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## Recent Discoveries of Glacial Scorings in Southeastern Iowa

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cross bedding that characterizes the whole formation. Some of the larger boulders found at various levels throughout the beds were probably not directly transported by currents, but by floating masses of ice. While, therefore, the gravels lie between two sheets of drift, and for that reason may be called interglacial, probably Aftonian, they yet belong to the time of the first ice melting, and are related to the Kansan stage of the glacial series as the loess of northeastern Iowa is related to the Iowan stage.

While the Illinois Central gravel pit is the typical exposure of the Buchanan gravels, the same beds are found widely distributed throughout Buchanan, Linn, Jones, Delaware and probably other counties. One exposure that has been utilized for the improvement of the county roads occurs on the hilltop a mile east of Independence. Another, used for like purposes, is found a mile and a half west of Winthrop. The county line road northeast of Troy Mills cuts through the same deposit. Throughout the region already indicated there are many beds of similar gravels, but in general they are so situated as not to show their relations to the two beds of drift.

The Buchanan gravels, it should be remembered, represent the coarse residue from a large body of till. The fine silt was carried away by the currents and deposits of it should be found somewhere to the southward. It may possibly be represented, in part at least, by the fine loess-like silt that forms a top dressing to the plains of Kansan drift in southern Iowa and regions farther south.

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## RECENT DISCOVERIES OF GLACIAL SCORINGS IN SOUTHEASTERN IOWA.

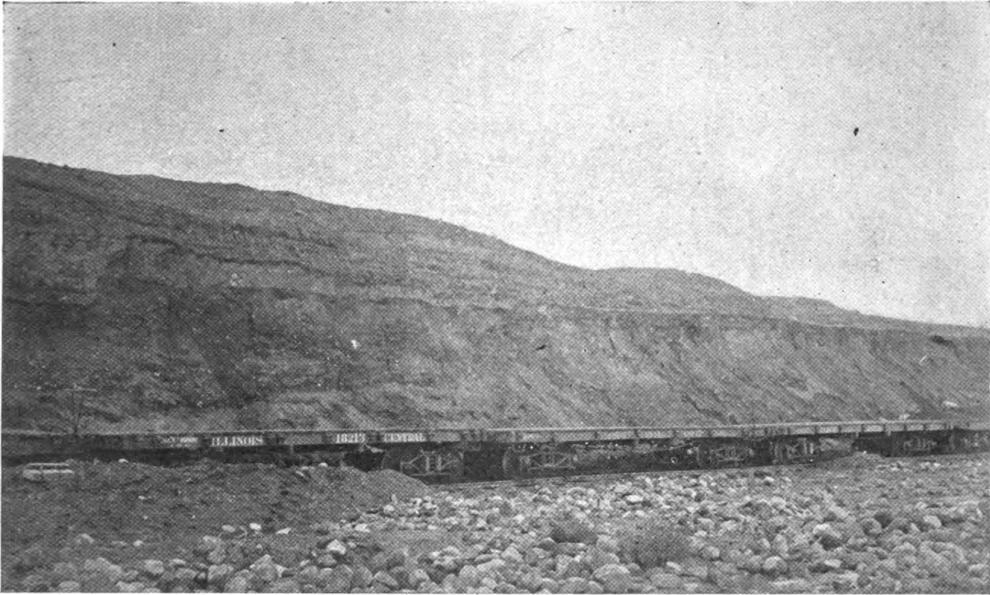
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BY FRANCIS M. FULTZ.

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The discoveries of localities showing glacial scoring in southeastern Iowa have been somewhat numerous during the last few years. In a paper presented before this body a year ago<sup>1</sup> I called attention in detail to the different known exposures

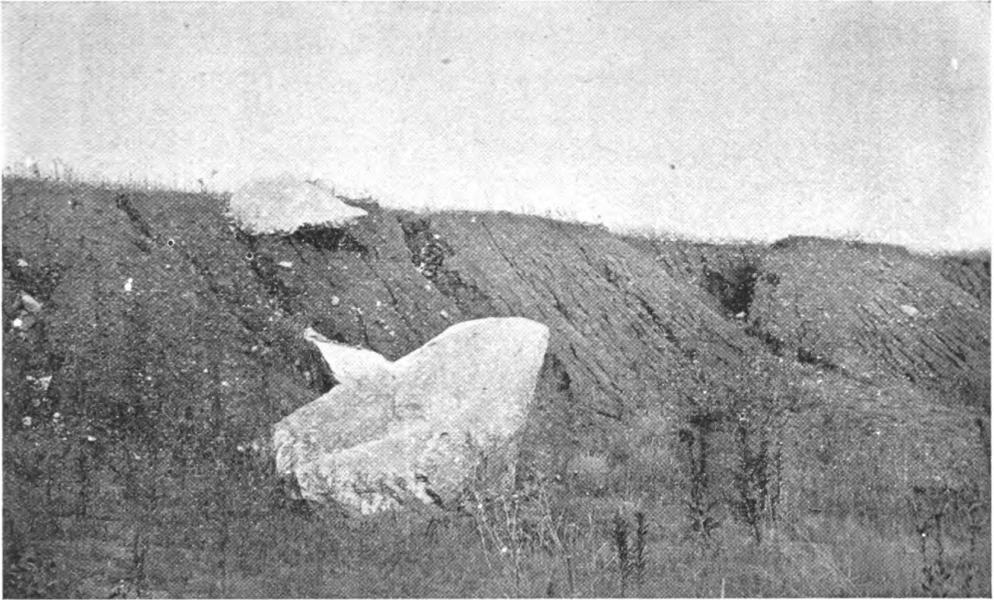
<sup>1</sup>Glacial Markings in Southeastern Iowa. Proc. Ia. Acad. Sci., Vol. II, p. 213. Des Moines, 1895.



