THE GREAT RAINBOW NATURAL BRIDGE OF SOUTHERN UTAH*

By Joseph E. Pogue, United States National Museum

With Photographs by the Author

NEAR the southeast corner of Utah, in a remote and well-nigh inaccessible part of the Navaho reservation now given over to the use of the Piutes, is situated a natural bridge, called by the Navahoes *Nonnezoshe,* the stone arch, by the Piutes *Barohoini,* the rainbow, which surpasses any structure of its kind known to man. Even the other great bridges of southern Utah, the Caroline, the Augusta, and the Edwin, known since 1902, are exceeded in size and beauty by the rainbow arch. Discovered but little over a year ago, it has thus far been visited by less than 25 white men and described but once.†

Recently a United States Geological Survey party, consisting of H. E. Gregory, in charge; John Wetherill, K. C. Heald, and the writer, stood upon the summit of Navaho Mountain and looked over a country of wildness and grandeur. Fifty miles to the north the graceful peaks of the Henry Mountains outlined themselves against the horizon; much nearer, the Colorado and San Juan rivers united in the midst of a tilted and disjointed table-land; to the west, the Colorado was already beginning to make that wonderful mile-deep gash so fitly called the Grand Canyon; while to the south was visible the even skyline formed by the extensive tops of Black and White mesas. Turn in whatever direction one would, the scene was one of bewildering magnitude.

Nearer at hand, surrounding the mountain like an island, surged a billowy sea of red sandstone, carved into fantastic, rounded, and oval masses, colossal in size, between whose cross-bedded and swirling slopes wound deep and tortuous canyons. Hidden away in such a labyrinth, it is not surprising that the bridge remained so long unknown. Yet it is only four miles distant in a northerly direction from the mountain's summit, and is visible from this point as a tiny arch, provided one knows exactly where to look. Otherwise the eye may wander at will over this wilderness of rock without sighting its most interesting feature.

Although so close at hand, this goal was only reached after two days' time and a journey of 35 miles over a very indirect route. The mountain had to be descended to the south, a long detour made around its eastern flank, and a devious and winding course followed northward down the bridge canyon, over a trail ever difficult and ofttimes dangerous. The way led between lofty and perpendicular cliffs, towering to a sheer height of one-fifth of a mile, on whose vertical sides could now and then be descried the crumbling ruins of some ancient cliff-dwelling.

In places the walls overhung to form vast semi-spherical chambers, large enough to shelter a cathedral, and in which a shout echoed and re-echoed many times; in other places the sides approached so closely that the only foothold was in the rocky bed of the small stream below, where one was forced to pick a precarious passage from boulder to boulder.

