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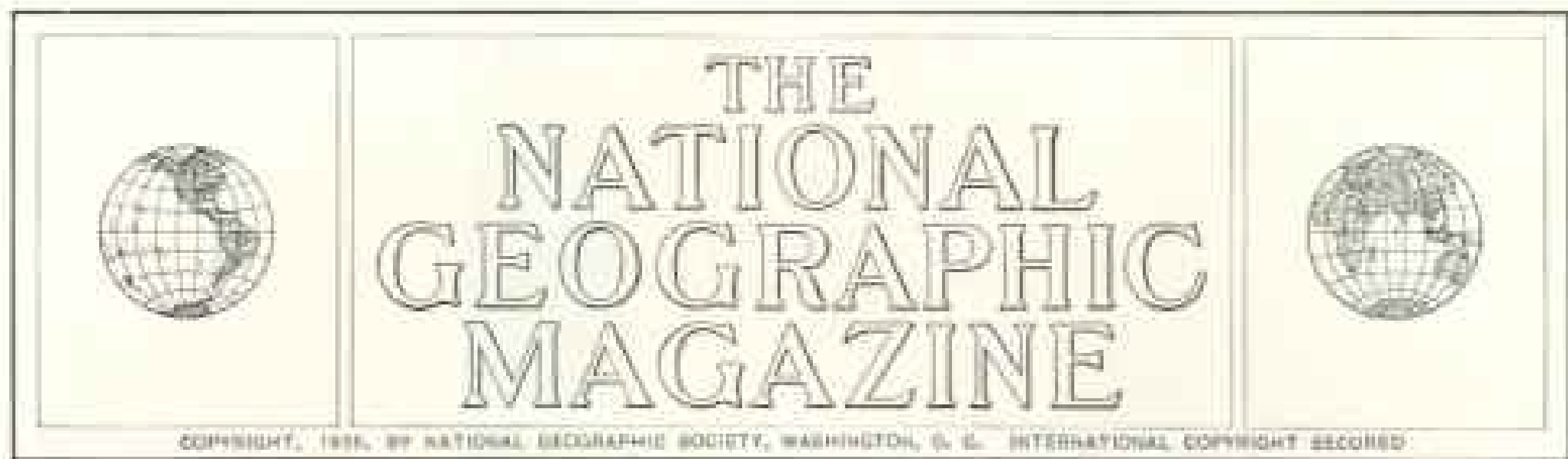
With 3 Illustrations

GILBERT GROSVENOR

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PETRA, ANCIENT CARAVAN STRONGHOLD

Mysterious Temples and Tombs, Carved in Glowing Cliffs of Eroded Sandstone, Are Remnants of a City David Longed to Storm

BY JOHN D. WHITING

AUTHOR OF "BETHLEHEM AND THE CHRISTMAS STORY," "AMONG THE BETHLEHEM SHEPHERDS," "FROM JERUSALEM TO ALEPPO," ETC., IN THE NATIONAL GEOGRAPHIC MAGAZINE

PETRA, silent city of the forgotten past, halfway between the Dead Sea and the Gulf of Aqaba, exerts a magic spell upon the minds of those fortunate enough to know it.* Its single and weird approach, through a deep rock cleft more than a mile long; its temples, numbering nearly a thousand, cut into the living rock of stupendous cliffs and showing Babylonian, Egyptian, Greek, and Roman influence; its high places, courts, libation basins, and altars where the ancients worshiped; its amazing color, the work of Nature lavish with ocher and all shades of red—all these are mysterious, enthralling.

"The rose-red city, half as old as time," † has a history that began long before histories were written. Near it have been found worked flints of the Late Chellean period, millenniums before recorded dates.

Its first written history is found in the Bible; for the land about it was Mount Seir of old (now Esh Shera), home of the Horites, cave dwellers whose progenitor was Hori, the grandson of Seir (Gen. 36 : 20). These Horites are first mentioned at the

time of Abraham in connection with the subjugation of the land by Chedorlaomer (Gen. 14 : 5-6).

Abraham had two sons: Isaac, father of the Hebrews in Canaan (Gen. 25 : 19-26), and Ishmael, of whom it was said, "he will be a wild man" (Gen. 16 : 12). From Ishmael sprang the Nabateans, a Bedouin people.

CHILDREN OF ISHMAEL, ESAU, AND JACOB WARRED HERE

When Isaac's two sons, Jacob and Esau, quarreled, Esau migrated with his family and flocks to Mount Seir (Esh Shera), and became the progenitor of the Edomites (Gen. 36 : 6-8). These were bitter enemies of the Hebrews, the descendants of Jacob's twelve sons. Saul fought against the Edomites (I Sam. 14 : 47); David subdued them, garrisoned their country, and dedicated their gold and silver, presumably for the use of the future temple at Jerusalem (II Sam. 8 : 14 and I Chron. 18 : 11-13); and Solomon ruled them, though he felt their menace in his decline (I Kings 11 : 1-16).

From the time of Saul, 1095 B. C., till about 740 B. C., Judah more or less dominated the Edomite country, but with the decline of Judah the descendants of Esau waxed powerful and gained territory. The

* See "The Rock City of Petra," by Franklin E. Haskins, in the NATIONAL GEOGRAPHIC MAGAZINE for May, 1907.

† From a prize poem by Dean Burgon, Newgate, 1845.



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A ROCK-CUT COULOIR IS THE ONLY WAY UP UMM EL BIYARA

Even this approach could be closed by a gate after the defenders had carried their women, children, and elders to safety on the top of the castlelike mountain. Near the summit the road dwindled to a narrow path (see text, p. 137, and illustrations, opposite page and pp. 149, 163).

Edomites themselves were driven out of the country around Petra or absorbed by the Nabateans, the Arab tribe descended from Ishmael. It was these Nabateans who made Petra their capital and wrought most of the monuments seen there to-day.

For centuries Petra was a rich caravan city, a veritable crossroads of the ancient world. The Arabian Peninsula was a network of caravan routes, over which passed the products of Africa, Arabia, and India to the valley of the Nile, Palestine, Phœnicia, and the Euphrates-Tigris Valley (see map, page 133).

Goods were brought to Petra for storage and for transshipment in every direction.

So important was the city that the Romans built two roads to tap its wealth. When Rome fell, however, its doom was sealed.

Abandoned save for a few desert tribesmen, who lived miserably in its caves, as some of them still live, Petra passed from the notice of the outside world, remaining in oblivion for more than a thousand years.

In 1812 the Swiss traveler, John Lewis Burckhardt, disguised as a Bedouin sheik, reached it and returned to tell of its mysteries. It had then become sacred ground to the Arabs, and danger menaced any Infidel who approached it (p. 141).

In the century after Burckhardt, few explorers attempted to visit it. Not, indeed, until after the World War was it accessible to any save the most intrepid; and even now visitors cannot enter it save under protection of armed guards. With a comfortable camp for accommodation of guests during the summer months (see illustration, page 159), Petra at last is open to serious travelers, though off the route of casual traffic.

The trip from Jerusalem to Petra and back once required about a month of arduous caravan travel through country infested with lawless Bedouins. Construction of the Mecca Railway from Damascus (Damas) to the sacred city of Medina was a first step toward opening the country, and later a highway from Jerusalem to Ma'an and a smooth dirt road from Ma'an to Elji brought motor vehicles within two miles of the ancient city. Airplanes, too, now carry passengers to Ma'an, bound for Petra (see page 137).

When the British cleared the way for automobiles between Ma'an and Elji, the Bedouins rose in open revolt, complaining that the road would deprive them of their income from renting saddle animals to Petra visitors (see illustration, page 142).

Warfare ensued, several persons of both sides losing their lives. After the Government had crushed the rebellion by armed force, the Bedouins received assurance that the road would not be extended beyond Elji, and that their horses and mules would be hired under Government supervision for the last part of the journey.

Thus the Bedouins have kept modern transportation from actually infringing on the silence of long ago and preserved for Petra a measure of its isolation.

VISITING THE MONUMENTS OF PETRA

However we travel to Petra, whether by railroad from Damascus, a method almost disused; or by car from Jerusalem, the most practical way; or by air, the latest innovation, all routes converge on Ma'an, a thriving adobe village girdled with walled gardens of palms, figs, and vegetables, and surrounded by flat, chalky white desert. There is an English school here, and visitors are often amazed to find that many of the Arab youths understand and speak English.

From Ma'an we drive northwest by car, passing the spring of Ain Musa, to Elji. Here a happy crowd of Bedouins, with emaciated riding horses and pack mules, awaits our arrival, which has been heralded over the telephone to the Elji police station.

Mark Twain named the horse he used



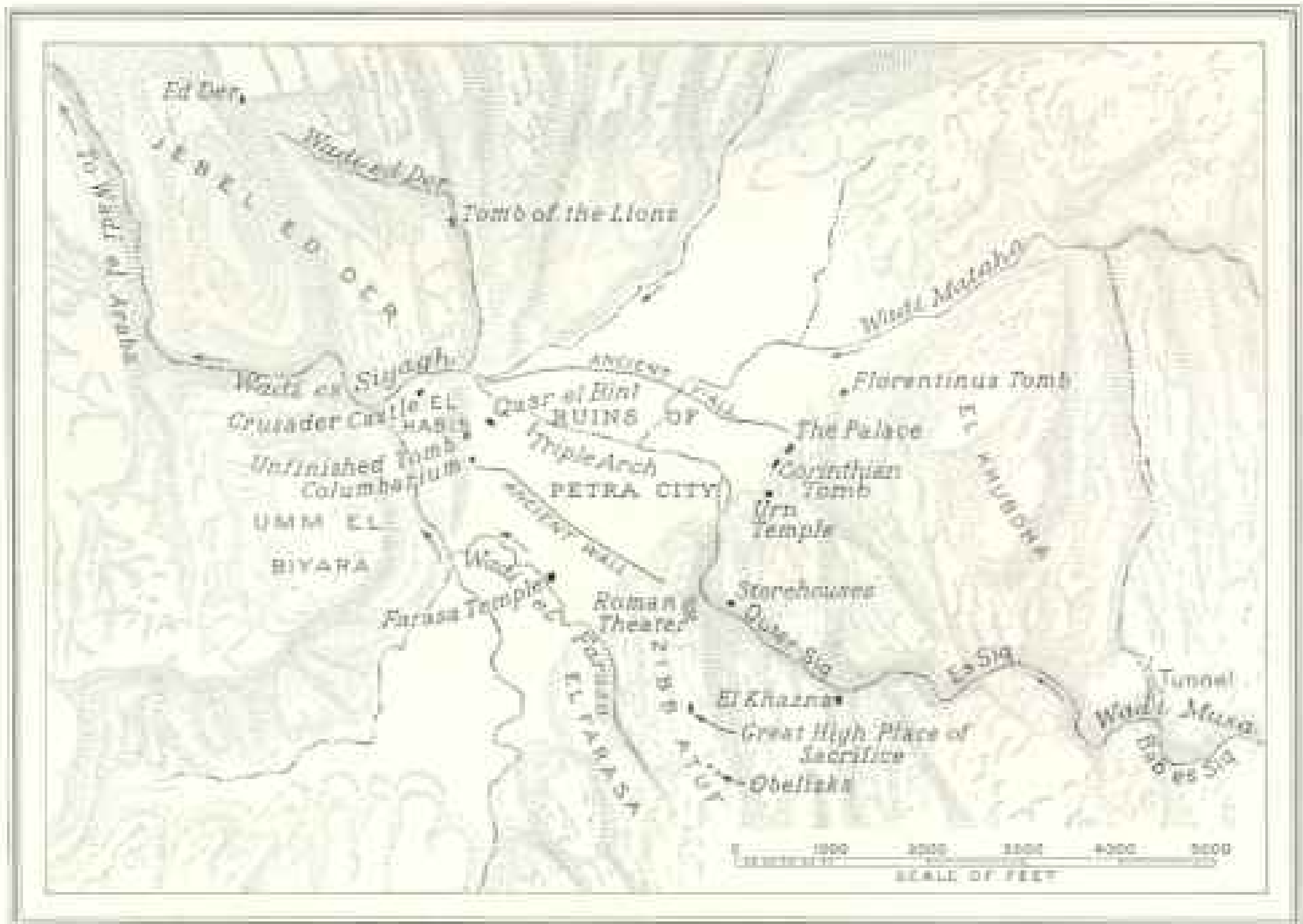
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ONE MAN COULD HOLD UMM EL BIYARA AGAINST AN ARMY

When Jeremiah inveighed against Edom as "Thou that dwellest in the clefts of the rock, that holdest the height of the hill," he may have had in mind this stronghold. The ancients cut roads along the lower levels, but made each path narrower and increasingly precarious as it approached the summit.

through the Holy Land "Baalbeck"—"because it was a magnificent ruin." These moth-eaten beasts remind one of the monuments of Petra, where the elements have been most severe and erosion has left little semblance of the original beauty of contour. Possibly "Erodia" or "Antiqua" would be suitable names for our mares.

Elji is a village of storage hovels; for the natives live summer and winter in goat-hair tents, migrating from the cool plateaus in summer to the warm valleys in winter. They cultivate grain and vegetables on narrow terraces irrigated by the waters of Ain Musa (Moses' Spring).



BEHIND ITS FAÇADES PETRA HOLDS SECRETS OF THE PAST

It is known that the rose-red city of rock was once the center of a vast network of caravan routes, but who built its temples and for what purpose archeologists can only conjecture.

We leave Elji under the escort of a mounted Arab police officer and a Bedouin guide, both armed. Over the police station floats the Trans-Jordan flag, though our equipment is English. We desert the few reminders of modern civilization and travel back through 2,000 years of history.

Descending first by slippery trails over limestone rock, we follow the bed of Wadi Musa to a mighty barrier, the eastern range of the red sandstone mountains that enclose Petra. Wadi Musa deepens. It seems that we are entering a cul-de-sac, but here Nature has rent the range asunder, cutting a narrow opening. For this long slit the Arabs have coined the name Es Siq (a cleft).

Through it the fountain and flood waters flow in winter, and after traversing the precincts of Petra city find their way into Wadi el Araba by another greater gorge, the Wadi es Siyagh (see page 165).

Approaching the gateway, Bab es Siq (see illustration, page 145), we pass through a small suburb of Petra, without the precincts of the fortified city. This was a city of the dead, as was most of what is left of Petra. Objects of interest are tombs of

the pylon type, cut from the solid rock, but, unlike the façade monuments of Petra proper, blocked out to stand apart as buildings.

Here, too, are scattered white sandstone hummocks, rock domes into which large numbers of small chambers have been cut without façades.

Many of like character are found on the less accessible mountain tops. They are believed to be the troglodyte homes of ancient people who lived on Mount Seir before the descendants of Esau made Edom of it.

ANCIENT ENGINEERS TAMED FLOODS

At Bab es Siq we find the remains of an ingenious tunnel cut through the mountain to the north. This, with the aid of a dam, drained off and carried back to the Wadi Musa floods that would have filled the Siq and isolated the city in times of storm.

Though now one usually traverses the Siq dry-shod, I have ridden through it with the water splashing my horse's knees. One such trip makes clear the purpose of the ancient tunnel.

The Siq is 6,000 feet long as the crow flies and considerably longer as it winds. Once it was all paved, and channels were cut into its precipitous sides to lead the spring water into the city. It is 20 feet wide in its narrowest parts and expands to not more than two or three times this dimension. Its sides are stupendous, making men mere ants by comparison.

In no place may we see far ahead, crooks and corners preventing. A streak of blue sky like a twisted ribbon is all that is visible of the heavens (see illustration, page 146). At every turn we hear in fancy the tinkling of bells and dream of a long caravan winding its way through, strong with the scent of perfumes, frankincense, and myrrh. Niched in the walls are small shrines as votive offerings to a deity for a safe return from a long journey.

Our horses slip over the great boulders that choke this ancient avenue, our Bedouins chanting their weary and melancholy notes. A horse stumbles; they call to Allah to uphold it and continue their songs of love. Our police escort gallops his nimble chestnut stallion over a terrain where another horse would break its neck; he is just showing off.

A TEMPLE TO AN UNKNOWN GOD

After 20 minutes of this bewitching seclusion, we strain our eyes for a first glimpse of the vision we know awaits us. Even though we watch, it bursts upon us as a surprise.

The Siq ends abruptly in a cross-gorge. From the face of the cliff opposite the Siq mouth El Khazna has been cameoed out, a temple to an unknown deity. It peeps at us at first (see page 150), we see a little more, and then it bursts upon us in all its beauty (see page 151).

This cross-canyon has been called the "Outer Siq." The name "Lower Siq" may fit it better. Its walls are equally precipitous. To the south its valley floor rises abruptly to the mountain top on which the Great High Place of Sacrifice is located. Steps have been cut at no little expenditure of energy to make easy the ascent of the worshiper. To the north the Outer Siq expands, opening into the Petra basin.

I shall always remember my first view of El Khazna. I had journeyed with a party to Petra from Jerusalem via Beersheba, across the Araba up to Mount Hor (Jebel Harun) and Petra in scorching June-July weather. Water holes were sand-choked.



Drawn by Albert H. Bumstead
 OLD TESTAMENT DRAMA WAS ENACTED
 HERE

Moses had many troubles in this region. One of the most serious was the refusal of the Edomites around the city of Selah (Petra) to let him cross their territory (see text, page 137).

In those early days (1905) we dared not camp at wells because of the fear of marauding Bedouins. Fresh camel droppings and fire ash told of their recent visits.

As we started our last day's march, we were told that early in the day we should reach Ain et Taiyibe (The Good Spring). With mouths parched and appetites whetted by the prospects of a deep draft after days of prolonged thirst, we reached the spring—only to find it dry. Had it not been for a cave in the *wadi* bed full of rain water, our mules and horses must have perished. They had gone 24 hours without water, under trying conditions, and still had a good 12 hours' stiff climb to Petra and water.

After 15 hours of repeated unloading and loading of the mules where the trail between rock cliffs was too narrow to let them pass, we reached our destination. I drove the last two camels into a camp pitched in the Roman theater (see text, page 134).

Frantic with thirst, I ran to a place in the valley above where I was told there was



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ED DER LOOMS ON THE TOP OF THE PETRA WORLD

"The Monastery" presents fine examples of classical architecture, but there is evidence of Christian occupation that wrought many changes (see pages 137, 143). The height on which it stands affords a magnificent view.

cool running water. I fell on my knees and with cupped hands raised the water to my lips.

In tilting my head to drink, I caught my first glimpse of El Khazna! The sight was so awe-inspiring and unexpected that I dropped the water and stared. How long it was before I came out of the spell I do not know. The thing was so beautiful as to pain the senses. I can remember no other occasion when I was so affected.

THE MONUMENTS OF PETRA

Throughout Petra there are possibly nearly 1,000 monuments. The majority of these are Nabatean (see text, page 129) and therefore of special interest. About 25 are

classical, made after Greek and Roman influence had become dominant. These few are by far the largest and most imposing, although archeologically not the most interesting. Petra, it must be remembered, became a city with far-flung trade routes about the sixth century B. C. and endured for nearly 1,000 years. From its monuments has been gleaned most of what is known of its history, and I shall let pictures of these relics tell their story.

Before we pass out of the Outer Siq, we come to the Roman theater, which is best seen from the cliff across the white wadi bed. Its benches, somewhat less than a semicircle, provided seating capacity for between 3,000 and 5,000 persons. That it was made at a later date than the Nabatean tombs is clear from the fact that its architects hewed away some of them. Their minor chambers, without the original façades, are seen in its back walls (pp. 147 and 162).

Leaving the theater, we take a westerly course and tread upon the precincts of the old city of Petra, little of which remains above ground. Test excavation shafts reveal some standing walls, but most of the houses have fallen in. Along the banks of Wadi Musa was the main avenue, and here we see the remains of a triple triumphal arch, probably from the Roman period.

Following the traces of this ancient highway along the wadi, we come to the only building standing in Petra, a large Roman temple called Qast el Bint (Palace of the Maiden). It is fairly well preserved (see page 159). Naturally, the timbered tiled roof is gone, but of the masonry itself only the four great columns that formed the

front of the pronaos are lacking. Except for the bases, which still stand, they lie scattered where they fell.

RESTFUL SLEEP IN A TOMB

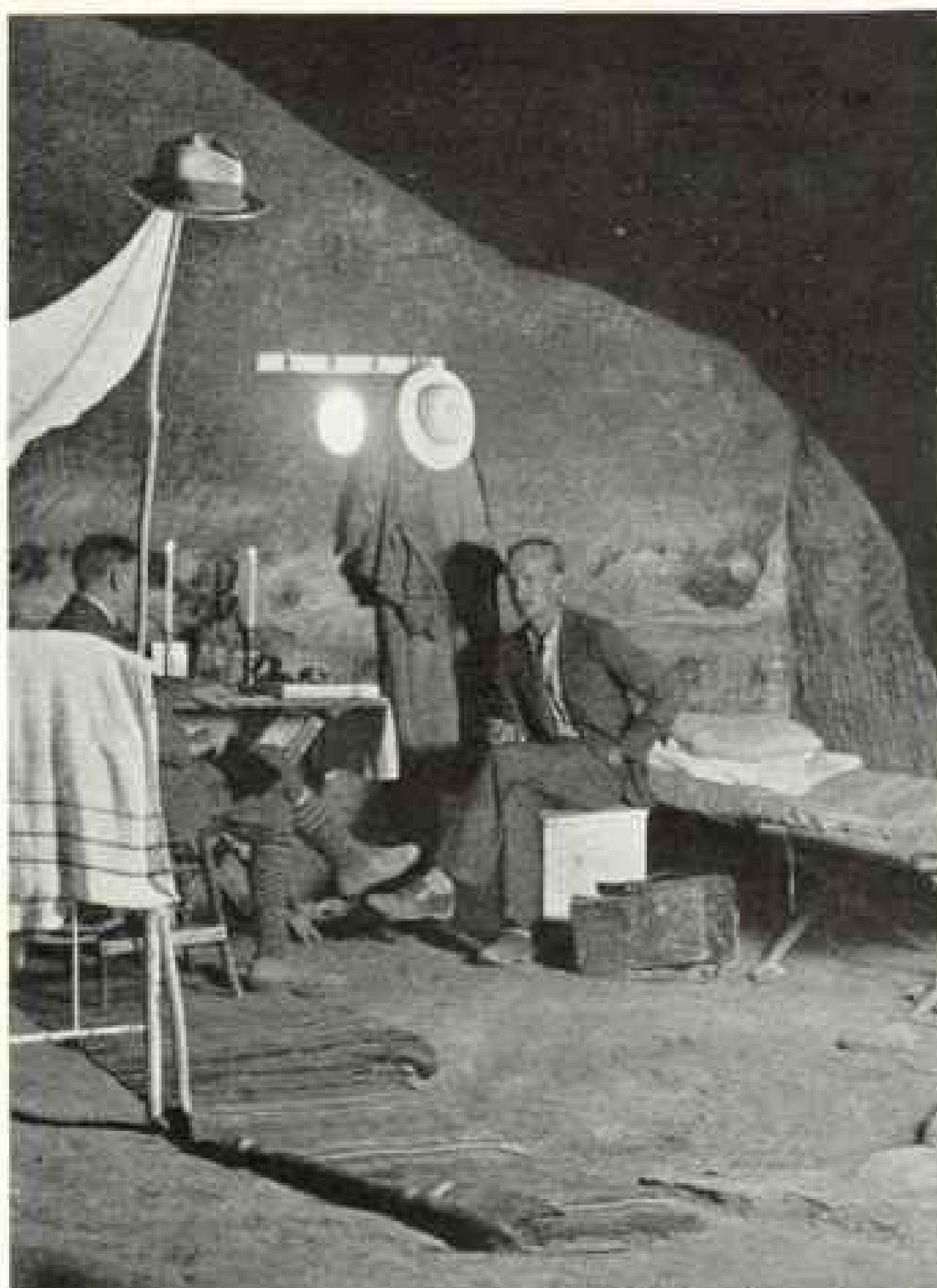
A comfortable tent camp has been set up between this ruin and the small, isolated hill of El Habis (see illustrations, pages 149 and 163). If we like, we may sleep in one of the tents, or we may seek repose in a cave tomb.

One of the most comfortable beds here is a pallet of fresh oleander boughs, pink with thousands of blooms that would cost a fortune in a Fifth Avenue flower shop, covered with a layer of dried grasses, and topped with a couple of blankets and a pillow. In the one-time abode of the dead, dead tired, we sleep after a happy day.

"Only too short an entombment," wrote one traveler who had passed a night there in Petra.

As one emerges from the Siq into Petra, one receives the impression that the city site is a blind pocket entirely surrounded by high mountains. But the two ranges of sandstone mountains, running approximately northeast and southwest and enclosing the dead city, Nature has cracked asunder, the eastern by Es Siq and the western by Wadi es Siyagh. The flood waters of Wadi Musa flow through these openings, falling in cascades from the Siyagh gorge, but mostly evaporating and becoming lost before reaching the Araba.

Between the ranges the ancients constructed two city walls—one the north and the other the south limit of Petra. Gates in these walls afforded the only means of ingress other than Es Siq, for the Wadi es



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A TOMB SERVES AS BOTH BEDCHAMBER AND DARKROOM

At night the lightless interior lends itself admirably to the development of films, and the author (left) and the photographer, G. E. Matson, made good use of it. Dr. John Oliver La Gorce, Vice President of the National Geographic Society; Mrs. La Gorce; and Major and Mrs. Gene Tunney occupied this room while visiting Petra under Mr. Whiting's guidance.

Siyagh was impassable. As thus enclosed, the city was some two miles square, its area bisected by the Wadi Musa (see map, page 132).

The eastern mountain range north of Es Siq is the solid block of El Khubbha. Along its high cliffs the largest of the classical monuments have been carved (see pages 152, 154-5). The same range, south of Es Siq, is much split up by ravines. Of its peaks the most important is Zibb Atuf, on which is the Great High Place of Sacrifice (see page 158). At its base are El Khazna, the theater, and many of the early Nabatean tombs.



CRUSADERS MAY HAVE BUILT THE CASTLE ATOP EL HABIS

Though scholars' opinions vary concerning this ruined structure, there is evidence that it was a stronghold of King Baldwin I of Jerusalem (see text, page 138).



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ROMANIZED ARAB ARTISANS CARVED THESE DELICATE DESIGNS

The modern Bedouin has no religious scruples or superstitious fear of the capitals of El Khazna, as he had of the figures above them; therefore they have escaped unmolested (see page 151).



Photograph by Byron D. MacDonald

THE FIRST PARTY OF EXCURSIONISTS TO TRAVEL BY AIR TO THE ROSE-RED CITY

This big plane carried 24 passengers of "The Odyssey Cruise" from Damascus to Ma'an (see page 130), which is a great air base for the British forces in Trans-Jordan, a British protectorate. In the group are Gilbert Grosvenor, President of the National Geographic Society, and daughters, Carol and Gloria, left of center. Capt. F. V. M. Foy, Commander of R. M. A. "Hanno," third from left.

The western range north of Es Siyagh is called *Jebel ed Der* (Mountain of the Monastery). It was a classic monument that in later times became a place of Christian worship (see page 157).

AN IMPREGNABLE STRONGHOLD

South of Es Siyagh the most imposing mountain of all, *Umm el Biyara* (probably *Mother of Cisterns*), rears its flat top (see pages 149 and 163). It was a Nabatean stronghold, inaccessible except by the aid of a sort of staircase in a couloir that was closed by a gate (see pages 150-1). In cisterns hollowed from the rock, its defenders stored water for use in case of prolonged siege.

The Greek historian, *Diodorus Siculus*, writing just before the Christian era, relates that the Nabateans had no built homes, but raised sheep and camels, using the latter instead of horses; trafficked in frankincense, myrrh, and costly spices, and loved liberty. He describes their cistern-equipped rock fastness with only one way up and gives vivid accounts of two expeditions

sent fruitlessly against them by Antigonus.

By using tactics like those attributed to the Nabateans, Col. T. E. Lawrence (T. E. Shaw), with a small band of desert-bred Arabs, harassed a whole Turkish army corps during the World War. He would place explosives on the Mecca Railway and retreat to just such an eyrie.

It is probable that the Edomites, before the Nabateans, had defenses on *Umm el Biyara* when they refused to let Israel through their borders. The story is told in *Numbers 20 : 14-18*: "And Moses sent messengers from Kadesh unto the king of Edom, 'Thus saith thy brother Israel, . . . Let us pass, I pray thee, through thy country: we will not pass through the fields, or through the vineyards, neither will we drink of the water of the wells: we will go by the king's high way, we will not turn to the right hand nor to the left, until we have passed thy borders.'

"And Edom said unto him, 'Thou shalt not pass by me, lest I come out against thee with the sword.'"

Because of this churlish refusal, Hebrew writers were ever denouncing the Edomites. Jeremiah says: "Thy terribleness hath deceived thee, and the pride of thine heart, O thou that dwellest in the clefts of the rock, that holdest the height of the hill: though thou shouldest make thy nest as high as the eagle, I will bring thee down. . . . Edom shall be a desolation: every one that goeth by it shall be astonished" (Jer. 49 : 16-17). The prophet may well have been picturing the topography of Petra and particularly this high mountain fastness.

In a psalm attributed to David, who longed to conquer Edom and so far succeeded as to place garrisons there, we read: "Who will bring me into the strong city? who will lead me into Edom?" (Psalm 108 : 10).

King Amaziah of Judah made war against the children of Seir and took Selah (Petra), smiting ten thousand. "And other ten thousand left alive did the children of Judah carry away captive, and brought them unto the top of the rock, and cast them down from the top of the rock, that they all were broken in pieces" (II Chron. 25 : 12). Could this "top of the rock" have been Umm el Biyara?

The bed of a winter torrent runs around the eastern base of Umm el Biyara, forming a V with Wadi Musa, where they enter the gorge of Es Siyagh.

Within this V we find the little rock of El Habis, where the camps are located (see illustrations, pages 149 and 163). It is honeycombed with sepulchers and crowned with a castle, whence it gets its modern name of "The Acropolis."

THE WATER SUPPLY OF PETRA

The short trip through Wadi es Siyagh, as far as it is practicable to go, is a lovely evening stroll. We pass between towering cliffs by the wadi full of oleanders, their pink blossoms, in season, contrasting with the hues of the walls of rock. The sun lights up one cliff, leaving the other in shade.

We come to a little spring that bubbles from the pebbles, falls over a cliff, and disappears in a streamlet among the ragged rocks where we cannot follow it. This spring, along with a smaller one in the valley higher up and the waters of Ain Musa, that came into the city by means of the Siq channel, furnished the main water supply of Petra.

Near our Habis camp are a couple of interesting monuments: the columbarium and the "unfinished tomb" (see page 149).

The so-called "columbarium" is one chamber within another, the walls covered with 10-inch cubical holes like post-office boxes. These holes are obviously not adapted for the use of pigeons, as some suppose, and we have no reason to believe that the Petreans cremated their dead.

The unfinished tomb merits study, for it reveals how the monuments were made. Few of the natural cliffs were absolutely perpendicular. Artisans started blocking out on a rock shelf and then finished off their work before cutting down to a lower layer.

On these high ledges the Nabatean stone-cutters must have drawn and completed their designs much as advertisement skyscraper artists do. Where the parts to be removed were massive, they quarried out building stones and then chipped the surface to design.

A CRUSADER FORTRESS ON A HILL

An excursion that agile climbers should not miss is that to the top of El Habis, "The Acropolis." From the camp chambers we ascend by winding paths cut into the eastern face of El Habis, and over a precipice of Wadi es Siyagh to a small flat plateau beyond. Two small gullies lead us thence to the summit.

All of the Petra city site is at our feet, and not too far away for intimate inspection. Here there are masonry ruins called by some scholars Roman and by others Crusader (see illustration, page 136). We know that King Baldwin I constructed at Petra a castle called Selah, the Bible name for Petra (II Kings 14 : 7). He was following the old idea of controlling and taking toll from the caravan routes.

Another interesting climb is to the top of Zibb Atuf. We leave the camp at El Habis and proceed west and south along the base of Umm el Biyara to the southern section of the eastern range. Bearing to the south to miss Es Siq, we pass up one of many wadis, that of El Farasa, a cleft that divides El Farasa mountain from Zibb Atuf, on the Obelisk Ridge. The walls of the glen heighten and its floor narrows almost to nothing, becoming increasingly steeper as we advance.

Hereabout are a number of monuments of the classical type, small but rather well



THE CAMEL IS THE BEDOUIN'S ALL IN ALL

From it he obtains milk and meat. Its droppings are often his only fuel. On its back he moves his house and home or carries his wife in a huge framework saddle. The fleet dromedary is his charger when he rides to war. For feasts the flesh is roasted, and a camel is sometimes the sacrifice offered to Allah.



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EAST AND WEST PLAY AN ANCIENT GAME

Mancala, which the Petra Bedouin guide is explaining to the author's son, requires skill at calculation. It is almost as old as the Nabatean monuments, dating from the time of the early Greeks and Romans.



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FROM THE COMMON BOWL BEDOUINS EAT THEIR EVENING MEAL

Sometimes in honor of distinguished guests a sheep is roasted whole and served in a huge copper platter under a four-foot pyramid of rice. The more grease on the food the more honor to the visitor. After the host remarks "In the name of Allah," all guests plunge their hands into the food and eat with their fingers. Large chunks of meat are torn off and swallowed between handfuls of cereal. As soon as one guest rises, all must leave the repast.

preserved. To our right is the Tomb of the Statues, and across the way is a monument of plain exterior so eroded that it gives no indication as to whether it ever had a carved façade. Within the latter we find the only decorated chamber in Petra (see page 160). Not distant is the Tomb of the Three Urns, its pedimented roof carrying three urns supported by two pilasters with quarter columns.

Farther up, where the wadi contracts considerably, is a small classic monument known as the Farasa Temple. In front of it a considerable plot has been cleared, which gave it the name of the Garden Tomb, though it is definitely not a tomb. Its two pillars, supporting three arches, form a portico, beyond which is a small room lighted and ventilated from one side by a window.

THE GREAT HIGH PLACE OF SACRIFICE

About the base of Zibb Atuf are the largest numbers of earlier Nabatean tombs and a couple of interesting altars, the latter undoubtedly placed here because of the sanc-

tity of the mountain on the top of which is the Great High Place of Sacrifice.

The exact purpose of the Farasa Temple cannot be definitely determined. Most probably it had to do with religious observances. Above it is a great tank for rain water. If we called it a "chapel," the word would probably better convey to us its original purpose.

One cannot wander leisurely about Petra without marveling at the amount of labor expended on steps, water runlets, aqueducts, basins, reservoirs, and cisterns. Especially do we find these in proximity to places of cult, high placed though most of them are.

The top of Zibb Atuf is reached by further climbing and rock-cut stairs. Here we are greeted by the unusual and unexpected sight of two mighty obelisks (see page 153). A closer inspection reveals that the whole of the surface of the mountain has been quarried away, leaving the obelisks standing. Just beyond is a *rax*, or small rock hill, reached by a steep flight of rock steps. This is the Great High Place of Sacrifice.

Sunk into the surface of the uneven rock is a large court surrounded by low benches. Two altars touch the western edge of this court. One, almost square, with a step leading to it, is placed opposite the middle of the court. A deep, narrow trench has been cut around it, forming three of its sides, and at the same time cutting it loose from the rock that falls away abruptly to the terrace below. The surface is uneven.

South of this big altar is a smaller one with a large flat surface and four hewn steps leading to it (see illustration, page 158). Into its top a depression has been cut, a circle within a circle. At the bottom a hole pierces the side, draining into a small channel that empties on to the court. South of the court is a slightly lower terrace with a pool and channels arranged to catch rain water and drain off the surplus.

Such is the Great High Place of Sacrifice. What rites it once witnessed can only be conjectured. There are other similar high places in Petra, but all apparently of less importance.

THE NABATEAN DEITIES

Ancient authors tell us explicitly that the Nabateans worshiped the sun god Dushara, whose symbol was an uncut black stone. Allat, the great mother goddess of Arabia, was his mother and consort. All over Petra we see carved niches containing pillars or large separate monoliths representing Dushara. These were placed near graves, along roadways, in temples, up steep stairways, just as the cross is placed by Christians.

The black stone of the Kaaba in Mecca, the kissing of which is part of the Moslem pilgrim ritual, is one of these Dushara.* This cult object has been taken over by the Moslems much as the Christmas tree has been borrowed by Christians from a pagan festival.

The only Dushara stone still in use in these parts is one in the mosque of Jebel Harun, the Moslem shrine of Aaron, west of Petra. This site is so sacred that no non-Moslem is allowed to enter or even approach its holy precincts. It was to this shrine that Burckhardt vowed a goat as a sacrifice—an act that led to his discovery of Petra.

More than 30 years ago, when I first visited Petra, the country was quite unsafe.

* See "Mecca the Mystic," by S. M. Zwerner, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1917.

Still, a companion and I ventured with our two Beersheba guides up to the top of Jebel Harun (the Mountain of Aaron). The guides had become very friendly and risked the consequences with us.

The going was steep and rocky, but our ponies carried us almost to the top. We dismounted and scrambled up a knoll on the summit of which was a small mosque with a whitewashed dome.

AN ANCIENT PILGRIM RENDEZVOUS

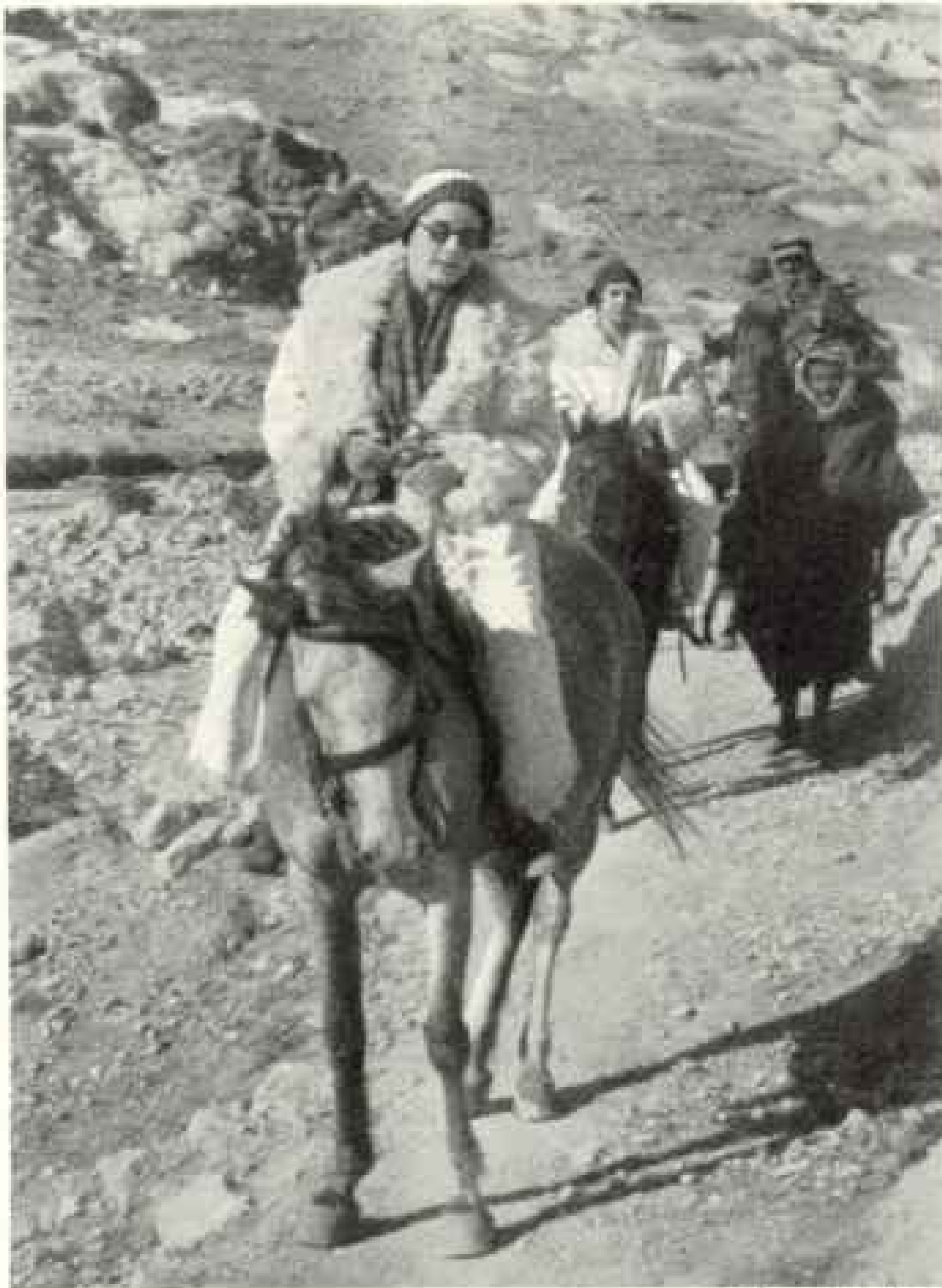
A large antique cistern at the base of this rock showed us that in ancient times the spot had been much used by pilgrims. Below the shrine an open natural cave contained three copper caldrons for seething the sacrifice, one so huge as to contain the meat from a whole camel. Later, as we descended, pilgrims met us with sheep and goats that they brought here to kill and eat in fulfillment of a vow.

The guides knew where the key was hidden, and we entered the "Holy of Holies." Within was a built tomb covered with a dark-green cloth. This, according to Moslem tradition, is where Aaron was buried. From the ceiling hung some eggs of the wild ostriches of the Syrian and North Arabian deserts. We saw on the cenotaph an inscription in Arabic as well as one in Hebrew.

Built into the masonry of the north wall, about five feet from the floor, we saw a black stone of greenish hue that had been kissed to a shiny surface—a counterpart of the black stone at Mecca. Both are Dushara.

As we prepared to leave, our guides spied a party of hostile Bedouins converging on us from afar. A scout had seen the Infidels and given the alarm. Hurriedly but carefully, on their knees, our men smoothed over every footprint in the sand that covered part of the floor, as they backed out to the door. We got halfway down before the Arabs reached the base. They let off a few pot shots, but our soldier guides called back the wrath of the Turkish Government.

This experience may give a key to the riddle of the Great High Place of Sacrifice. According to a Greek writer, the sacred image of Dushara kept in the central sanctuary of Petra was four feet high by two square, and uncut. The idea that the square altar of the Great High Place was the base of this Dushara image becomes increasingly



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TRAVEL IN AND OUT OF PETRA IS BY SADDLE

Not for naught did the Bedouins fight against building an automobile road to this ancient site (see text, page 131). They still make a livelihood by renting their horses and mules to visitors wishing to enter the rose-red city.

interesting when one thinks that the unusual shape and socketlike depression in the altar top might have been so chipped to fit an uncut stone of such dimensions.

Whatever the use of the altar, it faces directly on Jebel Harun, the most holy mountain, probably hallowed before Israel started wandering, when Aaron died atop a mountain in the borders of Edom (Numbers 20: 22-27). The idea of offering a sacrifice in view of a sacred mountain without actually going to it, as Burckhardt did, is a prevalent one.

We have here, then, twin altars possibly dedicated, as has also been suggested of the

two obelisks, to the inseparable god and goddess of Arabia.

The round altar has the appearance of being one on which goats and sheep were slain, the blood caught and poured out before the Dushara. The idea of the whole burnt sacrifice, so well fixed in the Western mind, is only one form, the less usual one practiced by the ancient Hebrews. More commonly the flesh was cooked and eaten at the sanctuary.

This is the form that all blood sacrifices took, originating in a dim past, perpetuated until to-day in these countries. Both Moslems and Samaritan Jews smear the blood as part of their ritual.*

On the flat court before this altar is a small raised platform, the probable use of which has caused no little discussion. It seems logical to think of it as reserved for the officiating priest.

Around the court are the raised seats where the sacrificial gathering would sit and partake of the feast. Thus the Nabateans perpetuated

the form of worship that, without doubt, the Edomites practiced before them.

From the Great High Place of Sacrifice we descend by rock-cut steps via the Siq, catching yet another glimpse of "Pharaoh's Treasure House," El Khazna.

CARAVAN STOREHOUSES AND TEMPLES

Passing the theater, we come to El Khubbda, the northern section of the eastern range. Here a spear of the mountain at the lower Siq is carved with some excel-

* See "The Last Blood Sacrifice: A Samaritan Rite in Palestine," by John D. Whiting, in the NATIONAL GEOGRAPHIC MAGAZINE for January, 1920.

lent examples of the corniced type of façade. Along the lower extremities of the Siq gorge, just before it opens into the great valley, are rooms with large cavities cut into their walls. It has been suggested that, being on the main highway at the entrance to Petra, these were the storehouses or shops in which the frankincense, gold, myrrh, aloes, cinnamon, and spicery were unloaded from the camels coming from Arabia, to be sold and recaravanned to points east, north, and west.

El Khubbda has the highest rock faces of all those about Petra; consequently, at the period of greatest prosperity, the most pretentious temples were carved upon its west façade.

Here are the Urn Temple (see page 152) and three sepulchers of the Nabatean type. North of these are the so-called "Corinthian tomb" and the largest monument of all, the Palace (see page 154).

Some three hundred paces again to the north is an ornate tomb known to be that of a certain Sextus Florentinus, a Roman officer of the time of Antoninus Pius. Near this tomb is the northern boundary of Petra; for here the crooked Nabatean wall started across the valley to the opposite western range.

A ROMAN TEMPLE ON A HEIGHT

We leave camp early for the climb to Ed Der, nearly 600 feet above the city level (see pages 134, 157, and 158). The valley, Wadi ed Der, that we follow is full of smaller monuments. Its walls become precipitous and close together, much like the lower Siq. Huge staircases, wider and more



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ANCIENT PEOPLE CARVED AN EAGLE SHRINE

Centuries before our United States national emblem was thought of, desert tribes had utilized the King of Birds in art representations.

pretentious, often cut through masses of rock, are here encountered. Were it not for fallen rocks blocking the route and other parts being eroded away, the road, though very steep, would be passable for animals.

In the caves at the entrance to the valley we usually find the few remaining families of the Bdul Bedouins living. They have no homes, no tents, the few clothes, usually in tatters, on their backs being their most valued possession besides the rags they sleep on. Often the children are quite naked. They eat barley, pounded into flour in holes in the rock and baked on ashes. Two meals a week suffice to prolong their existence. A few goats may be a family's sole source of livelihood.

On our way up, one monument claims our attention and we make a short detour to reach it. It is a small classical façade known as the "Tomb of the Lions." The pedimented top is supported by a pair of pilasters supplemented by quarter columns. The capitals are Nabatean of a decorated and developed type. Above the capitals are two Medusa faces. The monument gets its name from the lions carved on each side of the door.

Higher up, there is a choice of two ways, and we take that to the left. Here we come to a rock ledge overhung by a cliff and dropping into a chasm. From the overhanging rock, covered with maiden-hair ferns, water continually drips, and small tunnels have been made to conduct it into pools. We are hot and fagged on reaching this point, and the refreshingly cool drink is welcome. We rest on the stone seats of a triclinium in the shade of a rock-cut chamber. Along the walls are carved niches and cult objects, an inscription and a cross of later date.

The Der itself is not on the highest point of this range, but is rather on a plateau overlooking the great Araba rift directly facing Mount Hor (Jebel Harun). Carved from finely grained sandstone, it is better preserved than most of the monuments. There was no cliff here; therefore a whole section of the mountain side had to be removed, leaving a great flat space in front (see page 157).

AN EARLY ALTAR OF GREAT SANCTITY

Not far from it is the rock altar of a high place. Facing Mount Hor (Jebel Harun) as it does, it may have been at an early time a place of great sanctity. Ed Der is clearly a Roman temple that quite likely superseded, and in its construction demolished, many of the ancient cult cuttings that we should expect to find here, similar to those at the Great High Place of Sacrifice on the Zibb Atuf.

If this niche in Ed Der at one time held a Dushara, the idol would naturally have been removed by the Christians, just as the Moslems must have removed all Christian altars and appurtenances of worship.

Beyond Ed Der is a small tomb on the face of which a couple of camels and men are carved. These are so eroded as not to be readily distinguishable. Near by are many cisterns and rain-water catchments, indicating that large numbers of people frequented this temple.

My first trip to Petra, in 1905 (see page 133), was slow and dangerous. I have revisited the place many times. My last excursion was by air, in 1934; and it surpassed my wildest expectations in beauty of scenery, intimate views and placings of the ancient monuments, and unique experience.

FLYING OVER PETRA

Our party breakfasted on the shores of the Sea of Galilee (see map, page 133).

The day had dawned fair. Soon, however, enormous black clouds like demon heads, thundering cursings and spitting forth firebrands of lightning, came racing through the Pigeon Valley (Wadi el Hamam) and floated over the lake that a few moments before was "Blue Galilee."

Motors raced us through a howling gale along the lake shore, through Tiberias, to the wind-swept natural airport of Samakh, at the southern end of the lake. New Testament history tells us of these sudden Galilean storms which subside just as suddenly.

Ducking our heads into the gale, we crossed the airdrome and mounted the plane. A dozen men and officers clung to the machine's wings while others emptied the anchor bags. Captain Mahoney of the Royal Air Force climbed aboard and soon we raced away, the men clinging to the wings as long as possible.

First circling over the lake, we headed down the Jordan Valley. As we sped down toward the Dead Sea, we literally flew below the surface level of the sea, for the Dead Sea is nearly 1,300 feet below mean sea level.

ACROSS THE JORDAN VALLEY

The Jordan Valley behind, we raced diagonally across the Dead Sea and faced the precipitous sandstone cliffs of its eastern shore halfway down. Volcanic eruptions had poured molten black basalt over the bright-red rocks. Wind, rain, and stream had chiseled away the surplus, leaving varicolored monarchs standing erect, with crowns of black, their feet in the bluest of waters.

Here we crossed the narrow Siqlike chasm through which flows the River Arnon (Wadi el Mojib), and soon rolling, rocky uplands, cut through by deep wadis, were flying by below. Here and there were deep red patches where cultivated fields had been freshly plowed in the valleys. Scattered about were camps of Bedouin goat-hair



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Finlay Photograph by G. E. Matson

WHERE NATURE RENT ROCKS ASUNDER, A WAY WINDS THROUGH TO PETRA

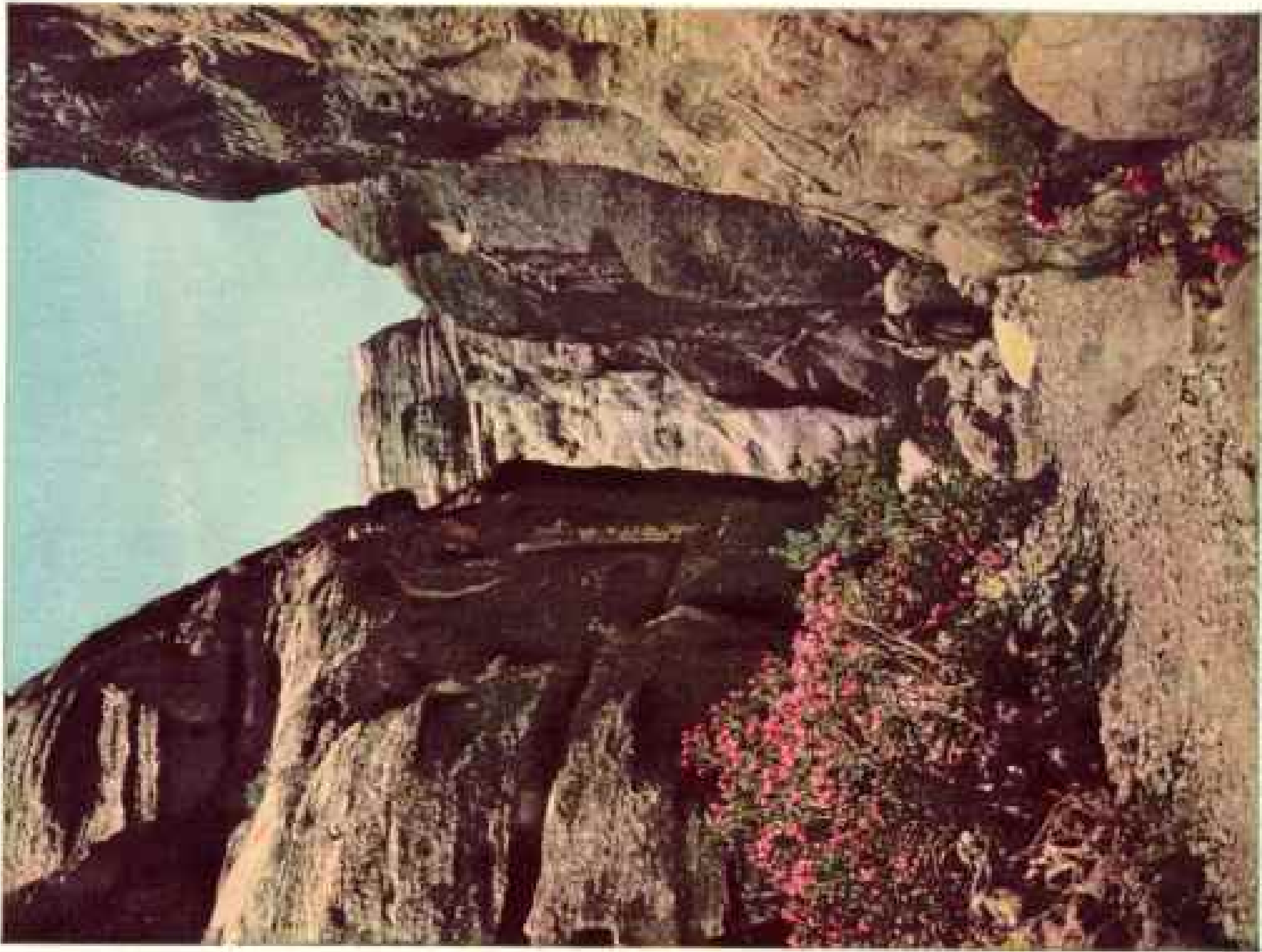
The Siq, main avenue of approach to the age-old city, is 6,000 feet long as the crow flies, and its turnings increase that length. Stupendous walls, in some places only 20 feet apart, hedge it in, towering so high that caravans seen from the top look antlike. The road was once paved throughout with 18-inch blocks of stone, some of which are still in place. This approach rendered ancient Petra well-nigh impregnable when intelligently defended.



