

PORTER'S CAVE AND RECENT DRAINAGE ADJUSTMENTS IN ITS VICINITY.

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Porter's Cave is mentioned in the Indiana State Geologist's Reports as early as 1875.¹ In the report for that year there is a brief description of Miller's Cave, as Porter's Cave was then known. Traditional accounts indicate the cave was known to the Indians and early settlers of the county. Indian flints have been found within the cave but these have long since been removed and their disposition is unknown. The following is taken from the 1875 report.

"Miller's Cave, a mile and a half northeast from the latter, (meaning Roger's Cave) on section 33, township 12, range 2, is surrounded by wild canyon-like scenery, romantic and interesting. The spring here has a fall of 40 feet, and by a turbine drives a boulder "corncracker" mill.

"The cavern is 40 feet wide and 4½ to 5 feet high for 100 yards, where there is a long room 7 feet wide and 15 feet high; beyond the water is deep and the roof descends to within a foot or two of the water. It has been traced as Mr. Charles Dow states, more than a half a mile to its source in two sinks, one in Morgan County, the other in Owen County. In wet weather the cavern is sometimes filled to its utmost capacity and the water in the pool is then 25 feet deep."

The statement referring to the source in two sinks, one in Owen, the other in Morgan County, is significant. No mention is made of the dry valley entering the gorge near the cave entrance. The dimensions given are very likely based upon estimates rather than upon careful measurements.

Another description of the cave is given in the State Report for 1883.² This contains a somewhat more detailed account of the cavern interior. Mention is made of an opening to the cave on the opposite side of an elevated ridge, three-quarters of a mile from the cave outlet. No reference is made to the dry valley near the cave.

The next account of Porter's Cave is that given by Blatchley in the 21st report.³ His description of the cave is an accurate and most pleasant one to read. He mentions, "the source of the stream which flows therefrom is about one-half mile northeast in Morgan County."

That a case of valley abandonment has recently occurred in connection with Porter's Cave seems to have escaped the notice of these early writers. This is no discredit to their efforts for they were primarily interested in the caves and in animal life found therein. In this respect Blatchley's report upon "Indiana Caves and Their Fauna" is the most valuable source of information concerning Indiana Caves.

¹ Geological Survey of Indiana, 1875,—p. 321.

² Rept. Ind. Geol. and Nat. Hist. f. 1883, pp. 78-79.

³ Rept. Ind. Dept. Geol. and Nat. Res. f. 1896, p. 124.

"Proc. Ind. Acad. Sci., vol. 36, 1926 (1927)."

