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TWENTY-FOUR PAGES OF ILLUSTRATIONS IN FULL COLOR

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MINNESOTA, MOTHER OF LAKES AND RIVERS

By Glanville Smith

SINCE I was born and raised in Minnesota and have lived here all my life until the gray hairs are beginning to show over my ears, I have got used to the State and to its faults and virtues. But it is a pleasure to come to a pause and think how the State is remarkable, and to consider what a newcomer would find striking in its geography.

One way of looking at the map of Minnesota is to see it all speckled with sky-blue lakes, the celebrated Ten Thousand. This is the way the intending vacationist looks at it, and it makes a chill of rapture run up his spine.

Another way is to see its shape as that of a sheaf of wheat that has lain on the side of the pile and so grown lopsided; it is easy to see where the twine binds it around. The sharp-sighted may notice that from this fragment of the American map the rivers flow south to the Gulf of Mexico, north to Hudson Bay, and east through the Great Lakes to the Atlantic. In this respect Minnesota is unique—the mother of three seas.

PINELANDS AND PRAIRIES

Now let me propose looking at the map in a less obvious but very helpful way. Imagine it cut into two vast triangles by a diagonal line running from the northwest corner (where the Red River flows out northward) down to the southeast corner (where the Mississippi flows out southward). Imagine the upper triangle painted green, and the lower one painted yellow, and presto! you have the State roughly divided into its natural forest and prairie parts (see map, pages 278-9).

The green triangle, before the lumbermen came, was in general a huge pine forest, and begins to be so again. The yellow triangle, before the farmer came, was a grassland "like the billows of a great sea, majestic and limitless"; now it is fields, with windbreaks of planted trees to shelter the red barns and white farmhouses.

ASPECTS OF THE TRIANGLES

The diagonal line that divides these triangles has its significance, too. It marks the chief trade route through the State, and also a wandering barrier of deciduous woods, now carved up to make way for farms and cities, which everywhere separates the pinelands from the prairies.

Broader toward the south where it attaches to the deciduous woods of Wisconsin, it dwindles to a thin scattering of stunted trees toward the north—the final outpost of the hardwood forest of eastern America.

As the ends of this diagonal mark the low exits of the State's two principal rivers, the outer corners of the two triangles mark the State's highest ground. At the outer corner of the yellow triangle the plateau known as Coteau des Prairies just crosses, dividing the Missouri from the Mississippi basins with its immense gradual swell. In the outer corner of the green triangle, the "Arrowhead Country" above Lake Superior, are the Sawteeth Mountains and the Misquah Hills, rocky, choked in forest.

The climate of this pair of triangles is a grief to those who resent surprises. It is "continental" in the most emphatic sense. Temperatures range in a mild year through 120 degrees; in a year with a real wallop

Photograph by Clifton Adams

WHERE THE MIGHTY FATHER OF WATERS IS A GENTLE STREAM

This procession of birch-bark canoes in Itasca State Park was a feature of the celebration in July, 1932, in commemoration of the one-hundredth anniversary of the discovery of Lake Itasca as the source of the Mississippi River by Henry Rowe Schoolcraft (see text, page 288).

to it, as high as 165. In consequence, the native of outdoor habits must maintain a wardrobe that includes everything from the shortest of swimming shorts to the longest of long woolens.

Lake Superior, it is true, tends to temper the winds of the region around it, but not to the shorn lamb; no, no. Thanks to the proximity of that deep reservoir of pure icewater, a grouchy visitor has been heard to complain that the coldest winter he ever spent was one summer in Duluth!

Nor are the blessings of ample rainfall to be taken for granted. Of late years the yellow triangle, commonly less rainy and much less snowy than the green, has involuntarily tried the experiment of getting along with next to no moisture at all. In fact, Minnesota has weather to please all tastes, in strong doses which as a rule stimulate rather than kill.

The 19th century marked an immense change in Minnesota. The white man arrived in numbers to establish himself in a country where it was easier to make a living than in the one he had come from. This was not a very noble purpose in one way, and it led to many injustices to the existing inhabitants, both men and animals.

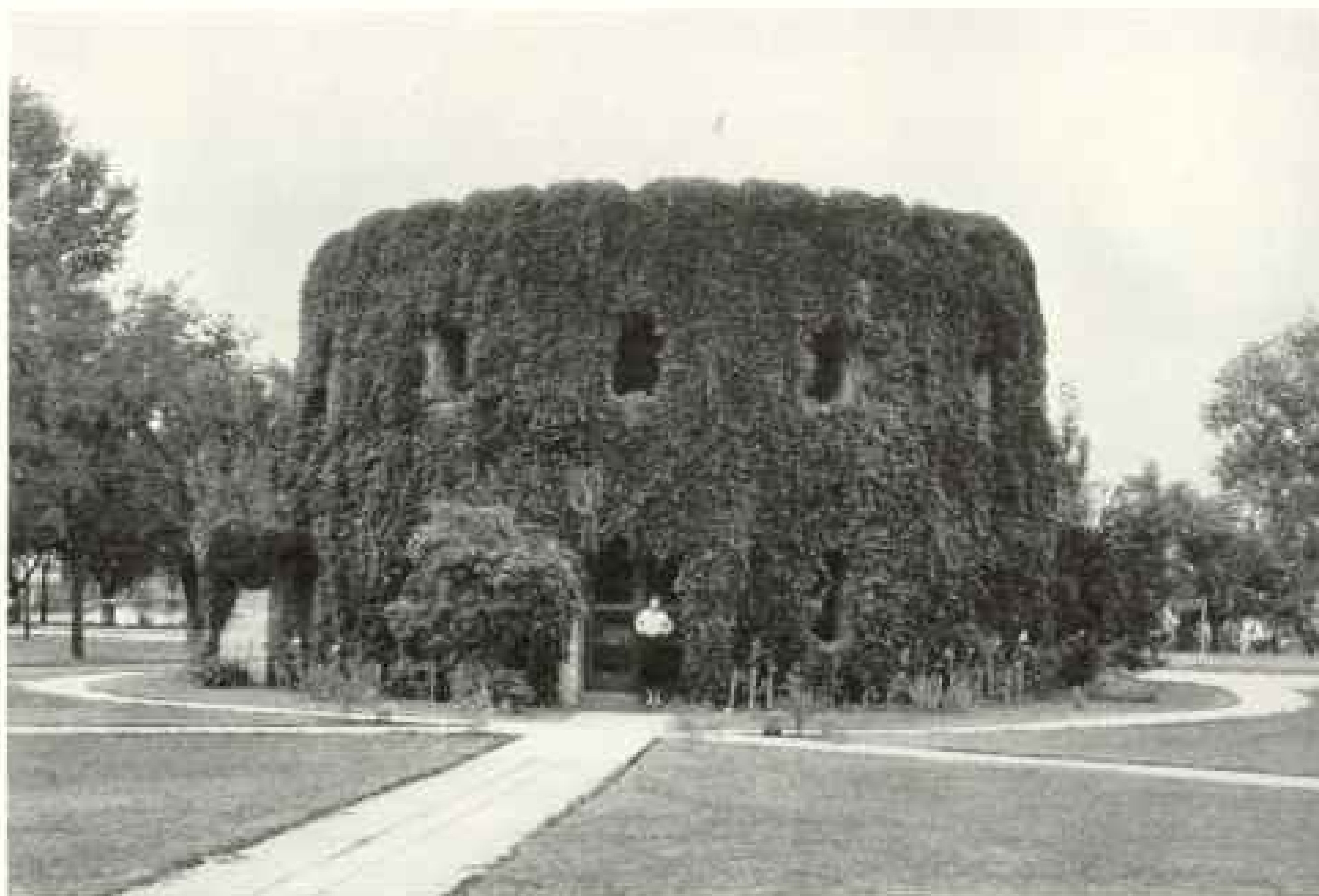
Yet the annals of the pioneer invasion reveal, too, a deep longing in those people for the good life, for they were certainly ready to undergo discomforts that were sordid and hardships that were killing in their high hopes for the future in a new land.

ANIMALS GO WHEN WHITE MAN COMES

There was much to be done, for the white man always insists on altering Nature to suit his own views. But energy was the characteristic of the age. With rifle, ax, and plow, and later with money, miracles were wrought.

For one thing, the status of the native animals was drastically changed. In the yellow triangle, marvelously fertile for wheat, the buffalo, antelope, and coyote were agricultural impossibilities. The first two were exterminated; the remnants of the coyote tribe retreated to the green triangle, altered their habits to suit a woods environment, and became "brush wolves."

The deer, whose natural home was the diagonal woods barrier (see text, page 273),



Photograph by Clifton Adams

FORT SNELLING'S ROUND TOWER HAS WATCHED MINNEAPOLIS GROW TO MATURITY

The first white child in Minnesota was born at this army post, occupied in 1822. The fort was one of the settlements that merged in 1872 to form the city of Minneapolis (see text, pages 288 and 301).

also retreated into the green triangle. The lumberjack, by hewing down the greater part of the pine there, did the deer a favor, for the birch and aspen that supplanted it made a home to their liking; in fact, in it they thrive and multiply.

Though I would not slight the luscious meadows, vast potato fields, and other agriculture of the green triangle, it has in general been rebellious in the farmer's hands and so remains essentially a forest and game refuge to this day.

True, the trapper and sportsman have drastically diminished the numbers of its natural citizens, such as the timber wolf, otter, fisher, and lynx.

But the beaver still builds his dams there; the black bear may be spied, fishing with his paws when the fish run in the streams; the porcupine in large numbers yet gnaws the jack pine bark, and travels a path which, winding through the snowy groves, looks as neat and regular as if someone had rolled a heavy truck tire there. And the snowshoe rabbit, whose favorite diet is the pine seedlings set out by Government foresters, travels the winter drifts on his padded legs.

The American elk, or wapiti, is extinct in Minnesota. The caribou is almost so; a herd is sometimes seen in the remote fastnesses of the great swamp of Beltrami County, north of Red Lake. But the moose, in the Arrowhead Country, survives in fair numbers (see pages 276 and 318).

Canoe travelers often see the noble monster at lunch in some lake, his body submerged for protection against the flies, his lips curling around the waterlily shoots that make a dainty hot-weather salad for this giant among American mammals. But he is wisely a shy animal. However, I can tell a true story of one that became a household pet.

A MOOSE IS A HOMESTEAD CLOWN

A homesteader named Gilbert Gilbertson found the moose calf, a helpless orphan. Humanity demanded that the infant be fed; the Gilbertson cow was entrusted with this task, with such success that her suckling one day soon after was able to bunt her into a swoon as an affectionate prank.

He was the clown of that homestead. Once, kicking at the dogs, he found he had

Photographs from George M. Shepard

"RIDE 'IM, MOOSE BOY!" SHOUTS THE PADDLER IN THIS LAC LA CROIX "RODEO"

Canoeists often see moose, partly submerged, munching waterlily shoots and other succulent water plants from the bottoms of Minnesota's lakes. These two guides chased this bull, and one jumped on its back. Increasing population has shrunk the State's wild areas, and trappers and sportsmen have diminished its natural citizens. The elk is extinct there, the caribou almost so.

grazed his master's leg. In horror he fled behind the cabin, from which safe place he peeped out to see the effect of his misdemeanor. But it can be imagined what the peeping of a moose would be: first, by inches, a half-yard of nose, then, ultimately, the anxious eye.

It was impossible to punish such a wag. But the cook, one day finding him at the back door ready to break in as usual to steal the flapjacks she was frying—they were his passion—in vexation threw the dishwater in his face. At this he sat down in dismay, and all winter afterward, for a reproach, wore a fringe of gray icicles and bits of carrot frozen in his whiskers.

Even the death of this clown had its absurd element. The wardens insisted upon loosing him in the woods, which was probably a relief to the Gilbertsons, for he had grown very bulky. Thus, next hunting season, a party of sportsmen were astonished when a young bull moose came galloping into camp and seized upon the flapjacks they were frying. They shot him in a brave manner as he ate the cakes; their astonishment did not prevent that.

TALL, BUT TRUE, FISH STORIES

Fish and fowl likewise have had to adjust themselves to their new neighbor, the white man.

A game-fish paradise has a way of retreating when the sportsman finds it. Thus the greedy now must go to the border lakes to catch a boatload of pike in an afternoon. But this does not mean that there is not famous fishing elsewhere.

The muskellunge of such lakes as Mantrap, or the fighting small-mouth bass of White Earth, and the many other fish of a thousand waters make tall fish stories annually, which, in spite of the low repute of fish stories, are essentially true. Certainly they reflect justly the fun that ancient sport provides.

And the Minnesota citizen almost anywhere may go out after supper and hook a black bass or a mess of crappies, or, in not more than a day's drive, reach lakes in whose 200-foot depths the noble lake trout can be caught on lines of spun Monel wire (see Color Plate VI and page 287).

Of the original game-bird inhabitants of the State only the grouse can now be called abundant, and its abundance wanes and waxes in cycles. This ruffed grouse is the characteristic bird of the green triangle. Tame, richly speckled and ruffed, it provides a voice for the wilderness in the accelerating thud of its wings drumming on some hollow log, a mysterious music that the forest muffles as if to hold secret.

Thanks to ill-considered drainage and the advance of the farmer, the wild duck's breeding grounds in Minnesota are largely lost to it; the black V's of its spring flight go for the most part beyond the border into Canada. Nor has the prairie chicken been very clever in adapting itself to life on the farm and as a target.

But the introduction of a partly parasitic bird, the ring-necked pheasant, which does not scruple to help itself to the farmer's corn to pay for serving as his autumn target, has proved a huge success. That fantastically colored bird, looking fitter to stand among the exotic blossoms painted on some Chinese screen than among the prairie sunflowers, nevertheless has made itself completely at home in the yellow triangle. Its voice has become that area's voice, the harsh double cry "like the clashing of two sabres."

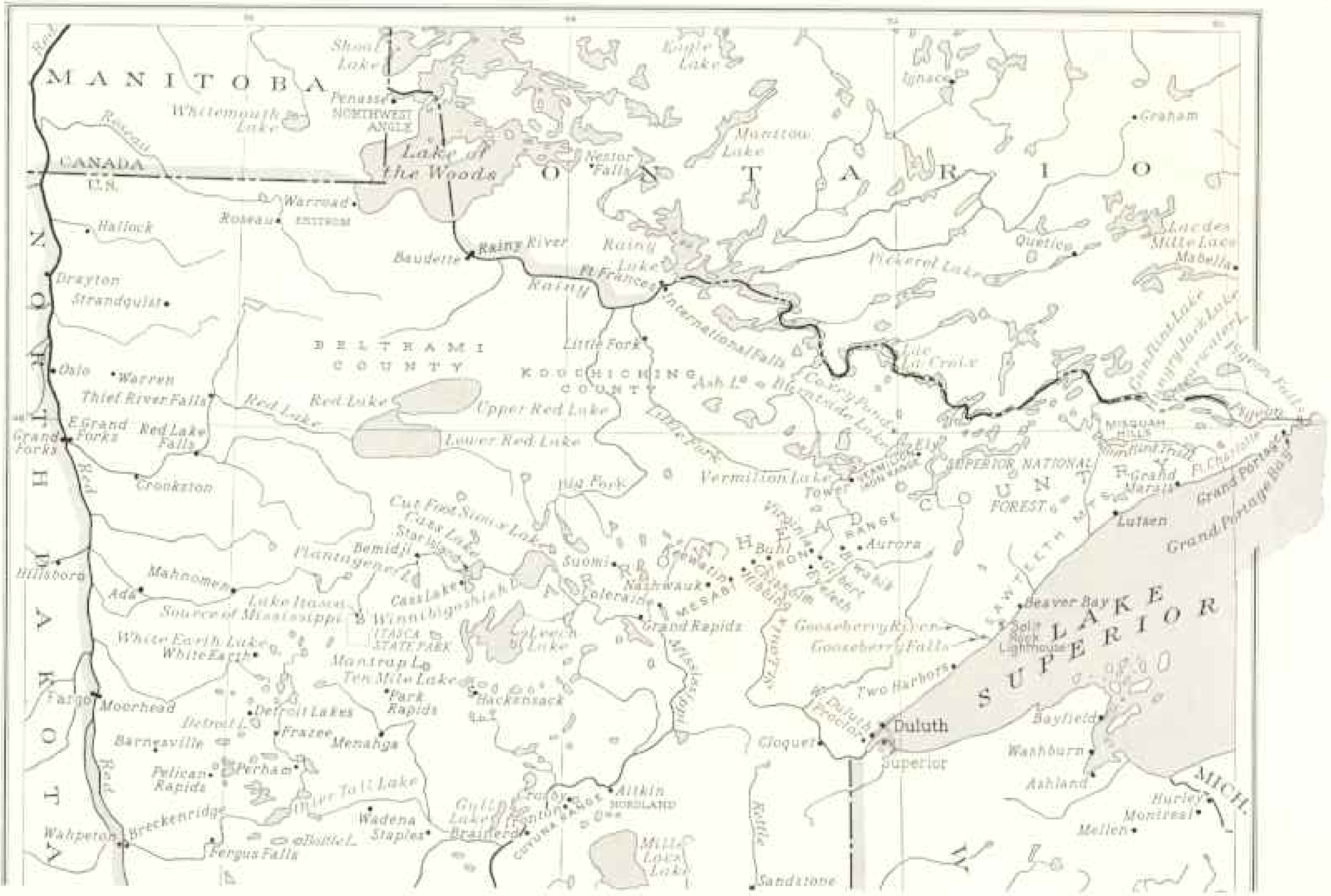
Another bird, too tough and clever often to be shot, gives a voice to Minnesota's lakes. This is the loon, whose melancholy cry on some black lake shaggy with overhanging pines, when the moon sets and the winds are down, speaks in the accents of truly great poetry. The man who has heard it never forgets that wilderness music to his dying day.*

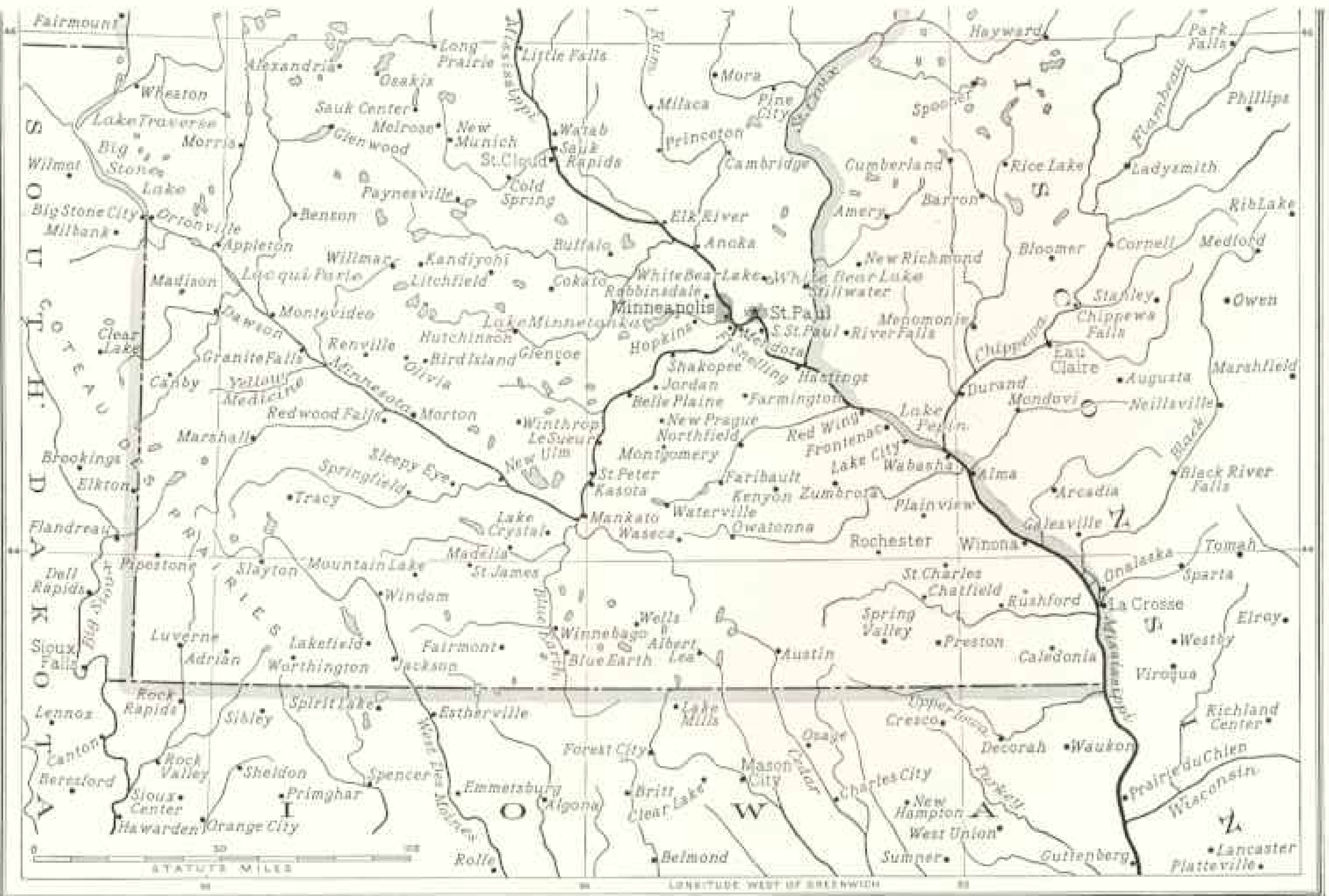
As for small birds, such as the woodsman's friend, the chickadee, or that winered winter visitor whispering its clear song, the pine grosbeak from the north, or the horned lark that brings the earliest music of spring to frozen February fields—they are far too numerous even to be mentioned here.

THE SIOUX ALMOST AS RARE AS THE CARIBOU

Minnesota's primitive human inhabitants, the Sioux, are now almost as rare within the State borders as the caribou. This is not wholly the white man's fault. Before the white man came as a settler, the Chippewas from the East had driven the Sioux out of the green triangle, anciently

* See "Far-Flying Wild Fowl and Their Foes," by Maj. Allan Brooks, in THE NATIONAL GEOGRAPHIC MAGAZINE for October, 1934; "Birds That Cruise the Coast and Inland Waters," by T. Gilbert Pearson, March, 1934; and "American Game Birds," by Henry W. Henshaw, August, 1915.


MANITOBA
NORTH DAKOTA
ONTARIO
LAKE SUPERIOR
MICH.
CANADA
U.S.
Shoal Lake
Eagle Lake
Ignace
Graham
Whitemouth Lake
Penasse
NORTHWEST ANGLE
Lake of the Woods
Nestor Falls
Manitou Lake
Quetico
Pickerel Lake
Mabella
Roseau
Warroad
Hallock
Drayton
Strandquist
Baudette
Rainy River
Rainy Lake
Rainy
Ft. Frances
International Falls
BELTRAMI COUNTY
KOOCHICHING COUNTY
Little Fork
Oslo
Warren
Thief River Falls
Red Lake
Upper Red Lake
Lower Red Lake
E. Grand Forks
Grand Forks
Red Lake Falls
Crookston
Red
Big Fork
Lac La Croix
Ely
Vermilion Lake
Tower
SUPERIOR NATIONAL FOREST
Grand Marais
Lutsen
Grand Portage
Pigeon
Cut Foot Sioux Lake
Cass Lake
Bemidji
Suomi
Nashwauk
Coleraine
Grand Rapids
Buhl
Aurora
Hibbing
Chisholm
Eveleth
Gilbert
Virginia
Hillsboro
Mahnomen
Ada
Lake Itasca
Source of Mississippi
Winnibigoshish
ITASCA STATE PARK
Leech Lake
White Earth Lake
White Earth
Ten Mile Lake
Park Rapids
Hackensack
Mississippi
Gooseberry River
Gooseberry Falls
Beaver Bay
Split Rock Lighthouse
Two Harbors
Duluth
Proctor
Superior
Cloquet
Fargo
Moorhead
Detroit Lakes
Frazee
Menahga
Barnesville
Pelican Rapids
Perham
Wahpeton
Breckenridge
Fergus Falls
Wadena
Staples
Brainerd
Aitkin
Mille Lacs Lake
Kettle
Sandstone
Bayfield
Washburn
Ashland
Hurley
Montreal
Mellen



Drawn by Newman Bumstead

A LAND OF MYRIAD LAKES, VAST GRAINFIELDS, GIGANTIC FLOUR MILLS, AND ENORMOUS ORE DEPOSITS IS MINNESOTA

Photograph courtesy Northwest Airways

A NETWORK OF CURVING BRIDGES SPANS THE MISSISSIPPI AT ST. ANTHONY FALLS

Huge mills, flanking the falls on both banks of the river, have earned for Minneapolis the title, "the world's largest producer of flour." Its first mill was originally built to saw lumber for new settlements that mushroomed near by.

their winter home, to the yellow triangle, which had formerly been their summer hunting grounds.

Thus, when the white man came, he found the Chippewas established in the green triangle, living in hemispherical birch-bark huts, traveling in canoes; and, in the yellow triangle, the Sioux, living in conical buffalo-hide tepees, and riding on ponies—the woods Indian and the prairie Indian. While the lumberman's ax advanced into the domain of the one, the farmer's plow advanced into that of the other.

The plow proved to be the deadlier weapon. The Sioux resented this extremely. Besides, they were treated by the white man with little tact and less frankness—or so they certainly felt. This complex resentment boiled up into the Sioux Outbreak, bloodiest Indian rebellion in the history of the Republic; it came, too, when about an eighth of the total white population was absent from the State as troops in the Civil War.

The panic which spread among the scattered settlers can be imagined. The plows that had begun to cut into the grove-dotted edges of the yellow triangle were abandoned. But, fortunately—I speak as a white man—the Sioux got licked at last, and as a reward for what they had done they were expelled forever from the land of their fathers.

WHERE THE CHIPPEWAS SURVIVE

Meanwhile, the Chippewas tried the opposite tactics, an attempt to reason with the Great White Father as he manifested himself to them in the guise of Congressional committees, land agents, and so on.

Photograph by Clifton Adams

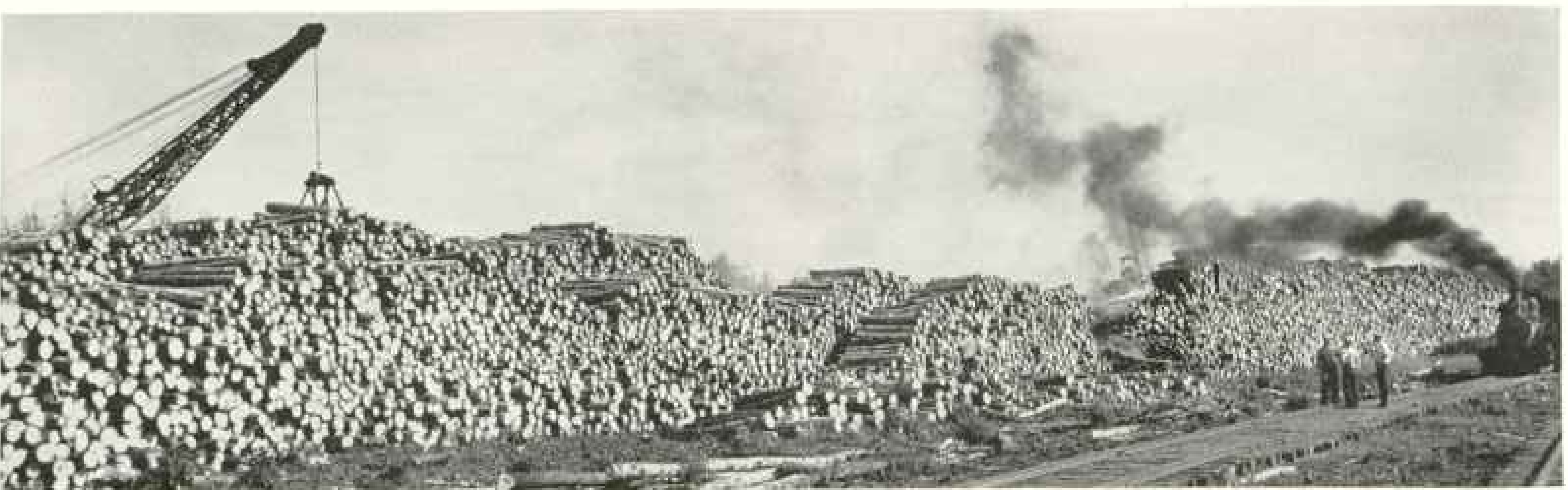
SAUK CENTER'S MAIN STREET HELPED A LOCAL BOY MAKE GOOD

Such people and scenes as this in many a Midwest town inspired Sinclair Lewis, a native son and a Nobel Prize winner, to write his famous novel.

Photograph by Edwin L. Wisherd

WIDE STREETS AND LANDSCAPED LAWNS ARE PREVALENT IN MINNEAPOLIS

Near this residential area is "Grand Rounds," a favorite drive of motorists. It is a tree-flanked system of boulevards that links the wooded gorge of the Mississippi with many of the city's parks and playgrounds (see Color Plate V).



A MINIATURE MOUNTAIN OF ASPEN AND POPLAR LOGS AT INTERNATIONAL FALLS, ON RAINY RIVER

Photographs by Clifton Adams

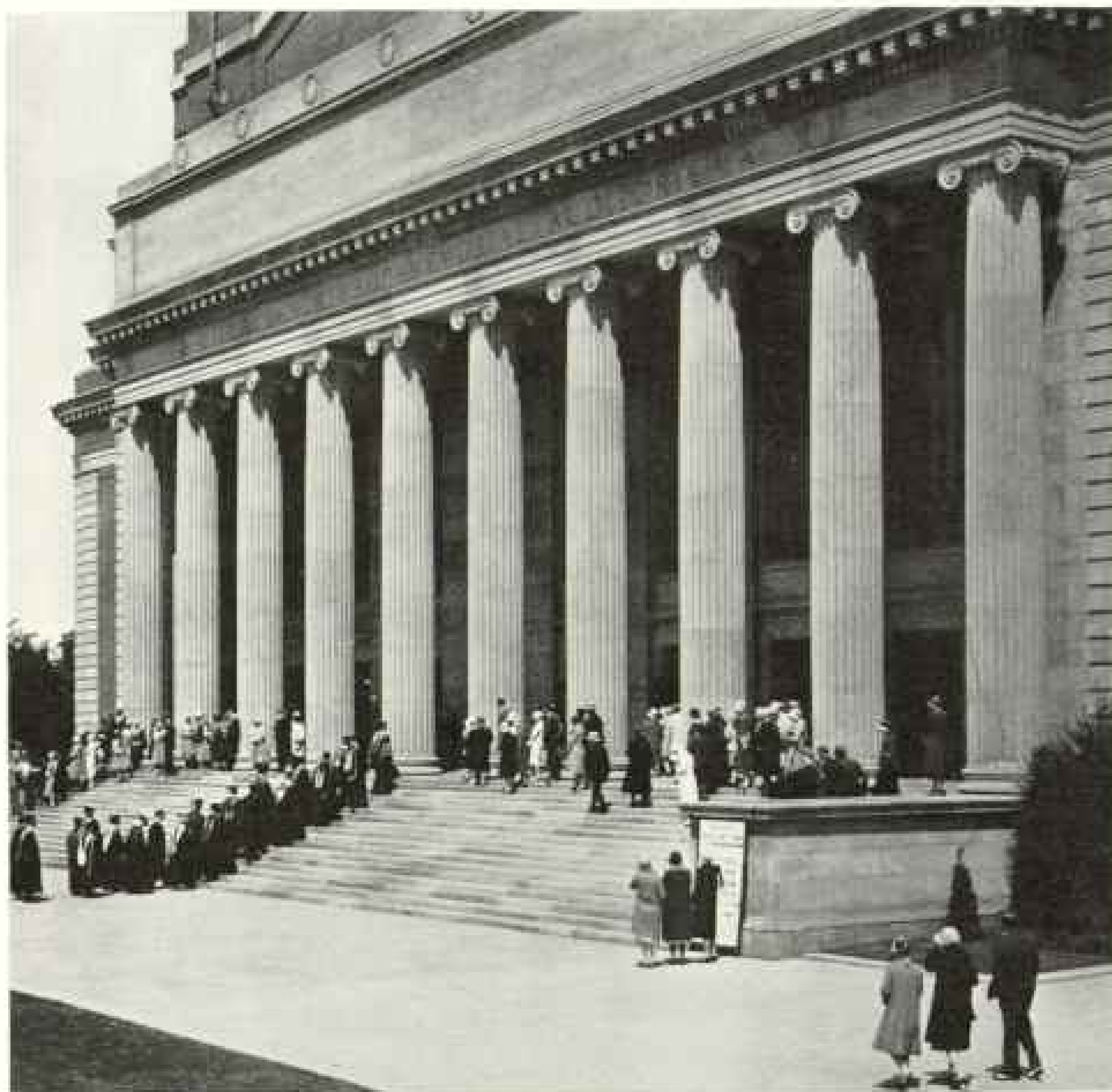
THE NEW STATE CAPITOL (LEFT) AND MODERN SKYSCRAPERS DOMINATE ST. PAUL'S SKYLINE

The small dome of the old capitol (left center), the Lowery Medical Arts Building (right center), the new City Hall and County Courthouse (see illustration, page 302), and the lofty First National Bank Building appear in the photograph, taken from High Bridge. The new Federal Building, not shown, would rise at the extreme right. A grain elevator and flour mill loom in the left foreground.

Photograph by Kenneth M. Wright

A HIGHWAY FOR PULPWOOD IS THE INFANT MISSISSIPPI ABOVE GRAND RAPIDS

In its upper reaches, the great water artery of the United States floats logs to the paper mill rising in the foreground. Some of the thousands of blue lakes scattered over Minnesota's northern regions appear in the distance. The lakes are a heritage from the glaciers that once covered the State.



CAPPED AND GOWNED FACULTY MEMBERS HEAD THE BACCALAUREATE PROCESSION

The University of Minnesota occupies an imposing site in Minneapolis, on the Mississippi. It is noted for its courses in agriculture, mining, dentistry, and social sciences (page 317), and for the athletic prowess of its students. Its famous football team was undefeated in 1933-34.

The results of this patient policy, though not so prompt and decisive as that brought about by the bold play of the Sioux, have been almost equally disappointing. The scandals of the land grab at White Earth, for example, which was to have been an Indian Utopia, make any sensitive Minnesotan blush.

However, the Chippewas survive. A day of more intelligent policy seems to be dawning. Their Pigeon River home is enviable for its natural beauty; the curious visitor will find them there, and at White Earth, Mille Lacs Lake, Red Lake, Leech Lake, and other scattered places, living in various degrees of civilization, sometimes progressive and industrious, again in sloth and dirt. Having much to mourn, they have reason to be slothful (see Color Plate VII).

But their birch-bark huts, their wild rice harvesting, their porcupine-quill embroidery, and their picturesque appearance never fail to excite interest; nor their pagan burying grounds, where little houses are made for the souls of the departed to live in, set in gardens adorned with colored pebbles and shells. At Cass Lake the art of intricate flat braiding survives among some of the women; a braided rug from their hands is unequaled in its craftsmanship and taste for color. I hope this art will not die for lack of young learners.

An Indian legacy that will not die, however, is their geographical names.

© Asahel Curtis

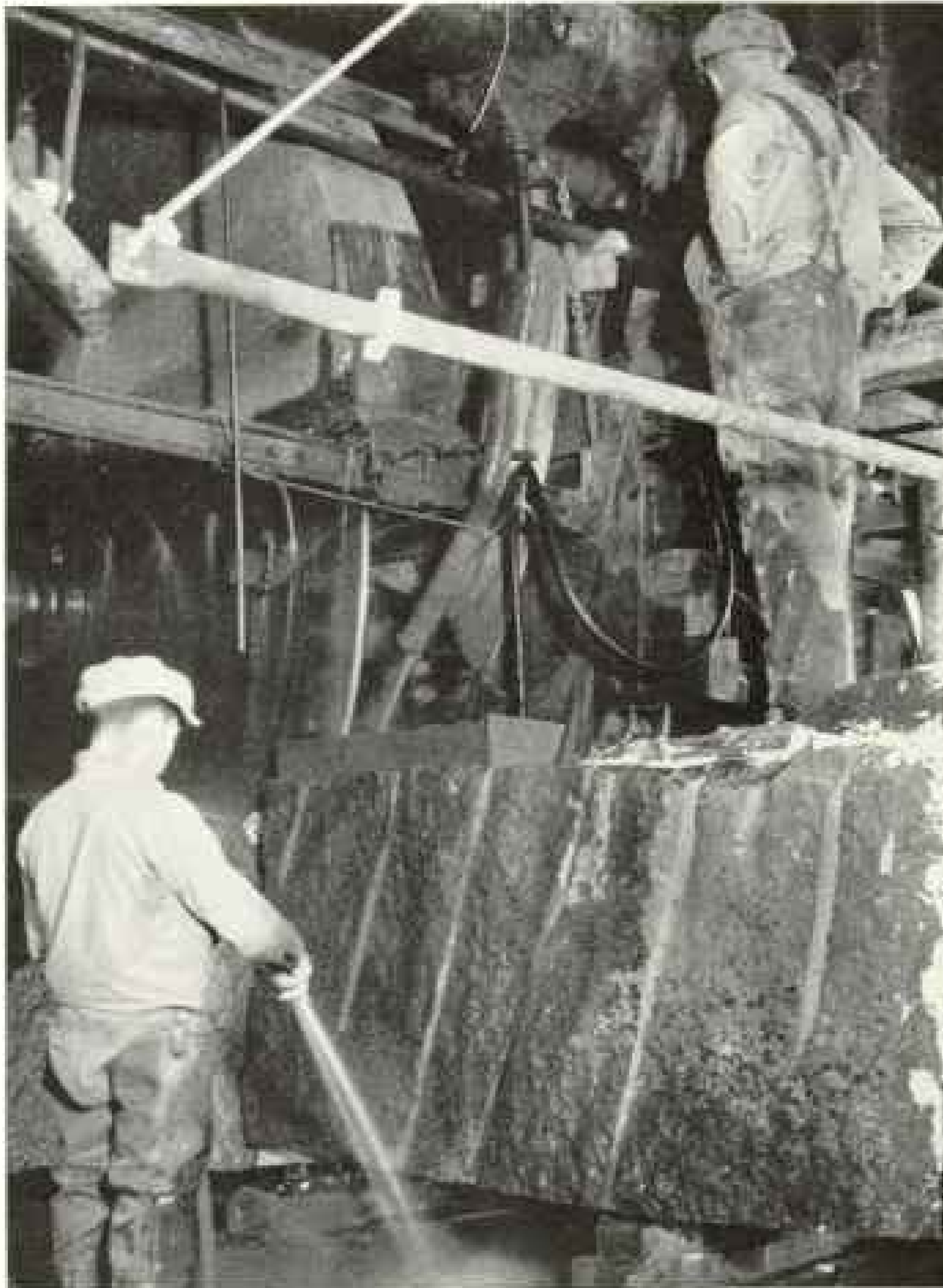
INDIANS HARVEST WILD RICE FROM BOATS

One man poles the craft through the shallows while his companion beats the ripe grain hanging over the gunwales with sticks (see page 297). Chippewas introduced wild rice as a food to early Minnesota explorers.

© Asahel Curtis

EVERYONE LENDS A HAND AT CHIPPEWA HUSKING PARTIES

Indians formerly gathered only enough wild rice to meet their own needs. Now, many tribesmen are employed in a new industry which supplies rice for sportsmen's game banquets and for planting as wild-life food in marshy hunting grounds.



Photograph by Clifton Adams

HUGE WATER-COOLED SAWS SLICE GRANITE BLOCKS

Quarries in the St. Cloud district vie with those of Barre, Vermont, in the production of fine granite. The stone is used for construction of public and private buildings, paving blocks, and curbing for American city streets. The making of red and gray monuments is an important industry in the "Granite City" (see text, page 315).

In the green triangle Chippewa names abound. Even the mighty Mississippi, "Great River," was given its name by these canoe paddlers at its source. Indian practicality is expressed in such names as Mahnomen, "Wild Rice," Menahga, "Blueberry," or Watab, "Tamarack Root Fibers," used in sewing birch bark together for hut or canoe. Their humor, casual and woodsy, crops up in such names as Winnibigoshish, "Miserable-Wretched-Dirty-Water," or the borrowed term Koochiching, "Somewhere or Other a River and Lake."

Now for the white man, that romantic adventurer, trader, builder, or whatever you choose to call him, for he is the most complex Minnesota animal considered in this essay.

He came first as a trader in furs and was a Frenchman. He got on well with the Indians; in fact, married among them. Like them, he interfered little with natural geography, merely leaving behind a few names such as Mille Lacs, St. Croix, or Lac qui Parle, "the Lake That Speaks," perhaps the most subtly poetic of any Minnesota name.

His were the early days indeed, in terms of the State's brief history—the 17th and first half of the 18th century.

The vanished Sioux left behind him in his old home such flavorsome names as Kandiyohi, "Where the Buffalo Fish Come to Spawn," Waseca, "Rich in Good Things to Eat," Minnesota itself, "Cloudy Water."

The Sioux chiefs of historic times are remembered in the city names, Wabasha and Shakopee, Red Wing and Sleepy Eye. So, too, is Winona, Indian heroine of the universal legend of the maiden who threw herself from a high rock rather than marry a man she did not love.

As will be anticipated, Sioux place names are found principally in the yellow triangle.

COLORFUL EPOCH OF THE TRADERS

During the latter half of the 18th century the British traders of the Hudson's Bay and Northwest Companies were dominant. It was a period of colorful enterprise. Headquarters for gathering in pelts from trading stations extending as far west as

the Yellowstone and Saskatchewan were established at Grand Portage, at the extreme outer corner of Minnesota's green triangle.

It is amazing to think of some 1,200 clerks, boatmen, interpreters, trappers, sitting down to dinner there at the height of the trading season in days prior to the Revolution; it was a scene "truly baronial."

The first cattle in all the northwest grazed around that bay; 70 canoes, of 40-foot length, formed the yearly quota of the boat builders. And up the portage itself, to the calm upper waters of the Pigeon River, which in turn gave access to the whole interior of a continent, went supplies and trinkets, and down it came furs, furs, furs—over 100,000 beaver skins for just one annual item.

Over that path, now grown up in violets and the wistful pale clintonia, came furs destined for the neck of Madame du Barry or Beau Brummell's beaver hat. If any Minnesota road is haunted, that oldest one of all is, by the ghosts of the voyageurs.

Photograph by Kenneth M. Wright

THIS TIME THE BIG ONE DIDN'T GET AWAY

This good catch of pike was hooked at Ten Mile Lake, near Hackensack. They are voracious fighters, and are said to eat one-fifth their weight in fish a day. Soon after the ice leaves, they spawn in streams and shallow lakes. Eggs hatch in about three weeks. The remote border lakes of Minnesota are a game-fish paradise (see Color Plate VI and text, page 277).

THE MYSTERY OF "THE LONG LAKE"

The old Grand Portage is of geographical importance for another reason.

At the close of the Revolution, the Treaty of Paris established the northwest boundary of the new United States as passing "through Lake Superior to the Long Lake; thence through the said Long Lake to the Lake of the Woods." Now this "Long Lake" proved in later years to be a joker. Which "Long Lake"? Any lake that is not round is longer than it is wide, and so is entitled to the name. I should guess that about two hundred of Minnesota's Ten Thousand are so called; the name is evidence of the lack of imagination in our forefathers. Thus there was a great deal of wrangling as time went on, since nobody really knew which Long Lake was meant.

The British, with good show of geographical justice, insisted that the boundary should start from the extreme western end of Lake Superior, where Duluth now stands. For a counter proposal, the Americans breezily suggested a boundary beginning well up toward Lake Nipigon. But when Daniel Webster and Lord Ashburton

finally got down to brass tacks in 1842, both acknowledged that old Grand Portage, or rather the Pigeon River to which it gave access, would make a reasonable compromise, and so settled the boundary there.

Neither gentleman guessed that this decision was destined to throw the chief source of iron in the New World, the Mesabi Iron Range, into the United States. If they had, they would probably be arguing the matter yet, death not preventing.

Hazy knowledge of geography as incorporated in early treaties also accounts for that odd bulge in the northern boundary of the State, the Northwest Angle, a promontory attached to Canada and divided from Minnesota by the Lake of the Woods. This is the northernmost part of the United States (exclusive of Alaska). The stamp collector who has a stamp postmarked "Penasse, Minn.," can boast an item from the northernmost post office of the 48 States.

THE FUR TRADE AND ST. PAUL

The British fur trade was in turn supplanted by the American. Grand Portage was abandoned, and furs found their way out to the world of commerce by a southern route, through Mendota and St. Paul. This latter city retains its importance as a fur mart to the present day.

Fort Snelling, first American outpost in Minnesota, had been ready for occupancy late in 1822. This gave a military backbone to society, and a picturesque society and period it was. The young lieutenants sacrificed their beards at Christmas to play female parts in the fort theatricals; when the supply of paper ran out, military reports were forwarded to Washington on birch bark. Steamboats began to ply the Mississippi from St. Louis to St. Paul, though the first stop going downriver, Prairie du Chien, was so distant that there was time for all the children on board to have the chickenpox and recover before arrival.

Many explorers vied in their quest for the true source of the Mississippi. Earliest of all was Pike, who sailed up Lake Pepin to the music of violins, and then made a romantic dash toward his goal in the dead of winter. Later came the Italian Beltrami, Governor Cass, and then finally Schoolcraft, who accomplished the trick in whiz-bang American style, and, from scraps of Latin, concocted the name "Itasca" for that long-sought lake. This was in 1832 (p. 274).

