

SOME PECULIARITIES IN THE VALLEY EROSION OF BIG CREEK AND TRIBUTARIES.

GLENN CULBERTSON.

Big creek and tributaries in Jefferson county, Indiana, present some interesting features in their erosive work. The most striking of these, presented by a map of the stream and its affluents are, on the one hand, their almost uniform flow in a westerly direction, or, on the other hand, in a course almost at right angles with those flowing westward.

These characters are clearly shown in the northerly courses of Lewis and Little creeks, while their tributaries flow in a westerly direction. The same is true of Big creek and its other tributaries, as may be seen in the central and northern parts of the map. Clifty creek, a smaller stream emptying into the Ohio just below Madison, has the same peculiarities, as has also the upper portion of the West Fork of Indian Kentucky creek. In these cases the main stream flows south, while the tributaries enter from the east and northeast.

Another interesting feature so noticeable in certain parts of Big creek and its larger tributaries, where the flow is either northerly or southerly, is their remarkably meandering courses. We have been taught that meanders have been found almost exclusively in streams of gentle slope and with banks of alluvial soil. Both of these characteristics are entirely wanting in the valleys here referred to. In the case of several of the meanders the stream after flowing from one to two miles around a curve, returns to within a very short distance of the starting point. The banks of the stream, as well as the sides of the valley, where the meanders are prominent, are almost perpendicular cliffs on the convex side. These cliffs reach the height of 100 to 150 feet in the lower portions of the stream. The concave side of the meanders have gentle slopes from one-fourth to one-half a mile in length.

The peculiarities in the valley erosion of these streams is largely due to the structure of the rocks. The rock strata of this region dip gently towards the west and southwest. The amount of this dip in the more

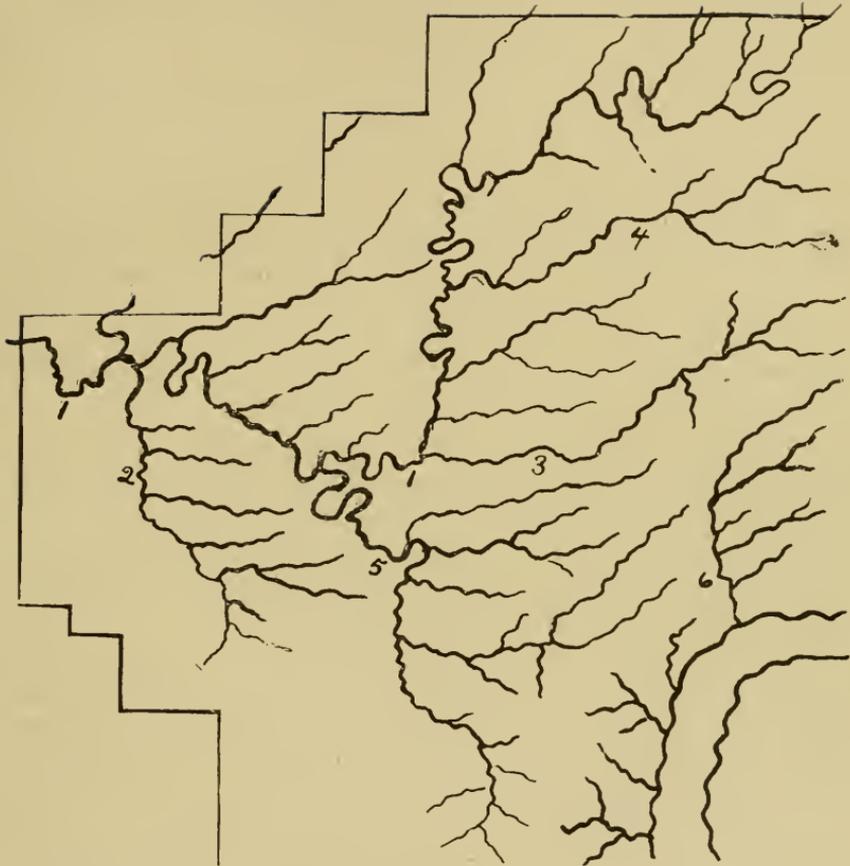
eastern parts of the county is not more than ten or twelve feet to the mile, but it increases to fifteen feet or more in the western part of the county.

The streams flowing into the Ohio directly have had to erode their valleys through the very resistant upper Hudson, Clinton and Niagara limestones. Consequently their courses are short and gradients very steep. The Wabash-Ohio divide in this part of Jefferson county is in places but one or two miles from the Ohio river, and at a comparatively short distance from the outcropping edges of the resistant limestone formations mentioned above.

Big creek and tributaries have not yet succeeded in lowering their beds to these resistant rocks, except in a very few places. Their erosive work has been in the softer corniferous limestones and New Albany black shale of the Devonian formations. The stream beds, in general, follow the dip of the rocks. In places the bed of the stream is upon the same layer of rock for long distances. Excellent examples of this may be found in the bed of Harbert's creek, between Volga and Smyrna church, as well as along parts of Middle Fork and Big creek. The dip of the rock strata has had much to do with the long, gently sloping streams flowing westward.

The tributaries that flow in an easterly direction and against the dip are very short and their gradients very high. In many of them the water pours into the main valleys over falls located but a few hundred feet from the main stream. In one case an underground stream pours forth from the face of a cliff into the principal stream. The easterly flowing tributaries eroding their beds largely or entirely in the black shale have cut somewhat longer courses than those in the limestone, but in no case do they even approximate the length of the westward flowing tributaries.

The meanders of these streams are in all probability a consequence of the variable resistance of the rocks followed by maximum erosion on the convex side of streams. They are probably consequent on the slope of the original land surface, although they may have been somewhat modified by the thin mantle left by the glaciers.



- 1.1.1. Big Creek.
2. Lewis Creek.
3. Harbart's Creek.
4. Middle Fork.
5. Little Creek.
6. Clifty Creek.