

THE INTERCISION OF PIKE RIVER, NEAR  
KENOSHA, WISCONSIN

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J. W. Goldthwait, writing in *School Science and Mathematics* for February, 1908, uses the term "intercision" to describe a peculiar drainage modification effected by the waves of Lake Michigan. The term is one not common in physiographic usage. Goldthwait mentions several other instances of the same process and Cleland tells how the waves of the ocean may cut into the valley of a river in the same manner that Goldthwait has described.<sup>1</sup> Goldthwait's use of the term is referred to in quotation marks by Alden in his recent paper on the Quaternary Geology of Southeastern Wisconsin.<sup>2</sup> My purpose, however, is not to call attention to the use of a term, but rather to describe the process referred to. Intercision, as the term is used by Goldthwait, is an instance where a lake shortens the course of a stream by intercepting the stream somewhere between its source and its mouth. The conditions for such interception are rather exceptional and the event is a rare one in drainage changes.

Pike River finds the lower portion of its course incised in the plain of Glacial Lake Chicago. It crosses this plain in such manner that for nearly three and one-half miles it flows practically parallel to the shoreline of Lake Michigan. The direction of flow is towards the south. T. C. Chamberlin mentions the course of the stream as indicative of a southerly alongshore drift, that, in a higher stage of the Lake than at present, diverted the stream towards the south.<sup>3</sup>

The remnant of the lacustrine plain in this region is suffering rapid removal by the wave erosion of Lake Michigan. It is this fact, plus the parallel position of the stream in relation to shoreline that furnishes the setting for intercision. In respect to the retreat of the

<sup>1</sup> Cleland, H. F., *Geology*, 1916, p. 214.

<sup>2</sup> Alden, W. C., *United States Geological Survey Professional Paper No. 106*, 1918, p. 340.

<sup>3</sup> Chamberlin, T. C., *Geology of Wisconsin*, Vol. II, 1877, p. 130.

cliffs, Dr. Andrews, in 1870, found that the average retreat of the lake cliffs between Evanston, Ill., and Manitowoc, Wis., a distance of 180 miles, was 5.28 feet per year. The measurements on which his estimate was based ranged through a period of from 10 to 35 years.<sup>4</sup> In 1870, or thereabouts, he found the retreat of the cliffs at Kenosha to be as much as twelve feet in a year. In 1874, measurements furnished Dr. Chamberlin showed that at one place in Racine, Wis., the cliffs for 24 years had been receding at a rate of 9.73 feet per year.

Measurements recently completed near Kenoska indicate that the cliffs have retreated as much as 34 feet locally within a period of one year and seven months. The average retreat during this period, as indicated by eight measurements was 27.7 feet. The maximum retreat was found to be 34.2 feet; the minimum, 22.6 feet. The eight measurements mentioned above were taken within a distance of 2.5 miles. Taking the average retreat as a fair indication of the loss of land, the figures given represent the loss of a little more than eight acres within two years. The height of the cliffs ranges from 20 to 40 feet. The material of the cliffs is partly till, and partly stratified sands and clays deposited by Lake Chicago. The annual retreat of the cliffs as indicated at present approximates 17 feet as compared with the 12 foot retreat noted by Andrews.

That this rapid retreat of the cliffs is responsible for a marked diversion of the stream is shown in the following fashion. As the stream gradually approaches the lake, the continuity of its eastern valley wall is broken in two places. The breaks or breaches occur at places where the valley swings in meandering curves towards the lake. Through these wide breaches it is possible to obtain an open view of the lake from within the valley of the river. At the breaches the beach of Lake Michigan is built directly upon the flood plain of the river. Opposite the northernmost breach the river flows but fifty feet distant from the lake. Merely the

<sup>4</sup> Andrews, Dr. Edmund, *The North American Lakes Considered As Chronometers of Post Glacial Time*, Chicago Acad. of Sci., Vol. II, 1870, p. 7.

beach sands separate the waters of the river from the waters of the lake. It is easy to anticipate that at some time of flood or storm a channel will be opened across the beach for the river to follow. When this is done and the water of the stream diverted, the river will have suffered a second intercision.

This description of the present situation leads on to an interpretation of what has taken place in the past. About a mile south of the present mouth of the stream and along the shore, is a curving channel that has both ends open towards the lake. This abandoned channel is interpreted as a remnant of the former valley of lower Pike River. It has been utilized as part of the Kenosha harbor and locally is called a lagoon.

Several features, evident in the field, point to the proper connection of this abandoned channel with the former valley of Pike River (1) Several deposits of peat, similar to the peat now lying underneath the flood plain of the river, are exposed along the beach between the present mouth of the stream and the lower channel. (2) Near the present mouth of the stream a line of willows similar to the willows within the valley of the river continues south along the lake shore. Back of these willows the land descends in a gentle slope towards the lake instead of terminating in a sharp wave-cut cliff as it does elsewhere in the region. (3) A third, but not very conclusive evidence, lies in the fact that the abandoned channel is within the projected course of the meandering stream. (4) Pile driving operations south of the present mouth of the river encountered soft mud and logs in such a way as to suggest that the lake has entered in upon the flood plain of the lower part of the stream.

The evidence seems to be sufficient to suggest that the valley of the stream has been entered by the waters of the lake and the stream actually shortened in its course by more than a mile. When the second intercision takes place, if such an event occurs, the stream will be shortened again by at least one-half mile. And unless some means are adopted to check the migration of the cliffs

a third intercision may be anticipated with some degree of reason.

The rapid retreat of the cliffs is proving of serious import to property owners along the lake shore. In some cases the slumping of the cliff material is facilitated by the tile drainage of the uplands. The small, artificial streams directed by the tiles aid materially in the erosion of the steep cliffs. The retreat of the cliffs and the possibilities of the future intercision of the river give the situation a certain economic as well as physiographic interest.

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