During all this period the beaver skin was the medium of exchange and the staple export. But the beavers could not forever be so obliging: the fur trade waned and is now only a minor industry.

LUMBERMEN SUPPLANT FUR TRAPPERS

The State's next handiest blessing was forthwith exploited—the pine. The green triangle was a wonderland of white and Norway pine forest, assumed to be inexhaustible. Lumbermen from Maine and Michigan flocked in. The St. Croix, the Mississippi, and later the more northern rivers teemed with logs that fed the roaring sawmills; it was the age of the lumberjack and his woods camps, of the log driver and his floating bunkhouses, or "wanigans."

A boom mill town of the period was Stillwater, on the St. Croix. In its earliest years there was a hotel there famous in Minnesota lore for its happy-go-lucky frontier fun. Everybody in town was present at its most celebrated ball, except one unfortunate man who had broken his leg the day before proving that he could lift a keg of whisky above his head and drink from the bung.

Even the babies were there, laid out in rows on a big bed. But while the good folk danced to the fiddler's one tune, some wag stole in and mixed up the babies, and transferred the clothes of some to others, which created an inexpressible confusion at the close of the party and indeed all next morning, until every mother was persuaded that she had got her own child back again.

Stillwater now is the site of the State prison, where binder twine is made to tie Minnesota sheaves. The sawmills saw no more. A tree-shaded calm has settled over the gay old lumber town. So times change.

YARNS OF THE PAUL BUNYAN ERA

Minnesota's forests, of course, were not inexhaustible at all. The green triangle pine was swiftly depleted, to build Omaha, Kansas City, and the hundreds of cities of the growing West. Only now are the noble white and Norway pines again lifting their heads among the softwood groves and jack-pine stands that the lumberman and his slash fires left behind him.

It is easy to grow angry at the lumberman, and indeed I often do it; but I am grateful to him, too, indirectly. The instrument of his devastation, the lumberjack, in the warmth of the bunkhouse when cards got tiresome, spun the stories of Paul

THE STATE CAPITOL—FOUNTAINHEAD OF MINNESOTA'S GOVERNMENT

Although Minnesota is a producer of fine building stone, the State reached halfway across the continent to Georgia quarries for the gray-white marble exterior of its capitol. The building was designed by the late Cass Gilbert, a former resident of the State.

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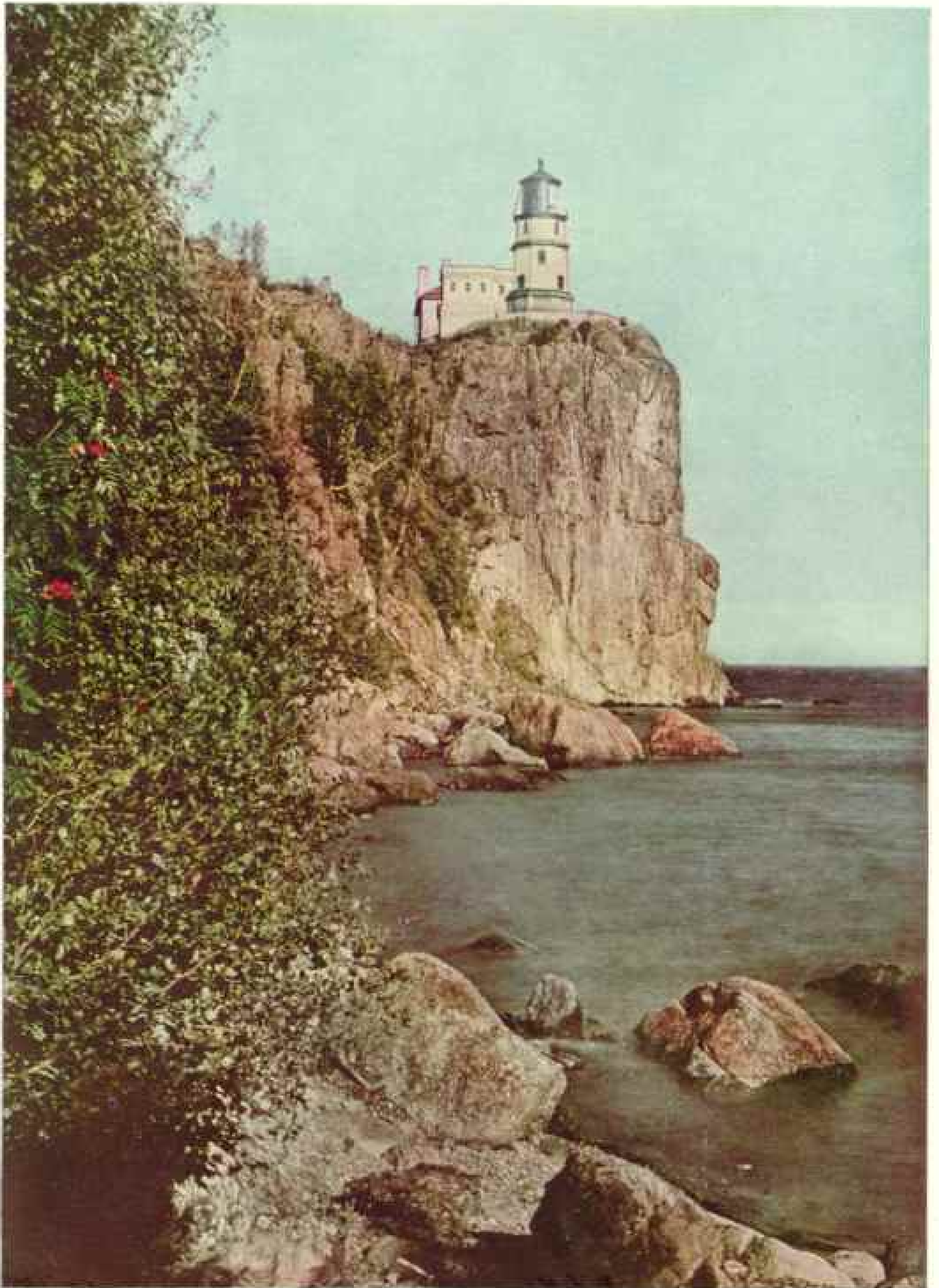
Finlay Photographs by Clifton Adams

SUMMER SPORTS LURE CAMPERS TO PLANTAGENET LAKE

Minnesota's chief contribution to scenic America is its more than 11,000 sky-blue, tree-fringed lakes. Sylvan vistas from porticoes of palatial hotels and shaded camp sites in the "Land of Lakes" delight thousands of pleasure seekers annually.



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Finlay Photograph by Clifton Adams

THIS BRIGHT-EYED SENTINEL IS A GUIDING STAR TO LAKE SUPERIOR MARINERS

From its lofty perch on Minnesota's rock-bound North Shore, Split Rock Lighthouse, with its 370,000-candlepower beam, is one of the lights that serve the parade of commercial and passenger craft to and from Duluth. When visibility is poor, its fog signal blares night and day.

GAY COPIES OF INDIAN CRAFT ARE PARKED IN RACKS INSTEAD OF BOATHOUSES

For a small fee, owners may rent a stall along the shore of a Minneapolis lagoon. Such scenes are common in the Minnesota lake region. In some sections of the State, to preserve natural beauty, highways are forbidden, and then the canoeist comes into his own.

© National Geographic Society Finlay Photographs by Clifton Adams

A RECORD-BREAKING PRIZE WINNER AMONG MINNESOTA'S HORSEFLESH

Five times this Belgian draft mare, "Genese de Ergot," was declared a Grand Champion at the Chicago Livestock Exposition. Horse and cattle fanciers are legion in Minnesota, and dairying is a major industry.

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Finlay Photograph by Clifton Adams

HARVEST TIME LENDS A GOLDEN GLINT TO RED RIVER VALLEY

A grove of trees acts as a windbreak in the distance for a small white house, a large red barn, and farm buildings. Soon after the lumberjack got into his stride, farming, Minnesota's chief permanent industry, began to expand, and the State became the "bread basket of the world." Later, diversified agriculture proved more profitable and many acres of wheat gave way to corn, clover, alfalfa, flax, potatoes, sugar beets, and onions. Wheat now is outranked by butter, of which Minnesota produces more than any other State.

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Finlay Photograph by Edwin L. Wisherd

PEONIES ENLIVEN THIS PARK, ONE OF 140 THAT SURROUND AND PENETRATE MINNEAPOLIS

The backbone of this park system is a chain of lakes ranging in size from tiny Spring Lake to the 425-acre Calhoun Lake. In summer and winter thousands of people find the parks a playground literally at their front doors. More than 5,000 acres—one acre to every 90 inhabitants—are devoted to parks. The city has 34 athletic fields, 44 baseball diamonds, 150 tennis courts, many toboggan slides, ski jumps, golf courses, bathing beaches, and hockey rinks.

Finlay Photograph by Clifton Adams

AFTER A MORNING'S ANGLING ON "BIG WINNIE" (WINNIBIGOSHISH LAKE)

Minnesota is a sportsman's paradise. In not more than a day's drive of his home, any Minnesotan may reach a good fishing ground where pike, bass, crappie, muskellunge, or lake trout is abundant.

© National Geographic Society

Finlay Photograph by Edwin L. Wisherd

PERHAPS SHE DESIGNED YOUR CHRISTMAS CARD

Mention a flour mill and one's thoughts turn to Minneapolis. Yet flour is but one of many commodities produced in the city's more than 1,200 factories. Until about twenty years ago, Minneapolis was a headquarters for lumbering, but now the industry has moved north.

© National Geographic Society Finlay Photograph by Clifton Adams

BIG BEAR, A CHIPPEWA CHIEF, LENDS A TOUCH OF THE OLD WEST TO ITASCA PARK

His tribesmen, who make beaded bags, toy birch-bark canoes, baskets, and other handicraft, live on Pigeon River, at White Earth, Mille Lacs, Red Lake, Leech Lake, and at other scattered places. The Sioux, Minnesota's original inhabitants, now are nearly as rare in the State as caribou. This park embraces within its 34,855 acres the source of the Mississippi River. The "Father of Waters" is an infant stream when it leaves Lake Itasca, navigable only by a canoe and easily waded.

© National Geographic Society

Finlay Photograph by Clifton Adams

A FAVORITE HAUNT OF BATHERS AND CAMPERS IS TUMBLING LOWER GOOSEBERRY FALLS

Indians called the stream Shab-on-im-i-kan-i-zibi, meaning "The Place of Gooseberries River," but they may have taken the name from the Frenchman, Groseilliers, translated "gooseberry bushes," who explored the region 275 years ago. While some of Minnesota's cascades have been harnessed for electric power, many still rush down their courses unmarred by man-made barriers.

Bunyan for his own laughter, and very American legends they are, oozing with rich exaggeration and backwoods fun.

Minnesota's Ten Thousand lakes became the mere footprints of Babe, Paul's ox; the Mississippi source was a leak that could not be mended in Paul's water cart. And the chipmunks, which in the green triangle are of an exceptionally small size, were reputed to have grown to the bulk of tigers on the prune pits Paul's cook threw out, and thereafter to have hunted the wolves. Forests will grow again, and are worth waiting for; meanwhile, we have a legacy of "rip-snorting" good stories to chuckle over.

But it is false to suggest that Minnesota's wood industries are dead (see pages 282-3, 304). Cloquet, a town wholly given over to them, is a busy place. Here the inquiring visitor can see in process of manufacture everything from the spatula the doctor presses on your tongue when he tells you to say "ah" to large sheets of wall-board.

Pulpwood still has its importance; at International Falls, on the border, is a paper mill that is gigantic, as are also the mounds of pulpwood logs kept on hand to feed it. But scientific lumbering is the rule of the new day, which seems very niggardly in comparison with the reckless methods of Paul Bunyan, who invented the aurora borealis to light the cutting of his night crew!

AND THEN CAME FARMING

Soon after the lumberman got into his stride, farming, the State's chief permanent industry, began marvelously to expand. Minnesota was soon "the bread basket of the world," thanks to the wheat her settlers energetically raised in the yellow triangle. But, as elsewhere, diversified farming has proved more profitable in the long run.

Thus, the State's present agriculture is noteworthy for a wide variety of products. Wheat is still important, but not so important as corn, and no grain crop is so important as the creamery products; they take top rank. A new title for the State, very fat and cozy, might be "the butter tub of the world." But potatoes and all the small grains rank high in the list of Minnesota's produce, and there are crops of value that a visitor might be surprised to find at all, such as tobacco and flax.

Minnesota's first fields were at Fort Snelling (p. 275). The first bread made from this first wheat was a failure; the garrison threw it on the ground in rebellion. But this inauspicious start was misleading. In not many years Minneapolis' mills, built on the same site—the gorge of St. Anthony Falls—were among the largest in the world (page 280).

It is a far cry from the first creaking mill-stones, and flour bolted through the miller's wife's silk dress, to these present temples of flour making and the thousands of barrels of scientifically standardized flour products they grind daily. And in the same period the meat industry has passed from that Arcadian beginning when the officer's bride at Fort Snelling could name what game she would like for supper (her husband would bring it back, freshly shot, in an hour) to this day of huge efficient packing-plants in South St. Paul and Austin (303).

Butter, no longer a matter of personal friendship with a cow, is prepared for the Nation's housewives in coöperative creameries, modern, sanitary, justly profitable, dotted everywhere through the State (317).

WILD RICE STILL HARVESTED IN ANTIQUARIAN STYLE

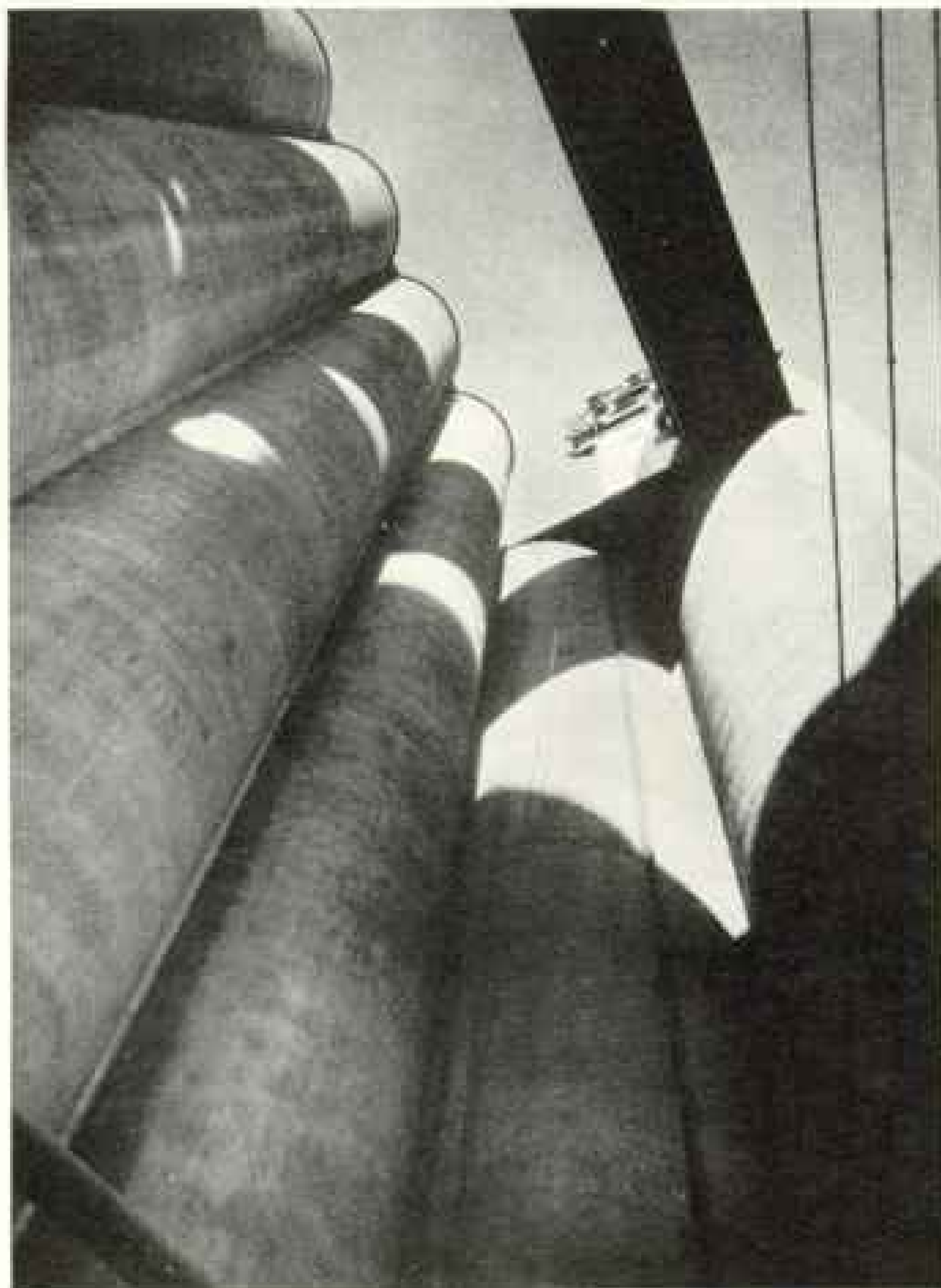
One Minnesota crop is still harvested according to prehistoric methods, wild rice. This grain Nature sows and the Chippewa reaps, where it hangs drooping in the shallows of lakes or slow rivers. Mechanical harvesting is forbidden; instead, as Father Hennepin, the rash missionary of the 17th century, described them doing, so do the Indians now, beating the ripe grain into their canoes with sticks (page 285).

And the blueberries and cranberries that fed the Indians and the early settlers still are harvested by hand, still carry the delicious tang of native wild-growing fruit; they are a characteristic product of the green triangle.

The homesteader there, too, can boast of quantities of wild strawberries, the delight of epicures.

In fact, Minnesota has much to brag about in its good things to eat. Let me mention wild duck and wild rice, harmonious poem of the autumn season; or Lake Superior trout, toothsome specialty of the Duluth cuisine; or the fresh lake herring famous at Lutsen.

Of fish and pheasant there is a rich abundance in season; likewise, of all the good things a western farm provides. Ham and green corn! I grow faint at the thought of them. And an inquiry into Minnesota



Photograph courtesy General Mills

AN ANT'S-EYE VIEW OF WHEAT STORAGE TANKS

Into these huge concrete elevators at Minneapolis, divided into numerous compartments, goes wheat of various grades for storing and blending. Because it lies at the door of a vast grain-growing region, the city has become the foremost primary wheat market of the world.

lore is no less mouth-watering. To Minnehaha, his Sioux sweetheart, Hiawatha brought a gift of venison. Father Hennepin, starved visionary, came to earth with a grateful thud when a dish of boiled wild rice and blueberries was set before him by the squaws. Governor Cass, worn with wilderness exploring, glowed with pleasure over Fort Snelling's fresh green peas.

As for the Paul Bunyan stories, they reek with the hearty smells of the cookhouse, where the pancake griddle was so broad that to grease it a darky boy was kept busy skating on its hot surface, a ham strapped to each foot. Nor have I forgotten the large, creamy, flour-dusted ginger cookies the wanigan cooks made and sometimes gave to a small boy visitor, in the days when wanigans still plied the Mississippi.

First into the woodland diagonal, then—it was a stampede, almost—into the yellow triangle, and then gradually into the green triangle, in the lumberman's wake came the flood of farmers, hungry for land. Railroads, in active process of construction under the great Jim Hill, left no part of Minnesota's farming country inaccessible.

Agents at Ellis Island and in Europe loudly advertised the Promised Land, some paid by the State, others by the railroads, still others by high-pressure land salesmen. But word-of-mouth tales were as always the most powerful persuasion.

Who was it that came?

There was an early and steady influx of native Americans who acted as a fortunate ballast for the somewhat unwieldy cargoes of immigrants every steamboat soon was bringing. In Red River carts and prairie schooners they creaked across the yellow triangle until the railroads could carry them.

DAYS OF THE SOD CABINS

Many went so far as the fabulous Red River Valley, that floor of a great vanished glacial lake, stoneless, treeless, level as a billiard table, ripe for the plow. Where there was no wood to build a log cabin, houses of sod were put up. In these the society of Crookston began, and the other Valley towns; the fiddler at their dances

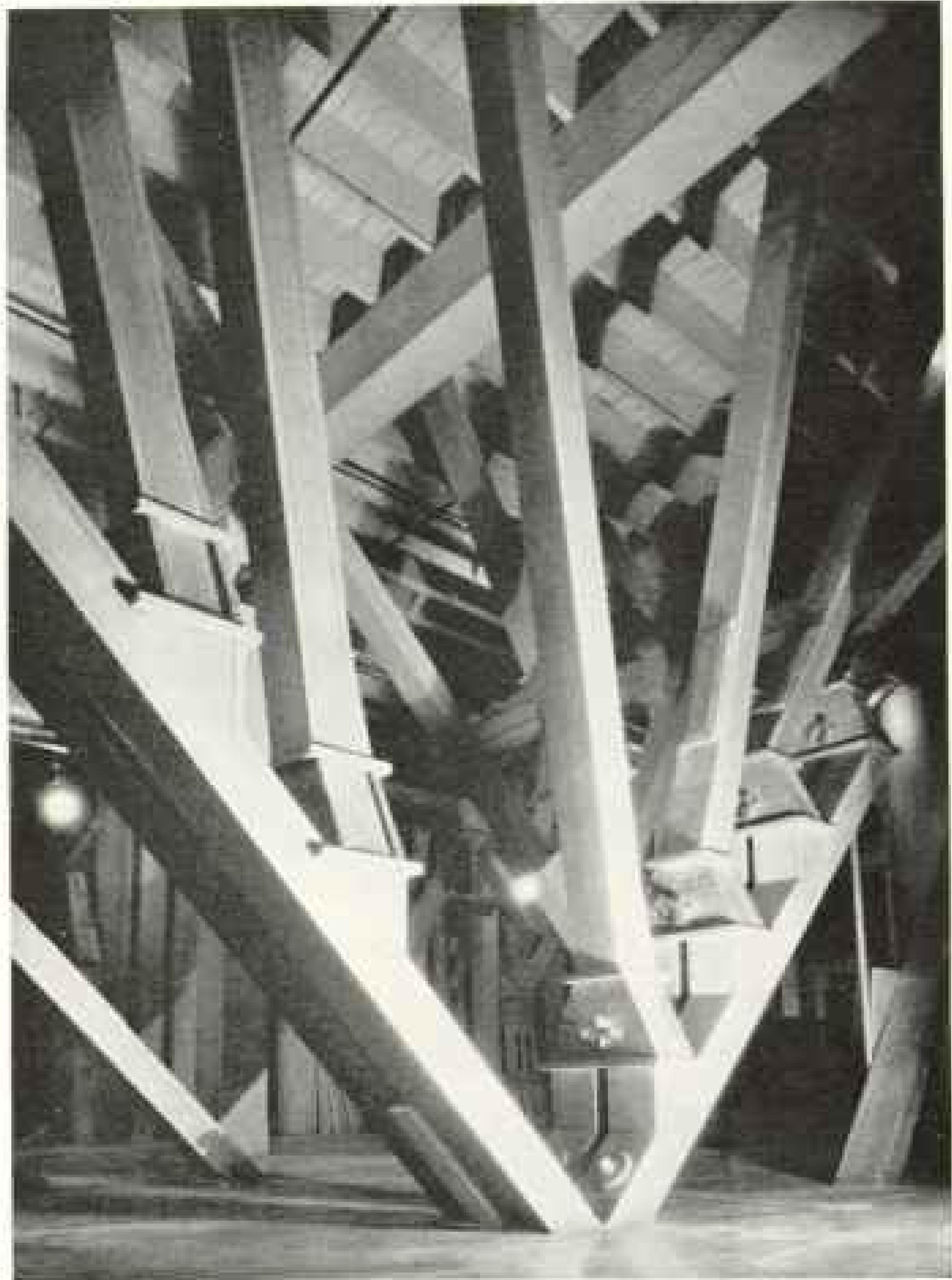
would call "Sashay your pardner!" and they hopped the polka to—

Left foot, right foot,
Any foot at all:
Jennie lost her petticoat
Dancing in the hall.

THE BRITISH BEAN GROWERS

Another group was British. A land salesman set up a London office, from which he proclaimed that certain riches awaited the grower of beans in Minnesota. This seemed easy; a colony of British bean growers was soon established at Fairmont, on land the salesman happened to own. But beans failed them. However, many of the colonists remained; their feats of horsemanship in the fox-hunting tradition were a sensation at the early State fairs. Other communities have been characteristically Polish or Bohemian, Welsh or Danish.

But the chief tides of immigration flowed from Norway, Sweden, and Germany. These people came by the thousands, the Scandinavians with their fish puddings, skis, and coffee pots; the Germans with sausages, holy pictures, and beer kegs. A healthy, industrious, cleanly lot they were, who knew how to take care of themselves. Such names as Nordland and Oslo, Strandquist and Enstrom, New Ulm and New Munich began to appear on the Minnesota map.



Photograph courtesy General Mills

ROOF SUPPORTS? NO! WHEAT CHUTES

The modern handling of grain in Minneapolis is a marvel of mechanical efficiency. These conveyors and spouts mix wheat of different kinds to make the millers' blend.

The musical singsong of the Scandinavians and the rich German speech overwhelmed English in whole communities, and only in these days is the latter becoming universal.

In remoter German parishes the male dancers show their strength, in robust Old Country style, by whirling with a girl seated on each bent forearm; the tune will probably be "Immer noch ein Tröpfchen" squeezed out of a panting accordion. The Scandinavians meanwhile drink Christmas *glögg* and sing "Gubben Noah" (Father Noah). Old chorales resound in their plainly built churches. And the Germans, no less true to the faith of their fathers, take comfort in the music of mellow bells ringing from the spires that dot their countryside, and in piety celebrate Corpus Christi in a procession from shrine to shrine around their churchyards.

THE TWIN CITIES

To handle the trade of this expanding rural population towns and cities sprang into existence, of medium size and very

Photograph by Maynard Owen Williams

MINNESOTA OFFERS UNEXCELLED VARIETY TO THE HIKER

Two Boy Scouts from Minneapolis, blankets and provisions strapped to their backs, stop to read about Fort Charlotte. This outpost of the Northwest Company stood on the south bank of Pigeon River, which to-day forms part of the boundary between Minnesota and Ontario.

Photograph by Clifton Adams

TO GET HIS MAIL HE MUST PULL HIS BOX OUT OF THE AIR

After heavy snows, State road plows bury conventional boxes beneath 10-foot drifts. This farmer, near Little Fork, solved the problem by attaching his box to a log boom resembling an old-fashioned well sweep.

regularly spaced all through the yellow triangle, more widely spaced through the green triangle, and as cities of larger size up the woods diagonal.

Minneapolis and St. Paul, grown virtually into one city, provided the chief mart, St. Paul for animal products, Minneapolis for grain. St. Paul also became a major railway terminus. Dominated by descendants of the early German and Irish settlers, it is famed to-day for such various things as its meat packing and beer, its State fair and its printing business (especially legal books).

Minneapolis is dominated by its Scandinavians—the jokes do not err. It is said that if the cry comes "Paging Mr. Johnson!" in a Minneapolis theater, half the audience will rise. The city has become one of the world's important grain markets; it is also famed for its lakes—several large ones within the city limits—its picturesque mills which make the artist reach for his brushes in a happy daze, its knit underwear, its University, and its renowned orchestra.

Photograph by Clifton Adams

"WANT TO BUY A PIE?"

This high-school miss at Ash Lake asserts that the secret of success with blueberry pie is to include a few green berries with the ripe to make it tart. Blueberries grow abundantly in the northern part of the State.

Linseed oil, base of paints and inks, is a very important Minneapolis product; the oil is pressed from the flaxseed of the Red River Valley, and by-products are returned to the farmer as valuable feed.

Thus these twin municipalities have a wide variety of things to boast of, including a population of almost a million people.

The rivalry of the two members of this one body is proverbial. St. Paul taunts Minneapolis with being a "nine o'clock town," for it is true that that city's Lutheran views dictate a stricter decorum than the more worldly-wise city bothers to maintain. Minneapolis retaliates thus: "Yes, we're thinking of incorporating both cities in one, to be called 'Minnehaha,' 'Minne' for Minneapolis and 'ha ha' for St. Paul."

The good-humored sparring involved keeps moss from growing between the toes of either.

IRON, AND "THE BIGGEST HOLES ON EARTH"

Toward the end of the 19th century the Mesabi iron deposits, of which Daniel Webster and Lord Ashburton had been ignorant when fixing the boundary, at last were discovered.

Photograph by Edwin L. Wisherd

ST. PAUL'S PROGRESSIVE SPIRIT IS EXEMPLIFIED BY THE NEW CITY HALL AND COUNTY COURTHOUSE

This modernistic, tower-type structure of limestone, trimmed with polished metal, is a recent addition to the city's ever-rising skyline. Public offices and court rooms are finished in some thirty different types of veneered woods, all manufactured in the capital. The building was designed by Holabird and Root of Chicago and Thomas Ellerbe of St. Paul.

Photograph by Clifton Adams

NEW JERSEY HAS ITS FAMOUS CLOVER LEAF, MINNESOTA ITS SPIRAL

Motorists driving from the Twin Cities southeastward over Minnesota Trunk Highway Number Three cross this Mississippi bridge to enter Hastings. The head of navigation on the river is at St. Paul, a few miles northwest of here.

Photograph courtesy John G. Hormel

AUSTIN-PACKED MEAT IS SOLD IN SIAM AND SIERRA LEONE, PERSIA AND PERU

The women at the tables are making link sausage of the "coils" of stuffed casings. When the racks are filled with future "hot dogs," they are wheeled into the smoking rooms at the rear. This packing house prepares meat and poultry for consumers in every State of the United States and in 47 foreign countries.

Photograph from George M. Shepard

WINTER DOES NOT DETER THE MINNESOTA LUMBERMAN

When forests are covered with snow and ice, sturdy sleds take the place of trucks. The State's trees built the pioneer homes of Omaha, Kansas City, and other cities of the West (see text, page 288).

Photograph courtesy Caterpillar Tractor Company

ENOUGH BOARDS TO BUILD 50 FRAME HOUSES FLANK THIS LUMBER LANE

The manufacture of wood products, including sashes, doors, barrels, and boxes, is Minnesota's third largest industry. Cloquet is entirely given over to fabricating products ranging from spatulas to wallboard.

Photograph from F. C. Clapp

IT WILL TAKE A DERRICK TO RESCUE THESE HORSES, BELLY-DEEP IN MUSKEG

The vast swamps or marshlands of northern Minnesota, carpeted with peat moss, were called muskegs by the Indians. In wet weather, both men and animals find it difficult to work in the soggy soil (see text, page 312).

Photograph courtesy Caterpillar Tractor Company

A TRACTOR TURNS THREE FURROWS OF TOUGH SOD AND WET PEAT NEAR WILLMAR

The prevailing soil of Minnesota is black loam, underlain by clay. It is deep and rich in the southern part of the State and in the Red River Valley. With the exception of a small rocky area in the north, there is scarcely any land in Minnesota that could not be made productive.

Photograph by Clifton Adams

THE VAST, MAN-MADE CRATERS OF THE CUYUNA RANGE SUGGEST THE EARLY DIGGINGS FOR THE PANAMA CANAL

Electric and steam shovels load the iron ore into cars which, made up into long trains, are hauled to Superior, Wisconsin. There the cargo is dumped into pockets in the ore docks and thence transferred to waiting lake boats. The Cuyuna Range was opened in 1910 and has since yielded about a million tons annually.

Photograph by Ewing Galloway

MORE THAN 400 CARS LOADED WITH POTENTIAL IRON AND STEEL PRODUCTS PAUSE AT PROCTOR

Minnesota is the largest iron-ore producing region in the world. Much of the mineral passes through these yards and the port of Duluth (see page 309). The Mesabi Range, one of the State's chief sources of ore, is less than three hours "by ore car" from here.

Photograph courtesy The Minneapolis Journal

HUMAN BIRDS TAKE OFF HIGH ABOVE A HUSHED CROWD

The skiers have just hurtled down a steep runway at Glenwood Park, Minneapolis, and shot off into space, their arms rotating to help them land skis down. They will alight on a snowy incline that breaks the shock of fall, and then, if lucky, glide to the level stretch and pull up in neatly executed turns to the echo of a thousand cheering voices. They are judged for their grace and skill and the distance traveled in the air.

The discoverers were a family of seven brothers named Merritt. Timber cruisers and woodsmen of the most expert sort, they were also amateur prospectors. With a faith almost unreasoning they explored the mosquito-infested swamps and forests of the hill country behind Duluth. This wild-goose chase was rewarded with a goose capable of laying truly golden eggs: their dip-compass charts located the first of those vast pools of soft ore which, soon exploited, built the ships, bridges, railroads, machinery, and skyscrapers that a lustily expanding nation hungered for.

With incredible energy these same brothers surveyed the railroad to carry the ore to port, and then, brushing aside the mining engineers who were thumbing their whiskers and trying to think how to sink the customary shafts, they turned a primitive form of steam shovel loose in that flaky red earth.

The Mesabi mines saw the development of this new contraption, the steam shovel. In the process a series of "the biggest holes on earth" were dug, all the way from Coleraine to Biwabik, with the biggest of all at Hibbing, rivals in grandeur and somber color to Nature's own canyons in the Southwest.

Unfortunately, the Merritts were not as able in management as in these rough-and-ready early doings; they went down in defeat before the subtleties of finance. It is a melancholy story, but the mines are their monument.

DULUTH'S UNIQUE LOCATION

Duluth, Minnesota's third city, was not slow to respond to the stimulus the ore traffic provided; she grew rich and great. Squeezed between a perfect harbor and a barrier of hill that hangs a natural rock garden above the very chimneys of the sky-

Photograph by Kurt B. Fiorman

COLOSSAL ORE DOCKS PIERCE DULUTH'S "PERFECT HARBOR"

These piers, nearly a half mile long and electrically operated, can dump 12,000 tons of iron ore every four hours into waiting vessels (see text, opposite page) destined for Chicago, Gary, and Pittsburgh, and other steel centers.

scrapers, Duluth is one of the most oddly placed of cities. But the placing was inevitable. Here is the natural terminus of Great Lakes traffic, the key point in its connection with the huge area of the plains beyond.

Since it is as easy to bring coal to Duluth as to take ore to Pennsylvania for smelting, steel mills have sprung up near the city, supplying the needs of a western market. These form a picturesque sight of the St. Louis River estuary, that maze of islands, some green as salads, others black with industry, that winds inland from the harbor.

Spidery coal hoists and drawbridges, grain elevators as massive and stately as Old World cathedrals, the vast hulks of ore docks make a picture of unresting enterprise along those calm waters.

The harbor itself is all that a harbor should be, ample, safe, protected from the lake by a bar so narrow that a small boy with a slingshot could put a pebble across it, and complete with the melancholy cry of the gulls and the sad hoot of entering and departing freighters.

Labor for the mines was recruited from south Europe. The Range towns are peopled by Italians, and by Yugoslavs and other Balkan folk. They form a kind of racial island in Minnesota's Teutonic sea, an incongruity in a land so uncompromisingly northern. But with them came a people who are eminently at home, the Finns.

THE FINNS FIND A NEW HOMELAND

Nowhere have Finns settled in such numbers as in Minnesota's Arrowhead Country. It is like their own Finland, rocky, wintry, laced with countless lakes; they know without any textbook guidance how to be happy and prosperous in it.

They dry their hay on racks of poles, and saw the poplar, birch, and pinewood that their Finn stoves devour—metal cylinders reaching to the ceiling—with Finn saws, sinuous blades of steel strung across rigid metal bows. At log-cabin building they are

Photograph by Clifton Adams

MODERN BUILDINGS DOMINATE THE MINNEAPOLIS BUSINESS DISTRICT

Looking at the skyline of downtown Minneapolis to-day, it is hard to realize that less than a century has passed since Indian tepees, a few rough cabins, and a sawmill clustered about St. Anthony Falls were the only habitations here. At the left is the Medical Arts Building, next, the lofty Foshay obelisk, and, extreme right, the Northwestern Bell Telephone Building.

Photograph by Clifton Adams

THREE THOUSAND THANKSGIVING DINNERS FATTEN ON THIS FARM BY THE SHORES OF BATTLE LAKE

Photograph by J. E. Quigley

CARLETON COLLEGE PIONEERED IN MINNESOTA EDUCATION

Although the college was established at Northfield, Minnesota, in 1866, most of the buildings on its 800-acre campus are less than 17 years old and are equipped with modern facilities. Dr. Laurence M. Gould, second in command of the First Byrd Antarctic Expedition, is professor of geology at the college (see text, page 316).

the master craftsmen. And as athletes they are famous; such names as Reino Kylmala or Arvo Wopjo on a hockey team are just so many danger signals.

The skis they carve from birchwood painstakingly seasoned over the cookstove are a treat to the eye—exquisitely long, narrow, and arched, like the eyebrows of some distractingly pretty Hollywood star.

In the same classic tradition are their Finnish baths, when first the men, then the women, gather in log bathhouses and swap the week's news in high good humor. A torrential sweat, a luxurious soaping and rinsing down, a breath-taking cooling process outdoors in the snow or the frigid water of lake or river—this is the ritual of the famed Finnish bath, and I can say from experience that it does limber up the joints wonderfully, and sends a man home whistling tunes as loudly as a locomotive, for he feels good.

Finnish names begin to appear on the Minnesota map, Suomi for example; but the unfamiliarity of that alien tongue has led to some baffling transmutations. For instance, Koksi (Two) Pond in the Superior National Forest is now Coxey on maps.

The Mesabi Iron Range is merely the most spectacular mineral resource of the State. The Vermilion Iron Range supplies high-grade Bessemer ore, steadily in demand; the Cuyuna Range's vast resource of heavily overlain manganese ores has not yet been worked to the same extent.

There are also important nonmetallic minerals; for instance, the pottery clays and filter sands of Red Wing. The gigantic peat resources of the green triangle are virtually unexploited; nearly seven billion tons—more than half of the United States' total supply—lie there ready for future use. I mention merely the high-grade peat, occurring in layers at least five feet thick (305).

Photograph by Edwin L. Wisherd

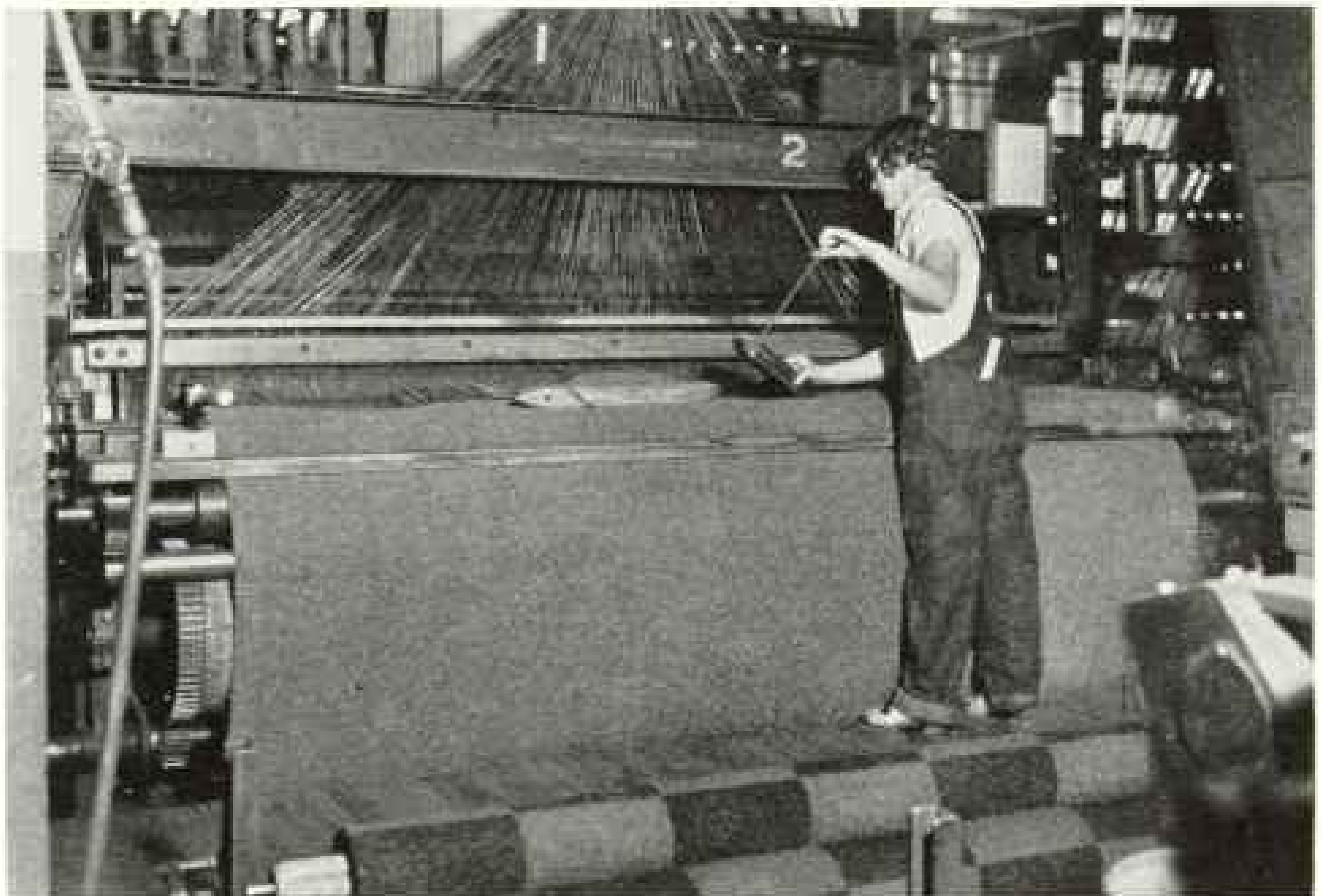
MINNEHAHA FALLS IN ONE OF ITS LIVELIEST MOODS

Since Longfellow wrote "Hiawatha," the march of civic growth and progress has nearly dehydrated the falls, so that, except in flood times, the rock-strewn bed of Minnehaha Creek is nearly dry. A dam has been built above the falls to impound the stream. For special occasions the flood gates are opened and then the cascade foams in its former glory.

Photograph courtesy The Minneapolis Journal

TWO MINNEAPOLIS CHILDREN SCULPTURED THIS SNOW "DOBBIN" AND COLT

"Father helped us only a trifle," said Glenn and Maxine Christopher, who each winter make fantastic snow figures.

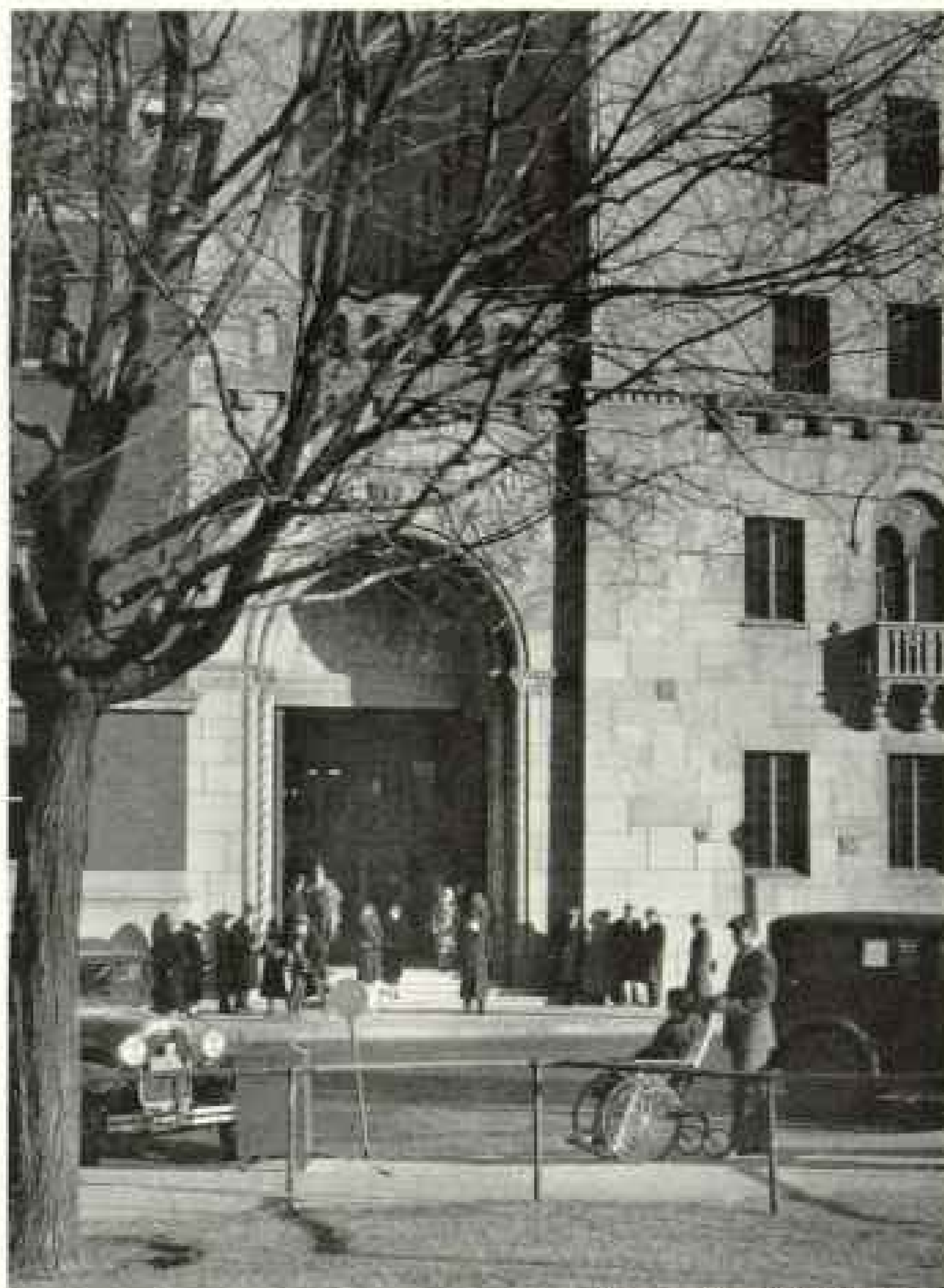


Photograph by Clifton Adams

THIS RUG WAS "GROWN" IN MINNESOTA

The operator is weaving a flax rug in a West Duluth mill from raw material produced in the State. Minnesota farmers have learned the value of diversified farming, and now many acres of former wheat land are planted to flax and other crops.