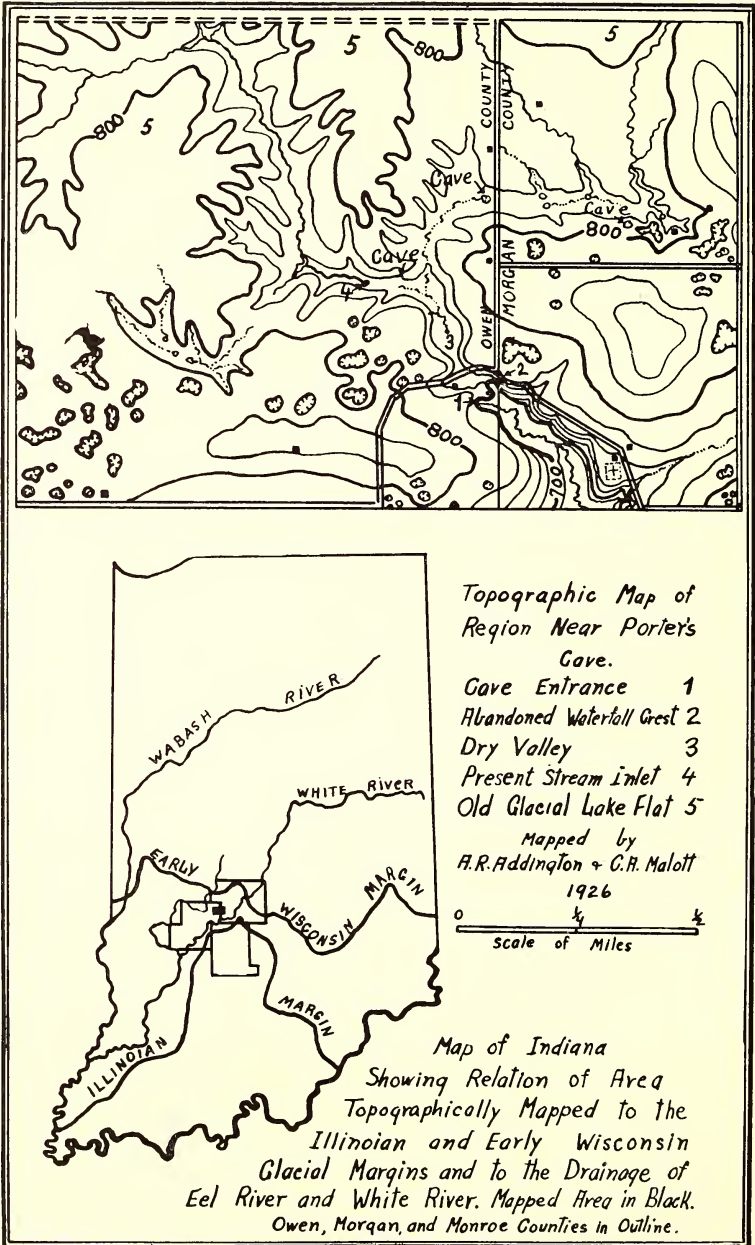


Fig. 1. The area in the topographic sketch is a slightly modified plain, characteristic of a transition zone, between the glacial lake flat of Lake Quincy located to the north of the area and the more dissected portion of the plain to the south.

It was my privilege to visit Porter's Cave for the first time the summer of 1926. During the course of this visit and of succeeding ones, it occurred to me, that a brief account of the cave and of drainage changes intimately associated with it might prove of interest. Such is the occasion of this paper.

Location of Area and Cave. The region involved in this discussion is an area including little more than one and one-half square miles in northeastern Owen County and western Morgan County, Indiana (fig. 1).

The exact location of the area is section 33 and the west one-half of section 34, township 12 north, range 2 west. Within the area is the cave known as Porter's Cave, the entrance of which is located near the bend in the road in the southeast $\frac{1}{4}$ of section 33 (fig. 1). The cave may be reached by a good stone road from Gosport from which it is distant six miles in a northeasterly direction.

Drainage and Topography. The country near Porter's Cave drains to the west fork of White River and to Eel River. Drainage passing through the cave is tributary to White River. One and one-half miles northwest of the cave entrance there is a low divide separating Eel River and White River drainage. The stream flowing from the cave entrance is known as Butler Creek. This debouches into White River a short distance east of Gosport.

Subterranean drainage, characteristic of an area underlain with limestone rock, is much in evidence. Several springs, most of them small, appear in the ravines near the contact of the limestone with the more impervious strata beneath. The springs represent the reappearance of water that has previously soaked into the soil and rock strata of the plain.

Topographically, the region is a plain characterized by a youthful stage of valley development. The conditions of rock structure are such as to favor the formation of sharp ravines, bordered by cliff-like margins. The ravines oftentimes have water falls in their headward portions. One such is shown in the accompanying topographic sketch (fig. 1).

In many places the plain is dotted with sink holes, most of them small but varying considerably as to depth. It is possible that some of the larger sinks owe their present form to the excavation of glacial materials from their basins, the origin of the basins antedating the materials derived from the early Wisconsin drift margin.

North of the area mapped, the country is a plain practically unmodified by drainage. It is referred to by the people of the vicinity as the "Flats." The elevation of this plain is slightly more than 800 feet. Remnants of it are represented in figure 1 (5). The "Flats" constitutes a plain of considerable extent and represents a part of the lacustrine basin of Glacial Lake Quincy, and is representative of a transition zone situated between the lake flat and the more dissected portions of the plain which have been developed by tributaries adjusting their valleys to the valley level of White River.

In the southern part of section 33 and 34 there is a gorge approximately 80 feet in depth. At the upper end of the gorge two valley heads are present in one of which the entrance of the cave is located, (see 1 of figure 1) while the other ends in a ledge of rock, over which a waterfall formerly descended to the gorge below. (See 2 of figure 1).