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OVERHANGING WALLS SOMETIMES SHUT OUT THE SKY

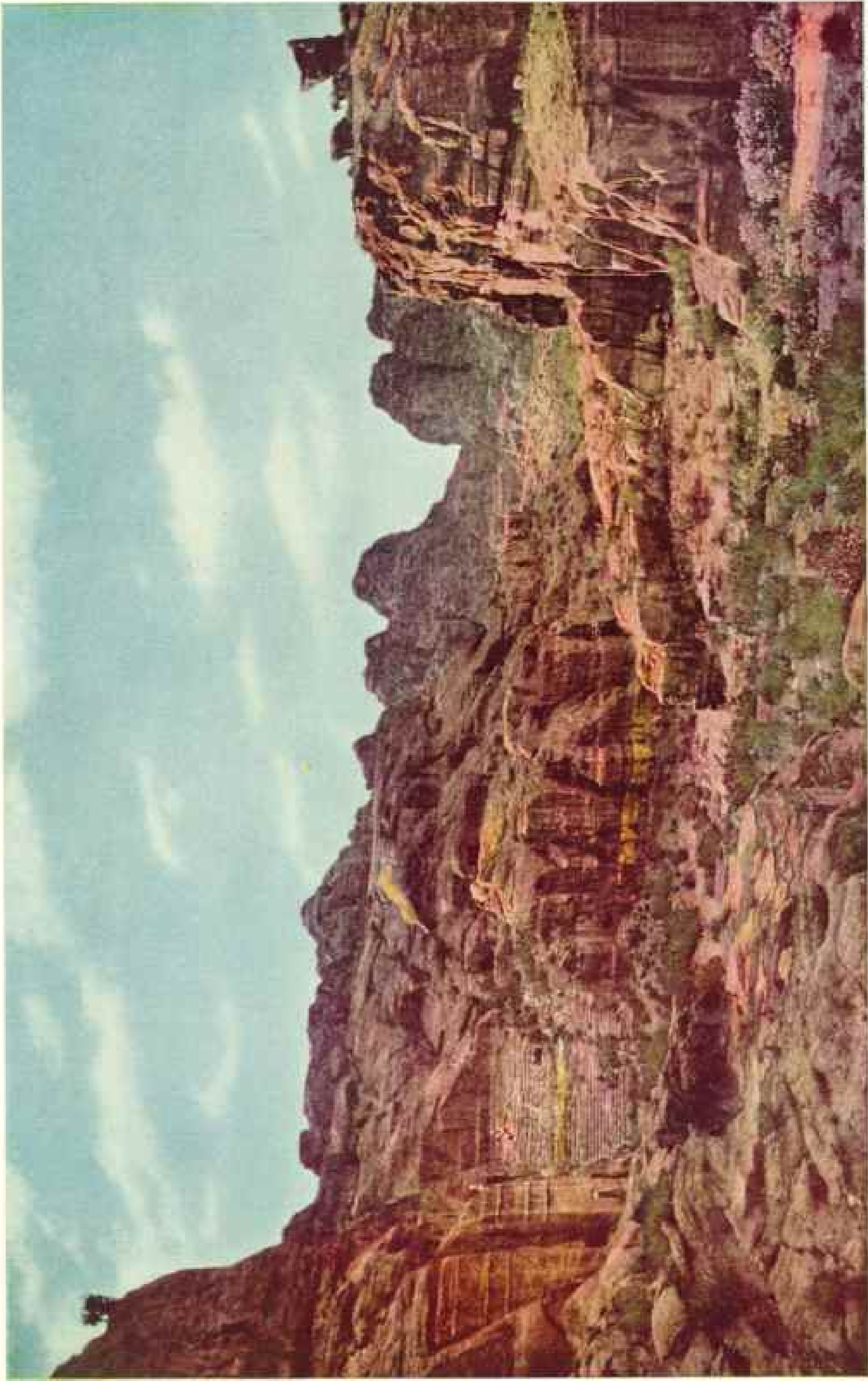
Past glowing clumps of cleaner blooms, the Siq winds tortuously, now widening till flooded with noontide sunlight, now narrowing to a tunnel, and revealing new color delights at every turn.



Finder Photographs by G. E. Mattson

IN A SANDSTONE BARRIER, SUDDENLY AN OPENING

To one approaching Petra by the bed of Wadi Musa, the road appears a cul-de-sac; and the Siq entrance, still bearing traces of the arch that once spanned it, is as unexpected as if conjured by genie.

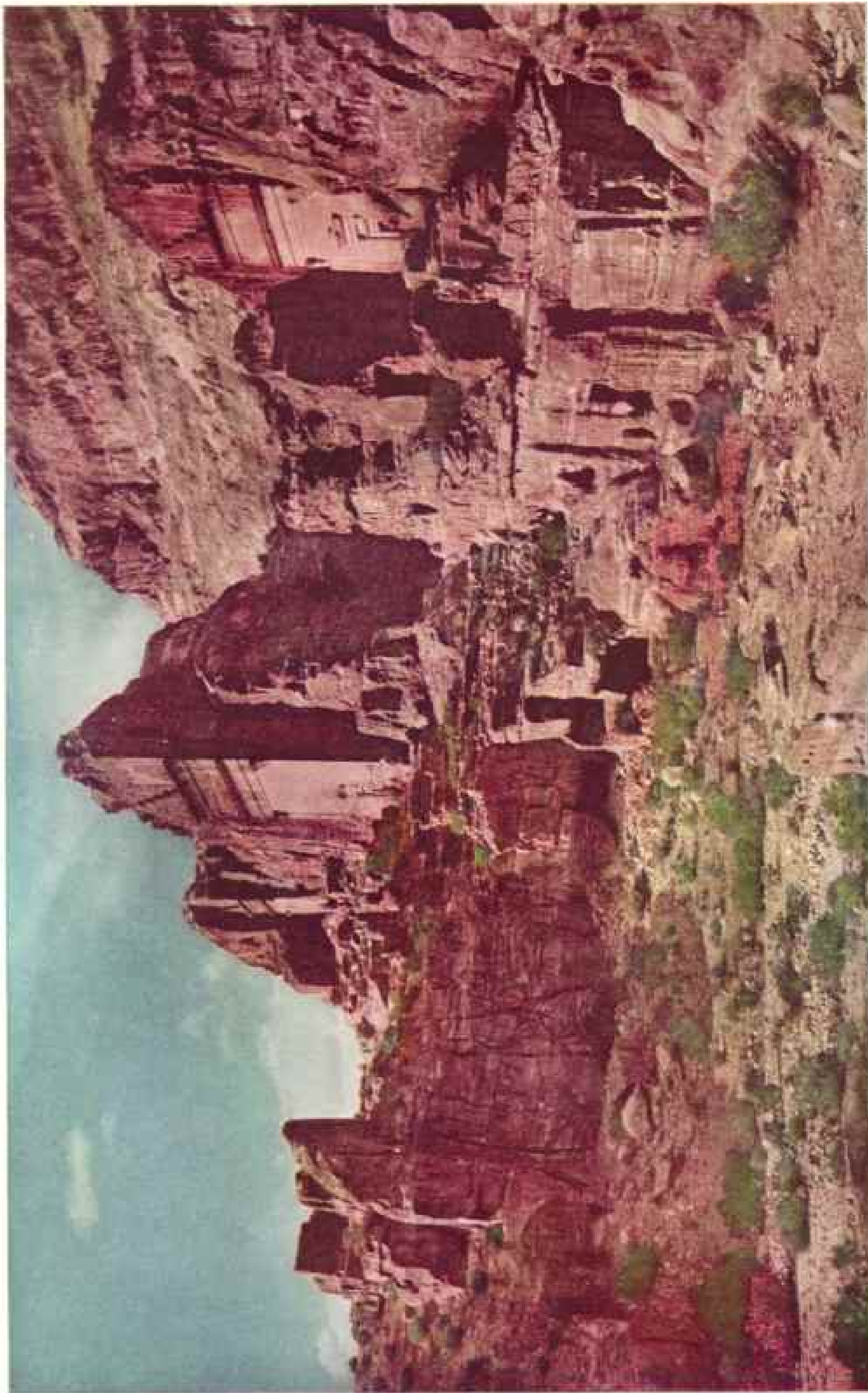


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AMID SEPULCHERS PETRA HAD A PLACE OF AMUSEMENT

The vast amphitheater at the left, with 33 rows of seats carved from a semicircle of rock about a floor 120 feet in diameter, is so well preserved that it might accommodate an audience today. One can readily imagine it filled by a horde of shadows from the past, watching a play by ancient Romans or by wandering Arabs. Its original capacity has been estimated at from 3,000 to 5,000 persons. The torrent bed in the foreground is that of Wadi Musa.

Finlay Photograph by G. E. Mabson

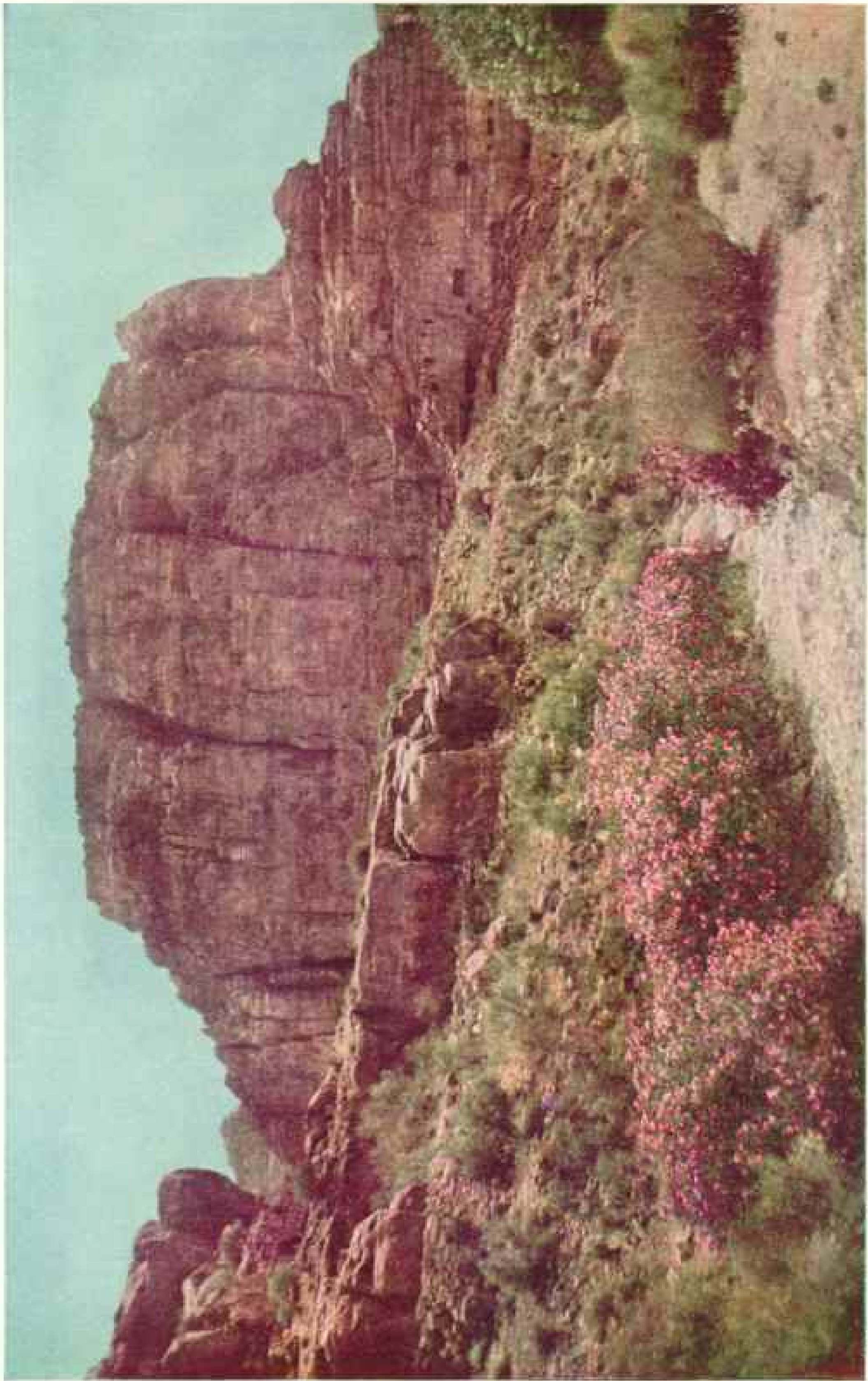


Flinder Photograph by G. E. Matson

EAST OF THE AMPHITHEATER TOMBS STAND OUT LIKE SCREENS

Eerie setting for dramas enacted on the huge stage opposite (see page 147) must have been these burial places, their exquisite fronts carved by master craftsmen from the rigged sandstone mountains, their deep recesses shrouded in mystery. The view down the outer Siq reveals scores of them glowing with rich color that changes as light brightens or wanes. Who made them or what dead they sheltered archeologists have not determined, but certain it is that they existed before the time of Solomon.

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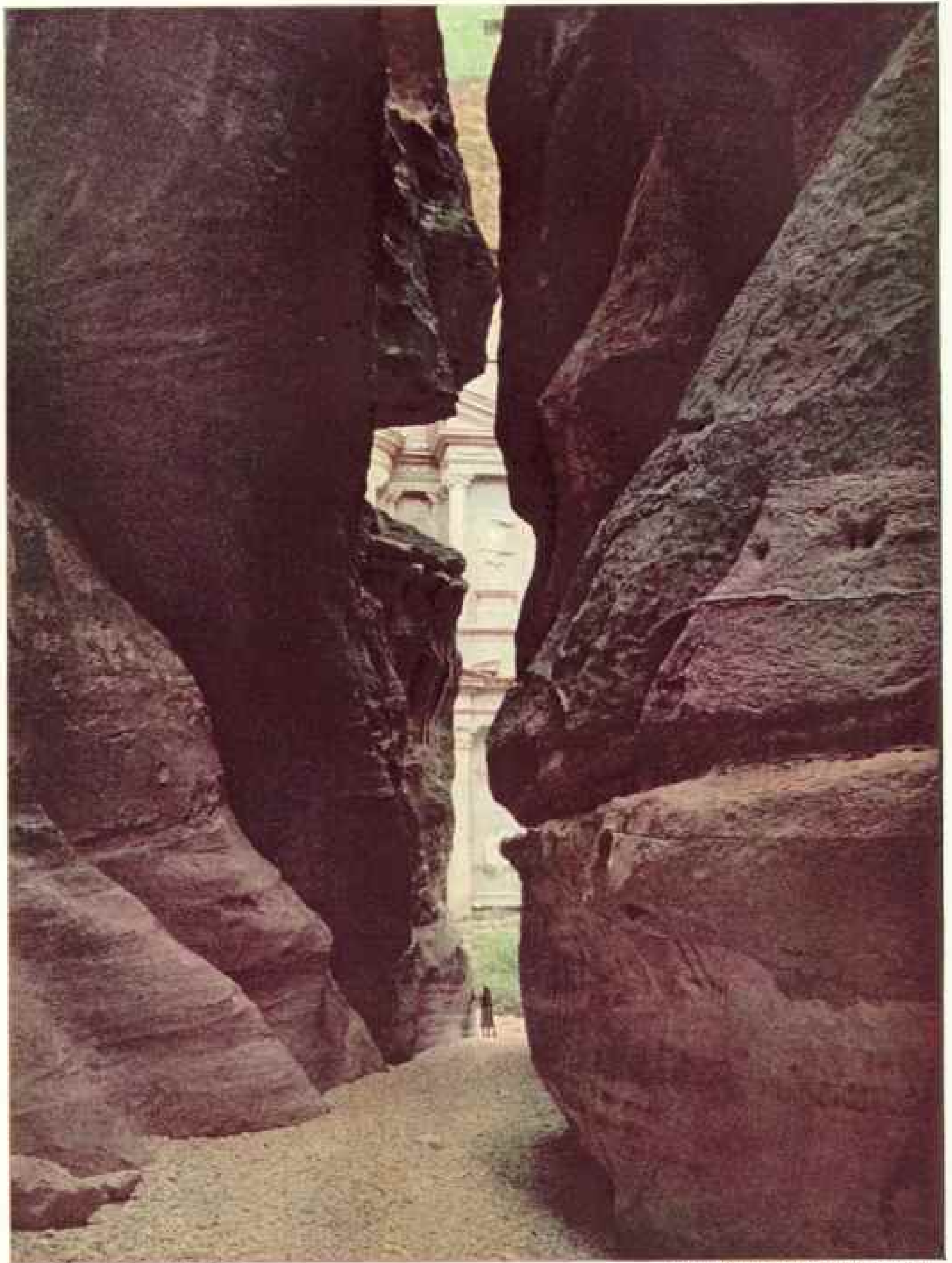


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DAVID LONGED TO STORM AN EDOMITE STRONGHOLD AFOOT UMM EL BIYARA

Finder Photograph by G. E. Mutton

The name of this highest mountain in Petra probably means "Mother of Cisterns," for the Nabateans and doubtless their predecessors, against whom the Psalmist warred, had hollowed out reservoirs in the flat summit, which was the site of a fortress accessible only by a stairway cut into the rock. In the right foreground, and separated from the higher eminence by a wadi, is the little rock hill, El Habie, in the face of which are openings of the "unfinished tomb."

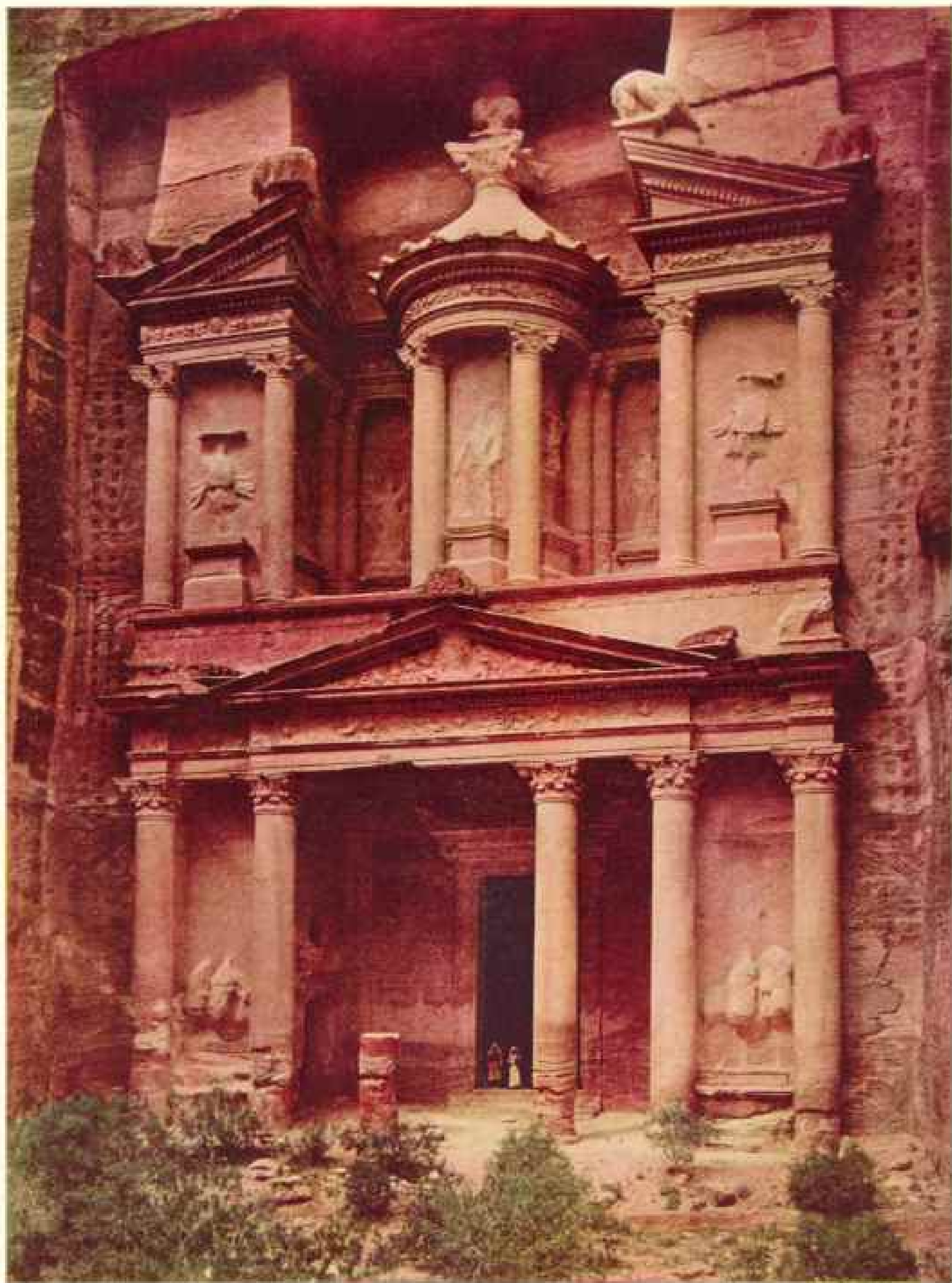


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Finlay Photograph by G. E. Matson

FACING THE SIQ MOUTH FLASHES THE SURPRISING TEMPLE TO AN UNKNOWN GOD

For more than a mile the traveler follows the bewitching way between the walls of the cleft; and even though he strains his eyes in anticipation of what he is to see at the end, El Khazna bursts upon his vision unexpectedly. It seems at first glimpse unreal as the figment of a dream. Its color ranges, with varying light, from marble white under the moon to red in the brilliant rays of the sun, and to deep mahogany when shadows creep along the walls (compare opposite page and page 156).

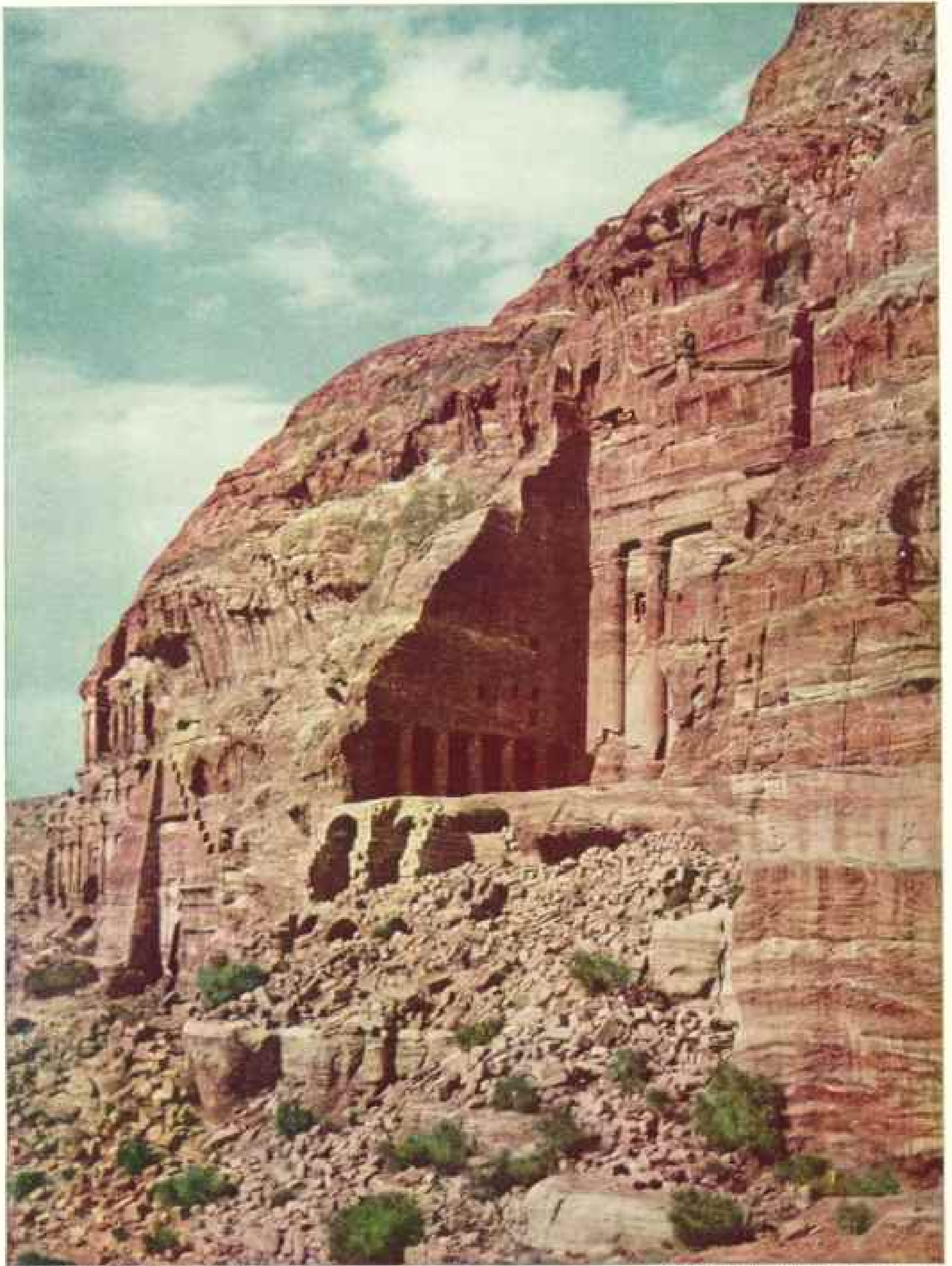


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Finlay Photograph by G. E. Matson

EL KHAZNA GLOWS IN EVER-CHANGING HUES, A CAMEO CUT IN A CLIFF

Pharaoh's Treasury, it has been called; and Arab tribesmen, seeking spoil, have scarred the urn or jar at the top with bullets, hoping to split it and obtain the riches it is supposed to conceal. Within, it has one large central room and two small side chambers, not connected by interior doors. Nine figures are carved into the front of the upper story. This temple to an unknown god is the finest of the Petra monuments.



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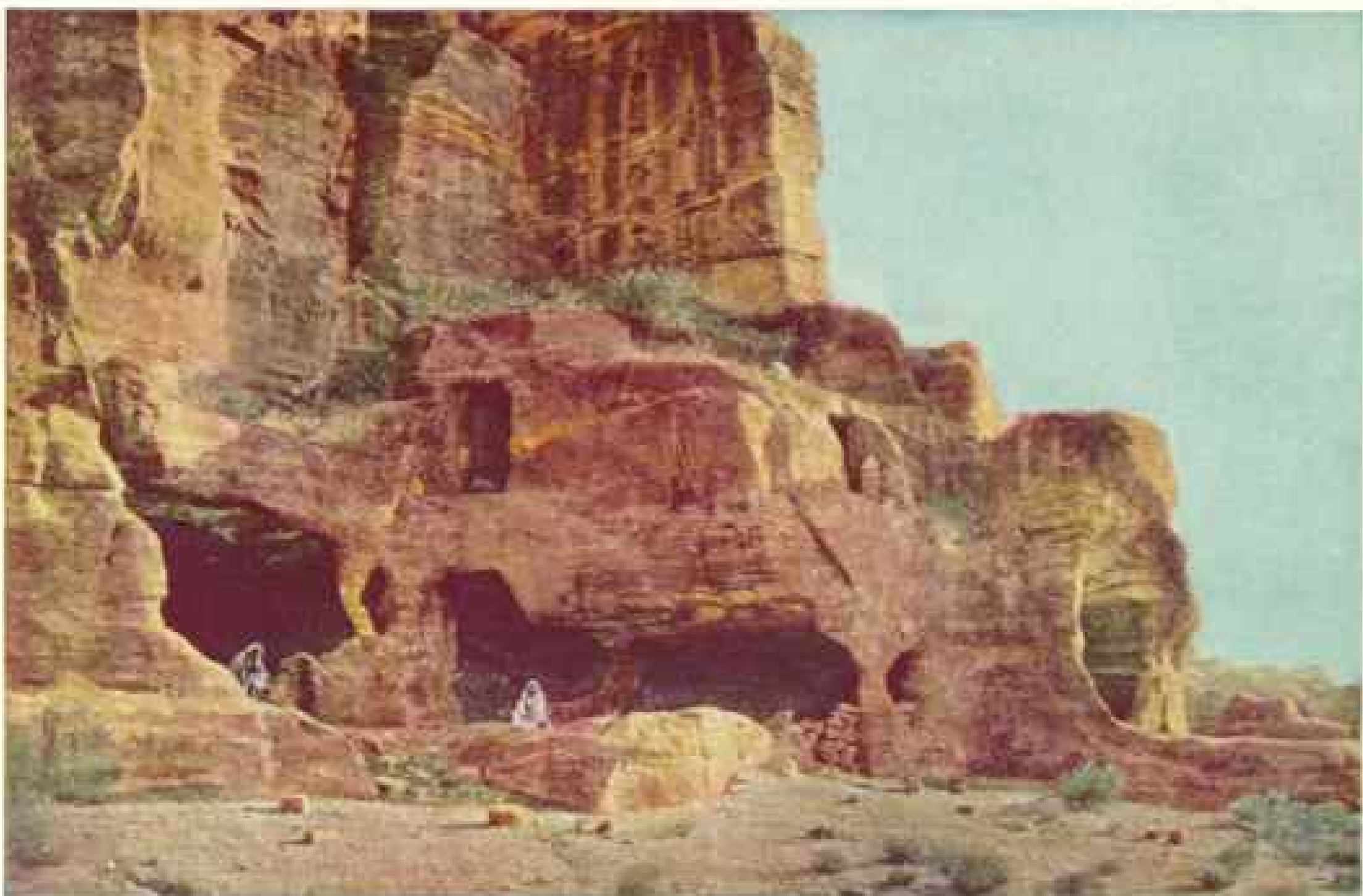
Finlay Photograph by G. E. Matson.

THE CLASSICAL "URN TEMPLE" MAY HAVE BEEN USED BY CHRISTIAN WORSHIPERS.

On an interior wall of this magnificent monument carved into the western façade of El Khubbha appears a Greek inscription mentioning a Christian bishop of about the year A. D. 447. It differs from other large edifices in Petra in that it is above the level of the city and has a masonry extension supported by two stories of arched vaults. A grand stairway, now a jumble of enormous building blocks, evidently led to the valley floor.



A WHOLE MOUNTAIN TOP HAS BEEN QUARRIED AWAY TO LEAVE TWO OBELISKS. What toil this summit of Zibb Atuf must have seen when Nabatean workmen hewed it! Beyond, to the extreme left, on a small rock hill, is the Great High Place of Sacrifice (see page 158).

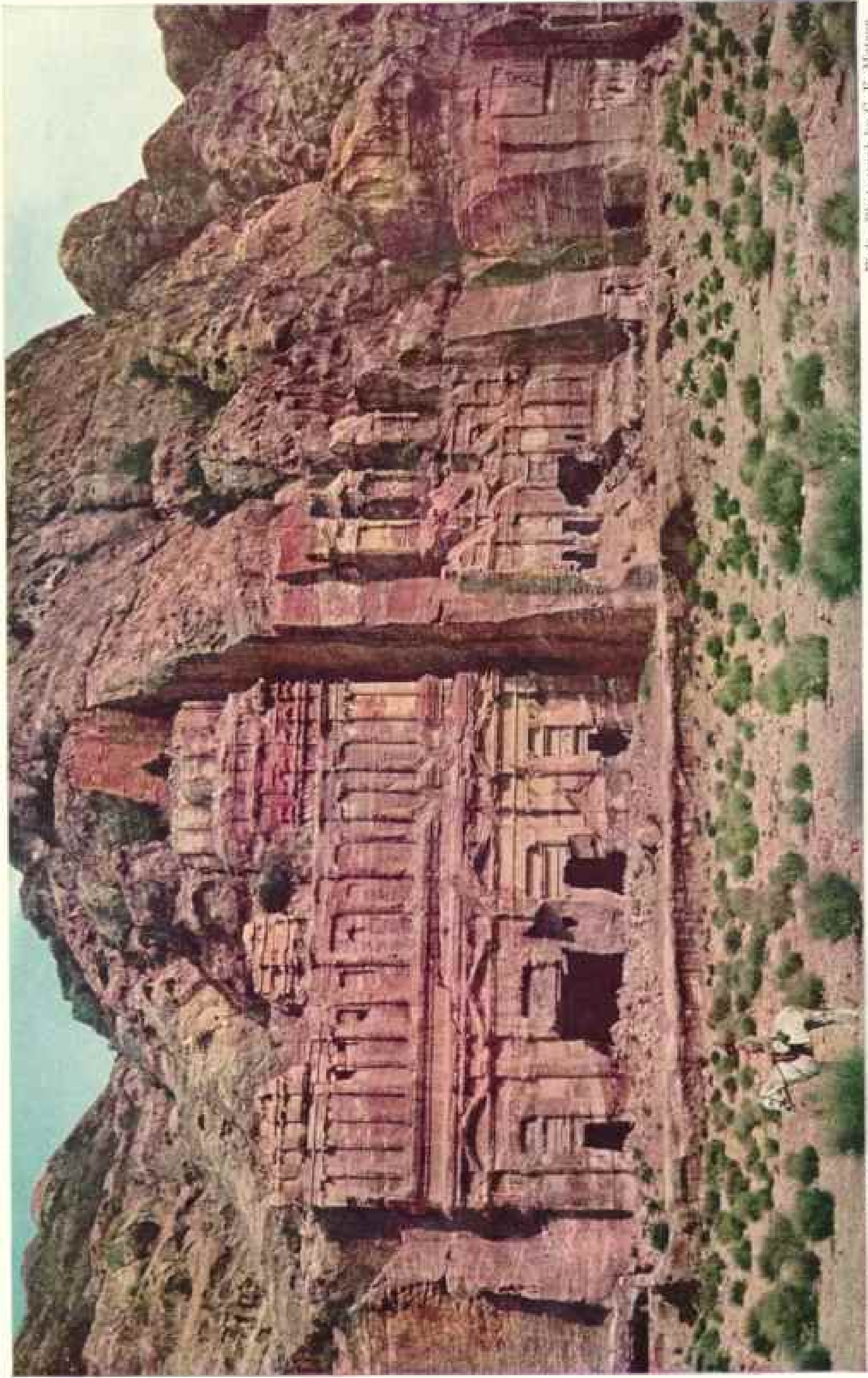


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Field Photographs by G. E. Matson

EROSION HAS SUPPLEMENTED THE NABATEANS' CLIFF CARVING

Winds and rains, frost and summer heat work fantastic designs in the highly colored rock veinings. Some of the openings on the lower slopes of El Khudha, opposite the amphitheater (page 147) are man-made tombs; others are the work of Nature.



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TWO MAGNIFICENT TOMBS ADORN THE WESTERN FACADE OF EL KHUDDHA

Largest monument in Petra (left), the Palace, so-called because it seemingly copies Roman architecture, had three stories, the top one of masonry, now fallen to ruin so that its original appearance is only conjecturable. The Corinthian (right) seems to have been made in the same style as the Khazna (page 151), though defacement by time and falling bowlders have rendered details of it difficult to identify.

Finlay Photograph by G. E. Matton



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VEINED ROCK OF MANY HUES GIVES THE EFFECT OF MOTTLED MARBLE

The vivid contrasts on the left are seen in the wall of a cave opposite the amphitheater. Cut into the Klindelia facade near the Corinthian tomb (see opposite page), the monument on the right shows variegated pastel shades of sandstone. Erosion has softened the carving, and the quality of light has much to do with the intensity and appearance of the colors, which range from white to deep purple.



Finlay Photographs by G. E. Matson



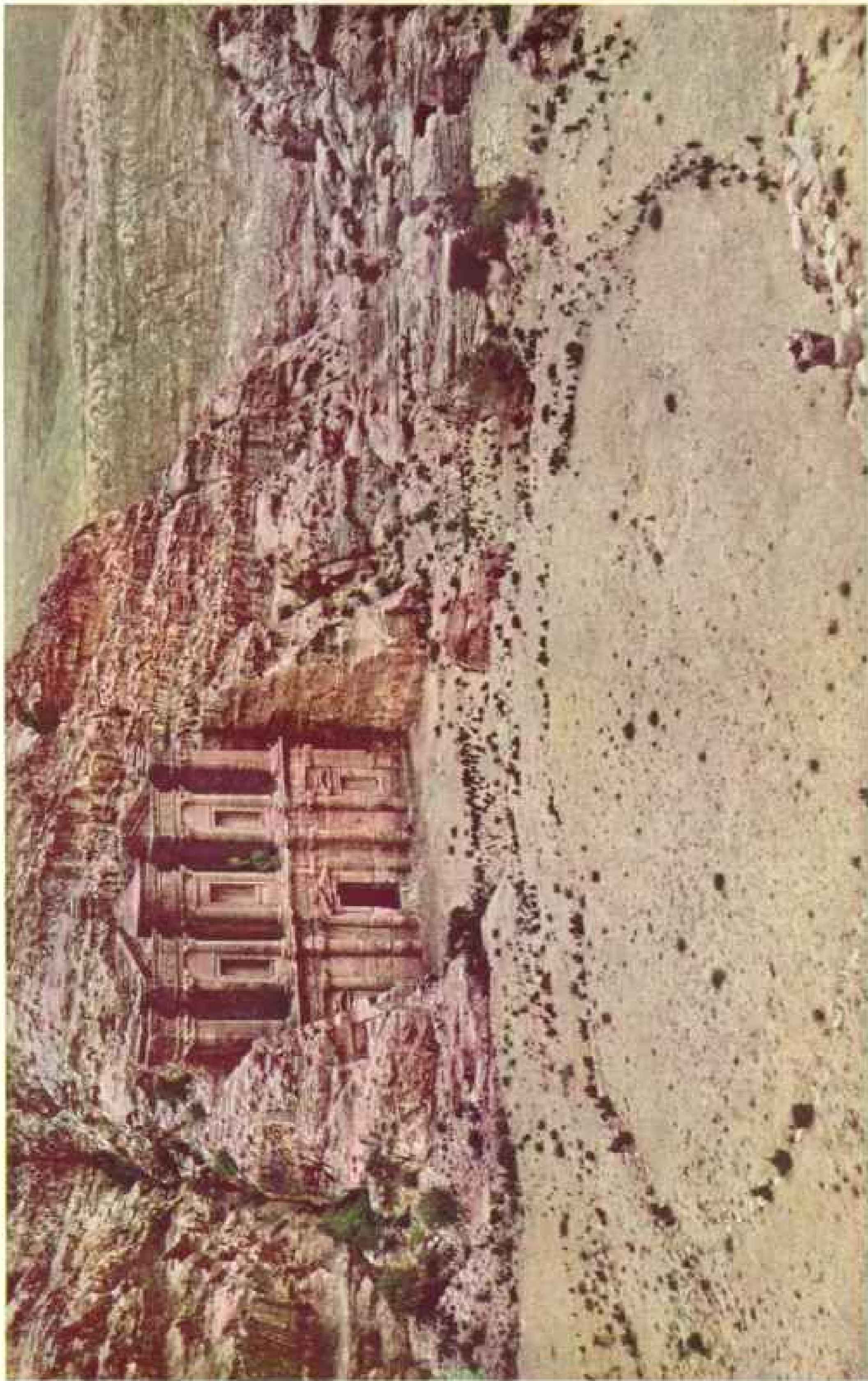
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FROM EVERY ANGLE EL KHAZNA PRESENTS NEW CHARMS
 Glimpsed from a little distance (left), it still dominates the wall into which it is carved, though actually it is only about a sixth the height of the cliff.
 The closer view (right) brings out the depths of its color, even to the purpling shadows under the portico (see page 151).



Finlay Photographs by G. E. Matson

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 The closer view (right) brings out the depths of its color, even to the purpling shadows under the portico (see page 151).

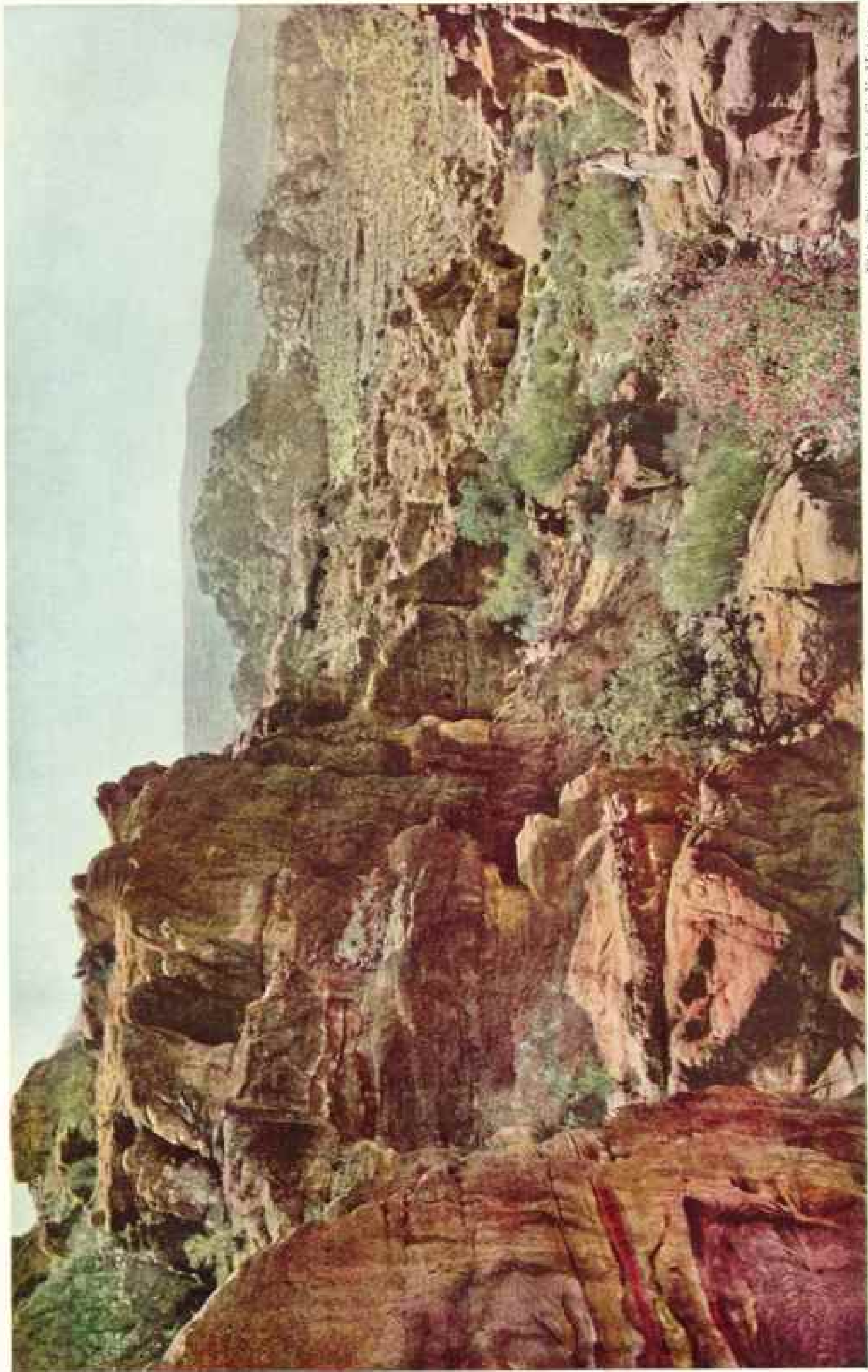


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MEN STRIPPED AWAY A MOUNTAIN FACE TO CREATE THE TEMPLE OF ED DIER

Here was no cliff such as that in which El Khazna was carved (see opposite page); the flat space in front marks the extent of the excavation that preceded the work of the edifice. Though of the same general architectural design as the other classical monuments, this one is severely plain. On the walls of its interior are two red-painted crosses, indicating that at some time it was used by Christians. Its name signifies "The Monastery." The man leaning against the threshold of the temple gives the scale.

Finlay Photograph by G. E. Matson

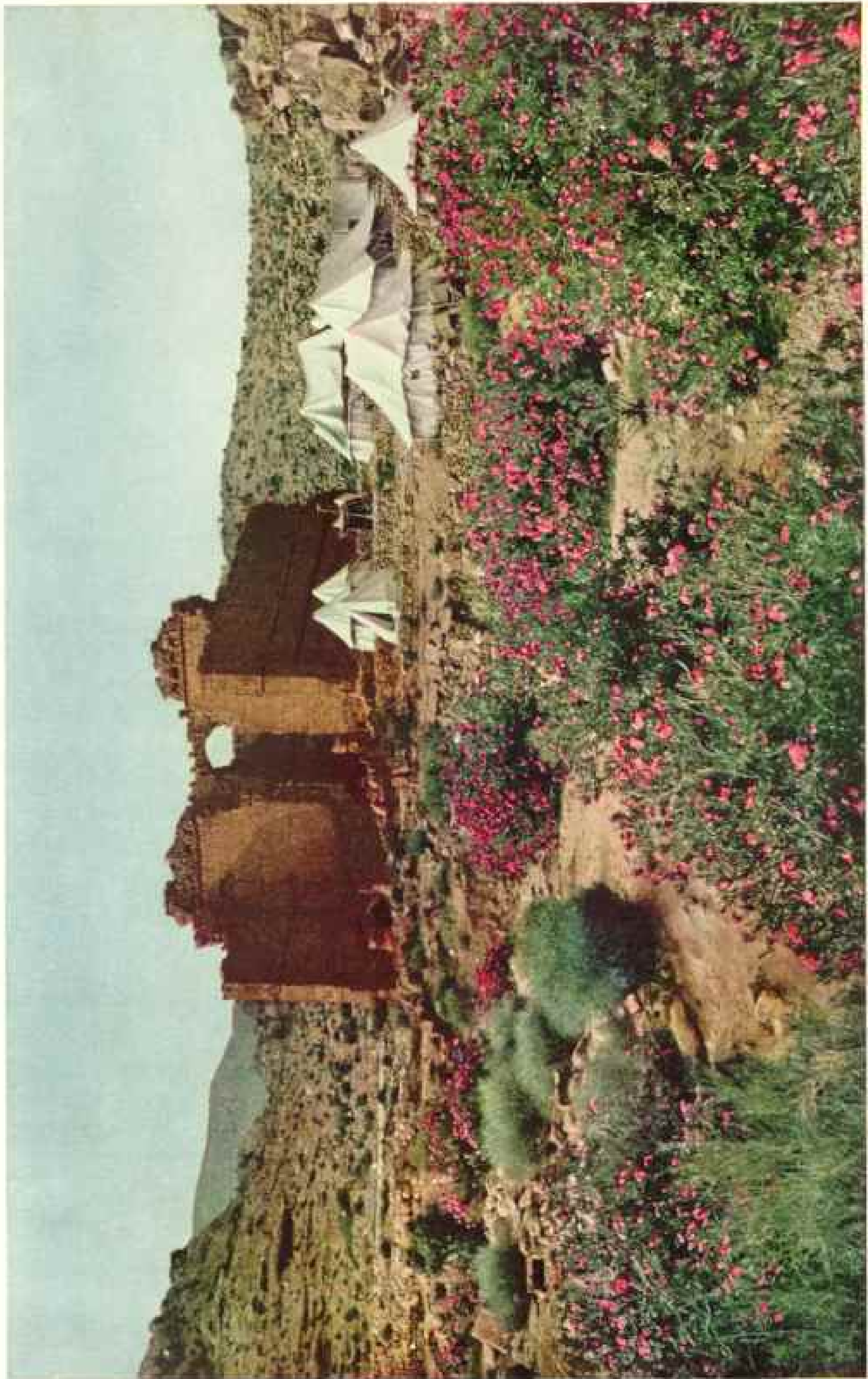


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Fielday Photograph by G. E. Matton

THE LOWER END OF WADI ED-DER AFFORDS A MAGNIFICENT VIEW OF PETRA

Looking southward, one sees in the distance the rugged hill that was the Great High Place of Sacrifice (center background) and obtains a conception of the ruggedness of the topography. With binoculars it is possible to pick out many of the tombs, though this vantage is remote from the main necropolis.



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AMID BLOOMING OLEANDERS BESIDE QASR EL BINT NESTLES THE CAMP

Before the World War only a few intrepid travelers had dared attempt to reach Petra, but today a visit to the ancient city of rock is made pleasant by good accommodations. The castle of Pharaoh's daughter near which the tents are pitched is the only structure in the city entirely of masonry.

Faraj Photograph by G. E. Matson



OF ALL PETRA MONUMENTS, ONLY ONE HAS A DECORATED INTERIOR

The outside of this small temple on the way to the Great High Place of Sacrifice has been eroded until it is impossible to detect whether its façade was ornate, but the varicolored engaged columns within are fluted and between them are niches, possibly for statues.



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Field Photographs by G. H. Matson

THIS CARAVAN STOREHOUSE RIVALS ALI BABAN'S CAVE

Marbled-like veining of many hues makes a fairyland of the large room, in the numerous compartments of which students agree ancient merchants were wont to deposit the bales of rich stuffs brought by camel train from Arabia.

tents. Silhouetted against the sky, a plowman drove his yoke of oxen as if intent upon plowing the rocky brink of a yawning abyss.

Before we knew it, we were flying through and up a large valley. At its head were terraced gardens and orchards, with El Kerak perched above. We circled the town several times, looking deep into its Crusader moat and seemingly flying level with the castle walls that had kept Crescent and Cross apart in many a long-fought siege.

Presently the ravine-cut terrain changed into vast expanses of desert plateau. We were flying over the Syrian Desert, the northernmost extremity of the Arabian Peninsula, now the British protectorate of Trans-Jordan.

This treeless desert was tan and yellow, with blue tints shading into black and broad ivory-colored wadi beds. We picked up the Pilgrim Railroad, laid from Damascus to the Prophet's shrine at Medina.* The desert rolled away to an interminable east; to the west a low range blocked the view of the Araba (see map, page 133).

This westerly range presently heightened and became covered with a scrub-oak thicket. We had been flying 5,000 feet or more above sea level; still, as we suddenly turned westward to cross this wooded range, we seemed just to escape scraping the gnarled tree-tops, so high is this plateau. With breath-taking surprise a view burst upon us, never to be forgotten, probably never to be outdone!

CHROMATIC PETRA FROM THE AIR

We were now above the jagged, dazzlingly colorful twin ranges between which Petra lies and of which it is a part (see text, page 135). Beyond, westward, stretched the deep expanse of the Araba, blue-tinted, remote, and forbidding. Here the sandstone held more of the yellow, tan, and ivory tints; but as we traveled south toward the Petra ruins, the colors changed to more vivid reds.

