

NOTES ON THE GLACIAL BOUNDARY IN SOUTHERN INDIANA

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The purpose of this paper is to describe briefly the occurrence of some glacial and glacio-fluviatile deposits which were discovered by the writer during the summer of 1931. So far as the writer is aware these

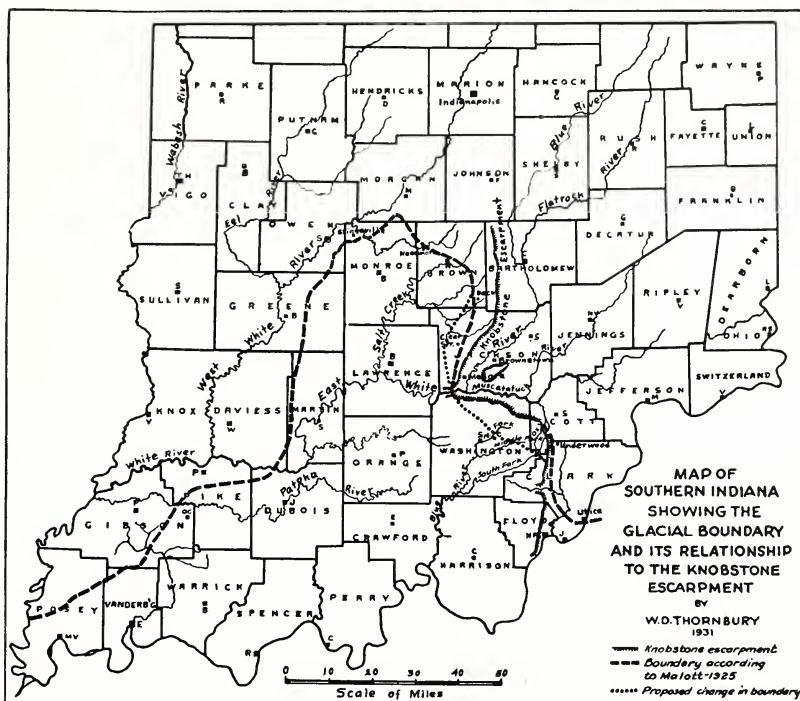


FIGURE 1

Fig. 1. Glacial boundary in Indiana showing its relationship to Knobstone Escarpment.

deposits have not yet been described, and since their discovery will make necessary some modifications of the Illinoian glacial boundary in south-eastern Indiana, it was thought wise to report their discovery.

During the latter part of the summer of 1931, the writer was engaged in some field work dealing with the physiographic history of the Knobstone escarpment, or the so-called "Knobs" of western Bartholomew, western Jackson, eastern Washington, western Scott, western Clark, and eastern Floyd counties. One problem which arose in connection with the study of the escarpment was its relationship to the glacial boundary

in southern Indiana. It became necessary to determine to just what extent the escarpment had acted as a barrier to the southwestward advance of the ice and how far beyond the escarpment the ice had extended.

Previous work by Leverett, Malott, and others¹ had fixed fairly definitely the Illinoian boundary in Indiana, especially in the southwestern part of the state. No glacial drift had been discovered west of the Knobstone escarpment anywhere south of the Muscatatuck River and the East Fork of White River. Glacial drift had been reported by Malott in 1925, up the Millport Knob road (State Highway 35) just southwest of where it crosses the Muscatatuck River, but this drift was at an elevation between 700-800 feet and did not extend up to the top of the escarpment. At no place south of the Muscatatuck River had glacial drift been found above an altitude of 800 feet, whereas the escarpment attains altitudes between 900-1000 feet at several points between the Muscatatuck and Ohio rivers.

The southernmost point where glacial drift had been found west of the escarpment previous to this work is along U. S. Highway 50, about three and one-half miles northwest of Medora, near the center of section 29 T3N, R3E. About ten feet of till are exposed at this place, the upper part of which is deeply weathered. It had generally been believed that the ice had surrounded the Brownstown Hills but had not extended over their tops. It appears likely now, in view of the fact that glacial drift has been found at an altitude of 930 feet from 12 to 15 miles south of the Brownstown Hills and west of the escarpment, that these hills may have been covered entirely by ice. The highest hills attain altitudes of approximately 945 feet. The writer has not made a careful search of the Brownstown Hills for glacial drift. Such a search may not reveal any drift, as the post-glacial erosion may have removed all traces of drift from their tops.

The first suggestion that glacial materials might be found west of the escarpment farther south than had hitherto been reported came with the discovery of a two-foot granite boulder in the upper part of the valley of Delaney's Creek in section 24, T3N, R4E. In addition to this large boulder there is present a considerable number of smaller glacial boulders and pebbles along the side of the valley and up the tributary valleys. It was supposed, however, that this material was probably deposited by a tongue of ice extending up this valley from the lowland to the east or rafted in on floating ice in a lake which appears to have occupied the valley of Delaney's Creek during a part at least of Wisconsin glacial times. This lake was formed by the ponding of the waters of the Muscatatuck and its tributaries by the valley train developed along White River.

