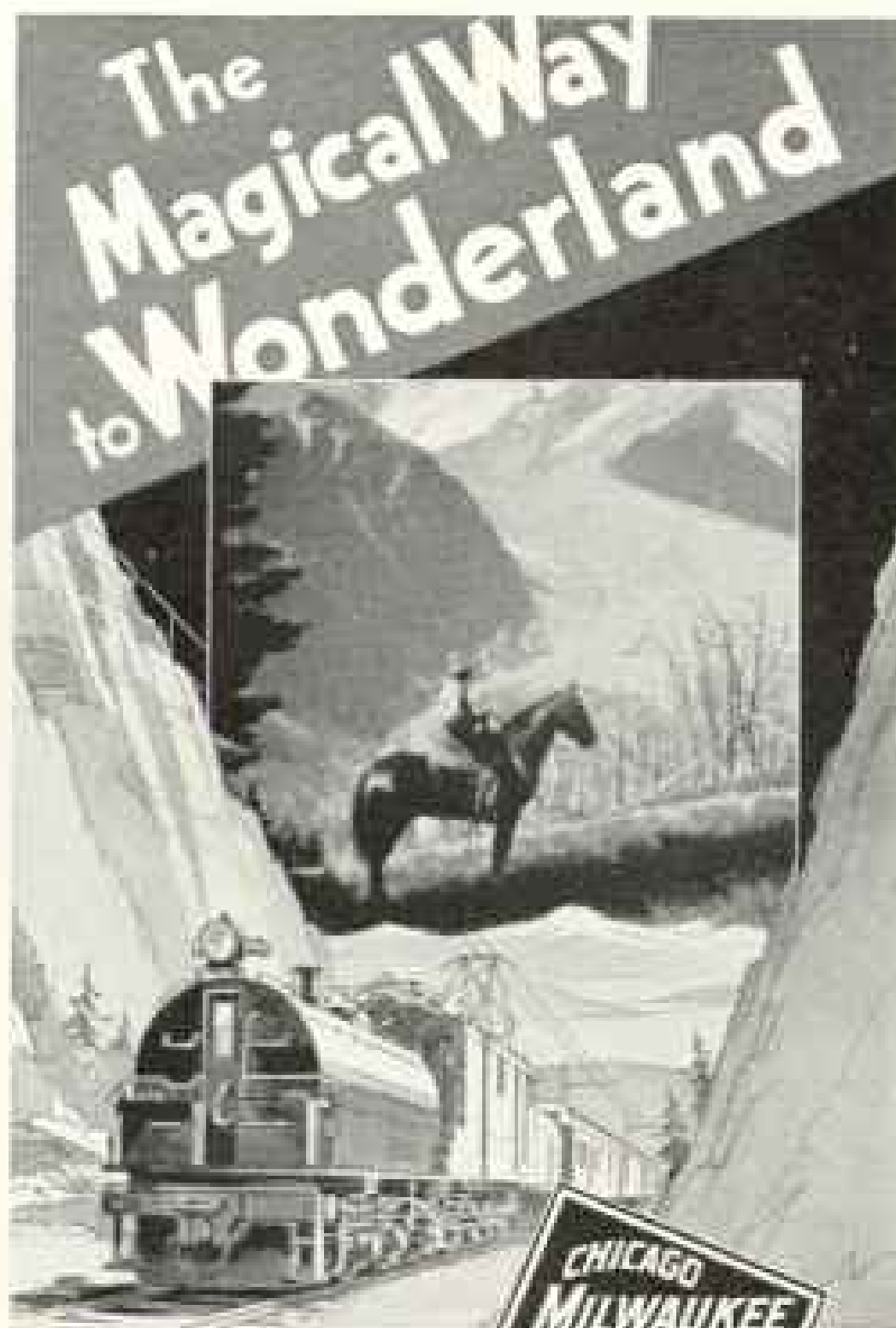
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*—says Ripley*

PHOTOGRAPH BY HARRY McHUGH & COMPANY

Its Visible Column of Ink, like the gas gauge on a motor car, shows when to refill—and it carries enough to write a 12,000-word book!