We flew between these ranges, gigantic piles of fascinating shapes and color. First to be recognized of Petra's monuments straight ahead was Qasr el Bint, the Roman masonry temple standing alone in the valley at the base of El Habis, the "Acropolis" hill (see text, pages 134 and 138).

About the same time the larger classical monuments in the façades of El Khubdha

flashed by on the left (p. 142). We crossed the western range and Ed Der seemed to look up at us. When climbing up to it from the valley bed, one seems to feel that the top of the range has been about reached. The air view changes this impression.

Through Wadi es Siyagh, amid wisps of clouds we flew, and emerged with a full view of the Araba. Following along this western range, we soon sighted its highest peak, Jebel Harun, dominating its southern extremity. We circled thrice at very close range the white dome of Aaron's tomb, as if imitating the Moslem *tawaf*, the pilgrim's ceremony of circling the Kaaba (see text, page 141).

SCANNING "INACCESSIBLE" PEAKS

As we swung back we passed over the Petra Valley again, the flat top of Umm el Biyara, Petra's most ancient stronghold, lying close to the left. We circled so low over the highest peaks that every detail could be noted (see illustrations, pages 130-1, 149, and 163). I now felt that my youthful aspirations and longings to climb every inaccessible peak to be sure that there were no new discoveries to make had been fully satisfied.

Flying over the Great High Place of Sacrifice, Captain Mahoney piloted the plane so low that the court, altars, and other details could be clearly pointed out. In circling, we repeatedly crossed and recrossed the Siq. We could see straight down into this most romantic of fissures, once the highway of desert caravans.

The day's ride had been fairly comfortable, but over Petra we experienced some severe bumps. Part of the time the wind blew so violently that it became dangerous to open the window to take pictures.

The novelty of flying over the Siq was to me possibly the most thrilling. One might see and geographically place any of the monuments by climbing to them, but of the depth and character of the Siq no adequate conception could be had except from the air.

I was enchanted and kept calling out, "Look down at the Siq! There is the Siq!" only to look back and find my two young nieces really *sick*. Since then they have never ceased to chide me about it.

As we flew from the High Place eastward, we could distinguish our horses and Bedouin escort at the police post at Elji waiting to take us to Petra. Down the mountain road rolled the car carrying our camp, well timed.

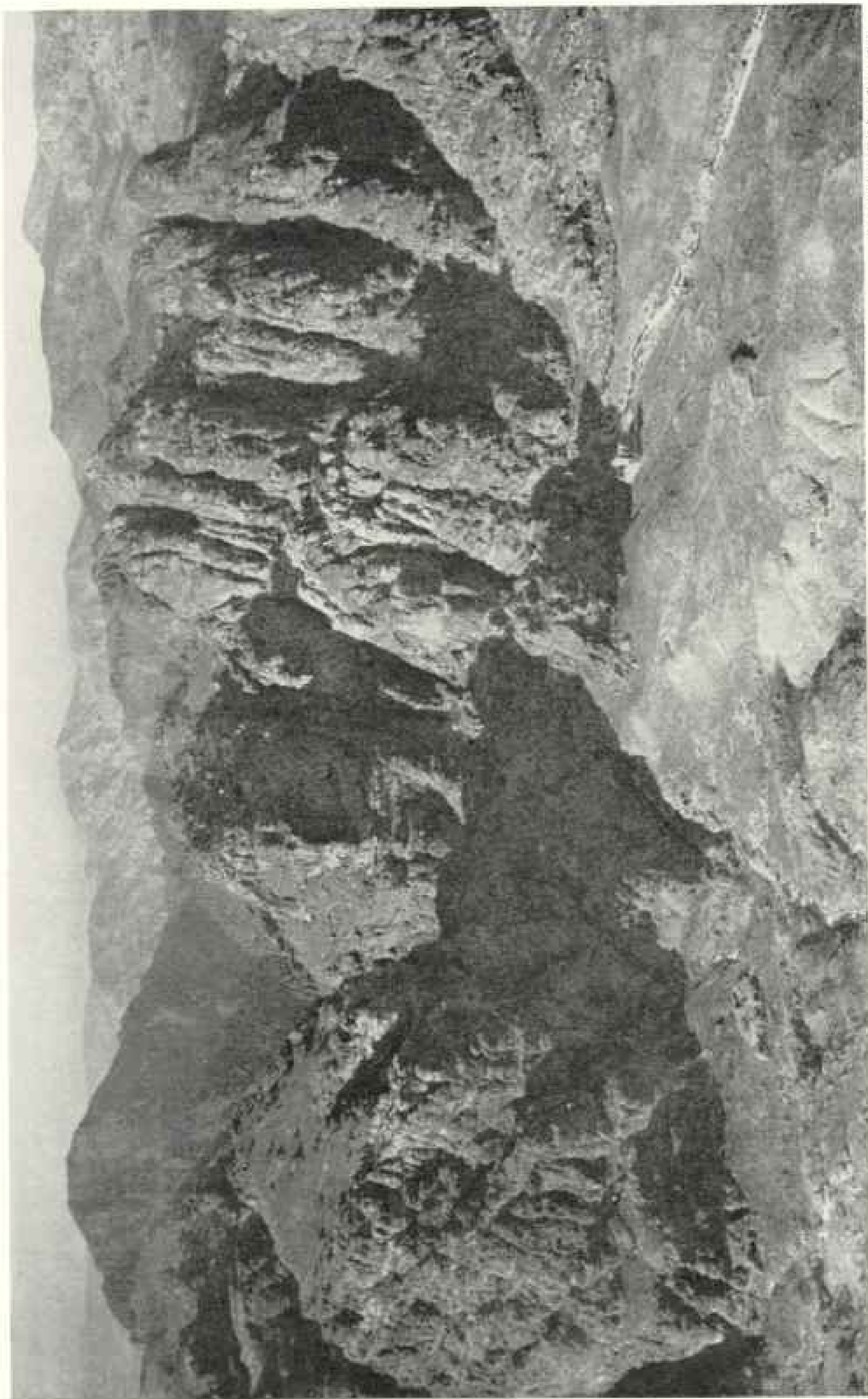
* See "Mecca to Damascus Railway," by F. R. Maunsell, in the NATIONAL GEOGRAPHIC MAGAZINE, February, 1909.



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WHAT A STUPENDOUS BACKGROUND FOR A SPECTACLE!

The Romans ruthlessly hewed away portions of the cliffs and the tombs they sheltered to make room for a vast theater (see illustration, page 147, and text, page 134). Some of the Nabatean sepulchers, their façades removed by the circus builders, are visible on the wall surrounding the tiers of seats.



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UMM EL BIYARA WAS IMPREGNABLE UNTIL THE AIRPLANES ARRIVED

The ancient Edomite and Nabatean stronghold was on the flat summit of the mountain on the left (see text, page 137, and illustrations, pages 130-1 and 149). The bird's-eye view shows how safe a retreat it was. The stream bed in the center is Wadi es Siyagh. In the right center El Habis appears—a tiny hill in front of the larger peaks. Almost in its shadow stand the ruins of Qasr el Bint (see illustration, page 159).

Presently landing on the Royal Air Force field at Ma'an, again we experienced British hospitality—tea and good cheer around an open fireplace.

Only once has Petra been entered by means other than the caravan. Wing Commander F. O. Soden, of the Royal Air Force at Jerusalem, then stationed in Amman (ancient Philadelphia), landed his own small plane in the valley of Petra near a caravan halt of the ancient metropolis. This feat, one that would defy any but such an intrepid pilot, will probably not be repeated soon.

In due course our waiting car carried us back to Elji, then the horses to Petra, after our luncheon at Ain Musa (Moses' Spring).

The day was now waning. Across the sky rolled great clouds, the softer light lending beauty and adding enchantment to the great red and buff cliffs, as we filed through the Siq and wound our way toward our cave camp in the Acropolis hill. It now started to drizzle.

We stopped at El Khazna. Its reflected color in the evening light beggars description. In passing we visited the theater and took a fleeting glance at the many interesting monuments, but the threatening sky hurried us on.

Scarcely had we reached our night's abode—rooms that had been carved into the bowels of this fortress rock two thousand and more years ago (page 135)—when the rain came down in torrents. Luckily, during the short twilight the sky cleared and we sauntered about the Acropolis hill.

SUNSET PLAYS A COLOR SYMPHONY

We were in no mood to examine architectural or historical details; rather, we revelled in the unique scenery, atmosphere, and quickly changing light and color effects.

Our camp was in a double-roomed chamber, possibly a triclinium, with door and window openings. In the outer one, where supposedly the ancients held religious feasts, we supped around a stone table; the inner one was to be the abode of the ladies. Our escort, with his mount and Bedouin guide, contented themselves with sharing a rock-hewn cavern below that was accessible to the horse, where they controlled the only rock-cut ascent to our camp.

As we dined and whiled away the early hours of the now black night, rain came down in sheets, and we could hear from our

lofty perch the rumbling of the wadi torrents. Without sharing my anxiety except with Deif-Allah (the Guest of God), I visualized the water so deep in the Siq that escape for a day or two might be impossible.

While I was musing thus, the policeman ran up to say that his mare had run away; and, taking a flashlight, he raced down the cliffs in pursuit. Deif-Allah smiled rather wickedly and went about his business of keeping a bonfire of oleander wood blazing without our chambers on a terrace but little protected from the elements.

A CALL FOR HELP!

Presently there came a long-echoed call for help. A little reticent, but in obedience to the single word of command, Deif-Allah plunged into the darkness, mumbling his disgust at police efficiency and training. The police officer returned drenched, reporting the Siq "flowing deep enough to carry away a camel," and his horse heading for home at Elji. He looked the picture of despair.

Presently Deif-Allah's song was heard above the roar of the streams resounding through the gorges. The policeman's downcast face lost its look of abject woe. His horse was caught; otherwise the Arab would not be singing. Soon the Bedouin was back poking the fire and shaking out the water from his black curls. One word and look told me that Petra's gate was inviolably closed; the stream had swollen beyond the possibility of escape.

During the night I awoke to find the sky clear and the valley bathed in the brightest moonlight. The waters of Wadi Musa coming through the Siq had abated; the other streams were still deep.

On arriving in camp, I caught our chauffeur, cook, and general handy man about to sacrifice a small white cock to the god of soup, but its life was spared, and canned soup, minus chicken, was served. As I went to bed in a small cave higher up, the little rooster lay with his legs tied tightly together, looking rather miserable. I tethered him by a yard of cord to my cot leg; he perched on a stone, and I dropped to sleep.

At the first streak of dawn the little fellow crowed incessantly, as if his heart was bursting with joy to see a new day. Still fatigued from the two days and nights of desert drive, the loading and unloading of the mules, and the arranging of the camp, the chauffeur emitted a stream of Arabic



© American Colony, Jerusalem

THIS MIGHTY GORGE IS A WAY OUT OF PETRA FOR WATER ONLY

Wadi es Siyagh, cut through stupendous sandstone mountains, is impassable to caravans. Nature made a safe means of ingress to the stone city by cutting the Siq (see illustration, page 145) through the massive range (see text, page 132).

curses at the rooster, ending with, "I bought you for soup, not a music box," wherewith he buried his head again in the pillow.

Never could Petra be more beautiful than it was that morning, bathed clean of desert dust, the multicolored sandstone soaked with rain that accentuated every shade and tint, the sky blue and cloudless.

The trip out by horse and mule brought back to my mind the old days of the long caravan journey from Jerusalem, when one saw less in a day but remembered more.

The tinkling of the pack-mule bells, the grumbling of the camels carrying water and fodder across desert stretches, the gay tents at evening after a long day in the saddle, the sometimes almost sumptuous dinners cooked by Arab chefs, and the very frugal meals when supplies gave out—all now are a joy of the past that lingers only in the remembrance of those who were not born too late to realize by experience what Petra, a gem in a caravan setting, meant to past ages.





Photograph from Keystone-Underwood

A FRENCH-CANADIAN MOTHER AND HER FIVE BABIES SHORTLY AFTER THEIR BIRTH

For several hours after the quintuplets arrived Mrs. Dionne suffered from extreme shock and the doctor was afraid she would not recover. Blankets were put in the oven to warm and then wrapped around the babies, who cried like kittens. An ordinary butcher's meat basket, obtained from one of the neighbors, served as bassinets. During the first 24 hours the quintuplets were fed nothing but a few drops of warm water from an eye-dropper. Then feedings were begun of a few drops of water, milk, and corn syrup with one-half drop of rum. They lay so close in the basket that it was necessary to count them off for fear that one would be lost and smothered under the covers. Efforts were made to obtain milk from the nursing mothers in the district, but the supply was small. However, on the fifth day, Dr. Alan Brown and Mr. Bower, through the Sick Children's Hospital, Toronto, offered to supply gratis the mother's milk, and they generously provided the growing daily needs until the babies were nearly five months old. This milk was collected from nursing mothers in Toronto by members of the Junior League of that city. It was sterilized, packed in dry ice, and delivered every morning by express. Soon gifts and equipment came from many places and the premature babies were each installed in a modern incubator.



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DR. A. R. DAFOE MAKES HIS DAILY CALL ON THE DIONNE QUINTUPLETS

Reporting on the arrival of the babies, the doctor said: "At 4 a. m. on May 28, 1934, a 'hurry call' came from the Dionne home. I was astonished to find two babies had already been born and a third was arriving. Two neighbors were acting as midwives and doing excellent work. I scrubbed up in the best way available and took over the situation. In the meantime another baby appeared in the world, and this was followed by still another. The attendants told me afterward that my eyes were bulging, and with the arrival of each baby my only word was 'Gosh!' with ascending inflection."

OLD FRANCE IN MODERN CANADA

By V. C. SCOTT O'CONNOR

Author of "Beyond the Grand Atlas," in the NATIONAL GEOGRAPHIC MAGAZINE

JACQUES CARTIER, pilot of St. Malo,* in Brittany, when he sailed away from the granite city of his forefathers to look for China, was but following the instincts of his race.

What matters it that he missed his mark by the width of the Pacific and most of North America, since he found Quebec and laid the foundations of France in the New World?

A small people of some 60,000 souls when Montcalm surrendered, cut off from their parent land and from their natural leaders by the stern arbitrage of war, the French Canadians have succeeded in retaining their cultural conditions, the faith in which they were born, and the language of their fathers, in the vast English-speaking world to which they were committed.

To-day that small and beaten community has grown to a self-respecting population more than three million strong, with a character and endeavor of its own, yet still inspired by that "light, sane joy of life" which is a major contribution of France to the civilization of the world.

Proud of their origins, and aware, almost to a man, each of his own descent, they remain Canadians above all and love nothing better on earth than their own vast Province of Quebec, whose boundaries extend over nearly 600,000 square miles, from Hudson Bay to Labrador and from New York State to Hudson Strait (see map, page 170).

LOYAL TO OLD WAYS AND CUSTOMS

At Quebec they have a splendid Parliament House of their own; and the historic Citadel, whose plans were approved by the Duke of Wellington, is now safely entrusted to their care. Lodged in the midst of a continent that is continually in pursuit of new ideas, they hasten slowly, careful of old customs, old loyalties, and old ways.

It is in the knowledge of these things, obtained in the course of three visits to their country, and more particularly of one in winter, when the French Canadians are most at home, that I write these lines; yet I should hesitate to do so—so small the space,

* See "St. Malo, Ancient City of Corsairs," by JUNIUS B. WOOD, in the NATIONAL GEOGRAPHIC MAGAZINE for August, 1929.

so big the subject—were it not that I came to know the lands of their origin well, at a time of life when the heart is open and the mind willing to enter into the spirit of another people.

It came about simply enough. My father, thinking only of a summer vacation—which ran on to eighteen months—took a charming old Breton house in the vicinity of St. Malo, almost within sight of Jacques Cartier's manor, where the explorer passed in quietude the last years of his life, almost unnoticed, yet content.

THE SHRINE OF CARTIER

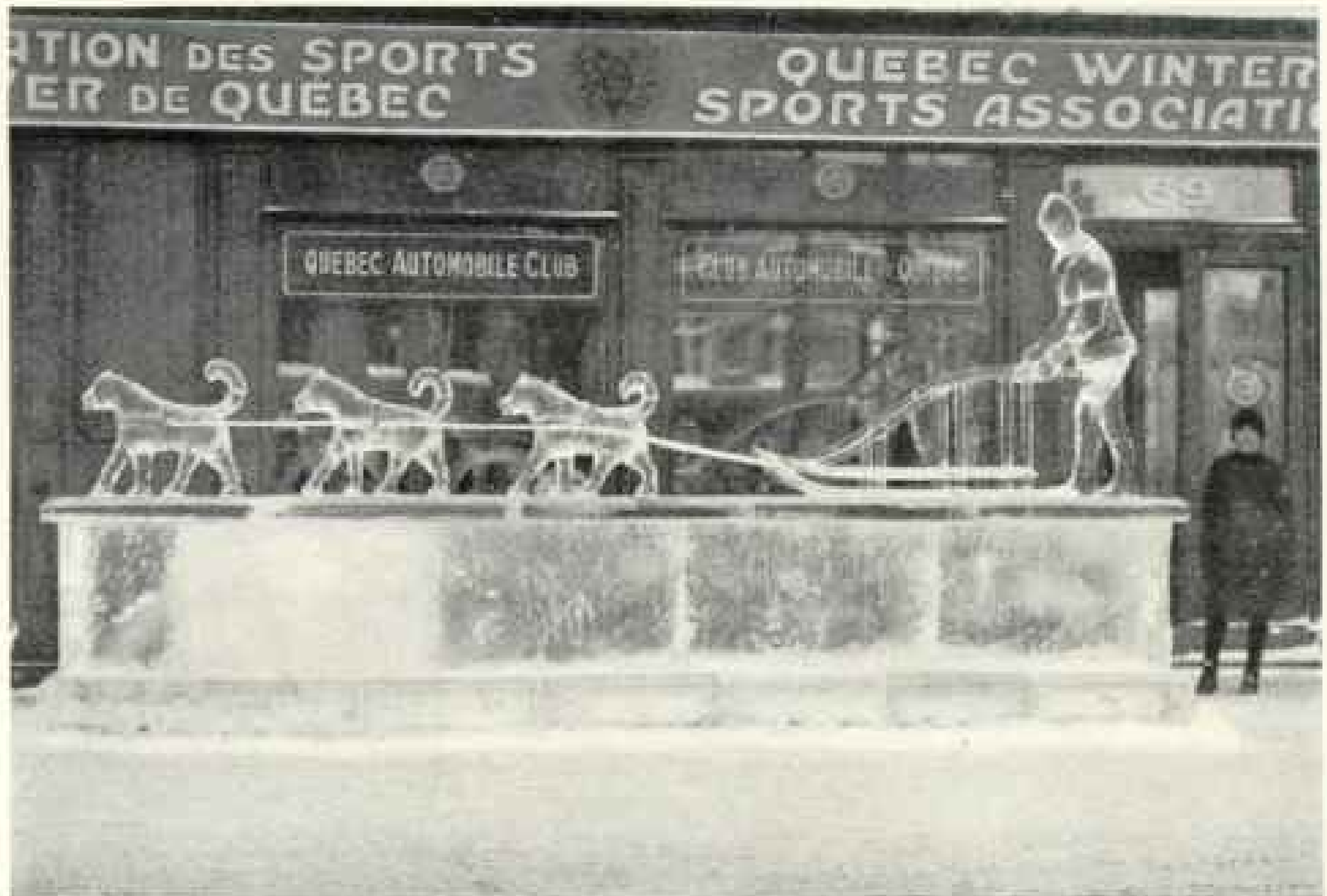
The River Rance, near by, which runs a short course to the sea, became almost as familiar to us as it must have been to him. He may well have been struck with certain similarities between it and the mighty river that gave him fame; for, like the St. Lawrence, it has a broad mouth, which converts it from an inland water into an arm of the sea, and, though quiet and peaceful in its upper reaches, it has a tide that sweeps in toward it with magnificent power. At its narrow end it has for its Quebec the romantic fortress of Dinan, scene of many a siege and battle.

At St. Malo, where it enters the sea, the Rance can boast of a proud old city. St. Malo's bishops were great princes, tenacious of their sovereign rights; its history is as stirring as that of Quebec itself, its annals showing centuries of conflict between France and England.

Its archives are as fascinating and as scrupulously cared for as are those of Quebec; and its rich and splendid old Cathedral remains to this day the embodiment of its national life.

Upon its stone floor, on a spot now marked by the piety of the French-Canadian people, Jacques Cartier knelt to obtain a benediction before he sailed away again upon his great adventure in 1535.

Its Museum contains the only surviving fragments of his ship, the *Petite Hermine*, found in the bed of the River St. Charles three centuries after his death; and in the records of the city there still is a list containing the names of those who are believed to have sailed with him to Canada.



Photograph from V. C. Scott O'Connor

A MUSHER AND HIS HUSKIES ARE CARVED IN ICE

Because the people of Quebec are divided into two racial groups, French and English, merchants say the same thing twice, that their message may be understood by all. Even many radio programs are broadcast in two languages.

St. Malo's people more nearly resemble those of his time than do the French Canadians themselves; yet, in many ways, in Old World customs and usages and in their piety, the Malouins are near kin to the *habitant** of to-day.

In the early days of spring I saw the fishing fleets gather for their annual voyage across the Atlantic to the Grand Banks, last remnant of their once spacious rights in the New World. All sailing craft they were except one, which carried the chaplain, an altar for divine service, and hospital supplies.

All the wives and all the sweethearts, and most of the old folk and many of the children were there, to wish them God-speed on a voyage from which there were always some who never returned. High hopes there were, but also tears. You could hear the click-clack of their wooden shoes on the cobbled street, as the men went to register at the old Ministry of Marine, with its

* Early French settlers in Canada disliked being called peasants and took the word "*habitant*," meaning inhabitant or dweller, from their own language. Today the appellation is used for their farming descendants, in both Canada and Louisiana.

memories of Louis XIV and the Corsair days, when many a Malouin sea-wolf harried the English Channel.

Our own man, old Eugène Bezard, who always claimed that he was the best man at sea along the Malouin coast, and Marie-Rose, his wife, lost two of their lads on that Grand Banks voyage; and she never spoke of it without putting her apron to her eyes.

Then, in the old Cathedral that had looked upon their joys and sorrows for generations, they would all kneel down, as sailors will—one knee to the ground, head bent, and cap in hand—to obtain the Bishop's blessing.

Full of Celtic dreams and fancies they were, especially on All Souls' Night, when we could never induce a servant to go into the lanes at dark; for the souls of the departed were then abroad.

OLD-WORLD RIVALS IN THE NEW

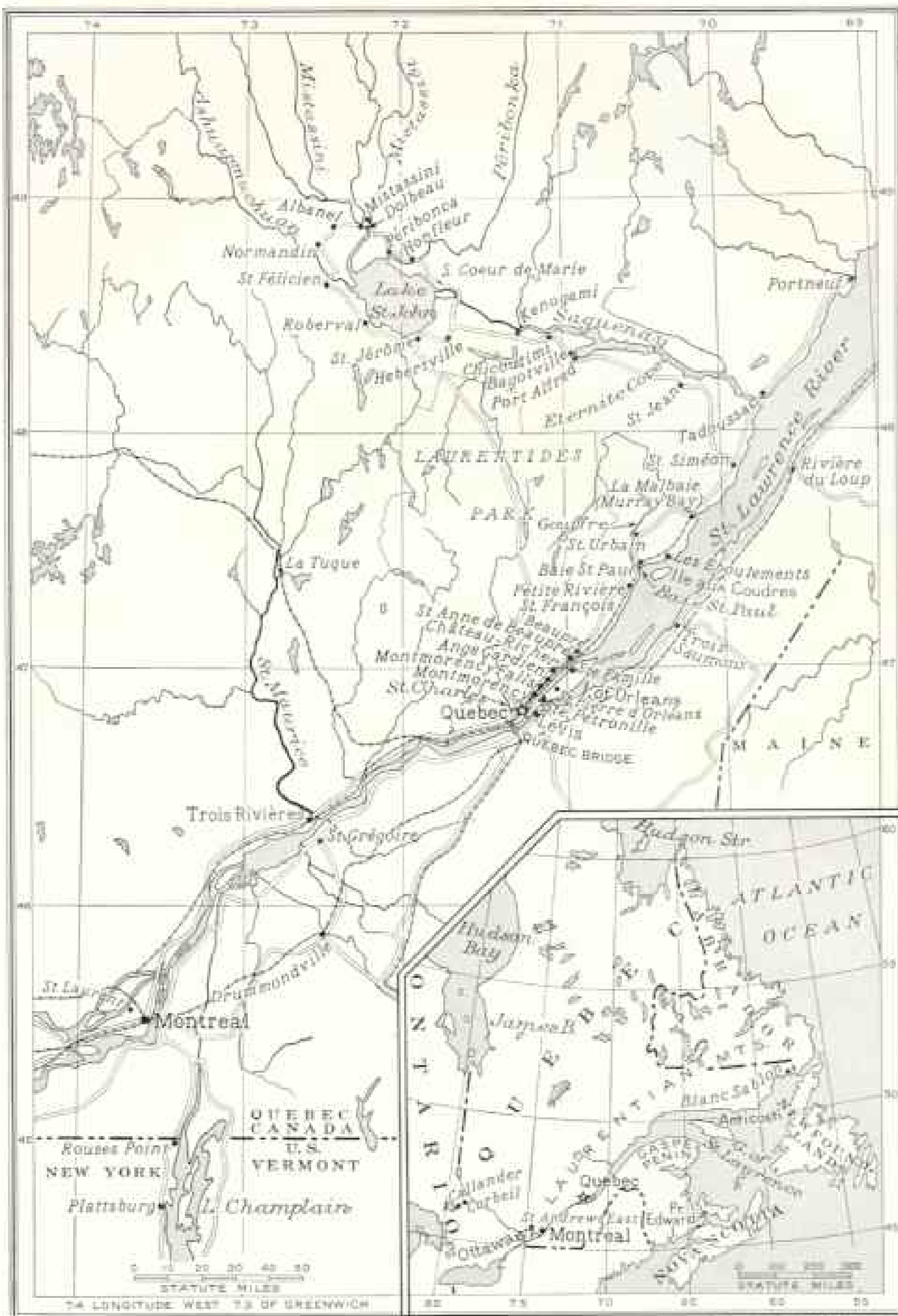
These and other experiences across the border in rival Normandy, whose people, with the Bretons, are of the warp and woof of the French-Canadian race, came thronging into my mind as I sailed up the



Photograph from V. C. Scott O'Connor

IT'S FUN CLIMBING UP FOR THE THRILL OF RUSHING DOWN

Toboggans rattle at terrific speed down these slippery snow slides of Citadel Hill and level off on broad Dufferin Terrace, social rendezvous of the city. At night the overhead arches glow with electric lights. Quebec is rapidly becoming a North American St. Moritz, so popular are its winter sports carnivals.



Drawn by A. E. Holbrook

HERE CARTIER'S FOLLOWERS PLANTED NEW FRANCE IN CANADA

Seafaring folk, they have built sturdy habitations along that broad artery, the St. Lawrence, where the throb of the Atlantic reaches them in the rise and fall of tides and fish are plentiful; where majestic liners bring the world to busy ports of Quebec and Montreal, and tributaries bear logs from inland forests to paper mills. The inset shows the whole of Quebec Province, an area more than twice as large as Texas.



© Canadian Airways Limited, Montreal

CHÂTEAU FRONTENAC REFLECTS THE TURRETS AND TOWERS OF OLD FRANCE

The famous hotel rises near the site of a castle built by Samuel de Champlain, "Father of New France," and overlooks the broad St. Lawrence, flowing 200 feet below. Beyond it Quebec's famous walled Citadel crowns the promontory of Cape Diamond, often called the "Gibraltar of North America."

St. Lawrence to pass my winter in French Canada.

The leaves were falling and the snow which drew me had not yet come when I reached Quebec and set off for Lake St. John.

There the old French life, invincible in its toil, is repeating itself; building its altars and cathedrals, its cottages and schools, and breaking the stubborn soil to the plow. There, while great businesses may fail and rich men become poor men, the habitant, like the peasant of France, holds on, unbroken and undismayed—the backbone of a Province.

It was this life, its ideals and sacrifices, and its mystical grip on the French soul, which found its outlet in Louis Hémon's famous story, "Maria Chapdelaine." At Péribonca, where he toiled, may still be

seen the humble cubicle in which he slept as Samuel Bédard's hired man; and the traveler may learn for yet a season from those who knew him how quiet and modest he was; and, though unskilled, how faithful in service.

From Péribonca I skirted the northern shores of the lake, where the Mistassibi and the Mistassini come down in sprawling streams, bogging the water-logged soil and impeding the circuit of the newly laid road.

I took my way by Dolbeau and Albanel and Normandin, names that commemorate some of the early French explorers. There was Albanel, a missionary who reached the shores of Hudson Bay by way of the Saguenay in 1671-2, accomplishing a journey of 2,400 miles on foot and by canoe and crossing 200 waterfalls and 400 rapids in the course of 60 days.



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WORKMEN COMPLETE THE DAFOE HOSPITAL FOR THE DIONNE QUINTUPLETS

The five tiny daughters of Mrs. Dionne now live in this new home, built to insure the welfare of the children. They cost about \$500 a month to keep, now that they no longer need mother's milk, and most of this money is supplied by the Canadian Government and the Toronto Red Cross.



© NEA Service, Inc., from Acme

EVERY DAY IS WASH DAY FOR THE DIONNES!

In this humble home near Callander, Ontario, were born to 25-year-old Mrs. Dionne the famous quintuplet babies. The family already had six children. These people are descendants of the original Quebec settlers, who came to Canada from Normandy more than 300 years ago.



© NEA Service, Inc., from Acme

WHICH IS WHICH—CÉCILE, YVONNE, MARIE, ÉMELIE, OR ANNETTE?

"The identical babies looked alike at birth and have gradually become more and more alike," said Dr. Dafoe recently. "When they are lying in a row, it requires concentration to tell them apart. Their eyes are changing into a dark brown and their hair is a light shade of brown. In order to prevent any mistakes in identification, footprints of all the babies were taken and filed away." Their combined weight the second day (May 29) was thirteen pounds, 6 ounces; at one time it was less than ten pounds. In December, 1934, they averaged over ten pounds each.

Normandin, a skilled surveyor, was commissioned by the King of France in 1733 to explore the entire region of Lake St. John, its waterways, its rivers, and its lakes, to the watershed that divides it from Hudson Bay (see map, page 170).

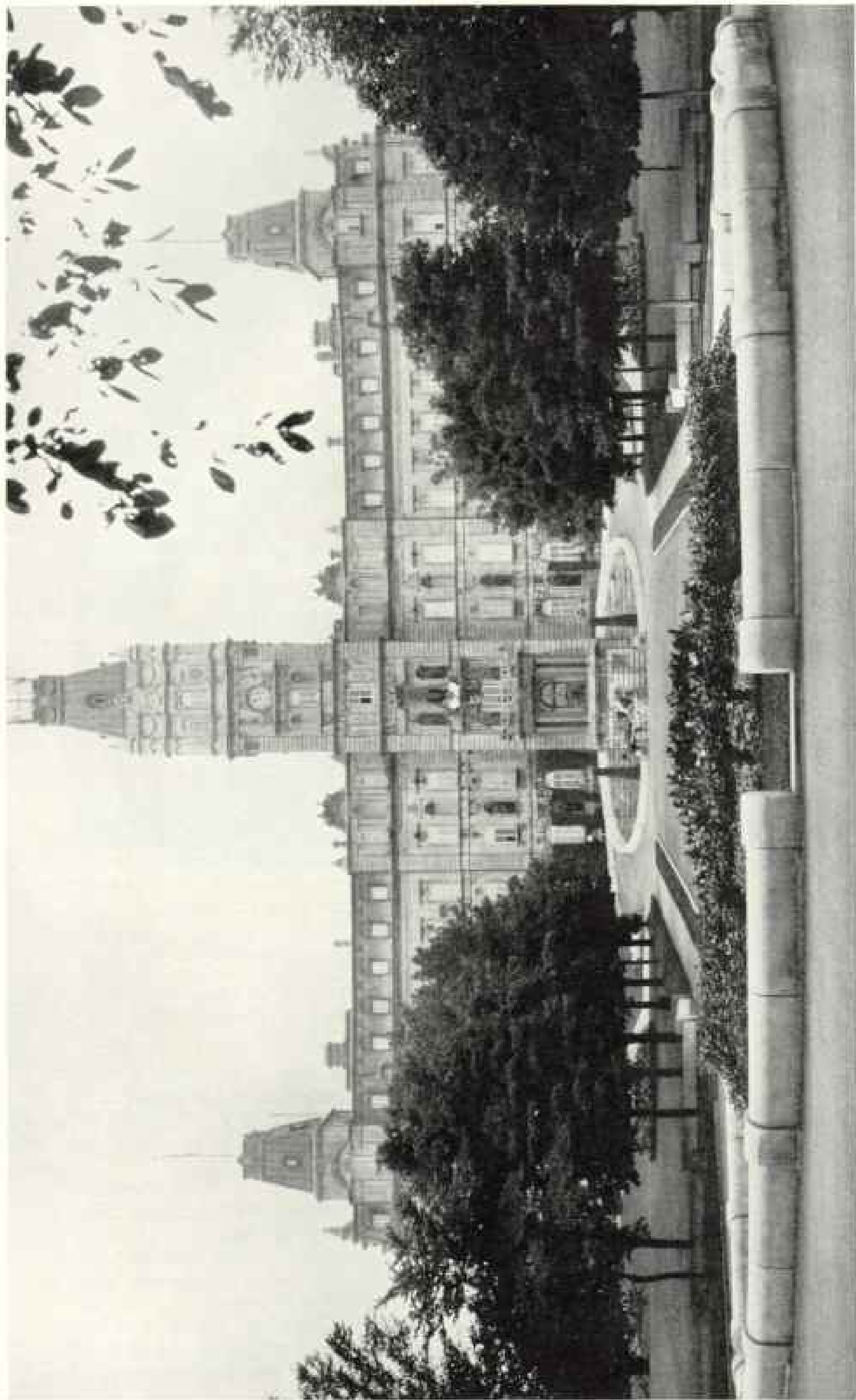
He brought back with him a chart and a journal in which the King might read every incident of his explorations. Long after he was dead, the trees of the forest to which he had affixed the Lilies of France continued to bear testimony to his labors.

My small car fought its way over the clogging surface of the unfinished road.

Cold and wet it was. The telegraph wire, which makes lonely places seem lonelier still, hummed in the solitary spaces between the sparse houses, as the car splashed and skidded on its way.

My mind went back to those who came to Canada to set up their tabernacle there when Louis XIV was King.

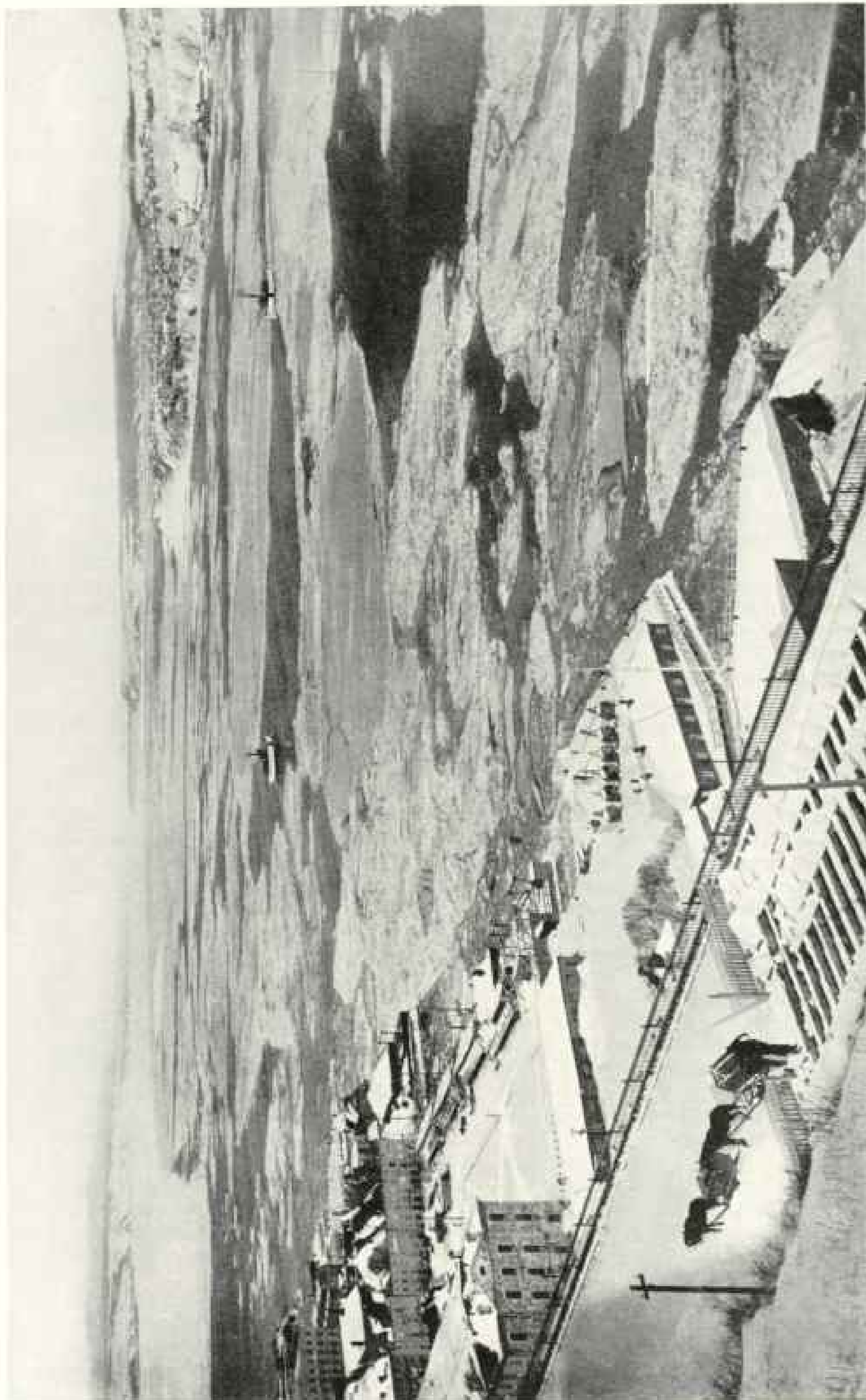
There, buried in the dark morasses, but exposed now by the makers of the road, were blocks of old ice that had resisted many a blazing summer, and vast glacial boulders, survivors from the Ice Age. In the midst of this half-desolation was a community of



Photograph by Publicity Photo Service

A. HUGE IRON CROWN SURMOUNTS THE CENTRAL TOWER OF THE PROVINCIAL PARLIAMENTARY BUILDINGS IN QUEBEC

A *calèche*, two-wheeled relic of old times and always popular with visitors, seems tiny as it waits before the edifice. Canada's early history was made by such sturdy heroes as Wolfe, Montcalm, Bibeau, Lévis, Frontenac, Marquette, and others whose statues stand in niches adorning the imposing façade. Legislative chambers and some departmental offices are housed within its walls, which form a quadrangle amid tree-studded grounds.



Photograph from V. C. Scott O'Connor

TWIN FERRIES CRUNCH THEIR WAY THROUGH TIDE-CHURNED ICE OF THE ST. LAWRENCE BETWEEN QUEBEC AND LÉVIS

The terrific force of the river's tides may best be appreciated on a winter's day. Huge sheets and pans of ice are driven headlong toward sea by ebb waters, and hurled back again by flood. When the frozen mass resists, powerful icebreakers come up from below Quebec to keep the channel open (see text, pages 176, 200). On a clear day the scene is one of Arctic grandeur. Even the carts for hauling snowdrifts from the streets are mounted on runners (left foreground).

Trappists building a house of stone and laying out the virgin soil with fruit trees and orchards, with the ancestral skill and devotion of their race.

Winter had come when I returned to Quebec, and the whole world lay white under its mantle of snow. A magic hand had transformed it all. Across the water lay Lévis, snug in its crystalline whiteness, and the mighty river was laden with sheets of ice that spread like waterlilies upon its surface.

But, as the day grew and the sun shone, a vast movement set in. The ice floes broke from their captivity and made off like slow-moving amphibians to sea. The ferry from Ste. Pétronille came fighting its way upstream, and as it drew near, the twin ferries that ply between Quebec and Lévis advanced to meet each other across the undivided stream (see page 175).

The tide was making—the mighty tide of the St. Lawrence—and a million tons of ice that had set off, moved by a primal instinct, on their voyage to the Atlantic found themselves compelled to return to their starting place. Far as I could see, their lethargic masses lay piled and tossed on each other in confusion. The scene was of an elemental, almost a cosmic, beauty, grander than any the parent land had shown me.

From Quebec I took a journey along the North Shore, rich with historic memories. The parlor car in which I sat disclosed continual pictures of a serene but ice-bound world; the Montmorency Falls, where Wolfe came so near disaster, now were silent; and Ste. Anne de Beaupré was like some miracle-working shrine of Normandy or Brittany, with Christ and His Apostles and His sorrowing Mother bowed down in the engulfing snow (see page 187).

Beside me, preoccupied with weighty affairs, sat the Cardinal of Quebec, a man of the people, but a Prince of the Church. His secretary, in white robes and a black cowl, took note of every word he said. His predecessor had received me during a previous summer, seated upon his throne of crimson damask, in the Episcopal Palace at Quebec; an old man, quiet and gentle, whose life had been spent between the little house in which he was born, at Lévis, and the proud city of Quebec, across the water.

Both were in unbroken succession from their great predecessor, Bishop Laval, who came to Canada with the King's sanction in 1659. He was a man imperious of temper,

yet saintly and devoted, whom nothing and no one, not even death, dismayed. He left Quebec upon his first pastoral journey on January 23, 1660, and on February 7 of that year confirmed nearly 170 persons at Château Richer. One of them was Louis Joliet, whose name is forever associated with the exploration of the Mississippi.

In the village of Ange Gardien, General Wolfe lay ill at the darkest hour of his life, in a small habitant home that still exists in the family of those who then possessed it. Its old folk, when I found it half buried in the snow, invited me in, and with a dramatic gesture pointed to the attic in which "the English colonel" lay, "with his head, *vous voyez, M'sieu*, under that window, and his feet over *there!*"

They forget nothing.

In their kitchen-parlor they laid before me a mass of family papers that carried back to early times. They showed me the illuminated testimonial, full of tenderness and respect, presented to them on the occasion of their golden wedding by their now numerous descendants; for it is the pious custom in this country to honor the old folk and pay them deference.

The principal member of the family, a distinguished lawyer in Quebec, had drawn up and had printed a history of the family, tracing its descent back to the little corner of France from which it came.

The snow, as I continued upon my way, lay white and sunlit on the close-cropped fields, and little brooks emerging from the foothills found their way in narrow ribbons to the St. Lawrence.

Summer and autumn were over and winter was now firmly established over the land.

A FRENCH-CANADIAN VILLAGE

I was met at Petite Rivière St. François by the owner of a small hotel, who took me up the village street in his sleigh. His house was full of children, one for each year. The eldest was a trim girl of sixteen who waited at table; the youngest, a baby a fortnight old. Their grandmother, quiet and authoritative, presided. They took me with them to their church on Sunday morning, where the old-time ceremonies pursued their appointed course. An intense devotion seemed to fill their hearts.

As soon as the service was over, those who had come in from the country went off to the village store for their provisions, the pretty daughter of the man who owns it,



HERE LINGER MEMORIES OF FEUDAL GRANTS FROM FRENCH KINGS

At Les Eboulements, on a spur of the Laurentian Mountains, is the rambling seigneurial manor of M. De Sales La Terrière. The author was entertained in this historic home and the owner showed him priceless family heirlooms and portraits and the chapel (see text, page 194).



Photographs from V. C. Scott O'Connor

THE CANADIAN MAPLE LEAF IS A FAVORITE DESIGN FOR QUEBEC HOOKED RUGS

This housewife of Ste. Anne de Beaupré displays her handiwork on the front steps of her home. She probably carded and spun the wool herself, then dipped the yarn into boiling pots of brilliant dyes, and sketched the outline of the rug on burlap. Hooking is a tedious process, and a whole family will labor for weeks on a single large rug. Sometimes the rugs are made from strips of rag.



Photograph by Bert Chesterfield

THE SPELL OF OLD FRANCE HANGS OVER STE. FAMILLE

Shells from British guns damaged the old church in 1759, but later it was used as a hospital for both French and English wounded. The five statues (lower left) will be restored to their niches in the façade when workmen have finished cleaning.

dressed in her silk and furs, attending to their wants. Large families of boys and girls ran in and out; and then away went the sleighs, their bells ringing, the horses tossing their heads. An old couple who had prospered in life sat back at their ease, their furs drawn up to their ears; their son stood erect in the sleigh, holding the reins in his hands, outstretched like some charioteer of olden days.

I had come to visit an old acquaintance who was Curé at the Ile aux Coudres when I visited his island one summer. But a change had now come over his fortunes. His health had failed him and he had given up his charge. Yet he remained a man of

ideas. He had built himself a neat little house with a sun parlor facing the river and the street. Behind it, where his Christmas-tree forest comes down from some of the oldest land in the world, he had erected a shrine, so that when he lies abed in winter he can see the white figure of Christ and the flowers he has placed there behind its glass door. A red lamp burns in this oratory at night and consoles him, he said, in his wakeful hours.

SHIPS LIE ICE-BOUND IN HARBOR

Though his thoughts were turning to the hereafter, his family instincts still gripped his heart. A picture of a genealogical tree overlooking the St. Lawrence, painted by his own hand, showed his father and mother on the trunk, and their numerous family nestling in the boughs.

"It gives me comfort," he said, "to look at it when I sit alone at meals."

I left him to walk down to the harbor, where the ships of the village lay ice-bound. As I walked, the big church and the little houses and the trees of the forest gleamed in the white snow and the windless air, and the artless life of a French-Canadian village was displayed before my eyes.

The village lies like a ribbon between the river and the hills, and twice a day the trains go thundering past it, the voice of their tumult loud above its quiet life.

Beyond the railway track is a no-man's land of white hummocks of ice that reaches to the St. Lawrence, a mysterious creature moving in its white prison of snow and ice.

The sun was setting as I looked across it, and the river which showed a streak of blue

at noon had now become a flood of gold. The South Shore rose clear across its waters; there was no sound or cry of any bird. Half dormant and half alive, the St. Lawrence moved upon its way.

A man drove by in his sleigh; a baker's boy stayed to deliver his long white loaves of bread. Silver foxes basked in the last rays of sunlight on the snowy roofs of their kennels; creatures of the wild, though bred in captivity (page 189).

This was a little world at which I was looking; far from Europe, far from English-speaking Canada; content with its own life and its own memories of the past.

It was the Fête of the Little Jesus, when the Curé goes from door to door to collect the offerings of his faithful. All await his coming, and as he enters they go down upon their knees to receive his benediction. They give him their annual alms for the Cardinal's fund for orphans in Quebec.

The night was bright with stars as I left his house. The village street lay white under its coverlet of snow. Lights shone from the windows of the little houses, revealing here a barn, a wood shack, or an oven; there a *balancine*, in which in summertime the lads and lasses swing together.

Red lanterns burned under the tall dark forest to guide those abroad upon the waters. Far across the St. Lawrence from its southern shore, more than ten miles away, a light-house sent its message in response.

Entering the now empty church, I heard a solitary clock ticking in the stillness; I felt the hot air coming up from the furnace in the crypt below, and on the walls I saw



Photograph by Norman Edson

NINETY-EIGHT YEARS OLD—AND CHURCH FOUR MILES AWAY

A French-Canadian habitant sets out with snowshoes, near Montreal, wearing his gray wool cap, moccasin boots, and prized sash of hard-twisted wool, dyed in rich colors (see illustration, page 190). He is the patriarch of a large family, all of whom, including great-grandchildren, live in an old stone house.

before me, under a bright light, a picture of the Jesuit martyrs of Canada, whose heroic exploits, recounted in letters of extreme fidelity, have become part of the common possession of mankind.

THE TRAVERSE OF A FROZEN RIVER

There are islands in the St. Lawrence that are easily accessible in summer, but in winter only across the ice and water. My purpose is to cross from the Baie St. Paul, which the people say "conceals in its entrails all the tempests of the world," to the Ile aux Coudres, and I am waiting for the post-boat to come in and take me over.



Photograph from V. C. Scott O'Connor

OUTDOOR OVENS STILL BAKE SOME OF QUEBEC'S BREAD

The fire is raked out of the oven when it is sufficiently hot, then food is placed on a spiked tray and shoved in to cook. Small children of the family often curl up to sleep in the warmth beside these primitive stoves.

The morning is clear and bright, and I am still at breakfast when Dr. Tremblay, the genial "Ole Docteur Fisset" of Baie St. Paul, rushes in to summon me.

"Be quick," he says, "the post-boat has arrived; a sleigh is at the post office collecting the mails and it will be here in a minute." And barely has he finished when the sleigh comes dashing up, packed high with mail bags, and with one passenger.

"Louis Tremblay," says he, introducing himself, "same as St. Louis!"

And so away we go, our bells ringing, the narrow road skirting the forest-clad hills till it reaches the bay.

Below us, keeping company, is the river of Baie St. Paul (the Gouffre), now frozen hard.

When the road climbs we walk; when it drops we ride, the big horse galloping, the sleigh bumping over the heavy snow. The day is sunlit, but piercingly cold. My glasses are covered with ice, and as the valley widens I look across the icy spaces of the St. Lawrence, in a welter of disorder, to the green and silver outlines of the little Ile aux Coudres.

A trapper goes sullenly by with a snow-white hare he has caught in a gin. Under the black cliff is the coastal railway line, more lonely than the lonely world through which it runs.

We descend to the harbor, where the *piroque* lies waiting, flat-bottomed, copper-sheathed, stoutly built, and 20 feet long. The mail bags are flung in, Tremblay takes the tiller, and the crew of four stalwarts get to work, islanders all. The boat creeps slowly along the high stone wall of the pier, now glittering under a layer of polished ice, from which pole and oar glance swiftly, finding no place to rest.

We strike across the bay, the solid accumulated ice resisting our passage. At times we break through it; at others the boat is hauled over sheets of ice, smooth as a skating rink and decked like a garden with snow flowers.

Behind us and now slowly passing out of sight are the wooden beams and structures of the pier, shattered by the winter storms as if by gunfire. The scene is desolate and threatening, as if this once happy world were but waiting to lapse back into the



Photograph from V. C. Scott O'Connor

MOOSE PLAY FOLLOW-THE-LEADER IN THE NORTH WOODS OF CANADA

In spite of its huge size and wide-spread antlers, the bull moose may stalk silently through forest thickets where man would make noise enough to be detected. During the mating season males have been known to charge hunters, striking vicious blows with horns and feet.

silence and oblivion from which it emerged when the ice cap receded northward.

We arrive at the channel of the St. Lawrence, the sun shining, the thermometer low, the cold bitter, feet like ice.

We are caught up in a world that is now mobile again and swift with action and life. The sun's rays, striking down upon the frozen spaces, give birth to low clouds and mists which, rising like steam from a gigantic boiler, gather speed from the morning wind and move off like an army in retreat.

Born of the sun and ice, they fly with the speed of a hurricane, and rise into the air in violet whirls, catching as they mount upward the flaming gold of the sun.

A WILD AND MENACING SCENE

At the climax of this pageant we reach the open flood of the St. Lawrence, moving with the incoming tide and driving before it ice floes and bergs and hummocks, in headlong disarray. Across this scene, lovely and fleeting, yet wild and menacing, we make our way through open water.

"*Lâchez l'aviron!*" cries the leader. Our oars are unshipped.

"*L'épaule aux toulines!*" And now over disklike islands of ice the crew, harnessed to the towing lines, haul the heavy burden of the boat and its cargo of mails (p. 182).

Meanwhile, the ice island to which we are committed is itself moving with the tide, as if bent on carrying us with it. But we are not bound for Quebec; and the island having served us, we leave it, to find ourselves once more in the boat surrounded by the confusion and tumult of piled-up masses and ridges of ice.

At the high ridges the crew, rushing forward, strain at the hawsers, slowly up one slope, swiftly down another, to the grinding murmur of the resisting keel, their voices calling to each other in a desolate world.