If any of my readers wish they were rich, let them busy themselves in solving the problem of how to use Minnesota's high-grade peat in smelting her lower grade iron ores. Not only riches will reward the discoverer of this process, but very likely the monument of some Pittsburgh of the West named in his honor, risen in the wilds of the green triangle.



Photograph from E. H. Schlitgus

THE THRESHOLD OF A WORLD-FAMOUS CLINIC AT ROCHESTER

Assembled and working under the guidance and patronage of William and Charles Mayo, a large staff of diagnosticians, surgical and medical specialists, and teachers and research men minister here in the cause of health. Hundreds of patients from many States and foreign countries register daily for examination and treatment (see text, page 317).

The building stones of Minnesota serve as a basis for an important industry. They are widely distributed in location and character: the jasper of the Coteau des Prairies, Kettle River's sandstone, the widely used pink-dappled Kasota and Mankato stone, the richly patterned gneiss of Morton used from coast to coast in cemetery memorials, and the granites of St. Cloud, which rivals Barre, Vermont, as a producer of granite.

The mechanical advance in these stone-working industries has been revolutionary in the last fifteen years. A visitor at some such vanguard establishment as the plant at Cold Spring, in the St. Cloud district, will see Minnesota's stubborn, water-resistant granite sawed into slabs perhaps a mere inch-and-a-half in thickness, these slabs brilliantly polished, then recut by carborundum blades whirling at such speed that they move in a path of fire despite the water jets that play upon them (see illustration, page 286).

The pipestone quarry, famed in legend, near Pipestone, in the outmost corner of the yellow triangle, is unique. It can be worked only by the Indians.

In one of the legends the soft red stone of that quarry is the flesh of the whole Indian people anciently drowned in the Flood. They had fled to the Coteau des Prairies as the waters rose, but were there drowned, all except one girl. Carried off by the soaring War Eagle, she became his bride in the skies, and so bore children who repopulated the world.

The Coteau thus is an American Ararat, in a sense; and from that grave in which the flesh of all tribes was mingled—now turned to stone—the Indian drew the material for his peace pipes. These pipestone calumets, symbols of the brotherhood of all, have been discovered as far afield as New York and Georgia.

Photograph by Kurt B. Florman

IN HIBBING'S HANDSOME SCHOOL, CLASSES RANGE FROM KINDERGARTEN TO JUNIOR COLLEGE

Within the limits of the district lie several vast open-pit iron mines. Funds for the construction of this building were largely supplied by the mine taxes. It has a large auditorium equipped with a pipe organ and a spacious stage.

Longfellow started one of Minnesota's most important industries. After the publication of "Hiawatha" the hotel proprietors at Niagara noisily bewailed the fact that all their business was going to that half-pint western waterfall, Minnehaha (see page 313). Such is the power of poetry.

The visitors have been coming ever since, their numbers exceeded only by those who go to the winter resorts, Florida and California. The Ten Thousand lakes offer an irresistible lure: the sandy lakes perfect for wall-eyed pike and bathing at Detroit Lakes or Alexandria, the rocky, pine-girt lakes of the Arrowhead, fashionable White Bear Lake and Lake Minnetonka, broad Mille Lacs Lake, or Lake Superior itself, marvelous in its pale-blue atmospheric effects and its rugged shore down which cascade after cascade comes splashing.

Resorts are abundant, and of kinds to suit all tastes, from the gaiety of Bemidji and Gull Lake to the old-fashioned quiet and civility of Frontenac or Clearwater Lake. But the most popular type, found on Star Island, in Cass Lake, with its primeval groves of rusty-boled pines, and in many other places, is the easy-going log-cabin camp, where folk in old clothes make the informal acquaintance of Mother Nature.

And what a profusion of flowers, mosses, and wild life of woods and waters that rich old lady is ready to show! She amiably cools the hot brow of the thankful Oklahoman at the same time that she gives his children a lustrous deep sun tan and fills his wife's larder with fresh fish and juicy blueberries.

But the most unusual of Minnesota's vacations is a canoe trip in the Arrowhead and border waters. Access to the district, through which roads are held to a minimum by policy of the Superior National Forest, is provided at Ely, Tower, and the camps of the Gunflint Trail. Sleeping in tents, portaging, exploring the maze of that watery wonderland, the modern voyageur can revel in the true wilderness life.

The wisdom of the State's founders and early legislators has blessed her with a school system amply financed.

Most noted are the schools of the Mesabi Iron Range. Built with taxes levied on ore-producing properties, they loom over those

Photograph by Clifton Adams

THEY MAKE 800 POUNDS OF BUTTER AT A SINGLE CHURNING

To supply the creameries of Moorhead, milk is shipped from dairies within a range of hundreds of miles. This plant alone produces enough butter annually to provide each person in Washington, D. C., with about 13 pounds. Roquefort cheese now is being made in caves along the Mississippi.

mining towns like bulls strayed into a herd of piglets. They are palaces of learning; it is a wonder the children ever go home. In the same grand tradition Duluth's Central High School beetles on its hill like a fortress, a long-range cannon standing at the door as if to blow up the enemies of education.

The University, which ranks among the Nation's half-dozen largest, makes no pretense of being another Oxford. Instead, it labors to prepare its thousands of students for useful, happy citizenship, in practical ways. To this end everything from an appreciation of the Brandenburg Concertos to methods of exterminating the sow thistle is energetically taught.

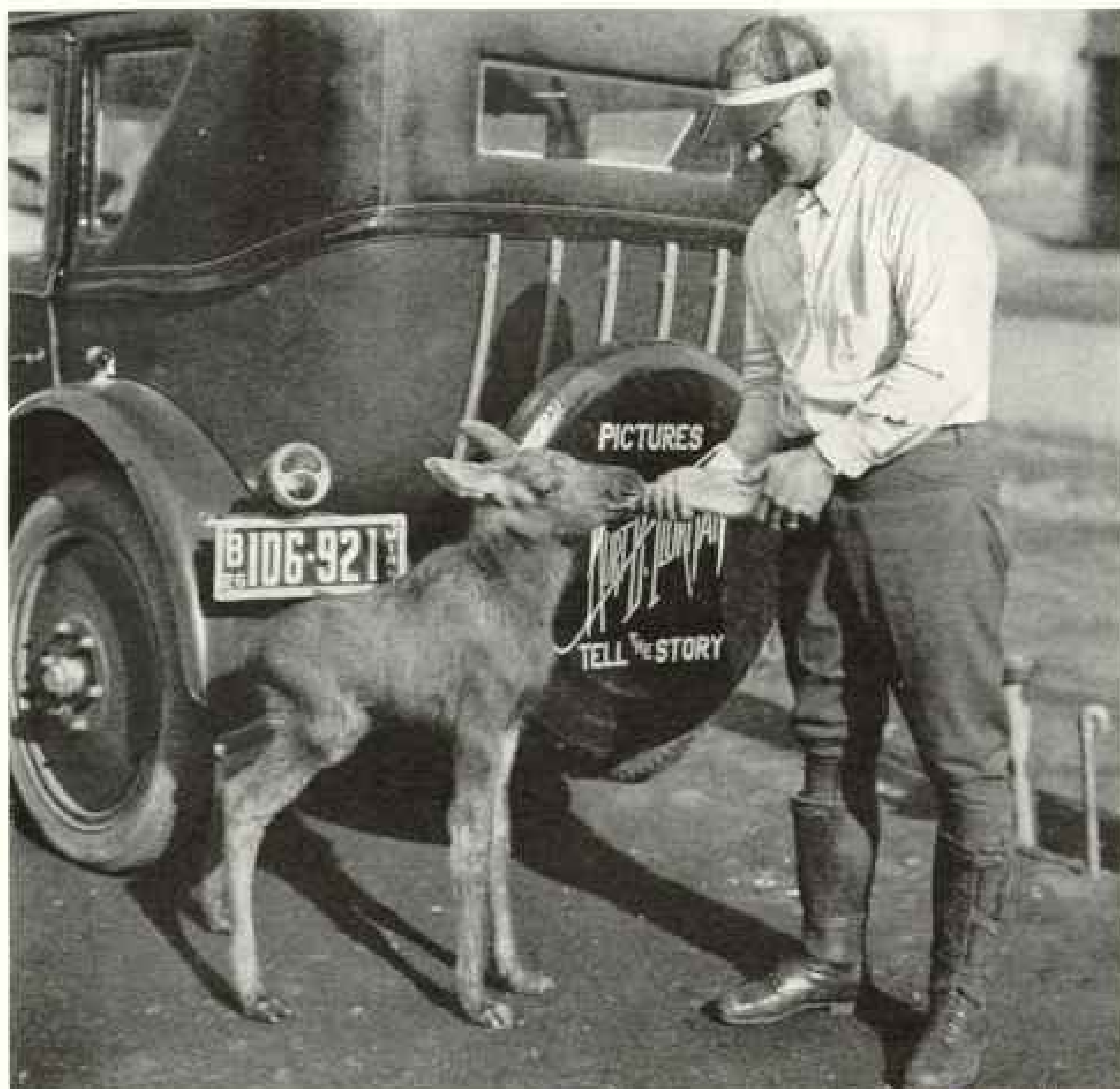
The College of Agriculture and Forestry and the School of Mines are given just emphasis. The Medical School is noteworthy for its affiliation with the famed surgical clinic of the Brothers Mayo in the yellow triangle city, Rochester (see page 315).

In like manner the affiliation of the Minneapolis Symphony Orchestra, already a third of a century old in this new western land, with the University's Music School, gives that school a unique advantage.

Music is an art that thrives in Minnesota. The Lutheran tradition of a religion of praise acts as a powerful stimulus. I have heard a Lutheran choir off on a frolic singing chorales antiphonally on a still, moonlit lake from their two boats; nothing more movingly lovely can be imagined.

In Glenwood, no metropolis, is a Lutheran church that has for years specialized in the music of Bach. And the Lutheran St. Olaf College, at Northfield, maintains a student choir that can fill the largest concert halls of New York or Europe with thankful listeners. The long, purplish, whispered dissonances of some Gretchaninov anthem, at last divinely resolved to harmony, sung by these Minnesota Olsons and Swansons, afford a memorable musical experience.

To lovers of the Gregorian chant, no pilgrimage could be more grateful than to the German St. John's Abbey, tucked away in its woods near St. Cloud; this abbey is to an important degree a center of the "Liturgical Movement" throughout the entire English-speaking Catholic world. At such a fountainhead the ancient ceremonies are performed and the ancient melodies sung in classic perfection and beauty.



Photograph by Kurt B. Floman

THIS TWO-WEEKS-OLD BABY MOOSE THRIVES ON A NURSING BOTTLE

Not often is a moose seen this close to an automobile tag in northern Minnesota. The ungainly looking youngster, when only a few hours old, was separated from its mother by a forest fire. It was rescued at Beaver Bay, about 50 miles from Duluth.

The art of letters also ranks high in Minnesota. Certainly the name of Sinclair Lewis is familiar; the embarrassing accuracy of his photographic work up and down Main Street in the yellow triangle towns almost makes us forget that he reveals only half the picture (see page 281).

There are many other names—Ole Rolvaag, Martha Ostenso, to mention but two. Paul Bunyan has given the green triangle a folk literature of its own. And Lindbergh has written in the sky one of the most romantic chapters of aerial history.

Such is the sketch-picture of his native State any Minnesotan might draw. What will a stranger find to carry away with him, and treasure, after a journey into this sheaf-shaped land?

Will it be the cry of the loon? The sting of frost? The scent of the bright prairie rose? Or the taste of wintergreen leaves plucked from where they shine glossy against the brown pine needles?

Perhaps it will be the ring of some flat-footed western name: Yellow Medicine River, Cut Foot Sioux Lake, Ten Mile Lake, Hungry Jack Lake. Or perhaps a picture of a rack laden with yellow grain crossing the stubble fields, with a towheaded farmer boy in blue shirt and overalls holding the reins strongly and driving toward red-painted barns which the setting sun makes to glow like rubies.

Or perhaps it will be the memory of peace long sought, found in a canoe, drifting on the sky-blue water.

NEPAL, THE SEQUESTERED KINGDOM

By Penelope Chetwode

Seeing something which is a closed book to the greater part of mankind is apt to give one a superiority complex. When travelers meet and relate their experiences each takes a savage delight in dwelling on the excellence of those parts of the earth with which his fellow is unacquainted.

In this way, I derive infinite pleasure from telling my friends that Nepal is the most wonderful country in the world because I'm pretty certain that they never will go there! And, incidentally, even if they do, I'm not at all sure that they won't whole-heartedly agree with me.

Nepal is remarkable in a number of ways. It can boast of unrivaled natural scenery, of the highest and most fascinating mountains; of unique architectural monuments; of an immense army quite out of proportion to the population; of an excellent and enlightened system of government which brings peace and prosperity to the little Kingdom.

VISITED BY A "CHOSEN FEW"

Even the chosen few who gain access to Nepal may not wander at will. My approach was through Raxaul, on the frontier of India (see map, page 323).

The most agreeable way of reaching Raxaul is by way of Patna, the ancient capital of Asoka. From here the pious Buddhist emperor himself set out, in 250 B. C., on his religious pilgrimage to Nepal and other sacred strongholds of his faith. At Patna you board a paddle boat and cruise five or six miles up the Ganges—the distance varies according to the height of the river—and get into a waiting train on the other side. Next morning you wake up in Raxaul.

On one side lie the unbroken acres of the Bihar rice fields, yellowing beneath the sun; on the other lie more rice fields, in the sequestered Kingdom. You strain your eyes toward the eastern horizon and dimly perceive a dark green belt.

This flat, low-lying tract of cultivation and jungle, lying between the Himalayan foothills and the border of Bihar, and stretching 200 miles from east to west, is known as the Tarai. From April to November this part of the country is infested with a deadly malarial fever. Thus the stray visitor to Nepal wisely confines his visit to the winter.

Beyond the Tarai again rise huge shadowy forms, the Himalayas hiding in the morning mist. Then ensues the inevitable argument with your neighbor as to whether a certain white object is Mount Everest or merely a deceitful cloud.

RICE FIELDS AND JUNGLES

From Raxaul, a little meter-gauge train sets off across the Tarai. For the first mile the railroad leads through the main street of the city, with shop and house fronts on either side. Then it comes out into the open rice fields and so into the tiger- and rhino-haunted jungles beyond. And what jungles! Halfway through them our train drew up, we all got out, clambered onto the backs of waiting elephants, and padded silently off into the mysterious depths.

The jungles of the Nepal Tarai are subtropical and consist chiefly of sal trees with long, thin black trunks, and huge leaves starting very near the base. Here and there a giant teak, with its beautiful crocodile back, soars upward, stately and erect.

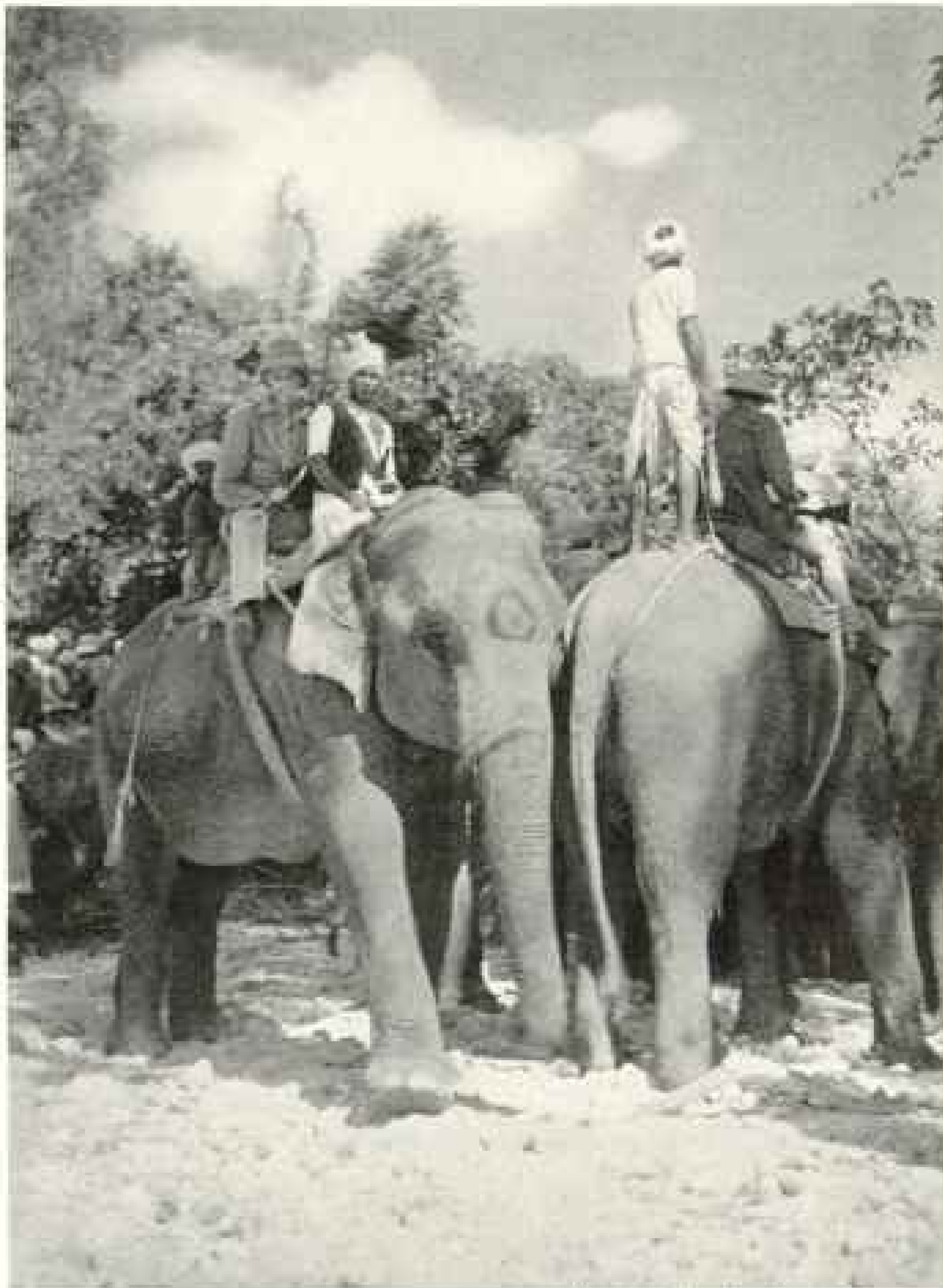
Festoons of creepers hang from tree to tree. The most common variety has magnificent velvety leaves, large and round like soup plates of palest green celadon. In the lower regions stocky little banana palms flourish, and wild ginger, with brilliant crimson fruits.

All this thriving growth is interrupted in certain places by the passage of wide river beds. These have long been destitute of water, and their barren white sands and smooth round pebbles contrast strangely with the luxuriant vegetation on either side.

A NOVEL TIGER HUNT

A tiger shoot in Nepal is conducted on novel lines: the tiger is attracted to a kill and is then surrounded by a ring of elephants. Slowly the ring closes in until the angry beast, well aware of what is going on, charges. As the undergrowth is very thick, and by no means all the elephants carry armed men, he has a fair chance of escape.

On our shoot we rode some two miles from the train to the kill, where we joined the ring of ninety elephants surrounding it.



Photograph by Penelope Chetwode

THE ELEPHANT RING CLOSES IN ON A TIGER

One of the famous big-game hunting grounds of the world is Nepal's Tarai, the strip of cultivated flat land, partly swampy jungle, along the southern border of the Kingdom. Since some riders do not carry guns, the beast has a fair chance of slipping through the pachyderm circle slowly tightening about him.

Lurking somewhere within that wide circle was the tiger.

The huge animals upon which we sat moved stealthily forward. I looked down the line of the waving trunks and swishing tails: there was not another howdah elephant, carrying rifles, for a hundred yards. Perhaps the wily creature we sought would break through the intervening, unarmed ranks?

But I had little time to consider this possibility. From a neighboring clump of banana palms came a series of snarls, and before I quite realized what was happening a huge bristling mass of black and yellow was hurtling toward us. It is a wonderful thing, the charge of an angry tiger—the break from cover in a crash of thunder, the mighty bounds toward the foe, the gleaming teeth, the flaming eyes, and roars of savage hate.

My companion fired once, and the elephants turned with one accord, for none will face a charge; twice, and the tiger turned with a bitter snarl which subsided into a last groan of defeat as he rolled over and lay dead at the bottom of a little gully.

CHILDREN FED TIGER MEAT

There ensued a terrific hullabaloo: mahouts remonstrating with their charges for displaying so much cowardice, shikaris shouting with delight, beaters breaking off branches to poke the victim and make certain that not a spark of life remained.

Then some of the men knelt down by the warm body and spread five or six large sal leaves with fresh blood in honor of their goddess, Kali. Many jungle folk feed their children tiger meat to make them brave and strong!

After two days' shooting in the Tarai, we pushed on to the railway terminus, Amlekhganj. From here we continued the journey toward Katmandu, the capital of Nepal, by motor.

Some thirty miles of narrow but excellent road lead through wooded foothills to Bhimphedi, where the ascent of the first mountain pass begins.

Here ponies and *dandis* take the place of cars (page 324). There are two different types of dandi: one is a wooden chair with

leather cushions, the other a canvas hammock, slung on long poles, in which you can lie full length. Both are carried by teams of six coolies in bright-blue cotton uniforms.

So long as the coolies walk, the dandi is a delight to ride in; but when they start to run, as they usually do downhill, none but the strongest constitution can remain undisturbed.

Ponies are by far the most agreeable means of conveyance. They are not bred in Nepal, but are all imported from Tibet, and they scramble up and down the steepest hills like so many monkeys.

Two miles from Bhimphedi lies the little mountain village of Sisagarhi, where travelers customarily spend the night. The village is complete with its garrison of Gurkhas—a foretaste of the tremendous military power active within the Kingdom.

After rising early at Sisagarhi we climbed the few remaining feet which led to the top of the first pass, approximately 8,000 feet high.

Photograph by Martin Hürlimann

NEPALESE PORTERS EASILY CARRY 150-POUND LOADS

Every day they trudge barefoot for miles over loose stone paths in the Himalayas under the constant threat of falling rocks. When it rains, the pass is hardly less slippery and dangerous than a glacier. An up-ended chair is the youngster's seat, and the lantern may serve as a tail-light.

Directly below us lay a smiling valley, while beyond it a turbulent mountain ocean rose and fell in colossal waves of sunlight and shadow; far out to "sea" the waves were capped by the glistening white horses of the eternal snows.

Then the descent began. The path was no longer smooth; it was exceedingly steep and incredibly rough. It consisted principally of solid rock and along its jagged surface large loose bowlders were strewn at random. Slowly, and with many tortuous turns, it made its painful way down into the valley.

For the next six miles we rode through flourishing fields of brown-headed buckwheat, golden mustard, and ripening rice. The snows were no longer visible and the sun shone brightly overhead. Near the various villages kind-hearted women had placed brass vessels full of water and flowers by the wayside, a thoughtful attention for the traveler.

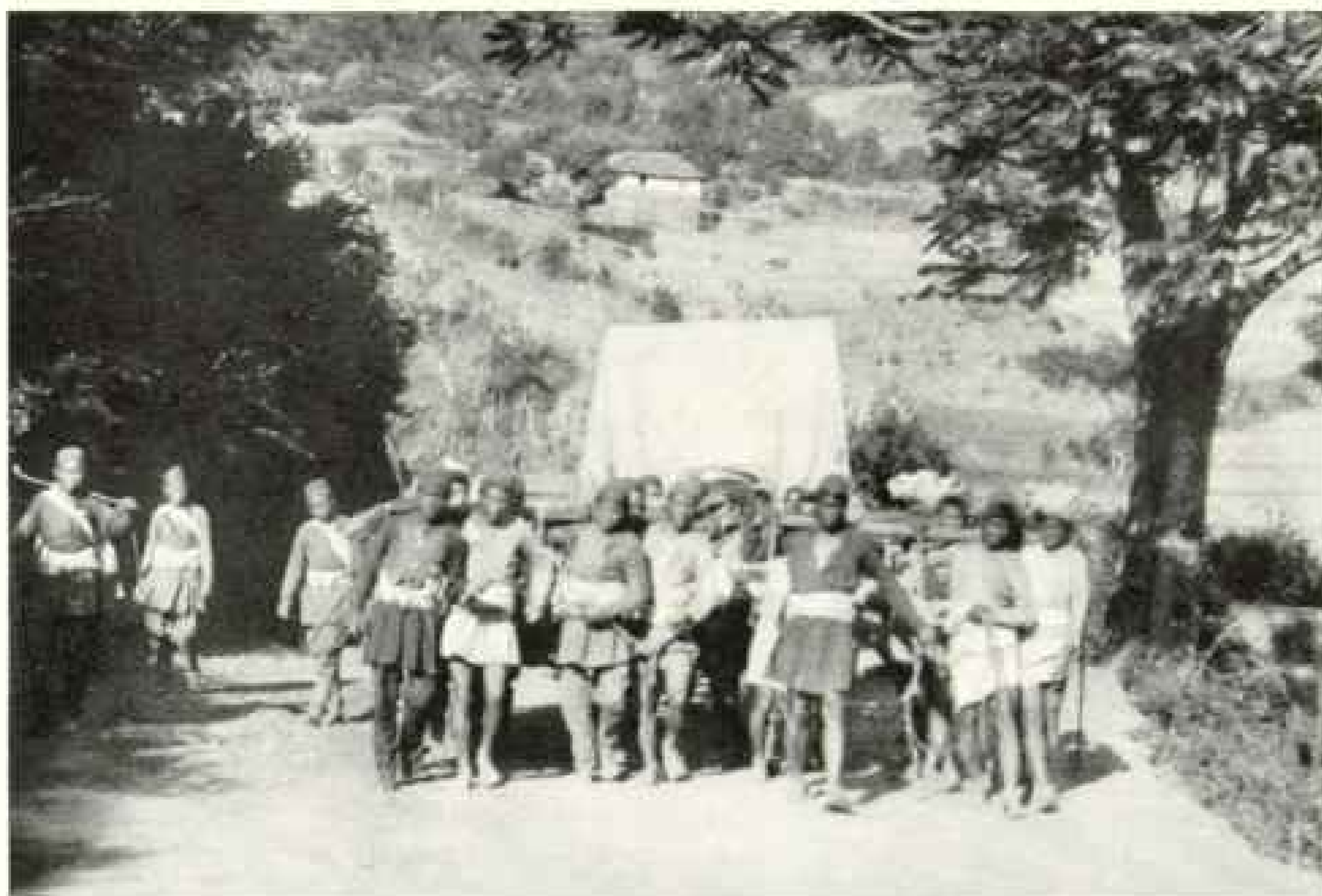
COLORFUL PEASANT HOMES

The dwellings of the Nepalese peasants are usually two-story buildings of brick, with wooden balconies and thatched or tiled roofs. The walls are plastered over with ruddy-orange clay, producing a charming

Photograph by Penelope Chetwode

CHEERFULNESS AND YARDS OF WAIST-CLOTH IDENTIFY THE NEPALESE PEASANT

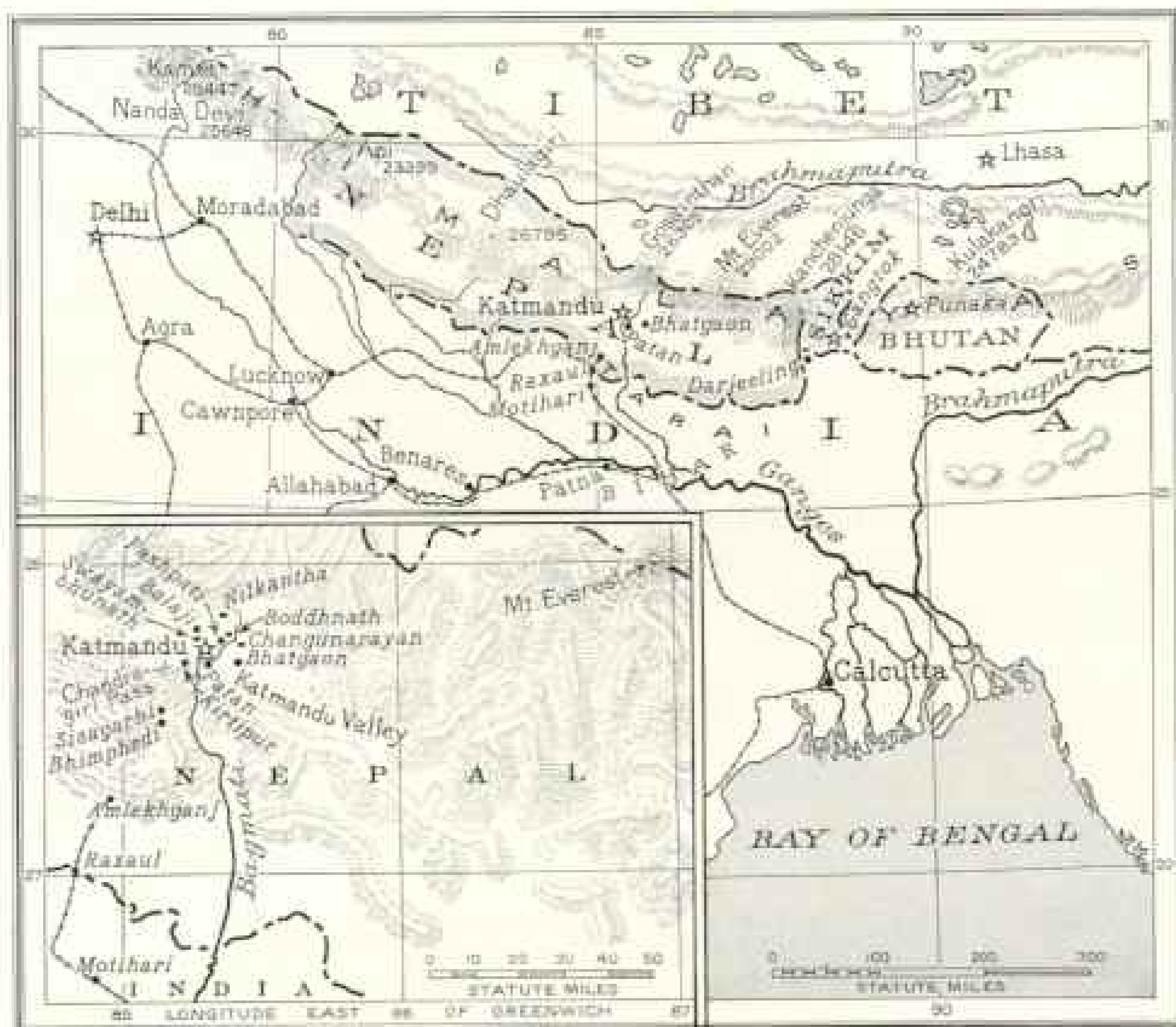
Agriculture is the principal occupation of the people, happy in their bowl of plenty. The valley yields fruit and vegetables in abundance. Barefoot women wear bright-colored skirts and beads; men prefer brown smocks; both insist on bulky wrap-around belts.



Photograph by Martin Hürlimann

LIFE GOES INTO REVERSE IN NEPAL, WHERE MAN CARRIES THE AUTOMOBILE

Steep, bowlder-strewn mountain passes that no vehicle crosses under its own power mark the entrances to the valley of Katmandu. Teams of coolies shoulder an American-made car on the way to broad roads of the capital. On this comparatively level stretch they find the going easier (328).



Drawn by A. E. Holdstock

WHERE BUDDHIST MEETS HINDU, THERE IS NEPAL, DEEP IN HIMALAYAN SHADOWS

Five hundred miles long and not more than 150 miles wide, the vigorous mountain kingdom between Tibet and India was acknowledged independent in 1923 as the result of a treaty signed with Great Britain. Katmandu, the capital city, basks in the tropical climate of its rice-clad valley, surrounded by snow-covered peaks—like a chafing dish set in ice to cool. The sacred Ganges and Brahmaputra Rivers almost encircle Nepal. Mount Everest still mocks the efforts of climbers trying to scale its white summit, pillowed in clouds 29,002 feet above sea level.

color effect, especially when the houses stand among the mustard and rice.

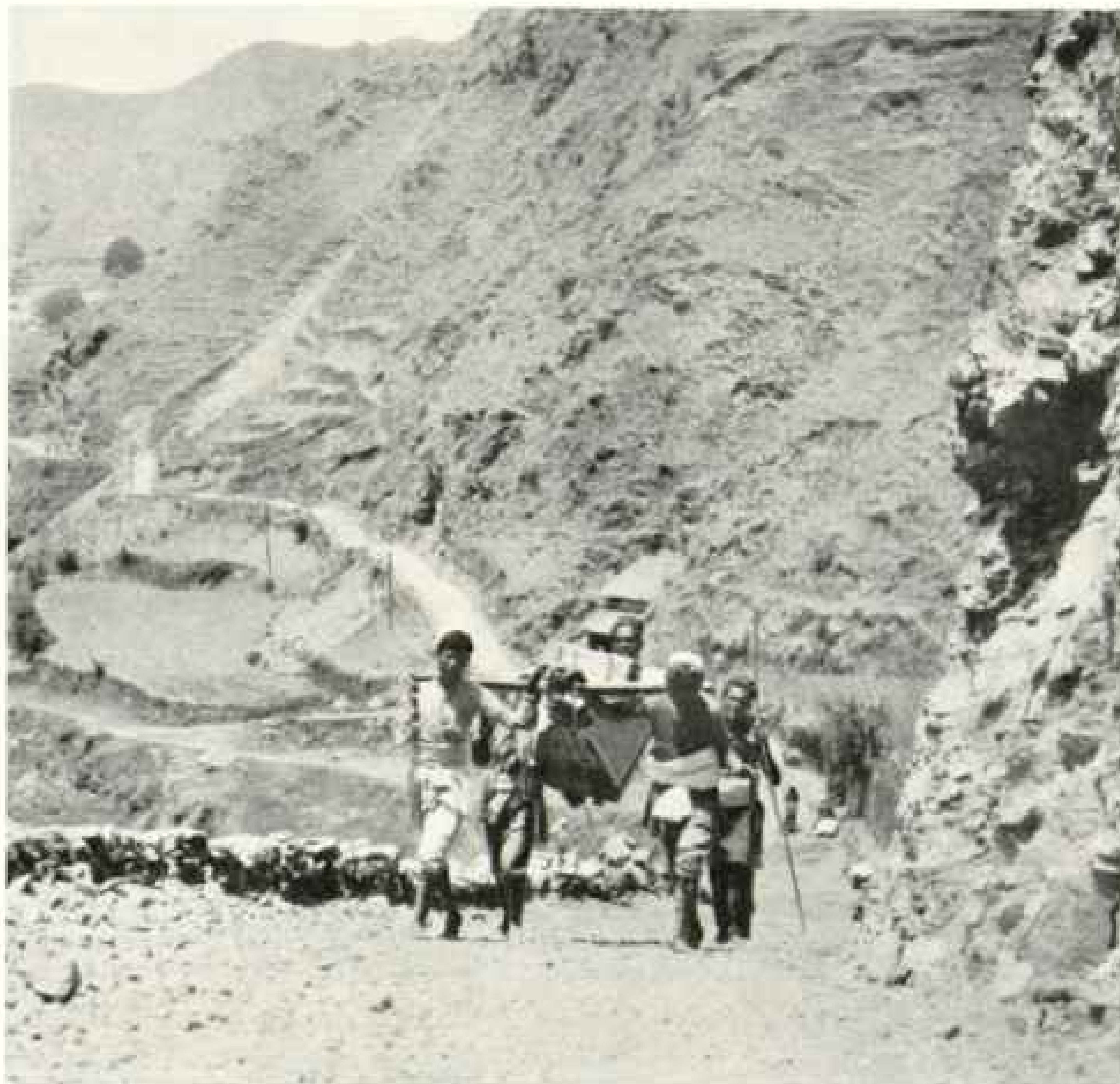
The path eventually left the fields to rise and fall over rolling grassy downland. Then we came to the foot of the Chandragiri Pass. From below, the road before us resembled the sheer wall of a precipice; but our ponies made light of it.

CLIMB LIKE RODEO RIDING

Without a moment's hesitation they charged forward, literally ran up the rough rock, and scrambled with surpassing agility over the huge bowlders. Not only did they carry wonder-struck riders clinging to their shaggy manes for dear life, but they also pulled along the full weight of their grooms, who hung on to their long, thick tails behind! My admiration for Tibetan horseflesh knows no bounds.

The view from the top of the Chandragiri Pass is so amazing that you cannot afterwards believe it exists. Below lies the circular rice-clad valley of Katmandu, bathed in the orange glow of the evening sun. Rising out of it, away to the right, in a medley of miniature pagodas, palaces, and towers, is the magnificent capital city. Surrounding it, in a black and purple wall, are the mighty mountain guardians.

At first I was disappointed because the snows seemed hidden. Vainly did I try to penetrate the misty white banks which clustered around the rocky heights. Sadly I abandoned hope and looked up into the sky to see if the young moon had risen. It



Photograph by Martin Hürlimann

TRAVEL THIS WAY, OR WALK, ON THE HIGH ROAD TO KATMANDU

A modern highway over the Himalayas is slowly nearing completion. Meanwhile, the sedan chair, born by blue-uniformed coolies, serves admirably, if somewhat uncomfortably when the men run. Two types prevail: the wooden chair with leather cushions, and the canvas hammock slung on long poles, permitting the rider to stretch full length. Tibetan ponies scramble over the twisting paths with the agility of monkeys on a rope (see text, page 320).

was difficult to believe what I saw. There, in all their glittering splendor, were the Himalayan giants, leaping to fantastic heights above the clouds.

ON THE ROOF OF THE WORLD

I stood transfixed at the top of an 8,000-foot pass, gazing at the highest mountains in the world.

Another hair-raising path, also beset with bowlders, dropped 4,000 feet down into the valley. Arrived at the bottom, we got into cars and motored the remaining seven miles into Katmandu.*

The capital city is a curious mixture of new and old. It centers around the immense parade ground, a beautiful two-mile stretch of closely cropped grass. Broadly speaking, the old part of the city lies to the west of this Maidan, the new part to the east.

Before the Gurkha conquest in 1768, the predominant and ruling race in Nepal was the Newar. The Newars are of Mongolian extraction and emigrated into Nepal from Tibet in prehistoric times. They are responsible for the origin and development of

* See "Nepal: A Little-Known Kingdom," by John Claude White, in the NATIONAL GEOGRAPHIC MAGAZINE, October, 1920.

Photograph by Martin Hürlimann

PROFESSIONAL MUSICIANS ALSO SERVE AS TAILORS TO THE NEPALESE

The drum and shepherd's flute are common, but musical instruments of other kinds are played only by the Damais, hereditary entertainers who sew as well as blow. Shrill music of this band outside a small temple in Balaji is accompanied by rhythmic hand clapping and singing.

Nepalese art in all its branches (page 349).

"Gurkha" is really a comprehensive term, embracing both the foreign Rajputs and the indigenous races of Nepal other than the Newar. It comes from the little State of that name in western Nepal, where the immigrant Rajputs from the plains of India originally settled.

These Rajputs, ancestors of the present rulers of the kingdom, fled to the hills after the Moslem sack of Chitor in 1303. Here they established themselves, flourished, and gradually extended their territories. It was not until 1768, however, that they finally effected the complete conquest of Nepal.

Thenceforth the Rajputs held undisputed sway over this unique Himalayan Kingdom. Internally, their activities have been directed not so much towards artistic as towards military advancement. Out of a total population of some 5,600,000, they have to-day an army of about 45,000. In times of need they can, with the aid of their well-trained reserve force, raise as many as 70,000 troops (see pages 339, 347).

ART AND THE ARMY

The bulk of the soldiery is drawn from the Gurung and Magar tribes. Among these peoples are some of the hardiest fighting men in existence. When, therefore, they are placed under Rajput leaders, the descendants of an ancient race, world-famous for its deeds of courage and chivalry

Photograph by Martin Hürlimann

KATMANDU VALLEY IS A GREEN BOWL OF LUXURIANT VEGETATION RIMMED BY THE SNOW-CROWNED HIMALAYAS

Horizons that pierce the clouds encircle a rice-clad landscape, where temperatures range from torrid to frigid in abrupt changes of altitude. The sacred Bagmati flows into the Kingdom through a cleft reputed to have been cut in the mountains by the sword of Manjusri (see text, page 337, and illustration, page 341). Houses scattered through the district are plastered with ruddy-orange clay and roofed with tile or thatch. Progressive rulers have benefited their subjects by introducing electric lighting and a water system.

Photograph by Martin Hürlimann

HOLIEST OF HINDU TEMPLES IN NEPAL IS THE TWO-STORIED, GILT-ROOFED PASHPATINATH

Looming high above the surrounding maze of houses, pagodas, and shrines that make a cloister of the bathing ghats is this house of worship (upper right) in Pashpati. Broad flights of steep stone steps lead down to the banks of the Bagmati River, where final rites for the dying are performed (see illustration, page 345).

on the battlefield, the power of this mighty Gurkha army is formidable indeed.

In Katmandu, the artistic spirit of the Newars and the martial spirit of the modern rulers mingle. To the west of the vast parade ground lies the old town with its palaces and temples, its tall houses and narrow streets. In the Durbar Square, that essential feature of all Newar cities, the principal buildings are grouped in a rich profusion of pagoda roofs, painted wood, chiseled stone, and shining metal (see Color Plate V).

At one side stands the imposing palace of the former kings, built around a spacious courtyard. Close by it, raised on a high step plinth, towers the lofty Temple of Taleju, the household goddess of the Royal Family. All around are temples and shrines and tall, slender pillars bearing bronze statues of kings and religious personalities.

The buildings in the indigenous "pagoda" style are of dull-red brick with tiled roofs supported by intricately carved wooden struts. The doors, too, are of wood and the lintels are invariably extended into the brickwork, where they form bold and effective designs. The woodwork is usually painted in bright colors and the roofs are sometimes covered with sheets of beaten brass, dazzling in the brilliant sun.

Lost in this maze of old Newar splendor stands the modern Hanuman Dokha, a large white building containing huge audience halls and staterooms used for important ceremonies. To this palace, during a durbar, the scarlet lancers of Nepal come clattering through the cobbled streets of Katmandu.

Mounted on big bay horses, they form the bodyguard of the King and the Prime Minister, whom they escort, together with the other dignitaries of the Kingdom, in large open carriages. At such times the principal figures in this brilliant procession are arrayed in the full-dress uniform of the Nepalese army—scarlet coats with priceless headdresses of seed pearls and emeralds.

COOLIES CARRY AUTOMOBILES ACROSS MOUNTAINS

Beyond the lovely Newar city, grouped around the huge Maidan and stretching away to the east, lies modern Katmandu, the creation of the Gurkhas. Here are no romantic pagodas rising golden tier upon golden tier towards an azure Heaven, but severely practical barracks, schools, colleges, hospitals, and prisons built in the "European style." Here, too, are the immense "modern" palaces of the King, the Maharaja and the chief nobles, designed by French architects in the late 19th and early 20th centuries (see page 339).

When one recalls the difficult journey into the valley over steep and wild mountain passes, it seems strange to look upon these vast buildings, standing in so remote a country, equipped with the most up-to-date conveniences and luxuries. The roads in the actual town are good and broad, and it is amusing to remember that all the motors and lorries which run on them have been carried bodily over the passes by swarms of coolies (see page 322).

Though Nepal is nominally a Kingdom, the King in reality is little more than a religious figurehead, the actual government of the country falling to the lot of the Prime Minister, or Maharaja.

