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MANSFIELD NATURAL BRIDGE, PARKE COUNTY: REQUIEM FOR A VANISHED INDIANA LANDMARK

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ABSTRACT: Mansfield Natural Bridge, a bedrock arch developed in Pennsylvanian age Mansfield Formation sandstone adjacent to Big Raccoon Creek, eastern Parke County, Indiana, was destroyed during quarry operations sometime between 1950 and 1955. This feature apparently was one of the largest natural bridges in the Ohio Valley region, perhaps exceeded in size only by the Powell County, Kentucky, sandstone arch. Plans to construct a flood control dam and reservoir at the natural bridge site, as well as interference with ongoing quarry operations, apparently were primary factors that led to removal of this significant landform; today, environmental concerns would not permit such action. Early descriptions of the arch and geological explanations of the origin are limited and vague. Historical background information on the arch, especially through a photographic record, is presented in this paper; a better theory for the geological origin is provided; and the reason why this natural bridge was the sole representative of this landform type along Big Raccoon Creek is explained.

THE SEARCH

Thanksgiving Saturday, 1990, dawned sunny, bright, and unseasonably warm. Some autumn color remained in the woods, and it seemed an ideal day to visit an Indiana natural feature, before known to me only casually. I had seen brief descriptions and photographs by Dryer (1913) and Dow (1938) of Mansfield Natural Bridge, one of two significant sandstone natural arches in Indiana, and reportedly one of the largest landforms of this type in the Ohio Valley region. I was familiar with the other Indiana natural bridge of this genre, the so-called Portland Arch in Fountain County, south of Attica. This latter arch, after all, is near Purdue; I had visited there with students on many field trips, the geological origin seemed clearly evident, and it always was pleasant to hike trails in the rock canyon cut by Bear Creek. The Mansfield feature, however, was twice as distant — nearly 60 miles from campus — the described location was somewhat uncertain, and the site never had been a field excursion target.

As my initial trip was spontaneous, I really had not done a proper literature search. Thus, with no location description other than that the arch was "about two miles northeast of the town of Mansfield ..." (Dow, 1938, p. 56), but with trusty topographic map in hand, I sallied forth and picked what experience indicated was a likely location; this was a streamlined, clearly bedrock-cored knob south of Big Raccoon Creek, and the requisite distance and direction from Mansfield (Figure 1). There, luck intervened, for I met Mr. Raymond Martin at his farm residence. Mr. Martin knew of the natural bridge — or, rather, as it developed, the former natural bridge — for it had been located on his original family homestead, a property settled in 1819. However, the actual site had been north of the creek, nearly a mile distant from where we stood! The topographic map provided no solace, but on subsequent trips, with the help of Mr. Martin and other longtime local residents, I have documented fairly well the timing of and reasons for destruction of this natural bridge. Herein also is proffered a probable geological explanation of the origin of this solitary sandstone arch; this explanation is better, at least, than

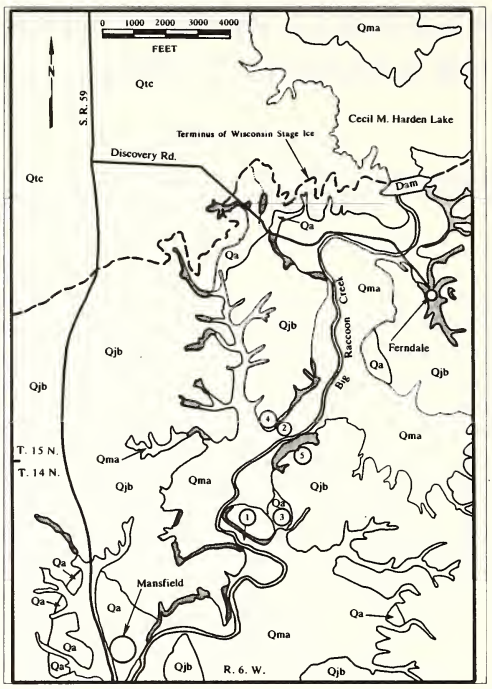

Figure 1. Location map and generalized geology of the Mansfield area, Parke County (geology modified from Hutchison, 1976): 1 = "Mansfield" dam site; 2 = "Ferndale" dam site; 3 = Martin Farm; 4 = former site of Mansfield Natural Bridge; and 5 = "The Zoo". Shaded pattern is bedrock exposure, mostly Mansfield Formation, but some Ste. Genevieve Limestone is exposed near Ferndale: Qjb = Butlerville Till Member, Jessup Formation (Illinoian ?); and Qtc = Center Grove Till Member, Trafalgar Formation (Wisconsinan). Dashed line is approximate terminus of Wisconsin stage ice: Qa = Quaternary alluvial terrace deposits; and Qma = modern alluvium.