A widespread inquiry among students was recently made by Ripley to aid friends and parents in selecting the Gift Pen that will gladden Youth the most. And he found an overwhelming preference for this revolutionary Parker Vacumatic.

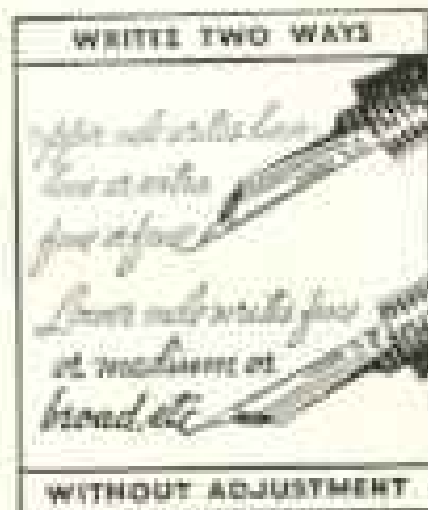
One reason is that it eliminates 14 old-time pen parts, including the rubber ink sac—thus it holds 102% more ink *without increase in size!*

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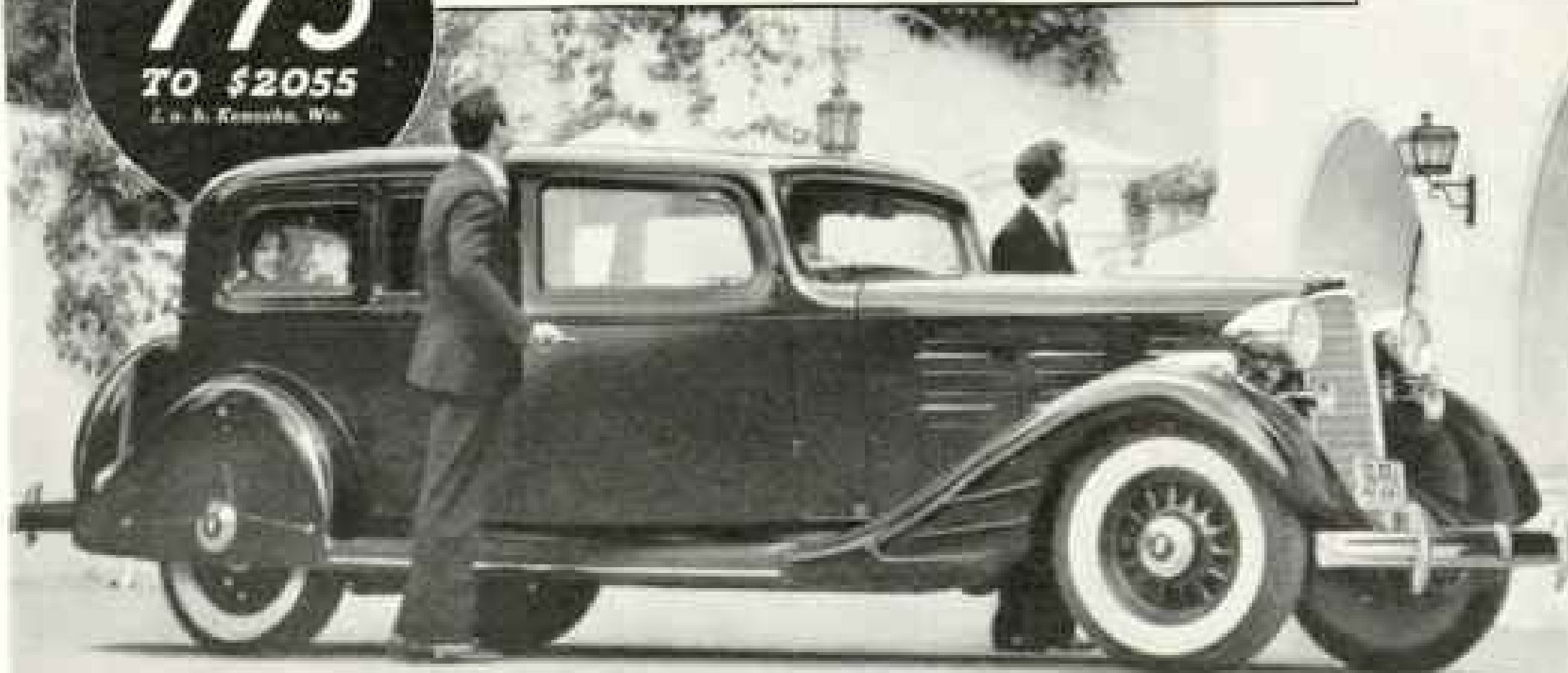
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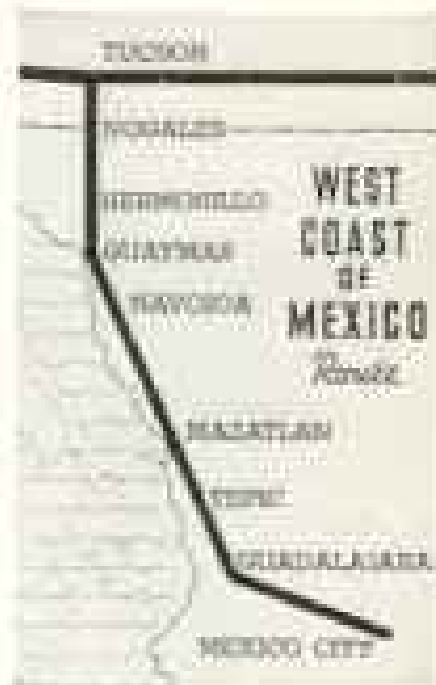