After hours of laborious and intricate travel, a point was rounded and 500 yards ahead a graceful arch was outlined, beneath which the canyon and stream continued their flexuous partnership. The first view of the bridge is minimized by the lofty walls beyond and
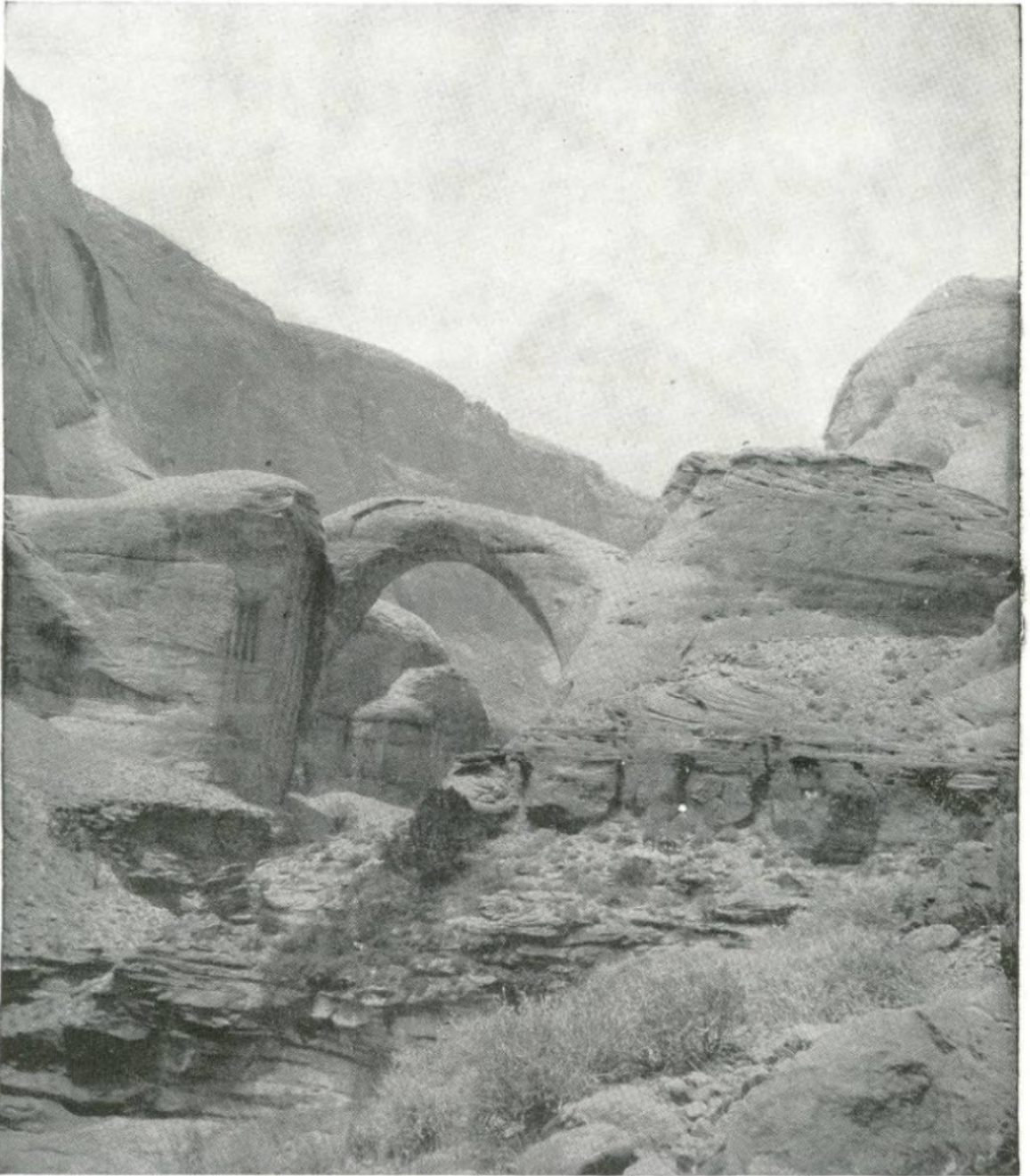
Photo by Joseph E. Pogue

A VIEW OF THE GREAT RAINBOW (NONNEZOSHE) ARCH FROM UP-CANYON, SHOWING
THE LOFTY CANYON WALLS AND THE CHARACTER OF THE
FORMATION FROM WHICH IT IS CARVED

The arch is carved from a buff-colored, fine-grained sandstone, brick-red upon its surface
and stained with vertical streaks of a darker shade. Mostly massive, though in part oblique-
bedded, the rock is only moderately firm, and is easily crushed beneath the blows of a hammer.

the comparatively narrow defile, through which it is only partly visible; but once passed under, it may be seen in its magnificence and entirety.

A towering arch, rainbow-shaped, of wonderful symmetry, rises nearly sheer from a ledge on the one side, and, spanning the stream, joins the opposite can-

Photo by Joseph E. Pogue

A CLOSE VIEW OF THE GREAT RAINBOW ARCH FROM UP-CANYON

"The arch is supposed by the Indians to represent the rainbow, or sun path, and one who passed under could not return without a certain prayer. Evidently Whitehorsebegay had forgotten this prayer and feared vengeance should he break the legendary prohibition. Nearly beneath the arch are the remains of an ancient altar built doubtless by the cliff-dwellers, indicating that the bridge was probably an object of superstitious worship, even to this ancient people" (p. 1053).