the vague, nebulous ideas suggested in the limited earlier references to this phenomenon.

PREVIOUS RECORDS

Richard Owen (1862, pp. 165-167) and other early geologists apparently either did not see, or failed to record, the natural bridge. Hopkins (1896, pp. 239-240) saw the arch, but makes only a brief comment about the feature, and gave a slightly incorrect location. I now know the arch was immediately adjacent and parallel to a gravel road along Big Raccoon Creek, in the SW¼, SW¼, Sec. 33, T15N, R6W, Union Township, Parke County (Mansfield 7½' quadrangle).

I then turned to the classic work on natural bridges of North America (Cleland, 1910). Cleland catalogs the "Bridge at Attica, Indiana" but, curiously, makes no mention of the Mansfield feature.

The first physical description of the arch was by Dryer (1913) in a brief paragraph that comprises Part III of his famous Wabash Studies. Dryer pictures this "Parke County

Figure 2. Mansfield Natural Arch, ca. 1904-1905, looking headward up the ravine. The split rail fence was emplaced to prevent horses from wandering onto the road, positioned about where picture was taken. Members of Martin family (left to right) on the arch: Robert Faris Martin; Albert Harney (b. 1902, son of Scott Harney and Dora Martin); Nora Martin Keyt (twin of Dora Martin and Albert's aunt); and twins, Edith and Ethel Martin (d. 1906, thus defining approximate date of photograph). Photo courtesy of Raymond Martin.

Natural Bridge" but says only that: "A small tributary of Raccoon Creek has cut a ravine in the Mansfield sandstone bluff and originally fell over a ledge about six feet high. A joint plain [sic] 20 feet back from the brink of the fall permitted the stream to descend and work its way under the stratum. The result is a natural bridge 60 feet long, 20 feet wide, 2 feet thick in the middle, with a span of 30 feet and a clear height of 6 feet underneath." (Dryer, 1913, pp. 212-213)

Dryer's photograph unfortunately is poor in quality and is a summer scene with foliage obscuring some of the arch. I have succeeded in obtaining a photograph (Figure 2) that shows part of the Martin family standing on the arch (ca. 1904-1905); at that time, a wagon could be driven from the roadway directly onto the right abutment of the natural bridge. The split-rail fence, uphill behind the arch, was erected to keep horses from straying onto the road.

The next literature reference to the bridge was by Dow (1938, pp. 56-57), who gave these measurements: inside length of span, about 54 feet; width, approximately 22 feet; height, 9 feet. These dimensions are consonant with those given by Dryer. One of Dow's pictures (Figure 3), taken in the absence of leafy vegetation, is far more revealing than Dryer's summertime photograph. Remains of the split rail fence, seen in the 1904-1905 photograph, still are evident.

The late Charles Bieber (1963, p. 181), searching for potential state park sites in the sandstone country of western Indiana, noted that the "Natural Bridge" was "destroyed by quarrying about 1955" and had been formed by "unusual stream erosion along joints in cross-bedded facies". Although Bieber's statements were more informative than anything before, I still was unsatisfied and determined to do better.

Figure 3. The arch as photographed by Dow, probably in autumn, 1937 or early 1938. Broken remains of the split rail fence are visible behind the arch.

GEOLOGIC SETTING

Early reports by Hobbs (1872) and Hopkins (1896) primarily were concerned with the coal and building stone resources of the Mansfield area, and only Hopkins (1896, p. 212) has an accompanying geologic map. The only recent substantive publication is by Hutchison (1976). This study also places emphasis on potential for coal extraction, but the report has a detailed stratigraphy of the area as well as a very accurate, colored geologic map of the Mansfield and Catlin quadrangles.