"*Marchons! Marchons! Haut les cœurs!*"

At half-open pools in the treacherous *frasil* they leap from one yielding cake of ice to the next; or they drive the boat forward with long, sweeping movements of their legs over the side, barely pausing between one instant's contact and the next. For, fine though the weather be, there is no moment to be lost in this battle of human



Photograph from V. C. Scott O'Connor

"SHOULDER TO THE TOWLINES!" SHOUTS THE LEADER

At the command boatmen unship their oars, jump to the ice, and pull the boat over frozen hummocks and ice pans floating on the St. Lawrence. Often a man slips and plunges into freezing water while making the traverse from Baie St. Paul to the Ile aux Coudres.

endeavor with the giant forces of Nature, and no mistakes may be made nor energy misspent.

We go through without accident; but there are times when a man will miss his foothold on the mush of broken ice and plunge neck-deep into the ice-cold waters. Seldom is one lost in the hazardous adventure, however, so bred to it are they by generations of experience.

The instant clear water is signaled, the men leap back into their places. "*En avant!*" shouts the captain, and, seizing the oars, they row as if they meant to win a race. When the ice closes round us again, they drop their oars and resume their slow and stubborn march.

Born to such conditions and inured to such risks, they make little of a voyage of this kind, accomplishing it, when all goes well, from two to three times a week, receiving but little pay for their toil. Their hands and faces grow red in the freezing cold, and icicles hang from their eyebrows and their beards. Yet, as the tense effort in which they are engaged increases, they fling off their coats and stand up in their overalls,

the sweat streaming down their honest and good-natured faces. One of them persistently smokes his pipe.

At times, as we make our way, an ice floe, smoother and more vast than usual, offers us a welcome relief, and then each man, seizing a rope and flinging it over his shoulder, starts to run at top speed, until brought up against hard fighting and dogged labor once more.

These interludes, when we met the great river moving on its way and driving before it its icy argosies, were among the most exhilarating and impressive of our journey. The grand elemental forces showed their hand, the waters advancing or retreating under a compulsion greater than their own.

THE WIDE-OPEN SPACES OF A FROZEN RIVER

Now and then we seemed lost in the wide spaces and the tumult of ice. Then the captain would go forward to survey the course. Standing upon a tall hummock or crag of ice, with his hand uplifted to his eyes, he would observe, like some Bedouin lost in the desert sands, the great move-



Photograph from V. C. Scott O'Connor

THROUGH DEEP SNOWDRIFTS THE CURÉ SETS FORTH TO A BEDSIDE OF THE SICK

Perhaps he was comfortably seated by a fire with a book from his well-stored library when a messenger came to say that someone was sick or dying. Then without delay the good man entered his sleigh and went to administer the offices of his Church.

ments in progress, and so return to direct our course.

It was plain, for all the men's cheery modesty and tremendous labor, that they were guided by an inherited instinct.

The dark cliffs of the island, white-crested with the winter snow, now rose before us. The boat fought its way slowly across the rough *battures* where land and water meet, the crew dropped their towing lines, and a sleigh was seen approaching. A fisherman's hut on the foreshore gave us a welcome pause, and glad were we all of the steaming-hot tea and the liberal whisky the good woman of the house poured out for us from her demijohn.

The master of the house, now frail and old, but in his day one who had made the traverse a hundred times and pulled his weight in fine or stormy weather, sat by the fire in silence, rocking himself. There were children of all ages in this lonely house that for months has no other landscape than that of a frozen world and a mighty river bound in chains. The eldest, who had been in Quebec, was dressed, and had learned to wave her hair, in the latest style.

But the mother of all sat worn and silent, with the hunted look of one who has spent her life in toil and the bearing of many children; for 15 to 20 are still common in this prolific race, and a prime minister of Quebec has said that his grandmother bore thirty-two, yet lived to a good age (pp. 166, 172-3). The Church and a political instinct sustain this custom, for the French Canadians, aware that they can look for no increment from their parent land, breed almost from a sentiment of duty to their race.

Tremblay invited me to enter his house. His sister-in-law, a wonderful old lady, came up and addressed me by name. "For," she said, smiling, "I heard it on the phone when Dr. Tremblay spoke to Monsieur le Curé!"

The twin spires of the island church now beckoned, as the sleigh carried me across the snowy white fields to the house of the Curé, who received me graciously, making from the outset no distinction between me and the people of his own faith and race. A frail, delicate man, deeply inspired by the things of the spirit, he opened to me the door of his heart, and was kindly and generous in all his ways.



Photograph from V. C. Scott O'Connor

WHITE PORPOISE HIDES AND OIL ARE THE LIVELIHOOD OF SOME FISHERMEN OF THE LOWER ST. LAWRENCE

These mammals are trapped at low tide by long nets of heavy twine or steel mesh strung across the mouth of an inlet at high water. French Canadians catch each spring many of the thousands that swim into the river to feed on halibut, haddock, and other fish.

A liberal supper provided by his sister, and helped out with some of his sacramental wine that comes to him direct from France, made pleasant our gathering. Our number was added to now and then, as we sat by the big stove in his kitchen, by a parishioner, who, with a knocking at the door, would enter in his *bottes sauvages* and leather *makina* to give a message or seek his advice.

One of these, a handsome fellow of 62, with the fair hair, hard blue eyes, and straight features of his Norman forbears, came with a wild air, as if distraught, into the sudden glare of the lighted room. He had something on his mind, and the Curé, with an understanding gesture, took him up to his study that he might unburden himself.

After a little interval the visitor returned, quite at his ease, his mind at rest. He called our attention to his magnificent coat of wild-cat skins.

"How much do you suppose I paid for it?" he asked with pride.

The Curé mildly suggested \$350.

"Sixty!" he replied, his eyes flashing at the thought of the fine deal he had made.

After he had gone, the Curé told me his caller lent money to his neighbors at high interest and was a prosperous man; but that, for all his fine manhood, he had no offspring. He had, however, adopted several orphans and children related to him by marriage.

A STRONG BOX OF ISLAND HISTORY

At the conclusion of these visits, the Curé opened for me his iron safe and produced from it the parish registers, dating from the year 1741. There were other papers more intimate still, and I can only regret that I may not stay to tell their tale and so reveal the picture they present of the lives and fortunes of the islanders.

The evening passed happily as we read these papers together, the Curé commenting on them in his gentle voice, while his sister nodded her head in approval and attended to our wants.

Between 2 and 3 o'clock in the morning the Curé rose, and I heard his footsteps as



Photograph by Edgar Garipey from a painting by Clarence A. Gagnon

FIR TREES ARE STUCK IN THE ICE TO MAKE A TRAIL ACROSS THE FROZEN
ST. LAWRENCE

On market day many horse-drawn sleighs carry supplies over the rough ice "bridge" across the river between Quebec and the Island of Orleans. The brightly painted vehicles and varicolored garments of the drivers and the rainbow lights on the ice present a scene of astonishing charm little suspected in summer (see text, page 200).

he went to relight the stove. At breakfast he offered me his kindly benediction and an excellent meal. The island produces quantities of chickens which go to Quebec, but the Curé pots his own, after cooking them, in a preserve of green tomatoes and salt, which keeps them fresh for his table throughout the winter. To these were added fresh eggs, apples, maple sugar, cream, and hot coffee.

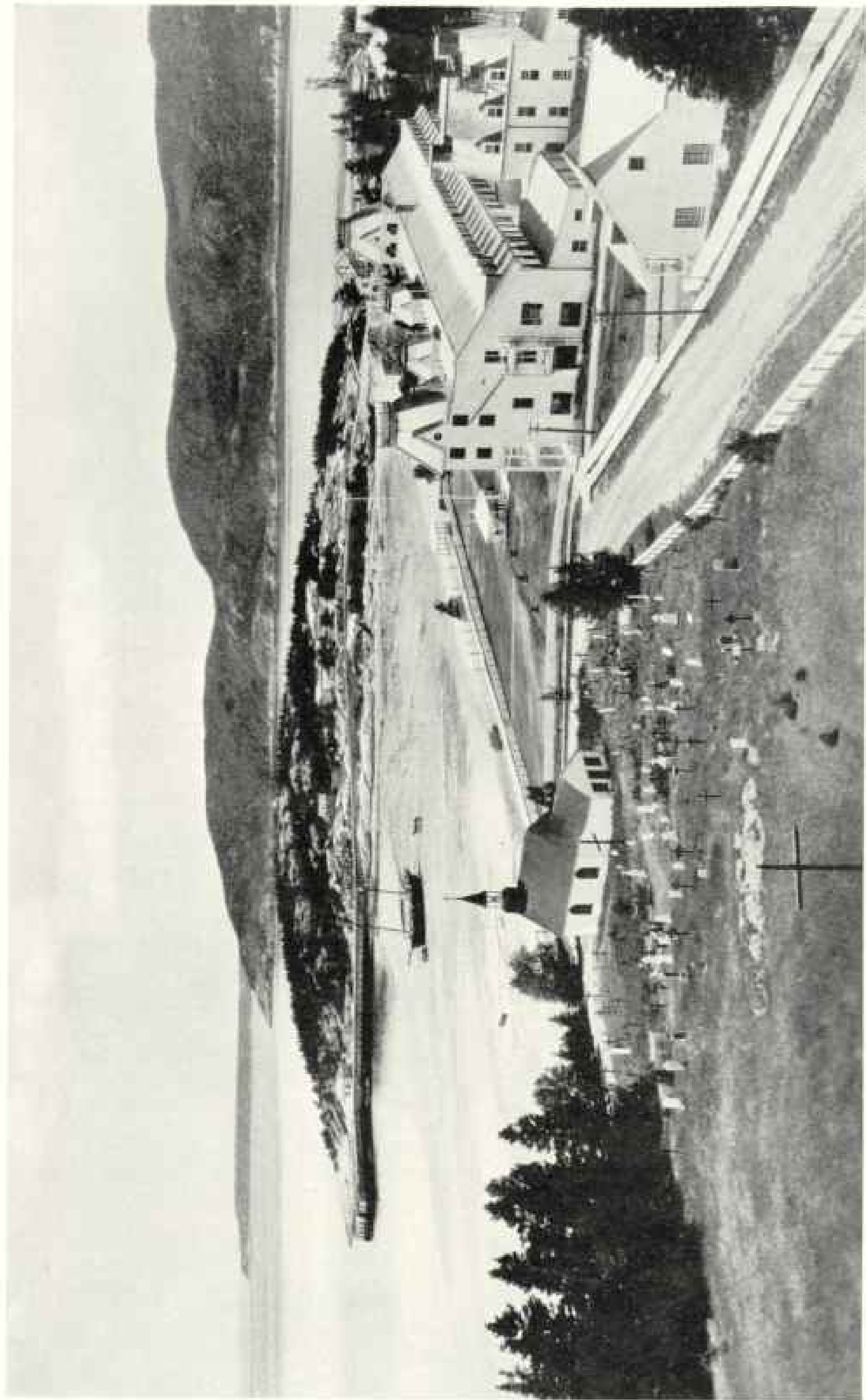
A spare eater himself, he was generous to his guest. He invited me to see his church, and made me keep on my hat as we passed through it to the cold sacristy, where he showed me the relics of St. Louis and the portraits of his own predecessors, all characteristically French.

Leaving him to his duties, I started on a walking tour around the island, accompanied by Louis Tremblay, calling at most of the little houses, talking with their inmates, taking my meals with them, listening to their personal histories, being received by them with a simple kindness, and in this manner did I enter some little way into their lives. The Curé's name was my passport; their kindly feelings were their own.

The island lay like a white ship englobed in a circle of snow and ice, silent and trafficless, the sparse houses scarcely disturbing its primeval character. Yet at one point I came upon a scene that was full of joy and happiness. It was at the schoolhouse, which we reached as the day's work was coming to an end. The children came tumbling out of school, as their fathers and elder brothers drove up in their sleighs to take them home. Pulling up their furs to their ears, their small rosy faces just peeping out and bright with laughter, away they all went, hungry for supper and cosy places beside their own kitchen fires.

The horses, fretting against the cold, were as eager to be off, and soon the music of their sleigh bells faded away into the winter silence.

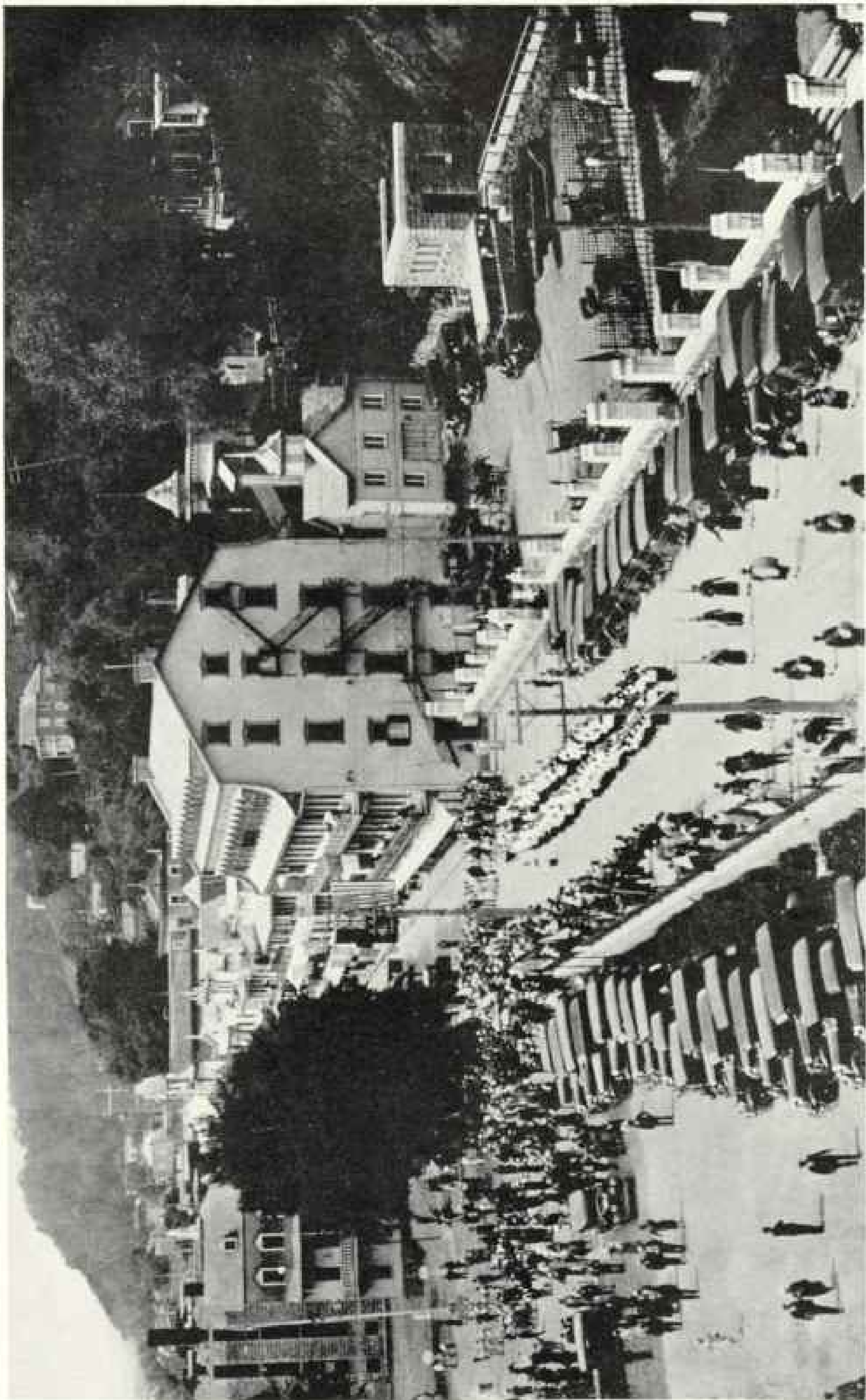
The trim little schoolma'am might have come to them from a New England State, for she was no simple habitant, but an educated girl with crisp views of her own on life. Many such girls, after teaching or working otherwise in the United States, bring a new ferment into the old homes.



Photograph from Publishers' Photo Service

CARTIER ONCE REFERRED TO WIND-SWEPT TADOUSSAC AS THE "POINT-OF-ALL-THE-DEVILS"

In early Canadian history this old village, standing where the Saguenay joins the St. Lawrence, was a bustling base for fur traders. Now, many vacationists stay at the long, white hotel of the popular resort. The schooner in the harbor was left high and dry by the ebb tide, and to natives use horse-drawn carts instead of boats to "ferry" the cargo ashore.



Photograph by Publishers' Photo Service

A SOLEMN PROCESSION OF CHURCHMEN MOVES UP A STREET OF OLD STE. ANNE DE BEAUPORT

Storm-wearied Breton sailors built here in the 17th century a shrine to Saint Anne, Patroness of Brittany, to whom they had prayed for delivery. Beau Pré, "Beautiful Meadow," they named the stretch of grassland, and it became a place of worship for fishermen sailing the St. Lawrence. Thousands of devout pilgrims come annually to this town, 72 miles northeast of Quebec.



Photograph from V. C. Surt O'Connor

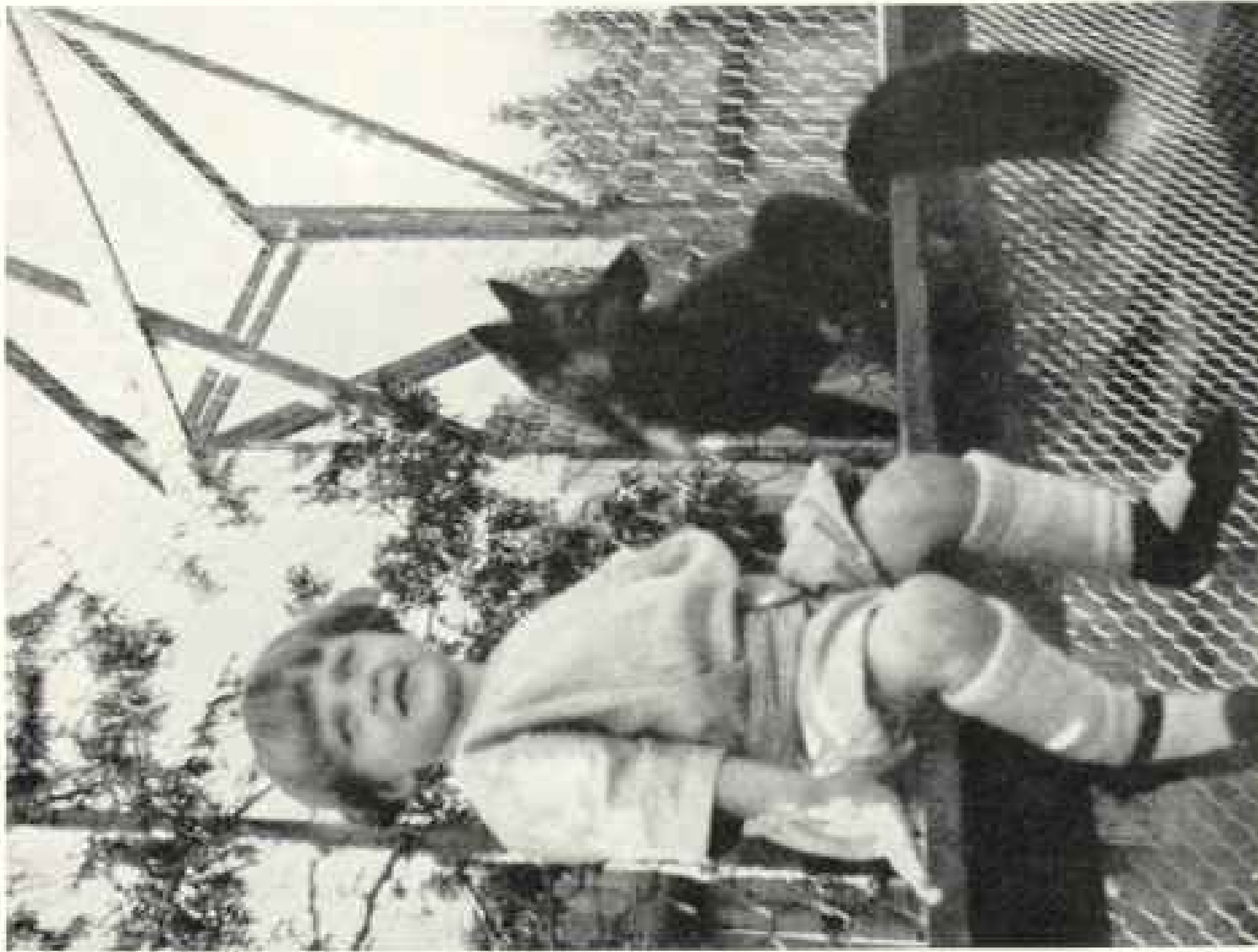
ACRES OF FLOATING LOGS—NEXT TO GRAIN, CANADA'S MOST IMPORTANT HARVEST

Timber lands of the north yield 175 million dollars annually. Often jams occur, clogging a river, and then skilled logmen swarm out over the upturned logs to untangle them. With the aid of long, spike-ended poles, and sometimes dynamite, they start them on their voyage to distant mills.



BOILED MAPLE SYRUP Poured ON SNOW TASTES DELICIOUS

It forms a taffylike candy, not maple sugar. Quebec produces more maple products than any other Province in Canada. In a recent year Dominion exports of sugar and syrup, mostly to the United States, were valued at approximately two million dollars.



Photographs from V. C. Seant O'Connell

A BABY SILVER FOX IS HER PLAYMATE

In early days, when trappers caught these animals in warm weather, they kept them alive until fall, when the fur was prime. Since that time fox farming has become an important industry, particularly in the Provinces of Ontario and Quebec and on Prince Edward Island.



Photograph from Associated Screen News, Ltd.

HE DECLARED HIS LOVE WHO ACCEPTED HER SASH

Formerly the young man who wore such a bright-colored *ceinture flèche*, or "arrow belt" (see illustration, page 179), was recognized as the sweetheart of the girl who wove it. The custom, now seldom observed, was copied by the French Canadians from the Indians.

Here, as elsewhere, changes are in the making, so that much that is still true to-day probably will soon have passed away. Over a million French Canadians have, till recently, found a living in the United States. Lost sheep they are regarded in the conservative homes from which they have sprung, but always with the hope of their return to the fold.

The schoolhouse was built upon the edge of the island cliffs, with an outlook from it across the frozen boundaries of the St. Lawrence to its southern shore, whose ancient settlements were displayed in a continuous line, diversified with the larger buildings of convents and schools and the silver spires of their churches shining in the evening sun.

In the springtime, the teacher told me, this place is lovely, with its orchards by the river in bloom. In summer the children can look up from their desks and see the ships of war and peace, bent upon their lawful occasions, moving upon the stately waters.

Faintly, like the voice of some elemental being, afar off and dim, yet mighty, I could hear the murmur of the St. Lawrence tide and see the moving waters laden with their burden of ice.

As darkness was setting in, I reached the end of the island and found shelter in the solitary house of the Widow Du Four.

The widow, a quiet woman, ruled her household of four grown-up sons—one married and with three fine boys—with a quiet and undisputed authority.

Her lands go down from the cliffs to the river, and include all the meadows and woods by the water's edge. I made their circuit in a sleigh drawn by her black-and-white ox, who took his way slowly and ponderously as an elephant over the engulfing drifts of snow (see illustration, page 195).

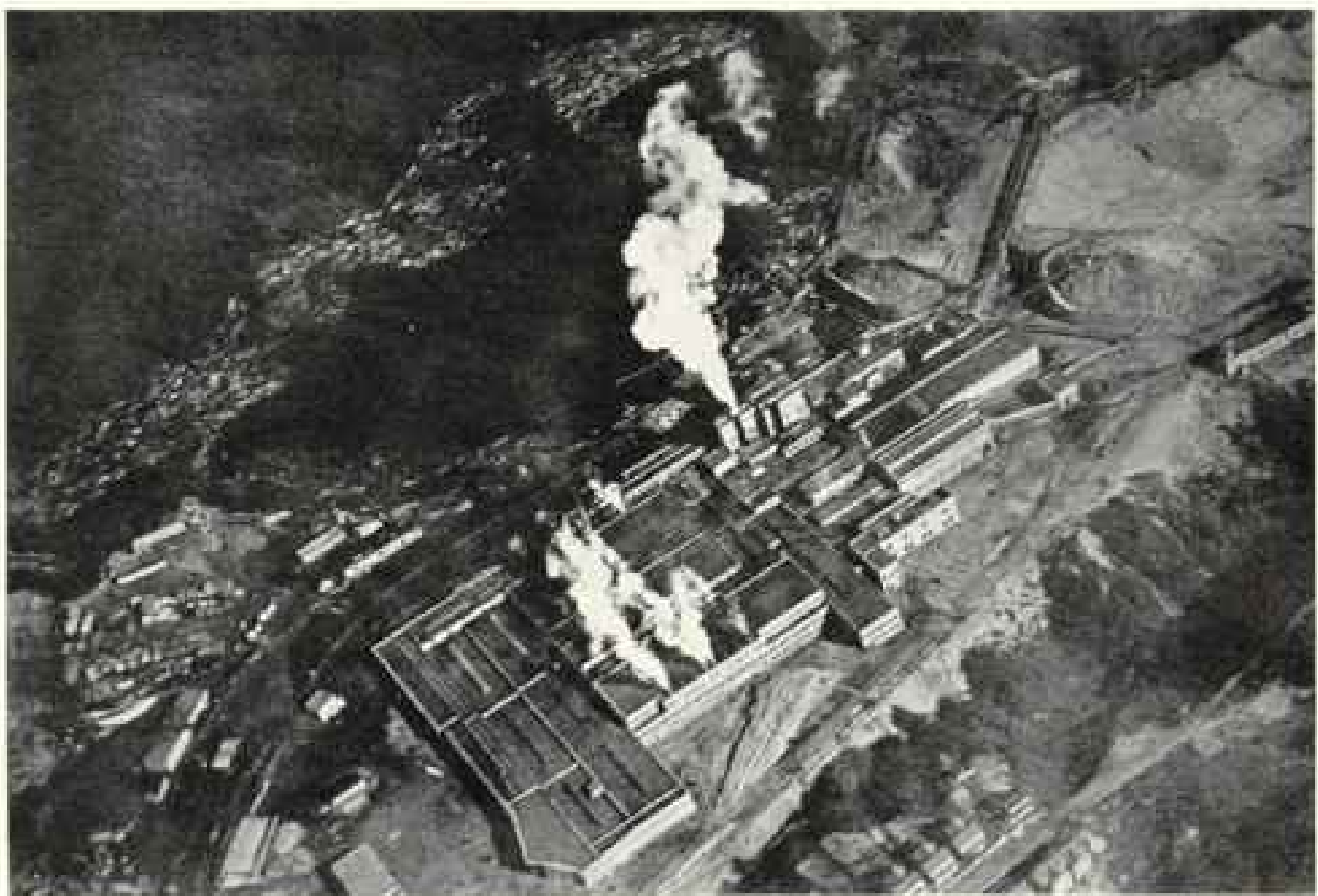
I returned to the house of the Curé.

On Sunday morning at an early hour I heard the Angelus ringing from the church tower and the sound of his footsteps moving in the house. In the dim light I saw the



IN WINTER, WHEN RIVERS ARE FROZEN, TRACTORS HAUL LOGS ON SLEDGES

The first paper mill in Canada was established by Americans in 1803, at St. Andrews East, in Quebec. To-day legislation requires that all pulpwood cut on government-owned lands must be manufactured into pulp in Canadian mills (see illustration, page 188).



Photographs from V. C. Scott O'Connor

LIFE IN KENOGLAMI CENTERS AROUND ITS PAPER MILLS

Smoking chimneys send aloft a cheerful symbol of activity below. Pulp-producing fir forests and unlimited sources of hydroelectric power have aided the growth of this young community on the Saguenay River.

small congregation of his faithful gathering together, the men with pocket torches in their hands, their coats pulled up to their ears, and the women, mostly young girls at this hour, wrapped up in their furs, and, lastly, the frail Curé making his way to his altar.

The bell ceased ringing, the door of the church was closed upon them all, and the night's stillness returned to the world.

It was beautiful at this hour. The setting moon was turning slowly to gold; the naked trees became sharply cut against her light. The long, dark pier, the little river of the island entering the sea, the tall masts and bare outlines of the island ships lay still under canopies of ice.

EARLY TO CHURCH

And then with a sudden burst the sun came up, gilding the snow fields and the morning clouds. The church door opened, and the early worshipers returned to their near-by homes, the lads flashing their torches and the girls with their furs about them hastening discreetly on their way. The frail figure of the Curé came slowly up the garden walk, his day just begun.

At nine the church bells began to ring again, as from far and near the island congregation drew up. It was snowing now, and the big flakes, falling thickly, overlaid the footprints of those who had gone within.

I entered the church to find it full, with no space for any late comer in its long triple lines of pews. The huge stove was alight, and continually, as the measured service took its course, the sexton replenished it with logs of wood, its open door revealing the flames that leaped and crackled within.

About it there knelt on the bare stone floor all those for whom no seats were available, their rosaries in their hands, their eyes fixed upon the high altar and the priest engaged in his solemn ritual. Six tall candles shed their soft light upon its mysteries and the rich vestments, upon the pale and worn countenance of the man.

Above them all St. Louis, King of France and Saint in Christendom, knelt in his ermine robes, a crown of gold upon his head.

These are familiar scenes. I record them here because it is in lonely and little places such as this that one perceives more poignantly than in great cities the part they have played in molding the lives of the French Canadians, cut off from the land of their forefathers.

St. Louis (Louis IX), to whom this church is dedicated, links them with the distant homeland of their race. Lifting up their eyes to him as they kneel, their minds freed from the preoccupations of their lives and the hard furrows in which they toil, they are brought into communion with that great spirit; while these very ceremonies, sanctioned by long centuries of usage, remind them—a small and half-forgotten community—that they belong not to Canada alone, but to a great fellowship of our common civilization.

These spacious and beautiful churches, the product of their self-denial—for every stone is laid by their hands—are an education for their eyes; the rich music of their organs and the trained voices of their choirs singing together bring to the more sensitive among them the consolation that some minds need.

More than this: their Church has taught them, here in Canada, that the parish is the true fortress of their national existence; and, with the devoted help of their early missionaries and of their regular clergy since, they have succeeded in retaining it intact, and with it that delicate instrument for the clear expression of human thought that is their mother tongue.

The service ends. The doors open, and all as they emerge exchange greetings. From the stables the harnessed sleighs come hastening up, the horses fretting at the bit. The old folk take the best places always reserved for them; and the women, forgetting their fashions, fling their plaid shawls over their heads as they vanish into the white world that lies between them and their homes.

I walk across to the presbytery and take my leave of the Curé. He offers me a glass of his muscatel and wishes me Godspeed. He bids me come again. A letter from him, which lies upon my table as I write, ends with an Old World courtesy with the words, "*Votre très humble serviteur.*"

FRENCH CANADIANS—OLD STYLE

Thomas Fortin drove up to my door at Baie St. Paul, a big Norman-looking chap, clad in a vast fur coat left to him by his father and destined to be passed on to his son. Cautious at first, slow and deliberate, he presently opened out and invited me to accompany him in his sleigh to St. Urbain.

Our way lay up a narrowing valley buried deep in snow and lovely in the moonlight,



Photograph from Canadian National Railways

BOTH DOG AND MASTER ARE DETERMINED THAT THE MAIL SHALL GO THROUGH

Each month several copies of the NATIONAL GEOGRAPHIC MAGAZINE go into this region near Lake St. John, Quebec. Nearly every mode of transportation takes THE GEOGRAPHIC to its destination—from canoes, camel caravans, and dogsleds to fast liners, trains, and airplanes.

its intense stillness broken only by the music of the sleigh bells. It was late, and only a house here and there showed a light at a window that threw a momentary glow across our path.

"In the forest," he said, shaking out his pipe, "the bears are now having their winter sleep; the moose and the caribou have gone afield; the beavers and their young families have settled into their log cabins under water; the timber wolf is on the prowl, seeking for beaver and small game. Now and then a hungry one will follow a man through the forest.

"Our timber cutters are there now in their winter camp. The curate holds a service for them on Sunday mornings, and there is less drink and blasphemy than of old. At Christmas and on New Year's Day they all get leave home. In April, when the ice

breaks, they float their logs down river to La Malbaie (Murray Bay). It is hard and often dangerous work, for they are obliged to go deep into the cold water to push off a stranded log.

"As for myself, M'sieu," he continued, always in the French to which he was born, "I am now in a good position and well to do; but I tell you frankly, I had no education of any kind. I was the wild one of the family.

"I ran off and followed the surveyor's chainmen into unknown lands. One of them used to read to us from a book of Jules Verne over the campfire at night. I had never listened to anything like that before. It enthralled me. But one day he was called away and he took his book with him! That was a disaster! So I taught myself to read; it is all the education I have ever had.



Photograph from V. C. Scott O'Connor

A RESIDENT OF TROIS SAUMONS (THREE SALMON) KEEPS YOUNG WITH A BUCKSAW BEHIND HIS BARN

"But in sixty years one can learn much. Yes! There was my Lord Grey, Governor in Canada, who loved birds and animals, and he took a liking to me. He would come to my poor house without pomp and ceremony. He would say, 'Thomas, I like to be alone in the woods.' From him I learnt what is an English gentleman.

"Then there was my good friend W. H. Blake; he loved us French Canadians. I have met also many millionaires; some good, some—what shall I say? When a man like that comes up to me—one I have never seen before—and says, 'Mr. Fortin, I am millionaire,' I reply, 'Pardon, M'sieu, I am only *cultivateur*.'"

So he talked on; and now and then, as midnight drew to the little hours of the morning, I would rise and go on tiptoes to the frosted windowpanes and look out on the strange world of things about his house: silver foxes at play in the moonlight, their elfish forms cut black against the snow; his sheep safely penned in their folds; and his cattle housed for the long winter in their byres.

The feudal tenures with which Canada started in the days of the French kings are now extinct. The land belongs to the

people. But the memory of those times still lingers, and here and there an old seigneurial manor still exists, an old family still carries on.

One of these, at Les Eboulements, on a spur of the Laurentian Mountains, is the property of M. De Sales La Terrière (177).

I took my way to it from Baie St. Paul on St. Catherine's Eve, when French Canada reckons that winter has come to stay. The snowflakes, turning to ice as they fell, whipped our faces as we drove in a sleigh to the railway station. From the windows of the moving train I saw no picture but that of a raging storm.

At Les Eboulements by the river the train stopped. A solitary sleigh was waiting in hopes of a passenger. The driver, a gay-hearted fellow, took to the road with a crack of his whip and a loud "Hallo!" to his horse. But the driving snowflakes concealed the world from sight, the white snow and the dark night shut us in, and I saw nothing but his massive form bent obstinately upon his task and the ghostlike fantasies of the forest trees.

Whenever I inquired how we progressed, he invariably replied, "*Encore vingt minutes!*"



Photograph from V. C. Scott O'Connell

THE RACE OVER SNOW AND ICE IS TO THE STRONG, AND DEPENDABLE, OX

In winter the animal drags a market sleigh; in summer, harkening to the plowman's voice, he labors in the fields at Ste. Pétronille. The dog, straining at his harness, seems anxious to be off with the happy youngsters.

But these twenty minutes lengthened to an hour, and the storm still raged. The big horse, now blowing like a bellows, plodded slowly up the hill until at last the first signs of habitation began to appear: a light at a window; the outlines of an old seigneurial mill, now silent by its frozen stream; and the ghostlike walls of a manor house withdrawn from the road.

We drew up at the inn of Amédée Bergeron half-frozen, our eyebrows stiff with ice; but the inn parlor was bright and warm and gaily colored, the people comforting; and a jug of hot milk and whisky soon revived us all. The driver, with two dollars in his pocket, bade me a cheerful good-bye, crying out, as he cracked his whip and once more vanished into the storm, "*Encore vingt minutes!*"

The innkeeper's daughter, a child of six, showed me with a candle to my room. She was blue-eyed and fair-haired. Every feature spoke of her northern ancestry.

"What is your name?" I inquired.

"Joan of Arc," she meekly replied.

All next day the storm raged as I sat by the inn fire, reading tales of old French

Canada and looking out through the windowpanes.

But at sunset the storm abated, the blizzard died down, and the stars shone in a clear winter sky.

In the dazzling gold sunshine of a perfect morning, in the stillness after the storm, I took my way to the manor house of M. De Sales La Terrière. The world had grown very lovely now. The gaily painted houses laughed together in the sunshine; the silvered spire of the village church rose like an anthem into a cloudless sky; two nuns walked sedately up the steps to church; a woodman with his carted logs went slowly by.

A VISIT TO A MANOR HOUSE

A thousand feet below me spread the wide valley of the St. Lawrence, now frozen white, the sun like a burning glass throwing upon its surface pools and circles of blinding light. My Ile aux Coudres seemed lost in these infinities; a little island of no moment till Jacques Cartier came to give it a name and place in history.

I entered an 18th-century interior, and



Photograph from Canadian Pacific Railway

JANUARY YIELDS A HARVEST FOR JULY CONSUMPTION

Here ice cutters are hauling solid blocks of clear ice on sleds to the icehouse. Buried deep under sawdust, it will keep with little loss from melting until needed in summer. The motor boat (extreme left), hauled out high above smashing ice floes, appears out of place in this wintry scene.

encountered the manners of a departed age. M. De Sales La Terrière showed me his house, its heirlooms and family portraits, his mother's chapel. He invited me, with a ceremonial courtesy, to stay to dinner, and placed before me his family papers. The most interesting of these was a memoir written by his ancestor, a gay young spark who left France when Louis XVI was King, and after some lively adventures settled in Canada. His little book is a picture of those times.

Of greater splendor was a stout volume of recent date, embellished with coats of arms and prepared in the evening of his life by his great-grandson, Col. De Sales La Terrière, who was born in England of an English mother, educated at Eton, and entered the 19th Hussars. Thence he passed into the Royal Household as an Exon of the Yeomen of the Guard. When death drew near, he remembered his Canadian ancestry, and sent the volume to his French cousin, believing, it may be, that French-Canadian piety would preserve it with more loving care than if he left it in the crowded world of his adoption.

"Such is the result of my researches," I read at the close of his volume, "which have now occupied a considerable time, and have been a source of amusement to myself and, I hope, no detriment to anyone else; and in the words of Pierre de Sales, when asked if he was a gentleman, replied: 'Noah had three sons—Shem, Ham, and Japheth—and positively I do not know from which of them I descend!'"

Towards midnight the son and heir of the house drove me back to the inn in his sleigh, the snow-white world about us, and the northern lights flashing in splendid fantasies in a starry sky.

On Sunday morning, while all the villagers and all the sleighs from far and near were assembling at the church, I was invited by M. De Sales La Terrière to sit with him in his family pew, which old custom has granted a prominent place in the church. Under our feet lay his forefathers in the family vault. As we came out, the town crier, ringing his bell, gave to the assembled people the news of the day.

And now, a year later, I have a letter telling me that the old church has been



Photograph by Bert Chesterfield

IT MUST BE A GOOD FISH STORY!

Men of three generations enter upon a lively discussion before their ancestral home on the Island of Orleans. The family has never lacked a male heir to inherit the domain, which is little changed since the house was built and the land cleared for cultivation, more than 300 years ago.



Photograph from V. C. Scott O'Connor

WHEN THE ICE MOVES OUT, BOATS ARE LAUNCHED AGAIN

Groups of men push, and others, up to their ankles in mud, pull on hawsers led to the bow and stern.



Photograph from V. C. Scott, O'Connor

THERE'S MANY A THREAD 'TWIN'T SHEEP AND SHIRT

During the long winter evenings, this elderly couple, Mr. and Mrs. La Chance, of the Island of Orleans, spin and talk in their snug French-Canadian home. Heaped on the floor is the raw wool that she will make into yarn for clothes and rugs.

destroyed by fire, and that the vault has perished. "A new and finer church is being built, but it can never be the same to me."

Such is the story of many a church in Canada. Little by little the houses, cathedrals, and churches tend to pass away. Old customs, more tenacious, live on longer; but even these will fade into the modern world in time.

MURRAY BAY DISCLOSES A CONTRAST OF RACES

At Murray Bay, named for one of Wolfe's brigadiers, but called La Malbaie by the French, one may observe the contrast between two races, between the quiet of an Old World French-Canadian village, the luxury and flair of a cosmopolitan hotel. But the immemorial river flows grandly past them both, unconcerned with the distinctions between poor men and rich men; between those who are French and those who are English.

After two days of luxurious ease at the hotel, I passed to its neighbor, La Malbaie, very proud of its parish church and peal of bells and content with its white figure of Christ at the crossroads, standing alone in the snow.

It was Christmas Eve, and in the church I found a small family assembled before a manger in which was laid the image of a new-born child with little figures of sheep and cattle about it. The parents in low voices related the oft-told tale; the children looked on with wide eyes, entranced by the spectacle. Red lights burned before the crèche in little pools of oil, and the place was so stilled and hushed that those who entered walked on tiptoes lest its quiet should be disturbed.

I spent the night at the little habitant inn, where there were no gala festivities, listening before I slept to the tinkle of passing sleigh bells and looking through my window at the white figure alone in the snow under its diadem of lights.



Photograph by William D. Boutwell

"LOOK OUT THERE, BROTHER, OR YOU'LL FALL!"

Many families of 15 or 20 children are found among French Canadians. A prime minister of Quebec once said that his grandmother bore 32, yet lived to a ripe old age (see text, page 183). It may be their home that the sign advertises for sale, but it bothers little these joyous youths of the Beupr e coast.

Fifty miles below La Malbaie the Saguenay, carrying with it the floods of Lake St. John from its vast watershed, joins at Tadoussac its sovereign lord, the St. Lawrence. Twenty-eight miles above its mouth is Eternite Cove, the headlands of which, rent asunder by earth convulsions in the past, and aptly named by the French, Trinite and Eternite, flank it like the walls of a fjord. They rise to heights on either hand of more than 1,000 feet, the bed of the Saguenay being 600 feet lower than that of the St. Lawrence at their junction.

These formidable bastions have always dominated the hearts and minds of men; and they still cut off all that northern shore of the widening St. Lawrence that extends from Tadoussac to the limits of Sir Wilfred Grenfell's Labrador, a distance of 700 miles.

There the traveler, seeking new experiences, may still look upon a world that is in the making—a world of scattered hamlets and small townships, where new timber and

mining companies and great pulp mills that supply newsprint to London are at work side by side with the last of the tribe of Montagnais Indians, who welcomed Jacques Cartier to Canada 400 years ago.

They now are reduced to 1,500 souls. Most of them vanish at the approach of winter into the vast hunting grounds that lie between the St. Lawrence and Hudson Bay, returning in summer in ever-diminishing numbers to vend their pelts and rest from their toil.

Tadoussac, with its summer hotel, lies at one end (see page 186); the last lighthouse of French Canada flames at the other. There, at Blanc Sablon, is a community of twenty families served by a missionary priest of the Eudist Order, to whom the spiritual care of this coast is assigned. Like their predecessors, the heroic Jesuit pioneers, who sought after the most difficult tasks and labored with an unforgettable devotion, they are nearly all Frenchmen born.

This coast is served by a line of small steamers in summer, but at the time of my visit had not yet any continuous road. A telegraph wire was the only thing that lent it unity. In winter it offers an interesting small adventure in the track of the postillions who carry the mails in sleighs drawn by a husky team and in stoutly built pirogues of the kind used at the Traverse at the Baie St. Paul.

From the North Shore I returned to Quebec, the predestined city, made accessible to ships throughout the winter by powerful icebreakers that keep the southern channel open to Montreal. The north channel is allowed to freeze, but an ice bridge carries travelers across it to the Island of Orleans in winter (see pages 175 and 185).

All kinds of wayfarers may be seen there on a winter day, going to and fro upon their business, while laboring more slowly are the ice cutters, who carry away huge blocks of ice for summer use in the city (see page 196). The track across the icy wastes is marked by young fir trees cut from the forest, so that none may lose their way.

At the far end of it, in the sweet village of Ste. Pétronille, on the Island of Orleans and on the site of one of Wolfe's batteries, lives a famous painter of French-Canadian life. No change in the Canadian year escapes the vigilant eyes of Horatio Walker, who for half a century has depicted the slowly changing life. From this vantage point, also, Clarence A. Gagnon, of a younger generation, whose colored illustrations to "Maria Chapdelaine" are a mirror unexcelled of French habitant life, painted on a winter morning a swift impression of the scene here given, its sleighs in transit from island to mainland, and the dim, gigantic fortress of Quebec frowning over all (see page 185).

TRAILS OF EARLY HISTORY

The South Shore, which borders the New England States and marks some of the earliest settlements of the French in Canada, is familiar to many summer visitors as far as the Gaspé Peninsula. All the early life of French Canada may be followed there from one historic parish to another, and in the narrow ribbons of land which, although they reach to the river, are often only a few feet wide. They perpetuate the old-time settlers' need of frontage when the great river was their only highway.

But that is another story.

After two months of further travel there, I found myself back once more at Lévis, facing Quebec across the water. It was the coldest day of the year. A north wind was harrowing the snow, but the sun shone brightly in the sky, making rainbow patterns of the trees on the sparkling surface of the clean-swept snow.

As night fell, I went down to the river where the ferry crosses to Quebec. It was dark there and the river moved swiftly on its way, carrying with it vast fleets of shattered ice; darkly beautiful in its open pools, mysterious and mighty, a voice in the lone stillness of the night. The ferry sidled up to the pier, moving up and down like a shuttle in the loom till it found its place. The stream of moving ice, impeded by its bulk, drove on in a line as straight as that of a sword, a myriad hummocks and masses of tortured ice rolling over each other like live creatures.

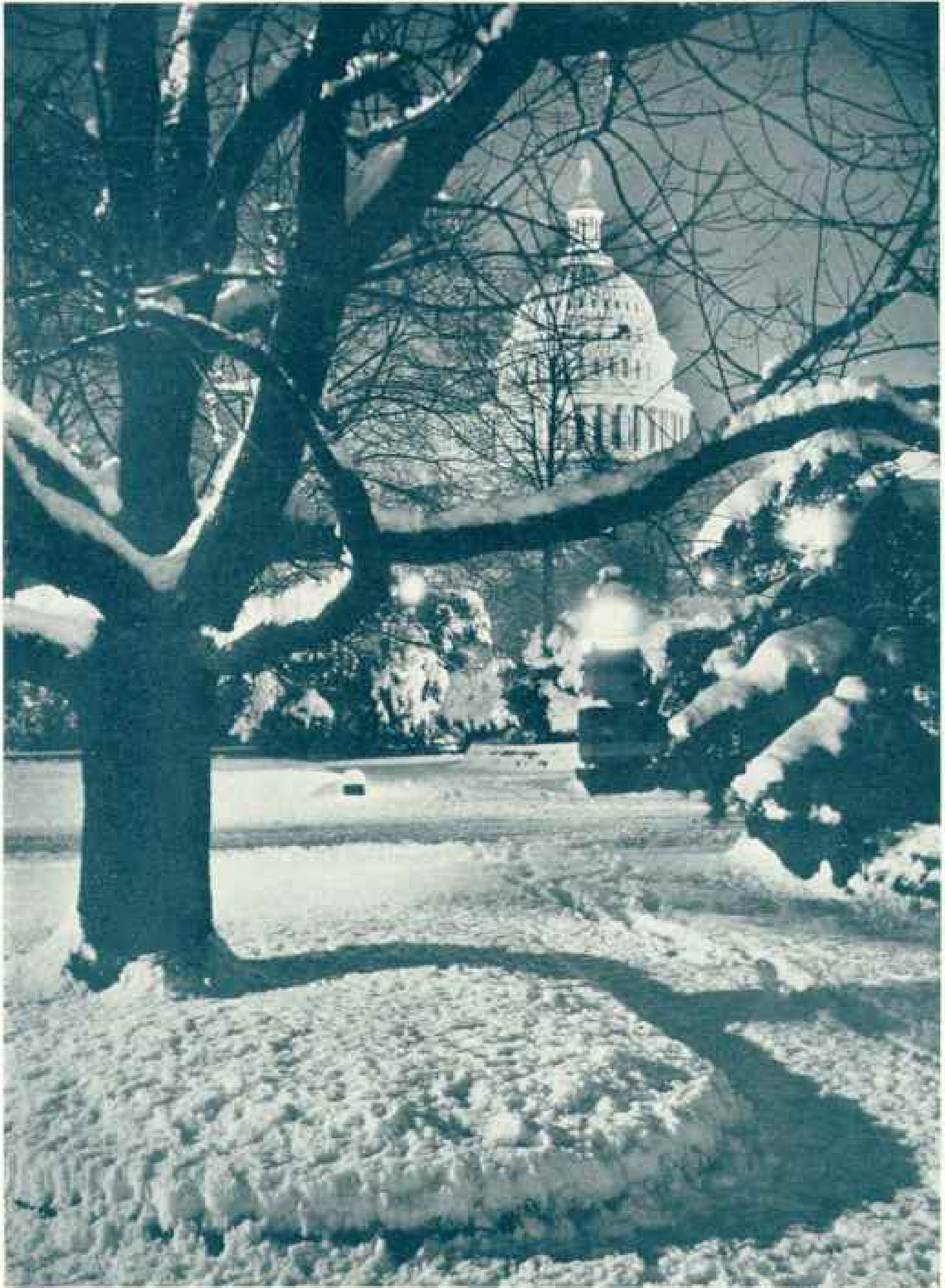
Across this turmoil and the giant flood of the St. Lawrence the lights of Quebec glittered, revealing its stately landmarks; the Château Frontenac; the Citadel, the spire of its Cathedral, and the tall skyscrapers of its paper mills that herald the future to which one of the most princely sites of any city in the world seems destined.*

Afar off, and upriver in the darkness, the massive Quebec Bridge rose above the waters, its main span one of the longest in the world. Somewhere in the gloom lay hidden the cove, since called after him, at which Wolfe landed on the last night of his life, to give battle to Montcalm on the Plains of Abraham. Victor and vanquished died together, one in the hour of his victory, the other in the painful sequence of his defeat.

My last day had now come. I spent it in a pilgrimage that took me through the old French town to the St. Charles River, where all this life began, when Jacques Cartier, heroic in his undertakings, spent his terrible winter there in 1535-1536. There is a cross there now on the left bank, in a railed enclosure, with a brief inscription that tells the famous tale.

The snow lay in heavy engulfing drifts about it, unmarked by any footsteps. The river was silent and motionless. The place was like a sanctuary, unchanged in its character through 400 years.

* See "Quebec, Capital of French Canada," by W. D. Boutwell, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1930.



Photograph by Edwin L. Wisner

BLEAK FEBRUARY SKIES OUTLINE THE MAJESTIC CAPITOL DOME

The seemingly tiny statue of Freedom, framed in a triangle of twigs, is actually 19 feet 6 inches high. Modeled in Rome by an American, Thomas Crawford, it was cast in bronze in Maryland and hoisted into place during the Civil War. The enormous cast-iron dome, painted gray-white, weighing nearly 4½ thousand tons, was under construction for nine years. It is viewed here, bathed in floodlights, from a point west and south of the House of Representatives wing.



Photograph by B. Anthony Stewart.

A CURTAIN OF SNOW FALLS OVER THE LAFAYETTE MONUMENT

Facing the White House, in a square that bears his name, is this statue of the gallant Frenchman whose aid to George Washington was so helpful to the cause of the American Colonies.



Photograph by Edwin L. Wishead.

A GROTESQUE SNOW MAN SLEEPS FULL LENGTH ON THE BISON'S BACK

The ornamental buffalo is one of four designed by A. Phimister Proctor for the Dumbarton Bridge on Q Street. Built in 1914, the curving, many-arched span over Rock Creek resembles a Roman aqueduct.



