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Glacial Lake Illinois and the Question of Post-Early Wisconsin Diastrophism in Northeastern Illinois

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Evidences have recently been discovered showing that there existed in early Wisconsin time a glacial lake in the valley of Illinois River and its tributaries which was dammed at Peoria by the valley train outwash of the Bloomington ice sheet, and which extended up the valley to varying distances, as the recessions and re-advancing of the ice permitted, the farthest known point being Joliet.

At the time that the Lake reached as far as Joliet, it was approximately 125 miles in length. It did not attain this length, however, until after several minor recessional moraines of the Bloomington stage had been deposited. Following this stage of known maximum length, the Marseilles glacier advanced as far as La Salle, thereby causing the lake to be shortened from 40 miles at the time of the building of the Farm Ridge moraine, and then lengthened again from 20 miles at the time of the building of the massive Marseilles moraine. The lake existed from the waning stage of the Bloomington glacier to the waning stage of the Marseilles glacier, a length of time which can not very well be reckoned in years on the basis of present evidence and which doubtless consumed several hundreds of years or a few thousands of years. One surprising fact regarding the lake's history is that it maintained a level with fluctuations so slight that they are not shown on topographic maps with ten-foot intervals. The

disappearance of the lake was relatively ^{shut}, geologically speaking for no deltas at lower levels have been found.

The geological record of this lake includes three lines of evidence: (1) torrential deltas at widely scattered points along Illinois River valley and its tributaries, (2) lake silts and even ^{be-} mudded sands, and (3) hanging ^{stream} green channels. The effectiveness of the dam at Peoria was due not so much to the moraine but to the enormous valley train which extended downstream for several scores of miles. Remnants of this valley train now exist as high accordant levels on both sides of the valley at Peoria, gradually becoming lower and lower downstream.

Torrential Delta Deposits

The writer has examined 21 different delta deposits all of which are so well exposed that the deltal structure can not be mistaken, and all of them are caught by the 600-foot contour line of the topographic maps. Nine of them are situated along the major valley, while the others are along tributaries, including the Vermilion River and the Fox River. The farthest one upstream along the Vermilion River is nine miles from its mouth, and along the Fox River fourteen miles. Along the Illinois River the farthest one downstream and the farthest one upstream are about sixty-five miles apart. On the east side of Spring Valley which is situated east of the city of Spring Valley, the Western Sand and Gravel Company has opened a large gravel pit in one of these deltal deposits showing a face fifty to sixty feet high and a maximum dip of 30° through vertical interval of about forty feet, as shown in figure 2. The

layers in their dipping position are strikingly uniform and contiguous; they betray ^{no} lens and pocket structure such as one would expect in stream laid material, and they grade into *bottomset beds* at the bottom. The only way that these beds of sand and gravel could have been deposited in such continuous layers, with such high dips, in such a large vertical range, and showing no cut-outs except at the top is by deposition in standing water over the fore-slope of a delta.

The pit now covers several acres and at different places where the pit face has not slumped, the ^eforset bedding is clearly shown, the direction of maximum dip varying from a southwesterly direction to a northwesterly direction. This variation in direction represents *deposition* on different sides of a delta finger or on different delta fingers.

In the south part of the pit, the ^eforset beds are truncated by thin ^{top}~~outset~~ beds, ranging in thickness from 3 to 3 1/2 feet which is in turn overlain by four feet of loess-like silt. The beds consist of current cross bedded gravel with a silt band some ten inches thick interbedded. In places the silt beds rest directly on the ^eforset beds and in other places it is separated from the ^eforset beds by horizontally bedded gravel. The **silt** bed records a brief season of quiet water on top of the delta, probably a winter season during which the finer material of the lake settled.

Another pit occurs across the paved highway to the north in this same deposit, but here the silt bed is buried by another shallow delta deposit. The lower delta deposit is much thicker than the upper and is of a much coarser texture showing that the waters deposited the lower delta were more torrential in character than the waters which deposited the upper. The torrential waters

which deposited the lower gravels scoured more deeply and hence the ^{out}crop of the delta deposits at this place was lower than elsewhere permitting the silt beds to reach a lower level. About three-quarters of a mile farther north the later waters entirely scoured out the silt beds and a part of the lower delta and the sandy bottom-set beds of the upper series were laid down on the coarse ^eforset beds of the lower series which dipped in a different direction from ^eforset beds of the upper series.

The deposit along this valley is composed of very coarse materials of poorly rounded pebbles, cobbles, small boulders, and a few large boulders up to three feet in diameter which were probably ice floated (fig.), and till balls up to 1 1/2 and 2 feet in diameter. Till balls do not have concentric structure but are more or less rounded pieces of till coated with pebbles. It is clear that the materials were not transported far and that it came directly from the glacier. The material was carried to the edge of the delta at each progressive stage and then rolled down the delta , under the influence of gravity, assuming that angle of repose which material of that size, shape, proportion, specific gravity and silt coating could assume in water made turbulent by torrential current. The gravels of this deposit are so coated with silt that the company has found it uneconomical to try to wash the material for concrete construction, but the silt coating causes the material to pack under traffic in such a satisfactory manner that it finds a large and ready market for metalling. The silt coating appears to have settled from the glacial waters which became entrapped in the void during the deposition of the gravel.

