

SOME EVIDENCES OF INCIPIENT STAGES OF LAKE CHICAGO*

BY

GEORGE E. EKBLAW

Geological Survey, Urbana.

Certain geologic data which were obtained in the course of study of engineering geology problems at two localities a mile apart, one in Westchester and the other at Broadview, west of Chicago, indicate that a fore-glacial lake existed in this portion of the Michigan basin at a higher level than has been recognized heretofore. The beaches of the Glenwood stage of Lake Chicago, the highest stage previously recognized in this locality, indicate that it stood at an elevation of 635-640 feet A. T. The newly noted data indicate a stage at an elevation of 655-660 feet, or 20 feet higher than the Glenwood stage.

In the first place, there is a low but distinct escarpment trending south-southwest from the limestone monadnock in Hillside across secs. 20, 29, 30, and 31, T. 39 N., R. 12 E., in the Hinsdale quadrangle to the junction of the valleys of Salt and Flag creeks. This escarpment is brought out by the 645-, the 650-, and the 655-foot contour lines on the Hinsdale quadrangle topographic map. Its alignment suggests an erosional origin. Below the 645-foot contour at the foot of the escarpment there is an abandoned longitudinal depression suggestive of an abandoned channel. Both the escarpment and depression are lost in a maze of morainic elevations in sec. 31, T. 39 N., R. 12 E., and sec. 36, T. 39 N., R. 11 E., among which there are several narrow tortuous depressions just below 645 feet. Several valleys trending southeastward across the upland are truncated at the escarpment and their streams are diverted along the depression. Swamps, marshes, and peat-bogs occur in and along most of these valleys. Poorly developed terraces occur in the NW. $\frac{1}{4}$ sec. 31 and along the east side of sec. 30. A pebbly concentrate beneath surficial silty loam has been observed on the east slope of low elevations along the center of the south side of sec. 20 and in the center of the east half of sec. 30. Numerous species of fossil shells, which Mr. F. C. Baker, Curator of the University of Illinois Natural History Museum, has identified as fresh-water animals, were collected along a drainage ditch in the middle of sec. 20. He reports that the fauna is

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practically identical to that collected by Mr. L. E. Workman, of the State Geological Survey, from the flat bottom of Flag Creek valley southwest of Western Springs. The bottom of the valley of Flag Creek is almost flat and lies between the elevations of 640 and 645 feet, the same elevation as the longitudinal channel at Westchester. Rock lies at shallow depth in the valley.

All of these facts indicate that at one time a strong current of water moved southwestward from the present site of Bellwood, threaded itself among a maze of islands northwest of the present site of Western Springs, poured out through the valley now occupied by Flag Creek, and escaped through lower DesPlaines valley. The depth to which this stream readily eroded was controlled by the rock in Flag Creek valley. The water probably stood at an elevation of 660-665 feet, as suggested by the numerous marshes and swamps in the small upland valleys and by the terrace-like features, the flat-bottomed tributary valleys, and the marshes that occur at the same elevation along Salt Creek above the proposed course of the glacial stream.

A low escarpment similar to and at practically the same elevation but not so well developed as the one already described may be traced north across the Elmhurst quadrangle into the Arlington Heights quadrangle. Marked escarpments between elevations of 650 and 670 feet occur on the west side of the Lake Border moraines in the Park Ridge, Arlington Heights, and Highland Park quadrangles. These suggest that an extensive body of water possibly as high as 675 feet occupied at one time all of the valleys and depressions below that elevation.

Several test-pits near the intersection of Roosevelt Road (12th Street, or State Highway Route No. 6) and Indiana Harbor Belt Railway at Broadview have revealed that a deposit of poorly sorted but clean sand and gravel lies beneath glacial till at a depth of 17½ feet. The sand and gravel has been tested to be at least 15½ feet thick without reaching the bottom of it. It contains a large amount of rounded fragments of hard dark shale, a pebble count revealing that nearly 50 per cent of the pebbles less than ¼ inch in size are shale. In this respect it is identical with the outwash gravel along upper DesPlaines valley. As the last known deposit of outwash along upper DesPlaines River occurs at Park Ridge, it is thought that the gravel at Broadview may represent the actual continuation of the DesPlaines valley-train, now covered by till. The till possesses a crude lamination which suggests that it was deposited in water. If this be true, it signifies that after the outwash was deposited in DesPlaines valley, there was a minor readvance of the glacier over the south end of the valley.