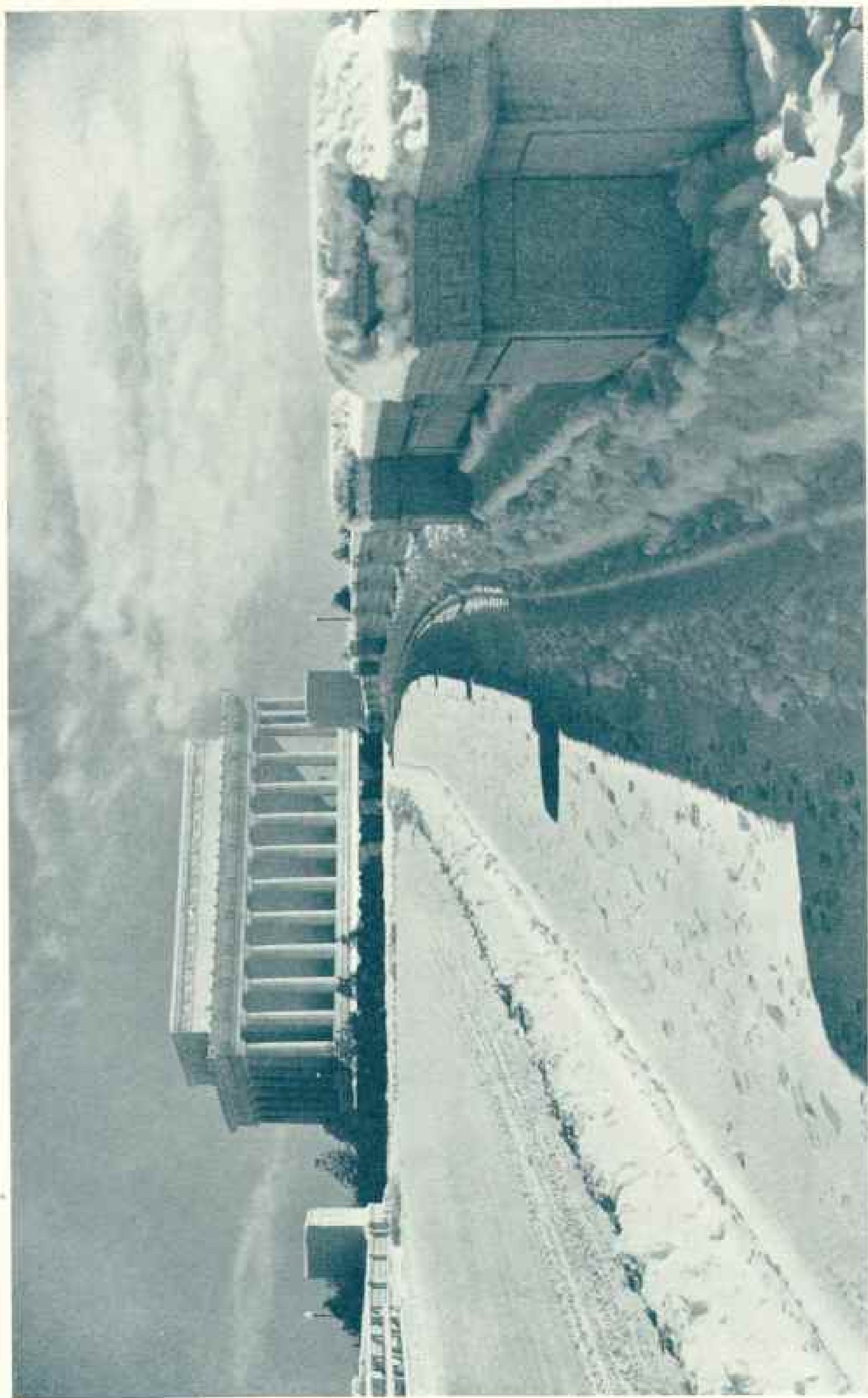
HORSEMEN BRAVE WINTRY BLASTS EVEN WHEN BRIDLE PATHS ARE SLIPPERY WITH SNOW. Regardless of season, riders wind through 30 miles of meandering sylvan lanes in Rock Creek Park, which cuts across the city's northwest residential section.



Photographs by B. Anthony Stewart

THE BELLS OF A ONE-HORSE OPEN SLEIGH JINGLE IN ROCK CREEK PARK

When the Capital City is covered by a deep snow blanket, its residents—many of whom have lived long in colder climates—participate in winter sports, especially coasting on sleds.



Photograph by Edwin L. Weiland

THE GRECIAN GLORY OF THE LINCOLN MEMORIAL CLOSES A WINTER VISTA AT THE END OF RIVERSIDE DRIVE

Enshrined within the central hall of this classic monument in Washington is the inspiring marble figure of "The Great Emancipator," by Daniel Chester French. Thirty-six massive Doric columns—one for each State in the Union at the time of Lincoln's death—support the upper frieze, where are carved the names of the 48 States. Above is the attic story with its roof of plate glass, which floods the statue with light. The architect, Henry Bacon.



Photograph by B. Anthony Stewart

THE NEW SOUTHERN GATEWAY TO THE CAPITAL LEADS ACROSS ARLINGTON MEMORIAL BRIDGE

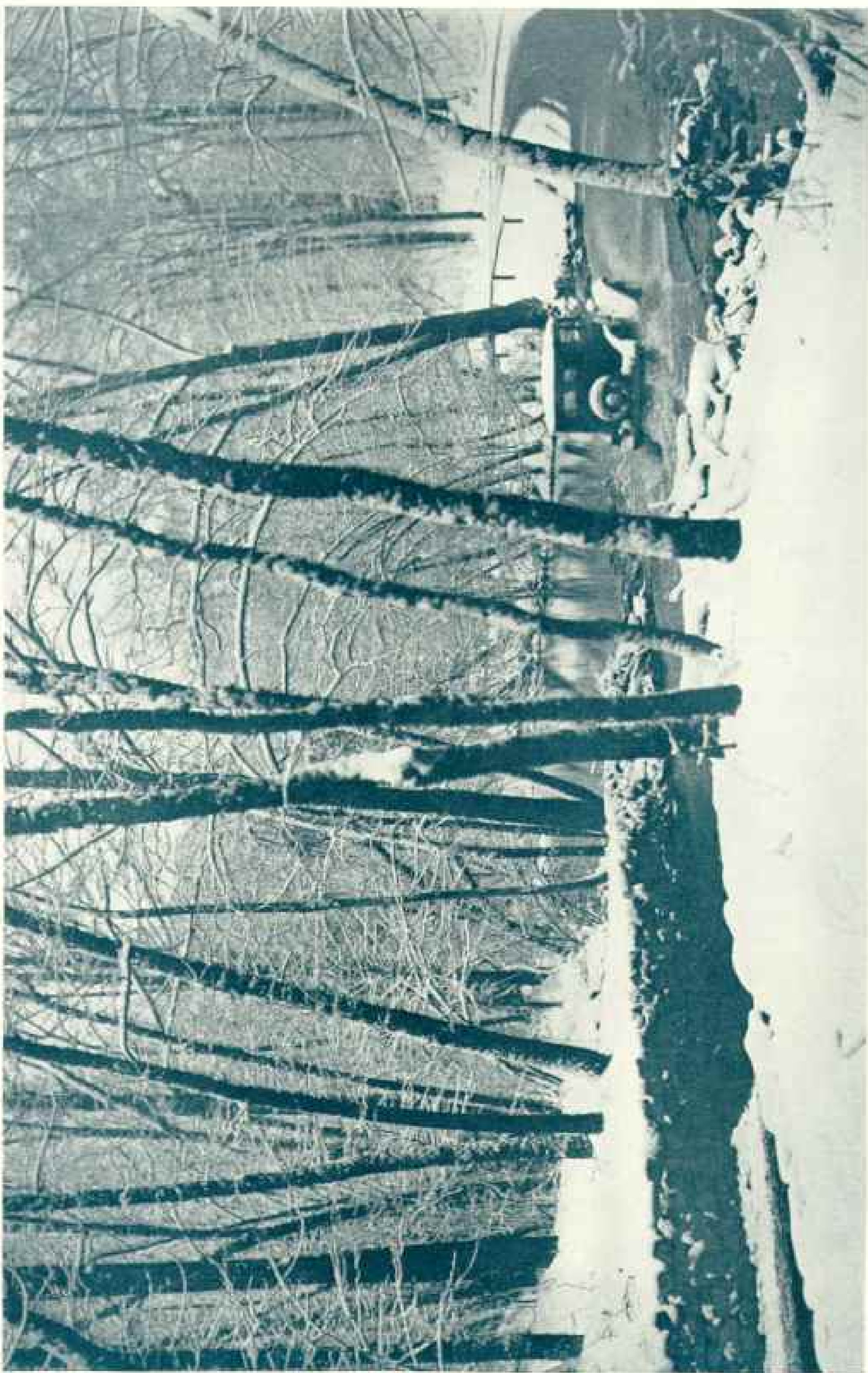
The broad Mount Vernon Memorial Highway and the road from Arlington National Cemetery, where rest the remains of the Unknown Soldier and other national heroes, are linked to Washington by this gracefully arched span over the Potomac. With the Lincoln Memorial on the Washington bank, it forms an imposing entrance to the city. Between Riverside Drive (upper left) and the bridge is the snow-covered water gate—curving steps of granite 215-foot wide.



Photograph by Charles Martin

GENERAL ANDREW JACKSON RAISES HIS HAT IN A SEEMING SALUTE TO THE WHITE HOUSE

The equestrian statue of the famous Indian fighter, who became the seventh President of the United States, stands in the center of Lafayette Square. Cast from cannon taken during the War of 1812, it reflects the personality of "Old Hickory," mounted on a spirited and vigorous charger.



Photograph by Richard H. Stewart

THE FORDS IN ROCK CREEK ARE ATTRACTIVE SHORT CUTS UNLESS SPRAY STALLS THE MOTOR

Sometimes drivers go home with wet feet after bulky engines have quit halfway through the water. Beyond this point begins one of the famous "Zoos" of the world, the National Zoological Park. Snow lends ghostly arms and fingers to the stark trees along the banks of the stream tumbling through Rock Creek Park.



Photograph by H. Anthony Stewart.

A HAPPY SMILE WELCOMES THE DANCING SNOWFLAKES TO WASHINGTON

Heavy snowstorms are infrequent visitors to the District of Columbia, but youth greets them cheerfully when they do arrive. The young lady presents a striking study in black and white as she strolls past the Lafayette statue, fringed by the broad-spread branches of phantom trees (see page 202).



Photograph by R. Anthony Stewart

SNOW-BOUND PIGEONS FIND SCANT SHELTER IN A WINTER-STRIPPED TREE

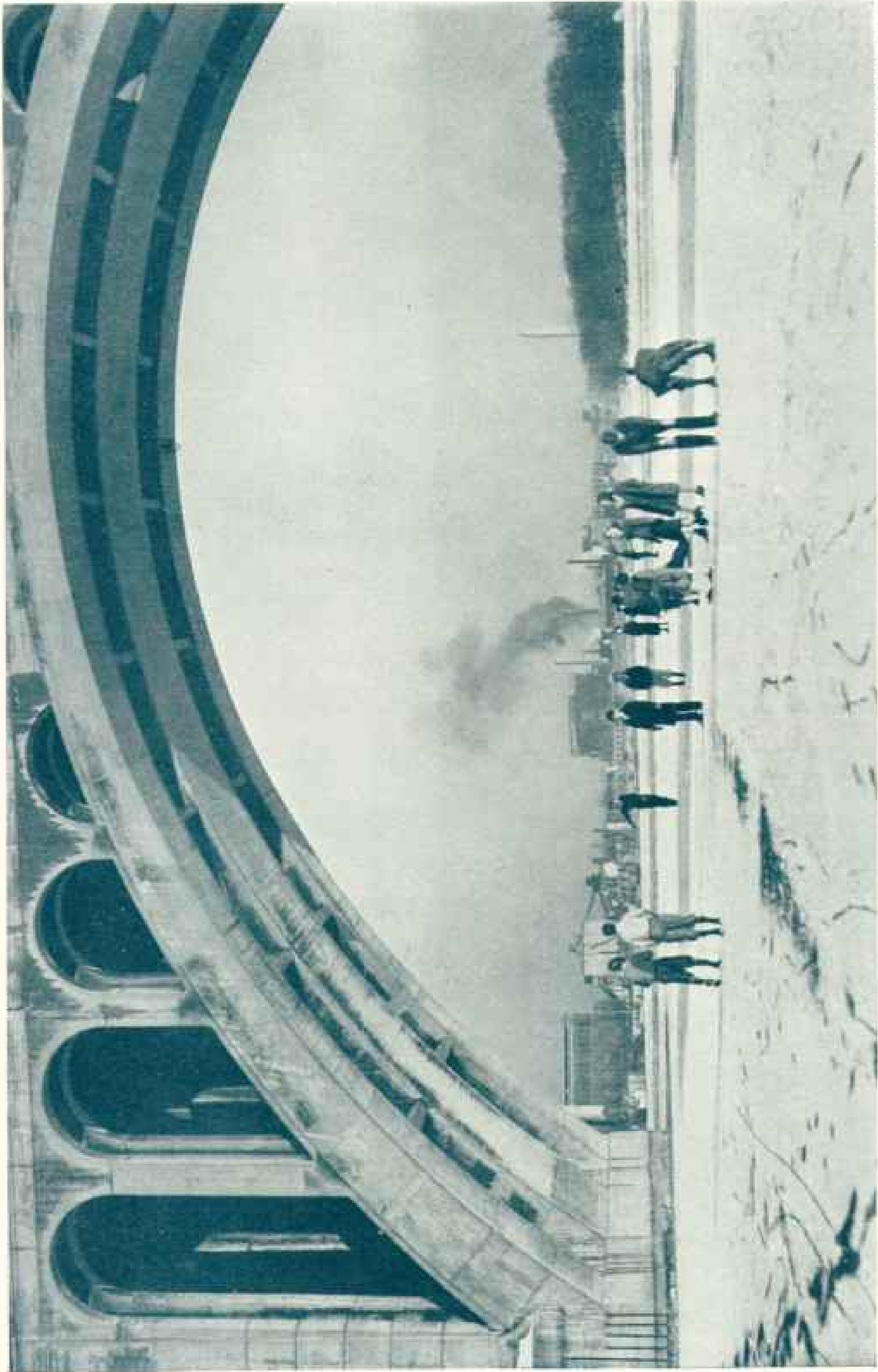
They will not be forgotten, for old and young scatter crumbs and peanuts when the white carpet covers Lafayette Square, dove rendezvous of midtown Washington. Branches and snowflakes partly obscure the statue of General Andrew Jackson (see page 206).



Photograph by Clifford Adams

STately ELMS LINK ARMS TO FORM A SNOWY ARCHWAY FOR SLEIGH PARTIES

Viewed north from Dupont Circle, tree-lined New Hampshire Avenue in February is no less enchanting to the Nature lover than it is in April, when the first spring foliage weaves a green tunnel. Cutting diagonally across the northwest section of the city, this broad street has long been a favorite strolling place of Washingtonians. Many of the Capital's old residences front upon it.



Photograph by Richard H. Stewart.

YOUTH SEEKS A SKATING RINK UNDER KEY BRIDGE—A RARE PRIVILEGE ON THE SELDOM-FROZEN POTOMAC

Arching the river from Washington to the Virginia side, this broad span was named in honor of the author of "The Star-Spangled Banner." For many years he lived in Georgetown, Colonial Maryland town, which now is a residential section of Washington and the home of Georgetown University.



Photograph by Charles Martin

BRONZE LIONS GUARD GRANT'S STATUE BELOW THE UNITED STATES CAPITOL.

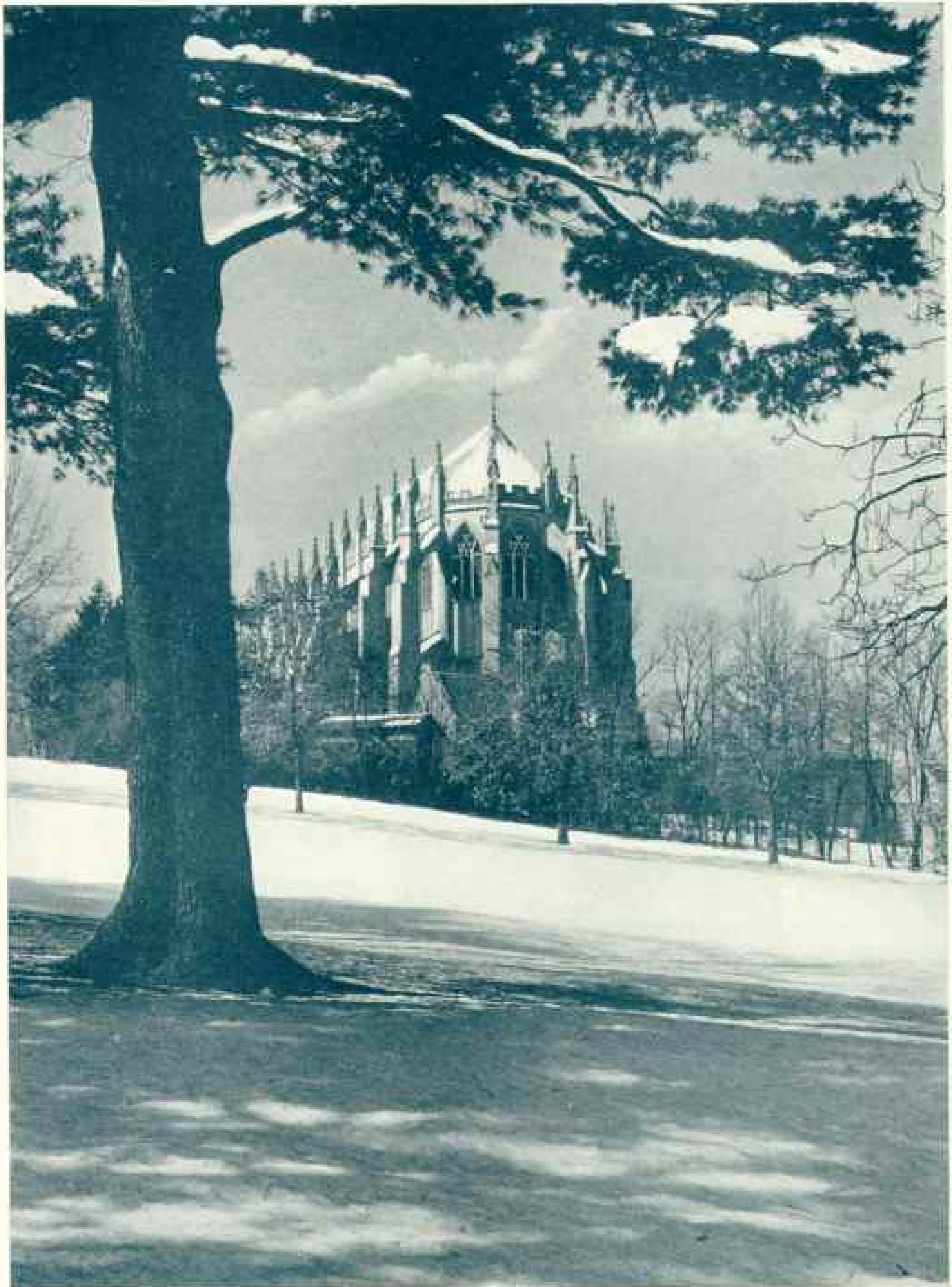
The sculptor, Henry Merwin Shrady, has conveyed the indomitable character of the Civil War general by planting the horse's four feet squarely on the pedestal and seating his subject firmly in the saddle.



Photograph by Edwin L. Wisard

SYMBOLS OF WIND, SEA, AND STARS COMMEMORATE A DISTINGUISHED ADMIRAL.

The figures support a graceful fountain honoring Samuel Francis Du Pont, noted naval leader during the Civil War. For generations of children Dupont Circle has been a favorite year-round playground.



Photograph by Charles Martin

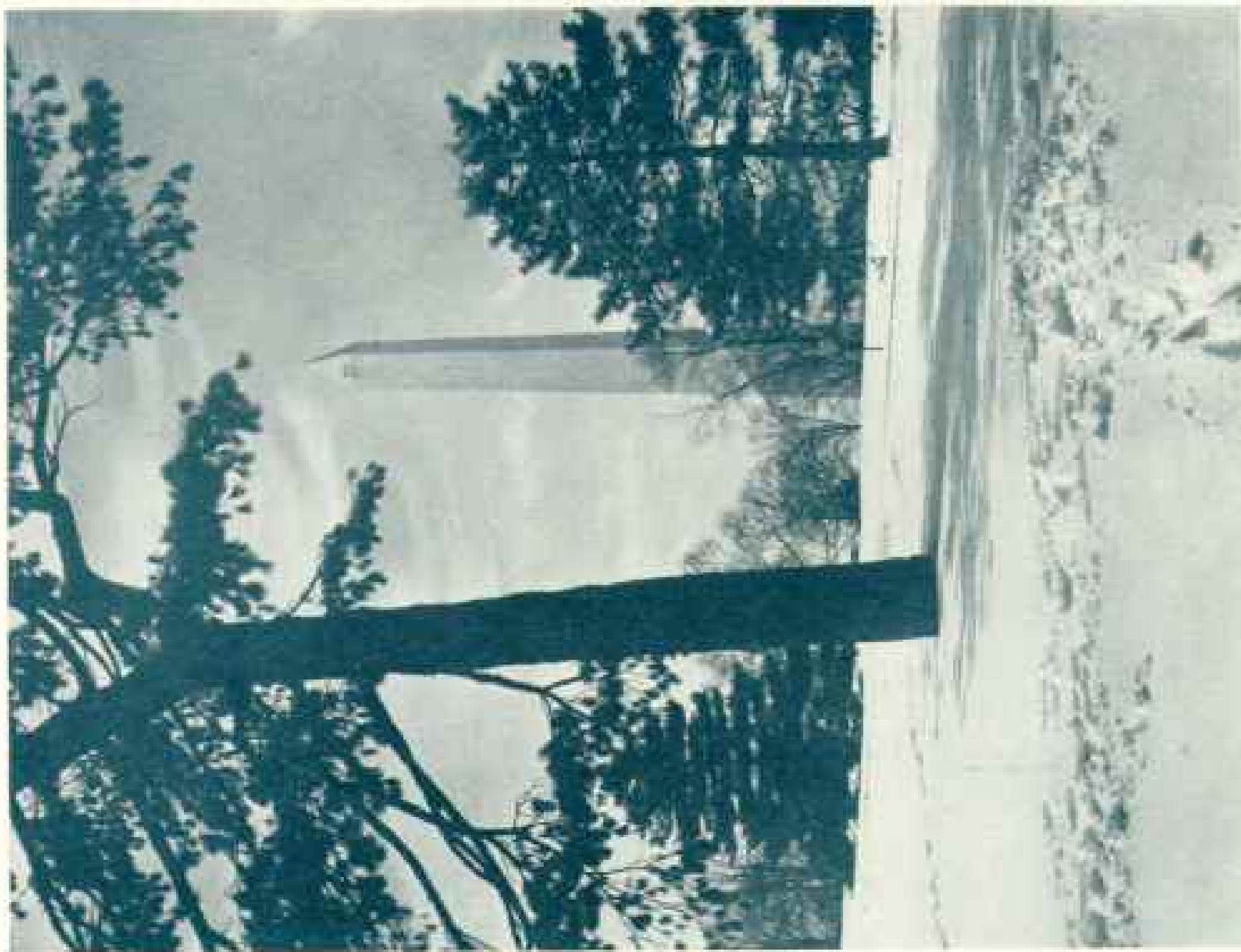
THE APSE OF THE WASHINGTON CATHEDRAL PIERCES THE WINTER HEAVENS

Men, women, and children in all walks of life and from every State in the Union have contributed to the building of the Cathedral Church of St. Peter and St. Paul. The tombs of Woodrow Wilson, George Dewey, Admiral of the Navy, and other well-loved citizens are viewed here by thousands annually. The inspiring Gothic temple, conceived in the early days of the Capital City and begun in 1907, is now one-third finished.



WINTER PLASTERS A WHITE MAINE ON A TAIT BRIDGE LION

The Connecticut Avenue bridge was named for William Howard Taft, late President and Chief Justice of the United States, who strolled over it daily from his home near by.



Photographs by Edwin L. Wisbord

VISITORS NEVER FORGET ITS SOARING MAJESTY

The 555-foot Washington Monument was recently encased in steel framework that its marble walls and aluminum cap might be repaired and washed. Nearly half a million persons annually survey the city from its windows near the top.



"SURRENDER? I HAVE NOT YET BEGUN TO FIGHT!"

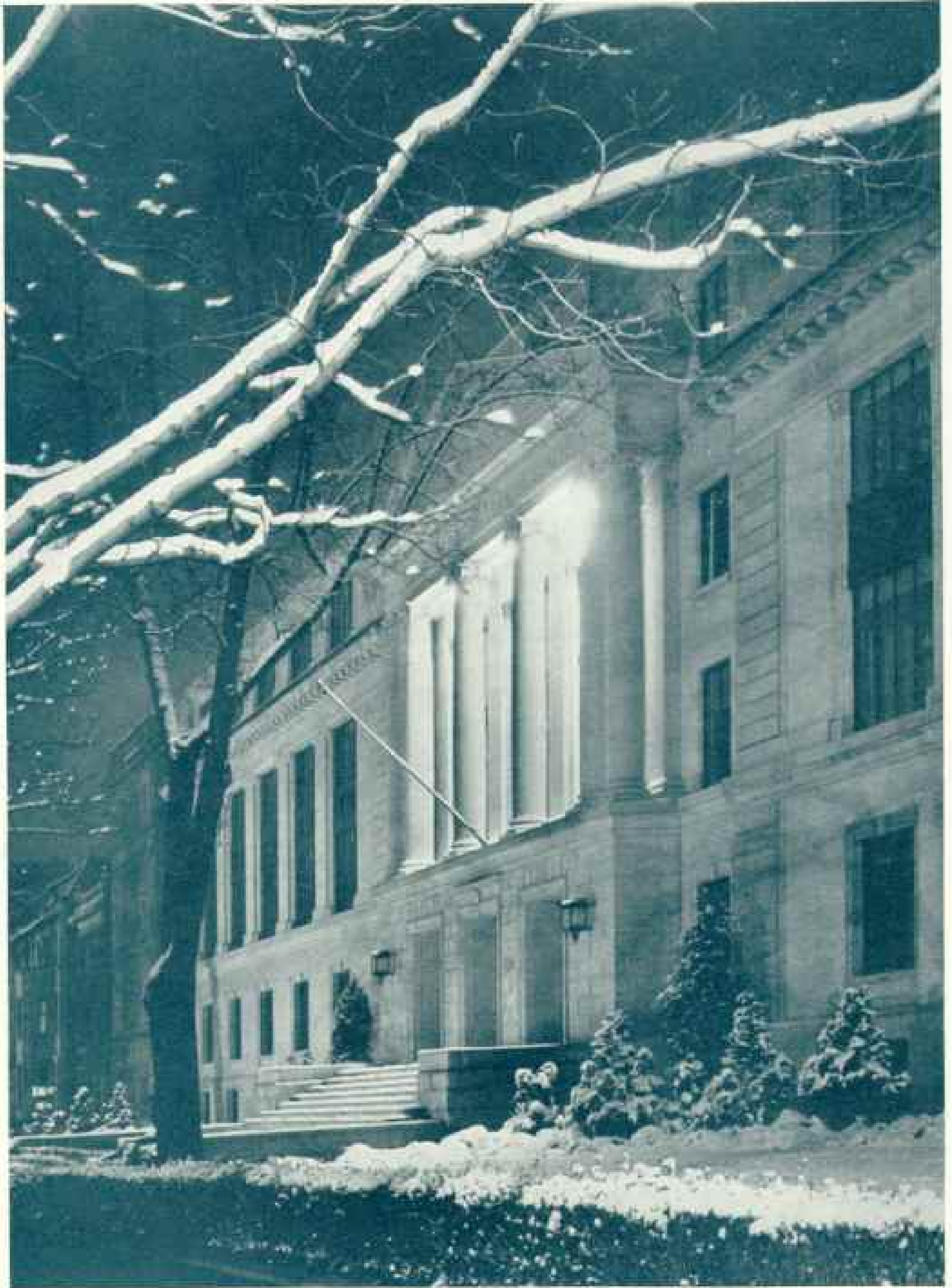
John Paul Jones' stirring reply to the British captain during the historic sea duel between the *Bon Homme Richard* and the *Sevigny* is inscribed on his monument at the foot of Seventeenth Street, near the Tidal Basin.



Photographs by Edwin L. Wisland

AMERICA REMEMBERS A SWEDISH-BORN NAVAL ENGINEER

John Ericsson's "chessbox-on-a-raft," the *Monitor*, silenced the *Merrimac* in a memorable Civil War battle in Hampton Roads. Today a granite memorial to his inventive genius overlooks the Potomac near the Lincoln Memorial.



Photograph by Edwin L. Wisheer.

ALL WHO ENTER ITS PORTALS LEAVE WITH A GREATER KNOWLEDGE OF THE WORLD
AND ITS PEOPLES

Snow-etched branches frame the illuminated façade of the new executive and editorial offices of the National Geographic Society on Sixteenth Street. Here, three years hence, will be observed the half-century anniversary of The Society, whose million members reside in every civilized community of the world.

SHADOWY BIRDS OF THE NIGHT*

BY ALEXANDER WETMORE

Assistant Secretary, Smithsonian Institution

THE evening air of late February in the Everglades of southern Florida is soft and mild. Delicate scents from unseen blossoms come with the breeze, together with the voices of myriad frogs in incessant but attractive chorus from the marshes. Suddenly, from the moss-festooned live oaks in this peaceful background, comes an outburst of demoniacal laughter, guttural in sound and startling in its abruptness, causing in me pleasant tremors of excitement.

Playing the beam of light from an electric torch through the branches, I discover presently two glowing spots of ruby red, reflections from a pair of eyes. As my own eyes adjust themselves to the feeble illumination, I can distinguish dimly the shadowy form of a great barred owl. The hubbub stops immediately, for the bird is puzzled by the spot of light; but as I continue along the trail the owl, now behind me, utters a loud, prolonged *whoo-oo-oo-aw* that resounds eerily among the trees. Until daybreak I hear at intervals the wild ululation of its calls filling the darkened woodland.

The voices of owls are more familiar than their persons, as most of them are active principally at night, and without special search the birds themselves are difficult to see. Their presence, unseen but constantly evident, has caused imagination to play about them until in practically every country in the world there have grown up fables and superstitions regarding owls.

FABLED BIRDS OF WISDOM AND OF DOOM

The little owl of Europe, about as large as the American screech owl but without the ear tufts of that species, has long been an emblem of wisdom, and in early years was accepted as a special ward of Pallas Athena of the Greeks. Romans, to whom this goddess became Minerva, did not retain this reverence for the bird, considering it of evil omen and a messenger of bad news. Death was foretold by owls alighting on the house-tops, and their calls near by at night aroused fear and foreboding.

* This is the tenth article, illustrated by paintings by Maj. Allan Brooks, in the important GEOGRAPHIC series describing the bird families of the United States and Canada. The eleventh article, with paintings in color by Major Brooks, will appear in an early number.

The vogue of the owl as an emblem of wisdom is not due to any special intelligence of the bird, but to the conformation of the head, with the two eyes so placed that they look directly ahead like those of man.

As the companion of night-flying witches, or as one of the ingredients in the brews concocted by these trouble-makers, the owl developed a black and unsavory reputation, attested by many references to its evil omen in Shakespeare and other writers.

Among American Indians, owls, though feared at times, were in better repute and were the basis of various lively legends. Zuni tales include stories of one called "gray owl" that lived in a house as a man does. The Pima Indians held that at death the human spirit passed into the body of an owl and, to assist in this transmigration, they gave owl feathers, kept for the purpose in a special box, to a dying person.

ELVES AND GIANTS AMONG OWLS

Among the Plains Indians, the Arikara included an owl group as one of their eight mystic societies, and in the sacred rites of this body they used the stuffed skin of an owl with disks of cunningly fitted buffalo horn for eyes. This emblem was displayed during their ceremonies to represent night, the eyes being symbolic of the morning star.

Owls are found throughout the world from the Arctic regions through the continents and to remote islands in the sea. More than three hundred kinds are known, ranging in size from the tiny elf owls, no larger than sparrows, to the powerful horned owls and eagle owls, which are two feet or more in length.

Scientifically, all owls are included in one order, the Strigiformes, in which two families are recognized, one for the barn owls (*Tytonidae*) and the other (*Strigidae*) for all other species.

Regardless of their size, owls are instantly identified by their broad faces with prominent disks of feathers about the eyes, coupled with sharp, curved beaks and claws, and long, fluffy feathers. Their nearest relatives are the whippoorwills, nighthawks, and goatsuckers.*

* See "Seeking the Smallest Feathered Creatures," by Alexander Wetmore, in the NATIONAL GEOGRAPHIC MAGAZINE for July, 1932.

Formerly it was thought that owls were allied to hawks and falcons, but on careful study it was found that these two groups differ radically in structure. The resemblances are superficial and are due to the form of the beak and claws, which have undergone similar development from seeking the same kinds of foods.

Most owls are nocturnal and by day sleep in caves, hollow trees, tangles of leaves, or whatever may offer protection. When they are found by other birds, there is high excitement, jays, cardinals, and the like gathering to scold and chatter at these enemies of the night. Crows are more aggressive and often drive the largest owls to seek more secure cover where they may avoid their cawing tormentors.

The homes of owls are located in hollows of trees, caverns in rocks, or in stick nests built by hawks, crows, or other birds. Often no nesting material of any kind is used. The eggs are white, occasionally tinted with buff or pale blue, but without markings, and are peculiar in being usually elliptical or nearly round. The young are covered with white down and remain in the nest under care of the parents for a considerable time.

QUICK TO DEFEND THEIR FAMILIES

In defense of their young, owls are often aggressive and swoop at any and all who chance to pass, sometimes with startling effect when the attack is delivered without warning. A friend climbing to the nest of a great horned owl (page 228) was struck so savagely in the back by one of the parents that the strong talons of the bird drew blood through his heavy clothing.

While walking at dusk near a woodland camp in eastern Kansas, I was startled by something that, without warning, struck my bare head. The aggressor was a little screech owl (see page 233) with a family of young near by. At other times I have had owls knock off my hat, assisted no doubt by my involuntary flinching as the bird brushed past. In Puerto Rico, country people informed me gravely that a native owl stole the hats of persons who walked the trails at night and carried them off to use them for nests, a superstition probably based on attacks such as those described.

All owls have soft plumage composed of long, fluffy feathers. The wings have softened margins, so that in flight the birds move without sound, as if they were shadows. In owls, the lower leg, or tarsus, and

upper surfaces of the toes, bare in most birds, are covered with feathers, these being reduced or absent only in a few species that inhabit warm countries. The plumage colors run usually to gray, brown, and buff, with lighter markings of buff and gray. White and black are extensive in some, but brighter colors are rare or absent.

Some of the smaller owls have rounded markings on the back of the head, resembling eyes. In South America the country people told me these birds were "four eyes" and could see behind as well as ahead (see page 240).

WHY THE APPARENTLY ROTATING HEAD DOES NOT TWIST OFF

The eyes of owls are fixed so immovably in the head, where both are directed forward, that the bird must change the position of the head to alter its line of vision. They are especially large and are adapted for vision where there is little light. As a very small boy, I was told that an owl, sitting on a perch, would follow with its eyes a person moving around and around it, until eventually its neck was wrung and its head was twisted off.

Opportunity arose to test out this intriguing theory on a Florida screech owl, perched in a low pine, and I walked around it for some time with its eyes steadily on me. As its head did not fall off, I was completely mystified, but later, at a somewhat mature age, in other experiments of this kind, I detected the quick movement by which the owl snaps its head around rapidly, giving the semblance of continuous motion in one direction.

Though the majority of owls remain hidden in shaded, secluded places by day, there are a few that are abroad by day or by night indifferently. This is true of the snowy owl, which lives in summer through the long Arctic day, and of the burrowing owls of open country in the New World (see pages 229, 237). One of the latter that I had in captivity for some time delighted in resting in the sun, and in broad daylight would detect and watch hawks and other birds flying at such great heights that I could barely see them.

AN OWL'S MENU HAS A WIDE RANGE

Owls live mostly on animal food which is captured alive, except that occasionally they feed upon rabbits freshly killed by automobiles along our highways, or upon



Photograph by Ben East

THE BARN OWL MAY BE RECOGNIZED BY ITS HEART-SHAPED FACE

Naturalists have classed barn owls under one family, while all other owls are members of another. This one brooded nearly ninety days over a clutch of ten eggs that failed to hatch. Then, after pushing them from the nest, she laid others and raised a family of four.

other carcasses. Mice, rats, and other small mammals are regular prey, as are birds of various species.

The barred owl eats many crayfish and fish, while crabs and fish are staple foods of the fish owls of Africa and India, which have featherless legs and rough, horny-surfaced toes to assist in capturing such slippery prey. I have known the great horned owl to capture goldfish in ornamental pools, but this is unusual.

Owls, like hawks, tear their prey apart and swallow the pieces entire. During digestion the flesh is assimilated, while bones, fur, feathers, and other indigestible portions are formed into compact pellets, which are regurgitated to leave the stomach empty for another meal. Such pellets accumulate about roosts and, through identification of the bones contained, give a

valuable index to the food of the bird concerned.

The great horned owls and snowy owls are fiercely predatory, killing rabbits, squirrels, and other creatures of good size. The former has been known to capture and eat small owls. In the Dominican Republic I once saw a burrowing owl tearing at the body of a young bird of its own kind which had been killed and thrown aside by some native. While the mind of a bird may be known only by inference, it was my impression that the owl had been attracted by the sight of bloody flesh, and that the cannibalism was involuntary, the bird being without recognition that its prey was a creature of its own kind.

Occasionally wild mice increase for various reasons until they form a veritable plague. Under such circumstances short-



Photograph by William L. and Irene Finley

ELF OWLS ARE AS ACCESSIBLE AS GNATS ON PORCUPINES

Woodpeckers drill holes in giant cacti. Oozing sap hardens. A gourd-like nest is formed. Result: a home to be appropriated by the tiny, night-foraging elf owl (see illustration, opposite page).

eared owls (page 225) gather in abundance and aid in reducing the numbers of the pests. Burrowing owls feed extensively on beetles and other large insects, and the barn owl in California destroys many Jerusalem crickets (see pages 225, 237).

BARN OWLS DWELL IN THE HEART OF
THE NATION'S CAPITAL

Since the early days of the Smithsonian Institution in Washington, barn owls have inhabited the northwest tower of the Smithsonian building, a secure retreat in the midst of the city. From 1,247 of their regurgitated pellets, picked up on the tower floor, I have taken the skulls and other bones of

1,987 field mice, 656 house mice, 210 rats, 92 sparrows and black-birds, and 4 frogs.

The usefulness of these birds in the destruction of injurious rodents is evident, but in spite of this all owls are considered vermin by some and are killed by hunters whenever seen. The sins of the larger species, which eat chickens and game, are visited on all their brethren, to the end that, with the hawks, owls have been included in bounties, and hundreds of useful kinds are killed under the mistaken belief that they are injurious. The majority of them should be protected at all times.

Barn Owl

(*Tyto alba pratincola*)

When encountered in a barn, hollow tree, or other retreat, the barn owl exhibits mannerisms so grotesque and utters calls so strange that often there is question as to whether it is bird or beast. Frequently letters come to the Smithsonian Institution asking information

regarding it, and to most it is known as the "monkey-faced owl" (see page 225).

This owl remains completely secluded by day, coming out at dusk to search for food. In Arizona I have seen them abroad in early twilight, quartering back and forth over the banks of dry washes and mesas, searching for mice and kangaroo rats. After nightfall in the city of Washington I have glimpsed the white breast of one of these birds by the light of street lamps, as it flew over from the Smithsonian towers to raid the sparrow and starling roosts on Pennsylvania Avenue. In southern California as many as fifty have been found roosting together in groves of oaks.



THE LARGEST CACTUS IN THE UNITED STATES HARBORS THE SMALLEST OWL

Mr. and Mrs. William L. Finley, noted naturalists and bird-lovers, take an elf owl from its hole in a giant cactus in Arizona. These clever little birds have been known to raise one wing in front of them, possibly to disguise their identity (see illustration, opposite page).



Photograph by William L. and Irene Finley

SIX WINDOWS WIDE OPEN AND THREE FOOD DOORS AJAR

These glassy-eyed, young great horned owls seem to be a little impatient because breakfast is late. They may be served rabbit, woodchuck, duck, even a goose or turkey. Their large and ferocious parents are solicitous birds, having been known to attack even men who approached their nests.

The nest of the barn owl ordinarily is concealed in a hollow tree, cave, or building. The eggs are laid at irregular intervals, so that partly incubated eggs and young are often found together. The nesting season is somewhat variable. No nesting material is used except rubbish that may have accumulated in the cavity chosen for a home.

The young crouch, peer, and posture, with nodding heads, in attitudes most strange and unbirdlike, uttering weird calls and hisses that at times resemble the sound of escaping steam. Little wonder that they are objects of surprise to those not acquainted with them!

Barn owls are not aggressive and often do not offer to bite or scratch even when handled. In captivity they are interesting mainly for their grotesque appearance, as they sit quietly by day and are active only by night.

Beneficial everywhere, this species, like other owls, is subject to constant persecution, sad to say. The barn owls eat destructive field mice and rats in large numbers, and in the West add to this diet numerous pocket gophers, a bane to ranchers everywhere. In regurgitated pellets of this owl from California I have identified hundreds of skulls of these destructive mammals. Barn owls also consume large insects, being especially partial to the Jerusalem cricket of the West.

These owls should be protected always for the good that they accomplish in relation to the interests of man.

The barn owl regularly raids the summer roosts of the abundant starlings where these birds gather to spend the night in groves of trees. The capture of a starling or two seems to make little difference to the multitude of its companions, but when the owls remain after the meal and call and chatter, this is too much for starling nerves, and the birds rush out with a roar of wings to circle in the darkness. A few nights of this and they usually remove to other quarters. Those who suffer the annoyance of starling roosts may well wish that barn owls were more numerous.

The barn owl is found regularly from northern California, Colorado, Ohio, and Connecticut south to Nicaragua, and occurs casually north into Canada. Related forms are widely spread through the temperate portions of the world.

Long-Eared Owl

(*Asio wilsonianus*)

When the long-eared owl is flying, its broad wings and tail give a deceptive appearance of size, as in reality the body of this species is small and slight, its bulk being composed principally of long, fluffy feathers (see page 225). In general appearance it resembles the darker forms of the great horned owl (page 228), but is decidedly smaller and differs completely in temperament.

Though formerly abundant, the long-eared owl has suffered at the hands of hunters and bounty systems, so that in many sections of the East it is now rare.

This owl is found during the day hidden in heavy cover, seeking pine and spruce trees where these are available, and the shelter of dense growths of leaves or limbs elsewhere.

In the Middle West I found them in fall and winter in little groups of six or eight that rested near one another. Possibly these were family parties. I have seen them in clumps of willows and in tangled roots beneath the bank of a gully when other cover was not at hand.

Like the screech owl and other small woodland species, the long-eared owl sometimes tries to escape detection by drawing its feathers close against its body and becoming stiffly erect with partly closed eyes, simulating a broken branch or part of a tree trunk.

These birds breed in nests of sticks placed in trees, often using old abodes of crows or herons, but sometimes building their own. Rarely, they place their nests on cliffs or in holes. They have from three to seven young in a brood.

The food of this owl is mainly mice and other small mammals, with only an occasional bird. In 225 regurgitated pellets that I examined, I identified remains of 187 mice and only five small birds. The long-eared owl also eats many large beetles, must be considered beneficial, and merits constant protection.

At a camp in northern Wyoming where I was collecting small mammals as specimens for the National Museum, I was troubled by the loss of numerous traps. I was puzzled as to what had become of them until one day I found a nest of young long-eared owls in a low willow near my camp, with



Photograph by Guy A. Bailey

SILENTLY AWAITING NIGHTFALL—AND A MEAL OF MICE

Daylight finds most owls hidden from sight in dark places—hollows of trees, old woodpecker nests, and other crevices and recesses. This long-eared owl, though resting in an open nest, is sheltered from intense light by thick pine foliage.

my missing traps scattered about it. Evidently the parent owls were not averse to assistance in securing food for a large and constantly hungry family, and as fast as mice were caught they were carried away, traps included, to the nest, where the mice were eaten and the traps discarded.

The notes of the long-eared owl include a low, hooting call, peculiar whining notes, and twittering, whistling sounds. They are less commonly heard than the calls of the larger owls.

The long-eared owl nests from central British Columbia and southern Quebec to southern California and Virginia. In winter it ranges south to southern Florida and central Mexico. Closely allied forms are found in Europe, northern Asia, and North Africa.

Short-Eared Owl

(*Asio flammeus flammeus*)

While most owls are inhabitants of woodlands, the short-eared owl ranges in open country in marshes, prairies, and meadows, where it rests on the ground or on clumps of low vegetation. Walk through its haunts and it rises suddenly, often at a distance of forty or fifty yards, and flies rapidly away, turning its head back over its shoulder to see what has startled it. Sometimes it perches for a moment on a post or low bush. Then its head appears completely round, the tufts of feathers that compose the "horns" being so short as to be seen only near at hand. More often it drops back to the ground, where it is hidden from sight by grass or rushes (see page 225).

More wary than the long-eared owl, this bird has remained common in spite of the many killed by hunters.

Although this owl has excellent eyesight by day, it usually hunts by night, flying with soft wings a few feet above the ground and pouncing suddenly on any prey that appears beneath it. I have seen them in winter coursing by moonlight near the highway leading to the Key Bridge on the Virginia shore of the Potomac River at Washington, and also flying by day over small areas of waste marshlands completely surrounded by railroad tracks in the suburbs of Chicago.

The nest of this owl is placed on the ground, where from four to nine eggs are laid in a slight depression containing a small amount of nesting material. When caring for their young, the parent owls hunt constantly by day.

The short-eared owl eats mice and other small mammals mainly, with occasional birds, and it must be considered distinctly beneficial. Over open ground, the owls seize their living prey easily without stopping, and carry it to a perch to be eaten. When cover is heavy, the owls pounce quickly into the grass and may remain on the ground to eat if successful in effecting a capture. Where there is a sudden increase of mice, these owls gather in numbers and at such times may be considered gregarious, as thirty or forty may be seen together.

The call is a monotonous hoot, repeated rapidly, higher in tone than the call of the great horned owl, and the bird also has high-pitched squealing calls. When its nest or young are approached, it often evidences displeasure by loudly snapping its bill.

This species is regularly migratory and ranges widely when not nesting. It breeds from northern Alaska and Greenland to California, Kansas, and New Jersey, and in winter is found south to Guatemala. It also ranges in South America to the Falkland Islands, and in Europe, Asia, and north-eastern Africa. Related forms are found throughout the world.

Great Horned Owl

(*Bubo virginianus*)

Fiercest and most powerful of our common owls, the great horn is the best known of those found in America. It ranges widely and is able to live under a variety of natural conditions (see page 228).

The great horned owl, except during the nesting season, is solitary and in the main inhabits unsettled areas. In the East and North it frequents dense woodlands of conifers or hardwoods, coming into the open only on its hunting expeditions at night. In arid sections in the West it is found along the cliffs of rocky canyons, or along earth-walled gulches where holes and crannies offer shelter during the day. In the mountains it ranges in open forests where there is little settlement and the birds are not frequently disturbed.

Even in the colder parts of its range this owl nests early in the year. I have taken eggs in Wisconsin the first week in March, during a blizzard, when the weather was so cold that the eggs were frozen before I arrived home. To give approximate dates, in New England they may breed in February and March, in Virginia in late January and February, and in Florida in late November and December.

The nest is usually in the deserted domicile of a hawk or crow, sometimes high above the ground, or about cliffs where holes may be occupied. Where such shelters are lacking the birds have been known to nest on the ground. The eggs usually number two or three, rarely as many as five. One family is reared each season, and both male and female incubate the eggs, which require about four weeks to hatch.

Great horned owls are solicitous parents, protecting their nests most successfully against depredation by other forest creatures, and many are the recorded occasions on which they have struck fearlessly at men who approached their homes. Driven with savage vigor, the claws of this owl can inflict wounds through heavy clothing.

The voice of the great horned owl is a low *whoo whoo whoo whoo whoo whoo*, the first four notes given rapidly and the last two somewhat slowly. One bird of a pair, supposed to be the female, has a deeper voice than the other. The notes carry for long distances, and to human ears attuned to wild Nature they are an attractive and mysterious element in life outdoors.

In choice of food the great horned owl is bold and predatory. Any bird or mammal not too large is subject to attack, this owl killing with ease rabbits, hares, woodchucks, and ducks, and occasionally even taking geese and turkeys. Domestic cats are not immune, and the bird regularly kills and eats skunks without seeming to be affected



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LET RATS AND MICE BEWARE THESE OWLS' SHARP TALONS!

When the author analyzed more than a thousand disgorged pellets of a pair of barn owls (top) nesting in a tower of the Smithsonian Institution, Washington, he discovered that they had consumed 2,853 rodents. Because of its characteristic markings, this bird is known to many as the "monkey-faced owl." It and the long-eared owl (left), of catlike face, hunt chiefly at night. Inhabitant of marsh and prairie, the short-eared owl (bottom) has no fear of the sun, being abroad frequently by day. The three represent two families found throughout the United States, the range of the short-eared owl being almost world-wide.

by the odor. I have shot great horns which were so heavily impregnated with this scent that it still remained evident after days of "airing" in the open and years of seclusion in a museum case.

In the north woods great horned owls have been shot filled with the quills of a porcupine, an animal usually immune to attack. One owl was found in Massachusetts holding a large blacksnake in its talons with the snake wrapped about its body so that the bird was nearly choked. Rats, mice, crayfish, large insects, domestic poultry, and birds of all kinds figure in the diet of this species, which must be rated as destructive.

That great horned owls are not entirely savage, however, is shown by one kept as a pet; year after year it served as foster parent to broods of young chicks, hatching the eggs and caring for the unusual brood assiduously.

In the broad territory it occupies, this owl has developed a number of forms that differ in size and color. These differences are illustrated by the accompanying plate (see page 228), which shows the ordinary type with dark coloration, and the arctic horned owl of the north, which is very pale in color though retaining the darker markings.

As a species, the great horned owl ranges from Tierra del Fuego and the Strait of Magellan north through western and northern South America, Central America, and Mexico to the limit of trees in the far north. North of Mexico the geographic races are recognized.

Great Gray Owl

(*Scotiaptex nebulosa*)

Related to the barred owl, which it resembles in smooth, rounded head without feather horns, this species is easily distinguished by larger size, grayer coloration, and light-colored eyes (see pages 229 and 232). The great gray owl lives in numbers in heavy forests in the far north and more rarely in the western mountains. It is known to relatively few persons.

Though this species in actual measurements of total length is among the largest of our owls, equaling or exceeding the great horned and snowy owls in this dimension, its apparent size is due to the long wings and tail and to the length and fluffiness of its plumage in general. As compared to the

others, its body is slight and its feet and legs small and delicate.

While it is in the far north, this owl must be forced to hunt at times by daylight because of the length of the day; but it prefers night, and even in its northern range it rests secluded in dense shade when not in search of food.

The great gray owl builds in a tree, making its nest of twigs and moss, lined with feathers or other soft materials. From three to five eggs, slightly smaller than those of the great horned owl, are laid, nesting taking place in the north from April to June.

The notes of this bird are described as deep in tone, but its calls do not seem to be well known.

With its wonderfully thick dress of long, soft feathers which extend clear to its toes, this owl is immune to cold. Though it comes south in winter into the northern United States, its presence there is casual except during years when its food supply in the north fails. Then numbers of the birds are forced southward.

It lives on mice, rabbits, squirrels, and birds, but, being less powerful than the great horned owl, it necessarily chooses smaller prey. Its long, slender, sharply pointed claws penetrate the thick winter fur and feathers of the creatures that comprise its food and hold them without the slightest difficulty.

The great gray owl (*Scotiaptex nebulosa nebulosa*) in America nests from the northern limit of trees south to central California, northern Montana, and central Canada. It comes south in winter as far as Wyoming, Ohio, New York, and New England. The Siberian gray owl (*Scotiaptex n. barbata*), which is paler colored, has been found in Alaska. Allied races range in northern Europe and Asia.

Snowy Owl

(*Nyctea nyctea*)

One bleak December day on the beach near Ocean City, Maryland, a large, apparently pure-white bird, of graceful flight, glided past me to perch on the summit of a low sand dune overlooking the ocean. From its size and color, I recognized it instantly as a snowy owl, a winter visitor from the north (see page 229). It faced the cold wind with gaze directed steadily out across the water, where its attention was attracted

by flocks of ducks driving steadily southward. At intervals it turned to look back over the inland dunes, a form of wild beauty against a wintry setting of gray sky, gray water, and yellow, wind-blown sand.