Deposits with similar structure, figure to , although not so deeply exposed are found only in territory north of Peoria. All of them show poor rounding, poor assortment, but most of them a content of till balls. Besides the 21 deposits which are exposed for study, 15 other deposits of sand and gravel were found at the 600-foot level, as small flat-topped remnants, towards the top of the valley wall. These deposits are known to be composed of gravel as shown by the refuge^s thrown out by burrowing animals or exposed through the soil and grass routes^o or in gully washes. In the course of the present investigation, it was found possible to predict the finding of additional deposits by noting places on the topographic map where the 600-foot contour line delineated a flat top shoulder at the mouth of tributaries which head back to recessional moraines.

Age of the Deltas

It is interesting how closely the age of the deltas can be told. Referring to figure 1, all of the deltas which occur downstream from the city of La Salle belong to the recessional stage of the Bloomington ice sheet. In this section of the State, the Bloomington till is pinkish in color and the till balls in the delta gravels of this area show a corresponding color.

All of the deltas upstream from La Salle belong to the Marseilles ice invasion and they contain till balls of a grayish-yellow color, characteristic of that till.

In figure 1, it will be noted that the outer moraine of the Bloomington drift sheet north from Peoria parallels the Illinois River. When the ice began to recede the rate of recession along the torrential front was approximately the same and this portion of

It will be noted from fig. 1 that the outer moraine of the Bloomington north from Peoria parallels the Illinois River. When the ice began to recede it soon uncovered the valley immediately above Peoria, and it was not long before the ice lay along the east side of the valley below the Big Bend, depositing low recessional moraines, correlations of those passing through Princeton, along the east side of East Bureau Creek, and east of Brush Creek respectively. The northeastward trend of the several parallel tributaries north of Illinois valley appear to mark the trend of the ice front. Remnants of deltas are found in the lower parts of these valleys which lay below the 600-foot contour and also in the valleys heading eastward from the Illinois into recessional moraines below the Big Bend.

the valley was soon covered up to the Big Bend. Most of the delta deposits, therefore, occur at the mouth of the tributaries which approach that portion of the Illinois valley from the east. Only those valleys which reach back to the recessional moraine contain remnants of deltas. On the north side of the upper Illinois valley most of the tributaries have a northeastward trend. Due to the position of the ice front and the drift deposits which were made there, deltas are found in the lower part of these valleys, especially those parts which lay below the 600-foot contour.

Some of the deltas and lake deposits belonging to the recessional stage of the Bloomington ice were overridden by the advance of the Marseilles ice. In the stripping operations of the Alpha Cement Company, just east of La Salle, there was exposed about six years ago delta-bedded gravels containing pink till balls overlain by gray-yellow till belonging to the Farm Ridge moraine of the Marseilles morainic system. The contact between the gravels and the till was irregular showing that the Marseilles ice had removed some of the deposits before depositing the overlying drift. East of Marseilles where the massive Marseilles moraine is present, there are deposits of sand and gravel and silt, more or less corded, the silts of pinkish color, overlain by the Marseilles drift.

The deposits in the Vermilion and Little Vermilion valleys, which are situated just outside of the Farm Ridge moraine contain gray-yellow till balls characteristic of this moraine. The same is true of the deltas along Pecunsautan Creek and a small valley 1 1/2 miles northeast of Utica.

The Fox River Valley and Covel Creek valley parallel the main Marseilles moraine and the deposits in these are of the age of

this moraine. Some of the tributaries which flow westward from this moraine into the Fox River have valley trains with current bedding in those parts of their valleys which lie above 600 feet A.P., but at and below this level, the gravels have delta structure. At the top of the valley wall of Illinois River on the north side, two miles west of Marseilles, at the edge of the Marseilles moraine, there is a 600-foot delta which is also clearly Marseilles in age.

The youngest known deltas lie just east of the Marseilles moraine, about 1 - 2 miles. About 3 1/2 miles northeast of Seneca, where the new paved highway ascends the north valley wall of Illinois River, a 600-foot delta is exposed resting on Marseilles till. About 1 mile to the northwest of this delta are two other deltas which have been opened for gravel recovery. The materials beneath are not exposed but the top-set beds are present and are , and there is no overlying drift. These are, therefore, deltas which were deposited during the recession of the Marseilles ice from the large Marseilles moraine.

Lake silts and sands

Laminated silts and even bedded sands have been found at various points where they were protected from the subsequent floods of the Illinois valley, particularly the Kankakee torrents and the large volume of water which came down the valley from Lake Chicago. The lacustrine sediment has not been found in the constricted portions of the Illinois valley. All of the occurrences of laminated silts and even-bedded sands are below the 600-foot level.