It suffices to summarize the geology by noting that the area along Big Raccoon Creek is underlain by a sequence of Mississippian age carbonates (Ste. Genevieve Formation), unconformably overlain by Pennsylvanian sandstones and shales, primarily of the Mansfield Formation. The latter apparently was deposited in a paleochannel (Montclair Valley and tributaries) cut into the carbonates (Hutchison, 1976, p. 14). The result is relatively sparse exposures of the carbonates, except in a deep, probably karstic valley that exits at Ferndale, and around the shoreline of Cecil B. Harden Lake; the karst character of the carbonates was well-displayed in excavations at the time of dam construction. Present Big Raccoon Creek tends to follow the line of part of the old Montclair paleovalley across the area; hence, bluff-like exposures of brownish-buff, well-jointed, massive to cross-bedded Mansfield Formation sandstones are common downstream from the dam. These exposures are best on the north valley wall, where quarrying of dimension (block) stone commenced a century ago. It was during a later phase of sandstone quarrying that the natural bridge was destroyed.

Running across the upland, along a general east-west line through the dam at Cecil Harden lake, is the terminus of Wisconsin glacial ice in the region (Figure 1). This position is not marked by prominent terminal moraine; rather, the boundary is merely a zone of rolling, dissected topography. Uplands farther south are mantled with varying thicknesses of Illinoian (?) till, loess, and sand dunes.

At the Wisconsin maximum, however, sediment-bearing glacial meltwaters must have streamed in abundance down Big Raccoon Creek valley from the ice front; this left

thick, extensive valley train outwash deposits. It is these deposits which determined the final location of the Mansfield Dam, and the meltwaters likely were responsible for forming the natural bridge.

THE DESTRUCTION

Planning for a flood control structure in Raccoon Creek valley commenced with an authorization act by the U.S. Congress in June, 1938. A preliminary site was picked at that time, based on field surveys and design studies, just upstream from Mansfield village (Figure 1). After major floods in 1947 and 1950, interest in flood control was renewed. Reconnaissance showed that the original Mansfield site was unsuitable for emplacement of the left abutment, which was on sand and gravel (U.S. Army Corps of Engineers, 1956). A new site farther upstream (river mile 30.1 or "Ferndale" site) then was considered, but after study this site was deemed equally unsuitable; sandstone rock was available in the right abutment, but foundation borings elsewhere indicated a flood plain underlain by "pervious materials" (outwash sands and gravels) and "no continuous rock shelf ... at reasonable depth in either abutment or across the flood plain...". The site finally selected, 2.3 river miles farther upstream ("Seward" site, river mile 32.4), had "rock ... available in the right abutment for foundation of the outlet works", and "... the left abutment ridge has some rock near the proper elevation for the base of the spillway cut". Construction started in October, 1956, and the dam was completed in August, 1960.

Map measurement of river miles confirms that the "Ferndale" site was almost exactly at or only a few tens of feet downstream from Mansfield Natural Bridge. In fact, it was this latter feature, and adjacent sandstone bluffs, that would be the right abutment rock mentioned in the Corps of Engineers report. Obviously, at that time, it seemed that dam emplacement would either destroy or flood the natural bridge. Too, the early 1950's were a renewed time in Indiana for extraction of both limestone and sandstone blocks, much used after recutting for facing stone in residences, shopping centers, and small, free-standing professional buildings. Old quarries reopened, and new quarries sprang up like flies. Thus, at or about this time, sandstone quarrying renewed at Mansfield, including the bluff at the natural bridge. None of these sandstone quarries likely were very profitable; the stone color was drab and inconsistent, the rock slaked readily, and the early reports dwell extensively on spalling problems caused by "blisters" (small ironstone concretions). The sale value of stone in Mansfield Natural Bridge probably did not greatly exceed $25.00!