As I came near, partly hidden behind a ridge of sand, the owl rose and flew to the south, resting from time to time on the summits of the tallest dunes.

The male of the snowy owl is frequently so nearly pure white that careful search is necessary to discover a few dusky flecks on the concealed margins of the wing feathers. The female, considerably larger than the male, is also white, but the plumage is barred more or less heavily with dusky and slaty brown. The birds are well suited for life in regions of cold, as their feathers are long and abundant, and grow in dense, closely set filaments clear to the tips of the toes. Even the bill is almost concealed amid the feathers of the face.

The usual home of the snowy owl is in the far north, where it ranges through the circumpolar regions of both the Old and New Worlds. It lives on the open tundra, though it is found also on the barren slopes of mountains, and seldom enters regions of extensive forests except in winter.

The food of this owl in its native haunt is composed largely of lemmings, which are a kind of short-tailed mice, the arctic or varying hares, and, to a less extent, birds of various kinds, and fish.

BIG INVASIONS IN FAMINE YEARS

At irregular intervals the arctic hares, or snowshoe rabbits, that form much of the winter food of all hunting animals in the vast north, die from disease in such tremendous numbers that there are few left to satisfy the hunger of the many creatures dependent upon them. Lynxes and men are left to starve miserably in the cold of the dark winter days, but the snowy owl spreads its broad wings and glides away southward.

As the shortage of rabbits comes every eight or ten years, the big invasions of snowy owls come at such intervals, though a few may reach the northern United States each winter.

During these flights of large numbers in the New England States, hunters kill dozens of snowy owls out of curiosity as to what they may be. The birds are often found in little companies that may contain six or eight individuals. Several such flocks may be seen at one locality in a day, and in big

invasions, such as that of 1926, hundreds of the birds are recorded. The snowy owl travels without fear over the ocean and has come aboard ships a thousand miles from land. Individuals have even reached the island of Bermuda.

A FLYING GHOST IS LAID

Track walkers along a lonely stretch on one of the principal railroads leading into the city of Washington some years ago were terrified at night by a moving white object that glided noiselessly through the air. It was interpreted as the ghost of a man who had been killed in the vicinity. After several weeks during which this spirit of the night had appeared at intervals, striking terror to the soul of the observer, the apparition was laid most effectively when a large snowy owl was shot from its perch in a tree by a hunter.

In the northern tundras the snowy owl places its nest on the ground on some low eminence. The eight or ten white eggs, longer and less rounded than those of most owls, are as large as small hen's eggs, and are laid in a slight depression which may be lined with a feather or two and some bits of moss, or may be bare. The eggs are not deposited at intervals of a day or so, as those of most birds are, but are laid irregularly through a considerable period, so that it is usual to find newly hatched young and fresh or partly incubated eggs in the same nest.

The young are covered with white down, which, as in the adults, extends clear to the toes. The task of incubation is said to fall to the female, but the male stands guard near by or seeks food for his mate.

The snowy owl is not nocturnal, as, in its northern haunts where the sun remains above the horizon during midsummer, it must perforce remain active by day. Even where woods are at hand these birds delight in perching on the ground, preferably on some low hillock where they can look about over open spaces. One that lived for several years in a cage in the National Zoological Park, in Washington, rested usually on the ground, though a perch was provided.

In its northern home this owl is regarded at times with dread, as it is fierce in its attacks on those who approach its nest. Some have asked if it can be really a bird. Laplanders are said to consider the flesh of the snowy owl excellent eating. This taste in food may have been shared by men of earlier periods in Europe, as bones of the snowy



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A HIGHWAYMAN OF THE NIGHT AIR LOOKS DOWN ON AN ARCTIC HENCHMAN

One of the fiercest and most powerful of birds, the great horned owl, perched on a tree stump, has been called the "tiger of the air," so savage and fearless are its methods. Like the jungle beast, it strikes unheard, its talons dealing death to birds and mammals. Another form is the arctic horned owl, shown with daggerlike claws deep in the fur of a snowshoe rabbit, whose peculiar track is seen in the snow at the right. The great horned is a bird of eastern, the arctic horned owl of western, North America.



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MUCH OF THEIR FORAGING IS DONE IN DAYLIGHT

Because true night is shortened or absent in the northern summer range of the great gray (top), and the snowy owl, they must perforce hunt for hares, mice, and birds during daylight. Both are known as winter residents in northern United States. Foolish crows have been seen mobbing the supposedly sun-blinded snowy owl, only to meet swift death in a rush of silent wings and unerring claws. The comparatively rare great gray, clothed in fluffy feathers, measures the largest of North American owls, though less powerful than its snowy companion.

owl have been found in numbers in the kitchen middens, or refuse heaps, near the caverns and grottoes inhabited by the strange, primitive men of the hunting tribes of Pleistocene times in France.

The snowy owl nests in the barren grounds from northern Russia to Greenland and Alaska, and in its southern flights spreads south to Japan, Turkistan, and even into northern India. It regularly occurs in the north of Europe and comes casually farther south. In the United States it is common, during its irregular occurrences, in the Northeast, particularly on the seaboard, and less abundant westward.

Barred Owl (*Strix varia*)

In the eastern half of our country the barred owl is one of the best known of its family, its loud calls being familiar to all who are abroad at night in regions of lowland woods. The bird is large, appearing equal to the great horn, though, as in the case of the great gray owl, a good part of its bulk is due to its long feathers, its body being small and relatively slender. The head is round, without vestige of ear tufts, and the bird, unlike most of our other owls, has dark-colored eyes (see page 232). It is solitary except during the nesting season, and then is encountered only in pairs.

In the South barred owls are partial to wooded swamps, and everywhere they are found in the open mainly during their nightly hunt for food. They are loudly vociferous in their calls, these being heard to some extent throughout the year. In spring the variety of their notes is surprising, and on many occasions when sleeping outdoors I have been awakened by their noisy cries.

This owl is frequently mobbed by the small birds of the forest when discovered by day, and at such times it is much disturbed by scolding groups of jays, cardinals, titmice, sparrows, and other species that gather to peep and peer and protest its presence. Crows speedily put a barred owl to flight to more secluded quarters.

The barred owl nests in hollows in trees, or in old hawk or crow nests, laying from two to four eggs. In Florida it nests as early as December and January, while in the North the date is later, usually March and April. Eggs have been found in Connecticut, however, in February, when the

ground was covered with snow and the eggs themselves lay on ice frozen in the nesting cavity. One brood is reared each season. These birds are migratory to some extent, and in fall sometimes are lost in unusual situations, so that at times they are found about tall buildings in cities.

The food of this owl is composed mainly of mice and other small mammals, and it takes comparatively few birds. Curiously enough, remains of smaller owls have been found occasionally in stomachs of this species. It also eats frogs, fish, crayfish, and large insects.

The northern barred owl (*Strix varia varia*) is found from Saskatchewan and Newfoundland to eastern Wyoming, Arkansas, and the mountains of North Carolina. The Florida barred owl (*Strix varia alleni*), which is slightly smaller and has toes nearly bare of feathers, ranges in the South Atlantic and Gulf States from the coast of North Carolina to eastern Texas. The Texas barred owl (*Strix varia helvecola*), which is paler in color, occurs in south-central Texas. Another form ranges in the highlands of Mexico.

Spotted Owl (*Strix occidentalis*)

A western cousin of the barred owl, the spotted owl is rightly considered one of our rare and unusual birds. In the Northwest it is found in heavy forests, and in the mountains hides in dense growths of quaking aspens, or in deep, dark canyons. In fall and winter the birds wander from their secluded haunts to some extent and come into other situations. Even so, they are seldom seen, and until recently have been known to few, even among naturalists.

Resembling the barred owl in smooth, round head and dark eyes, this species likewise is chiefly nocturnal, being active in daylight hours principally when it has growing young in its nest. By preference it is abroad at night, coming out by day mainly when driven by necessity to search for food. The mottled colors of the plumage of this owl harmonize completely with sunlight coming through leaves; so that, whether resting motionless on the face of a cliff or against the trunk of a tree, the bird blends with its surroundings and so escapes detection (see page 232).

The nest of the spotted owl is a structure of sticks lined with bark and other soft

materials in the fork of a tree or in a cavity in rocks. One found by Donald Dickey in southern California was located in a hole in the side of a cliff fifty feet above the bottom of a deep canyon. The parent owl, which had two young, was tame and unsuspecting and in no way resented approach, once even alighting in the nest cavity when it was being examined by a man suspended from a rope.

The note of the spotted owl is a hooting call, heard most frequently during the nesting season, when the birds may be quite noisy. They have in addition a considerable variety of other notes. Occasionally these birds may be attracted from their coverts during the day by imitating the shrieking of a wounded or frightened bird, but except for this these owls are seldom seen.

The spotted owl feeds mainly on mice and rats, occasionally taking birds. In New Mexico and California it is recorded as killing many of the abundant wood rats, and a skull of the rare red tree mouse was found in the stomach of one killed in northern California. One kept in captivity by E. S. Steele was tame and confident and never refused to take mice, rats, or chipmunks from the hand, though even when hungry this owl would not accept birds of any kind.

Three races are recognized. The California spotted owl (*Strix o. occidentalis*) ranges from central California in the Sierras of Mariposa County to northern Baja California. The northern spotted owl (*Strix o. caurina*), somewhat darker, is found from southern British Columbia to central California, and the Mexican spotted owl (*Strix o. lucida*), lighter below, occurs from Colorado and Arizona to central Mexico.

Screech Owl (*Otus asio*)

A tremulous, high-pitched call, quavering in ghostly cadence through the still night air, announces the screech owl, best known of the smaller American owls, as it is found through a broad range (see page 233).

To some superstitious folk of the South, the note of this bird betokens the approach of death or other trouble if uttered near a house. As a charm to counteract the evil, they turn the left shoe upside down, pull the left trousers pocket inside out, or cast a bit of iron or a handful of salt in the

fire—such are the beliefs of those who follow omens.

The ill thus imagined becomes fact and not fancy to the mice and other small creatures that form the food of this rapacious bird. To them the screech owl is indeed a goblin of the night.

A bird of woodland groves and forests, it dwells indifferently in the orchards of New England, the scrub pines of the South, or the scanty cottonwoods that follow the small watercourses in the drier sections of the West. It has prominent "horns" of feathers that project above the head, distinguishing it from any of our other small owls except its cousins, the flammulated and spotted screech owls.

By day the screech owl retires to hollows in trees when these are available, and, failing these, to the densest cover accessible, where it may hide from the eyes of other birds and rest. When it is discovered, there is loud outcry, as jays, cardinals, flickers, titmice, and other small species gather to peer and scold, reviling the one responsible for the destruction of many of their number. Occasionally, when the owl is in an exposed situation, the attack becomes real, and, handicapped by daylight and by force of numbers, the owl may be put to flight to search for safer quarters.

Among the screech owls found in the eastern United States there are two distinct color phases, one gray and one reddish brown, as indicated in the two lower figures of the plate on page 233. These are merely individual variations, as both reddish birds and gray birds are found in the same family of young, regardless of sex. Curiously, the western screech owls do not exhibit these two definite styles in coloration.

Hollows in trees furnish nesting quarters for these little owls, old woodpecker holes being frequently selected. The eggs are laid in the bottom of the hollow without nesting material. Ordinarily from three to five young constitute a family, but as many as nine have been found. When the young are out of the nest the parents often swoop at the heads of passers-by, snapping their bills threateningly.

The screech owl feeds extensively on mice of various kinds and on large insects. Moths and beetles are taken in numbers and birds of various sorts are eaten. Crawfish, frogs, spiders, small snakes, snails, scorpions, earthworms, and millepedes in



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THEIR EERIE HOOTING FRIGHTENS THE TIMID

The weird *whoos-oo* night serenade of the northern barred owl (top) may continue until dawn. They frequently respond to imitation of their calls. Inhabitants of dense woods and swamps, they live on mice, fish, crustaceans, insects, and sometimes small birds. Below is the rare northern spotted owl, a western cousin. With the barn and flammulated screech owls (pp. 225 and 236), these are the only dark-eyed members of owl families found north of Mexico.



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HODGGOBLIN OF THE DARK IS THE POORLY NAMED SCREECH OWL

A high-pitched quavering note is its nearest approach to a screech, but the uncanny call sometimes stirs the superstitious, who go to fantastic ends to break its "evil spell." Because these small birds destroy harmful mice and insects, they bespeak man's protection. There is no satisfactory explanation as to why the eastern screech owls (lower pair) develop the two plumage phases, red and gray. Kennicott's (top with young) inhabits northwestern North America.

small amount vary the menu, and the birds on the whole are decidedly beneficial. Like other owls in recent years, these birds have become less common in many sections where they were formerly abundant.

About country estates the activities of the tree surgeon in filling cavities and removing dead limbs reduce the number of shelters available for small owls, a matter perhaps to the advantage of other birds. Where natural holes are not available, the owls will often use flicker boxes and similar artificial shelters.

As a species the screech owl ranges from New Brunswick, southern Manitoba, and Sitka, Alaska, south into Baja California and northern Mexico. In this vast area fifteen geographic races, differing in size and color, are found.

The plate (page 233) illustrates two types among these forms. Kennicott's screech owl (*Otus asio kennicotti*), a large dark form, of the northwest coast from Sitka to the State of Washington, is shown in the upper figure.

The red and the gray phases of plumage in the eastern screech owl (*Otus a. naevius*), which ranges from New Brunswick, Ontario, and southern Manitoba to the highlands of Georgia and west to eastern Oklahoma, are depicted at the bottom.

Flammulated Screech Owl

(*Otus flammeolus*)

Our curiosity was aroused by an unusual owl call heard nightly from a small gulch near a camp in the Chiricahua Mountains of Arizona. Investigating, Eugene Law and I found that it came from the little flammulated screech owl, a species as rare as the spotted owl and equally little known. As we moved slowly through the brush in our search, the owl, previously not seen, swooped suddenly at Law's head and then returned to a perch. Here we had a view of its short ear tufts and dark eyes (page 236), the latter being entirely different from the yellow eyes of ordinary screech owls (page 233).

Brief episodes of this character have given naturalists most of what little is known of the habits of this rare owl.

The flammulated screech owl is nocturnal and is seldom abroad by day. It is found in wooded areas in the western mountains, and in Colorado has been encountered as high as 10,000 feet above the sea.

The nest is usually in an old woodpecker hole, where the eggs, two to four in number, are placed on a few chips, to which there are added sometimes bits of twigs or feathers. The egg of a flicker has been found with those of the owl, indicating that the latter may sometimes preempt domiciles in use by other birds. However, the owls do not seem quarrelsome, as occasionally neighboring holes in the tree occupied by them may be in use by bluebirds and other hole-nesting species, all living peacefully in close proximity.

One flammulated screech owl collected by Dr. C. Hart Merriam at the Grand Canyon in Arizona had eaten a scorpion and various beetles. These birds also feed on small mammals.

This screech owl ranges from southern British Columbia and Idaho to Colorado, south through the mountains into Mexico and the highlands of Guatemala.

The spotted screech owl (*Otus trichopsis*), which is not illustrated, is somewhat like the ordinary screech owl, but has long bristly tips on the feathers of the face. Like the eastern screech owl, it has two color phases, one gray and one reddish brown. It is found from the Huachuca and Santa Catalina Mountains of Arizona south into Guatemala.

Saw-Whet Owl

(*Cryptoglaux acadica*)

This tiny owl takes its name from its curious notes, uttered constantly during the nesting season. They often resemble the sound made by filing a saw, though at times they are more softly modulated (page 236).

The saw-whet owl inhabits forests where it hunts at night. It breeds from April to June, placing its nest in an old woodpecker hole or other tree hollow, or rarely in a cavity among rocks or in the abandoned nests of birds or squirrels. There is sometimes a slight nest lining to protect the eggs, which range from three to seven in number. The birds call regularly from February to April, when some idea of their abundance may be gained. After the nesting season they become quiet and are seldom seen, as they rest quietly by day and are detected only by chance.

This owl feeds on mice and insects, occasionally taking small birds. At irregular intervals considerable numbers of saw-whet owls come south in winter beyond their

usual range, probably through shortage of their food supply. On such occasions some are thin and emaciated from lack of food, and the birds often appear in unusual localities. Even when in good condition they are frequently captured by hand, as they are so unsuspecting as to appear stupid. It is even possible at times to stroke them without causing alarm.

The saw-whet owl (*Cryptoglaux a. acadica*) nests from southern Alaska, Alberta, and Nova Scotia to California, Arizona, and Mexico, and in the East to the northern United States, coming as far as western Maryland in the mountains. In winter it goes casually as far as Louisiana and Georgia. The Queen Charlotte owl (*Cryptoglaux a. brooksi*), darker in color, is confined to the Queen Charlotte Islands, British Columbia.

Richardson's Owl

(*Cryptoglaux funerea richardsoni*)

This relative of the saw-whet owl is a northern bird that nests north of the United States, ranging widely through forested areas from eastern Canada to Alaska. Like the related species, it is rather strictly nocturnal and even in the far north, where daylight in summer is long, it appears sluggish except when it is dark. The Eskimos, according to Dr. E. W. Nelson, believe that it cannot see by day and call it *tuk-wholinguk*, "the blind one" (see page 236).

It is certain that the birds are tame to a point where they seem stupid, because, when they come in winter to more southern regions where they are in contact with man, they are often caught by hand. One New England lady, seeing a ball of feathers hanging on her clothesline, was astonished to discover that it was a Richardson's owl, alive. When captured, the birds are passive and offer no resistance.

Richardson's owl is an inhabitant of timbered areas, though where large trees are lacking, as in the Yukon Delta in Alaska, it frequents willow thickets. It nests in May and June in holes in trees, or in the deserted nests of other birds, laying from four to six eggs. Its food is mice, insects, and small birds, and it comes south in winter when a shortage of mice deprives it of this food supply. At such times it is found frequently about farm buildings, and many seem to starve, as those captured are often thin and poor.

At intervals they are very common during winter in the woods of Maine and elsewhere in New England, but as yet there is no record of their nesting within United States territory aside from Alaska. The southern invasions are governed by periodic shortages of mice in the north, as then the owls must migrate or starve.

Richardson's owl ranges from the tree line in Alaska, Yukon, and Mackenzie to northern British Columbia and Nova Scotia. In winter it is found casually to Oregon, Colorado, and New England, while its bones have been identified in ancient cave deposits in New Mexico. Tengmalm's owl (*Cryptoglaux j. magna*), a closely related form of eastern Siberia, has been taken on St. Paul Island, of the Pribilof group, Alaska.

American Hawk Owl

(*Surnia ulula caparoch*)

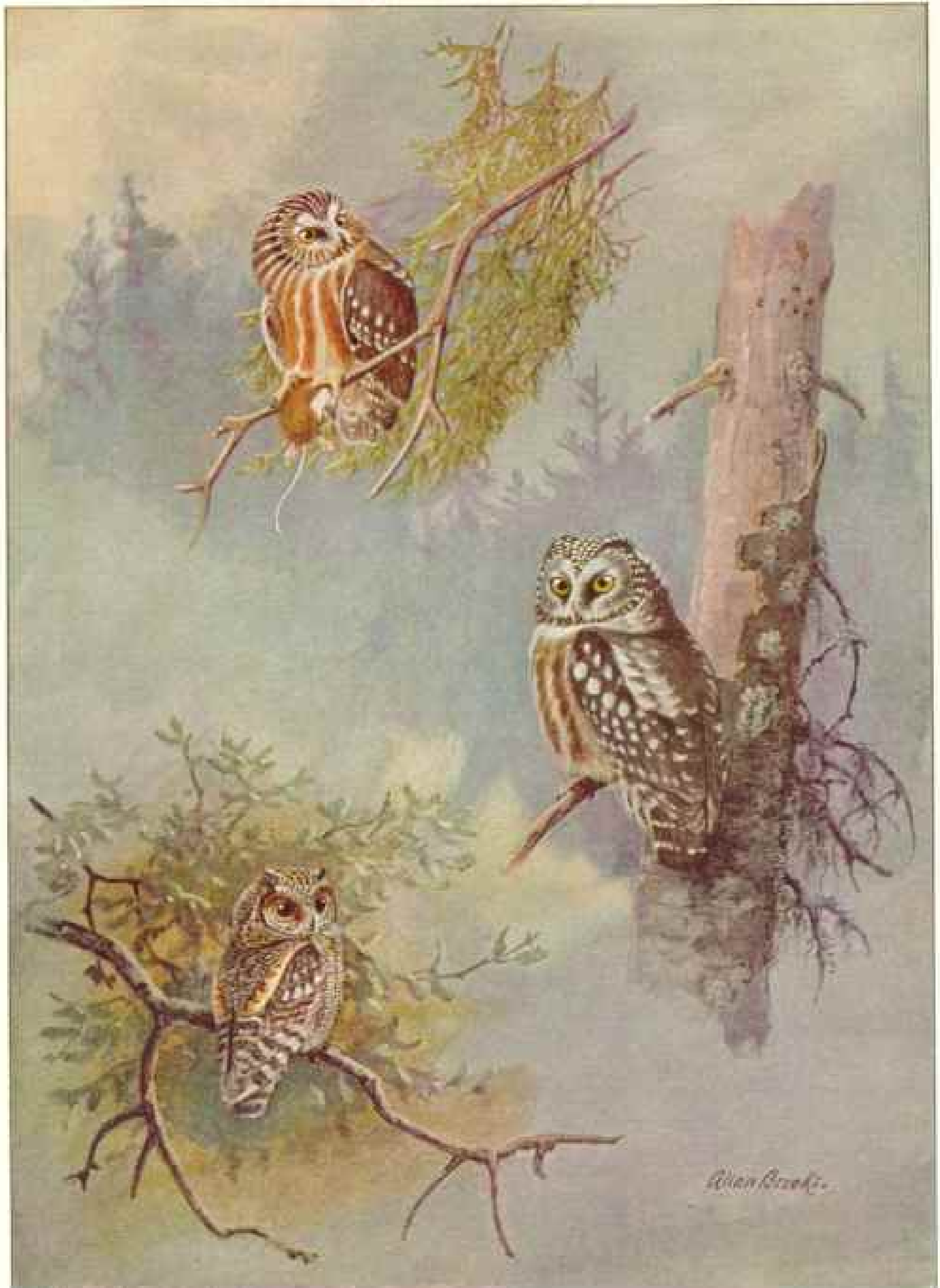
A long tail and slender body mark the curious hawk owl of the north from all our other species of owls, though comparatively few persons see it, as its range in the main is in the vast forests of Canada and Alaska, where human habitations are widely scattered (see page 237).

The hawk owl is much more conspicuous than any other forest owl, as it rests regularly on the top of a tall dead stub or some other commanding perch, where, in broad day, it is entirely in the open. Added to this, it has the habit of jerking its tail nervously like a sparrow hawk, a movement that aids in attracting attention to the bird. Ability to hunt by day or night is truly an advantage to a species of the north where day is long in summer and night equally extended in winter.

These owls are entirely fearless, and there is no difficulty in approaching them within gunshot. Though seen constantly in the open, they are flushed occasionally from thickets of aspen and willow.

The notes are described as a rolling trill, and when the birds are disturbed about their nests the hawk owls utter chattering calls and other sounds of protest.

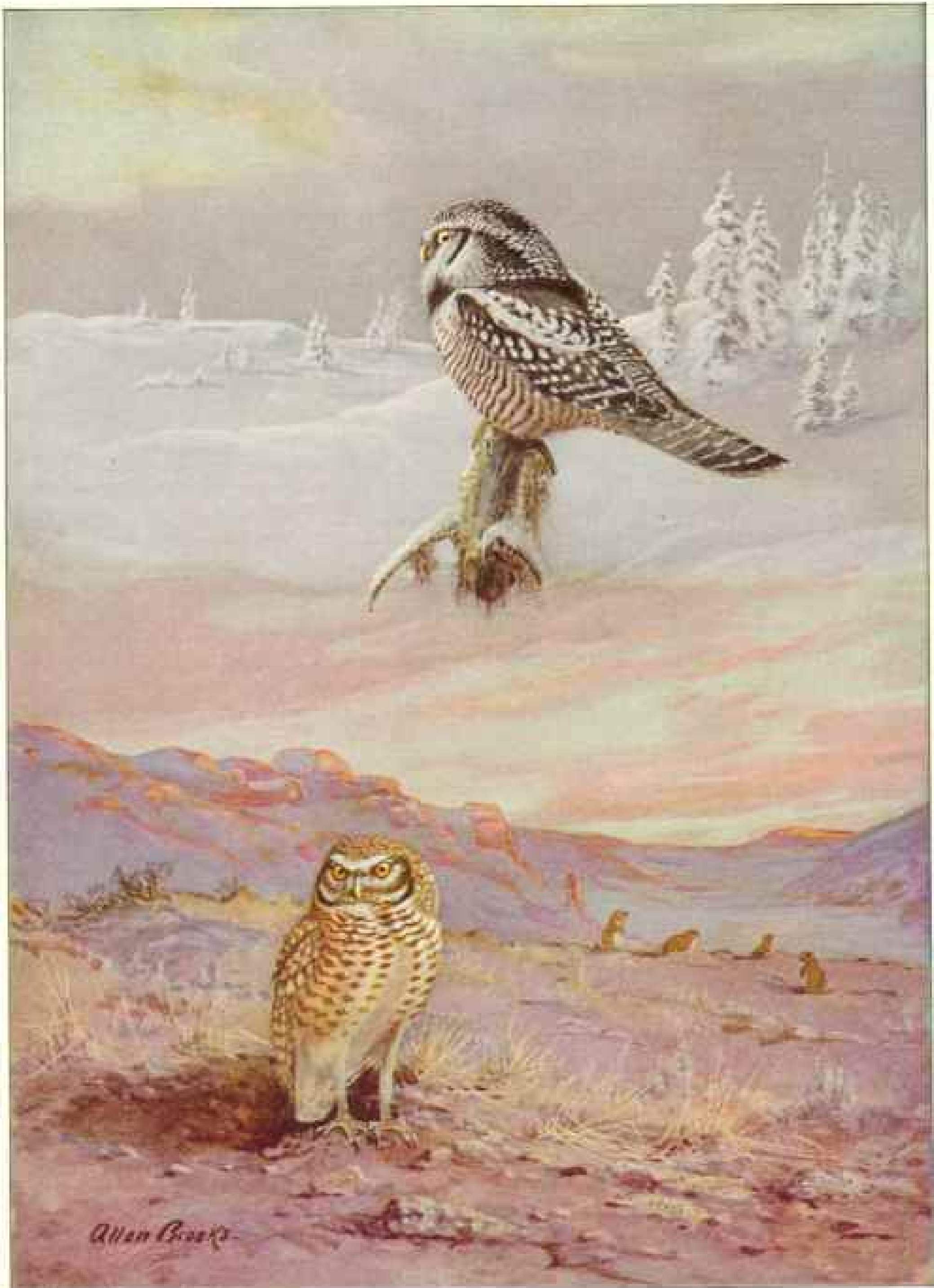
Heavily feathered to the tips of its toes, this species is entirely unmindful of cold, so that it remains in the far north throughout the winter, coming south in numbers only in those years when mice, lemmings, and other small mammals are scarce. Even then the hawk owl remains as far north as possible, unlike the snowy owl and other



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A BROWN-EYED WESTERNER ENTERTAINS WINTER VISITORS FROM THE NORTH

Lazy sleepyhead is the saw-whet owl, clutching a rodent. It often places its nest in an old woodpecker hole or tree hollow. At night its rasping cry sounds like a saw being filed. Eskimos call Richardson's owl (right) "the blind one," since it may often be caught by hand in daylight. Its musical cry is like water dripping from heights. Good mousers, both birds inhabit northern North America. At the moment they are guests of the little-known flammulated screech owl (bottom), whose home is in mountain regions of the West.



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ONE REVEALS ITSELF IN TREE TOPS, THE OTHER HIDES IN HOLE'S

Perching high on an old tree stub, the American hawk owl of Alaskan and Canadian forests awaits the moment to swoop silently down on unsuspecting rodents and birds, while the western burrowing owl stays close to its ground hole, feeding on locusts, snakes, grasshoppers, or anything its sharp claws can snatch. Unlike most owls, both see well and hunt regularly in broad daylight. The burrowing owl, inhabiting unforested regions of western North America, will occupy any abandoned hole or perhaps dig its own.

species that pass southward in numbers.

Regardless always of temperature, the hawk owl begins its nesting season in April and early May, even in the high latitude of Great Slave Lake, at a season when ice and snow abound and the weather is still extreme. A nest of twigs is built in a pine or spruce, or, failing this, the eggs are placed on decayed wood on the summit of a broken stub or stump. Intruders in the home domain are attacked without hesitation, and many naturalists have had hats knocked off by parent owls when climbing to their nests. The birds' sharp claws are to be respected, as they can easily gash the skin.

The hawk owl subsists mainly on mice and lemmings. It eats insects in summer and also kills birds the size of a ptarmigan.

The American hawk owl breeds from northwestern Alaska and Hudson Strait south to southern British Columbia and the Ungava region. It winters south into the southern Canadian Provinces, casually across the border in the northern United States. The Siberian hawk owl (*Surnia u. pallasii*) has been taken twice in Alaska. Other races of this bird are found across Siberia and northern Europe.

Burrowing Owl

(*Speotyto cunicularia*)

During travel through the open plains and desert areas of the West, small owls with long legs and round heads are often seen resting on the ground, perhaps on a little mound of earth (see page 237).

Approach them and they watch attentively, bobbing their heads gravely, or crouch as if about to fly. At the last moment, instead of taking wing, they turn tail and dash precipitately into a hole in the earth, hitherto unnoticed, and disappear below ground in a most astonishing and unorthodox escape for owl or any ordinary bird. On other occasions the burrowing owl rests on posts, poles, or in low trees, and flies away to safety in usual owl fashion.

These owls regularly use old burrows of prairie dogs and other small mammals as their homes, but when these are not available they dig shelters of their own. The form found on the open prairies of Florida must regularly excavate its own homes, as do the related forms of the West Indian islands, since there are no other burrowing animals of proper size to supply them with domiciles.

According to one amusing western story, prairie dogs, burrowing owls, and prairie

rattlesnakes live in amity all in the same burrow, each with its own little lateral compartment off the main tunnel leading down from the entrance. The tale is more romantic than probable, as the three are hardly compatible, both rattlesnake and owl being partial to young prairie dogs and possibly also to the flesh of one another. Should all three be found in one prairie dog burrow, this is due to necessity for haste in concealment and not to any preference for one another's company.

The burrowing owl nests in the holes that it inhabits, and its young do not venture far from the burrow opening until they are well able to fly. During the warmer weather these owls subsist largely on insects, especially grasshoppers and beetles.

In late summer, in the plains regions, grasshoppers form the bulk of their food, and in locust years, when these destructive insects abound, the owls eat little else. They also feed on mice, rats, and lizards, and on occasion eat small birds.

One that I kept as a captive was fond of garter snakes, seizing them, pinching them with the bill all along the body, and then swallowing them headfirst. Ordinarily the snake was too long for all of it to be swallowed at once, and the owl stood about for an hour with a few inches of the snake's tail drooping from the corner of its mouth until digestion made room for all inside.

In the level pampas of Uruguay the Gauchos told me that the body of this owl, if eaten by convalescent invalids, promoted appetite for other food.

The ordinary call of this little owl is a loud *boo boo boo*, and it has various chattering notes. Though active at night, it is regularly abroad by day, being able to see in bright sunlight without difficulty. My captive bird, by watching intently, often brought to my notice soaring hawks so distant that they were mere specks in the sky.

Throughout the West these interesting birds are known as "billy owls" or "prairie dog owls." The western burrowing owl (*Speotyto cunicularia hypugaea*) is found in the treeless districts of the West from British Columbia and Manitoba south to western Iowa, Louisiana, and Panama. The Florida burrowing owl (*Speotyto c. floridana*), darker in color, ranges in the prairie region of central and southern Florida. Related races are found in the Bahamas, Hispaniola and other West Indian islands, and in South America.

Pygmy Owl

(*Glaucidium gnoma*)

With the rapid fall of darkness in deep-walled Oak Creek Canyon in north-central Arizona there came a slow, whistled call, uttered in mournful cadence, from distant shelter near the cliffs. At my imitation of the notes answer followed quickly, and after two or three repetitions a little pygmy owl alighted in the tree above me to peer down balefully with distended eyes and jerking tail, searching for the intruder that had dared to invade its special territory (p. 240).

Various birds are attracted by this call. On my first experience with it in the Chiricahua Mountains near the Mexican border a screech owl came, leaving me much puzzled for a time as to whether or not this was the owl that produced the strange and unusual note. In daytime, as I stood in deeply shaded gulches, the whistled imitation of the pygmy owl call has brought about me in scolding flocks kinglets, hermit thrushes, warblers, and other small birds, ready to mob the disturber of their rest.

Pygmy owls are found in forested country, usually about gulches and canyons, where they nest in old woodpecker holes or similar cavities in trees or stumps. The family ordinarily numbers three or four.

Active to some extent by day, they often feed on grasshoppers and other insects. They also eat mice and other small mammals, lizards, frogs, and small birds, the latter including English sparrows. In California these owls have been known to kill pocket gophers, good indication of their strength and prowess, as the mammal is certainly as large and heavy as the owl. They will also strike birds as large as a robin.

This owl has two color phases, one grayish and one rufescent.

Five races of the pygmy owl are found in the region from southeastern Alaska, British Columbia, and Wyoming south to Baja California and Arizona. Another form ranges from the highlands of Mexico to Guatemala.

Ferruginous Pygmy Owl

(*Glaucidium brasilianum ridgwayi*)

This tiny owl, closely related to the ordinary pygmy owl, is widely distributed in tropical America, ranging north barely within the border of the United States. Though small, it is fierce and rapacious. It has been known to attack birds several times its size, tearing at them until they were worn out and at its mercy (p. 240).

The nest of this owl is placed in old woodpecker holes and similar hollows, where the eggs are laid without nesting material. By day the bird generally hides in thickets, but since it is often abroad to hunt, it is far from being strictly nocturnal.

The black spots on either side of the neck seem to natives in South America to resemble eyes, so owls of this type are known in Spanish as "four eyes," in the belief that they can see both before and behind.

The ferruginous pygmy owl ranges from the lower Rio Grande Valley, Texas, and southern Arizona south to Panama, with allied forms in South America.

Elf Owl

(*Micropallas whitneyi*)

Tiniest of all our owls, no larger than a sparrow, the elf owl is abroad mainly at night, so that it is far more abundant than ordinarily may be supposed. It is found in the Southwest, in the country of the saguaro, or giant cactus. Living in old woodpecker holes in the trunks of this cactus, it is secure from most enemies (pages 220, 221, 240).

When captured, elf owls often feign death, lying limp and motionless until chance offers escape, when they dart away instantly to safety. They have been seen also raising one wing and extending it in front of them, so that, hidden behind this shelter, they had no appearance whatever of being a bird. Though confined to the giant cactus belt while breeding, elf owls later may wander afield and are sometimes found in growths of willows or similar dense cover.

Eggs are laid in a woodpecker hole without nesting material. Occasionally the owls preempt occupied nests, as their eggs have been found mingled with those of the woodpecker, with the owl in possession.

The elf owl feeds almost entirely on insects, with occasional mice, and in captivity has been known to starve rather than eat birds. In its hunting it seems to be wholly nocturnal.

Whitney's elf owl (*Micropallas whitneyi whitneyi*) ranges from southeastern California and southwestern New Mexico into Sonora. The Texas elf owl (*Micropallas w. idoneus*), grayer above, is found from the lower Rio Grande to the Valley of Mexico. Sanford's elf owl (*Micropallas w. sanfordi*), paler gray, is confined to southern Baja California. A related species is restricted to Socorro Island, of the Revilla Gigedo group, west of Mexico.



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ALTHOUGH SMALLEST OF THE OWLS, THEY ARE STOUT-HEARTED AND SHREWD

Resting on the pine bough above is the courageous Rocky Mountain pygmy, who will pounce on squirrels or other rodents twice its own size. In Latin America, natives call the ferruginous pygmy (left) "four eyes," believing the black spots on either side of its neck are eyes and that it sees both in front and behind. Little Whitney's elf, in the tangle of cactus, is the dwarf among owls, being hardly larger than an English sparrow. Wise in the ways of the possum, it feigns death when captured. Southern California to Texas is its habitat.

WHAT IS THE SAAR?

BY FREDERICK SIMPICH

AUTHOR OF "THE WINDS OF THE SPREEWALD," "THE STORY OF THE RUHR," "HAMBURG SPEAKS WITH STEAM SIRENS," ETC., IN THE NATIONAL GEOGRAPHIC MAGAZINE

POWDER keg of Europe; witches' caldron; political sore spot. For years such graphic labels have been tacked onto this small but highly industrialized region, known as the Saar, which lies north of Alsace-Lorraine, between France and Germany (see maps, pages 242 and 243).

Though barely 738 square miles in area and with fewer than 825,000 people, the Saar, tied by historic and economic bonds to Alsace-Lorraine, has been since antiquity, like that tormented land, a stage of European disputes.

From the days of Attila and the Cæsars down to Foch and Von Hindenburg, its valleys and wooded hills have rocked and echoed to the tramp and shouts of marching armies.

THE PLEBISCITE FOCUSES ATTENTION

For the past few months it has loomed ominously large in the world's eye because of the plebiscite set for January 13, 1935. "But why a plebiscite?" you ask.

Well, by the Treaty of Versailles France recovered Alsace-Lorraine from Germany. The adjoining Saar Basin, however, with its mines and factories, was made a separate territory, to be ruled for 15 years by a commission under the League of Nations. That 15-year term, expiring now, marked the date of the plebiscite.

Under the treaty, all qualified persons were entitled to vote on three possible solutions: (1) to remain under the League of Nations; (2) union with France; (3) return to Germany.

Once more, then, in its long, stormy history, has this tiny map spot become the shuttlecock of destiny.

Geographically, the Saar is an irregular patch of hilly land crossed by small valleys. It lies alongside Luxembourg, forms a buffer State between France and Germany, and was cut from the two German States of Prussia and Bavaria.

With a population about equal to that of Boston proper, it shelters more than 1,000 people per square mile—one of the most densely settled areas in all Europe.

Only such miniature European States as Andorra, Liechtenstein, San Marino, and

Monaco are smaller than this tiny, yet dynamic country. America knows no State so dwarfish. Delaware is about three times the Saar's size, yet has less than a third its population.

Saarbrücken, metropolis of the Saar, has only 132,000 people; yet in one year Saar trains haul 60,000,000 passengers!

Sit in any stuffy café at Saarbrücken, watch the guests eat red cabbage and boiled pork, or sip fat steins of beer as the band plays heavy Wagner music, and the place seems just another German industrial center.

A SAAR PROBLEM IN ROMAN TIMES

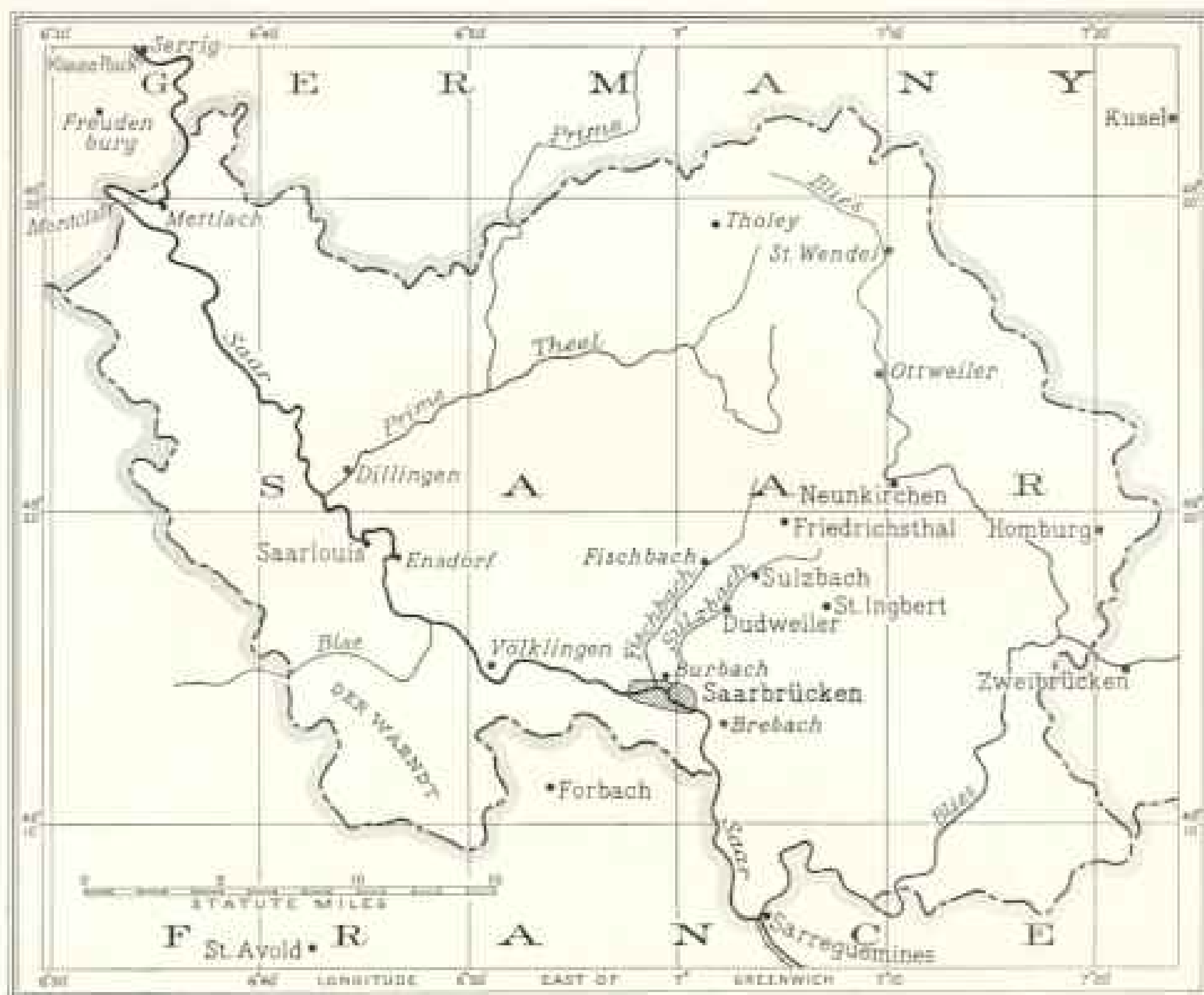
But look into its eventful annals, or make a careful trip about its historic roads and ruins, and you find a land with a past peculiar to itself.

There was, in fact, a Saar problem even in Roman times, when blond men from east of the Rhine already had invaded this Basin. In Cæsar's "Commentaries" you read of these early German settlers. One Roman report of the time says that 120,000 barbarians, enamored of Gaul, had settled here.

Cæsar feared these Germans might menace Rome itself; so he helped the Gauls drive them back across the Rhine. His battles on the Aisne and elsewhere were precursors of centuries of fighting along the Rhine.

Some Roman military roads hereabouts are shown on the Peutinger map of about 200 A. D. One ran north from Argentoratum (now Strasbourg) to the Saar Basin. About this same time the Romans built a castle at a point on the Saar River where it was bridged by their military road from Paris to Mainz. Saarbrücken was so named, meaning "Saar Bridge." That early Roman castle was the first house in the now modern city of Saarbrücken.

Dense forests choked all the Basin then, forests frequented by heathen druids, by wild Celtic tribes, who hunted deer and boars with spears. Scattered ruins of menhirs, dolmens, and cromlechs, symbols of the druid cult, have been found in Saar forests.



Drawn by Newman Bushnell

THE SAAR IS ONE OF EUROPE'S MOST DENSELY POPULATED AREAS

Here live an average of more than 1,000 people to each of its 738 square miles. Yet, except for spots desolated by pit heads, steel mills, foundries, and factories, the Saar is a region of river landscapes, small lakes, and rolling, wooded hills, some rising to 1,800 feet.

Slowly, through centuries of paganism, tribal wars, and feudalism, the Saar was settled, civilized, and its wooded areas dotted with castles, villages, and towns.

Many old castles, as at Saarbrücken and Ottweiler, were set afire by invading French in 1793, and some of their occupants perished on the guillotine. Yet in German-speaking Saarbrücken to-day, with its street cars, new city hall, baths, paved streets, playgrounds, "talkies," airport, museum, and brightly lit stores with glass fronts, newspapers, and crowded schools, there is little to remind one of the Roman stronghold of long ago; no old Latin edifices remain, as in Rome itself (see illustration, page 246).

Roman ruins there are—if you dig—ruins of villas, of baths and bridges, some almost in the shadow of early Christian churches. At Tholey is a church that dates from the 13th century. In sharp contrast,

near Saarbrücken is a mosque built by the French during the World War, wherein their Moroccan soldiers might pray!

A TRANSIT LAND

Strategically, the Saar lies on a natural route between France and Germany, and for centuries they have disputed as to where their boundary lines should be fixed.

Soon after the break-up of Charlemagne's empire, and the Treaty of Verdun in 843, the Saar became German soil.

Briefly, for more than a thousand years prior to the Versailles Treaty, Germany held the Saar, except for two short periods, the second being the years from 1793 to 1815, when Napoleon pushed the French frontier to the Rhine.

When Blücher and his Prussians advanced into France in 1813, he followed the very route taken by the German hordes when the Roman Empire fell.



Drawn by Newman Humstead

TINY SAAR'S STRATEGIC POSITION ON THE MAP MAKES IT POLITICALLY IMPORTANT

Lying across a natural pathway between France and Germany, trade flows across the Saar in times of peace—just as armies march over it in war time. The Roman armies, those of Louis XIV, of Napoleon, and of the World War, all passed this way.



Photograph by Burton Holmes from Galloway

SAAR PEASANTS SAY FIREWOOD WARMS TWICE—FIRST WHEN CUT AND HAULED, AGAIN WHEN BURNT!

Pushing home a load of fuel is all in the day's work to this toil-accustomed mother of Saarbrücken.



Photograph by Max Wenta

NEUNKIRCHEN APPEARS AS A HUGE INDUSTRIAL BEEHIVE

This labyrinth of iron and steel plants, mostly owned by the Von Stumm family (see page 250), is the Saar's second largest city. Crowded into the busy picture are tall chimneys of many mills, surface and elevated railways, coal bunkers, slag dumps, overhead conveyers, freight trains, steam whistles, car sheds, offices, and workers' houses. Cluttered and disorderly though all may seem to casual eyes, these German factories are usually models of orderly method.

It was so in the Franco-Prussian War; Von Moltke, in 1870, followed Blücher's route of 1813, and about Saarbrücken came one of the first clashes of that war which helped Bismarck to found his German empire. Again, of course, in the World War, the armies passed this way, and many an Allied soldier washed his shirt in the Saar, the Moselle, and the Rhine, or traded cigarettes and white bread to willing *fräuleins* for a jug of wine.

Fly over Saarlouis, where Marshal Ney was born, and in its very heart you see the outline of the old forts built there by Louis XIV of France.

Dating, as a town, from 1680, its people lived for more than 200 years almost wholly by trading with the garrisons—first French, then German, then French again.

To-day old walls and moats that encircled the fort have been torn down and filled to make broad, smooth streets, as the Americans did with parts of Manila.

CITIZENS OF A "PHANTOM STATE"

German infantry, artillery, cavalry, army wagons—all the money-spending machinery of war—made Saarlouis a busy town until after the World War. When they evacuated, the French came in for a while; but now few occupants are found for all the vast barracks. It is quiet, much too quiet, for those residents who remember the band concerts, the glittering reviews, and fat army payrolls of other days.

German in race, speech, culture, and traditions, the Saar showed by a pre-war census only about one person in 200 with



Photograph from H. A. Bauer

HIGH ABOVE ANCIENT SAARBURG FROWNS A FORMER CASTLE OF THE ELECTORS
OF TRIER

A tunnel leads down from the ruined pile to the town below. From here the Saar River flows a few miles north to join the Moselle.

French as his native tongue. It was simply a legal accident at Versailles which made these people citizens, temporarily, of a phantom State. The Saar, under that treaty, gained no nationality, no president or other ruler of its own. Instead, a commission of five Europeans was named by the League of Nations to administer the Territory's affairs until the plebiscite.

Civil servants are all German; so are the court and school officials.

By treaty the Saar went under a customs union with France; French customs guards were set to patrol the line between Germany and the Saar, and French money was put into use. To pay France for her own coal mines damaged by Germans in the World War, she was given the coal mines in the Saar. The treaty provided also that after the plebiscite Germany might

buy these mines back again if she wished; and such an agreement was concluded late in 1934.

Only around Saarlouis is any French influence noticeable, and that is not due to the presence there of many living Frenchmen. Such influence belongs to the past—Vauban's old forts, built when Louis XIV made this a French garrison town; French names and epitaphs in the cemetery; and an odd local dialect current among older residents, a curious blend of German and French. The word umbrella, for example, *parapluie* in French and *Regenschirm* in German, is here pronounced *parplischirm!*

To see how thoroughly German the region is, in speech and sentiment, you have only to mingle with any holiday crowd and listen to the songs, the speeches, and the music; or read the papers, or see what



Photograph by Burton Holmes from Galloway

OVERHEAD, FAT GAS PIPES SPAN THE STREETS OF SAARBRÜCKEN

Workers with lunch pails, a flower girl with her basket, a student with his books, a child carrying the family milk can, and the photographer's motor car bring to life a picture of grim, grimy foundries which smoke and roar day and night in this iron and steel center.

crowds follow broadcasts from the radio stations at Frankfurt and Stuttgart.

On any anniversary of the battles of 1870, some of which were fought hereabouts, you see men in old-style Prince Alberts and top hats making speeches, bands playing familiar German airs, and crowds flocking out to lay wreaths on the war monuments about Saarbrücken.

MILLS AND MINES AMID FORESTS

In many stores you find signs which read "French Spoken Here." Much French capital is invested, and many mine and mill officials are French, but the working and middle classes are almost uniformly German. So, too, are the methods of mining, shop work, and agriculture.

As in the Ruhr, industry here is compact, intensive, and theatrical in its setting.

Like volcanoes, its giant mills, as at Völklingen (250, 264), belch forth clouds of thick gray smoke; the red glare of blast furnaces turns black night into brilliant Gehenna.

Under every hill is coal. Over every mine is a big wheel on a tower; again and again you see the big wheel spin, as it winds up a cable that lifts its load from deep in the earth (see page 254).

This is the only place on earth where you see mines and steel mills closely crowded by forests, as if bits of industrial Pittsburgh were set in one of our forest reserves (page 260). When I saw the wooded slopes of the winding Saar River all covered with snow, it much resembled Algonquin Park in Ontario in winter; to me it seemed the woods must be as dense and mysterious as when druids built their sacrificial altars there and hungry pagan Celts searched for wild meat.

But about many mines, with their bustling, grimy towns of straight, new streets, lined monotonously with discolored brick or stone houses, coal dust settles so thick on meadows and trees, even on the streams, as to give them a blackish look.

As I tramped about in the wet snow, my feet were numb and cold on that January day when they took me down to see the mines. But what a magic change! A two-minute dizzy ride down, and we walked among hot, sweaty men working nearly naked.

Miners at work seem silent and sober-minded, seldom joking or singing like their more free-hearted fellows working under open skies up above. Here in the Saar, before descending into the pits, men often stand, caps in hand, while prayers are said.

What with fire damp and coal-dust explosions, death is often just around the corner in these winding tunnels. Many a strong man who had walked alertly to his post has been carried back dead. Religion, since dangerous underground work began here long ago, has been the miner's consolation; at cross-roads all over the Saar Basin you see crucifixes adorned with bunches of flowers, and during Mass on Good Friday the miners' children, twirling their rattles, march singing through the village streets.