Lacustrine silts of Bloomington age. East of the massive Marseilles moraine the Illinois River valley widens until it becomes

a very broad basin known as the Morris basin, named after the town of Morris which is centrally located. In the northwest outskirts of town on the west side of the east fork of Mettle Creek an old clay pit exposes about twelve feet of laminated clays and silts pinkish in color, interbedded with thin layers of fine yellow sand. About 3/8 of a mile to the north in the bank of the same creek Culver reports the occurrence of similar silts overlain by Marseilles till. The elevation of the silt is about 520 feet A.P.

Lacustrine silts were also found about 2 3/4 miles northeast of Seneca in the NW. 1/4 sec. 17, T. 33 N., R. 6 E., at the bridge over Carson Creek. These silts are overlain with Marseilles drift.

In the vicinity of Joliet there are several occurrences of laminated silt ranging from a known minimum elevation of 564 feet above sea level to 583 feet above sea level. All of these are reported to be blue in color and since the overlying till, which in some of the cases overlies the silts, can not be definitely identified as Marseilles drift or Minooka drift the precise age of these silts is uncertain. In the northwest 1/4 sec. 21, T. 35 N., R. 9 E., 4 feet of laminated calcareous bluish silt containing numerous small concretions occurs in the north bank of the creek tributary to DuPage River has an elevation of about 565 feet. The silt overlies pink Bloomington till, the upper of the silts has been leached, and subsequently overlain by yellow till.

In the NW. 1/4 sec. 10, T. 35 N., R. 9 E., in the west bank of DuPage River 4 feet of yellow silty sand and 1 foot of blue laminated silt under the sand which occurs at an elevation of about

585 feet is overlain by 12 feet of till. The base of the clay is not exposed.

In the NW. 1/4 sec. 14, T. 35 N., R. 10 E., at the base of Knowlton Mound on East Washington Street, Joliet, the south bank of Hickory Creek, there is a 6 foot section of laminated blue silt reaching to an elevation of about 564 feet. This silt is overlain by some 45 feet of glacial materials, largely cemented gravel. The lake silts extend along the creek for more than 100 yards and show in both sands.

At Baer's sand pit in the SE. 1/4 sec. 2, T. 35 N., R. 10 E., there are at least 10 feet of laminated sand of medium grade underlying 14 feet of torrentially bedded sand with pea-sized pebbles which is in turn overlain by 18 feet or less of till. The top of the lake sand is at an elevation of about 598 feet. They were exposed in a pit hole which was dug to determine the amount of sand available in the pit. It is reported that 200 yards to the east 12 feet below the base of this said pit, (elevation about 583 feet) a compact blue clay is encountered, indicating that the lake sands are underlain with lake silts.

When Joliet Mound was in existence, that is before the removal of the sand and gravel of which it is composed, Leverett reported a still-water deposit of clay underlying the mound.

The wide distribution of these exposures of lake silt indicates that it was a general body of water and the stratigraphic relations of the silts leads one to refer them to Lake Illinois.

Post-Marseilles silts. At two localities bordering the Marseilles moraine on the west, in a gulley tributary to the Fox

River, three and four miles northeast of Dayton laminated gray silts are found with no till above them. In view of their geographic relations to the Marseilles moraine and in view of their color they are referred in time to the building of the Marseilles moraine when Lake Illinois bordered this moraine on the west.

Hanging stream channels

A conspicuous stream channel bounded by the 600 foot contour line occurs about 3 miles south by west of Bureau. It crosses a divide between the small tributary ^{and} ~~in~~ the main valley without showing any indication of entrenchment. It would have been impossible for the channel to have been cut under present topographic situations, without entrenchment, with the major valley flat some 140 feet below the hanging channel.

Other hanging channels occur about 2 1/2 miles east by north of La Salle and 1 1/2 miles northeast of Oglesby.

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Cause of the Lake

The prevalence of these deltas within the Bloomington Moraine, north of where it crosses Illinois valley at Peoria, and their absence to the south, led to an inspection of conditions at Peoria which might have produced the lake reservoir. Bedrock played no part for no bedrock outcrops to any considerable height in either valley walls. It is not conceivable that the Bloomington Moraine itself would be an effective barrier very long.

An examination of both sides of the valley revealed, however, that there are remnants of a valley train high up on the valley walls reaching an elevation of 610-620 feet where it leaves the moraine,

showing that an immense valley train filled the valley here at the close of the building of the Bloomington Moraine. This valley train is recorded in remnantal terraces for a distance of at least 100 miles. This is the only known barrier which can be credited as having dammed Illinois valley at Peoria, but there are difficulties in conceiving how it could have remained, keeping the level of Lake Illinois nearly constant for that interval of time consumed in the discontinuous retreat of the Bloomington ice-sheet and the advance of the Farm Ridge-Marseilles ice-sheet and the building of the Farm Ridge and Marseilles moraines.

The occurrence of lake silts and sands under probably Marseilles till, as far back as Joliet, probably means that the Bloomington ice retreated at least that far. That there was a notable retreat of the Bloomington glacier has been previously recognized, because the pink color of the Bloomington till, as contrasted with the gray-yellow till of the Farm Ridge and Marseilles shows that there must have been a great change in either the source of materials or conditions for obtaining a glacial load.