Photo by Joseph E. Pogue

THE RAINBOW ARCH AS SEEN FROM DOWN-CANYON: HEIGHT, 308 FEET; SPAN, 278 FEET

Its isolated position and remarkable symmetry are well shown by this photograph. The bridge is at once the largest and most remarkable known. Not only in size but in shapeliness does it surpass any of its rivals (see page 1054)
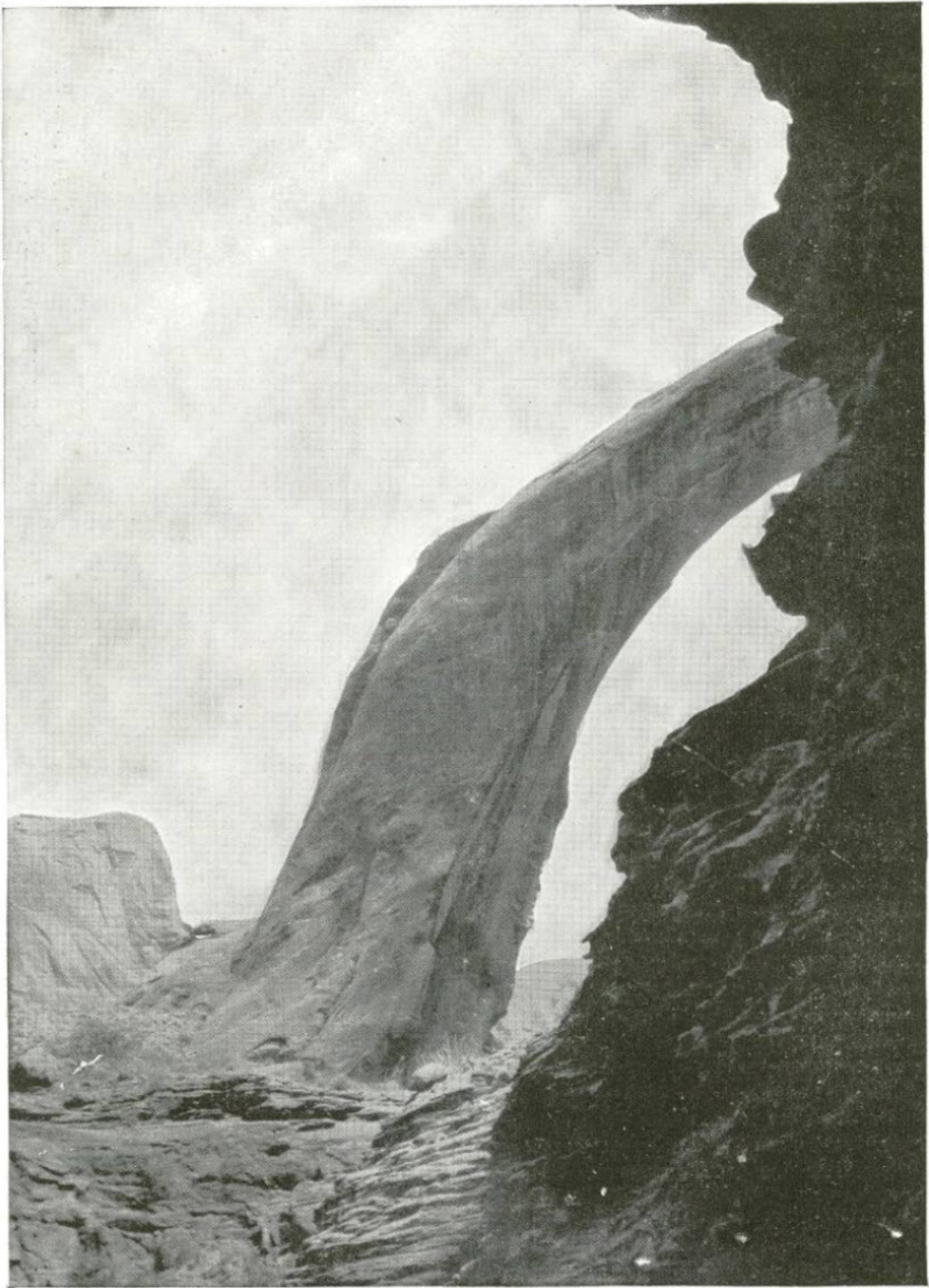
Photo by Joseph E. Pogue