When you watch groups of these miners trudging to the pits, pouring out of the crowded work trains or riding in on old bicycles from their tiny farm homes, at first glimpse they seem a rather shabby and



SHE IS THE PRINCIPAL OF A SCHOOL IN THE SAAR

The "Saar Annex" of the Versailles Treaty gave France the right to maintain certain schools in the district. But of 122,000 school children, only about 2,500 attended French schools in 1934, and in them German textbooks were used, though the French language was taught. Alphonse Daudet's moving story, "The Last Class," deals with a similar public-school problem which arose in Alsace when the Germans occupied the province after 1871.

discontented lot. In truth, they are not so at all; probably no mining region on earth knows a working class so contented and, in normal times, so well off. Nearly 100 years ago the Prussian mining administration aided miners here to acquire land and homes. Often this aid was extended through a miners' society called the "Knappschaft," which dates from the middle of the 18th century.

Members of this Knappschaft, as in certain lodges of America, on gala days wear a distinctive uniform; it is a black-velvet

coat, a hat with feathers in it, and a miner's lamp.

For more than 150 years all Saar miners who have been in every way men of good repute have been eligible to join the Knappschaft. It grants pensions to men past 50 and aids members—like a building and loan association—in buying homes.

Besides coal, coke, and steel, the Saar produces cement and tar by the trainload. Plate glass and phonograph records, paper and textiles, each it makes literally by the acre—enough to cover a good-sized cow ranch every year.

Soap, perfume, cigars, cigarettes, shoes, matches, beer, ready-made clothes—all these things pour from its factories.

But it cannot feed itself. Much of its wheat, meat, fruit, milk, and vegetables comes from France; certain things, like tobacco, are often smuggled in.

Yet here, uniquely, a large number of mine and mill workers also own their own homes, with a small patch of farming land. *Zwergbetriebe*, or "dwarf holdings," these subsistence farms are called. They resemble, economically, the tiny farm homes provided in Utah long ago by Brigham Young for his Mormon disciples.

Riding along the River Saar, through the Sulzbach and Fischbach valleys, or from Saarbrücken to Neunkirchen (p. 244), you pass through an unbroken string of villages and settlements with tiny farms attached.

In almost every back yard is a nibbling goat, here called "the miner's cow." There are pigs, too, poultry, a potato patch, sometimes a cow; and then, of course, that conventional front-yard manure pile, remembered by all doughboys who passed this way. Its size reflects the fortune of its owner.

"LUCKY ROOSTERS" RIDE POTATO CARTS

Here, as in old Germany, the rooster is the farmer's symbol of fertility. In the Fatherland, as an act of superstition, farmers arrange for a rooster—or the effigy of a rooster—to ride in from the fields on the last load of hay or grain to be harvested.

Here the "lucky rooster" rides in on a cart of potatoes or grapes!

Less than 10 per cent of the Saar population earn their living from the farm. Some 90 per cent spend all or most of their working hours in mine, mill, trade, transportation, or allied pursuits. Before industry absorbed so many, Saar workmen used to tramp all over middle Europe as peddlers, tinkers, and doers of odd jobs.

There is unemployment, of course. Yet few houses are posted "For Rent." Everywhere, like ants, you see long lines of men with dinner pails, walking, riding trains and tramcars, or pumping bicycles.

To see the old chapel near Serrig, where blind King John of Bohemia is buried (page 257), a few tourists wander in; others visit the ancient abbey at Mettlach (page 258), now the seat of a world-famous ceramic industry. For stamp collectors, too, the Saar has been a happy hunting ground since, under the League of Nations, it has issued its own stamps.

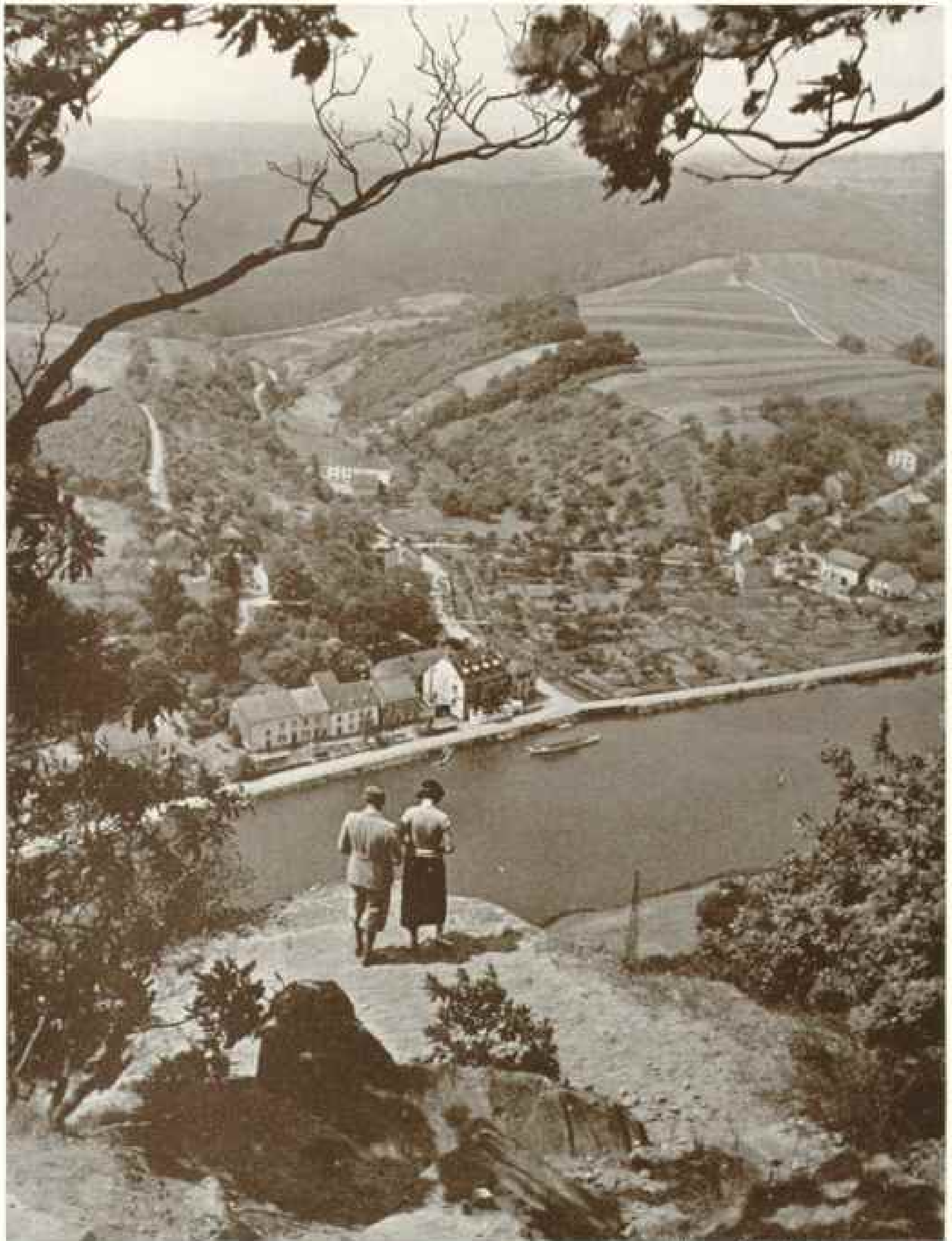
AWAITING A BALLOT FOR 15 YEARS

But to such casual visitors people here are indifferent. Their one constant thought, in all their 15 years under the League, has been the outcome of this plebiscite. Economically, the Saar and Alsace-Lorraine are interdependent, since one has coal and the other iron ore. But nationalistic feelings are above all economic considerations.

Other disputed areas, grasping at treaty "rights to self-determination," held plebiscites after the World War. Such votes took place in Schleswig-Holstein, between Germany and Denmark; in East and West Prussia, between Germany and Poland; in Upper Silesia, also between Germany and Poland; in Burgenland, between Austria and Hungary, and elsewhere. Always there was the same excitement as in the Saar and often grave disorders.

Whatever flags may in future fly over this tiny, long-tormented land, its place on the map and the convenient routes which cross it must make it forever the natural path of marching armies.

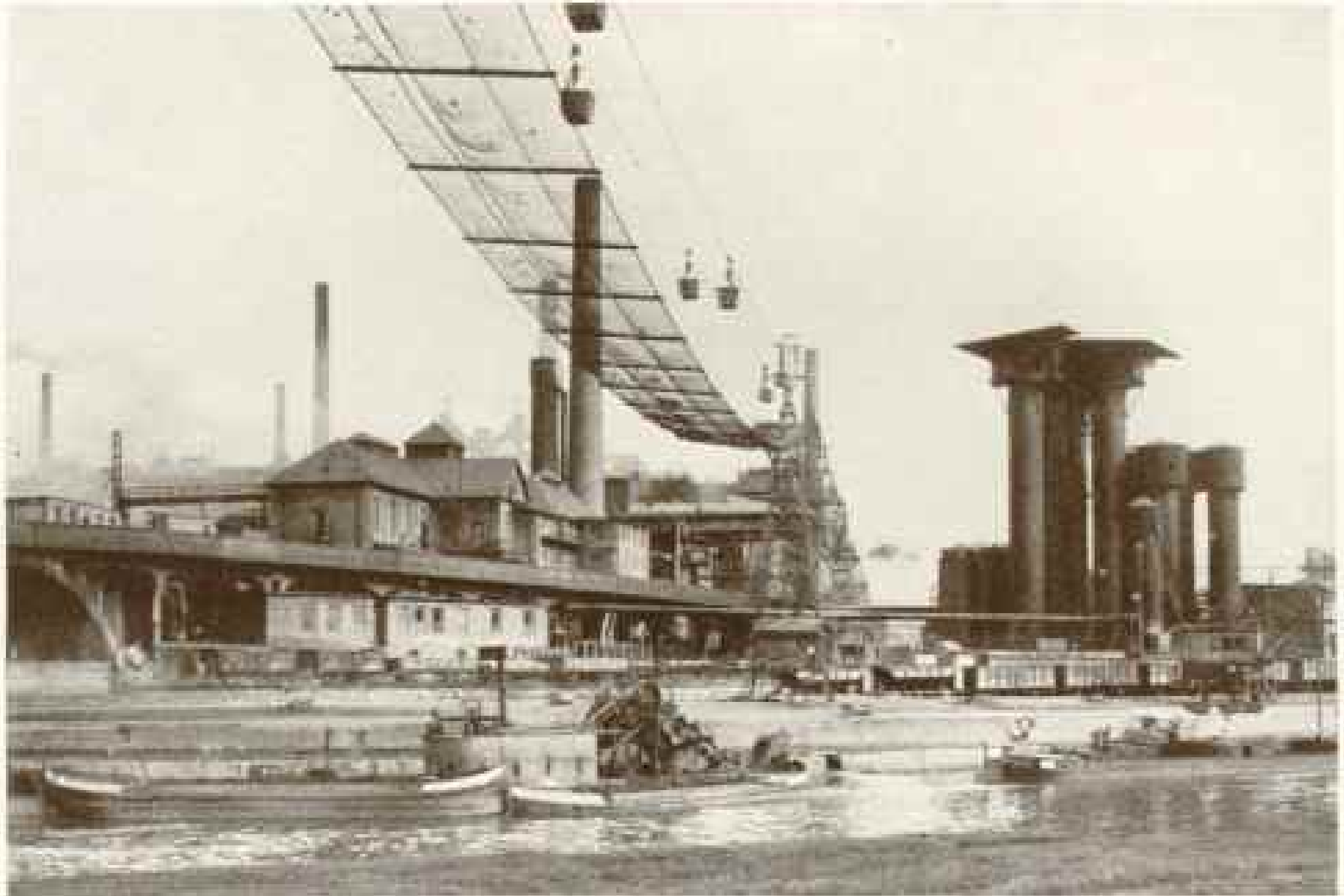
Notice of change of address of your NATIONAL GEOGRAPHIC MAGAZINE should be received in the offices of the National Geographic Society by the first of the month to affect the following month's issue. For instance, if you desire the address changed for your April number, The Society should be notified of your new address not later than March first.



Photograph by Wolf from European

LOOKING DOWN UPON THE RIVER SAAR ALONG THE PATH TO MONTCLAIR

Well-built highways, winding among wooded hills, are used by thousands of German trucks and motor cars. Many tiny garden plots appear in the open spaces between groups of cottages in this village near Mettlach, while grainfields spread over sloping hills farther away.



Photograph by Ewing Galloway

THE GIANT RÖCHLING IRON AND STEEL WORKS RISE BESIDE THE RIVER SAAR

Like the famous Von Stumm and Von Boch families, the Röchlings have for generations been associated with the growth and technical development of Saar industry. Overhead is an aerial conveyer system at Völklingen, with a wire netting to save workers below from being hit by lumps of ore or coal that might fall from moving buckets (see illustration, page 264).



Photograph by Wulff from European

MOLTEN SPARKS FLY WHEN A BLAST FURNACE IS TAPPED

Protected from the intense heat by the shield, the man is poking sand from the furnace opening to permit molten iron to flow into the trough (foreground) which leads to the hopper cars (opposite page). The bar is tipped with heat-resistant clay.



Photograph by Wolf from European

ACRID AS CANNON SMOKE RISES THE HOT COKE OVEN'S STIFLING BREATH

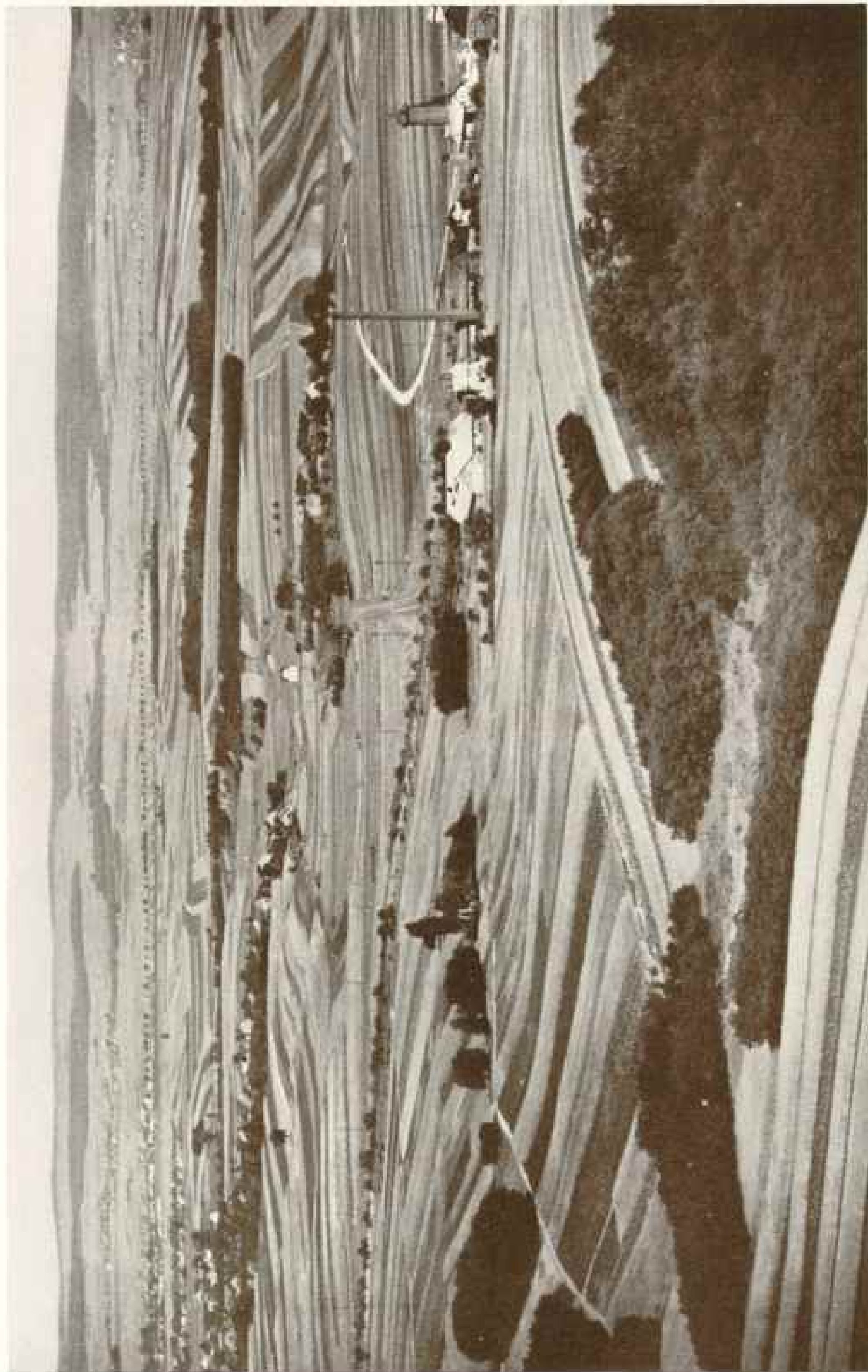
Since the Middle Ages coal has been mined in the Saar. Much of to-day's huge output, and the coke made from it, is consumed in the steel works—which in turn take iron ore from French Lorraine. By treaty after the World War, Germany ceded the Saar coal mines to France, but in November, 1934, she agreed to buy them back.



Photograph by Wolf from European

THROUGH DARK GLASS HE WATCHES THE DUMPING OF A CONVERTER

Tiny pieces of red-hot metal fly through the air and are dangerous to the eyes. Molten iron is brought in hopper cars from the blast furnace (opposite page) and then it is refined into steel in the giant egg-shaped converters.



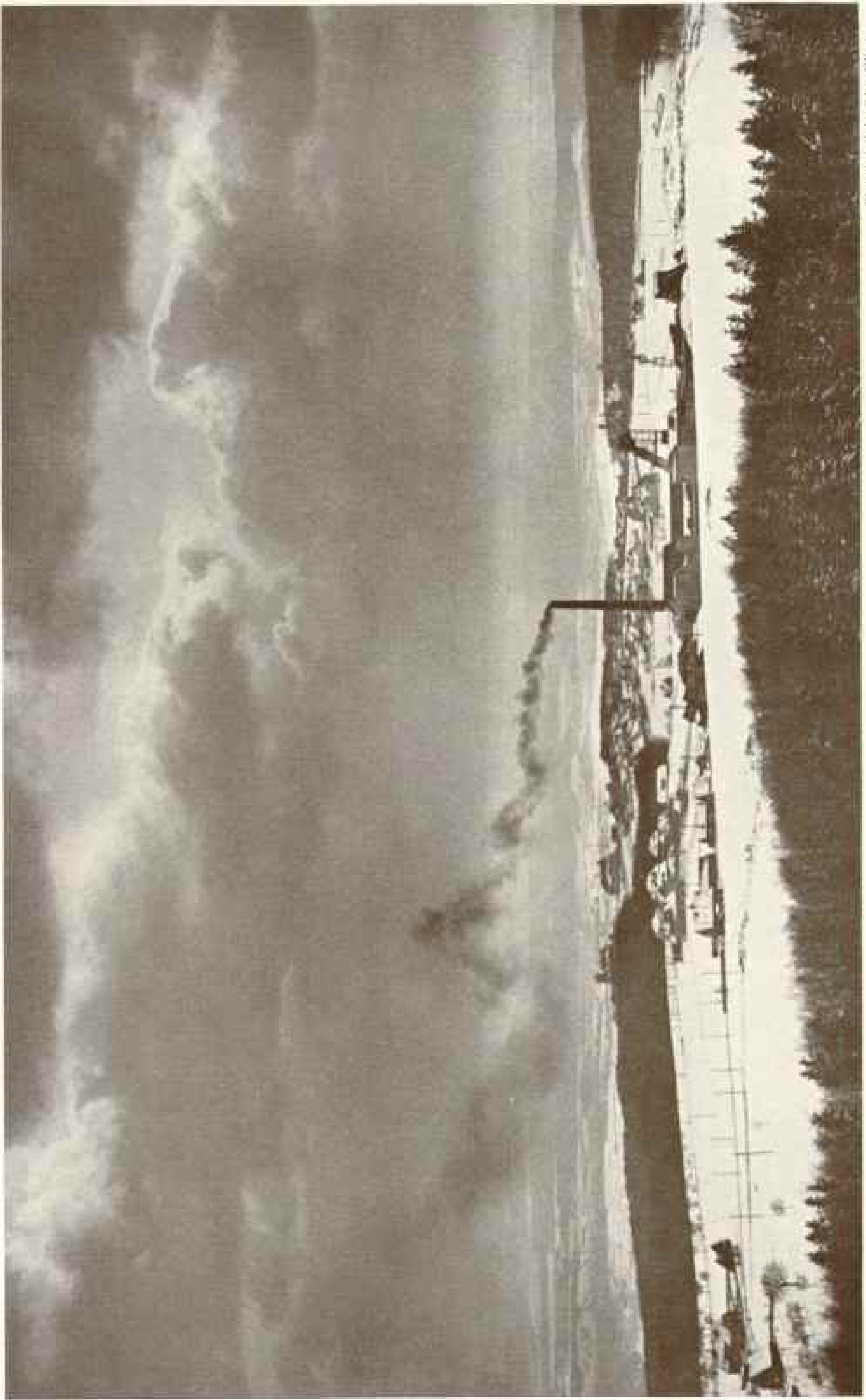
Photograph by Max Wenta

LONG, NARROW SAAR GRAINFIELDS PAINT CARPETLIKE STRIPES ACROSS THE ROLLING COUNTRYSIDE

The pattern of these slim fields suggests "strip-cropping," now being developed on American farms for the control of soil washing, or erosion. Such tiny fields often indicate individual ownership. Farmers utilize every inch of soil, the fields extending to the edge of the trees.



WHILE THE FARMER, WHIP IN HAND, GUIDES THE OXEN AND PLOW, HIS WIFE PLODS BEHIND AND DROPS POTATO SETS INTO THE FRESH FURROW
Despite modern labor-saving devices in Saar industrial plants, farming is as old-fashioned as when Rosa Bonheur painted such scenes.



Photograph by Max Wenta

UNDER A WHITE WINTER BLANKET THE SAAR LAND SEEMS BLEAK AND DESOLATE

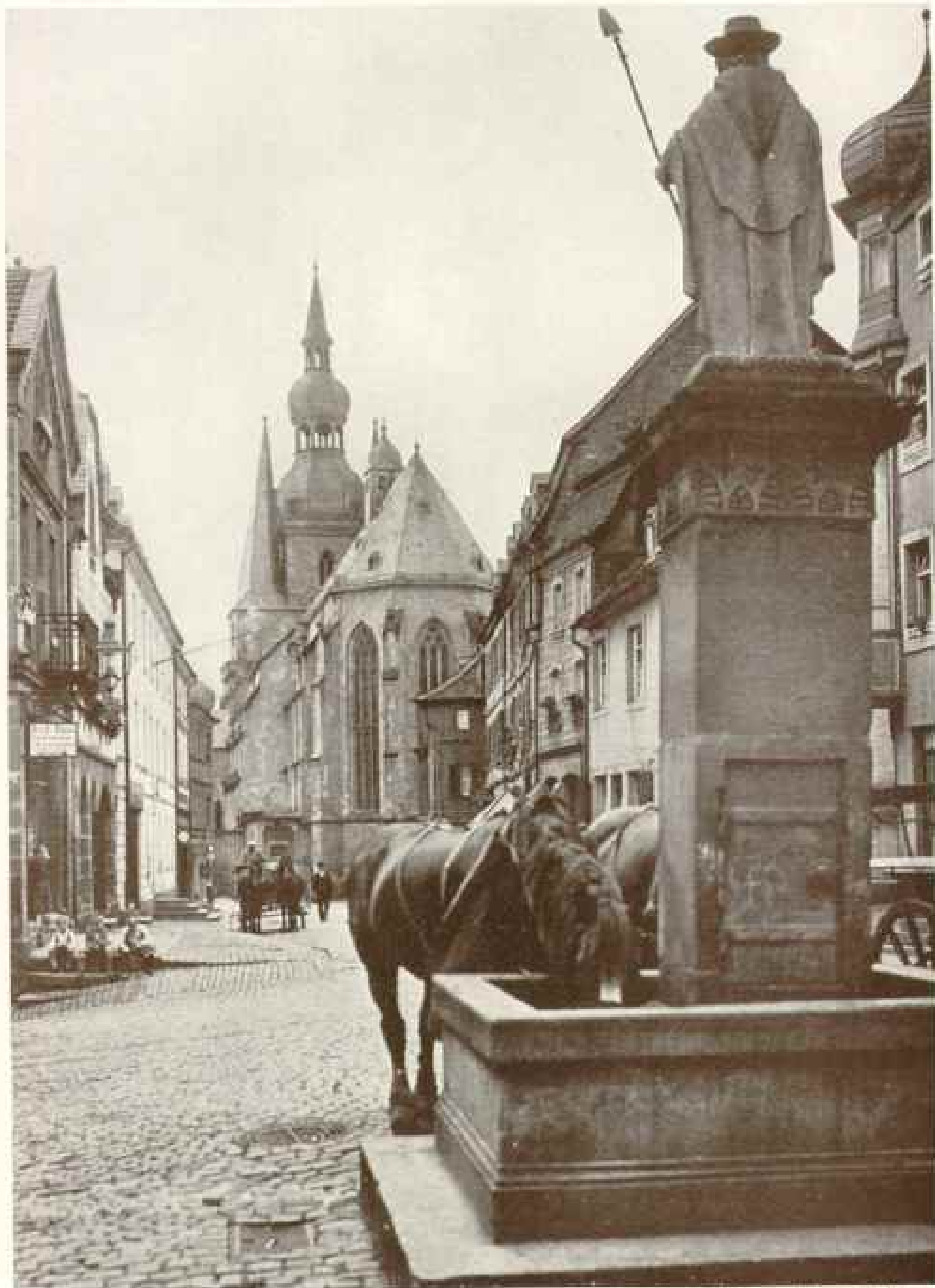
Down deep in its bowels, oblivious alike to snow or sun, generations of miners have toiled. Here at Frankenhohl Mine are the tall chimney and wheel tower that mark a coal shaft.



Photograph by Burton Holmes from Gallows

THRESHING DAY IS ALWAYS EXCITING, IN THE SAAR NO LESS THAN IN KANSAS.

Near-by neighbors join to help each other at this hard, dusty task, and small boys follow, charmed by whirring wheels and flying straw. When all grain is sacked and stored, a big dinner and a harvest dance inevitably follow.



Photograph by Max Wenzel

THEIR IRON SHOES CLATTERING ON COBBLESTONES, HORSES DRINK AT THE
FOUNTAIN IN ST. WENDEL

Above the fountain stands the figure of St. Wendelinus, who was one of the early Christian evangelists to the Saar, a Scottish prince, and the patron of shepherds. The town dates from the seventh century, and beneath the altar of its church is the sarcophagus of the Saint. Many pilgrims journey here for prayers.



Photograph by Wolf from *European*

TWO "WANDERING BIRDS," AS GERMAN WALKING CLUB MEMBERS ARE CALLED,
PAUSE FOR A VIEW

On this Klaus Rock, rising above the Saar River not far from Serrig, is a chapel which contains the bones of blind King John of Bohemia, who fell in the battle of Crécy in 1346. Modern dams in the Saar River, between Serrig and Mettlach, provide hydroelectric power for use as far away as the Rhine country.



Photograph from H. A. Bauer

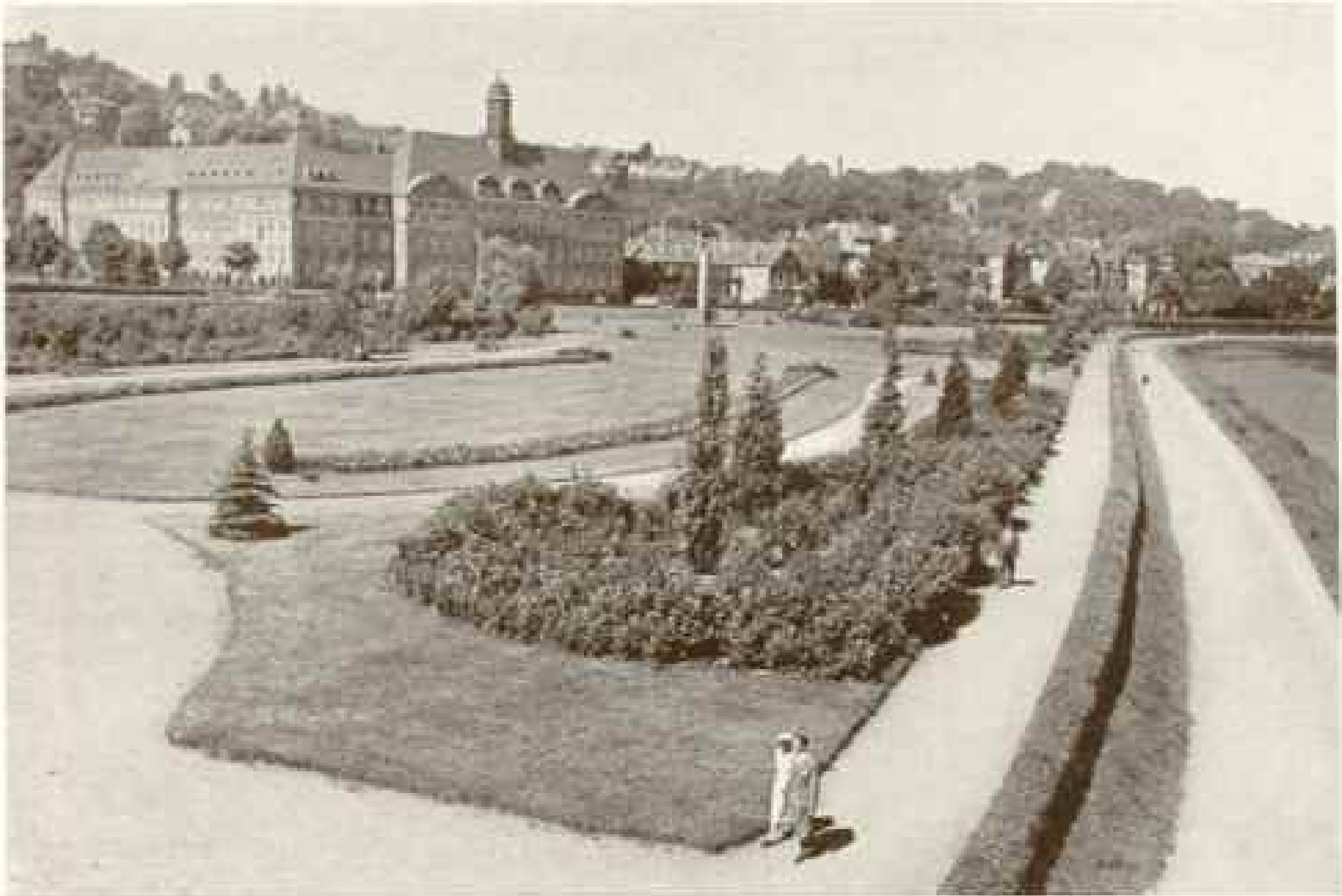
FEW CONSIDER THE WORK IT TAKES TO GROW THE GRAPES THAT MAKE THE WINE!

Tending a vineyard means hard and systematic work under a hot sun. Saarlanders put every fertile inch of their steep, sun-exposed slopes to work, but terracing, as practiced on the Rhine and Moselle, is not general in the Saar.



THE ABBEY CHURCH OF METTLACH RESTS AMONG ROLLING, WOODED HILLS

Here, in buildings that once housed a Benedictine abbey, flourishes a pottery factory. Saarlanders have a deep affection for their native soil, and there are few places where coal miners and industrial workers may make their homes in such charming natural surroundings.



Photograph by Wolf from *European*

THIS IMPOSING STRUCTURE AT SAARBRÜCKEN HOUSES THE SAAR GOVERNMENT

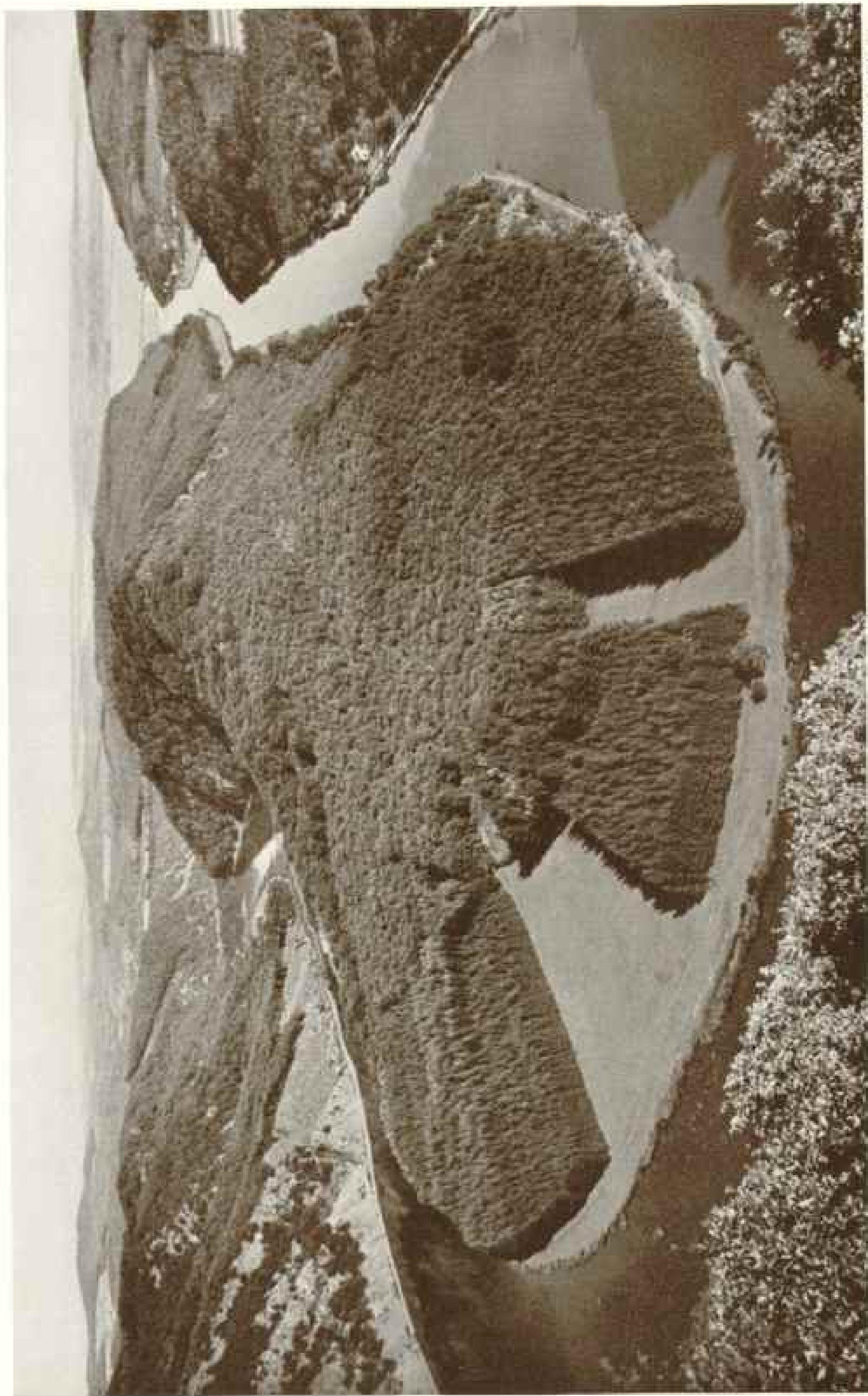
After the World War Germany yielded her former rule over the Saar Basin Territory to the League of Nations, as trustee, until a plebiscite could be held. The League, in turn, named a commission to "sit in the Territory," and to exercise all powers (see illustration, page 261).



Photograph by Max Wenta

"WE MIGHT GET A BITE IF THOSE SWANS WOULD GO AWAY."¹⁷

Miners, mill hands, and their boys try their luck in a small lake of the Warndt region near Saarbrücken. With its thickly wooded hills and cool waters, this section of the Saar Basin affords a popular playground for the hikers and fishermen of busy cities.



Photograph by Max Wentz

SLICED LIKE A GIANT CAKE BY MAN'S INSATIABLE AX, DENSE WOODS CROWD THE SAAR RIVER LOOP NEAR METTLACH

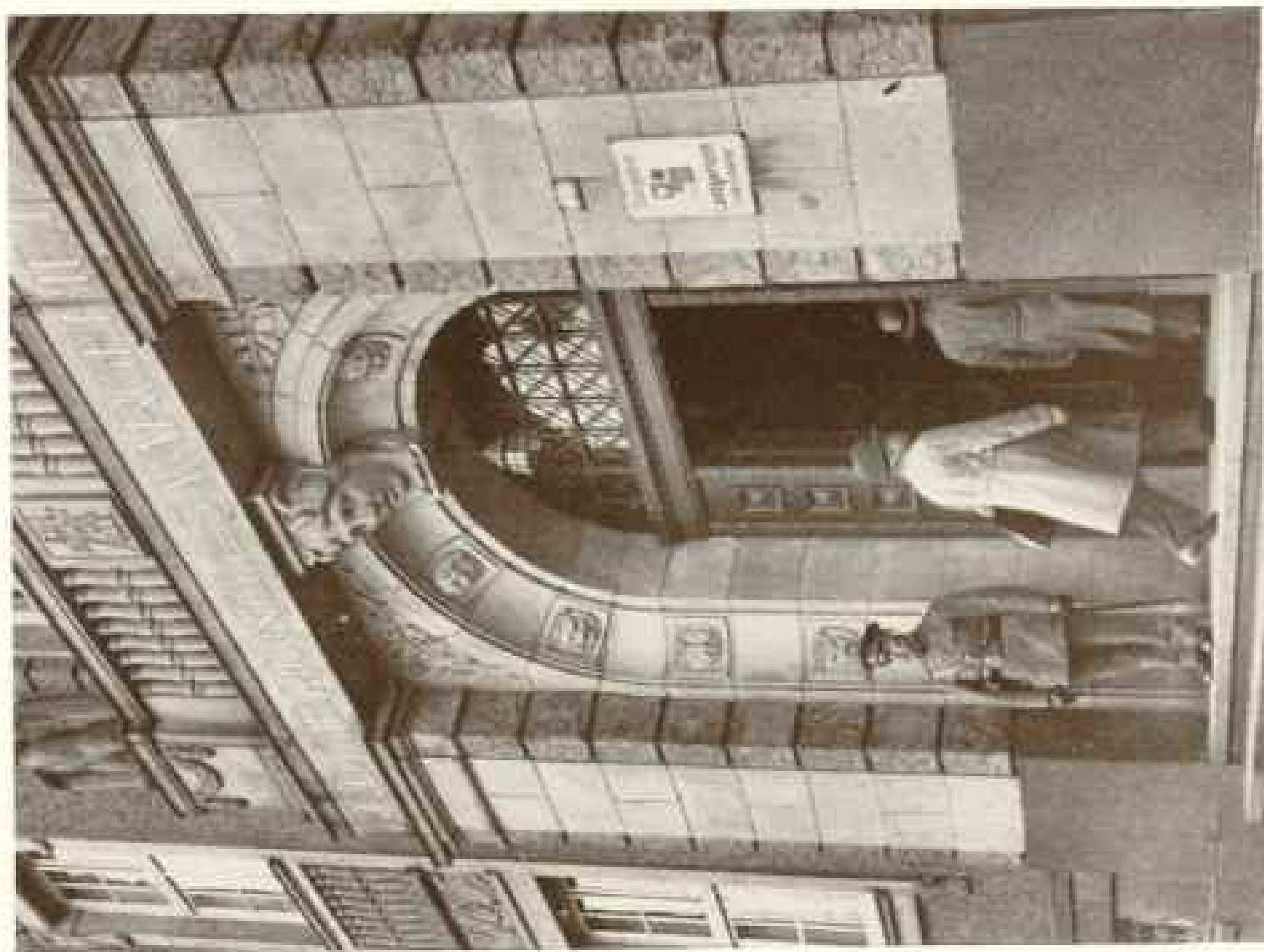
This charming sylvan scene in the northwestern section of the Territory is a decided contrast to the busy industrial centers that line the banks of the stream in its upper reaches farther south (see map, page 243).



Photograph by Max Wornitz

WANDERLUST IS INHERENT IN MOST GERMANS

Groups of boys and girls, often singing as they march, tramp each year through the Saar and all over Germany. Beyond the lake stands a new "youth hontelery," where young hitlers find food and shelter.



A SENTRY OF THE LEAGUE COMMISSION'S BUILDING

Uniformed guards scrutinize all who pass. Above the sculptured head a panel reads, "Government of the Saar District," and on the small plaque above, also in German, are the words, "One Right for All" (see page 259).



Photograph by Max Wentz

IN THEIR HILLSIDE SOIL A SAAR WORKER AND HIS WIFE PLANT POTATOES

Tiny garden plots, cultivated by many miners and mill hands, help meet their individual needs. In this densely settled region only a small share of the people devote their whole time to farming; much meat, grain, fruit, and other foods are imported from France (see text, page 248).



REICH MINISTER PAUL JOSEPH GOEBBELS ARRIVES IN SAARBRÜCKEN

Chattering throngs line the street. Uniformed men guard official cars, Boy Scouts sound their trumpets, and an official photographer (with the swastika on his sleeve) takes pictures.



PULLING TOGETHER, A MAN AND WOMAN TOW A SAAR VALLEY BARGE

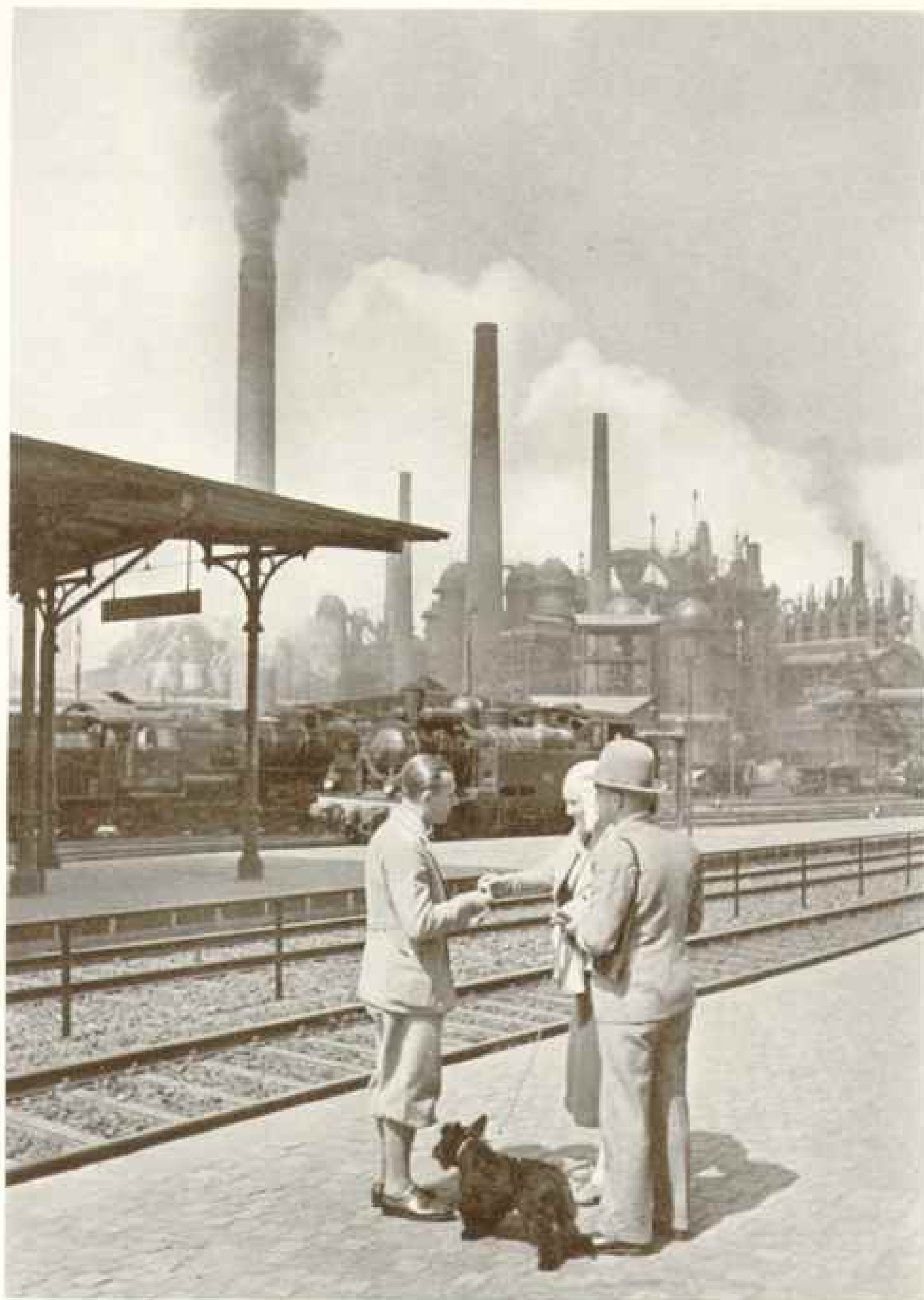
Although the Saar River is canalized from Sarreguemines to Ensdorf, and a canal connects with the French Marne-Rhine Canal, the Saar's water transport system is wholly inadequate to move its huge traffic, which depends on railways.



Photographs by Burton Holmes from Galloway

LABORIOUSLY, DAY BY DAY, THEY TRUDGE THE BEATEN TOWPATH

Mother and son they may be, leaning wearily, heavily, against the breastbands of the towrope. Harvesters in the background pause in their labors to watch.



Photograph by Wolff from *European*

**BUT FOR SMOKE, SMELL, AND DIN, HOW MUCH LIKE MINARETS AND MOSQUES
THIS STEEL PLANT SEEMS!**

Busy, belching smokestacks they are, amid the domes and fiery furnaces of the Völklingen Iron Works. On a side track locomotives steam and pant, while travelers with their Scottie pause for a cigarette on the station platform (see illustration, page 250).

THE SOCIETY ANNOUNCES NEW FLIGHT INTO THE STRATOSPHERE

BY GILBERT GROSVENOR

President, National Geographic Society

THE National Geographic Society will continue during the coming summer its exploration of the stratosphere.

The flight this year, like the one of July 28, 1934, in the *Explorer*, will be in co-operation with the United States Army Air Corps, and will be made from the same place, a natural depression in the Black Hills of South Dakota, near Rapid City. The new balloon, on which the Goodyear-Zeppelin Corporation has already started work in Akron, Ohio, will be as large as the three-million-cubic-foot bag used last July.*

In the new flight Captain Albert W. Stevens will be the senior officer as well as the scientific observer. He will have as pilot Captain Orvil A. Anderson, who served as copilot during the flight of last summer. Major William E. Kepner, who so skillfully and bravely took the balloon aloft and managed its difficult descent, will be unable to make the second flight because of assignment to other important duties in the United States Army Air Corps. He will serve on the Advisory Committee.

VALUABLE DATA FROM FIRST FLIGHT

The decision again to send observers and scientific instruments far into the upper air by means of a large balloon was reached after careful consideration by the Board of Trustees and Officers of The Society, and the Advisory Board of Scientists who assisted in last summer's flight. They had before them data showing increasing salvage of the automatic records made during that flight, and a report from a special committee clarifying the problem of the torn bottom fabric of the *Explorer* and outlining methods for preventing a repetition of the accident.

In the concluding paragraph of its report, the Committee says:

"The Board feels that, much as the accident is to be regretted, it has presented a

* See "The Geographic's Stratosphere Expedition," in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1934; "World's Largest Free Balloon to Explore Stratosphere," in July, 1934; and "Exploring the Stratosphere," by Captain Albert W. Stevens, October, 1934.

series of incidents and phenomena which certainly would have presented themselves sooner or later. Occurring at this time, they have initiated studies which form a distinct contribution to the science of stratosphere ballooning and will add to the security of future stratosphere flights."

FLYING CROSSES AWARDED

For their skill and bravery in managing the disabled *Explorer* and remaining aboard until they approached the earth, the three members of the flight personnel, Major William E. Kepner, Captain Albert W. Stevens, and Captain Orvil A. Anderson, have been signally honored. They were each awarded the Distinguished Flying Cross by the Secretary of War in October, 1934.

The official citation of the War Department follows:

"For extraordinary achievement while participating in an aerial flight. Major Kepner was pilot and commander; Captain Stevens was scientific observer; and Captain Orvil A. Anderson was copilot of the National Geographic Society-Army Air Corps Stratosphere Balloon Flight, which took off from the vicinity of Rapid City, South Dakota, July 28, 1934, and landed near Loomis, Nebraska, that same date.

"Each officer assisted in piloting the balloon into the stratosphere to an altitude of 60,613 feet, and in making continuous scientific observations en route; and, when the balloon became disabled through circumstances beyond human control, did attempt, under most adverse and hazardous conditions, to successfully land the disabled aircraft in order to preserve the scientific records that had been obtained.

"By the exercise of cool judgment and foresight under these conditions, certain scientific records were saved and the disabled aircraft was abandoned only when it was clearly evident that not to do so would prove disastrous to human life."

The financial loss resulting from the explosion of the balloon and the crash of the gondola was much reduced by insurance. The National Geographic Society recently

was paid \$30,170 by Lloyd's of London on the policies covering the bag, gondola, and instruments.

Insurance was carried in ten policies against practically every risk involved in the flight. The three members of the flight personnel were insured against death and major disablement. The balloon, gondola, and scientific instruments were insured during inflation, during the flight, during deflation, and until all equipment should be packed for shipment from the landing place.

A UNIQUE INSURANCE RISK

This insurance was against damage resulting from explosion, fire, lightning, wind, and collision.

The risk on a stratosphere balloon in flight was so unusual that American insurance companies would not assume it, but The Society secured the insurance through Lloyd's of London. There the risk was spread among a group of hundreds of individual underwriters.

The *Ætna Casualty and Surety Co.* and the *United States Aviation Underwriters* insured the balloon and equipment against damage during transportation to the Black Hills, and from the landing place. These companies also undertook to pay any damage to property or persons not connected with the flight, caused by the balloon or by objects falling from it.

For the soldiers and civilians employed at the Black Hills camp in connection with the flight, workmen's compensation and employers' liability insurance were provided; and automobiles, trucks, and planes used at the camp were insured against damage to persons and property. Altogether, the policies represented one of the most comprehensive and unusual cases of insurance underwriting in recent years.

WORLD'S HIGHEST-ALTITUDE PHOTOGRAPHS

A continuation of the explorations in the high regions of the atmosphere by another flight during the approaching summer is considered important and desirable to check and test data already obtained, to make additional photographic studies, to bring back samples of stratosphere air, and to make certain other new studies. The expedition will place special emphasis on data that can be obtained only from manned balloons capable of lifting standard laboratory instruments.

Among the striking results of the flight of last July, salvaged from the crash of the gondola, and brought to light after painstaking laboratory work, is a series of photographs of the earth taken at intervals of a few minutes, from an altitude of three miles to that of more than eleven and a half miles. A number of these photographs were taken from greater heights than any heretofore made. The highest photograph of all—the world's record high-altitude picture—exposed at 59,300 feet above the earth and more than 62,000 feet above sea level, is reproduced on page 270.

By triangulation from these photographs of the earth taken vertically downward, the altitude of the balloon at every minute-and-a-half period during the greater part of the flight has been calculated and compared with the less accurate altitudes indicated by the barographs. This method has not been used in previous stratosphere balloon flights.