Above the ledge a dry valley (see 3 of figure 1) extends about one-fourth mile in a northerly direction at which point it branches, one prong extending eastward into Morgan County, the other extending westward a short distance at which place a stream of water is found entering a cavern (see 4 of figure 1), the inlet for Porter's Cave. From this point on the valley contains a stream that has its origin upon the "Flats" located to the north and west. (See 5 of figure 1.)

Near the place where the dry valley forks and on the north side of the left valley prong, a small entrance to a low cave is found. Placing an ear at the small opening it is possible to hear water flowing rapidly along the subterranean channel. This is thought to join with that issuing from the entrance to Porter's Cave.

In the dry valley which extends eastward into Morgan County it is possible to enter subterranean passages at two points, within the valley. One of these is a small sink hole, near the road separating Owen and Morgan counties; while the other is in Morgan County, about mid-way between the points where streams are observed to disappear in sinks in the dry valley. The general direction of water flow in these places is westward. The elevation of the subterranean channels is 35 feet above the outlet at Porter's Cave.

It seems that the statement given in the 1875 report, where the writer says, "The source is in two sinks, one in Owen and the other in Morgan County," is correct. The topographic map is suggestive of this condition.

Geology. The bed rocks exposed at Porter's Cave are of Mississippian Age. The formations present are the Riverside sandy shale member and the Harrodsburg limestone.

The Riverside member is a muddy sandstone, impervious to water but disintegrates rapidly under the influence of weathering. It grades rather gradually into the lower part of the Harrodsburg above, so that the actual point of contact can scarcely be determined with precise accuracy.

The Harrodsburg is a rather fine layered, coarsely crystalline, fossiliferous limestone. In the lower part of the limestone the character changes to that of a limy shale, oftentimes with geodes distributed throughout the mass of shaly layers.

It is more resistant to weathering than the Riverside shale member and where it overlies this formation along valley sides it forms overhanging cliffs. This result of lithologic control is beautifully illustrated at the entrance of Porter's Cave and again at Roger's Cave one and one-half miles southwest of the former.

Porter's Cave and the subterranean drainage associated with it is developed in the Harrodsburg limestone. The stream issuing from