WHY MOVIES ARE BARRED

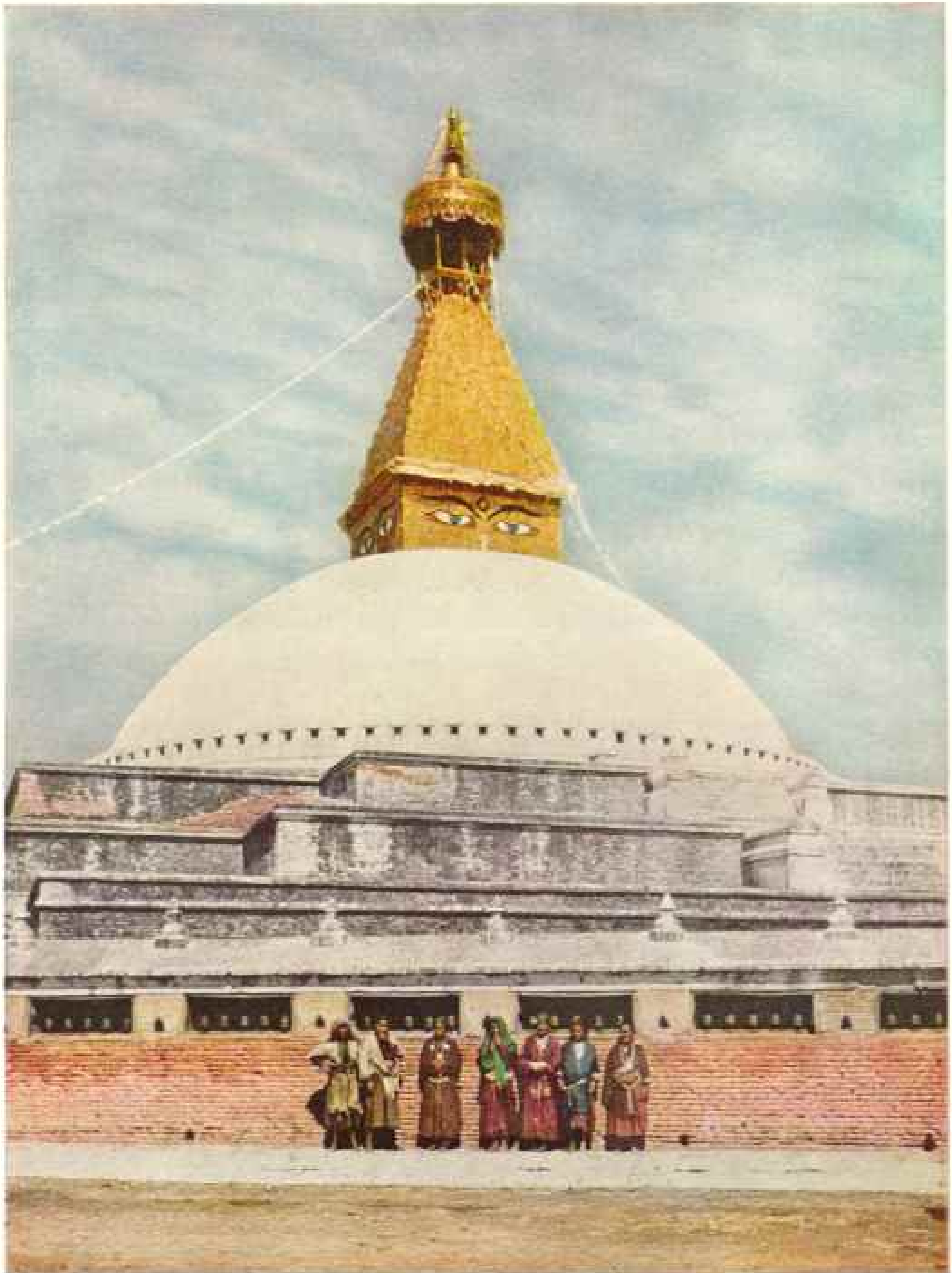
He is modern and enlightened in his outlook and anxious to introduce any new invention which may benefit his country, but prohibits importation of certain Western creations. Foremost among these is the cinema. He believes that to show vivid scenes of intimate occidental life has a demoralizing effect on the spectators.

The charming son of the Nepalese envoy to India told me that he once sent his Gurkhali servants to a cinema in Delhi. They came back horrified and exclaimed that the male actors they had seen could not possibly be men; if they were, then they did not deserve to live. So that is what the martial Nepalese think of the movie stars!

At 10 o'clock every evening a curfew tolls in Katmandu and the other big towns of the Kingdom and everybody must retire to his house. Anyone found in the streets after this time has to spend the night in prison. Gambling and drinking are forbidden except during certain festivals. The most popular is the great Durga Puja, which lasts 10 days, during which time hundreds of buffaloes are beheaded in honor of the goddess Durga, who is but another form of the famous black Kali.

Besides Katmandu, there are two other large towns in the valley, both former capitals of Nepal.

Patan practically adjoins modern Katmandu. Passing through its narrow streets



© National Geographic Society Autochrome Lumière by Martin Hürlimann

ALL-SEEING EYES GLARE FROM THIS GILDED TOWER AT KATMANDU

A huge snow-white dome of plaster supports the glinting pyramid and umbrella atop this temple, one of the holiest shrines in the Buddhist world. Such towerlike superstructures are found on most Buddhist temples of Nepal. The question mark beneath each pair of eyes is the artist's conception of a nose. Tibetan pilgrims who have survived the difficult journey across the mountains from Lhasa stand before some of the 108 prayer wheels which are set in niches around the base of Boddhnath Stupa.

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THE GOLDEN DOOR IS ONE OF THE WONDERS OF NEPAL

This gem in gilded copper is set in a red-brick wall, not much larger than the doorway itself. The entrance to Bhatgaon Palace is surrounded on all sides by temples and palaces, and faces Durbar Square.

Autochromes Lumière by Martin Hürlimann

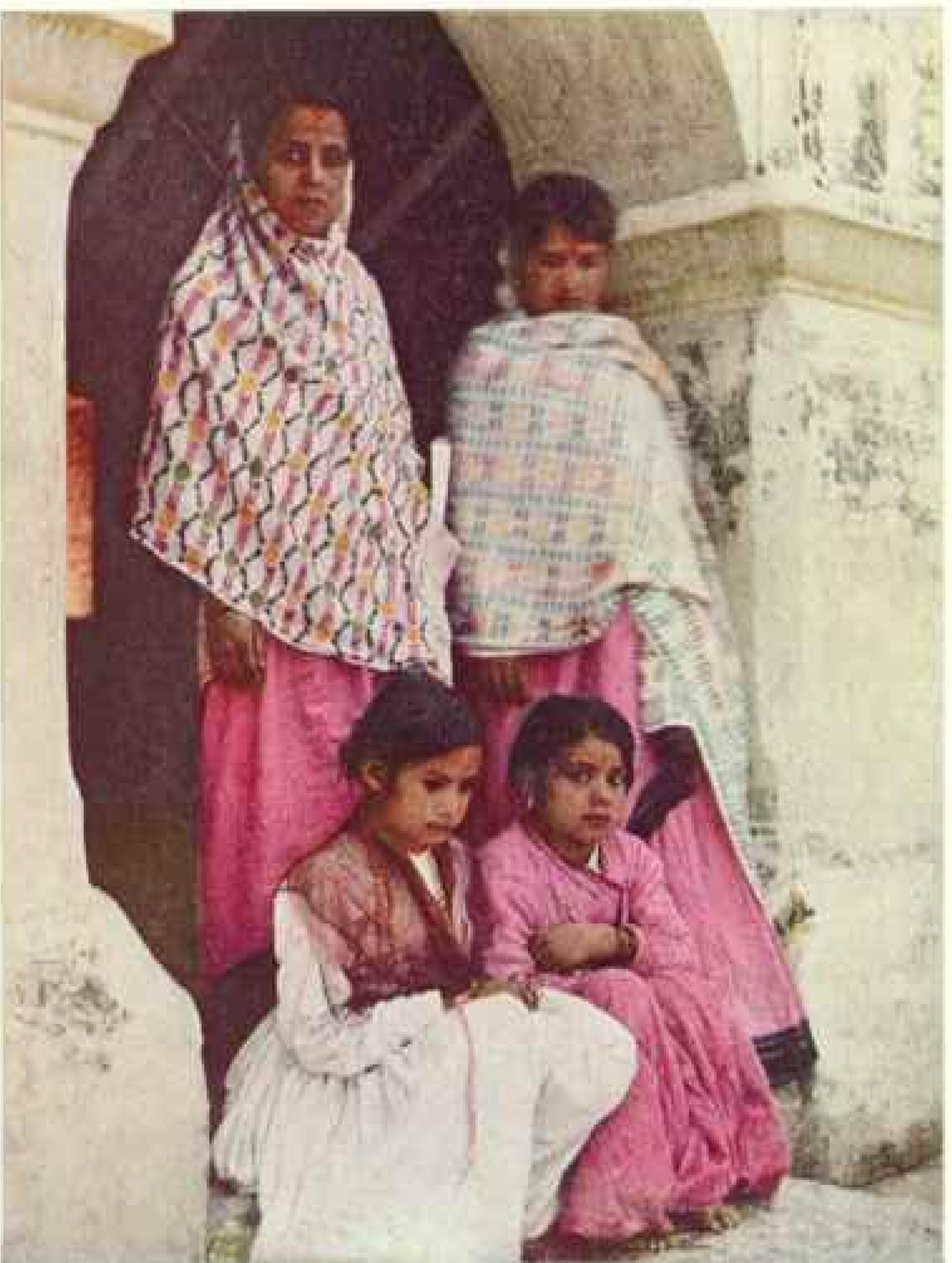
MASSIVE BUDDHIST TEMPLES HAVE NO INNER SANCTUARIES

Pilgrims pray out of doors among smaller shrines housing sacred images or funerary urns. This stupa, in a courtyard of Katmandu, capital of Nepal, has the usual narrow, brooding eyes and a 13-stepped conical top.

© National Geographic Society

HER GILDED HAT SUGGESTS THE LATEST WESTERN MODE

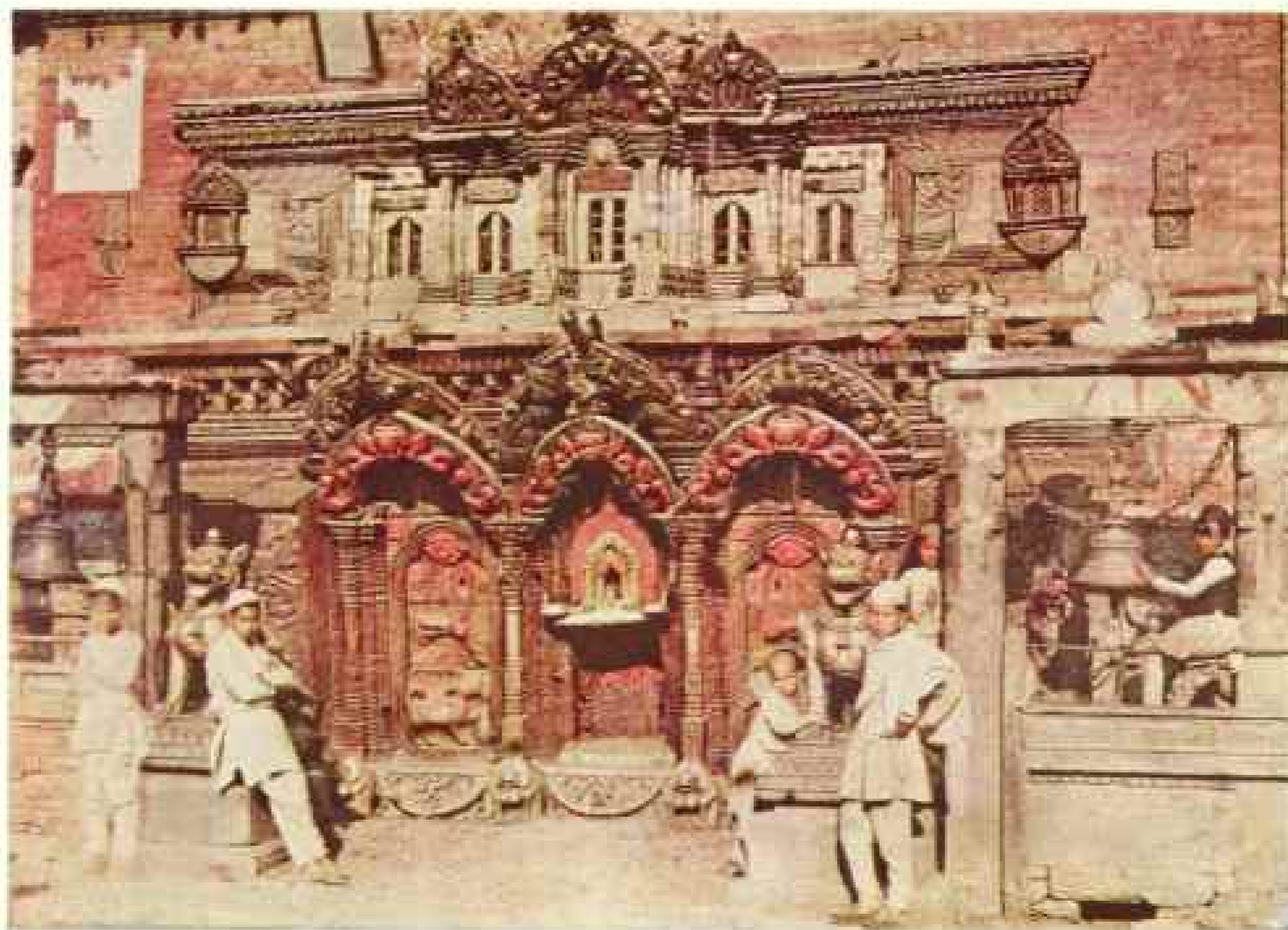
This high-caste Newar girl wears her festival finest. Stuck in the top of a metal "tam" are colored glass balls. Around her neck hang red beads and golden amulets, containing holy sayings.



Autochromes Lumière by Martin Hürlimann

NEWAR GIRLS CHOOSE GAY COTTONS FOR EVERYDAY DRESS

Custom decrees that each girl child be married to a bel fruit—always found here—as a symbol that even if her husband dies she shall not become a widow.



A PONDEROUS, ORNATE FRAME FOR A TINY IDOL

The object of worship in this temple at Bhatgaon is the small figure in the central niche. The seated boy rests his hand on a temple bell, rung vigorously when an offering is made.

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Autochromes Lumière by Martin Hurlimann

WATER SPOUTS FROM THE MOUTHS OF STRANGE STONE DRAGONS

At the sides of the necks are carved medallions and on the wall are other mythological reliefs. In the rainy season the lowland plains of Nepal are unhealthful for Europeans because of malaria.

KATMANDU IS PROUD OF ITS PALACES AND TEMPLES IN DURBAR SQUARE

Jumbled are many odd, step-roofed buildings set off by rich carvings of weather-beaten brown. The view is from the old Royal Palace, now used only for state occasions.

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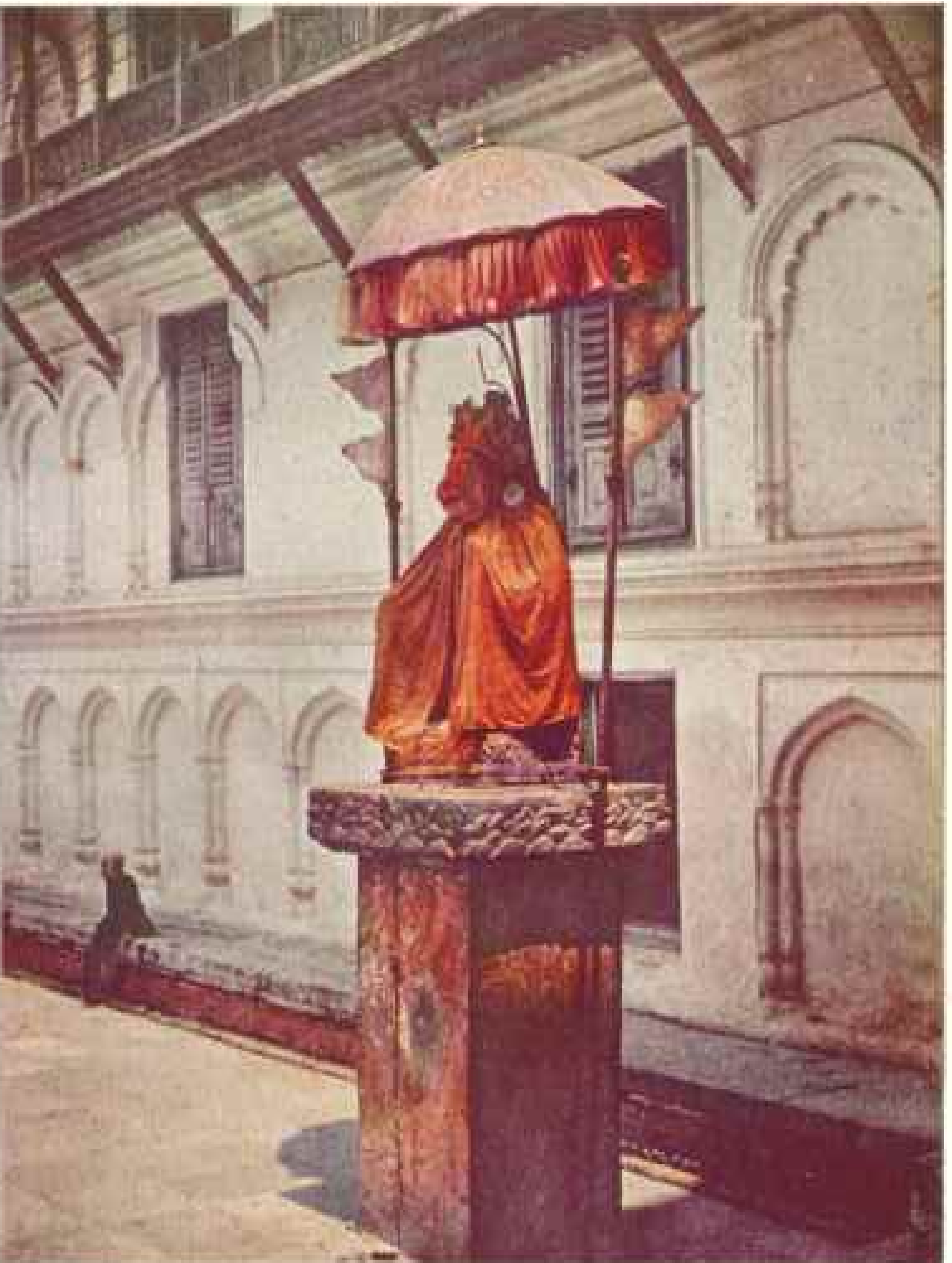
HEAVY STRINGS OF BRILLIANT BEADS HAVE LONG BEEN THE FASHION IN NEPAL

Seated in front of a Hindu shrine, these girls of the middle caste willingly display the trinkets that represent their fortune.



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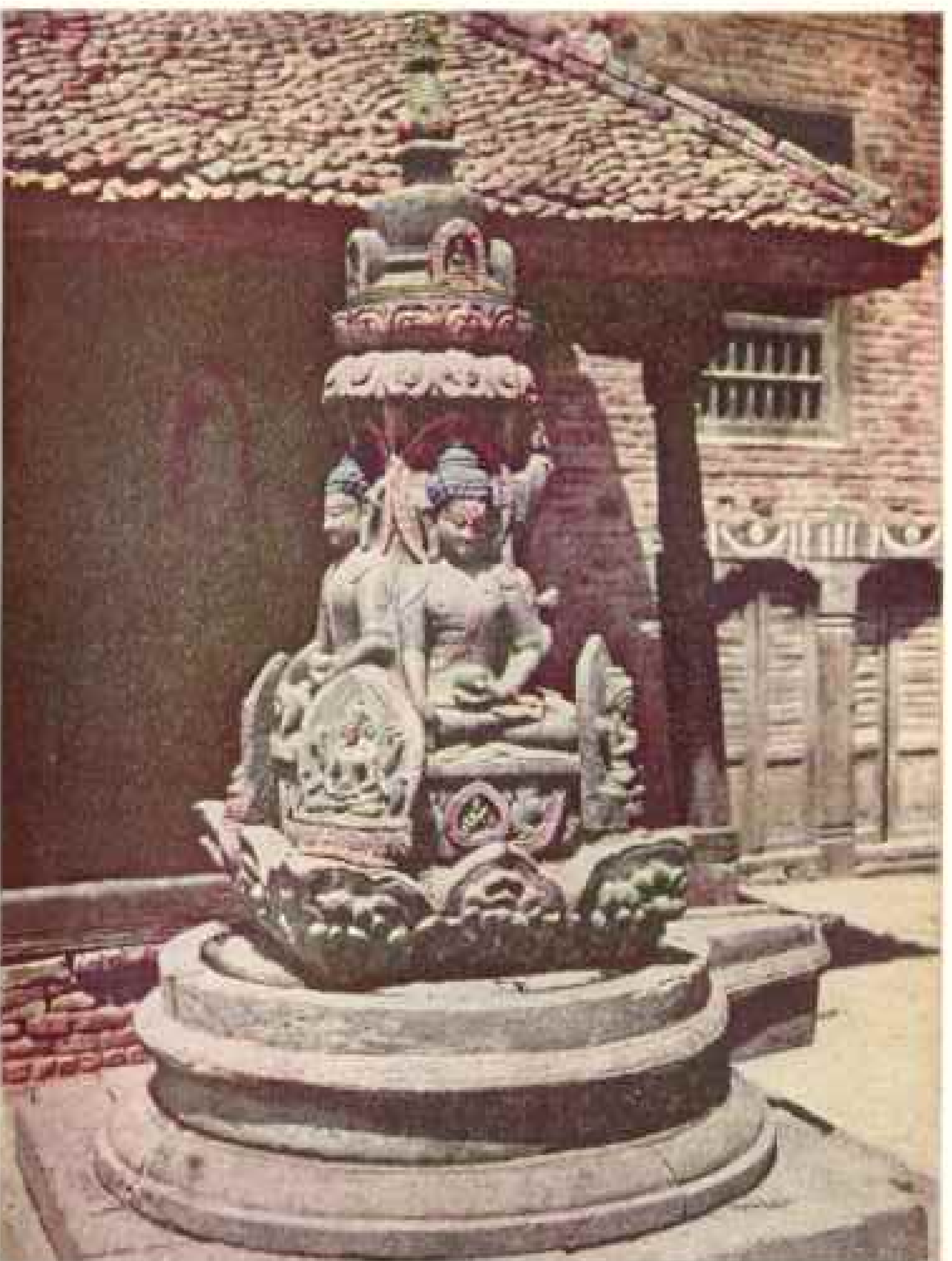
THE MONKEY-FACED GOD IS POPULAR IN NEPAL

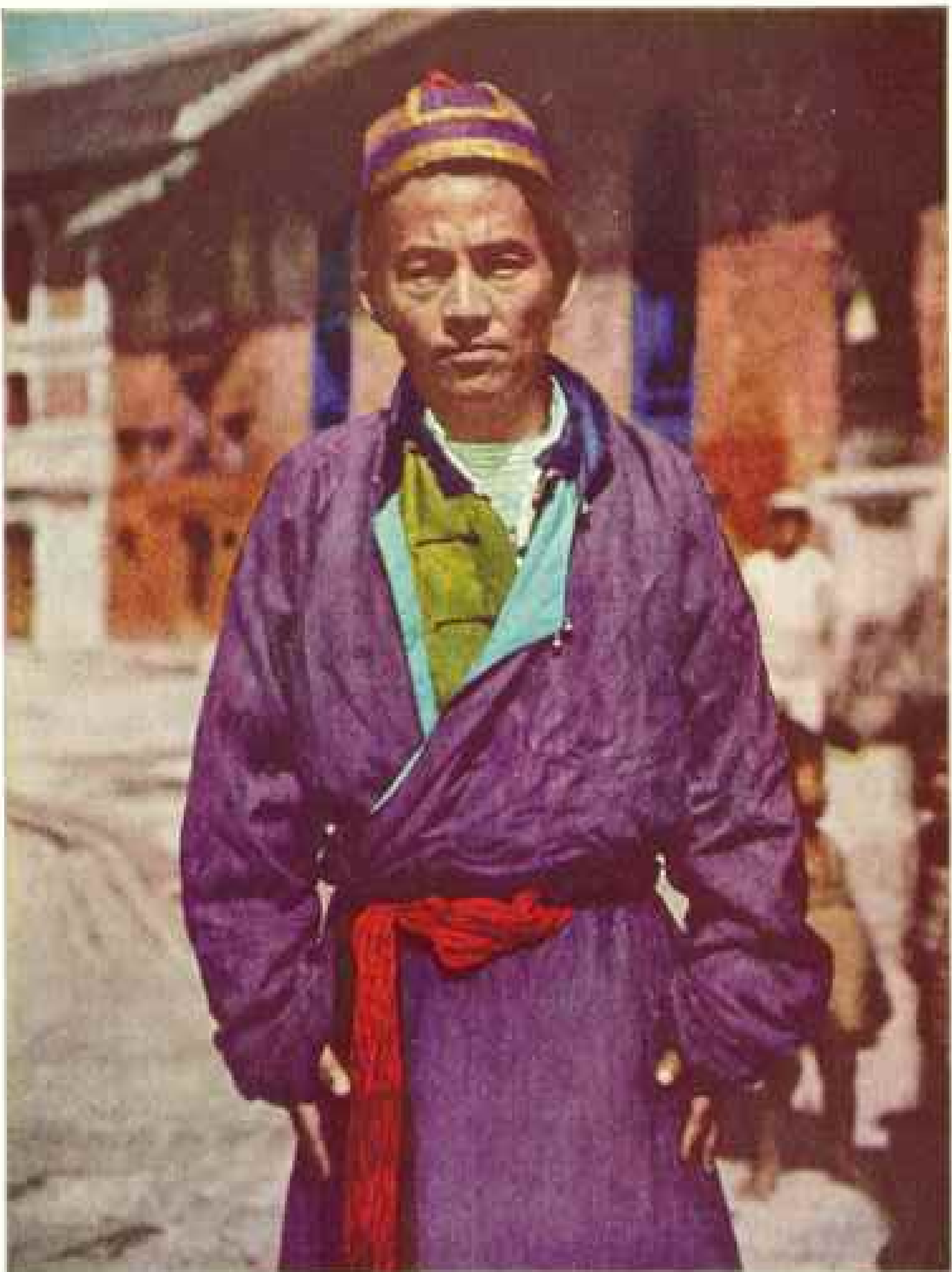
This figure of Hanuman, seated on a column beneath an umbrella of honor and wearing a silk robe, graces Durbar Square. The monkey at the left is one of many that run wild around temples of the capital.



Autochromes Lumière by Martin Hürlimann

A SYMBOL OF FERTILITY IS THIS EXQUISITE MONUMENT

Four painted Buddhas are represented emerging from a lotus in this shrine, the gift of a worshiper, which stands in the courtyard of one of the larger temples.



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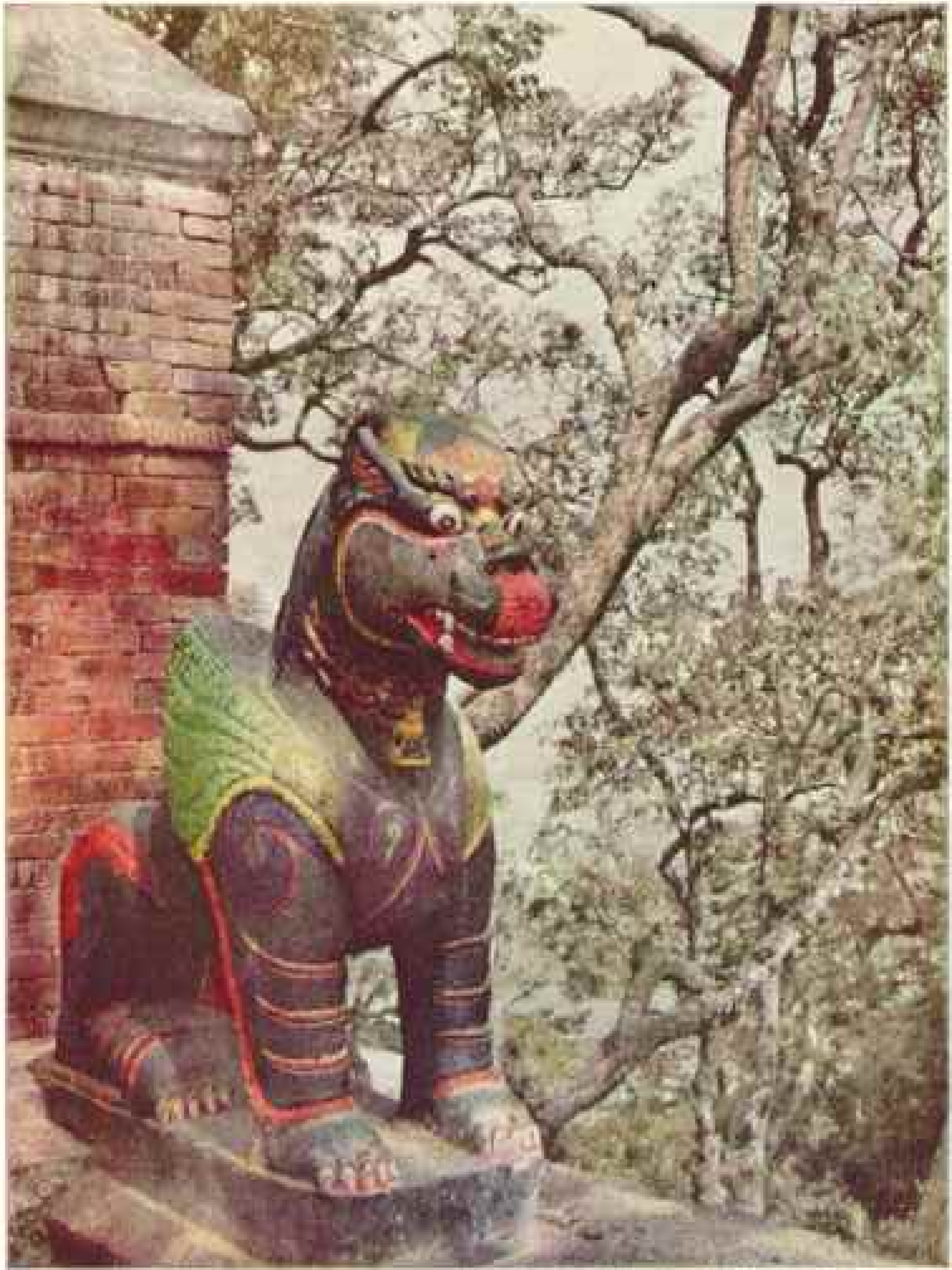
THIS YOUNG LAMA SPEAKS ENGLISH FLUENTLY

He wore crepe-rubber shoes and did not discard them when later he climbed the steps of Boddhnath Stupa. He represents the Dalai Lama at Katmandu, and welcomes Tibetan visitors to the shrine (see Color Plate I).



Autochromes Lumière by Martin Hürlimann

A FABULOUS MONSTER GUARDS A TEMPLE

There are few ruins in Katmandu valley, because all of the famous temples and shrines are kept in good repair, as is this freshly painted bronze figure on Swayambhunath Hill.

GAUDY PRAYER FLAGS FLUTTER ABOVE THIS NEPAL SHRINE AT DARJEELING, INDIA

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Autochromes Lumière by Martin Hurlimann

A NEST OF SNAKES SERVES AS A BED FOR THE GOD NARAYAN

This image, its head supported by a pillow of serpents' heads, is carved from a single block of black stone. It was discovered by a farmer when digging a water tank for his garden at Nilkantha. At high water only the head protrudes above the surface, and the rippling waves of the pond give the impression that the figure is breathing.

you come into the fantastic Durbar Square. It was difficult to believe I was in the everyday world. It seemed as if I had been miraculously transported to some other planet and stood in a dream city of surpassing loveliness.

On one side, a graceful group of temples rises in a series of elegant red pagodas ribbed with gleaming bronze. Brightly colored struts, rich with delicate carving, support their myriad roofs; shimmering bell finials cap their airy upper stories. Opposite them, and dotted irregularly over the spacious square, lies a swarm of other temples, a fountain, a colossal bell, and a number of tall, slender pillars bearing the shining bronze figures of gods and kings.

The pagoda temples have brightly colored stuffs hanging in gay ripples from their eaves. There are also temples in silvery stone built up in tiers of intricately carved pillars, and pavilions which cluster around the massive curvilinear tower rising from their midst like some huge gray cactus plant.

TAKING A LOCAL DIVINITY FOR A RIDE

Of the many other temples in Patan, situated outside the transcendentally beautiful Durbar Square, by far the loveliest is that of Machendranath. It stands on the edge of the city in a grass courtyard surrounded by a wall and resthouses for pilgrims. From the midst of the slender eucalyptus trees which shelter the courtyard, it rises in three elegant stories, and from the eaves of its pagoda roofs hang rows of little jingling bells in place of colored stuffs.

Machendranath is the most important of all the local divinities. He is the protector of Nepal and is said to appear to the rulers of the country in times of national crisis. His festival, the Machendra-jatra, is a popular annual event, for it is then that he brings rain to thirsting crops. He is taken out, in June, in his elaborate chariot with its 25-foot beam (formerly, no one in Patan might have a house taller than this beam!) and exposed to the adoring populace. He is worshiped both by Buddhist and Hindu.

If the rains have not previously broken, they are bound to come at his festival, and when they do, they are not looked upon as a miracle. They are in the special charge of the god, and it is his bounden duty to bring them to his people at the appointed time.

Another important deity in Nepal is Manjusri. He is not of local origin, but came from China, where he dwelt on the mountain of the five peaks. Before his coming, the valley of Katmandu was a huge circular lake. He came, carrying in his right hand a shining sword curved like the smile of the moon. With this wondrous weapon he struck the mountains surrounding the great lake and formed a channel through which the waters flowed. To this day the cleft in the mountains is called the "kot-bar" (sword-cut) and the sacred Bagmati River flows through it, draining the fertile valley (see page 341).

Manjusri was a Bodhisattva and is in reality, therefore, a Buddhist divinity. He is worshiped in China and Tibet as well as in Nepal, but in the latter country he is venerated equally by the Hindus.

The third large town in the valley is Bhatgaon. It can be approached from Patan by motor over a bad, uneven road, a distance of some seven miles. Far the most delightful way to enter it, however, is on the back of an ambling Tibetan pony.

In the early 18th century the city was the capital of Raja Bhupatindra Malla, a man of exquisite taste and a patron of the arts. It was he who built the stately Durbar Hall with its famous Golden Door—one of the chief marvels of Nepal—and its richly carved windows (see Color Plate II).

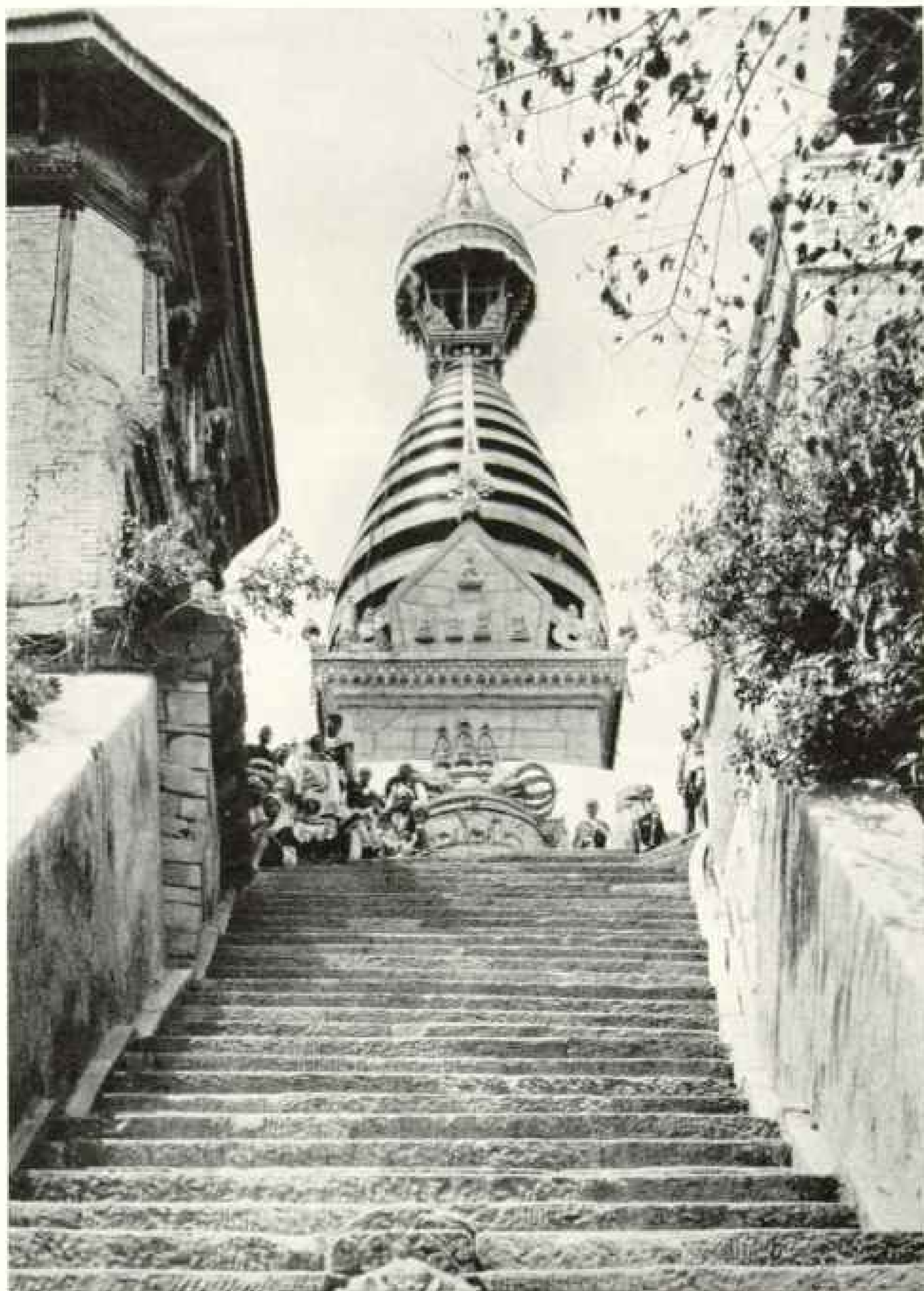
In the square opposite this door, on the top of a tall stone pillar, his statue reposes in bronze, in the attitude of a religious devotee. Beyond the statue hangs the brass bell used in former times to assemble the people before the palace (see page 340).

A CITY OF SURPRISES

Bhatgaon is a city of surprises. Unlike Patan, its beauty is not concentrated in one colossal and breath-taking durbar square; it is distributed throughout the length and breadth of the town.

Here you come upon a little temple of silver stone, set gracefully upon a high step plinth, with an avenue of gods and monsters leading up to its portals. There you walk through a blue wooden door in a crumbling, pink brick wall and lo! you are in a wild, tangled garden with fruit trees and flowers, tall, slender palms, and in the center a flourishing crop of rice tended by a group of smiling peasants!

Beyond the garden you pass down fascinating little streets of shops and houses with carved windows and suddenly you find yourself in an open square. On your right



Photograph by Martin Hürlimann

THIS STUPA HONORS THE BUDDHA WHO FORESAW THE BIRTH OF NEPAL

According to tradition, Vipasya planted a miraculous lotus on the spot where the tower of Swayambhunath stands, declaring that when it flowered Swayambhu, the Self-Existent, would cause the lake covering the valley to be dried up and the land to be populated. His prophecy was fulfilled with the coming of Manjusri (see illustration, page 341, and text, page 337). Three hundred feet above the plain, a rounded mass of brick, rubble, and plaster supports 13 gilded disks.

Photograph by Penelope Chetwode

SUMPTUOUS GARDENS SURROUND THE ROYAL PALACE OF NEPAL

Western influence is reflected both in the architecture and in the interior decorations. The oriental liking for mechanical devices is shown by the cash registers, the slot machines for dispensing candy and gum, the automatic scales, and other objects that line the state staircase inside.

Photograph by Martin Hürlimann

OUT OF A POPULATION OF 5,600,000, SOME 45,000 ARE SOLDIERS

Gurkha troops from Nepal established an enviable reputation for bravery while fighting with the Allies on the western front during the World War. The roster was recruited mainly from tribes that supply some of the finest fighting men in Asia (see illustration, page 347, and text, page 325).

Photograph by Martin Hürlimann

THE HIGH-POSTED STATUE OF RAJA BHUPATINDRA MALLA FACES THE GOLDEN DOOR HE BUILT AT BHATGAON

A lotus flower supports the throne upon which the bronze figure of the famous patron of arts kneels under a gilt umbrella (see Color Plate II). Surrounding the column are pagodas and shrines in a bewildering display of bizarre carvings. Their gilded bronze roofs glitter in the sun, and upturned eaves suggest Chinese influences.

READING, WRITING, AND ARITHMETIC

State education is offered the children of Nepal, and this schoolboy with his writing slate may be fortunate enough to win some day one of the Indian university scholarships given to deserving students. A score or more languages are spoken in the valley.

Photographs by Martin Hürlimann

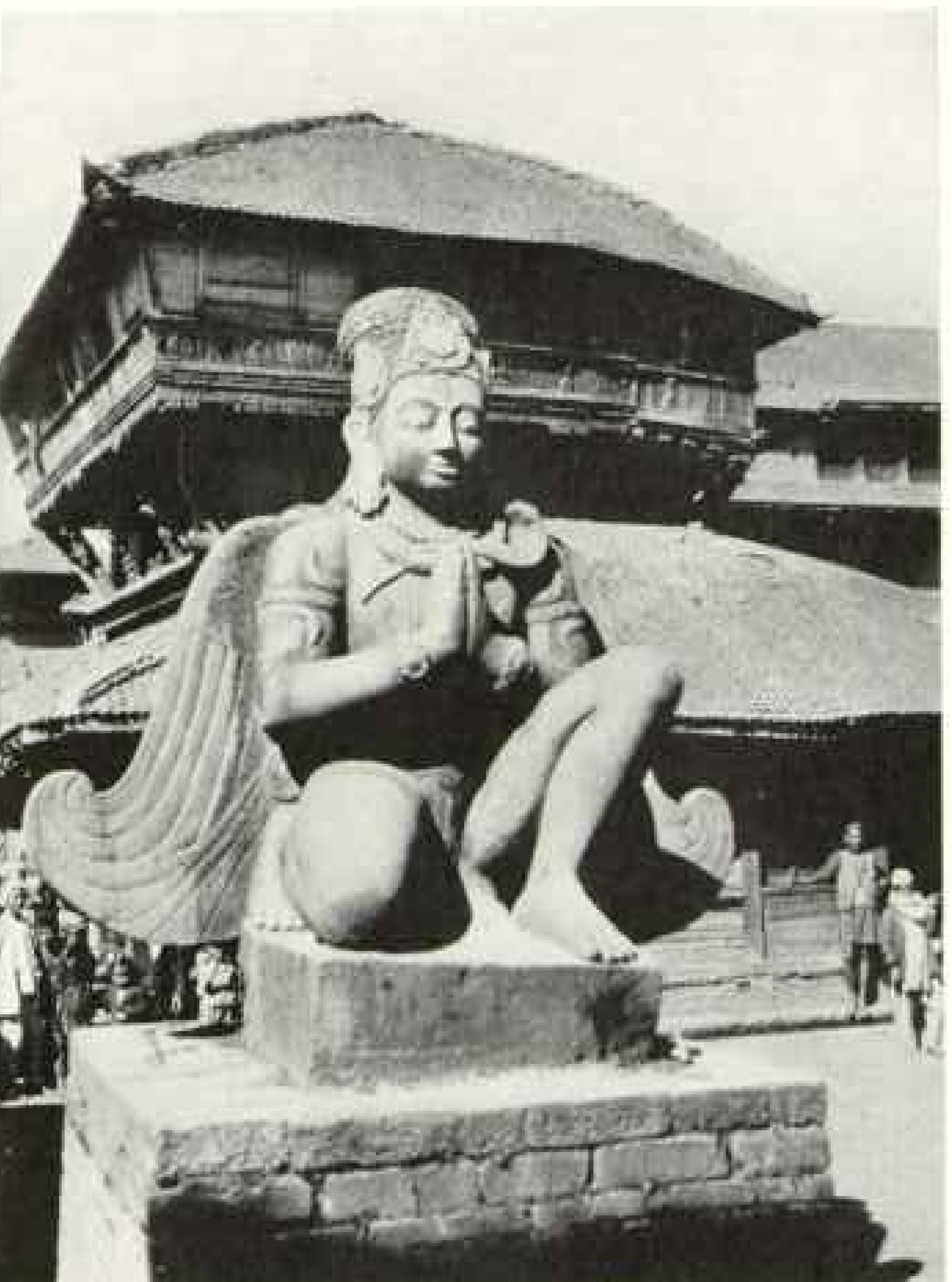
WITH HIS MIGHTY SWORD HE CLEFT THE HIMALAYAS

Legend states that one sweep of Manjusri's blade parted the mountains, draining the lake believed to have covered Katmandu Valley (see illustration, page 326). This rare picture shows the Buddhist deity who came from China and is now venerated both by local Hindus and Buddhists.

Photograph by Martin Hürlimann

"YOU'RE NEXT!"

Under an improvised awning in one of Patan's public squares a barber shaves his customer's head and piles the hair by his side. The workman has removed his shoes for greater comfort. The barber, not his client, enjoys the shade, and vegetable market venders look on.