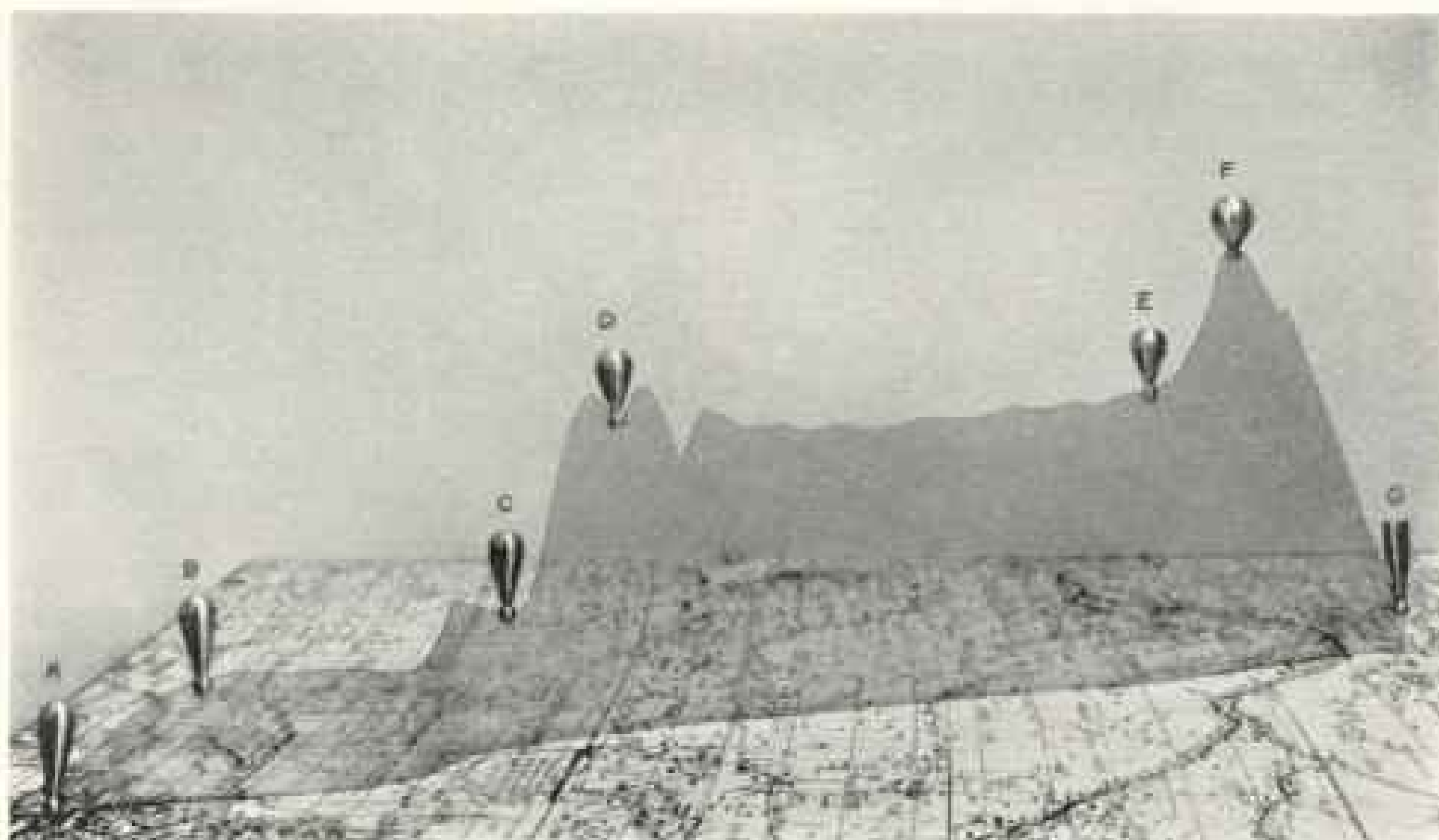
FILMS SHOW ASCENT OF NEARLY 12 MILES

The calculations disclosed that above 40,000 feet the altitudes shown by the barographs were less than those ascertained photographically; and that there were lags in the barograph records where there were sudden changes in direction up and down.

Calculations from the highest of the photographs showed that the balloon reached an altitude more than 1,400 feet higher than that indicated by the barographs. The height attained according to the barographs was 60,613 feet above sea level. The photographs showed a height of 59,300 feet above the earth's surface in Custer County, Nebraska, which is itself approximately 2,800 feet above sea level. The balloon's maximum altitude above sea level, therefore, as determined photographically, was approximately 62,100 feet, or slightly more than eleven and three-quarters miles.

Study of the series of photographs, together with the automatically recorded times at which they were exposed, has brought to light interesting data in regard to the speed of drift of the balloon at different levels, and therefore of the wind velocities at those levels.

At approximately 23,000 feet up, the speed was 22.75 miles per hour, to the southeastward. At an altitude of 40,000 feet the direction of drift was still southeastward, but the speed had increased to



Photograph from model by Lieut. S. B. Talley

THE STORY OF THE "EXPLORER'S" FLIGHT IN THREE DIMENSIONS

The model, consisting of a map, a celluloid profile of the flight, and miniature metal balloons, shows in detail facts about the adventurous journey of the world's largest free balloon. Rising near Rapid City, South Dakota (A), at 5:45 a. m., mountain standard time, July 28, 1934, the *Explorer* came to earth near Holdrege, Nebraska, 315 miles away, nine hours and 57 minutes later. It was possible to construct the profile showing the altitude at each moment, because of the photographs made straight down, automatically and continuously during the flight. Each photograph told by its scale the exact height at which it was exposed. From the photographs, the wind velocities at various heights were also ascertained. The swiftest winds were encountered at an altitude of about 40,000 feet (D to E). The slowest winds were found at 60,000 feet (F). The balloon was at the level F for about the same length of time that it was at the level D-E. In the model the forms of the little balloons indicate the shapes of the *Explorer*, owing to varying pressures, at corresponding levels.

55.7 miles per hour. While the balloon was at 60,000 feet and higher, its drift was almost directly to the westward, at a rate, however, of only 6.25 miles per hour. On its way downward the balloon again drifted southeastward.

HOW RECORDS WERE SALVAGED

Soon after the crash of the gondola on July 28, it was feared that all of the vertical photographs were lost. The magazine containing the exposed films was crushed and the roll was necessarily left unprotected for some time. The latest photographs, made while the balloon descended, were ruined, but the earlier exposures, being surrounded by the later exposures, were protected to a gratifying extent.

Even the earliest films were in bad shape, but by extremely careful handling in the laboratory of the United States Army Air Corps at Wright Field, Dayton, Ohio, the dim lines on the negatives were brought out.

Some of the finished films were so weak that it required ten minutes or longer to print them. Despite all of the handicaps, prints were obtained from 163 of the 200 exposures.

Comparable good fortune attended efforts to salvage other records made automatically during the flight of the *Explorer*. Studies are still in progress on the data recorded by the spectrographs and by the cosmic ray detecting instruments. Reports on these studies will be made at a later date.

Careful tests and observations in the laboratories of the U. S. Bureau of Standards in Washington enlightened the problem of the tears that appeared unexpectedly in the bottom fabric of the *Explorer*. These made it necessary to cut short the flight of the balloon probably 15,000 feet below the altitude to which the bag's lifting power was capable of taking it.

The salvaged portion of the balloon bag was brought to Washington early last Au-

gust and specimens were taken to the Bureau of Standards for intensive study under the supervision of a Joint Board of Review appointed to investigate the causes of the accident.

The Board consisted of the chairman, Dr. Lyman J. Briggs, Director of the U. S. Bureau of Standards; Dr. John Oliver La Gorce, Vice President of the National Geographic Society; Brigadier General Oscar Westover, Assistant Chief of the U. S. Army Air Corps; Dr. W. F. G. Swann, Director of the Bartol Research Foundation; Dr. L. B. Tuckerman, of the U. S. Bureau of Standards, and Mr. Thomas W. McKnew, secretary.

OFFICIAL REPORT ON THE ACCIDENT

In its report, the Board said in part:

"The Board has inquired minutely into the history of the balloon, including design computations, specifications, material, construction, packing, shipment, unpacking, inflating, launching, and the events which occurred during the flight.

"It has studied published and some available unpublished reports of previous stratosphere flights. It has examined in detail photographs of the balloon during launching and flight, salvaged wreckage, and the reports of computations and tests upon samples of the wreckage made at the Board's request by the National Bureau of Standards.

"As a result of these inquiries, examinations, and tests, it has reached the following conclusions:

"1. The design provided an ample margin of safety for all stresses which would occur in normal handling, inflating, launching, and flight.

"2. The fabric of which it was constructed fully met the specifications.

"3. At temperatures as low as minus 60 degrees centigrade, the properties of the fabric had not altered sufficiently to account for the failure.

"4. Nothing occurred during the construction, packing, shipment, unpacking, inflating, and launching which could have torn the fabric of the balloon.

"5. Nothing in the handling of the balloon by the Flight Personnel was the cause of the failure.

"6. At an elevation of about 57,000 feet the Flight Personnel observed multiple ra-

dial tears in the lower portion of the balloon which was at that time still slack within the lower catenary.*

"7. To facilitate launching, and to overcome difficulties which had proved serious in launching previous balloons, and which undoubtedly would have been correspondingly greater in this larger balloon, the balloon fabric below the lower catenary was folded inside the fabric above that catenary. This manner of folding was first used in the *Explorer*. The initial failure of the portion of the bag below the lower catenary was caused by large areas of adhesion between the 3-ounce fabric above the lower catenary and the 2-ounce fabric below it. The manner of folding allowed the transmission of excessive local stresses from the 3-ounce fabric to the 2-ounce fabric through the shear resistance of these adhesions. These stresses produced the multiple radial tears.

"8. It is customary in balloon construction to use talcum or zinc stearate to avoid adhesions. Nevertheless, adhesions between parts of a folded balloon are not infrequent, and have not in past experience placed excessive stresses on the fabric. In previous methods of packing these adhesions released under low stresses by a process of peeling loose during inflation. A possibility that the manner of folding the balloon would allow the transmission of appreciable forces by shear resistance of adhesions was not anticipated by anyone connected with the design or construction of the balloon.

TAKE TO PARACHUTES

"9. The gradual increase of the primary tears and final complete separation of the greater portion of the 2-ounce fabric was the natural result of loose torn fabric flapping in an airstream.

"10. After the separation of the lower portion from the catenary, the upper portion of the bag above the catenary was intact and undamaged until somewhere below 5,000 feet elevation it suddenly disinte-

* The lower catenary band is a belt of heavy fabric extending around the body of the balloon bag about halfway between the equator of the balloon and its bottom point. From the lower catenary band the load carried by the balloon is suspended by ropes. The fabric below the lower catenary band serves only to form a bottom for the balloon; it carries no load.

grated and the flight personnel were obliged to take to their parachutes.

"11. The aerodynamic forces acting on the bag at this time were wholly inadequate to damage this intact portion of the bag.

"12. The final disintegration of the upper portion of the bag was caused by the explosion of the hydrogen-air mixture which it contained."

THREE METHODS OF INFLATING LARGE BALLOONS

The reasons for the occurrence of the tears become clearer to those unfamiliar with ballooning and engineering terminology, when the three methods of handling large balloons during inflation are considered.

A balloon which is to ascend far into the stratosphere cannot be completely filled with gas. Gas, ascending to 60,000 feet, for example, will expand to approximately fifteen times its volume at sea level. If the bag were filled at the earth's surface, therefore, it would immediately start to spill gas as it rose, and would have to dispose of fifteen times its earth-level capacity by the time it reached the peak of its flight. Furthermore, the lifting power of the full bag would be almost impossible to control.

If the *Explorer* had been completely filled when it left the ground (and strengthened sufficiently), it could have lifted more than one hundred tons of weight. It could have soared upward, dangling beneath it a medium-sized railroad locomotive and tender.

In stratosphere balloons, therefore, it is customary to place only about one-fifteenth of the gas which they can hold. At approximately 60,000 feet up, this gas will have expanded so as to fill the bag completely.

If a balloon bag is to be filled only one-fifteenth with hydrogen, however, a problem arises as to the disposition of the lower portion of the bag. The hydrogen, of course, will flow upward and fill the upper part of the balloon. The fabric below the hydrogen either will be sucked in and crumpled against itself, or air must be admitted to fill out the lower fabric.

Professor Auguste Piccard,* during his two flights in Europe, admitted air to his

balloon so that it took roughly the shape of a pear, with hydrogen expanding the top and air filling out the lower part of the bag somewhat slackly. Since a mixture of hydrogen and air in certain concentrations is explosive, there is an element of danger in following this method.

If no air is admitted, the fabric of a large balloon hangs far down and becomes exceedingly difficult to manage during inflation. Commander Settle and Major Fordney, in their flight in 1933 in a 600,000-cubic-foot balloon, preferred to admit only hydrogen to their bag, and to fold the bottom fabric inward against itself. This double fold of fabric did not extend above the lower catenary band. As the balloon rose and the gas expanded to fill it, this folded bottom fabric opened out without difficulty.

When the 3,000,000-cubic-foot *Explorer* was built, it was realized that the bottom fabric of this balloon—five times the capacity of the Settle-Fordney bag—would be even more difficult to handle during inflation. It was thought safer not to admit air; so the bottom fabric was folded, and, since there was much more of it, it was folded farther up into the balloon.

Thus some of the 2-ounce bottom fabric came into contact with the 3-ounce fabric above the lower catenary, and in places the two fabrics stuck together because of the stickiness of the rubber with which they were impregnated.

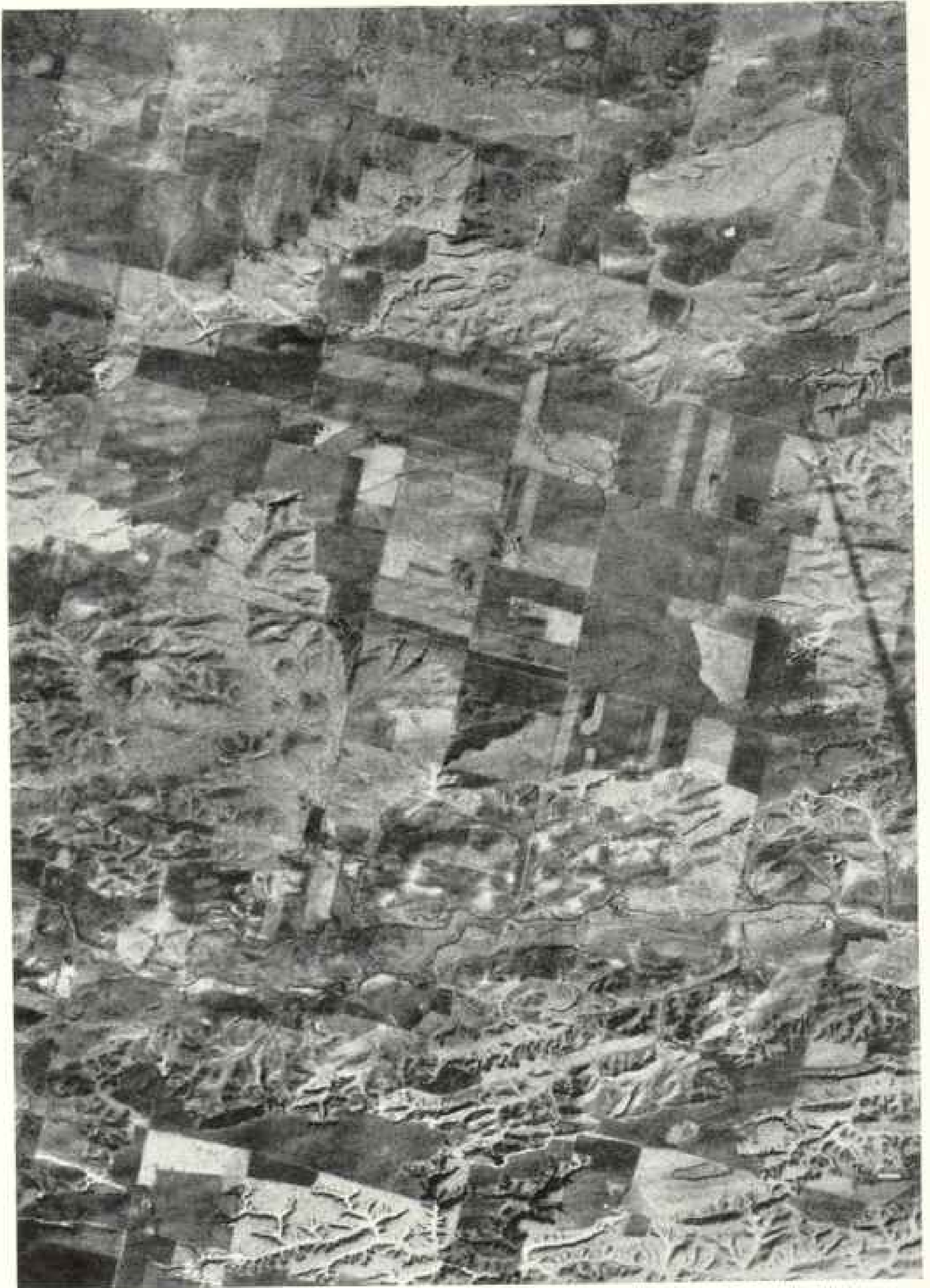
As a result, strains in no wise too great for the heavier fabric were transmitted to the lighter fabric, and the latter was torn before it was pushed down by the expanding gas into its proper place. When the bottom fabric did unfold, the tears were disclosed and the balloonists found it necessary to start their descent.

CAUSE OF THE EXPLOSION

The second problem which faced the Joint Board of Review was to determine the nature of the final and sudden disintegration of the balloon as it approached the earth. After discussing the facts disclosed by its examination, the Board says in its report:

"The sudden disintegration of the balloon can be fully accounted for on the basis of a hydrogen explosion, and no other explanation has been found which is at all adequate to explain it."

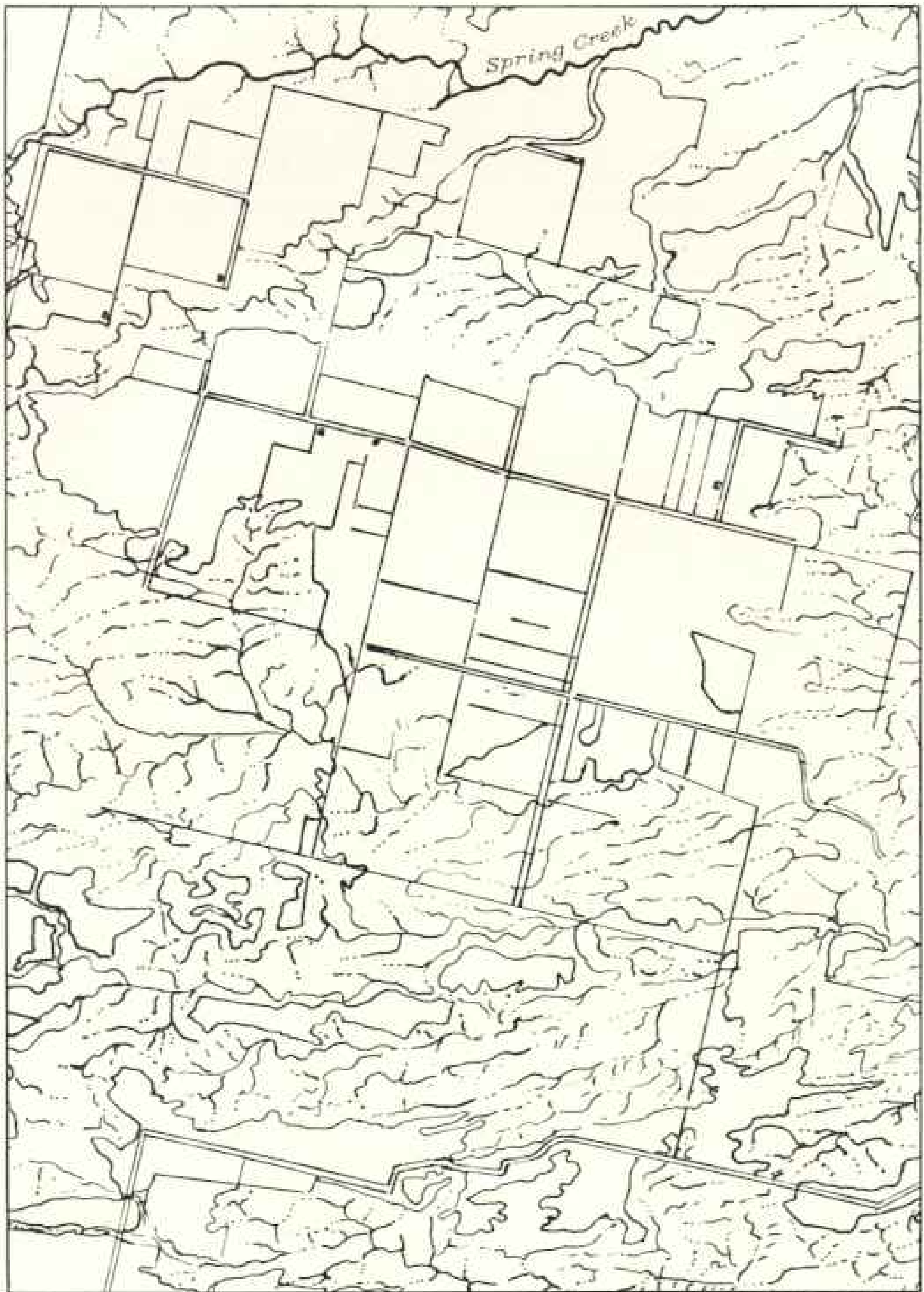
* See "Ballooning in the Stratosphere," by Auguste Piccard, in the NATIONAL GEOGRAPHIC MAGAZINE for March, 1933.



Photograph by Capt. Albert W. Stevens

PATCHWORK FARMS AND BADLANDS OF NEBRASKA FROM HIGHEST UP

This is an enlarged segment of the highest-altitude photograph ever made, taken straight down from the gondola of the *Explorer* when it was at a height slightly more than $11\frac{3}{4}$ miles above sea level. Newly plowed fields are darker than the wheat and grasslands. Broken ground, creeks, and arroyos are identified by crooked lines and lights and shadows. The white dot (upper right) is the spectrograph hanging 500 feet below.



Drawn by Lieut. R. B. Talley

THIS SKETCH WAS MADE FROM THE HIGHEST-ALTITUDE PHOTOGRAPH (OPPOSITE PAGE)

The complete photograph, from which the segment was taken, covered 98 square miles, a record area for one photographic exposure made vertically. The balloon was over Custer County, Nebraska, about 38 miles east of North Platte, when the picture was taken. The roads are indicated by lines running north-south (left to right) and east-west. Each large square represents approximately one square mile of land.

In the discussion of the evidence of the explosion, the report said in part:

"A mixture of hydrogen and air is highly explosive, and there have been numerous occasions on record in which the hydrogen in balloons has been ignited and sometimes exploded, in which there was present no source of a flame or spark except the balloon itself, the hydrogen in it, and the air around it.

"The rubbing of dissimilar surfaces together is the classic method of producing electric sparks and in the balloon such dissimilar surfaces as the rubber and cloth side of the fabric, the ropes, the valve gaskets, etc., cannot be avoided. This constant danger of a chance spark is the reason for the meticulous precautions prescribed in handling hydrogen balloons.

"In the *Explorer*, with the lower portion torn away and an opening approximately 125 feet in diameter affording a free access of air, it is certain that there existed in the balloon a large amount of explosive hydrogen-oxygen mixture ready to be exploded by any chance spark. All the materials necessary to produce a spark were present in the balloon.

"Besides the absence of any other conceivable types of forces adequate to rupture this part of the balloon, the disintegration of the balloon into many pieces is further evidence that this was the result of an explosion. Normally, in bursting tests on fabric under static forces, the forces produce one, or, at most, two tears (at right angles). The spreading of these tears, relieving the static pressure, prevents the development of multiple tears and fragmentation of the fabric.

"Tests have been carried out by the National Bureau of Standards to determine whether under any conditions approximating the conditions of the balloon static forces not locally concentrated, continuous over a reasonably long period of time, could produce multiple tears and fragmentation.

"The tests made confirm the conclusion that only explosive forces could produce the multiple tears and fragmentation observed.

"The absence of any sensation of a loud noise has been cited as evidence against explosion as a cause. The maximum velocity of a hydrogen-air explosion is 15.7 feet per second. It would, therefore, have required somewhere between 5 and 11 sec-

onds for the explosion to propagate across the balloon at the level of the break, depending on the position of the initial spark. The noise of the explosion would be more in the nature of the rumble of distant thunder and would readily be unheard over the drone of the airplane flying in the neighborhood. The 'thuds' reported seem well consistent with the sensations to be expected from such an explosion, and the barograph records prove the existence of a considerable shock.

EXPLOSION TIME BRIEF

"The duration of the explosion was short in comparison with the time necessary for the fabric of the balloon to readjust itself and redistribute the stresses caused by a local change of shape. The long period of the pulsations (7 to 10 minutes) shows that it would require several minutes for the whole balloon to readjust itself to a local change of shape.

"The time of the explosion was thus insufficient for redistribution and the local concentrations of stress produced multiple tears and fragmentation of the fabric.

"A hydrogen flame is almost colorless and could not have been seen under the circumstances. Finally, it would not set the balloon on fire or even scorch the fabric. None of the fragments in the tests at the Bureau of Standards showed any sign of scorching.

"Although souvenir hunters destroyed the possibility of accurate verification, it seems probable from the examination made that the three large pieces contained almost the whole of the upper part of the balloon above a line near pattern 28 and that the multiple small fragments came almost wholly from the zone between patterns 29 and 39. This is consistent with the effect of the explosion of a layer of a hydrogen-air mixture lying between a layer of air and hydrogen too rich to explode."

The Advisory Committee for the new stratosphere flight has been named as follows: Dr. Lyman J. Briggs, chairman; Dr. Gilbert Grosvenor, Dr. F. V. Coville, Brig. Gen. Oscar Westover, U. S. A., Maj. W. E. Kepner, Capt. R. S. Patton, Dr. W. F. G. Swann, Dr. Floyd K. Richtmyer, Dr. Charles E. K. Mees, Mr. Willis R. Gregg, Dr. L. B. Tuckerman, Dr. John Oliver La Gorce, and Mr. Thomas W. McKnew, secretary.

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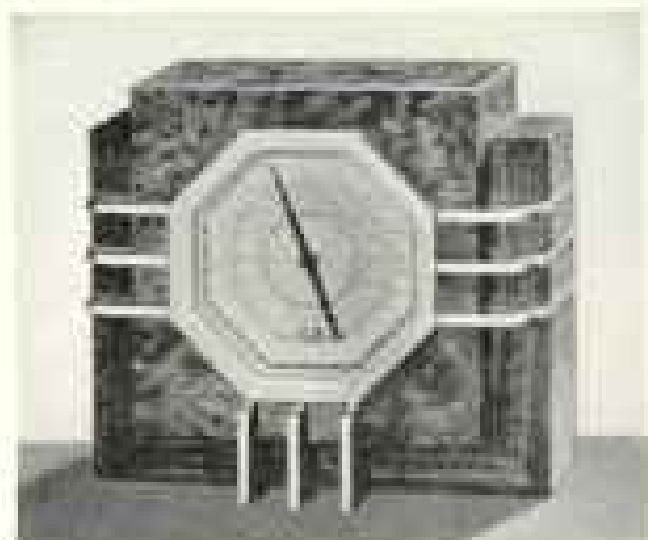
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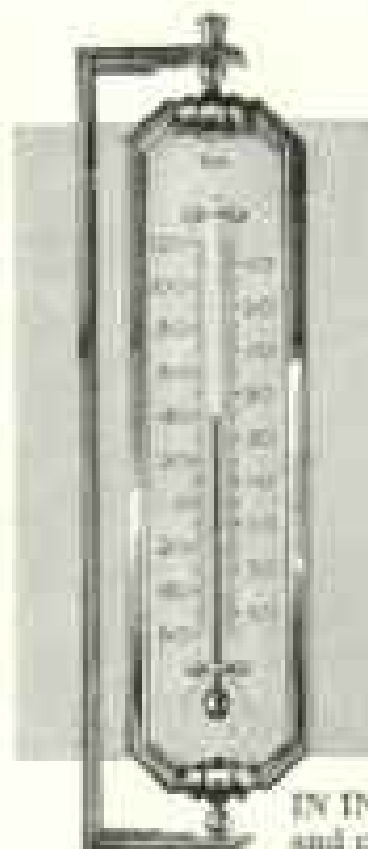
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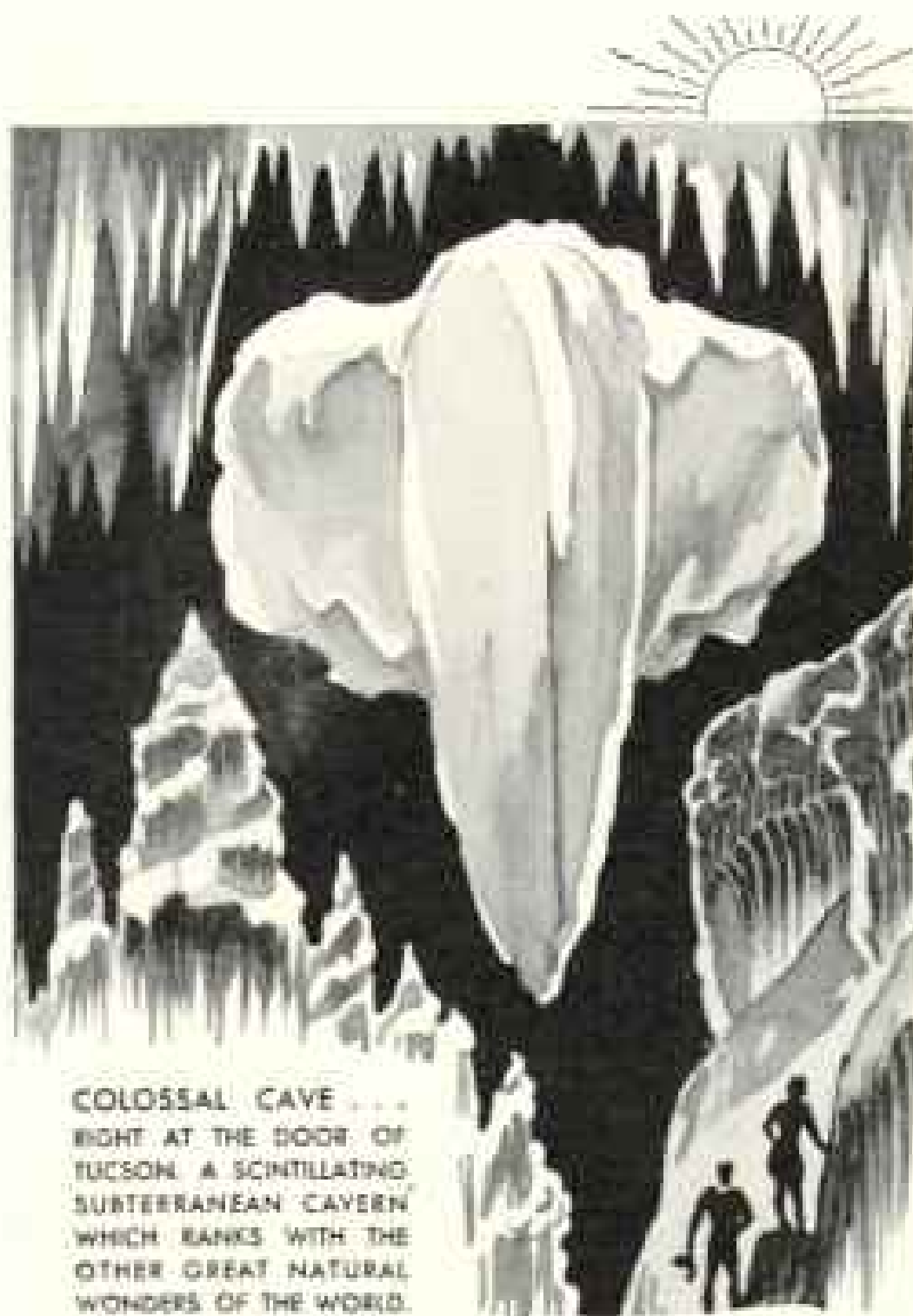
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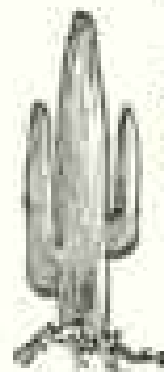
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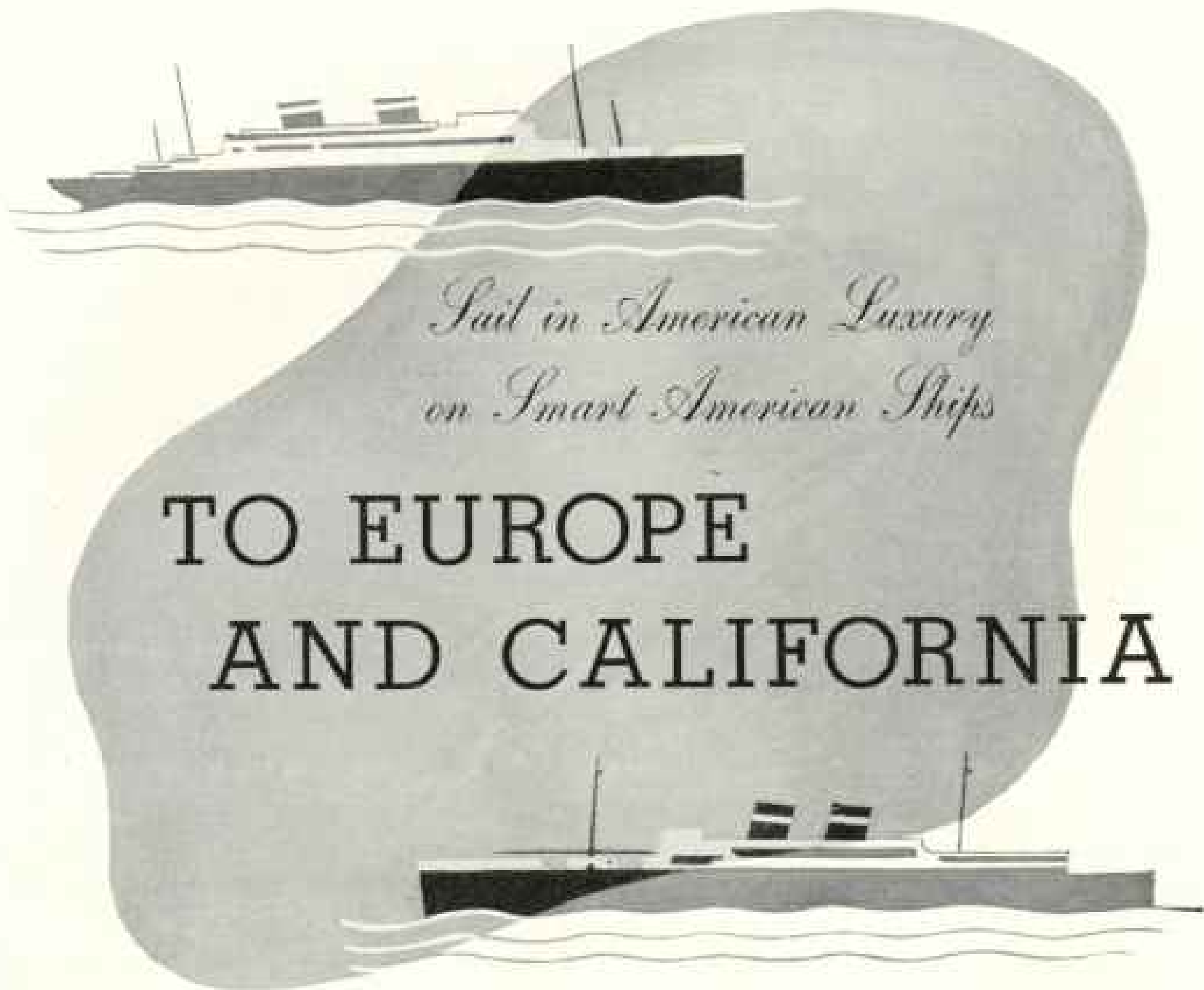
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Hay Fever

MANY a hay fever sufferer can point to a calendar and foretell almost to the day when his misery will begin. Often, he knows how long it will last.

His acute distress is caused by pollen carried in the air from a particular kind of tree or grass or weed or, in rare instances, a flower. Some people may be affected by several types of pollen. Little or no relief may be secured until the particular types are known and proper measures are taken to immunize against them.

It requires patience on the part of the sufferer and thoroughness and understanding on the part of his doctor to find out, in advance of the dreaded season, whether hay fever will be brought on by a tree in April or May, a grass in June or July, or a weed in August or September.

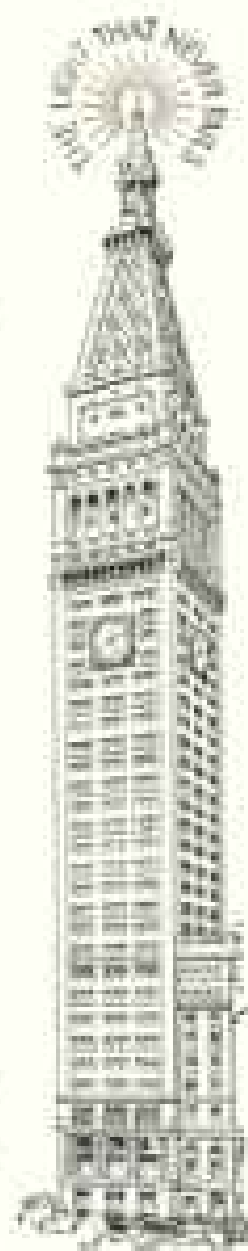
One of the methods by which the doctor finds out which pollen causes hay fever consists of making a series of tiny scratches,

about an eighth of an inch long, which penetrate the outer skin. He may make from eight to thirty tests, the number depending upon the variety of air-borne pollens in the patient's locality. On each scratch the doctor applies one drop of a different pollen solution. If a particular pollen has caused past trouble, a slight, itching elevation will appear on the skin where the scratch was made.

Based on the results of these tests, the doctor knows just what to do and when to begin to build up the immunity of his patient against the individual trouble-making pollen or pollens.

Some stubborn cases do not yield to this immunizing process, but a majority of hay fever patients have been made far more comfortable by it. Many of them have been relieved completely.

The time to begin the battle against 1935 hay fever is now!



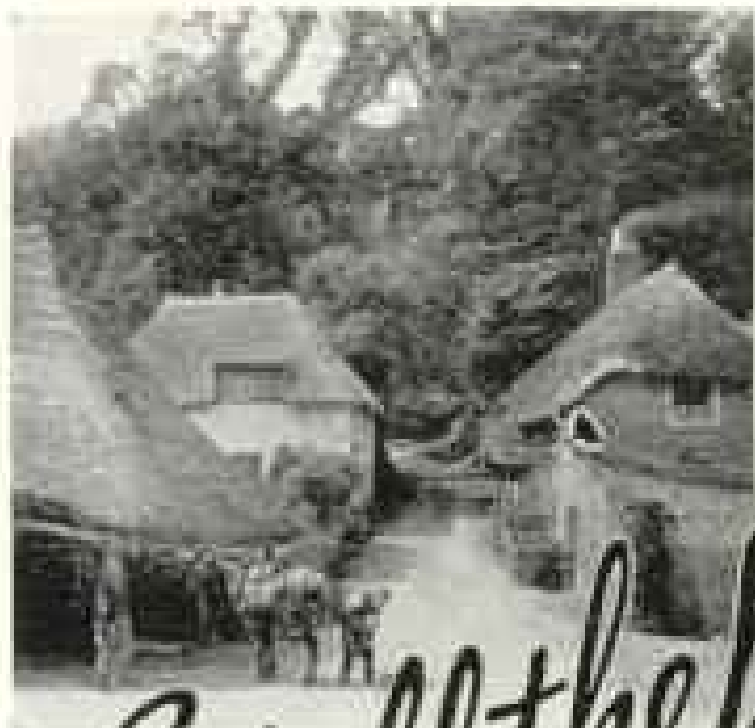
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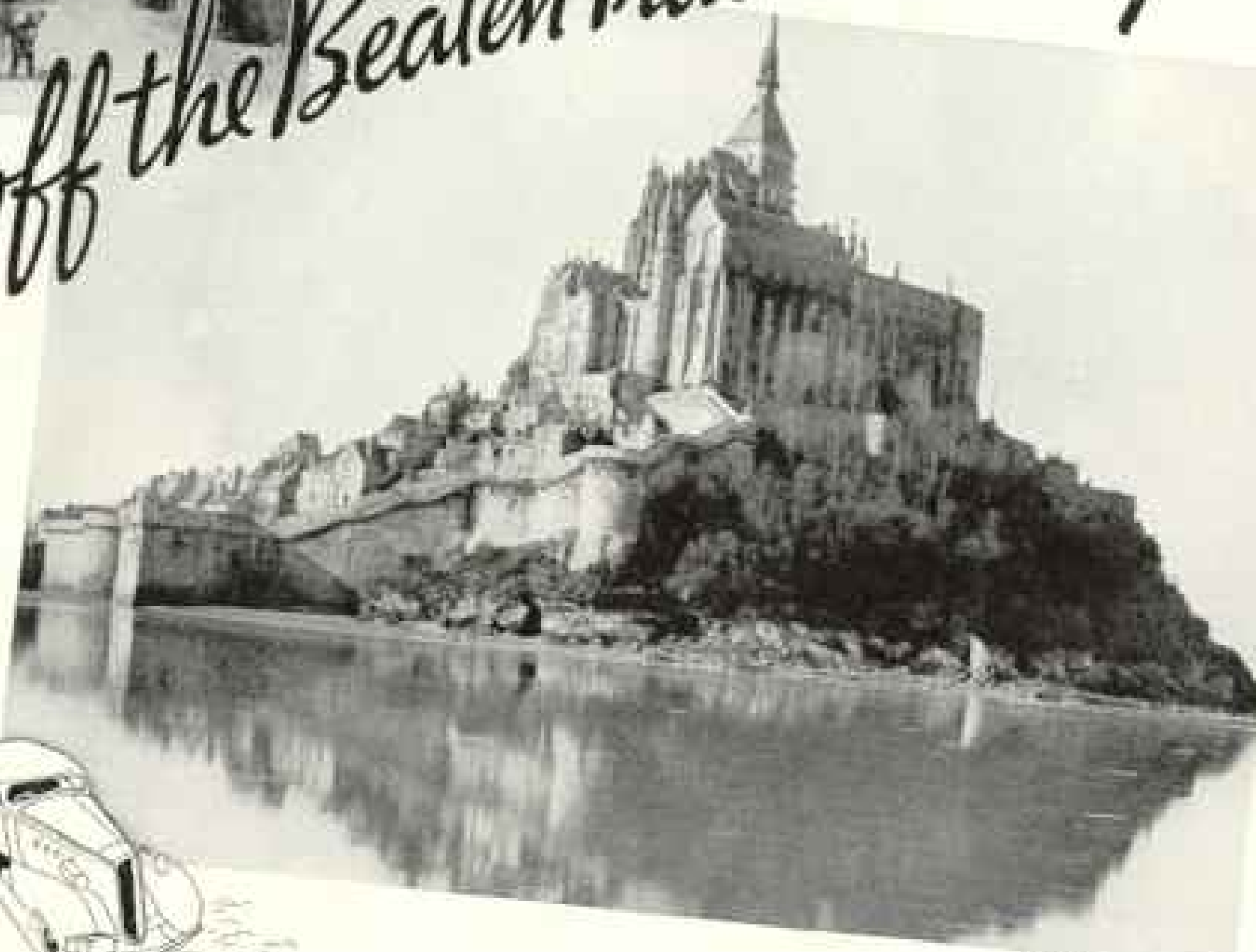
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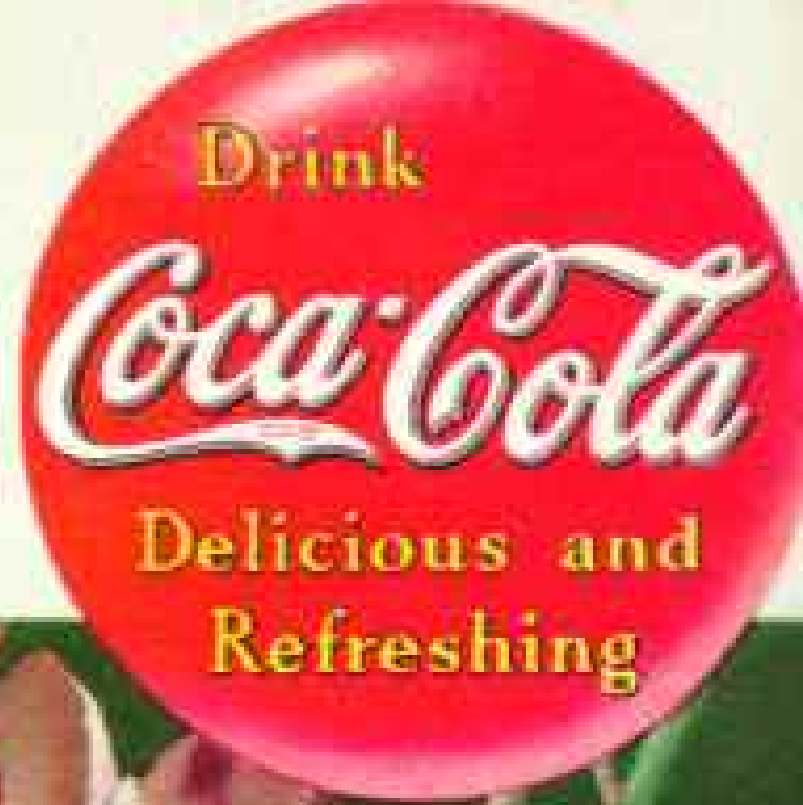
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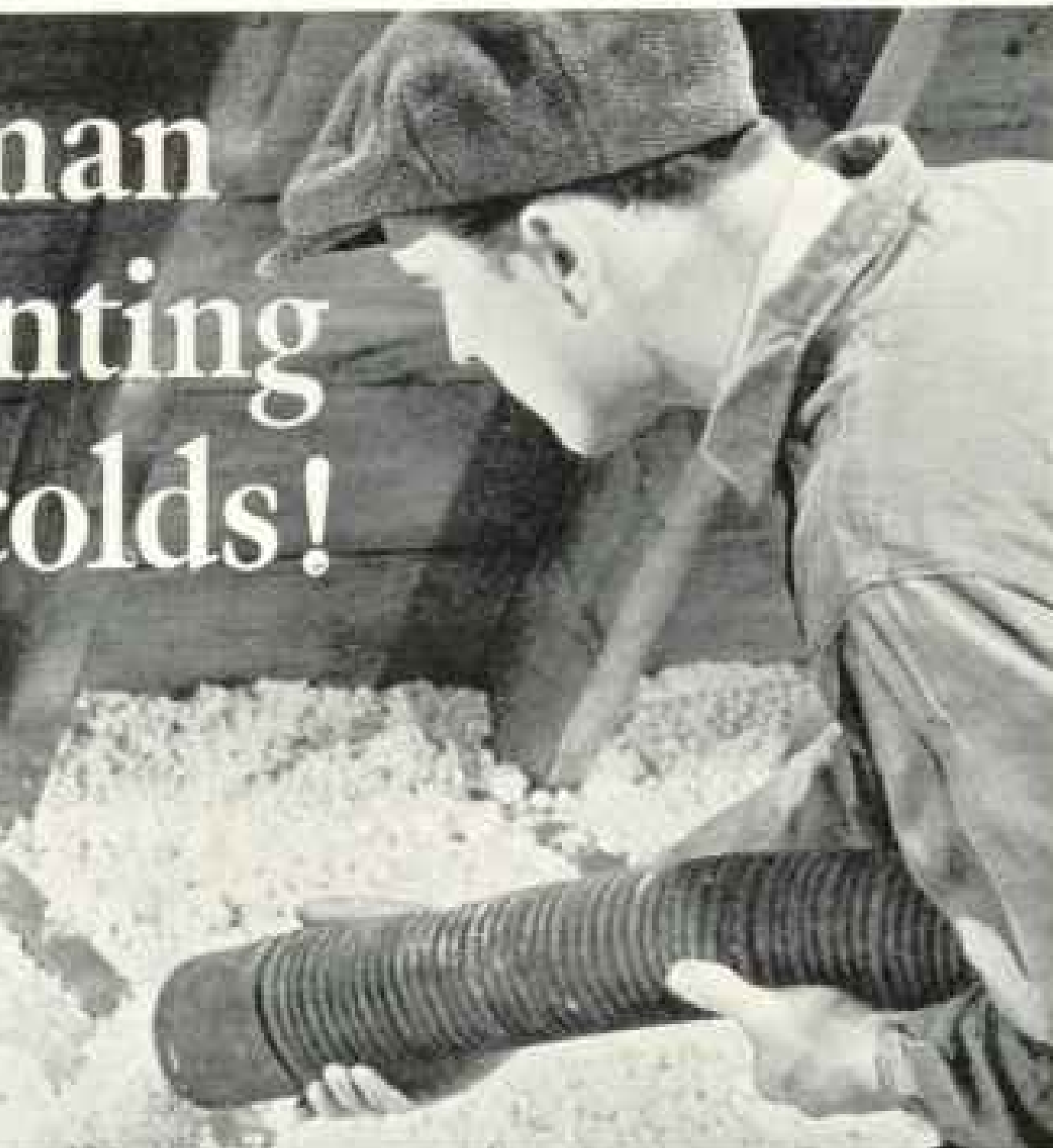
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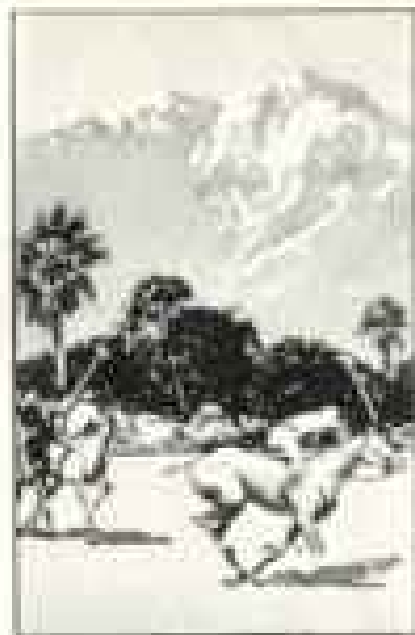
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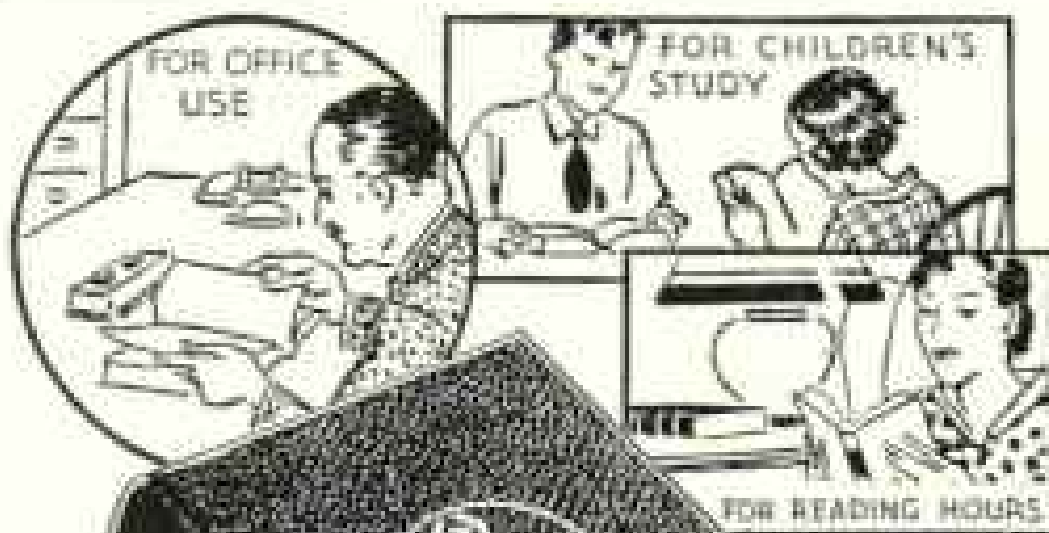
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ON literally millions of occasions—in every corner of the globe—when a strong bright light is necessary, Eveready means “the difference between day and night.” Eveready Batteries are ALWAYS fresh when you buy them. The “Date-Line” is your guarantee of this freshness. The next time you purchase batteries, look for the “Date-Line.” Your Dealer sells Eveready Batteries so fast that they are always FRESH on his shelves... *“Packaged Electricity at its best.”*

NATIONAL CARBON COMPANY, INC.
General Offices: New York, N. Y.
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EVEREADY
FLASHLIGHTS & BATTERIES

This “DATE-LINE”

tells you
they're
FRESH



This picture
for framing—

a beautiful 10" x 14" color-reproduction of this painting (devoid of advertising matter) will be sent to you if you will fill out the coupon herewith, and mail it to us with ten cents in coin or stamps.



NATIONAL CARBON COMPANY, INC.
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Dept. I

Enclosed find ten cents (in coin or stamps) for which send me a color-reproduction of this Frances Tipton Hunter painting, suitable for framing.

I have checked your questions below:

Who generally buys the flashlight batteries for your family? (Please check)

MAN WOMAN BOY (under 18 yrs. of age) GIRL (under 18 yrs. of age)

Name _____

Address _____

City _____