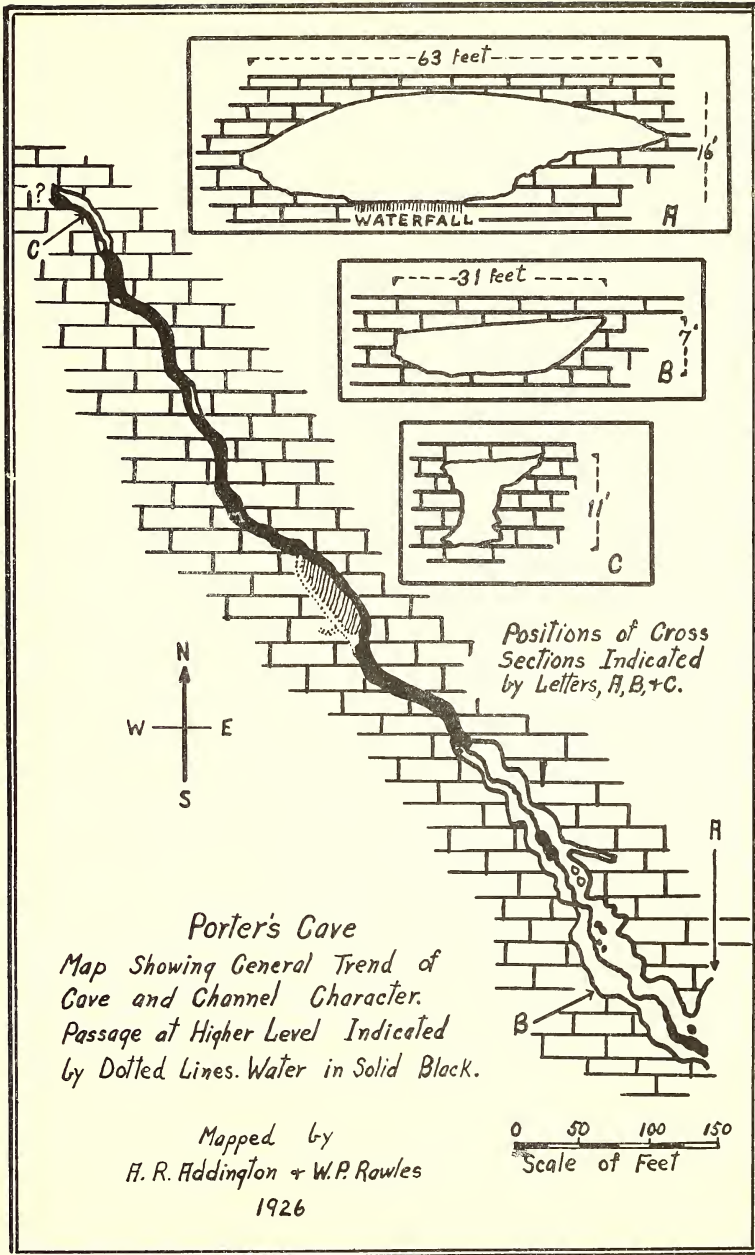


Fig. 2. The cross sections indicate progressive channel widening due to the influences of weathering. The whole trend of the cave is essentially a joint controlled feature.

the cave mouth flows over a limy shale layer characteristic of those found near the lower part of the Harrodsburg formation.

The normal dip of the rock is to the west and south. The entrance of Porter's Cave is at an elevation of 735 feet. On a similar rock layer one and one-half miles southwest at the entrance of Roger's Cave, the elevation is 700 feet, which gives an average dip of 20 feet to the mile for the rock layers in this vicinity.

Porter's Cave. Porter's Cave (fig. 2) is a narrow water worn channel, that trends in a general northwest direction from the entrance. The cave insofar as it was mapped is somewhat winding but the bends are not sharp so that light from the entrance is visible at a point 350 feet within.



Fig. 3. The entrance to Porter's Cave. The waterfall is 17 feet wide and drops a vertical distance of 35 feet. The crest of the waterfall is 15 feet lower than the ledge of rock marking the crest of the abandoned waterfall in the adjacent valley head.

The entrance (fig. 2A) is a great arch of limestone, 63 feet wide and 16 feet high at the place the above cross section was taken. The arch overhangs a waterfall 17 feet wide, the waters falling 35 feet to the bottom of the gorge (fig. 3). The entrance faces nearly due east. Early in a morning the sun lights the interior for a considerable distance. The majestic archway, the sparkling water and the gradual deepening of the interior shadows is a sight not soon forgotten by the observer.

From the entrance the passage rapidly narrows to 30 feet wide and 7 feet high. The roof is an immense slab of limestone that appears to be tilted but is more likely a result of the cross bedded character of the limestone layers. At 300 feet the channel narrows to 10 feet in width but is about 15 feet high.

Three hundred eighty-nine feet from the entrance the channel is nearly blocked by a magnificent deposit of flowstone. A ladder leads to the top of this where a narrow passage floored with slippery clay soon joins the main channel. To the right of the base of the ladder (fig. 4) a low narrow channel extends along the margin of the flowstone deposit. Near the top of the ladder a small stream of water enters the main channel and trickles down over the flowstone. This seemingly insignificant stream has been the main factor in supplying the mineral matter for the huge flowstone deposit.

At 780 feet, there is partial collapse of the cavern roof. Huge blocks of rock are tilted at precarious angles. Considerable water trickles into the cave at this point. I estimate the source of this water to be



Fig. 4. The ladder leans against an immense deposit of flowstone. The light at the top is due to the intensity of the flash which was placed in the upper channel. At the base of the ladder a channel nearly filled with water extends along the right of the flowstone deposit.

from a small spring located on the side of the dry valley (see 3 of figure 1) the waters from which soon disappear in a sink hole in the bottom of the valley.

At 800 feet the channel is only four feet in width at the base, and 11 feet high being somewhat wider at the top.

At a distance of 832 feet from the entrance the channel is 12 feet wide but only 18 inches high. Further progress necessitated crawling through water and mapping was abandoned at this point.

The great width of the entrance is due for the most part to the efficiency of weathering, particularly changes of temperature involving freezing and thawing. On the interior the temperature remains practically constant so that rock disintegration due to physical weathering processes is absent.