A PORTION OF THE ARCH AS SEEN FROM THE BOTTOM OF THE GORGE AT SOME
DISTANCE DOWN-CANYON

yon wall on its downward curve. The opening, augmented by a gorge cut by the stream to a depth of 80 feet below the level of the supporting bench, measures a vertical distance of 267 feet; but the total height from stream-bottom to the top of the arch is 309 feet, while the abutments at their base stand 278 feet apart. The causeway, upon which one may be lowered from an adjacent cliff, but whose sides are too steep to serve for a complete passage, is 33 feet wide by 42 feet thick at its keystone point; and the limbs are not greatly in excess of these dimensions.

A mere recitation of figures must fail to convey an adequate idea of the imposing nature of the bridge. It is not the size alone, though this far exceeds the greatest masonry arches constructed by engineering skill; nor is it solely the graceful lines or curvature of maximum stability, but rather all of these, that combine to make this the most remarkable single arch now known. It would easily span, with room to spare, the dome of the Capitol at Washington; or, if hung over the Flatiron Building of New York, its limbs would come within a few feet of the ground, though to the west of Fifth Avenue on the one hand and to the east of Broadway on the other.

The arch is carved from a buff-colored, fine-grained sandstone, brick-red upon its surface and stained with vertical streaks of a darker shade. Mostly massive, though in part oblique-bedded, the rock is only moderately firm, and is easily crushed beneath the blows of a hammer. Geologically it is a part of the Upper La Plata sandstone, a formation of great thickness, deposited in Jurassic time over a large portion of southeast Utah, southwest Colorado, and northeast Arizona.

The origin of the arch is simple and evident. It was caused by the progressive narrowing of the neck of a meander intrenched between high and steep walls, until an opening was made through the tongue of intervening rock, permitting the stream to cut off its meander by flowing beneath the arch thus formed. The hole, once made, has been enlarged and given its present shape by the combined action of weathering, expansion, and contraction due to changes in temperature, and the carving effect of wind-blown sand, all of which unite to produce the rounded rock-forms so characteristic of this region. The abandoned arm of the meander is present and unmistakable, indicating the former course pursued by the stream.

Though doubtless requiring many years for its formation, the arch is nevertheless a very recent geological feature, and destined to withstand the forces that gave it being for only a brief period as geologic time is reckoned.

The bridge was first visited by white men and its existence made definitely known on August 14, 1909. It was then reached by a party consisting of W. B. Douglass, of the United States General Land Office, with four assistants; Byron Cummings, of the University of Utah, with three students; John Wetherill, of Oljato, Utah; and two Piute Indians, Jim and Nasjabegay. Douglass was acting under instructions from the Department of the Interior, dated October 20, 1908, to investigate a reported natural bridge in southeast Utah, with a view to making it a national monument if found of sufficient interest. An attempt was made in December, 1908, to locate the bridge, but was abandoned on account of snow. The search was renewed in August, 1909, the party being joined at Oljato by Cummings, Wetherill, and the three students. The arch was surveyed by Douglass, and the figures herein used, as well as the details of its discovery, are taken from his official report to the Land Office.

The bridge was undoubtedly known to the Indians prior to its discovery by white men; but as to the actual knowledge of it there is uncertainty. Douglass relates that Whitehorsebegay, his guide, on a second visit to the bridge, would not go beneath the arch, but laboriously clambered around one side whenever it was necessary to pass. Later Mrs. John Wetherill, an accomplished Navaho linguist, ascertained from an old Navaho that the arch is supposed to represent the rainbow, or sun-path, and one who

Photo by Joseph E. Pogue

VIEW OF A PORTION OF THE ARCH FROM A POINT NEARLY BENEATH

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The bridge is at once the largest and most remarkable known. Not only in size but in shapeliness does it surpass any of its rivals. Below is tabulated for comparison the dimensions in feet of the largest of the natural bridges, the measurements of the first four taken from the surveys of W. B. Douglass.