Photograph by Penelope Chetwode

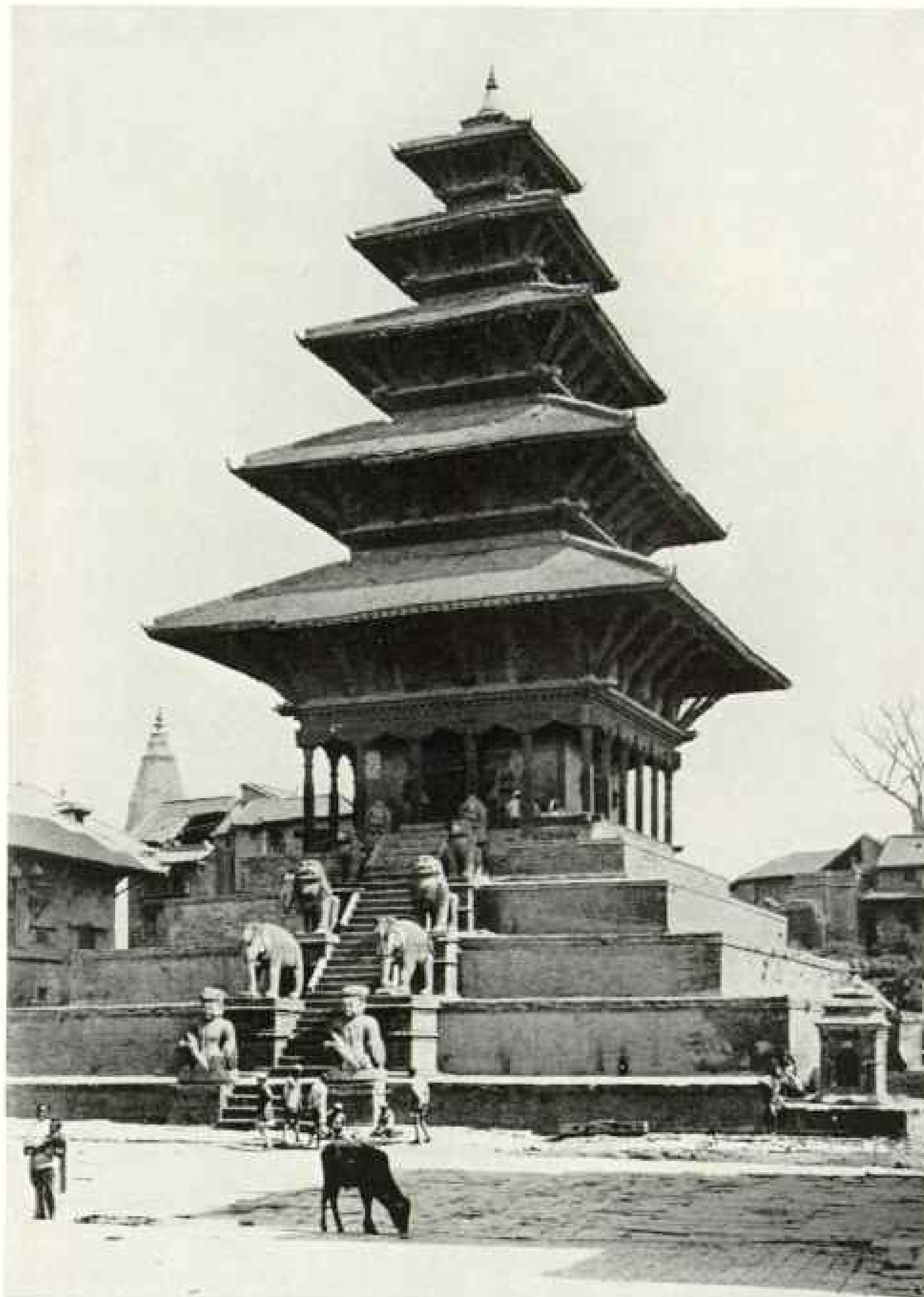
HALF MAN, HALF BIRD IS GARUDA

The weird creature bears the Sun God, Vishnu, who is manifested by flame and lightning, as well as by the sun. The Asiatic deity is carried through the heavens from morning birth to evening death. The peacock, serpent, rat, and lion are also ridden by gods.

Photograph by Martin Hürlimann

ONLY FOOD PLANTS MAY BE GROWN IN KATMANDU'S NEATLY TERRACED VALLEY

Such edibles as rice, buckwheat, onions, potatoes, cucumbers, pumpkins, and many others grow well, but the cultivation of tea, cotton, and tobacco is unknown because of prohibiting regulations. The Kingdom's agriculturists, the Newars, are capable gardeners, giving as much attention to detail in the fields as they do to the delicate woodcarving that has brought them renown (see page 349). Every available inch of land is cultivated and the fertile soil planted twice a year, leaving little grazing ground. Consequently few sheep or cattle are kept.



Photograph by Martin Hürlimann

GODS AND BEASTS LINE THE STAIRS TO THE TEMPLE OF THE FIVE STAGES

Ten times as strong as man are the legendary heroes, on the lower landing, and each ten times stronger than the next below are the elephants, lions, griffins, and two goddesses at the top. Crowned by a bronze finial, the Dyapola Deval, highest building in Bhatgaon, was built by the illustrious Raja Bhupatindra Malla. It is said that he brought the first bricks for this building with his own hands to set his workmen a good example (see text, pages 337 and 346).

Photograph by Martin Hürlimann

ROOFS LIKE TOPS OF FANCY CAKES CAP TEMPLES OF PASHPATI, BENARES OF NEPAL

As their devout Indian neighbors to the south go to bathe in the holy waters of the Ganges, so during religious festivals thousands of Nepalese pilgrims journey to the bathing ghats here along the Bagmati. Dying persons are placed on the sloping ledges so that their feet at least may be laved in holy water. Cremation on the stone plinths near by follows death, and the ashes are strewn on the river (see text, page 347, and illustration, page 327).

Photograph by Martin Hürlimann

HER STRONG BACK SERVES NEPAL WELL

Many women carriers are as sturdy and tireless as men of the coolie class, bearing heavy loads seemingly without effort. This woman of low caste wears a rope of beads at her throat, and gazes with wide-open almond-shaped eyes.

stands another architectural marvel of Nepal, the Temple of the Five Stages.

This famous building was erected and is thought to have been actually designed by Raja Bhupatindra Malla A. D. 1700. So high was the King's enthusiasm that he brought bricks to the site with his own hands. His subjects quickly followed the royal example and within five days sufficient material was collected for the entire temple!

As it stands today, it is one of the best proportioned and most beautiful buildings in the East. It is raised on a five-step plinth of pale brick, with the customary avenue of gods and beasts leading up to the main portals (see page 344).

On the lowest step kneel the deified Rajput heroes, Jaimal and Patta, who have ten times the strength of ordinary men. On the second step are two elephants, with ten times the strength of the former; on the third two lions, ten times as strong as the elephants; on the fourth two griffins, ten times as strong as the lions, and on the fifth and last step two goddesses, Singhini and Baghini, reputed to be the most powerful of all!

Beyond these omnipotent deities rises the temple proper—five stories of pagoda roofs clear-cut against an azure sky, each successive pagoda, of brownish-red tiles, a little smaller than the one below it, and the fifth crowned with a bell finial of bronze, glowing like bottled sunlight.

By a curious but typical oriental inconsistency this marvelously beautiful temple—which should surely house the chief god of the Kingdom—is today unoccupied. It was originally intended as a shrine for a secret Tantric divinity, but now stands empty, although it is locally regarded as sacred to the Bhairavas, the attendants of Bhairava (the terrible form of Siva) and Kali.

TEMPLES BARRED TO EUROPEANS

No European may go inside a Nepalese temple. This is no great loss because, as can be gathered from half-open doorways, the interior is always dark (there are no windows) and devoid of any carving or decoration. The ground floor contains the

image of the principal deity, while the upper stories either enshrine lesser deities or are simply used as temple granaries. Ladders lead from one story to another; the staircase was unknown to the Newari architect.

After the three large cities of the valley, Katmandu, Patan, and Bhatgaon, the next in size and interest—to some the first in importance—is Pashpati, the Benares of Nepal. The place is named for Siva, who once visited Nepal in the form of a gazelle and announced that he wished henceforth to be worshiped there as "Pacu-Pati," Lord of Animals.

It is here, on the banks of the sacred Bagmati River, which flows past the city through a narrow gorge, that the bodies of pious Hindus are burnt and their ashes are cast on the waters (345). Upstream from the two central bridges lie the public burning ghats; downstream lie the royal ghats confined to the King's and the Maharaja's families.

Photograph by Martin Hürlimann

HIS PIERCING EYES ARE THOSE OF A MARTIAL RACE

Gurkha soldiers of Nepal are born with fighting blood in their veins, and have dominated the country for more than a century. Each of these fierce soldiers carries a dagger sword in his belt.

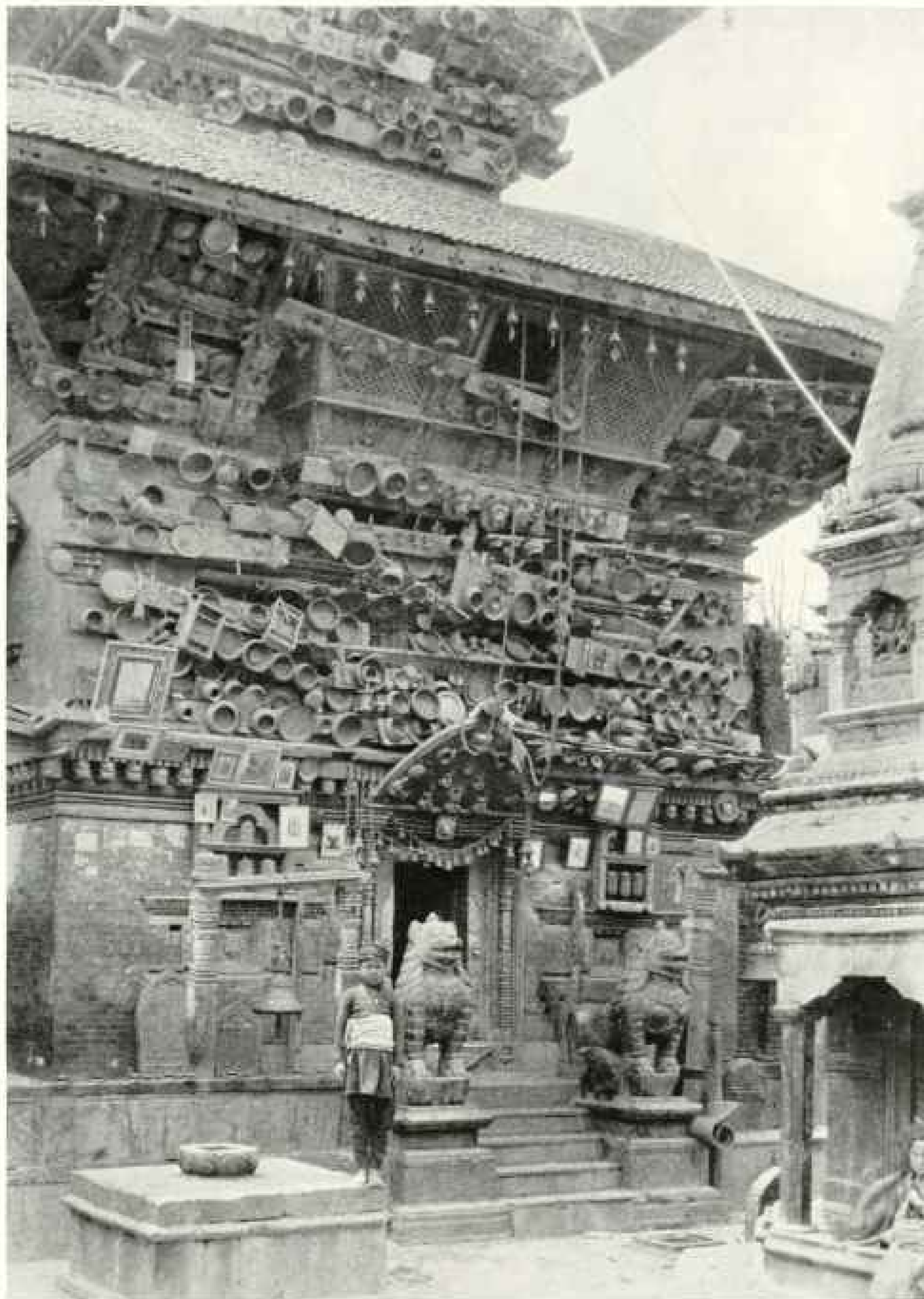
Broad flights of steep stone steps lead down to the water's edge from the myriad temples and memorial shrines which cluster along both banks. But the whole city is dominated by the bright gilt roofs of the two-storied temple of Pashpatinath—the holiest in all Nepal (see page 327).

The sanctity of this shrine is so great that in 1600 A. D. the Newari queen, Ganga Rani, had a rope tied to the bronze bell finial. This rope was nearly two miles in length and the other end was attached to the Queen's palace in Katmandu.

In 1829 Raja Vikram Sah brought an offering of 125,000 oranges to Pashpati, all of which were piled in the courtyard around the temple!

Hinduism in Nepal is closely allied to the northern school of Buddhism and they flourish side by side. It is not unusual to come across a statue in a temple courtyard which is worshiped by the Hindus as Siva and by the Buddhists as Avalokiteshvara! Devil dancing is much practiced by the Buddhists, the dances and masques resembling those of Tibet. The Hindus also have special religious dances with masques and headdresses peculiar to Nepal.

The most popular dance is that in which the Hindu Trinity is presented in its female aspect. The three forces continually active



Photograph by Martin Hürlimann

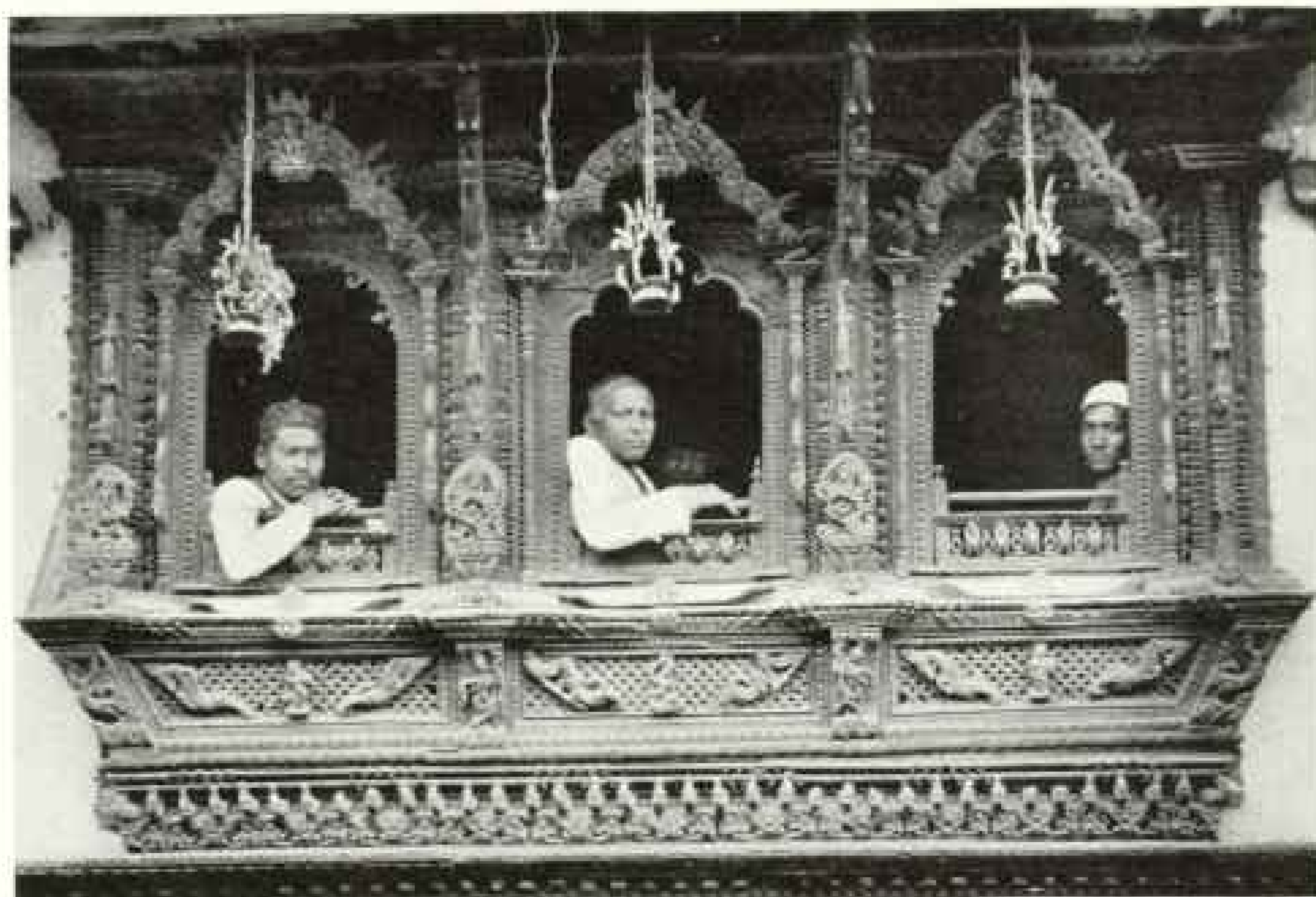
COUNTLESS POTTERY GIFTS HONEYCOMB THE FAÇADE OF A WELL-LOVED TEMPLE

Bells play an important part in Nepalese architecture. Here ropes of them strung across the doorway and those hanging in a row from the eaves await a favorable wind to set them tinkling. Intricate Newar carvings are almost completely obscured by the mass of offerings that litter the walls. Two grotesque lions flank the stairs in the courtyard. Although the sanctuary is Buddhist, it is also visited by Hindus. The devout bring flowers to be blessed with water and then worn in the hair.

Photograph by Penelope Chetwode

SINGHA DURBAR HOUSES NEPAL'S REAL SOVEREIGN, THE MAHARAJA

The King is ruler in name only, all affairs of state being handled by the Prime Minister, or Maharaja, whose title is hereditary. His word is law in the cloistered Kingdom. A long artificial pool reflects the dignity of double Corinthian columns over the entrance to his palace.



Photograph by Martin Hürlimann

KATMANDU'S SUPERB WOOD ARTISTRY RESEMBLES DELICATE LACE

The Newars who came from Tibet to settle in Nepal brought with them an unusual aptitude in decorative art. Their skill in woodworking is responsible for most of the scroll-like ornamentations surrounding the windows and doors in the valley.

Photograph by Penelope Chetwode

MALE IMPERSONATORS DISPLAY THE GROTESQUE TRAPPINGS OF A HINDU RITE

They are Maha Kali, the Destroyer, and an attendant Bhairava at her feet; Maha Lakshmi, the Preserver; a clown, in European clothes, for comic relief; Lakshmi's lion; and Maha Sarasvati, the Creator, and her peacock.

Photograph by Martin Hürlimann

NATIVES OF HIMALAYAN FOOTHILLS COME DOWN TO THE VALLEY ON MARKET DAY

A medley of races produces such peoples—Indonesian, Tibetan, Indian, Siamese, Burmese, and even a branch of the white race as represented in the Aryans. As they face the strange camera, they offer an interesting study in fear, vanity (beads), apprehension, tenseness (note the grip of the man's hand at the left), skepticism, and bravado.

Photograph by Martin Hürlimann

GROTESQUE LIONS GUARD A BRONZE THUNDERBOLT

The colossal, keylike bolt rests on a circular base divided into 12 panels, each containing an animal symbolic of the months of the Tibetan year. It stands in front of two small gilded shrines (right) that adorn the white-domed base of Swayambhunath Stupa (see text below).

in the world are personified by Sarasvati the Creator, Lakshmi the Preserver, and Kali the Destroyer.

The parts of these goddesses are not played by temple dancing girls, but by male performers. Other participants in the dance are Kali's attendants, the Bhairavas; Lakshmi's lion—a fine, shaggy, pantomime beast; and the peacock of Sarasvati. A comic element is introduced in the form of a clown who wears a topi and pretends to be a European! (See opposite page.)

THE GOD WHO SEVERED A MOUNTAIN

To Buddhists, the most sacred place of pilgrimage in Nepal is Swayambhunath. In the far-off days, when the valley of Katmandu was a lake, Vipasya, a former Buddha, visited it. He saw that many kinds of water plants grew therein, but not the sacred lotus. So he took a lotus root, blessed it, and threw it into the water, prophesying that when the root produced a flower, Swayambhu, the Self-Existent, would leap from it in the form of a flame and the lake would be transformed into a fertile and populous country. Accordingly, through the blessing of Swayambhu, the Bodhisattva Manjusri eventually came to the valley and drained the lake through the cleft in the mountains which he cut with his sword (see text, page 337).

The stupa at Swayambhunath was raised on the site of the miraculous lotus planted by Vipasya. Originally built in the third century B. C., it frequently has been enlarged and restored, because of its great sanctity. It stands on the summit of a hill which rises some 300 feet above the plain. To reach it, you have to climb a seemingly interminable flight of steps guarded by statues of the five Dhyani Buddhas.

The present stupa consists of a large hemispherical mass of brick and rubble covered with white plaster. It is crowned

by a bronze tower with a square base supporting 13 disks symbolizing the 13 Bodhisattva heavens. On the four faces of the square base a pair of narrow piercing eyes is painted, symbolizing the omniscience of Buddha. The question mark below the eyes is the artist's convention for a nose.

The stone-paved courtyard surrounding the great stupa is littered with smaller relic stupas containing the ashes of various lamas and monks. Scampering about among them are dozens of brown monkeys which are fed by pilgrims and, not always satisfied with what they are so charitably given, steal the rice and other food offerings laid before the several images of Buddha.

THE GODDESS OF SMALLPOX

Near the great stupa is located the little two-storied Hindu Temple of Hariti (Sitala), the Goddess of Smallpox—a further proof of the close relationship existing between the Hindu and Buddhist faiths in Nepal. In the courtyard is the colossal bronze Thunderbolt (*Vajra*), the emblem of the Dhyani Buddha Akshobya. It rests on a circular stone base (*dhatu mandal*), divided into 12 panels, each containing an animal symbolical of one of the 12 months of the Tibetan year.

Next in sanctity and importance to Swayambhunath is the amazingly beautiful stupa of Boddhnath. It is said to have been built shortly before the Christian era by a parricide king in expiation of his sin. It rises, in a hemisphere of snowy plaster, out of rich fields of brown buckwheat. The omniscient eyes gaze across the valley from the four faces of its bronze *toran;* the thirteen Bodhisattva heavens rise in a gleaming pyramid of 13 steps crowned by an elaborate umbrella, the insignia of royalty.

A STUPA OF 108 PRAYER WHEELS

Around the base of the hemisphere runs a continuous line of 108 niches containing different incarnations of Buddha. The stupa stands on a fine brick three-step plinth enclosed within a circular wall. On the outer face of this wall there are oblong recesses containing in all 108 prayer wheels! In the courtyard around the central stupa stand several small ones erected to house a bone of each Dalai Lama.

When we visited Boddhnath we were shown around by the Chini Lama, so-called because he knows Chinese and acts as interpreter and scribe in negotiations between China and Nepal. He was a small man, a Tibetan by birth, and he wore a beautiful dark-red brocade robe lined with pervenche blue; beneath this his feet appeared, clad in smart yellow brogues with crepe-rubber soles (see Color Plate VII).

The Chini Lama adopted certain European customs when he went to Calcutta University. He spoke fairly fluent English with a peculiar syntax, and he told us many interesting things. Once every twelve years, in February, water gushes from the base of the Boddhnath Stupa. This is looked upon as sacred nectar and pilgrims come from afar to drink the sanctifying stream. Before they may approach it, however, the Chini Lama comes forward and bottles some of the water, which he subsequently sends to the Dalai Lama in Lhasa.

There are other places of interest and beauty in this enchanted Himalayan valley: the lovely water garden of Balaji, a mile or two outside Katmandu; the Vaishnava temple of Changunarayan; the little town of Kirtipur—a book would be necessary to describe them all.

WHERE THE BUY-A-BALE MOVEMENT WOULD PROSPER

In strange contrast to the gloomy Indian peasant, the village dweller of Nepal is a happy, smiling individual with a true Mongolian joy in living. The women wear gay skirts of painted cotton stuff, mostly procured from India and Japan, with yards of plain material wrapped around their waists for belts (page 322). Many of them like wearing simple black shirts with strings of scarlet beads about their necks.

The men wear cotton jodhpurs (though their legs are bare when they work on the land) and brown or peach-colored smocks, with the same bulky belts as the women. Members of the martial tribes from whom the Gurkhas are recruited tuck kukris, the famous Gurkha daggers, into the voluminous folds of these belts (page 347).

Whether seated at the potter's wheel, bringing water from the village well, or harvesting rice in the vast yellow fields, the peasants are smiling, seemingly enjoying their work, obviously glad to be alive. And well they may be, living and dying as they do in the shadow of the sun-kissed snows, in the fertile, happy valley of this sequestered kingdom.

THE HUZULS MUST COME DOWN FROM THE HILLS TO ATTEND CHURCH

In the southeastern panhandle of Poland, among the Carpathian Mountains, live these shepherds or woodchoppers, here seen in holiday attire, who tend their flocks on alpine pastures. Zabie is a shoestring village extending for miles along a river.

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Autochromes Lumière by Hans Hildenbrand

WARM-COLORED RAIL-BIRDS BESIDE A RUTHENIAN SHRINE

The Sunday gathering in the churchyard near a gabled crucifix is the principal social event for hospitable Huzuls.

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A RUTHENIAN BLONDE DONS HER SUNDAY BEST

The sleeveless tan jacket covers a delicately embroidered white shirtwaist and gorgeous skirt. The gaudy costumes of Huzuls, Gorals, and other mountaineers are prized by visitors to the resort of Jaremcze, many of whom take them home to wear at fancy-dress balls.

Autochromes Lumière by Hans Hildenbrand

HUZUL DEACONS REST BY THE UNIAT CHURCH DOOR

They wear sheepskin vests and black baggy trousers tucked into red wool puttees and rawhide sandals. Living a lonely life as shepherds on the swift rivers of the Carpathians, these people, at Żabie in the southeastern wedge of Polish Galicia, seldom assemble except for church.

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HE KEEPS HIS HEAD COOL AND HIS BODY WARM

In summer, this Ukrainian peasant wears a straw hat with a rainbow band. His waistcoat keeps him warm in the evenings when the temperature drops suddenly because of the high altitude.

Autochromes Lumière by Hans Hildenbrand

WHO COULD RESIST THESE BAREFOOTED BERRY SELLERS?

To the broad-eaved villas and resort hotels with wide verandas along Poland's southern frontier come peasant girls in spotless raiment to sell wild berries gathered on cool mountain sides.

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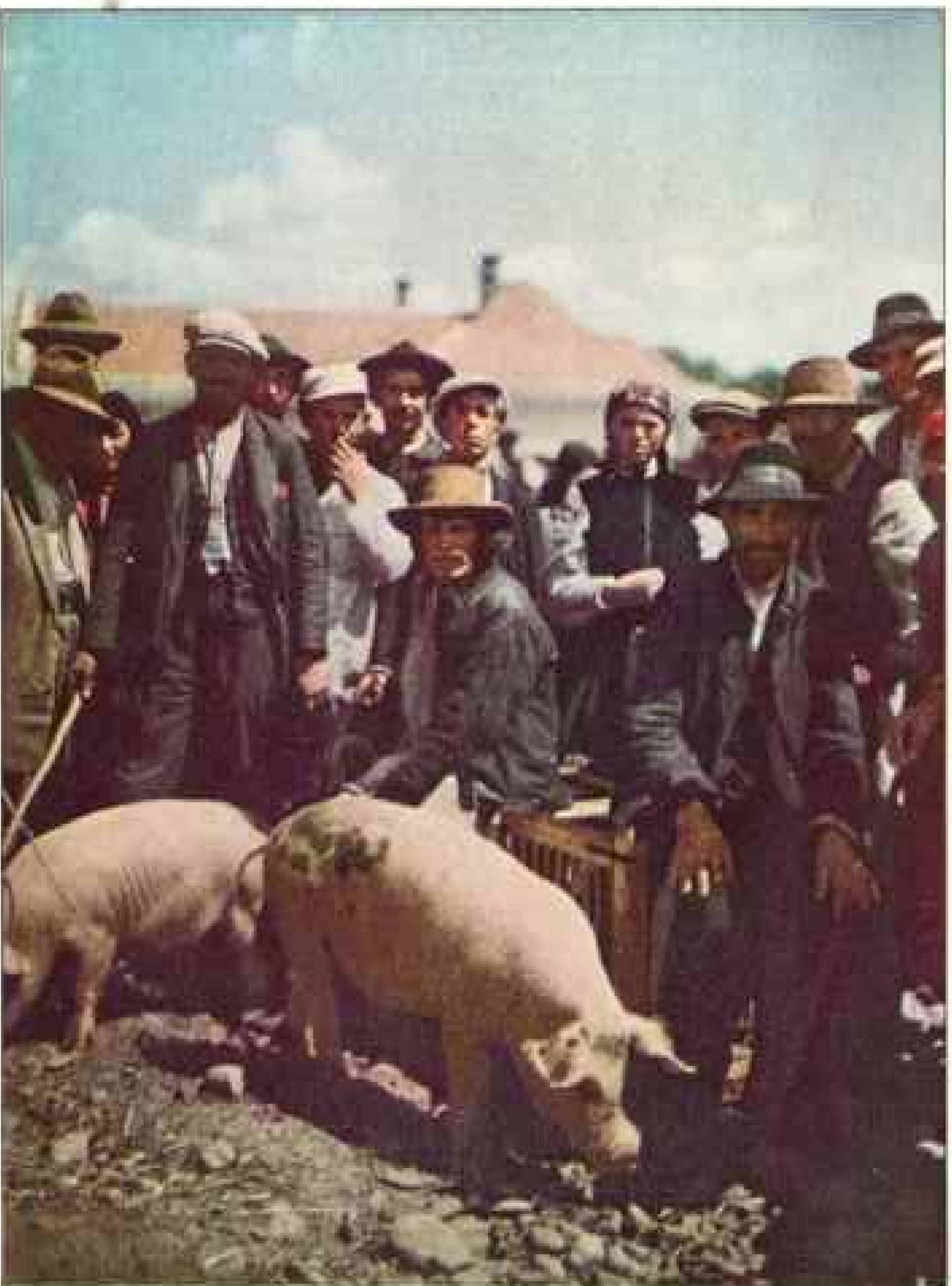
THE MARKET HAS A BACKGROUND OF AMERICAN DRAMA

When the peasant women come to markets such as this at Stanisławów, they bring country products to exchange for goods from the town, here symbolized by posters for "movies" and theatres.

Agfacolor Plates by Hans Hildenbrand

HUCKLEBERRIES AND CREAM IN STANISŁAWÓW

Both are sold in the open air market by women whose costumes are influenced by the proximity of Ukrainian, Romanian, and Czechoslovak mountaineer dress.



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PIG MARKETS ABOUND ALONG THE DNIESTER

Swine, being valley dwellers, do not have as colorful masters as do sheep. This scene at Stanisławów might have been posed for "The Three Little Pigs."

Agfacolor Plates by Hans Hildenbrand

RUTHENIAN EMBROIDERY ENLIVENS THIS ALFRESCO STALL

The photographer in search of local color always turns to the market place, where large crowds, better dressed than usual, congregate for weekly banter and barter.

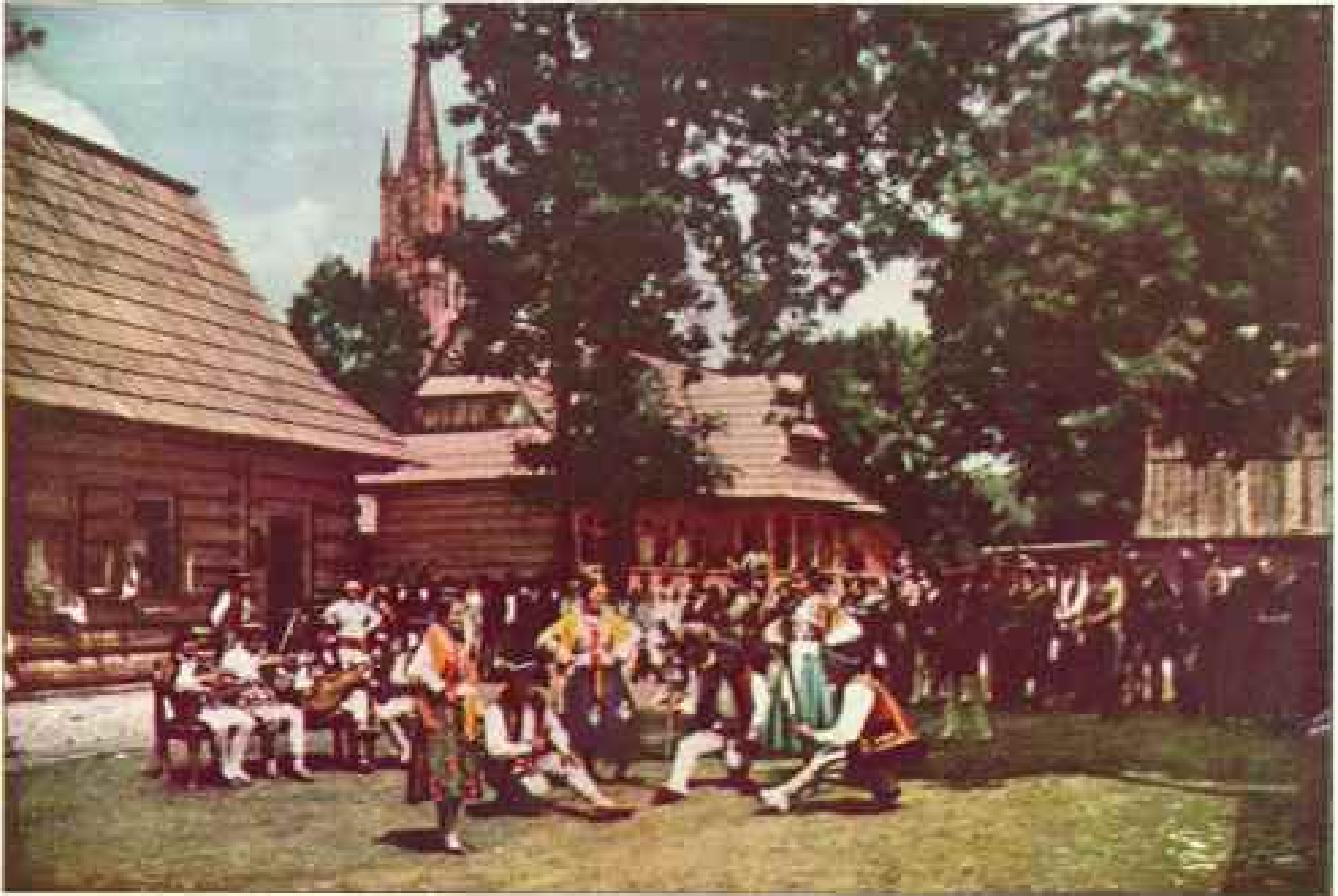
OFF TO CHURCH IN THEIR SIX-PASSENGER CAR

Where mountain gives way to plain near Kosów, woven-bark wagon boxes, which serve sundry purposes on weekdays, hold living bouquets of worshipers bound for Sunday service.

© National Geographic Society Agfacolor Plates by Hans Hildenbrand

AMID RACIAL COMPLEXITY, COSTUME GIVES THE CLUE

At church gatherings and in the market place, the expert can distinguish farmer from herder, plainsman from mountaineer, by their respective garments. While these people welcomed the camera, they said they would prefer to be wearing their holiday best.



GORAL FIDDLERS STIR THE FEET OF DANCERS IN THE VILLAGE SQUARE

These low-stepping, felt-clad Gorals inhabit the mountain-girt projection of Poland, south of Kraków. They resemble American Indians and carry light wooden hatchets like tomahawks.

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Agfacolor Plates by Hans Hildenbrand

A STORK-BLESSED FARMHOUSE NEAR SAMBOR

Peasants of Galicia regard the stork as a harbinger of good luck and babies. During the return flight from Africa in 1858, migrating storks were decimated by a terrible storm and almost disappeared from Poland.

CITY HATS ATOP PEASANT VESTS MARK THE CHANGING FASHION

As in Turkey, changes in dress in Polish Galicia touch the headgear, but the *serdaks*, sleeveless sheepskin jackets, remain. Proof against biting wind and evening chill, they are being adopted and carried abroad as sports dress by visitors to Polish winter resorts.

© National Geographic Society Autochromes Lumière by Hans Hildenbrand

WHILE LEADING LADIES POSE IN PIGTAILS, "EXTRAS" CROWD AROUND

In obtaining a natural-color photograph of the rainbow saleswomen in a vegetable market of Polish Galicia, the photographer also recorded the popular interest in his function of revealing the world.

THE CONQUEST OF MOUNT CRILLON

By Bradford Washburn

With Illustrations from Photographs by the Author

ONE hundred and fifty miles south of the icy pyramid of Mount St. Elias, a chunky peninsula of rock and ice juts out from the North American mainland into the turbulent waters of the Gulf of Alaska. Though but a scant forty miles wide at its broadest point, and considerably less than a hundred miles in length, this rugged little headland has one of the highest ranges of coastal mountains on the face of the earth (see map, page 363).

Little is known about the Fairweather Peninsula, even in Alaska itself. At Juneau, a hundred miles to the east, prospectors and boatmen tell fabulous tales of the enormous patches of wild strawberries which line its western beaches, the terrific tide rips at the mouth of entrancing Lituya Bay, of sparkling glaciers dropping headlong to the sea, and of virgin forests draped with Spanish moss, dark and mysterious as the jungles of the Tropics.

Capt. James Cook, on his third voyage around the world, saw these gorgeous mountains in 1778. Eight years later a French explorer, La Pérouse, entered Lituya Bay during his futile search for the Northwest Passage, and named some of the lofty peaks which tower from its waters—Fairweather (Beautemps), Crillon, Dagelet, and La Perouse.

MUTE TALE OF A GOLD RUSH

Eventually Russia took control. Traders from the south worked up along the coast. The United States came into possession, and the Indians who had inhabited the peninsula in the days of La Pérouse migrated southward to become swallowed up by the advancing civilization.

Then, with the gold rush, people once more sought the shelter of Lituya Bay. Pits and ditches overgrown with moss, ancient cabins and rotting sluices scattered for miles along the wooded coast, still tell a mute tale of the mad struggle for the precious metal.

Gold was found, and platinum, too, but the valuable sands were far too finely pulverized to permit profitable working. One by one the cabins were deserted and the fortune seekers pushed on into the interior in search of richer ground.

But one of these pioneers remained. Jim Huscroft was his name and he had grown to love the great mountains and the seclusion of their forests. In 1917 he moved to tiny Cenotaph Island, in the middle of Lituya Bay, where he started a silver fox farm. There he has lived as a hermit for seventeen years (see page 365).

Once each year Jim makes a trip to Juneau with Ernie Rognan, a Norwegian fisherman friend, who has slowly developed into a sort of partner in the little enterprise. They sell their pelts, buy fresh supplies, and return to the bay once more—the only inhabitants of eighty miles of lonely coast from Cape Spencer to the Alsek River.

In 1907 the International Boundary Commission spent considerable time in mapping the range, and in ascertaining the altitudes of its major peaks from Glacier Bay, which lies to the east of the peninsula, for the reason that Mount Fairweather, its loftiest summit, and that of Mount Root to the north, are important turning points of the boundary between British Columbia and southeastern Alaska.

It was not until many years later that any attempt was made by an expedition to push beyond the coastline and actually to explore the heart of the range. The late Allen Carpé and Dr. William S. Ladd, of New York City, accompanied by Andrew S. Taylor, of McCarthy, Alaska, landed at Sea Otter Bight, 25 miles north of Lituya Bay, in May, 1926, and attempted to climb Mount Fairweather by its redoubtable northwest ridge. After reaching an altitude of slightly over 9,000 feet they were forced to give up because of lack of food.

ONE MUST WADE TO CLIMB

The account of this glorious new country which these climbers brought back to the East fast circulated among their mountain-loving friends. No plans for a renewed attack on Fairweather materialized until 1930, when I led a group of six Harvard men to an altitude of just below 7,000 feet on the same ridge.

Fairweather's seemingly modest altitude of 15,318 feet (some 464 feet lower than easy Mont Blanc) had completely fooled both of our parties into thinking that it was

HERE THE LAST SHORT STRUGGLE FOR THE PEAK WAS WAGED AND WON

An aerial close-up of Mount Crillon shows faintly the track of the climbing party to the left of the central ridge. Just below the summit, a narrow knife-edge shoots upward at an angle of 50 degrees and steps had to be hewn in its icy face. The precipice on the right drops 8,000 feet to Johns Hopkins Glacier, and the one on the left nearly 4,000 feet to the upper plateau, from which the ridge was reached (see illustrations, pages 380, 386, and 397).

an equally easy climb. Most Alpine ascents start at four thousand, or even five thousand, feet, and then, usually, the next three or four thousand are covered in a funicular or aerial tramway.*

To climb the peaks of the Fairweather Range one starts by wading waist-deep in seawater, unloading supplies in the surf. There are no trails through the thick lower forests. The glaciers, which are usually veritable highways in the Alps, are for the most part honeycombed with crevasses hidden under a thin, treacherous blanket of winter snow and blocked by stupendous icefalls. There are no huts, no porters, no guides, and no fresh food.

Mountaineering in Alaska is still little short of Arctic exploration, with all of its attendant difficulties and hardships. But the beauty of the country casts a spell which it is well-nigh impossible to shake off. Carpé, Ladd, and Taylor returned early in the spring of 1931. They had with them a new companion, Terris Moore, of Haddonfield, New Jersey.

They brought with them food supplies for three months and prepared to lay siege to Fairweather. Ocean currents had built sandbars across the entrance to Sea Otter Bight and they found it impossible to beach their boat there again. The nearest harbor

* See "Manless Alpine Climbing," by Miriam O'Brien Underhill, in the NATIONAL GEOGRAPHIC MAGAZINE, August, 1934.

Drawn by Albert H. Bumstead

MOUNT CRILLON STANDS ON A COAST TORN AND TATTERED BY GLACIERS

The peak conquered by the author and his companions rises near the head of Lituya Bay, which notches Alaska's Fairweather Peninsula. The whole region, with its jagged fiords, bears the marks of giant glaciers in slow retreat. Making aerial pictures, Mr. Washburn and Mr. Goldthwait flew northward as far as the Malaspina Glacier and Mount St. Elias. The lower insert locates Mount Crillon in relation to the whole of Alaska, while the upper shows in detail the mountains and glaciers around the base camp on Crillon Lake.

was Lituya Bay, 25 miles to the south. Here they landed early in April after fighting terrific storms for nearly two weeks, during the usual 20-hour voyage out from Juneau.

The gales continued. Scarcely ever seeing their mountain at all, they back-packed their supplies up the beach, over miles of barren glacier, and at length, after a heartbreaking struggle, Carpé and Moore conquered the peak of Fairweather on June 8, 1931. It had taken two months of the utmost skill, pluck, and determination of four of America's finest mountaineers to scale a peak which would not rank as highest even in the Alps.

With Fairweather conquered, the center of interest shifted to Mount Crillon, the stunning 12,728-foot monarch of the southern end of the range. To me the attraction of the Fairweather Range lay not only in climbing on its virgin mountain peaks, but also in the study of their geology and in delving deep into the unique secrets of their great glaciers. It was with these varied interests in mind that the Harvard Expedition of 1932 and the Harvard-Dartmouth Expeditions of 1933 and 1934 were led into the marvelous country about Mount Crillon.

The first expedition amounted to a mere reconnaissance. Over-confident at the start, exasperated at the close of the summer, we

A TINY LAWN MOWER MOTOR RAN THE RADIO

At his listening post in the "radio corner" Putnam kept the base camp in constant touch, by short wave, with Juneau, Prince Rupert, and Ketchikan, as well as with climbers on the mountain (see pages 367 and 374). The lowly motor powered a generator that charged two storage batteries. These ran a small dynamotor which, in turn, operated the set.

did little more than gain a detailed knowledge of the intricate approaches to the mountain and a realization of the fact that we were up against fully as tough a problem as we had faced two years before on Fairweather.

A LAKE RESTORED TO MAPS

In 1933 our earlier experiences stood us in good stead. The three-week back-pack from Lituya Bay to the base of the mountain was eliminated completely. Crillon Lake, shown on most charts and supposed recently to have "drained out," we had discovered not only to exist but to be a mile longer than had been shown on any of the maps (see page 368).

Working with a seaplane, we transferred every ounce of our supplies to the lake in a single morning. I shall never forget sitting in that plane, with nearly a thousand pounds of food, tents, and other equipment piled about me, as I watched the scenes of our 1932 troubles slip peacefully along below us at a speed of a hundred and twenty miles an hour!

The use of the airplane enabled us to have a much more comfortable base camp at the lake. Richard Goldthwait, of Dartmouth, assisted by Russell Dow and Howard Platts, of Woodsville, New Hampshire, spent the whole summer there studying the movements of the large South Crillon Glacier and conducting a geologic survey of the mountains roundabout.

The climbing party of six men spent nearly a month in a desperate effort to reach the peak of Crillon and to extend our geologic and geographic knowledge deep into the heart of the range.

We made two attempts to conquer the summit of Crillon from our highest camp. One reached an altitude of 11,750 feet and was turned back in a terrific storm. The second attained the summit of the east peak of the mountain (12,390) feet and almost reached the base of the final pyramid before it, too, was driven back in the face of high winds and treacherous snow (page 385).

SURVEYING GLACIERS WITH AIRPLANE

Near the close of the summer, Goldthwait and I, piloted by Gene Meyring, of the

Alaska Southern Airways, made an aerial survey of all the existing glaciers for more than a hundred miles northward up the coast. The last time that most of these icefields had been accurately mapped was some 25 years ago, when the region was studied by the National Geographic Society's expedition under Tarr and Martin.* The changes that had taken place since that time were amazing.

The most outstanding case was that of the Nunatak Glacier, ninety miles north of Crillon Lake, which we found had retreated about six miles back into the mountains, leaving a deep fiord of the Pacific Ocean where but a quarter of a century ago the ice had been mapped as over a thousand feet in thickness (367, 370). Rivers had changed their courses. Lakes had appeared and disappeared.