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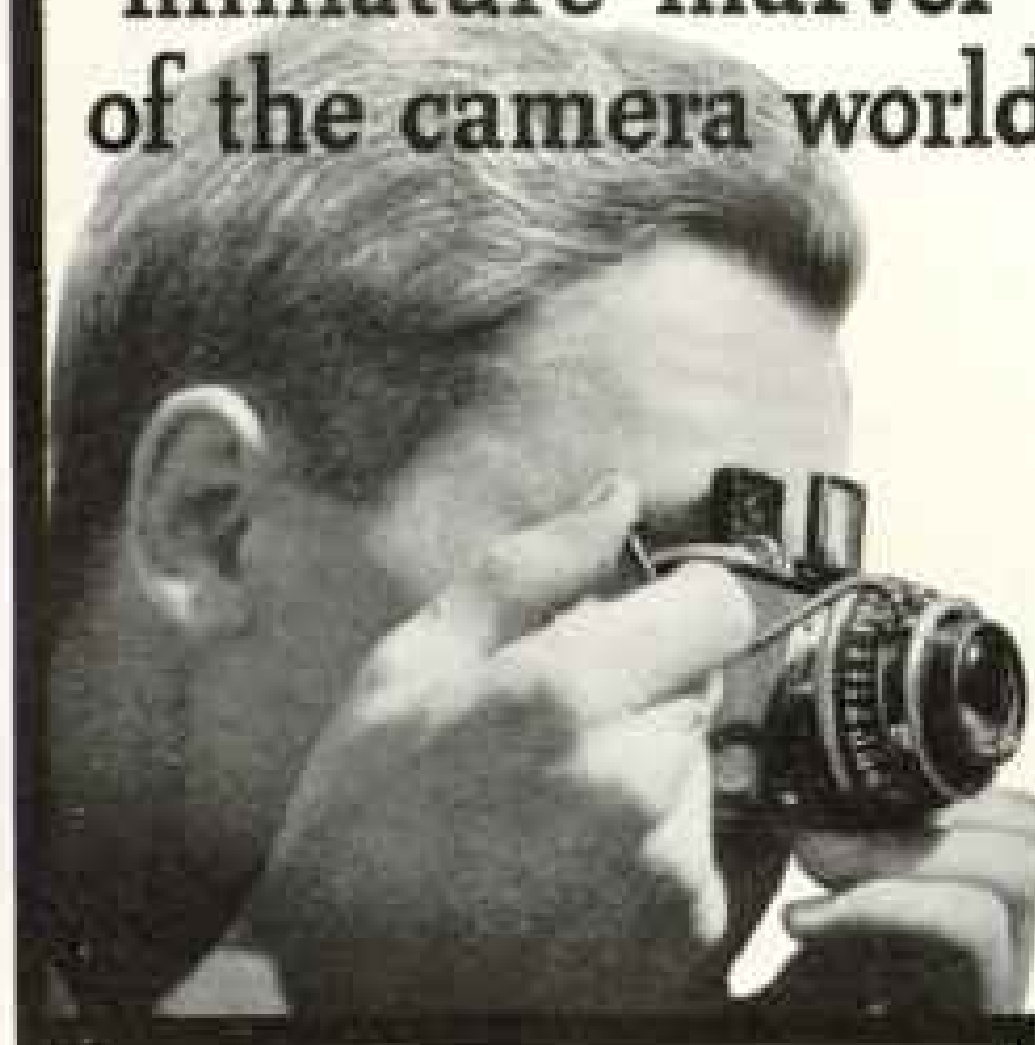
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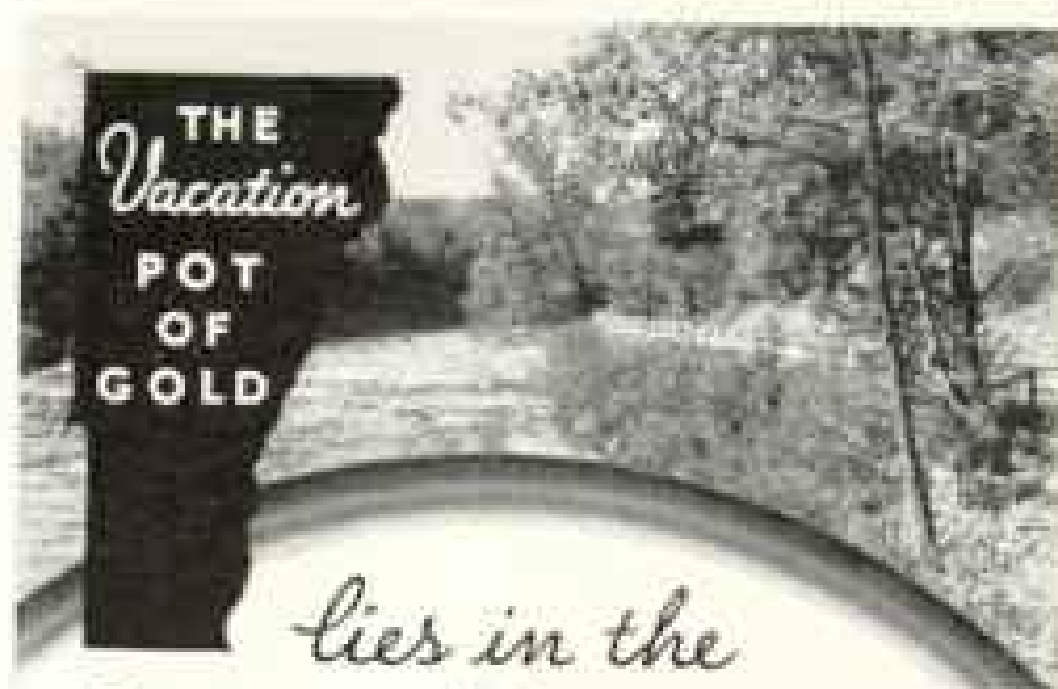
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