The exact location of the bridge is latitude 37° 03′ 21″ and longitude 110° 56′

	Height.	Span.	Width.	Thickness.
The Barohoini (rainbow) or Nonnezoshe (stone arch), southeast Utah.	309	278	33	42
The Sipapu (gate of heaven) or Augusta, southeast Utah.	220	268*	31	53
The Kachina (guardian spirit) or Caroline, southeast Utah.	210	277†	44	50
The Owachomo (rock mound) or Edwin or Little, southeast Utah.	106	180	28	9
The Virginia Natural Bridge.	200	45	..	..
Pont d'Arc, France.	197	213	..	..

* Arch skewed; span with axis, 283 feet.   † Mean span, 275 feet; greatest span, 350 feet; least span, 202 feet.

Photo by Joseph E. Pogue

ONE LIMB OF THE ARCH PHOTOGRAPHED FROM THE BASE OF THE OPPOSITE LIMB

This picture brings out, perhaps, more than any other the imposing proportions of the structure

48" west of Greenwich (Douglass), in San Juan County, Utah; six miles north-ward from the Arizona-Utah boundary line; four miles west of north from the summit of Navaho Mountain, and four miles above exit of the bridge canyon into the Colorado River at a point 16 miles below its confluence with the San Juan.

The most exact directions for reaching the bridge would be inadequate, so obscure and devious is the trail leading thereto; hence the services of a guide are indispensable. Oljato, Utah, where guide and outfit for the final portion of the trip may be secured, is reached by two routes, between which there is little choice. On the one hand, Gallup, New Mexico, on the Santa Fé line, may be made the starting point, whence one must go by stage 35 miles to Fort Defiance, Arizona, and from there by wagon or pack outfit 155 miles in a northerly direction to Oljato. On the other hand, the traveler may leave a branch of the Denver & Rio Grande Railroad at Dolores,

Colorado, stage 81 miles to Bluff, Utah, and there secure horses for the remaining 60 miles to Oljato. The bridge is distant from Oljato only 37 miles, as the crow flies, but the trail passes over twice this distance, and three days will be required for this last and most difficult part of the trip. A minimum of 18 days should be allowed for the round trip, whether the start be made from Gallup or Dolores, and the journey may be accomplished at any time during the year save in winter. The trip is an extremely arduous and toilsome one, and would be fraught with danger to an inexperienced traveler, but under competent guidance may be accomplished with no special hazard, though hardships and inconveniences, and many of them, must be expected.

The government has already made of this natural wonder a national monument, thus preserving it for all time against vandalism and commercialism and conserving it for the enjoyment of all.

THE MYSTERIES OF THE DESERT

The following article is abstracted from "Across the Sahara," by Hanns Vischer, one of the few explorers who have traversed Tripoli and the Sahara to Bornu:

THERE are many hamadas in different parts of the Sahara. The Hamada el Homra, the red wilderness, stands first among them all (see map, page 1047).

The great range which bars the road to the south between the coast and Fezzan rises here in one great, solid plateau of chalk to a height of 1,800 feet above the sea-level. It is a mighty sheet of rock falling off to the east, 360 miles from east to west and about 140 miles broad where the road crosses it.

Except for a few narrow depressions, which lie like islands in the surrounding desolation, the surface is of solid rock, covered everywhere with small red stones and little bits of chalk, doubtless the remainder of former layers which have long ago disappeared. Heat and cold

break up the surface, and the incessant wind carries away every loose particle of sand, finally piling it up into large dunes somewhere in the desert around. The surface is swept clean as with a broom, and the polishing action of the drifting sand gives the stones the appearance of being varnished.

The hot air trembles over this shining surface, reflects the blue of the sky in every little depression of the ground, and distorts distant objects into fantastic shapes. Hollows in the rock appear as dim, blue lakes, and wandering camels on far-off rocks are transformed and magnified into the semblance of dark palm groves or strange-shaped hills. These are the games the hamada devils play to terrify and mislead the luckless caravans. For five days in the Hamada