A MODERN CRUSOE DWELLS ON CENOTAPH ISLAND

Jim Huscroft, a typical pioneer of the Alaskan coastal country, first came to Lituya Bay as a trapper and miner in 1917 and has lived there as a hermit ever since. A Christmas card sent in October by the author reached Jim on the boat which brought the supplies for the next Expedition in June! Jim raises his own vegetables in a small garden cleared from the dense forest (see text, page 361).

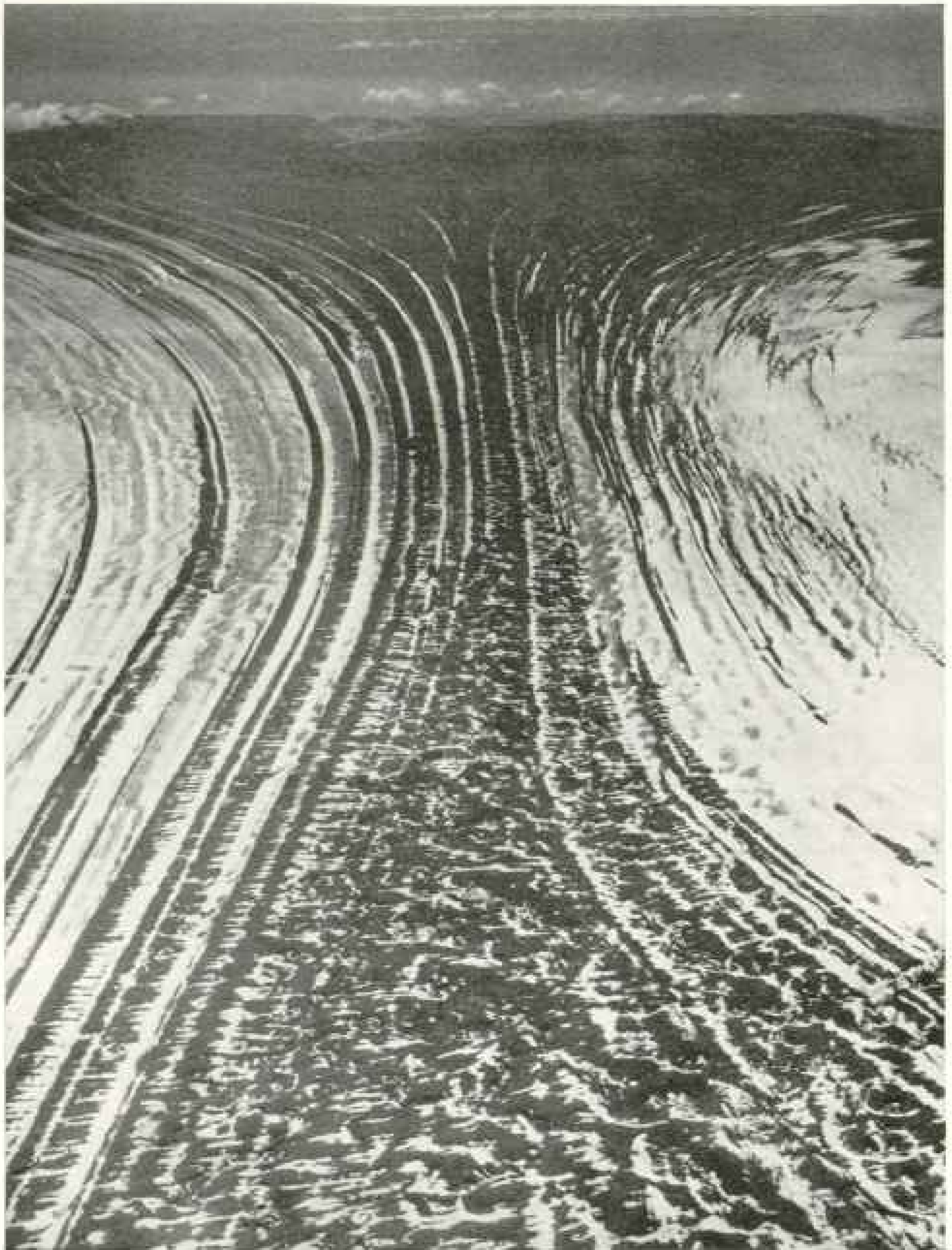
Our flight carried us into a region well known but little studied—one which to-day is the stronghold of the Ice Age on the continent of North America.

The preliminary observations which Goldthwait made of the motion of the South Crillon Glacier have dealt a death blow to the popular idea that a glacier moves slowly, steadily along, like an irresistible river of ice. Instead of making the usual daily or weekly observations of the moving ice, he placed a matchstick on a bowlder near the center of the glacier and reported its movement from the shore every two hours through the eyepiece of a powerful theodolite.

Early in the morning, at noon, and around sunset, the ice surged forward at a speed nearly twice as fast as it did during the rest of the day. The graphs stand as mute evidence that a glacier moves in waves or jerks, the origin of which even now we do not definitely know (see page 376).

The Geological Society of America, in March, 1934, agreed to furnish sufficient funds to enable us to carry on another

* See "The National Geographic Society's Alaskan Expedition of 1909," by Ralph S. Tarr and Lawrence Martin, in the NATIONAL GEOGRAPHIC MAGAZINE, January, 1910.



TWO GLACIERS SPREAD A GIGANTIC FAN TOWARD THE DISTANT PACIFIC

Long, sweeping bands of rock and dirt mark the junction of the Libbey Glacier with the Malaspina Glacier at the left (see pages 378, 382-3). From an airplane flying at 14,000 feet the mottled foreground looks smooth, but actually it is a chaos of enormous hills of rough, dirt-strewn ice, many of them well over a hundred feet high. Although the alternate black-and-white ridges appear curved in the picture, actually they are parallel at this junction of two of North America's largest glaciers. The curved effect in the foreground is due to distortion from foreshortening. A white mantle still covers the rocky surface, even though the picture was taken in July. Later the snow will melt and disappear for several weeks until the first fall blizzard. The Pacific Ocean, toward which the glaciers are moving, is just visible 30 miles away.

AN AIR VIEW SHOWS NUNATAK GLACIER IN FULL RETREAT

In a quarter of a century this Alaskan ice mass has receded nearly six miles from the point indicated at the left. The white line marks the edges of the glacier as it was 25 years ago. Where now lies the head of Nunatak Fiord a National Geographic Society expedition in 1909 found solid ice more than a thousand feet thick. Nunatak, derived from an Eskimo word, means a hill or mountain surrounded by ice. The glacier takes its name from the hill marked The Nunatak, which was an island in the ice when they were named. One arm of the present glacier is plainly visible in the center of the picture, while the other is out of sight at the right (see page 370).

season of aerial photographic work and to make possible an even more accurate series of glacial motion studies than before.

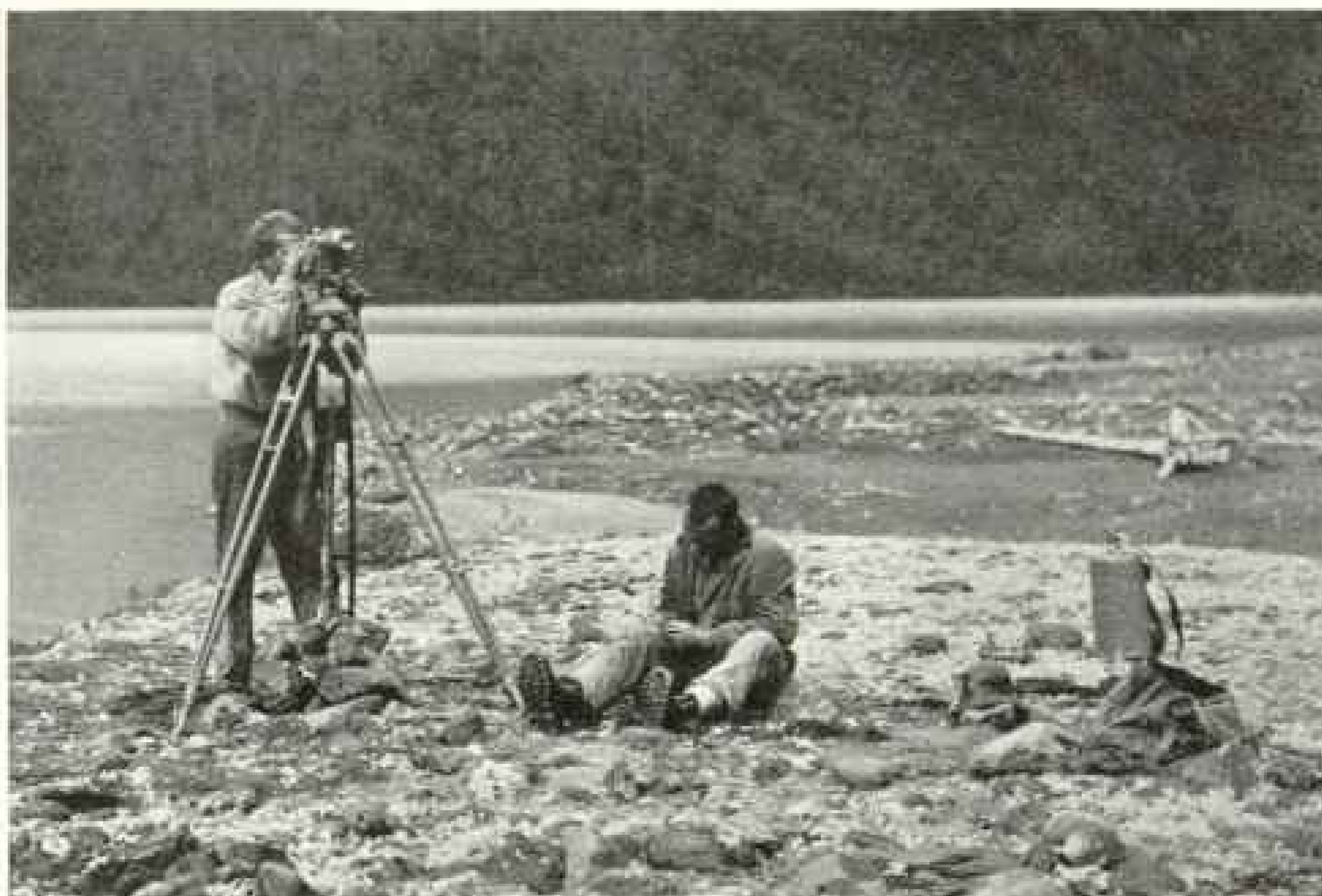
Immediate coöperation came from other sources as well. Dr. Hamilton Rice, of Harvard University, furnished us with an instrument capable of making hourly motion observations, and a special marker was built that could be seen clearly both by day and by night. A complete geophysical blasting apparatus was furnished Goldthwait by the Harvard Geology Department, with which he was to determine the depth and certain other qualities of the glacial ice (see page 384).

RADIO AIDS THE CLIMBERS

The base camp was supplied with a short-wave radio so that we might keep in touch with civilization. Two portable five-meter radio telephones, weighing less than 20 pounds apiece, were purchased to maintain constant daily communication between the Crillon Lake camp and the highest depots on the mountain—a program which has never before been successfully attempted by any mountaineering expedition.

Eleven men were speedily recruited—five to carry on the observations at the lake, six to spend the summer on the mountain. Advance arrangements were rushed through with Alaska Southern Airways and on June 19 a boatload of supplies left Juneau for Lituya Bay. Four days later, with the valuable assistance of Meyring and the seaplane, the 1934 camp was firmly established at Crillon Lake.

On the following day Meyring, his mechanic, and I carried a load of 900 pounds of canned food and tents which had been carefully packed in wire-bound boxes, and threw them out on a snowfield at an altitude of 5,600 feet on the west slope of Crillon. Although the boxes were not equipped with any form of parachute and fell through the air nearly a thousand feet, we counted upon

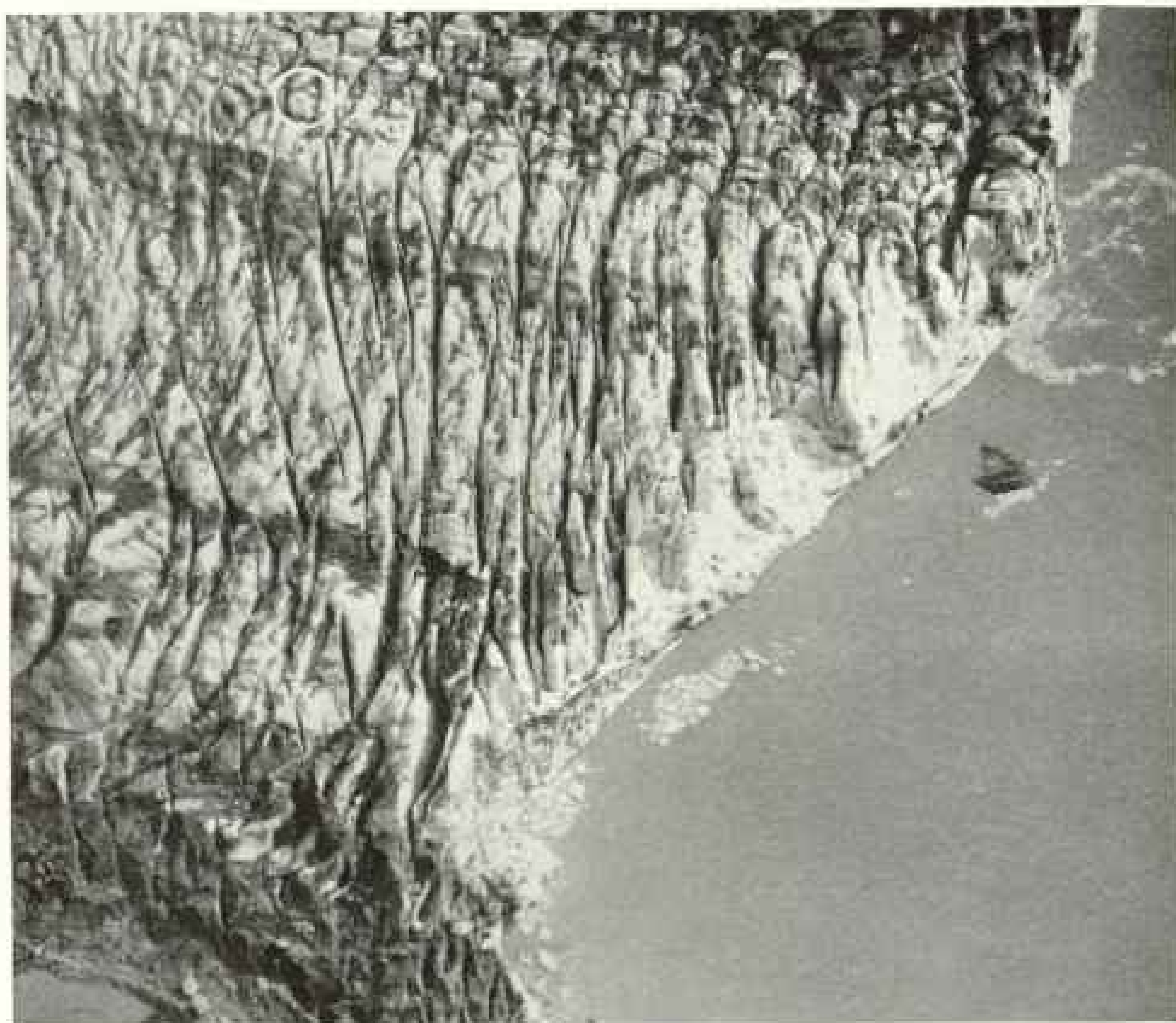


PUTTING CRILLON LAKE BACK ON THE MAP

It was supposed to have "drained off" recently, but the Expedition found it present and grown a mile (see text, page 364). Here the author sights through the theodolite, and Walter Everett, in heavy-nailed boots, records the observations.

A SIMPLE MARKER HELPED CLOCK THE SPEED OF A HUGE ICE RIVER

The device was left in the middle of the South Crillon Glacier and observed from the shore through the theodolite, an instrument for measuring angles. The vertical black tube was observed in the daytime and a tiny light bulb was watched by night (see pages 371, 381, and 384).



THIS CRINKLED AND CREVASSED RIVER OF ICE FLOWS JERKILY

The South Crillon Glacier, advancing into the murky waters of Crillon Lake at a rate of about two feet a day, travels fastest at early morning, noon, and sunset (see diagram, page 376). The white circle in the upper left corner locates the Expedition's instrument for measuring the motion (see illustration, opposite page, and text, page 365). Treacherous crevasses, many of them over 100 feet deep, added the spice of danger to the twice-daily trip out to the marker to connect the light and put it out.

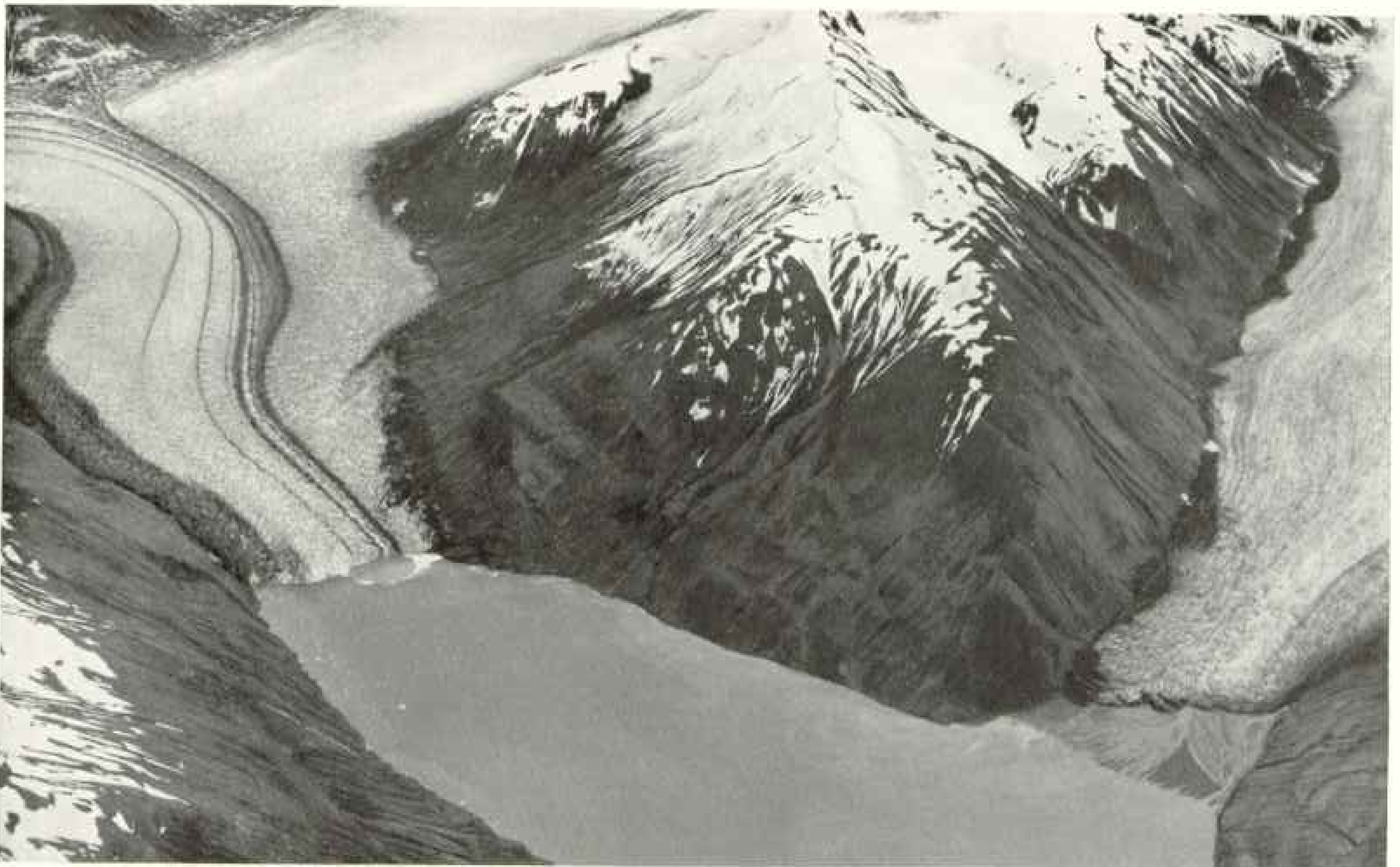
their not breaking because of the soft, slushy snow encountered at that time of year.

Thirty-one boxes were tossed from the seaplane as it cruised back and forth above the mountain. Each made a large pockmark in the smooth surface of the snow and each was carefully located on a sketch map that we drew before we cut the motor and circled back to the base camp. Should this novel experiment work, we could accomplish in a single day the work of six men for two weeks.

The plane returned to Juneau that afternoon. The small five-meter radios were at once set up and tested. They worked perfectly. On June 25 Carter, Streeter, and Kellogg, of the climbing party, attempted to locate the boxes on the upper snowfield. But the clouds had come down during the night, snow conditions in the lower valleys were terrible, and they returned late in the evening, having managed to reach an altitude of only 3,500 feet.

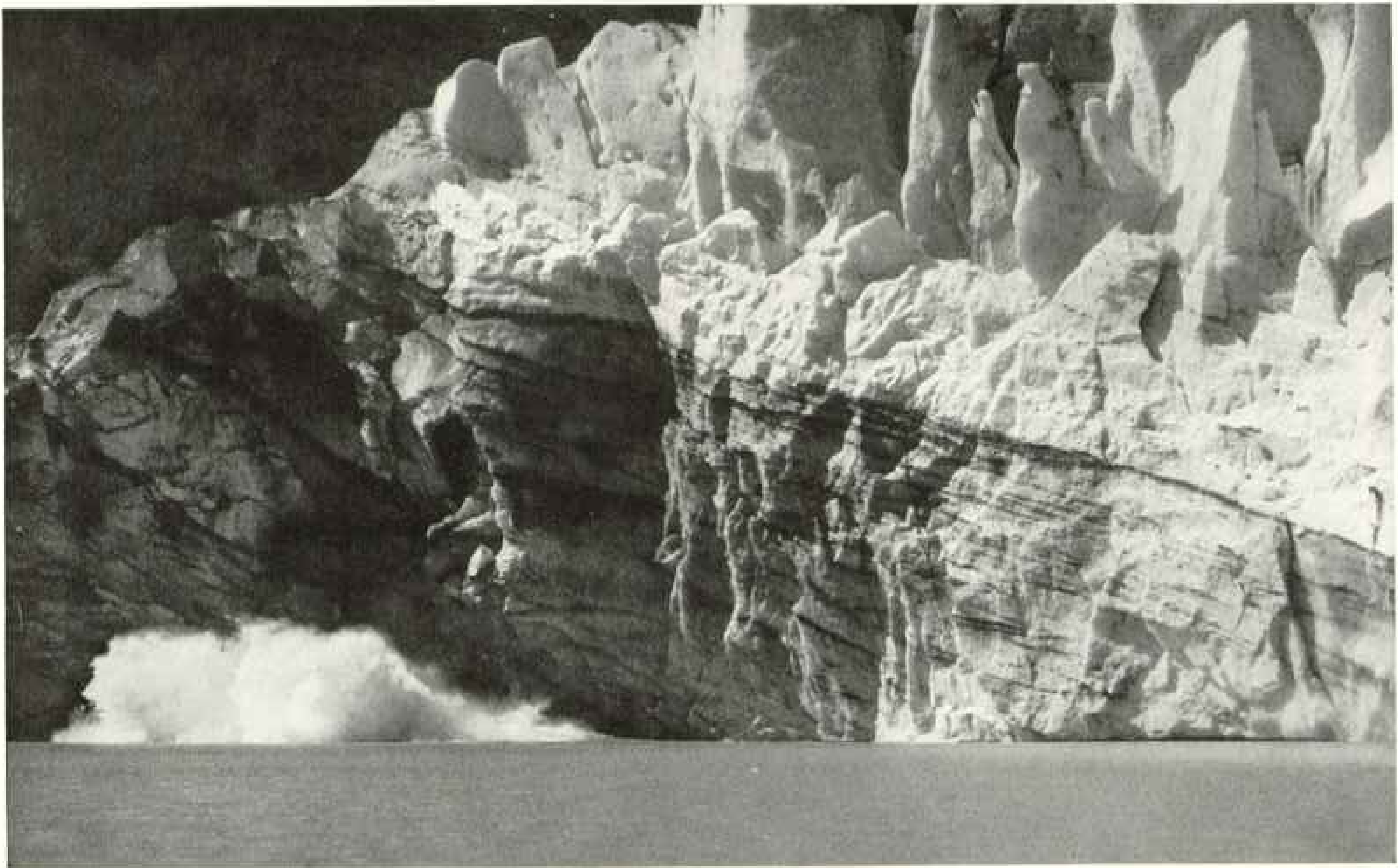
The failure of this first party was a big shock. The weather was getting colder and we were afraid that fresh snow might bury the boxes before we could reach them. At 2 o'clock the next morning, nine of us set out in a desperate attempt to discover them and check their contents for breakage.

This time we had better luck. Using a new route, we managed to make the snowfield by noon, and by 3 o'clock, with the aid of our aerial map, every box had been located and we were on our way once more to Crillon Lake. Out of the total 900 pounds, only thirteen small tins of corn and peas had been broken. Our glee at this



NUNATAK GLACIER PLUNGES ITS TWO ARMS INTO A TROUGH OF ICY WATER

At the time of the National Geographic Society Expedition of 1909 (see text, page 365, and illustration, page 367), these two ice bodies, left and right, were fused into one, which flowed nearly six miles farther down the fiord. Airplane views taken today show they are fast melting back into the mountains, leaving hundreds of feet of water in the valley which they covered 25 years ago. Nunatak Fiord, in the foreground, is one of the long, narrow inlets at the head of Yakutat Bay.



WITH A CRACKLING ROAR HUNDREDS OF TONS OF ICE TAKE A HIGH DIVE FROM THE CLIFF OF SOUTH CRILLON GLACIER

A giant pinnacle has just hit the water and the camera has caught the beginning of the splash. The clouds of spray often rose nearly 100 feet into the air, and six-foot waves foamed far up onto beaches more than a mile away. The picture was taken from the Expedition's canoe, which was rocked unpleasantly but not upset. The 160-foot ice cliff towering to the right is beautifully colored in every conceivable hue of blue and green, veined with brilliant ruddy rock and dirt (see illustrations, pages 369, 381, and 384, and text, page 365).

SUCH A WATER BIRD HAD NEVER BEFORE BEEN SEEN ON CRILLON LAKE

The Expedition's Lockheed Vega seaplane saved labor by carrying supplies and dropping them on the snow-cushioned slopes of Mount Crillon. Even on long photographic flights over mountains and glaciers the plane carried no landing gear but pontoons, as wheels would have been useless in a forced landing. Its veteran pilot is Gene Meyring, of Alaska Southern Airways.

EXPLORERS MUST BE JACKS OF ALL TRADES

Sturdy spruce saplings and an extra pair of seven-foot skis are nailed and lashed together to make a sledge. The "makings" were back-packed up over the difficult lower ridges and assembled here above Camp II, where a long trench of snow and ice, called the Great Valley, permitted speedy progress toward establishing a final camp (see illustrations, opposite page, and page 392).

CROSSING SNOWFIELDS, THEY OFTEN WERE SUNBURNED!

Sledging a 900-pound load up the Great Valley was a red-hot job, no matter if the weather was cold. The men rarely wore anything above the waists and frequently lay down on the snow to cool off. Most of the sledging was done at night to escape the sun's heat and to profit by the hard night crust. The final cliffs of Crillon rise in the shadow at the left (see page 392).

CANDLES AND A FLASHLIGHT ILLUMINATE A DELICATE REPAIR JOB

Goldthwait, Carter, and Washburn furrow their brows over the powerful theodolite, which was slightly damaged while back-packing it over a glacier. The prisms which Goldthwait is adjusting had to be set entirely by guesswork, as no human eyes can judge so small a distance as one one-thousandth of an inch. It took nearly eight hours of steady guessing to strike the right adjustment.

AN ICEBERG LIKE A SKELETON DRIFTS SLOWLY PAST THE CAMP

The Expedition's canoe was too big to be brought in to Crillon Lake by airplane and was back-packed over the rough surface of the South Crillon Glacier (page 384) in 48 consecutive hours of hard work by the 1933 Expedition. Left in the woods during the winter of 1933-4, it was partly eaten by porcupines, but was reconditioned for use again.

result was uncontrolled, for even now I cannot remember a single soul in the East who gave us the slightest encouragement about this plan.

A BACK-BREAKING TASK

The first bit of good luck put everybody in perfect humor. The problem was now to back-pack all of the breakable supplies to the cache of dumped material at 5,600 feet. The walk was a terror. As Crillon Lake was only 300 feet above the sea, it meant a pack of over 5,000 feet up and back in a single day.

On June 27, at 4 o'clock in the morning, the first load went up, including one of the five-meter radio sets. At noon the station at the base camp picked up a message that the climbers had reached 5,000 feet and were eating lunch above a glorious sea of clouds At 3 o'clock a second conversation told how they had reached the upper cache safely and were on their way down. The radio was left near the cache and they descended as fast as possible, reaching camp, weary but jubilant, just at dusk.

By the end of June most of the supplies had been moved to the "Knoll" where the boxes had landed, and on July 3 we had six men working loads daily up through a short icefall to an altitude of 6,000 feet.

ON THE TIP OF FAIRWEATHER GLACIER GROWS "A FOREST ON ICE"

Trees rooted in the dirt of a glacier's surface cover the whole upper left half of the picture. The grayish lake in the left center is nearly surrounded by an ice wall a hundred feet high. In its waters float icebergs and the remains of trees that have crashed off the cliff as the ice slowly melts. Glacial ponds gleam white from the air; smaller, freshwater ponds, in the right foreground, are dark and almost invisible.

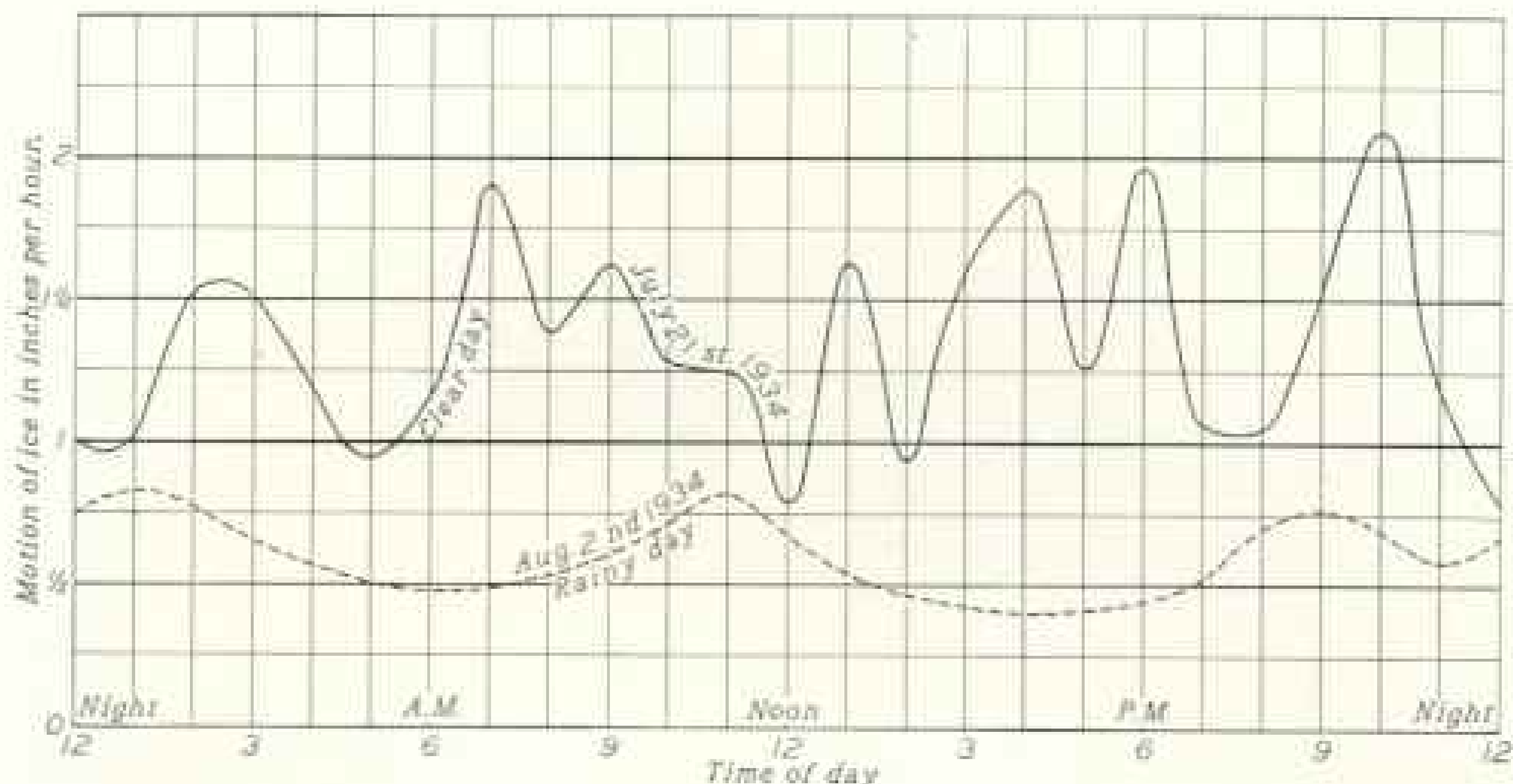
From there on they could easily be sledged to the location of the last camp from which we hoped to make the summit.

On the morning of July 7 the portable Byrd dogsledge, which had been backpacked up the lower part of the mountain, was put together and a load of 800 pounds went through to an altitude of 6,300 feet near the base of the Great Barrier Cliff, which surrounds the summit mass of Crillon.

With this job completed and only one more load to go ahead before the climbing camp would be ready to occupy, the advance party returned to Crillon Lake for several days of rest before commencing the final attack on the mountain. The scientific work had been progressing perfectly. We had tested the ice-motion apparatus and the instruments were ready for making our final set of accurate hourly readings.

A MAGNIFICENT PHOTOGRAPHIC FLIGHT

At daybreak on July 11 Carter, Streeter, Kellogg, L. Washburn, and Dow went through to the "Knoll" with the last load. It was a lowery morning, but shortly after noon the clouds melted away and we radioed at once for the airplane to come in for the Geological Society flight. The next morning dawned utterly cloudless—one of the



THE RECORD OF A GLACIER'S JERKY PROGRESS—IT MOVED FASTEST ON CLEAR DAYS

The Expedition's observations of the South Crillon Glacier showed that it moved forward in surges, these occurring at nearly the same time every day. The graph shows its hourly motion on a clear day by a solid line, and a dotted line indicates the rate on a rainy day, when it traveled only about half as fast (see illustration, page 368).

most beautiful days I have ever seen—and at 9 o'clock Meyring came soaring in from the southeast.

At 11 o'clock we started out on the most magnificent photographic flight that I have ever made. As on last year's trip, Goldthwait went along with me in the cabin to make geologic notes, and I devoted my entire attention to taking pictures.

We had unscrewed the door and the back windows and removed them completely, for pictures taken through glass are of little value. I sat in the rear in a sleeping bag where I could look out either side.

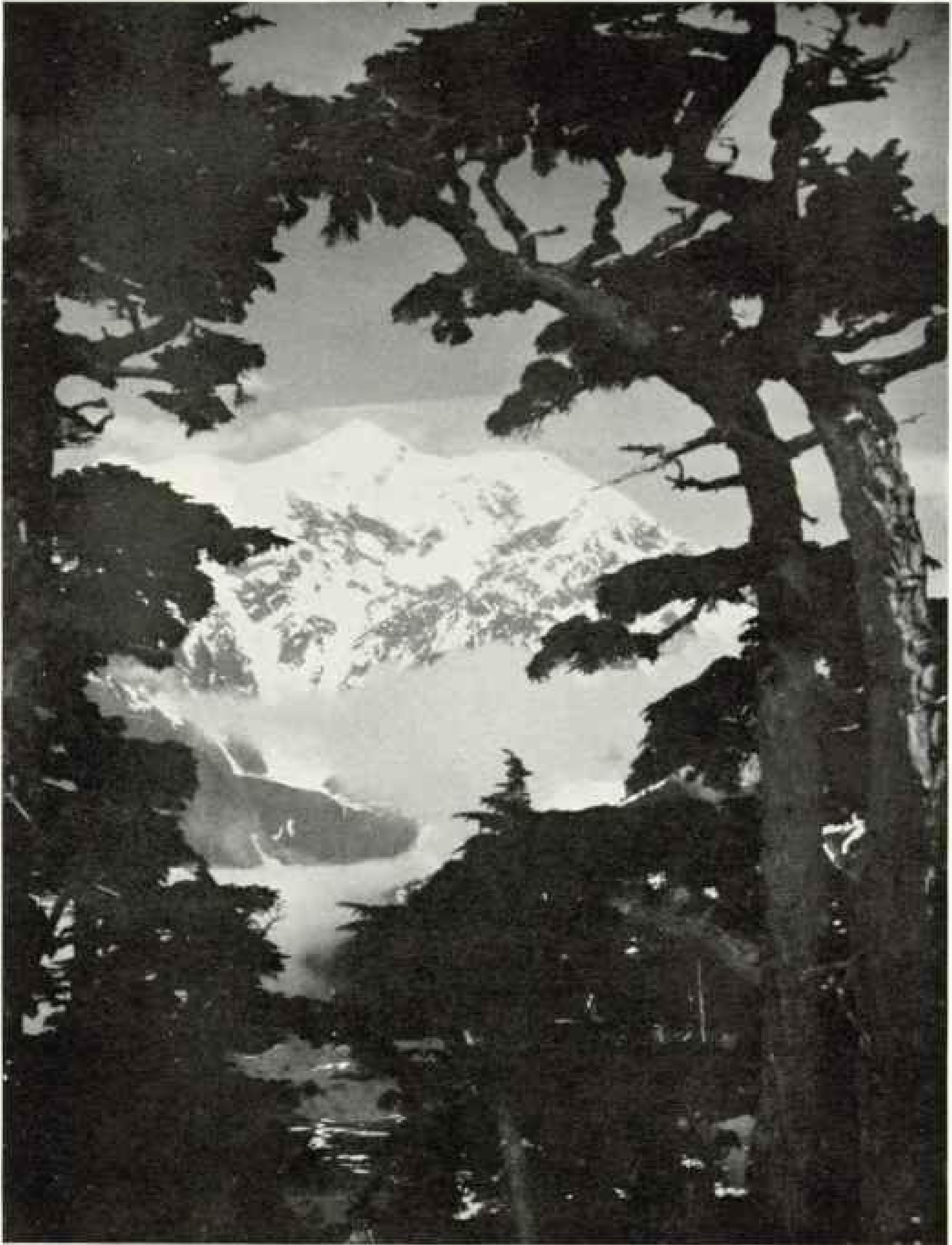
Our plan, outlined in detail to Meyring before the start, was to follow up the coastline, slowly gaining altitude for some fifty miles, then to swing gently eastward over the great glaciers which die out on the coastal plain just south of Yakutat Bay. Continuing, we were to circle the glaciers of this bay and then to cross the Malaspina Glacier south of Mount St. Elias.

The weather was perfect, as was the operation of the plane, and noon found us right up to schedule, circling Nunatak Fiord between twelve and thirteen thousand feet above the sea. The changes in the glaciers since 1933 had not been great—in most cases they were not even noticeable—but the transformations that had taken place since 1909 were almost unbelievable. Whole valleys once filled with ice had turned into barren fields of rocks or deep, glittering fiords, packed with myriad icebergs.

The mountain scenery was awe-inspiring. As we swung westward across Disenchantment Bay toward the Malaspina, we crossed the tip of the Hubbard Glacier, which is certainly one of the largest tidewater glaciers in the world and contains alone easily as much snow and ice as all the glaciers in the Swiss Alps put together. At its head rose the superb summits of Mount Hubbard and Mount Vancouver, while slightly to the northwest towered the immense mass of Mount Logan (19,850 feet),* the second highest peak of North America. Before us, across the Malaspina, looming larger every moment, rose the majestic snowy cone of Mount St. Elias (18,008 feet), fourth highest among the mountains of the continent.

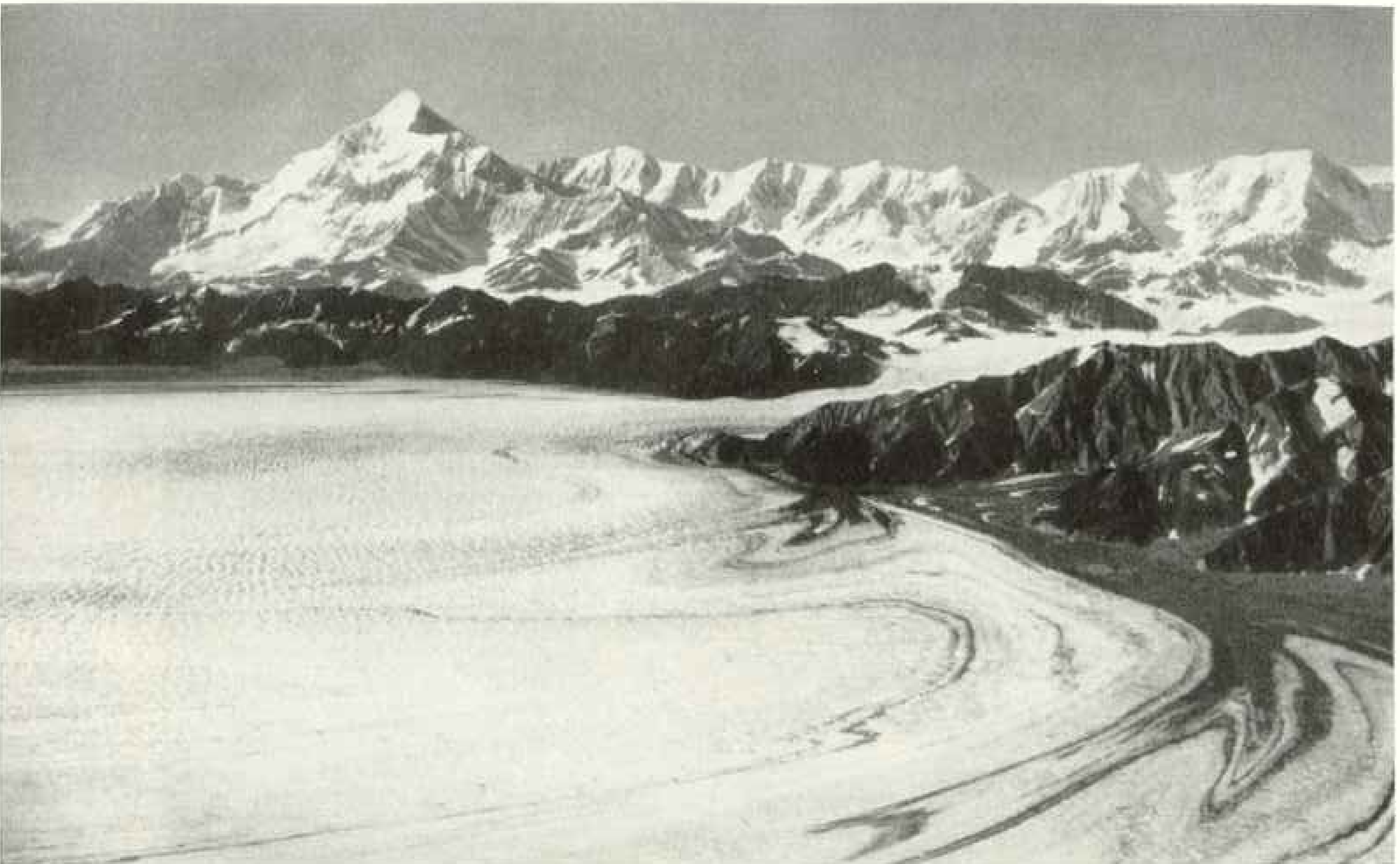
Our attention was now riveted to the fantastic patterns of the great dirt bands of the Malaspina as they slipped smoothly along in the brilliant snow, nearly three vertical miles below us. Curved, twisted, squeezed into the most amazing shapes, it is almost impossible to conceive of the gigantic forces and the endless time that have worked hand in hand to fashion the

* See "The Conquest of Mount Logan," by H. F. Lambart, NATIONAL GEOGRAPHIC MAGAZINE, June, 1926.



WHERE LORDLY MOUNT FAIRWEATHER LIFTS ITS HEAD, ALASKA AND CANADA MEET

A glade in the deep-shadowed forest of the coastal hills north of Lituya Bay frames a glorious glimpse of the mighty ermine-robed mountain—clouds above and clouds below. Highest peak of the Fairweather Range and one of the hardest to climb in North America, it marks an important turn in the international boundary, 21 miles northwest of Mount Crillon. Two New Yorkers climbed to Fairweather's 15,318-foot summit in 1931 (see text, page 362, and map, page 363).