It is noteworthy that ponds and lakelets are more numerous in the vicinity of Hillside than they are west of Salt Creek. This suggests that the morainic deposits east of Salt Creek may be younger than those west of the creek. The abundance of ponds and lakelets even on top of the morainic ridge is characteristic of the Lake Border moraines on the Park Ridge and Wheeling quadrangles and also of the eastern ridges of the Valparaiso moraine in the Tinley Park and Palos Park quadrangles.

All of these data provide a basis for a concept which is here put forth solely as a working hypothesis. First there was a glacial recession beyond upper DesPlaines valley and deposition of outwash as a valley-train in that valley. At that time the south end of the valley was farther west than it is now, either swinging through Broadview over against what is now the high land at LaGrange or turning west from Broadview into the present valley of Flag Creek. Coarse outwash material along Salt Creek north of Western Springs and in Flag Creek valley support the latter alternative. Then there was a glacial readvance which overran the south end of the DesPlaines valley but left the rest of the valley open. In the vicinity of Westchester this glacier may have advanced as far as Salt Creek, causing a slight diversion of that stream along a course now represented by abandoned channels in secs. 23, 22, 27, and 26, T. 39 N., R. 11 E.; blocking other valleys and creating odd depressions and diversions like those in secs. 13 and 24, T. 39 N., R. 11 E., and in secs. 17, 18, and 19, T. 39 N., R. 12 E.; and blocking DesPlaines valley so that all the waters above Hillside were dammed. Farther south the glacier advanced only as far as Flag Creek, and still farther south it advanced to the present locality of Tinley Park, where a large flat—a site of an old lake—separates two morainic ridges. Dr. Paul MacClintock has reported that there is a distinct interglacial interval recorded at this locality, as an old soil at the level of the flat is overlain by the east ridge of drift. Farther north the advanced positions of the glacier are recorded by the Lake Border morainic ridges.

The point of the glacier in the vicinity of Western Springs soon retreated, thereby opening an avenue for the escape of the waters that had been dammed in upper DesPlaines valley. This rush of waters developed a channel which is in part now represented by the valley of Flag Creek. Above Western Springs the ice-front formed the east side of the channel; the west side is now represented by the escarpment as noted. Shell animals advanced up the glacial stream—their shells remain as evidence. When the glacier retreated farther, a lower level of escape for the waters was opened east of LaGrange and this may have

initiated the Glenwood stage of Lake Chicago. Following the retreating level of the lake, Salt Creek developed a channel across the higher lake bottom. Thus it appears (1) that the present course of Salt Creek is its original course, (2) that the valley of Flag Creek is not a beheaded portion of Salt Creek, as has been generally considered, but (3) that there is a logical explanation for the striking difference between the valleys of Flag Creek and Salt Creek, a condition which has been pointed out as anomalous for stream piracy.¹

The high-level lake stage which has been described may have been coexistent with a high-level stage of Lake Chicago which has been recognized in Indiana and which has been designated the Valparaiso stage.² As the name Valparaiso is already so well established to designate a prominent morainic belt and glacial stage, it seems that an entirely distinct name for the high-level stage of the lake would be preferable. Further investigation of this problem may reveal a locality at which some features significant of the lake stage occur and from which a suggestion for a suitable name may therefore be derived. Westchester, the name of the suburb in which the escarpment is so well developed, may prove to be suitable.

It should be emphasized that the sequence of events as outlined in this paper is not the result of a thorough study. However, the data which have been recorded do indicate that some significant events occurred, and as a complete investigation of them is beyond the province of engineering geology, this opportunity is taken to present them, together with a likely interpretation, in order that other students of geology may possibly take advantage of them.

¹ Goldthwait, J. W., Physical features of the DesPlaines valley: Illinois State Geol. Survey Bull. No. 11, p. 67, 1909.

² Cressey, G. B., The Indiana sand dunes and shore lines of the Lake Michigan basin: Geog. Society of Chicago Bull. No. 8, pp. 54-55, 1928.