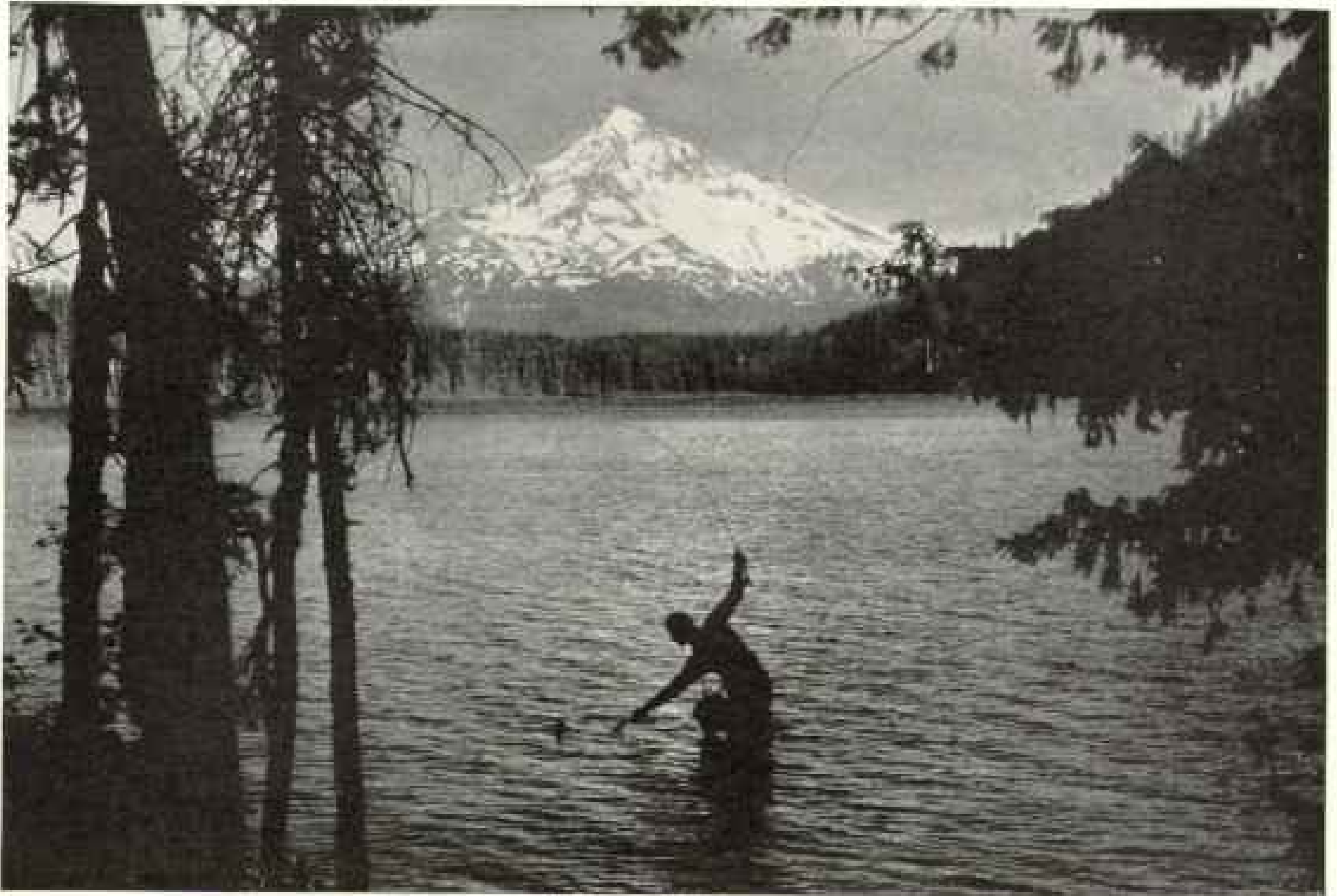
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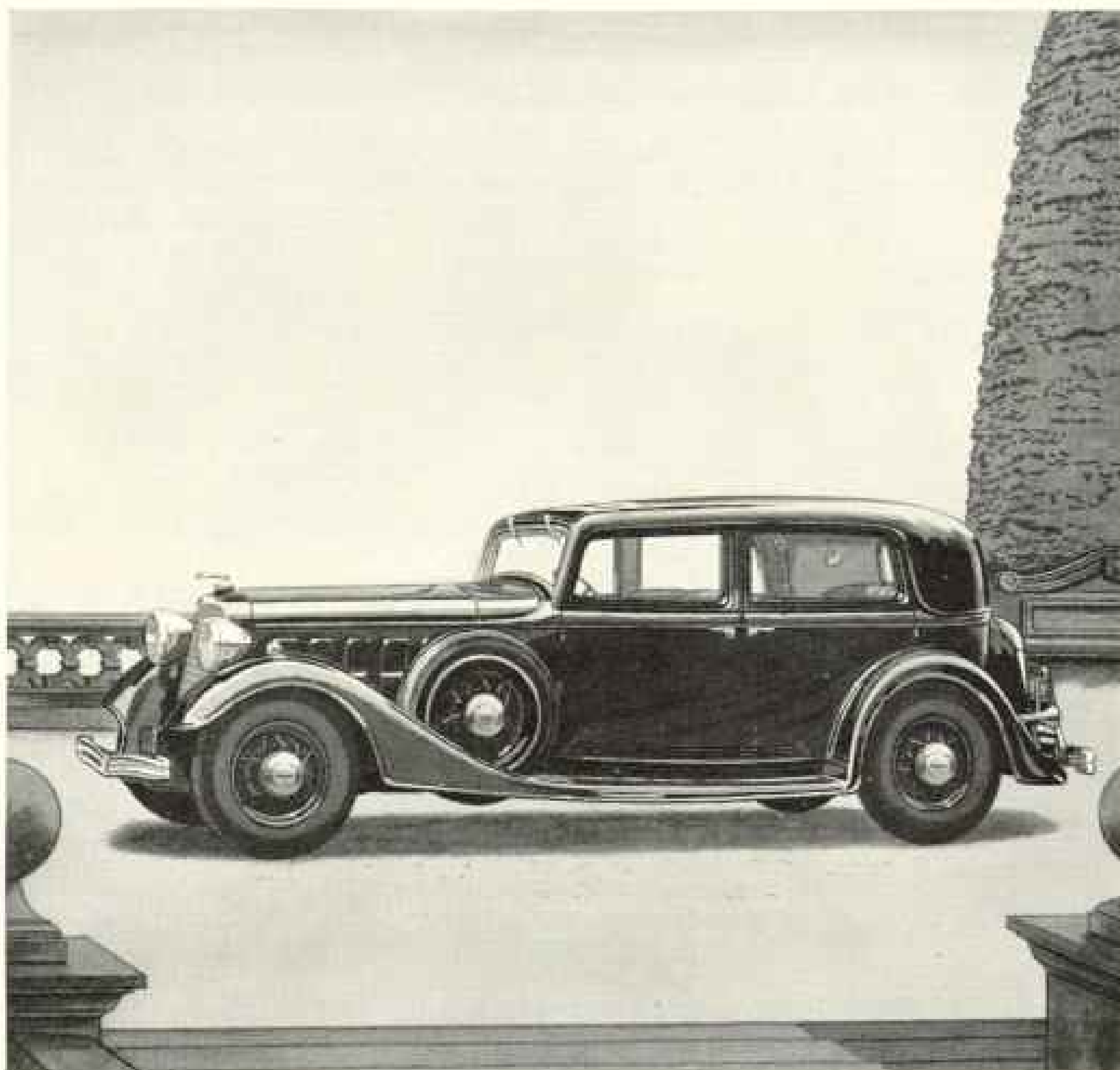
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