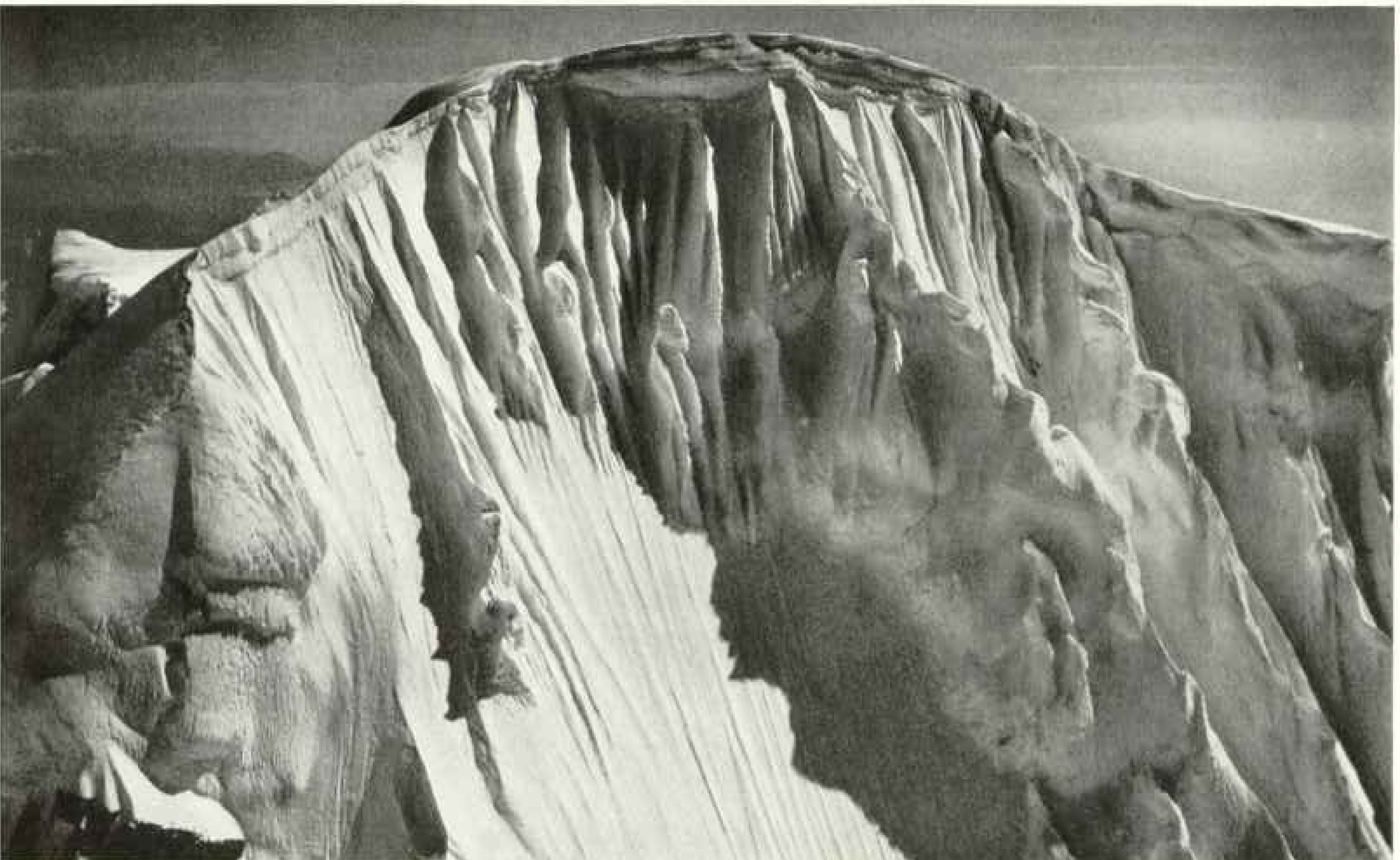


A VAST ICE BLANKET IS SPREAD AT THE FEET OF TOWERING MOUNT ST. ELIAS

The fourth highest peak in North America shows its rock-ribbed bulk to an airplane flying at 5,000 feet. The gigantic mass of this mountain towers 18,008 feet among the low coastal hills in the middle background. The huge ice expanse in the foreground is part of the Malaspina Glacier, one of the largest in the world, outside the polar regions, with an area of more than 1,000 square miles of ice surface (see pages 366, 382-3).

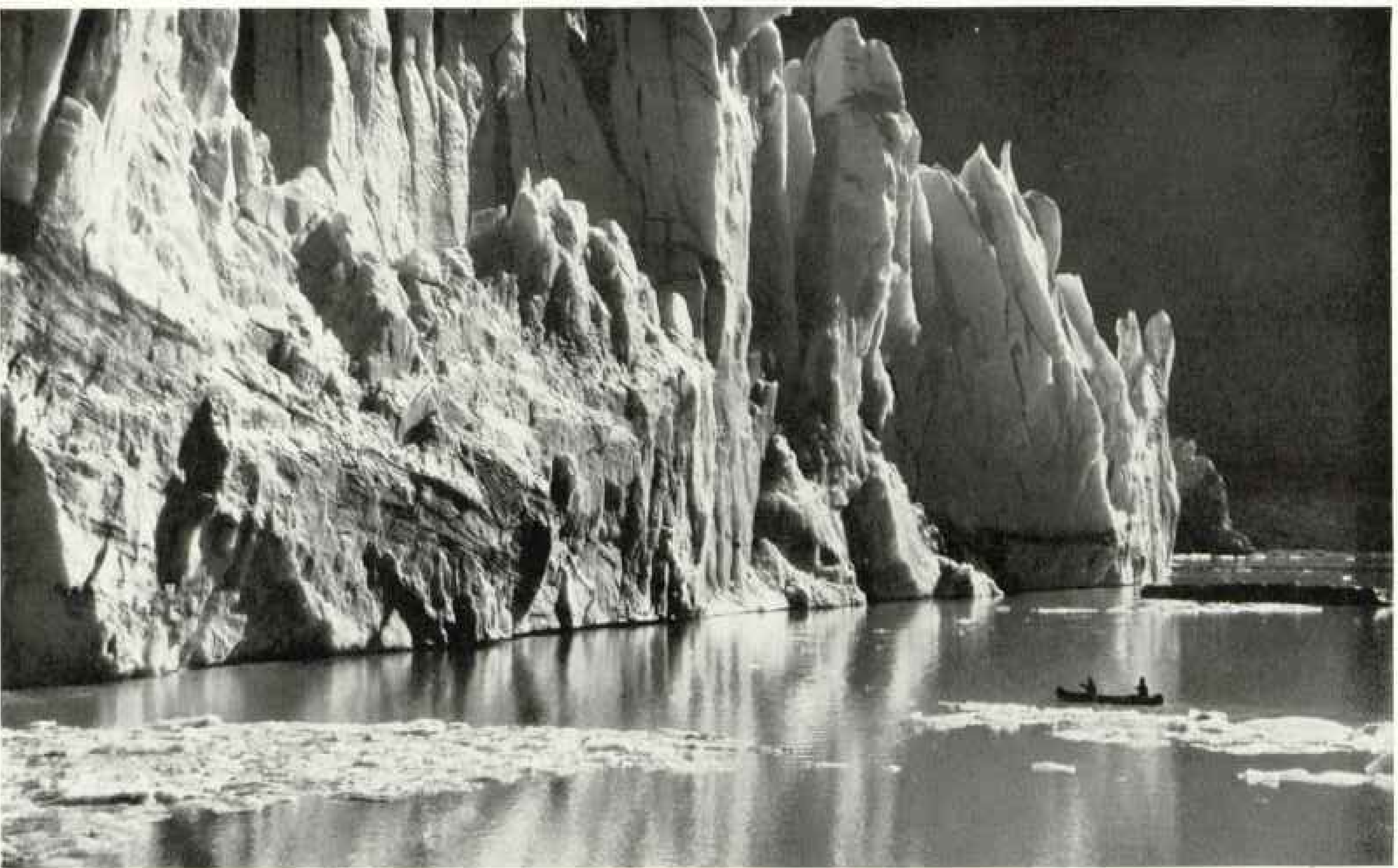
FROM A MILE-HIGH CAMP IN MOUNTAIN SNOWS, TWO CLIMBERS HIT THE UPWARD TRAIL

Packing hundred-pound loads of supplies for bases farther up, they follow the steep path which swings off in the left foreground toward Mount Crillon's wind-lashed summit, six miles away and more than 7,000 feet higher. In 1933 men lived in tents here for nearly two weeks. Supplies dropped from a plane in 1934 fell on smooth snowfields a hundred yards behind the spot where the photographer stood (see text, page 367, and illustrations, pages 372 and 398).



THIS WAS THE GOAL—MOUNT CRILLON'S AWE-INSPIRING CREST, WEIRDLY CARVED BY STORM AND AVALANCHE

Stern and forbidding was the face of the mountain as the author, in an airplane, circled close around its northern cliffs, planning his attack. The almost vertical wall of ice and rock drops to a snowy basin nearly a mile and a half below. The ascent was made up the ridge dropping out of sight to the left (see illustrations, pages 362, 386, and 397). The whole summit is a snow dome buttressed by a rock base, one jagged edge of which is just visible in the lower left corner. The snow rarely, if ever, melts at these altitudes in Alaska. The picture takes in, vertically, about 500 feet of the peak (12,728 feet).



ENORMOUS CRASHING CHUNKS OF ICE MAKE THUNDER IN THIS CRYSTAL FAIRYLAND

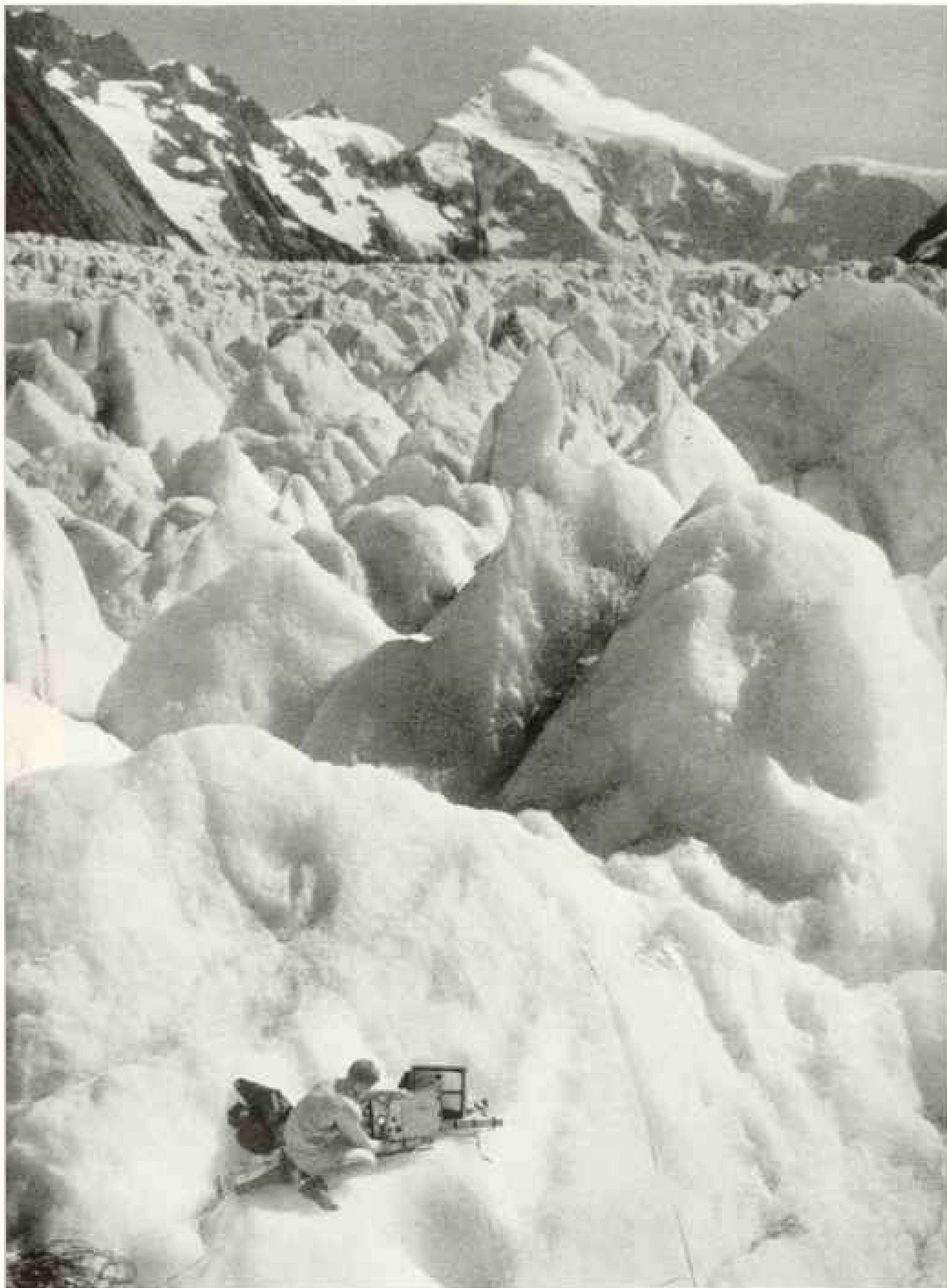
The towering, beautifully sculptured wall of the South Crillon Glacier splits into bergs with deafening reports where the 160-foot-high cliff reaches Crillon Lake and advances into the water at a rate of about two feet a day. The canoe is considerably closer to it than safety would dictate. The Expedition's base camp was a mile away, across the lake, and on top of this glacier its ice-motion studies were made (see illustrations, pages 368-9, 381, and 384).

FORESTS GROW ON MOVING ICE WHERE THE MALASPINA GLACIER REACHES THE SEA

Dirt and rocks, mixed with the ice during avalanches at its source near Mount St. Elias, form graceful bands and make a deeper and deeper mantle on the surface as the ice slowly melts away. Far in the distance at the right, where the Malaspina dies out by the shores of Yakutat Bay, this soil cover has grown so deep that large trees are rooted in the ice-borne earth (see illustration, page 375). Seen from the air, the glacier spreads out like an immense fan 30 miles wide.

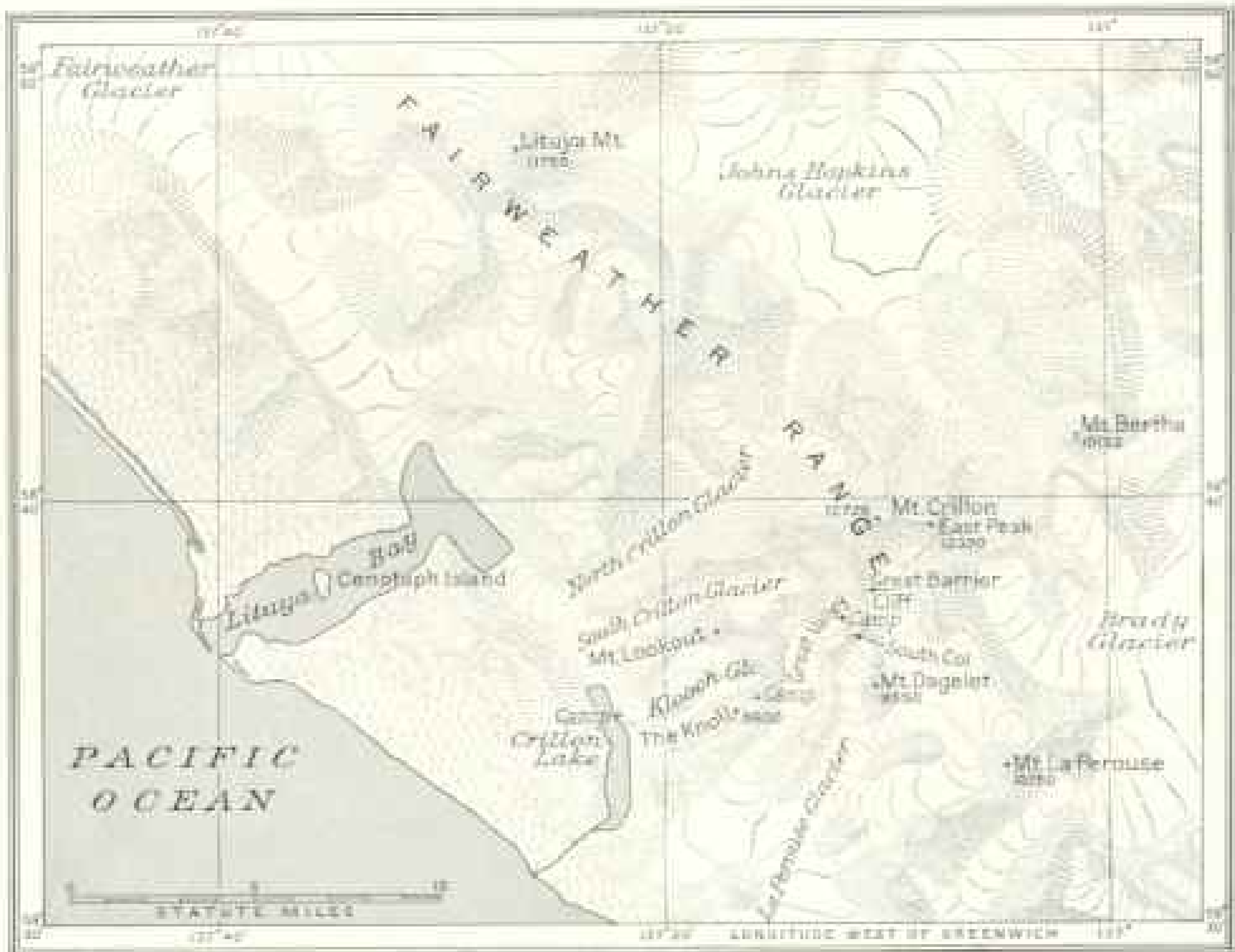
MASSIVE ICE WALLS OF THE MALASPINA GLACIER (RIGHT) DAM A NARROW VALLEY OF THE ST. ELIAS FOOTHILLS

Could explorers have flown over the White Mountains of New Hampshire during the great Ice Age, they would have seen many such ice-dammed lakes. The two shown are connected by a stream and contain numerous icebergs; those in the lower one are very dirty, as the ice is heavily mixed with rocks.



EXPLODING DYNAMITE SOLVED THE SECRET OF THIS GLACIER'S DEPTH

On the tumbled, pinnacled top of the South Crillon Glacier, Richard Goldthwait, of Dartmouth, adjusts the geophysical blasting apparatus with which he found that the ice mass at this point was about 1,100 feet deep. The wire crossing the slope at the right connects the machine with a charge of dynamite a quarter of a mile away. Depth is determined by the time it takes the impulse of the explosion to reach and rebound from the rock floor. In the background, six miles away, rises Mount Crillon, where the glacier has its source (see text, page 367).



Drawn by C. E. Riddiford and Newman Bumstead

THE AUTHOR'S ROUTE UP ONE OF THE WORLD'S HIGHEST COASTAL PEAKS

currents of this unique sea of ice and rock (see page 382). .

We wheeled time and again—photographing, jotting notes, and changing film. Then, shortly after 2 o'clock, we turned westward toward the ocean, our mission successfully completed. As we neared the Pacific, the huge mass of ice below us became more and more buried beneath rock and dirt. Bushes appeared here and there, and finally, to our astonishment, we were able clearly to discern large trees growing upon the stagnant slopes of the glacier overlooking the sea!

Holding our altitude at close to 13,000 feet, we sped southward, first high over the mouth of Yakutat Bay, then along the white ribbon of beach that stretched before us almost as far as the eye could reach. Shortly after 3 o'clock Fairweather loomed ahead, its magnificent western cliffs throwing off an appalling icy glare in the hot afternoon sun. As we neared Lituya Bay we banked gently toward the east. Crillon towered before us, and we intended to try to solve its problems from the air before the final attack on foot.

The northern and eastern precipices of this mountain are truly colossal. The first is a staggering wall of ice and rock dropping nearly 8,000 feet to the smooth, snowy basin of the North Crillon Glacier; the second is a forbidding crag of tottering granite falling away almost as far to the icefalls of the Johns Hopkins Glacier.

The southerly approach from the wide ice plateau between Mounts Crillon, Dagelet, and La Perouse still looked in excellent shape for climbing. It was this route that we had used on our nearly successful attempt on Crillon the year before. But speed was vital. Huge cracks were already splitting across the snowfields, threatening completely to isolate the final peak. We circled close about the summit pyramid—once so close it seemed as if the pontoons would graze its very tip. Two routes appeared, but each was nearly blocked by well-nigh bottomless crevasses.

READY FOR THE BIG ATTACK

The motor spluttered, the flight was over, and the plane glided lazily downward toward the waters of the lake. Below us

12,000 FEET, AND CRILLON'S PEAK STILL BECKONS

The final ridge drops eastward in a curious knife-edged crest, tufted with many miles of rock pinnacles and snowy cornices, before it merges with the smooth surface of the Brady Glacier, 8,000 feet below. In the distance, beyond a vast flat ice field, the low hills surrounding Glacier Bay seem swimming in a sea of fog.

slipped two tiny specks far out in the midst of a vast sea of white. They were the tents of the high camp (see pages 379, 398). The climbing party had succeeded in pushing through on schedule and the scene was set for the final attack on Crillon.

Shortly after noon of July 14, Holcombe, Putnam, and I arrived on skis at the 6,300-foot camp after a 12-hour steady climb from Crillon Lake with 60-pound loads. Goldthwait and Stix had remained at the base camp to conclude the geophysical observations. This placed nine men for two days at the climbing camp, before Dow, L. Washburn, and Putnam had to return to assist in completing the glacial motion studies.

The two tents that were ordinarily crowded with six men were jammed to overflowing. Six of us slept in one 9-by-9 tent 8 feet high, and three in the other along with all of the kitchen apparatus. We had only six sleeping bags and mattresses and simply piled in, in a great heap, getting all our warmth by lying close to each other.

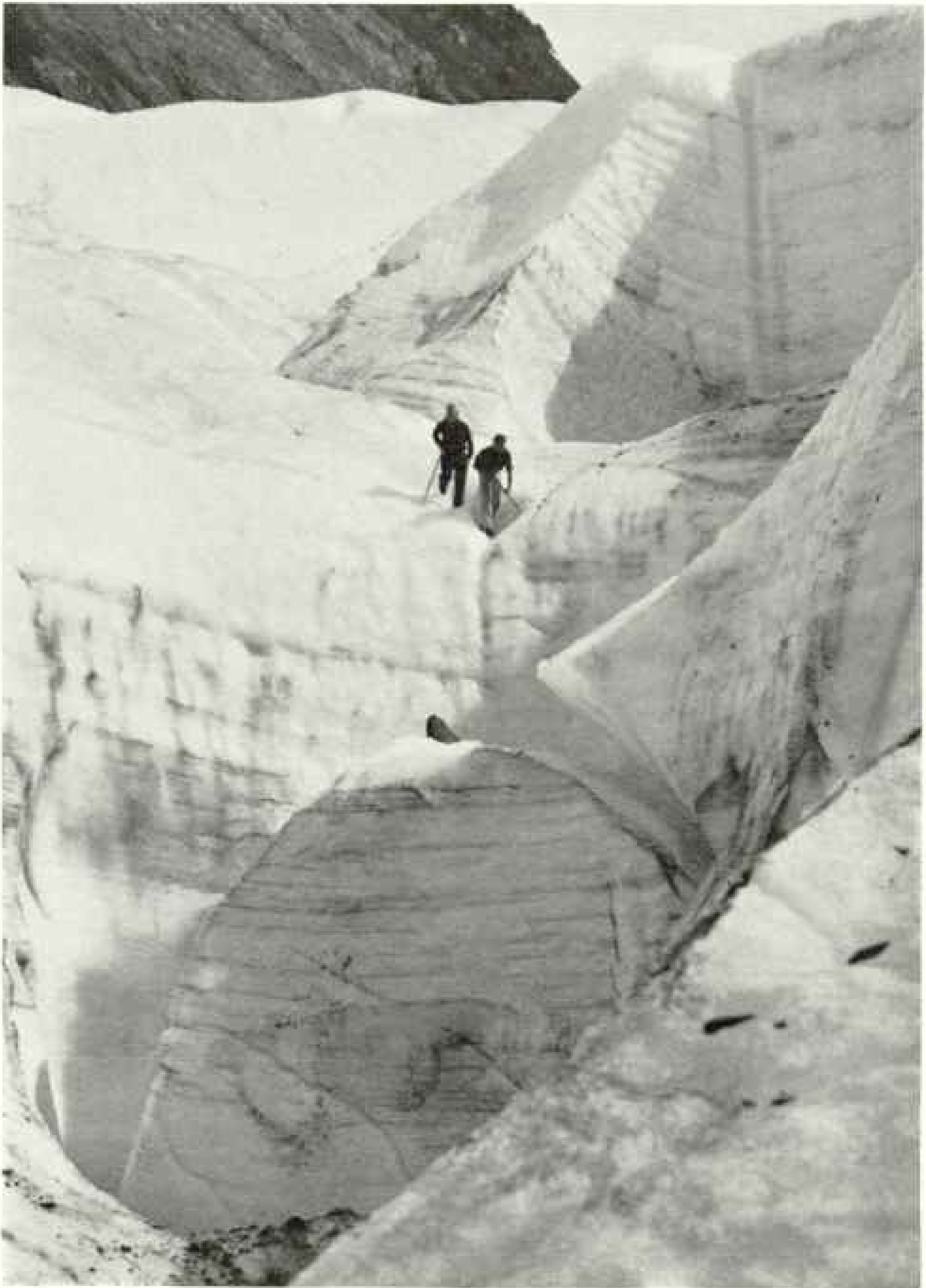
At daybreak on July 15 we sledged a 400-pound load, consisting of a week's food, rope, ice creepers, ice axes, and trail markers, up to the South Col, a snow saddle at an elevation of about 8,000 feet. The last 600 feet of the slope were so steep that we were forced to abandon the sledge and break the load up into parts to back-pack it over the Col. There we established a small refuge camp from which we hoped to make the final climb.

Snow flurries, whipped along by a biting southeast wind, screamed across the Col as we made camp. The beautiful weather of the past week was gone—for a while, at least.

Above the Col our main problem in the climb was a very precipitous cliff of snow, ice, and rock that now rose for 1,000 feet immediately ahead of us. Beyond that stretched four miles of exposed wind-swept

A HUMAN LADDER LEADS TO A PERILOUS OVERHANGING LIP

Two climbers shod with long iron spikes called crampons balance on a small pinnacle of snow-covered ice, while a third, his ice ax jammed deep in the snow below, stands guard in case of a slip. All are roped together. The man groping with his ice ax for a firm hold in the cliff's upper lip will climb over the back of the man in front of him and thus reach the bottom of the long ice slope leading to Mount Crillon's upper plateau (see illustration, page 389).



DOWN THEY GO TOWARD THE COLD HEART OF A WATER-CARVED GLACIER

Two members of the party watch their step as they explore the ice grottoes, which they called "the caverns of the River Alph," in the Klooch Glacier, near the base camp. Stream-cut tunnels, through which runs a frigid glacial river, drop several hundred feet into the depths. The ice far below the surface has a glittering, frozen aspect and flashes magnificent blues and greens. The black object jutting up in the center is an ice-borne rock.

ice plateaus. Then came the everlasting enigma of the 4,000-foot final mass of Crillon and the precipitous summit cone.

A short ski run through the gathering storm revealed the lower part of the cliff, its last nerve-racking slopes wreathed in swirling mists. It looked most forbidding—infinitely more difficult than when we had barely succeeded in climbing it the year before. Avalanches had swept last year's route out of existence—a new one must be chosen, but this was no work for a cloudy day.

We retreated to camp under leaden skies. The storm did not break quite as soon at 6,000 feet as it had higher up and the next noon the base campers left for Crillon Lake in moderately clear weather. That night, however, snow began to fall and it kept on almost steadily for two more days.

On the afternoon of July 18 the sun broke through the fog several times, showing clearly that we were just below the upper surface of the clouds. That evening after supper a blaze of sunlight suddenly struck the tents. The mist had settled below us—a vast unbroken sea of clouds stretched out across the Pacific as far as the eye could reach. The gigantic mass of Crillon towered above us, silvery streamers of wind-torn powder snow seething upward from its lofty peak.

We made a 20-minute ski trip to a nearby ridge several hundred feet above the protected hollow in which camp was pitched. Sitting there in the twilight we thoroughly inspected the cliff. The upper reaches of the mountain had obviously been in the hot sun above the clouds most of the day. Scarcely any new snow was visible on the rocks below ten thousand feet. Only on the final pyramid a delicate lacework of white covering the cliffs showed where it was yet unmelted.

2 A. M.—AND ON THEIR WAY!

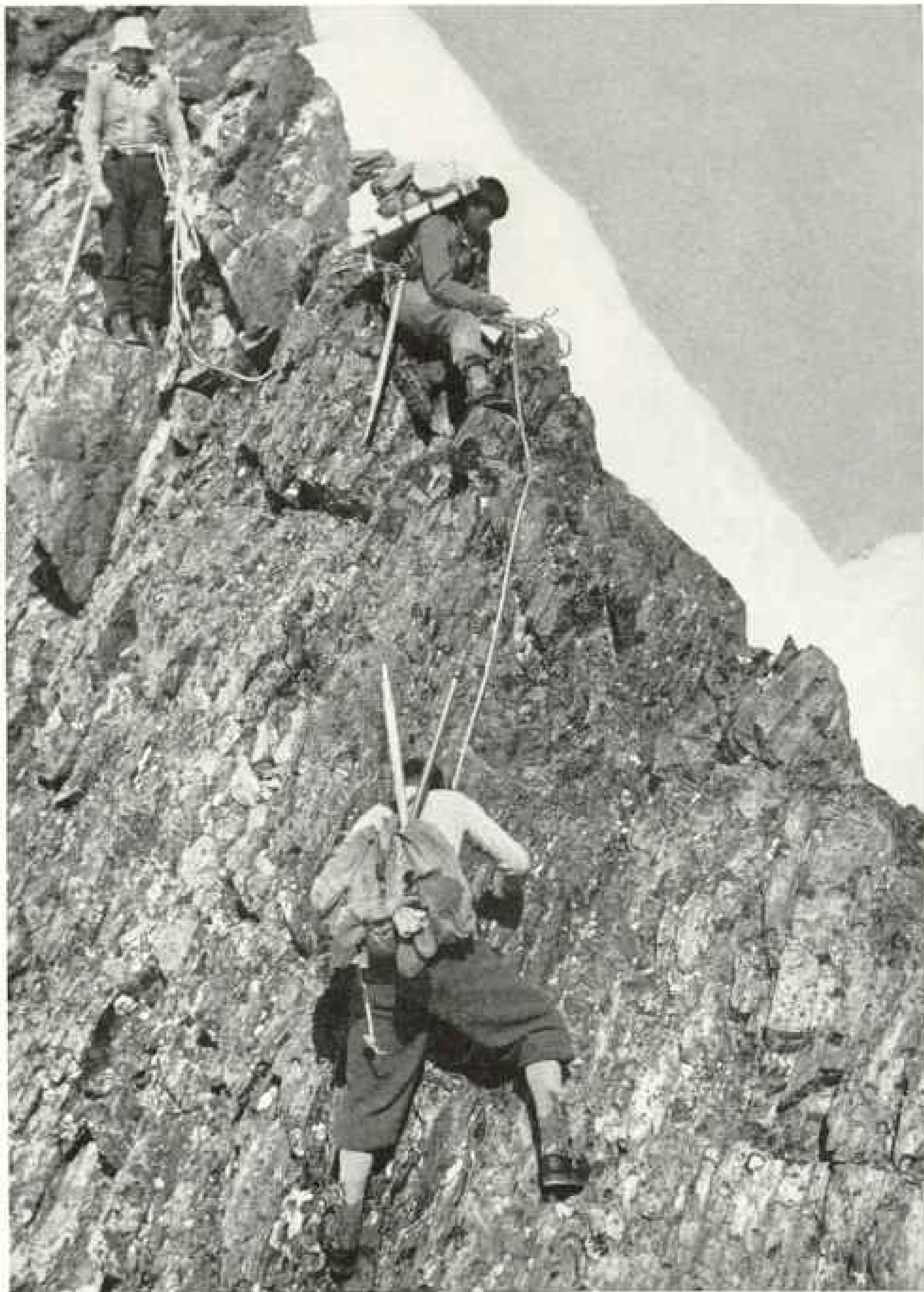
That night at midnight I rose and lighted the gasoline stoves. At 2 o'clock we had breakfasted and were well on our way toward the base of the cliff. The weather was perfect—cloudless, cool, and crisp. The sun was just touching the summits of the highest peaks as we reached the South Col. There we stopped at our cache of four days before to pick up ice creepers, extra rope, axes, and food. From there to the foot of the cliff was but a moment on skis.

ROPING DOWN AN ICE WALL

The last man across the crack at the base of the Crillon cliff slides over to terra firma after a descent of nearly 1,500 feet of terrific upper ice slopes. The ropes were attached, wherever possible, to rocks jutting through the snow (see pages 387 and 390).

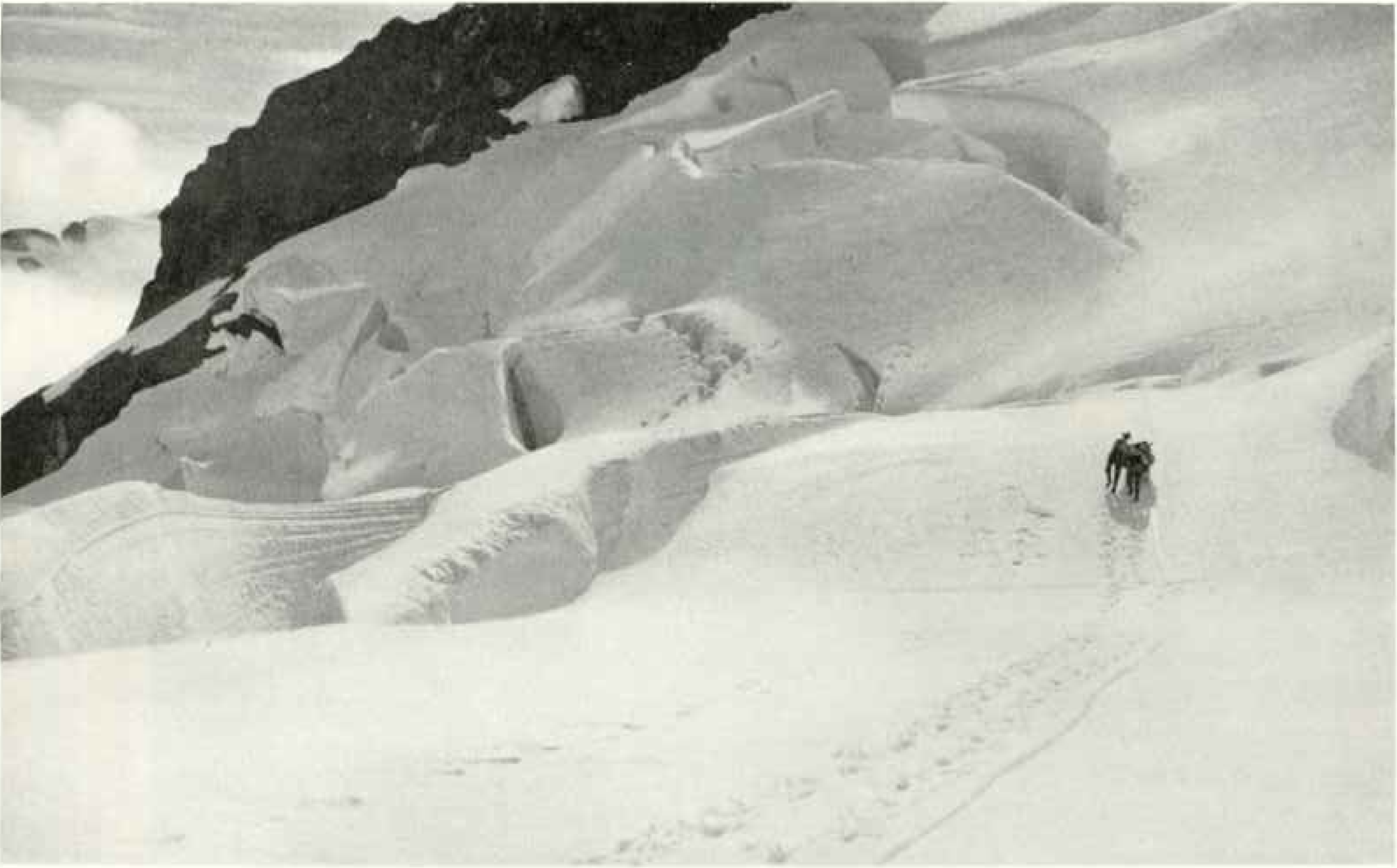
LIFE LINES GUIDE A CLIMBER DOWN THE CRILLON ICE CLIFF

Held taut in Henry Woods' left hand is the hand line anchored at the brink, 200 feet above. A heavier rope, attached to his waist, leads up to Carter, first man of his group. With another rope in his right hand Woods steadies the third man, Kellogg, as he descends across steep, ice-covered rocks 50 feet below. In the distance, directly above Woods' head, towers the peak of Crillon, now buried in a cloud-cap storm.



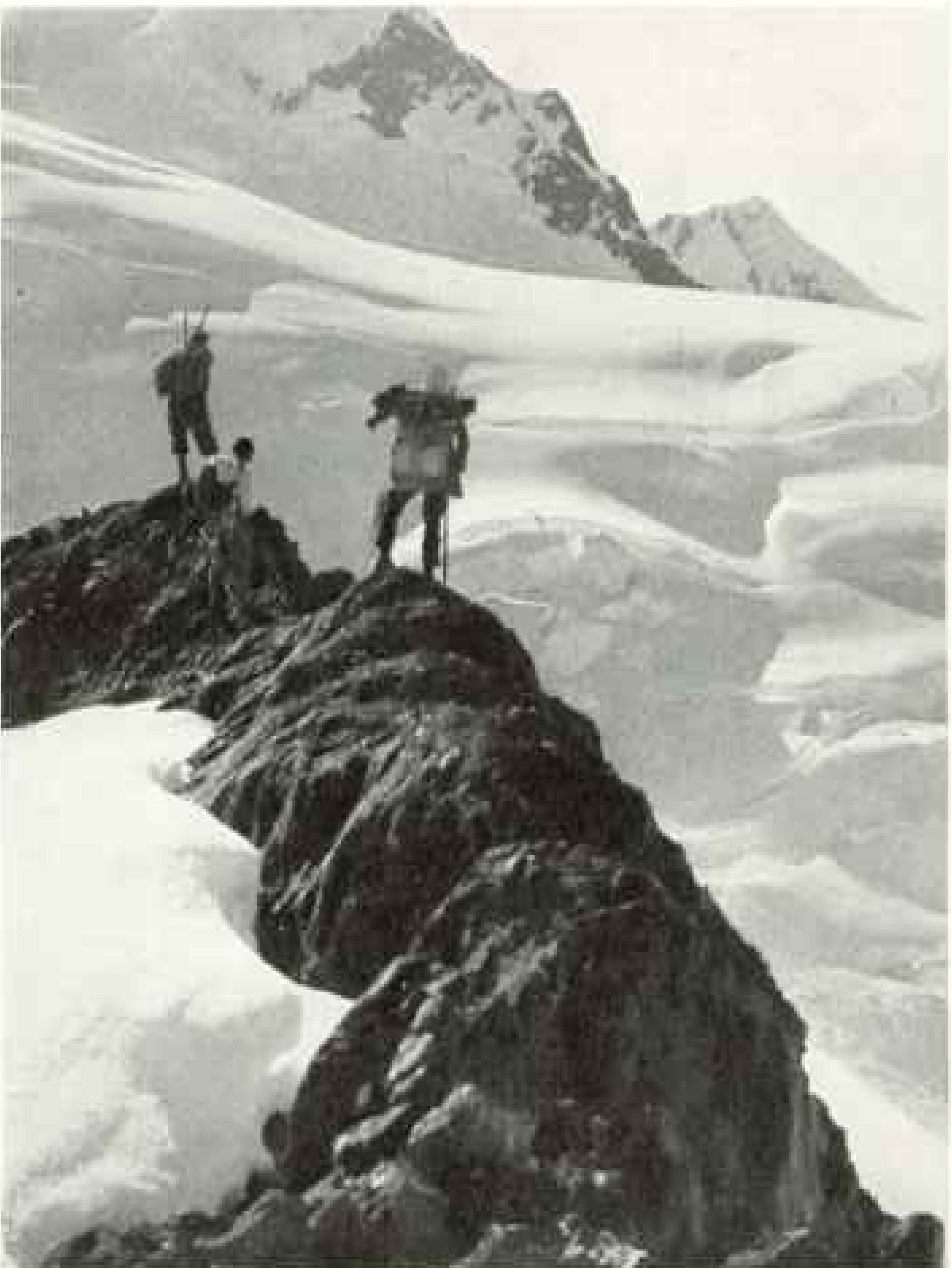
UP PERPENDICULAR WALLS OF ROCK THEY CARRY 60-POUND LOADS

Only one man can move at a time in scaling such rocky pinnacles that jut up through snow ridges and make back-packing of supplies to higher camps extremely difficult. Two men in the roped-together trio anchor themselves to guard against slips by the other fellow. Supplies for the 1934 Expedition were flown over these exasperating obstacles by airplane and dumped on snowfields about 500 feet above.



HUMAN HUSKIES SLEDGE THE TORTUOUS ROUTE THROUGH THE CRACKS AT THE GREAT VALLEY'S MOUTH

Excellent conditions prevailed when this picture was made, but deep, slushy snow often made human sledging very difficult and occasionally dangerous while following the steep zigzag route to the left down through the crevasses (see illustration, page 373). The smooth line at the right is one of the sledge runner tracks, the other having been obliterated by footprints.

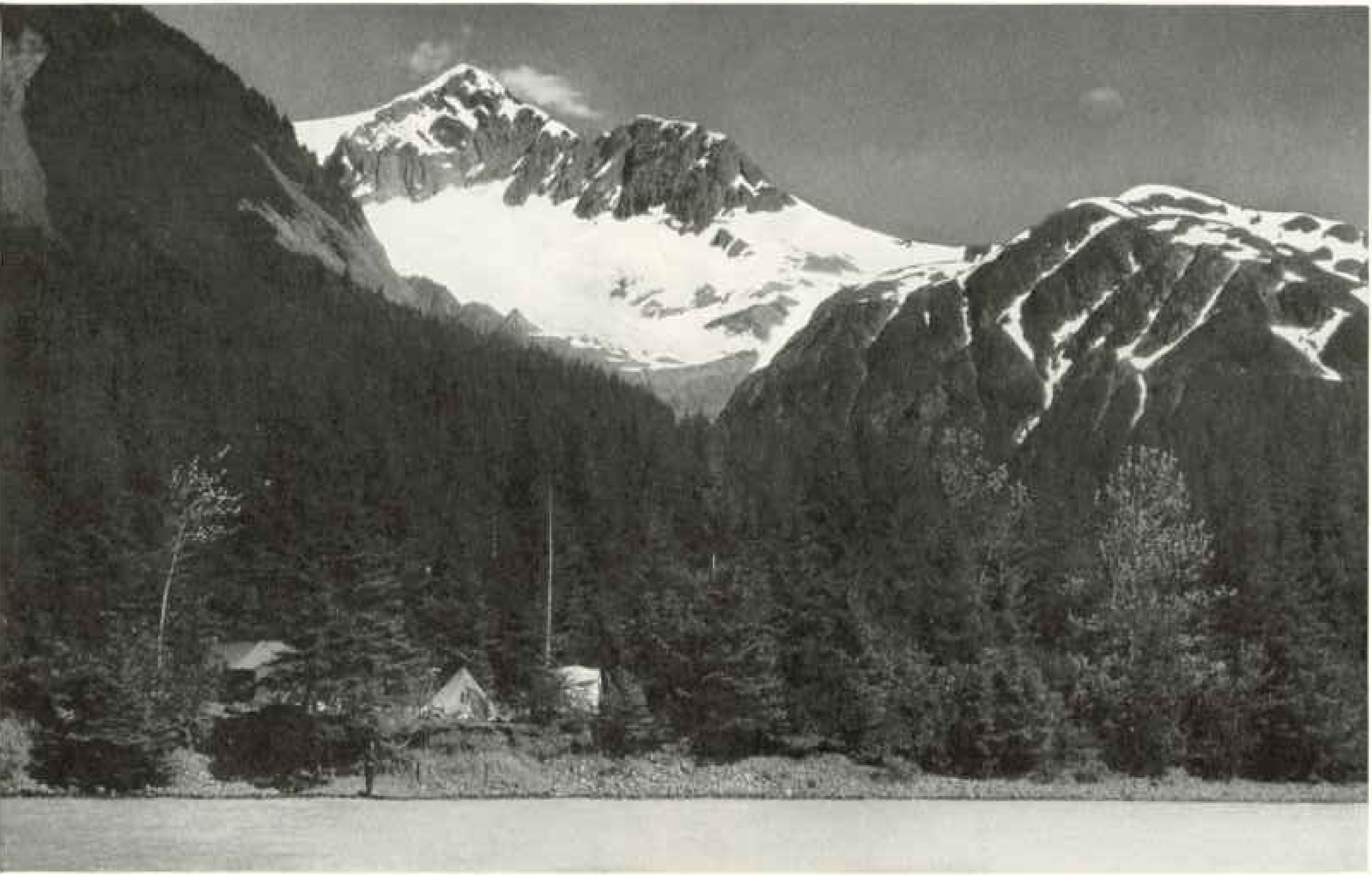


ON A ROCKY RIDGE THEY SKIRT A DANGEROUS ICEFALL

About the time the trio made this noonday halt, 5,500 feet up on the lower spurs of Crillon, an avalanche thundered down from the glacier before them; its débris can be seen at the right. Because of the danger from such avalanches, most of the back-packing of supplies had to be done along narrow ridges separating the glaciers. Up one side of rocky pinnacles and down the other the men clambered, carrying heavy loads (see page 391).

MOVIES ON THE ROOF OF ALASKA

The author trains his camera on the summit of Mount Crillon from a steep slope above the highest camp. Ski-pole rings were used on the legs of the heavy tripod to keep them from sinking deep into the soft snow. At midday the temperatures below 8,000 feet were rarely cold enough in clear weather to necessitate very heavy clothing; in fact, for hard jobs the men often stripped to the waist (see illustration, page 373).