I have not been able to determine exactly when or by whom the quarrying was done, but local consensus says that the stone was cut, loaded on flatcars at a railroad spur which then extended from Rockville to Mansfield, and taken to Chicago where (presumably) the blocks were cut and sold as facing stone. The photograph (Figure 4) is from the quarry opened behind the natural bridge (perhaps photographed from the bridge itself?). Local recollection also has it that the arch was "just in the way of quarrying and, after all, the dam and lake would destroy it anyway". This idea is reiterated in the recently published history of Union Township (Parke County Historical Society, 1989). The quarry, as seen today, is shown in Figure 5. C.L. Reeves, owner of the Mansfield grist mill, died in July, 1956; by then the natural bridge was gone, to his great distress. Other veteran local residents also profess unhappiness with the act, though some of them worked in the quarry and may have been accessories in destruction of the arch! One still senses a certain uneasiness, reluctance, and "memory loss" among the locals when the

Figure 4. Sandstone quarry in operation at the natural arch. Date is unknown, but likely from the late 1940's or early 1950's. The arch was removed during quarrying; picture may have been taken from left abutment of arch prior to removal. Photo courtesy of Mr. Art Taylor.

Figure 5. The quarry in November, 1990. Remains of left abutment of natural bridge immediately left of standing figure (Dr. W.J. Zinsmeister). Drill marks still visible on old quarry face at right.

natural bridge is mentioned, as if a common, lingering guilt remains.

All that is assured is that the bridge was removed after the 1950 flood and before July, 1956. Bieber's 1955 date may be correct, though H.H. Gray (pers. comm.) says that the natural bridge and rail spur were gone, and the quarry abandoned, when he was there in the late summer of 1954. Today, of course, no such act would occur; the requirement for environmental impact statements and howls of outraged preservationists assuredly would prevent quarrying. In the early 1950's, however, who could know that the then-favored "Ferndale" site would be unsuitable and that the dam actually would be built farther upstream, so that flooding or destruction of the natural arch never would have occurred?

GEOLOGIC ORIGIN

No other natural bridges are known in the Mansfield sandstone along Big Raccoon Creek. Bluff exposures are common, and locally there is some evidence of evulsion at cliff bases. Only at one site is there any evidence of spring water emergence, thus generally excluding seasonal freeze-thaw as a major factor promoting undercutting of the bluffs.

The best clue to origin of the natural arch comes from examining a minor, wet-weather ravine almost directly across Big Raccoon Creek, only about 750 feet laterally from the former natural bridge. This unnamed ravine, locally called "The Zoo", is marked in the headward areas by a U-shaped, upland valley in Illinoian (?) till; on encountering an outcropping sandstone ledge, the ravine abruptly turns, follows a master joint face in the rock, and cuts a short but spectacular gorge at about a 45° angle to the upstream course. Below this rock gorge, the stream resumes downhill flow in a direction essentially parallel to the course held above the gorge. A minor waterfall probably existed here in the past, but only an insignificant knickpoint remains.

I speculate that the ravine holding the former natural bridge essentially was a mirror image of The Zoo. The arch was never part of a waterfall ledge, later hollowed out and cut through at the base by some vague process as recounted by Dryer (1913) and Dow (1938). The base of Mansfield Natural Bridge, according to the topographic map, was at about 600 feet elevation, and almost directly abutted the Big Raccoon Creek floodplain. Conversely, at The Zoo, the base of the exposed sandstone ledge is between 630 and 640 feet, and is some distance laterally removed from the floodplain. Therefore, I suggest that the arch was "holed through" by glacial floodwaters, which perhaps impinged repeatedly against the side and base of the former rock "spine" adjacent to the joint-controlled ravine channel. The Zoo ravine was not similarly impacted, for it was 30 or more feet higher, and far distant from any contact between meltwaters coursing down Big Raccoon valley and the base of the local rock bluff.

This explanation always will be suspect; after all, restoring a vanished landmark is somewhat akin to putting an ear to a railroad track to determine how many boxcars were in the last train. However, the two ravines discussed are the only places along the creek where there seems to be juxtaposition of a tributary drainage line, a sandstone outcrop, and a master joint. At Mansfield Natural Bridge, positive proof has been gone for more than 35 years. If not for the fortunate preservation of The Zoo, it is unlikely I could provide what I believe is a better, more rational, explanation of the origin of Mansfield Natural Bridge than occurred to earlier workers.

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