On the interior of the cave, near the entrance, are several pot holes. These are indicative of the swirling currents of water that at times pour from the entrance. Mr. Whitaker, manager of the cave, states that during the high waters of 1913, the stream flowing from the entrance was nearly four feet deep and the noise of the falling water was plainly audible at his home, three-fourths mile distant. The high water mark is about the middle of the notch shown at the left margin of the cave entrance (fig. 3).



Fig. 5. A view of the valley recently abandoned. A short distance beyond the spring house, middle background, the valley bends to the left. Rock fragments in the foreground are from a quarry in the Harrodsburg limestone.

At 279 feet from the entrance, water covers the channel from side to side. Except for a short boat trip, it is necessary to wade in water of moderate depth while exploring the cave. At one or two places gravel deposits were found in the channel. The greater part of it, however, has a floor of solid rock.

The narrow channel-like character of the cave and the absence of any extensive rooms would seem to indicate that the cave is relatively young. The general direction of extent is an example of joint control over direction of subterranean waters.

The Dry Valley. Mention has already been made of the dry valley which enters the gorge near the cave. At this point there is a ledge of rock marking the crest of a former waterfall, at the base of which a considerable pot hole had been excavated. This is now somewhat filled in by the slump of material from the sides of the gorge and by the occasional fall of material weathered from the surrounding cliffs.

Above the waterfall crest a dry valley may be followed about one-fourth mile to the place where it forks, one prong extending into Morgan County, the other containing the stream which reappears at the

cave. That this valley was not occupied by a stream for a very long time is evidenced by the ravine-like character of the valley (fig. 5) and by the short distance which the waterfall has receded. No large stream flowed through the valley as indicated by its small size.

The abandonment of the valley by the stream has been at a very recent date. This conclusion is based upon the relatively slight modifications of the valley since the stream occupied it, the relative freshness of the waterfall crest and slight amount of recession of the crest, the youthful character of the drainage above the present inlet (fig. 6), and young stage of development of the cavern interior.



Fig. 6. The dark place in the left foreground is the inlet for water which appears at the entrance of Porter's Cave. Near the base of the tree in the middle foreground a portion of the abandoned valley can be made out.

Relation to Glaciation. The region was covered by the ice of the Illinoian glacial lobe (fig. 1). The well log at Quincy indicates a glacial advance, an interglacial stage, and a readvance of the ice in this area. The modifications of drainage which the Illinoian ice and drift produced in this vicinity are perhaps too far in the realm of speculation to merit a consideration. Rather than state it as a fact I offer the suggestion that the drainage development here is Post-Illinoian, a suggestion based upon the youthful character of the drainage.

The conditions of rock structure are very favorable to the rapid development of gorge-like valleys. Hand in hand with the deepening of these gorges across the plain a subterranean circulation would be established in the limestone uplands. If the gorges are Post-Illinoian then the cave and the adjacent sink hole topography are also Post-Illinoian.

The area is marginal to the Early Wisconsin Drift. Along the margins of this drift Glacial Lake Quincy had its inception. Similar

to any marginal lake formed along the border of an ice mass, this lake had a number of overflow outlets. The positional relation of the lake flat to the Porter's Cave region is such as to suggest a partial escape for the lake waters in the vicinity of the cave.

If it is not too much speculating I venture the suggestion that during a short period overflow from the lake was by way of the valley now abandoned and at the same time part of the waters were escaping by subterranean passages along the route of the cave, the subterranean routes receiving more water than they could transmit.

The abandonment of the valley by the stream and the diversion of the waters to subterranean routes would come as a result of lessened supply due to the lake finding a lower outlet. If this assumption is correct, the drainage condition near the cave had its inception during the Early Wisconsin Glacial Stage.

Before the exact relation of Lake Quincy to the Porter's Cave region can be ascertained, a detailed study of the lake basin with a view of determining the various overflow outlets will be necessary. This in itself is no small matter. An overflow outlet associated with the drainage through Roger's Cave is present two miles west of the area discussed in this paper.

Perhaps this account is somewhat disappointing because of the uncertainty of conclusions expressed, but such must be the case until more definite knowledge is obtained. There can be no question as to the fact that the valley has been abandoned in favor of the cave channel. As to the time of abandonment and the causes leading up to it there is some room for doubt. So far as I am aware no account of drainage change near Porter's Cave has ever been written. It seems to me an interesting phenomenon of this small area.