BEHIND THE BASE CAMP LOOMS THE 5,600-FOOT "KNOLL," ONE OF THE LOWER SPURS OF MOUNT CRILLON

Against this inspiring backdrop the tents nestle amid the trees on the eastern shore of Crillon Lake. Its waters lie in a deep, narrow valley between the low hills which follow the seacoast and the base of the great peaks in the heart of the range. The trough which it occupies was carved and chiseled out of solid rock by the glaciers of the Ice Age.

FISHING BOATS DOT THE WATER AND CLOUDS HANG LOW AT TWILIGHT AT POINT ADOLPHUS

The Mount Crillon explorers, homeward bound, sighted these small craft here near the shores of Icy Strait. Operated by Indians who live almost their entire life on water, the vessels carry long protruding poles, each bearing a baited line. When deeply laden with salmon, a boat returns to its mother cannery, where the catch is sold, then it heads back to the lonely fishing grounds.

MOUNT LOOKOUT YIELDS TO A FLANK ATTACK

Conquest of this near-by peak proved far less difficult than that of Mount Crillon. The sea of clouds which often overhangs the Pacific in summer stretches nearly a mile below the climbers to the horizon. Dropping supplies from an airplane onto similar snowfields on Crillon called for good marksmanship and luck in keeping them from landing in crevasses (see text, page 367).

Deep in the frigid shadows of early morning we roped up in three groups. The cliff looked impossible, but with three years of experience a grim determination had been born within us never to give up without actually trying. Henry Woods and I made up the first rope. Carter and Kellogg made up the second. Holcombe and Streeter were to stay below and await developments.

It was my job to lead the way. Woods carried 300 feet of three-eighths-inch line to attach in difficult places. Carter and Kellogg brought 600 feet more of this line and handed it to him whenever his coil was used up. If we succeeded, we planned to have a continuous strand of hand line all the way from the upper plateau to the bottom of the cliff. This safety measure was well worth the trouble because of the exhausted condition in which we were bound to be when we reached this treacherous bit of climbing on the way down after the long fight for the top.

The climbing was better than we had expected. Routes appeared, winding tortuously up ledges that had looked inaccessible from below. The upper snow slopes that rise at an angle well above 50 degrees were firm and secure for chopping steps.

A six-foot cornice of hardened wind-blown snow overhung us as we toiled up the last steep incline, but two tussles with the same barrier a year before had taught us a safe method of attack. Securely anchored by Woods, who crouched beneath the cornice to my left, I slowly chipped away the snow with my ax, working upward and outward from underneath.

CRILLON'S CONQUERORS INVADE A LOST WORLD OF SNOW AND ICE

Four thousand feet above the upper plateau the climbing party reaches the final ridge of Mount Crillon. After an airplane reconnaissance, the ascent finally was accomplished from the opposite side by a much safer and less precipitous route up the cliff (see illustrations, pages 362, 380, and 386, and text, page 389). The immense unscalable cliffs in the center of the picture plunge 5,000 feet to the Brady Glacier, east of Crillon.

The job was delicate at best, for no big chunks could be knocked off, as they would have seriously endangered Carter and Kellogg, who were busy attaching a fixed rope on a rock buttress only a short distance below us.

Finally, at 6:45 a. m., I balanced gingerly on Woods' shoulders, poking my head slowly and carefully up through the excavations we had made.

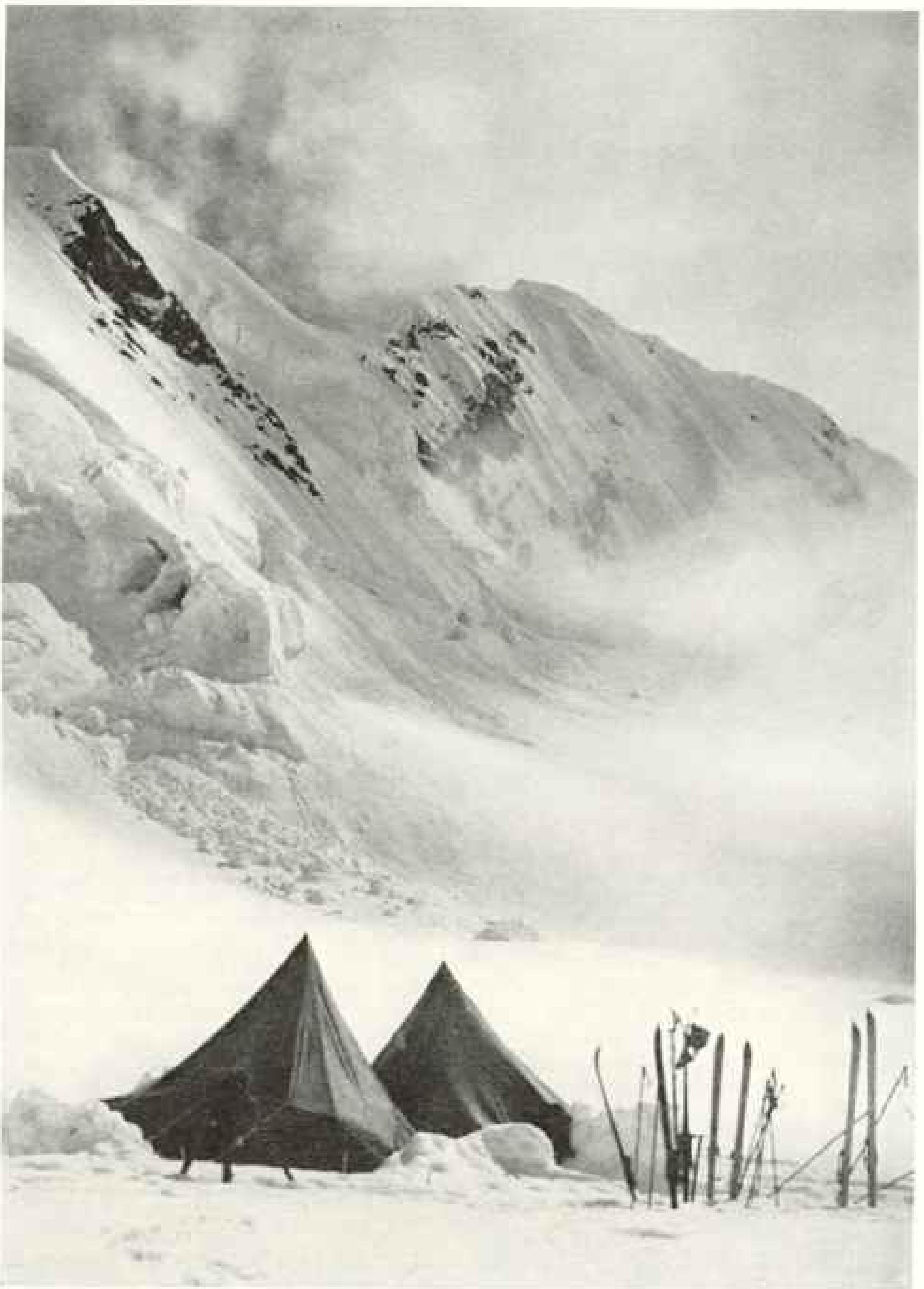
Reaching gently forward, I jabbed my ice ax deep into the firm snow above us. Suddenly the sunlight burst full into my face. A dazzling array of glittering peaks rose before me. Once more we had reached the great plateau.

In a jiffy Woods was by my side, and we stood for a moment speechless with joy that we had succeeded in doing what we had thought but three hours before was utterly hopeless. We beckoned to Holcombe and Streeter to follow. They were now two tiny dots on the vast shadowed snowfield a thousand feet below us.

Carter and Kellogg soon came through the cornice, their roping work completed, and, sitting on the edge of the plateau, we held a serious council of war.

A QUICK DECISION, AND SUCCESS

The sky was cloudless. Not a breath of wind stirred. The air was almost warm and the snow under foot frozen firm as rock. The summit rose before us four miles away across the smooth undulating surface of the plateau. We had come 2,000 feet in six hours. Four thousand five hundred still remained.



FRESH SNOW LIES DEEP AROUND TWO LOFTY, LONELY TENTS IN MID-JULY

Made of very light sail silk, the shelters weigh only 15 pounds apiece when dry, but can stand up under almost any wind. Inside a single tent on one occasion huddled six men, with their mattresses and sleeping bags (see text, page 386). Cooking was done on gasoline stoves and the heat—what little there was—came from the same source. Skis, parked in the "back-yard," were used for all the climbing between 6,000 and 8,000 feet. Beyond the camp rises an unnamed peak, a low neighbor of Crillon (see illustration, page 379).

HIDDEN DANGERS LURK BENEATH FRESH POWDERY SNOW

Two climbers halt on the steepening slopes of Mount Crillon's summit and the Pacific Ocean stretches out below them in the distance. It was such treacherous surface on the upper knife-edges that caused the Expedition of 1933 to give up, although but 400 feet from the top (see text, page 364).

Success depended upon a quick decision and we made it quickly. We had reached the highest point that we had thought possible for that day. Our lunch was very scanty, but, by doubling it up, it might be possible for two of us to make the peak. At worst we could climb far up onto the summit cone and bring back to camp a report of the conditions farther ahead.

Woods and Kellogg gave Carter and me their food supply. I borrowed Woods' goggles, mine being on the way up in Holcombe's knapsack, and at 7 o'clock the two of us started out for the peak, armed for the fray with plenty of clothing, eight bars of chocolate, and two pocketfuls of lemon drops! Kellogg and Woods were to await Holcombe and Streeter at the top of the cliff and to follow with the extra food as soon as they could. They were acting as a support party in case of emergency.

The plateau reminds one vividly of Conan Doyle's "Lost World," but this time an Arctic world—an immense snowfield, fringed with peaks and hemmed in on every side by staggering cliffs of snow and ice.

The walking was easy. We pressed ahead at a fast, steady pace and had covered the four miles to the base of Crillon's summit mass in just over an hour and a quarter. There we rested a moment, roped ourselves more securely, and pushed onward toward the final ridge.

The last 4,000-foot pitch, honeycombed with snow-covered cracks, was a grueling grind. One had to keep constant watch on the rope for fear of a sudden slip, and the relentless grade of 35 degrees or more sapped our energy fast after the early-morning struggle with the cliff.

Carter led most of the way, as I wanted to save my energy for the obvious difficulties of the final pyramid. He set a perfect pace, and his strength and courage in the ever-deepening powdery snow were an inspiration.

Shortly after 10 o'clock we reached the final ridge, having made the 3,500-foot pitch from the plateau without a single stop. At last it seemed as if we were destined to succeed—the last cone rose but 500 feet above us.

The ridge climbed steeply in a series of enormous corniced hummocks of snow and

ice, beautifully festooned with feathers of silvery frost that shone in the dazzling sun. A steep shelf of snow to the left of the hummocks brought us safely to a point but 200 feet below the top.

From there on the peak was a veritable mushroom. We were barred completely by a huge, yawning crack with an upper lip that overhung far above our heads. We stood in powder snow to our waists and examined the obstacle. With the summit but a stone's throw away we were not going to give up without a last and desperate struggle.

To the left the crack extended out of sight around the peak. On the right it ended at the very crest of the ridge. The only solution of the problem was to cross over onto the opposite side of the ridge, and there to cut a series of steps around the end of the crack along the upper part of the colossal eastern ice cliffs.

RESTING IN A CAVE OF ICE

Before this final effort we rested a few minutes in a sheltered cave of ice and put our creepers on once more. When we emerged from our grotto the summit had disappeared completely in a dense frost cloud. The wind was coming up and it was clear that speed was now imperative. This sort of cloud had thwarted us the year before, but this time we were too close to give up as easily.

We waded out of our grotto, waist-deep in feathery snow, and up through a narrow pass to the crest of the ridge. There the wind struck us for the first time, carrying with it a wild swirl of cutting snow. Step-chopping, not too difficult under normal conditions, became frightfully delicate in the buffeting gale. The 50-degree slope of bluish-green ice above us was veneered with a foot of treacherous, brittle crust, which had to be swept away before we could find a safe surface in which to hack the steps. We advanced at a snail's pace.

Occasionally the mists thinned enough to reveal a widening in the ridge a hundred feet ahead. It seemed as if that hundred feet were at least a thousand! Another ridge was converging toward us from the right.

At last the grade lessened. We plunged wearily onward through a series of heavy drifts. A little mound appeared ahead, gray and indistinct through the eddies of swirling snow. We turned toward it. Ten more steps, and at half past 12 we trudged out onto the very summit of Crillon with an exultant yell.

A GLORIOUS MOMENT

Emotions at such a time are indescribable. Incident upon incident of the three years of arduous work that had led us to this stormy spot rushed wildly through my mind as we sat dazedly buried waist-deep in the softness of that lofty drift. What a pity that Walt Everett or Bob Bates or any of the others who had worked so hard in years gone by should not be with us to share in these glorious moments!

Two minutes went by before a particularly rude gust of snow-laden wind brought us suddenly to our senses. The storm was fast settling down over the mountain and we must not linger. It seemed ridiculously futile to turn back so soon—yet those two fleeting minutes held for us the tingling thrill of success—a thrill that will linger undimmed forever in my memory.

The descent was a myriad times worse than going up. The wind seemed to tear and buffet us at every step as we crept slowly, carefully down that last icy knife-edge. Then came the marvelous feeling of soft, firm snow once more under foot. The roaring wind died down and we sang triumphantly as we plodded downward toward the plateau.

Fifteen hundred feet below the top we met the support party and reveled in our first real meal since midnight. But time was precious. It was too late and stormy for the others to try the climb, and we headed downward for camp as fast as weary legs could carry us.

Three days later Holcombe, Carter, and I reached the summit once more in perfect weather on a photographic trip. The next day I skied back to the base camp to complete our geologic work.

Graphs and pictures easily tell the tale of all our scientific studies, yet it is impossible to do justice to the men whose names appear constantly between these lines. Without our supporters on the mountain, the climbing party never would have reached its final goal. Without our assistants at the lake, the measurements of the glaciers could never have been made. And it is to this group of unselfish, fearless workers that their leader owes an everlasting debt of gratitude.

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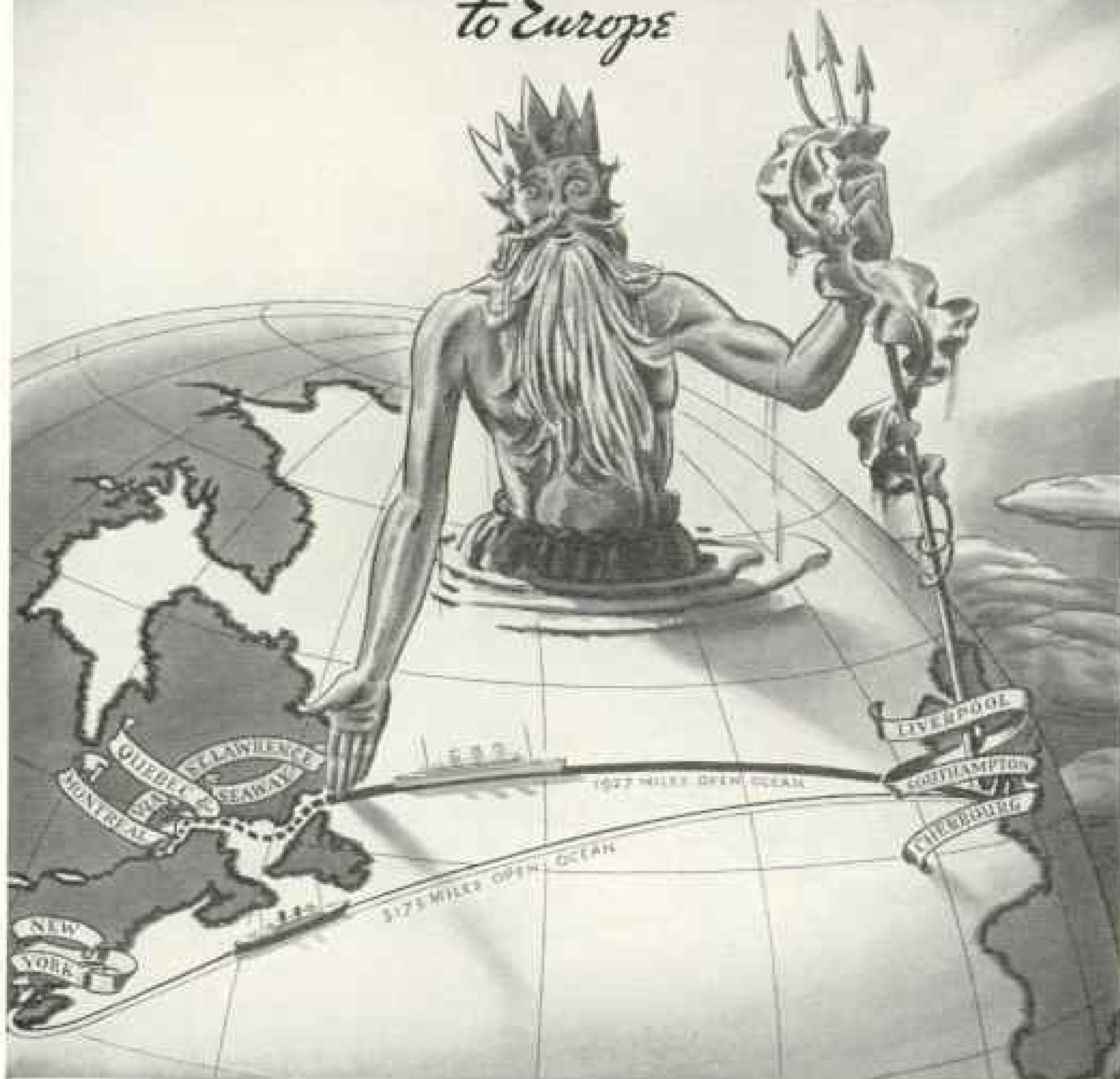

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THE TRUTH

ABOUT TOOTH PASTE

DON'T expect too much of your dentifrice. The mistaken belief that tooth paste can do the work of the Dentist in caring for the teeth is causing untold ill health. It is keeping many people out of the dental chairs lulled by a false sense of security.

Since 86% of our bodily ills have their inception in the mouth, and in view of the conflicting, exaggerated claims often made for dentifrice, it is high time that Americans know the truth about tooth paste—what it *can* do and what it *cannot* do in promoting oral hygiene.

A recent issue of the Journal of the American Dental Association expresses the opinion of the highest dental authorities. It says: "*On the basis of available evidence the functions of a dentifrice are limited to its aid in mechanically cleaning the surfaces of the teeth when used with a tooth brush.*"

No dentifrice can effectively clean the hidden areas of the teeth—the inter-proximal surfaces, the tiny pits and crevices and the parts beneath the gum margins. These are the real danger spots where the tooth brush cannot reach. These are the places tartar collects and where germs are apt to cause decay spots. If allowed to go unattended, these conditions frequently lead to a vast train of serious ailments.

These surfaces require frequent, thorough inspection and cleansing by a Dentist. At least once in three months everyone should receive this treatment called Dental Prophylaxis to keep the teeth really clean, the mouth healthy and the body reasonably safe from diseases emanating from the mouth.

Dental Prophylaxis is without question one of the most important habits a person can contract. It is painless. It guards your health. It adds much to personal appearance.

A good tooth paste is of great value in keeping the *accessible* surfaces of the teeth constantly clean. It makes the daily process of cleaning the teeth easier, more thorough and far more pleasant. It keeps the mouth sweeter—cleaner—and the teeth brighter and more beautiful.

By helping to keep the teeth clean, a good dentifrice *can* retard the development and activity of decay germs. But it *cannot* eliminate these germs. It *can* retard the formation of tartar—thereby giving some protection against gum infection and pyorrhea—but it cannot prevent or completely correct this condition. Only your Dentist can safeguard you from these grave dangers.

In selecting the proper tooth paste for daily use your Dentist will advise you. (1) Beware the falsely advertised tooth paste. (2) Beware the tooth paste that bleaches or scratches or removes more than the surface accumulations.

The great American Dental Association maintains a group of scientific specialists called the Council on Dental Therapeutics. For the guidance of A. D. A. members in selecting preparations for professional and home use, this Council makes careful laboratory tests of all preparations submitted—awarding the "Seal of Acceptance" to those products found to be safe and honestly advertised.

With this Seal provided for your guidance there is no reason for buying doubtful preparations.

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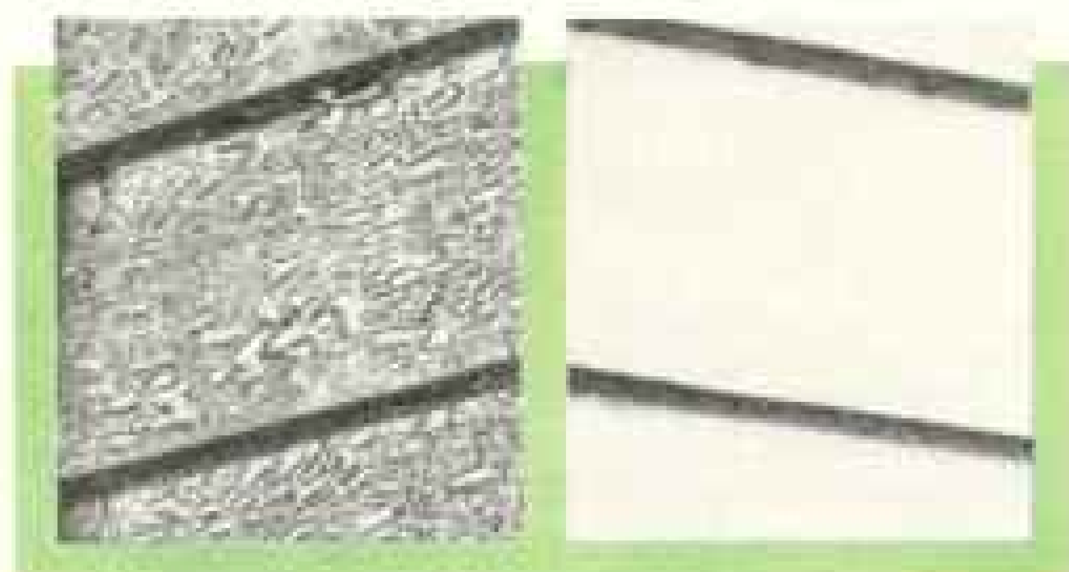

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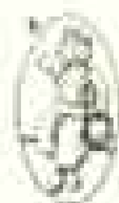

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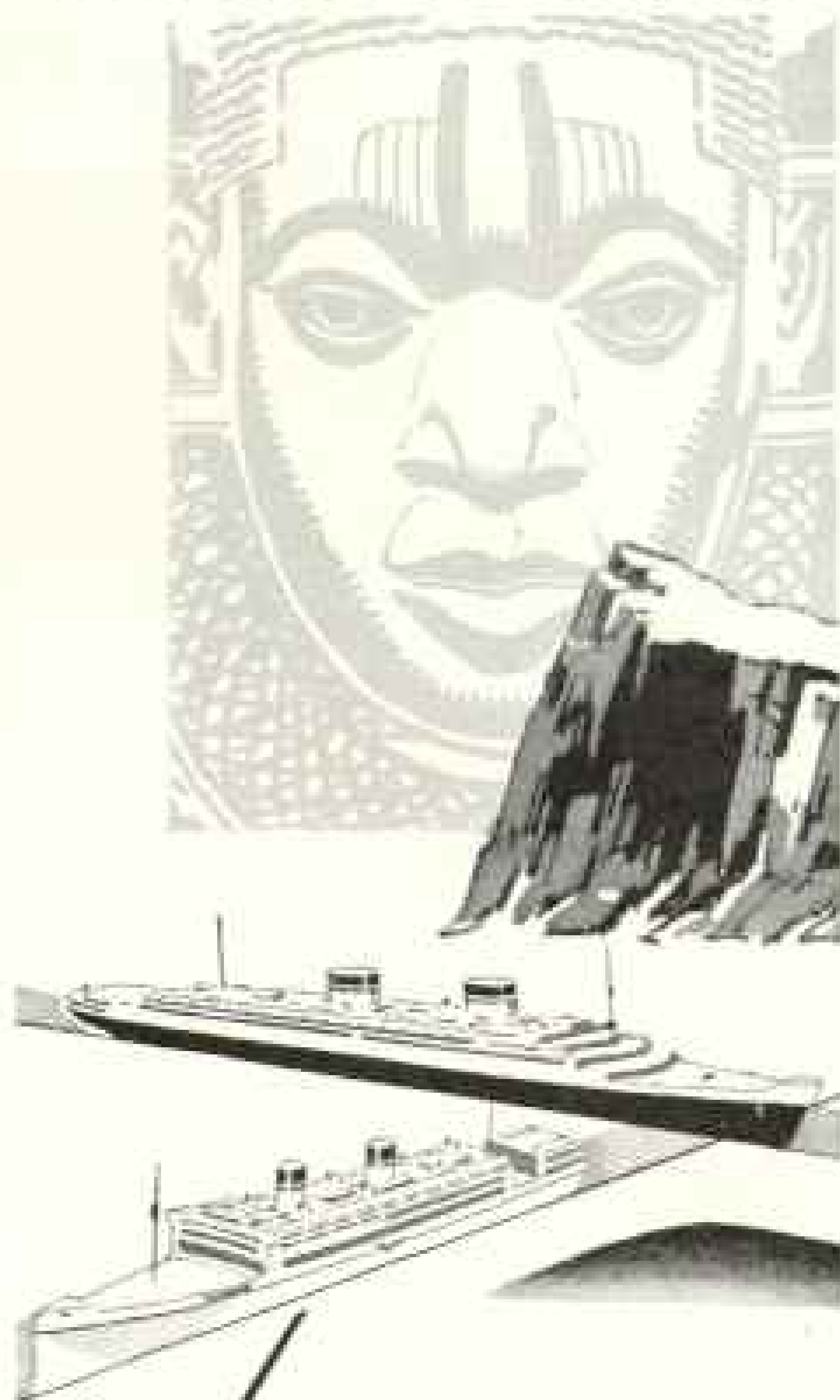

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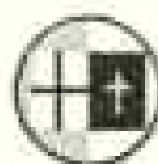

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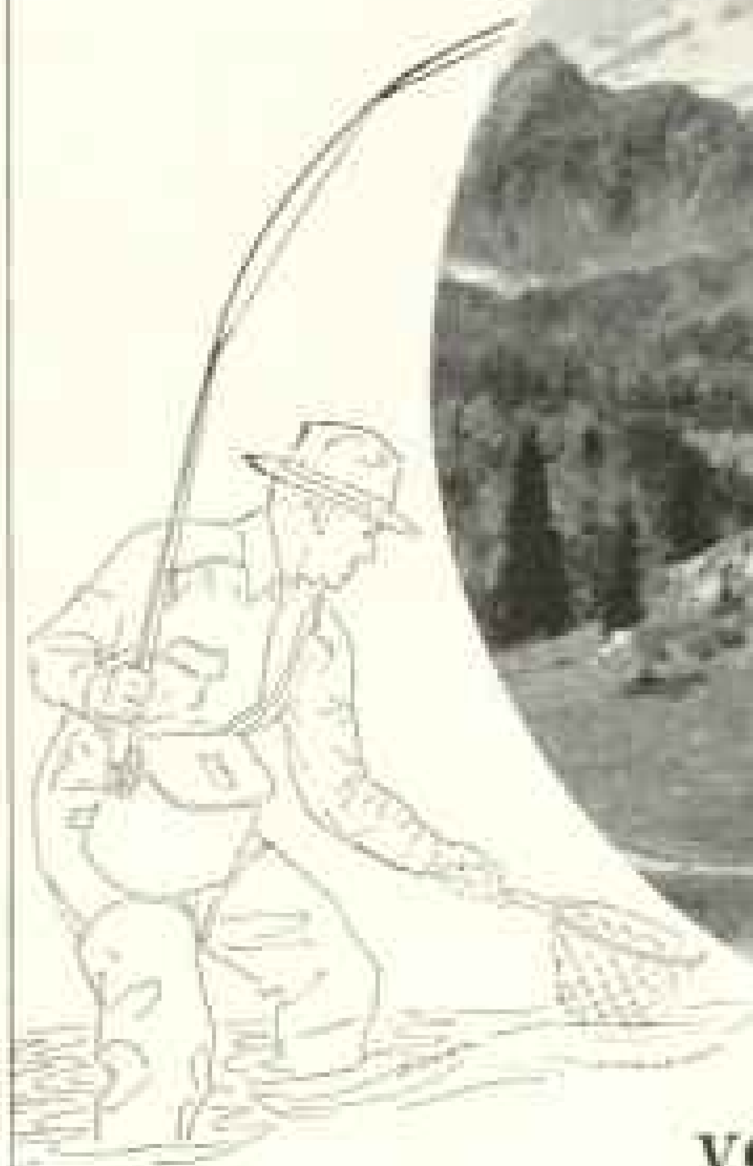

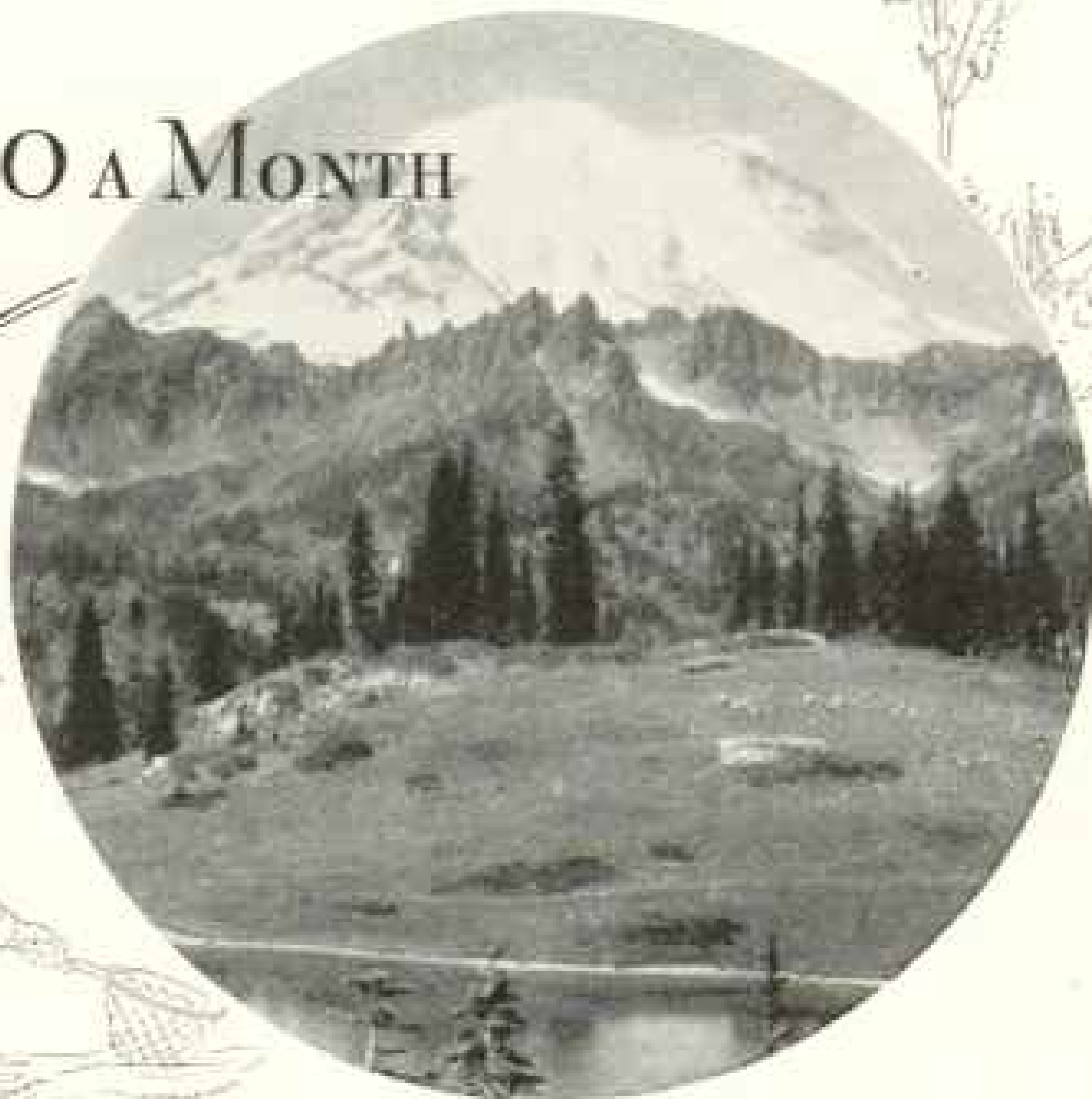

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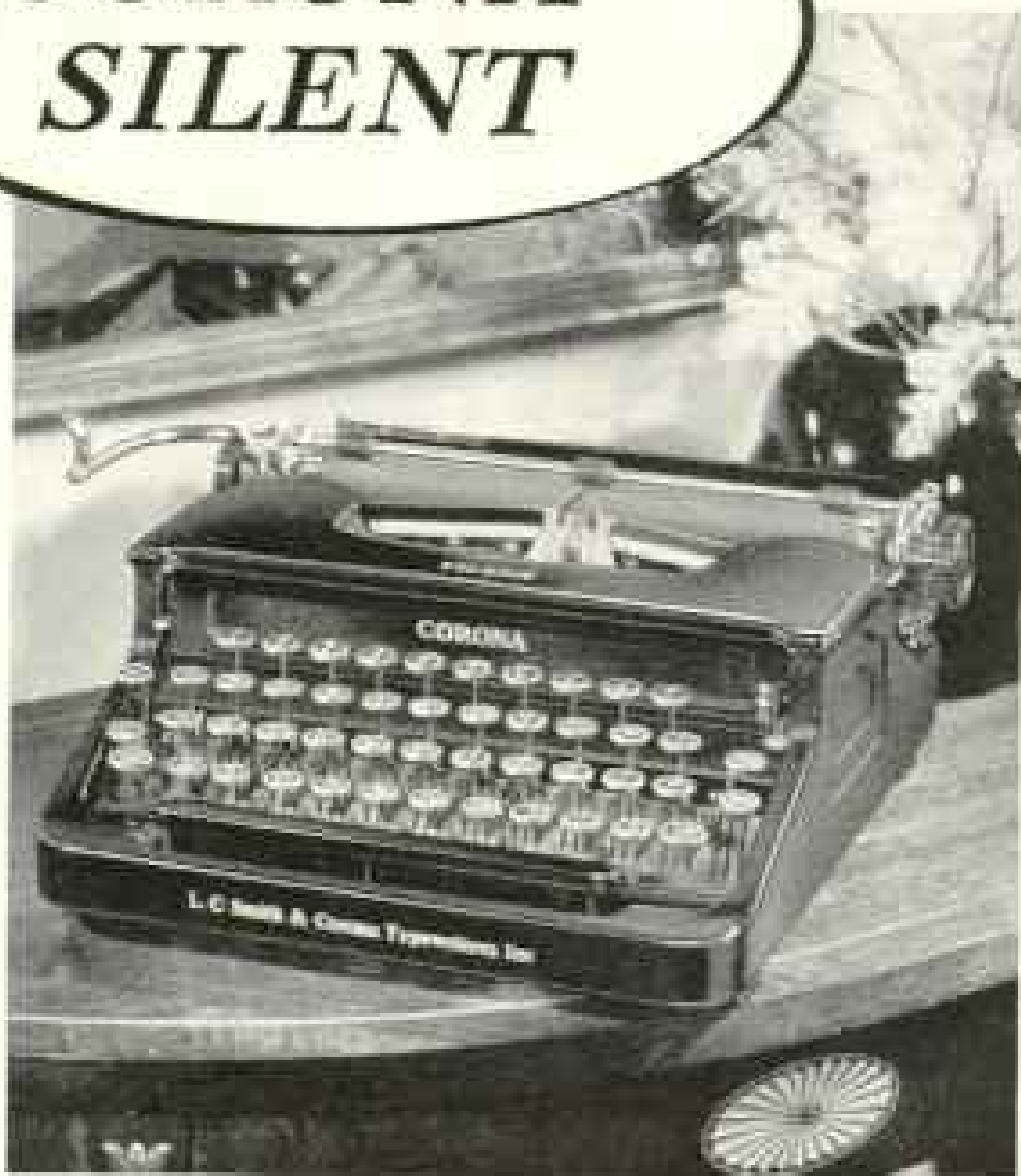

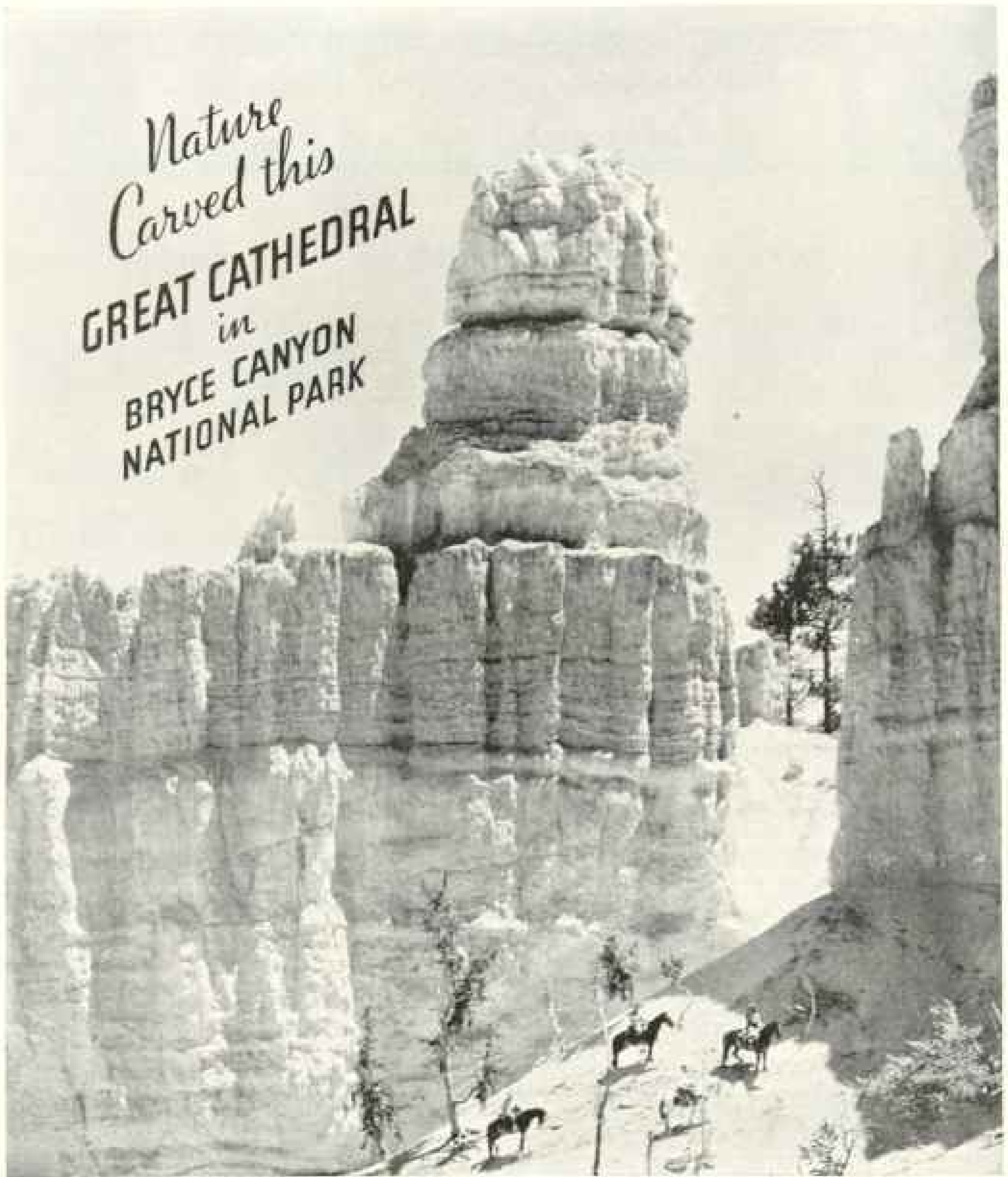

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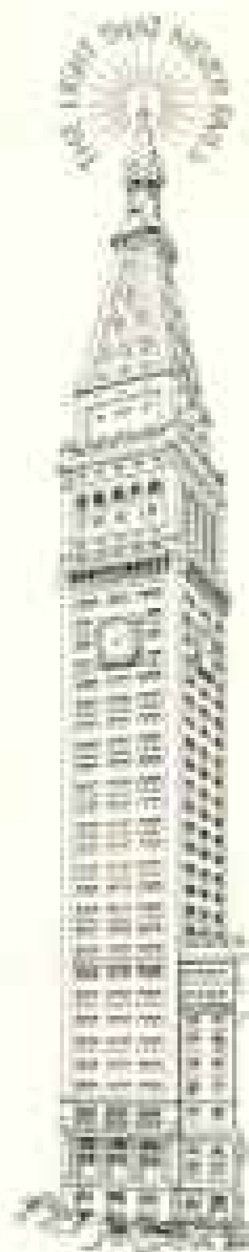

Not all of the diphtheria tragedies are due to lack of information or to negligence on the part of parents. In some cases mothers are under the impression that their children are in no danger of contracting this disease because of the devoted care given them. They are reluctant to have their healthy children immunized. Parents should realize that the utmost care may not protect their boys and girls from this preventable disease. Successful inoculation in infancy will protect them.

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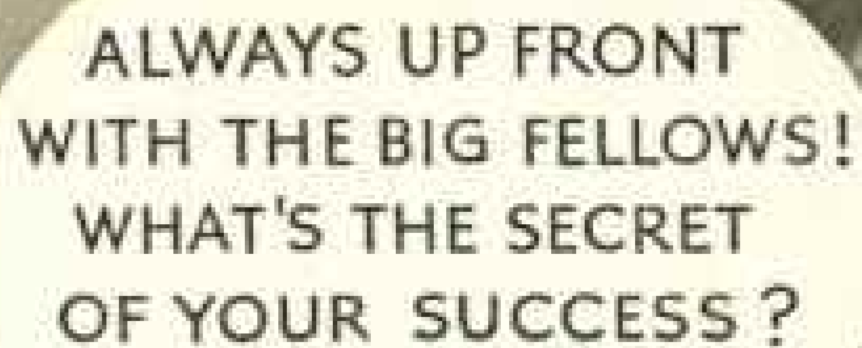

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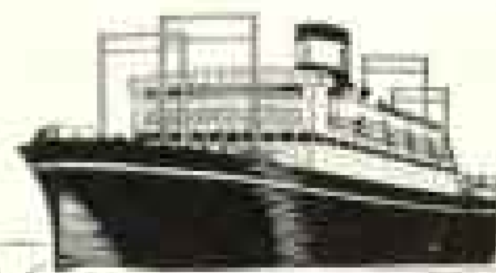

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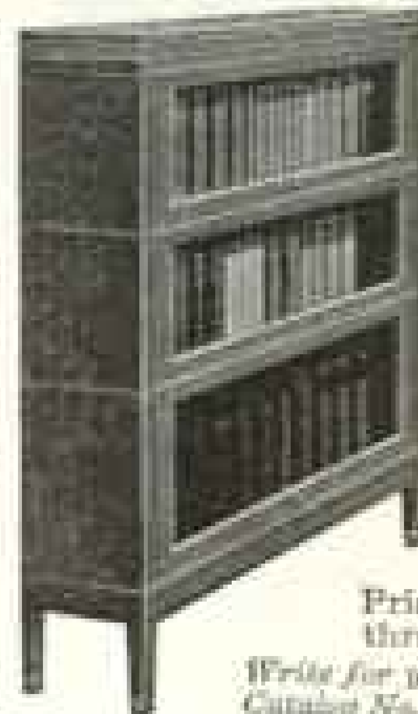

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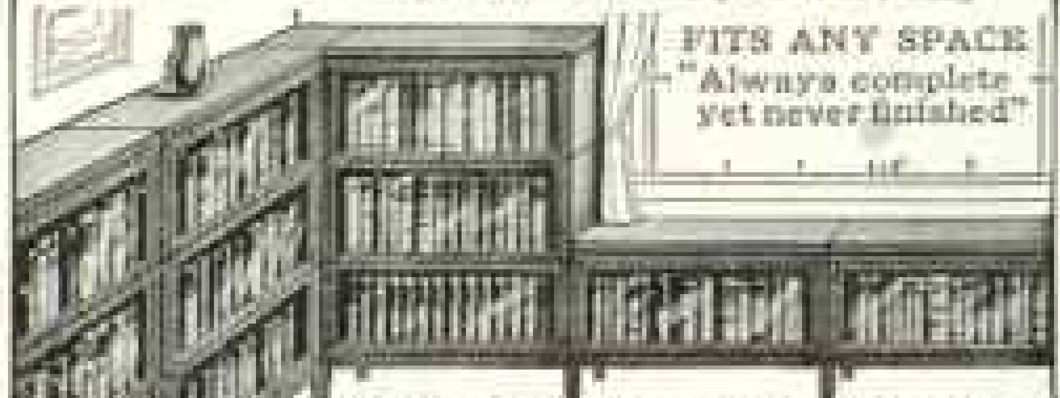

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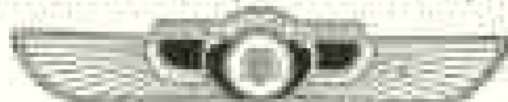

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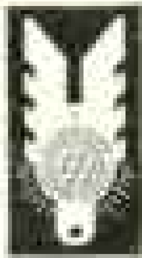

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