Several days later, however, while driving along State Road 56, between Scottsburg and Salem, glacial material was discovered in a road cut about one-half mile west of the escarpment near the south-central part of section 32, T3N, R5E. The altitude as determined by an aneroid barometer was 930 feet. Careful examination of this material revealed

¹ For an excellent review of the work done in Indiana upon determination of the position of the glacial boundary the reader is referred to a paper by C. A. Malott, *The Glacial Boundary in Indiana*, Proc. Ind. Acad. Sci. 35: 93-107, 1925.

the presence of numerous white quartz pebbles and boulders of quartzite, granite, and greenstone. This discovery led to a more detailed search for glacial material west of the escarpment. The time available did not permit a thorough study of the region, but the results thus far seem important enough to justify calling attention to them in this brief paper.

No striking changes are as yet indicated as necessary in Jackson County, but glacial drift was found at three places slightly farther west than hitherto reported. Drift has been discovered in the following localities:

1. East-central part of section 24, T6N, R2E, about one and one-half miles southeast of Norman station.
2. East-central edge of section 36, T6N, R2E, and on opposite side of road in section 31, T6N, R3E, about two and one-half miles south of Clear Spring (Old Mooney postoffice).
3. Near center of section 19, T5N, R3E.

These discoveries will move the boundary somewhat farther west, but will not make necessary as much change as will be necessary in Washington County. Glacial drift had already been found west of the escarpment in Jackson County, about one-half mile southeast of Clear Spring.

Previously the glacial boundary had been drawn in Washington County at the foot of the Knobstone escarpment. Glacial drift or glacial boulders can be said to be definitely present at the following localities in Washington County, west of the escarpment:

1. One-half mile northeast of the West Point M.E. Church in the SW $\frac{1}{4}$ of section 29, T3N, R5E.
2. Near east-central part of section 35, T3N, R5E.
3. Near middle of south section line of section 32, T3N, R5E.
4. In the NE $\frac{1}{4}$ of section 4, T2N, R5E, about one mile northeast of New Philadelphia.
5. Near the central part of section 12, T2N, R4E, about one-half mile northeast of Canton, along State Highway 56.
6. In the north-central part of section 19, T2N, R5E, one mile northeast of Harristown.
7. In the west-central part of section 19, T2N, R6E.
8. In the SW $\frac{1}{4}$ of section 30, T2N, R6E, along Henryville-Salem road, about one-fourth mile east of Bunker Hill Church.
9. In the east-central part of section 33 and west-central part of section 34, T2N, R6E, about one mile east of the Liberty Church in a cut in a road leading north from the Henryville-Salem road. There is perhaps as much as 60 feet of drift present here in the form of what is apparently a terminal moraine.
10. In the north-central part of section 4, T1N, R6E, upon the farm of Rev. W. D. Bartle.

There are doubtless several other places in eastern Washington County where glacial drift may be found, but these are sufficient to prove conclusively that the ice did pass over the escarpment, and reach as much as five or six miles beyond it. Further work will be necessary in order to fix the boundary exactly.

It is interesting to note in this connection the presence of a rather well-developed valley train in the upper part of the Pekin (South) Fork of Blue River. Numerous glacial pebbles and boulders are present beneath and in the alluvial terraces of the broad valley floor. It appears that this fork of Blue River acted for a time as the outlet for the melt waters from the ice front which lay a short distance west of the rim of the Knobstone escarpment near the headwaters of the Blue River system. The terraces along the valley of Blue River appear to be composed largely of glacio-fluviatile material and represent remnants of this old valley train. Whether or not outwash material is present in the headwater portions of the other two forks of Blue River, the writer is unable to state definitely, but it seems very likely that a careful search will reveal evidence of valley trains along these two streams; as glacial material is unquestionably present near their headwaters. If such be the case, Blue River at one time must have carried a considerable volume of glacial waters. It may well be designated an Illinoian glacial sluiceway.

The fact that the headward portion of the Pekin Fork of Blue River is a wide, flat valley a mile or more in width and occupied by a stream much smaller than one would expect in such a valley, led to a search for an explanation of this fact. The explanation seems to lie in two things, first, the above-mentioned fact that during a part of Illinoian times this valley acted as a route through which glacial waters were discharged from the Illinoian ice front, and secondly, in the fact that subsequent to the withdrawal of the ice a portion of the upper drainage of this fork of Blue River has been beheaded by the northeasterly-flowing Big and Little Ox Creeks. This piracy has been possible because of the much steeper gradient of the two Ox creeks down the front of the Knobstone escarpment. Just how much of the Blue River drainage has been diverted into the Ox creeks can not be said until the region has been mapped, but it seems probable that several square miles of drainage have been lost to Blue River. This case of piracy is particularly interesting in view of the fact that Dr. C. A. Malott has previously described¹ a notable case of stream piracy affecting a tributary of this same fork of Blue River. In this case, about 35 square miles of Blue River drainage has been diverted into the drainage of Silver Creek, due to conditions similar to those described above. Thus we have presented the very unusual occurrence of two cases of stream piracy affecting parts of the same stream system. This is the first case of this which has come to the writer's attention.

¹ C. A. Malott, *Handbook of Indiana Geology*, pp. 180-186, 1922.