**FIGURE 1.** General view of the typical exposure of the Buchanan gravels.



**FIGURE 2.** Near view of the Buchanan gravels.



**FIGURE 1.** Abandoned part of gravel pit.



**FIGURE 2.** Field immediately north of the gravel pit, showing large numbers of Iowa boulders.

of glaciated rock in this region, and pointed out that the testimony they gave was unanimous as to the southeastern movement of the ice sheet. Since then another exposure has been located that seems to bring conflicting testimony.

This locality is the joint discovery of Mr. Frank Leverett and myself. It is situated on the lot at the northeast corner of the intersection of Court and Prospect streets in the city of Burlington. Some quarrying had been done by blasting out the level rock floor. Everywhere on the margin of the hole thus formed may be seen the finely striated and grooved surface. On the east side a patch, 6x8 feet, was cleaned off and a finely striated surface brought to view. The direction of the striæ, taken with compass and corrected, was S. 79° W. This would indicate an almost due westerly movement, which is in direct variance with that shown by all other discoveries of glaciated rock in this region. If *direction of striæ* alone were taken into consideration, then it might be claimed that the ice movement in this case also was towards the east. But a close and critical examination shows that all the accompanying phenomena point to a westerly trend; *e. g.*, the indicated movement of the ice around and over a prominence, and down into and out of a depression.

This is new and important evidence that the Illinois lobe of the great ice sheet crossed the Mississippi river and invaded Iowa. It will be remembered that I presented a paper on this subject at our last meeting.<sup>2</sup> The evidence on which the claim was based was the presence, on the Iowa side, of boulders of Huron conglomerates. I was convinced that this westward movement was not the *latest* in this region, but that the ice moving from the northeast was the last to hold possession of the west bluff of the Mississippi; and I so put forward in the paper. Mr. Frank Leverett, who has made an exhaustive study of this question, is of the opinion that the Illinois ice sheet was the last to invade this portion of Iowa, and that the movement extended to some twenty miles west of the river. This recent discovery of glacial scoring certainly strengthens his theory. For it is situated at such an elevation that any ice sheet passing over would be almost certain to leave its impress; and therefore the striæ we now find are very apt to be those made by the latest invasion.

<sup>2</sup>Extension of the Illinois Lobe of the Great Ice Sheet Into Iowa. Proc. Ia. Acad. Sci., Vol. II, p. 209. Des Moines, 1895.

However, I am not yet fully convinced. Of the somewhat numerous discoveries of glacial scorings in this region, nearly all are on the very brow of the west bluff bordering the Mississippi flood plain, where they would offer the best possible opportunity for erosion. It would therefore seem that they ought to be the records of the *very latest* invasion. And all these, without a single exception, show southwestward movement.

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## SOME FACTS BROUGHT TO LIGHT BY DEEP WELLS IN DES MOINES COUNTY, IOWA.

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BY FRANCIS M. FULTZ.

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During the past year a number of deep wells were sunk in Des Moines county. Some of them reached such extraordinary depths before touching rock, or without touching rock at all, as would clearly show the presence of buried river channels.

In a paper presented before this society a year ago I stated that the preglacial and present drainage systems in this region were practically the same. From facts recently brought to light I must necessarily change that opinion. To what extent remains yet to be seen.

My attention was first called to the presence of buried water courses in this locality by Mr. Frank Leverett, of the United States Geological Survey, who has collected a large mass of data on the glacial phenomena of this region. He has already given us a general discussion of the preglacial conditions of the Mississippi basin<sup>1</sup>; and in the course of time we may hope for further and more detailed contributions along the same line.

The deep wells in question are located some eight or nine miles north of Burlington. One is on the farm of L. Aspelmeier, near Latty station. It is 233 feet deep, and penetrates the rock but two feet. Unfortunately there was no record kept of the character of the deposits passed through, which is also true of the other wells to be mentioned further on. Therefore the details are somewhat meager. As nearly as could be determined the till continued to a depth of 188 feet, where a gravel

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<sup>1</sup> Journal of Geology, p. 740, Vol. III, No. 7, 1895.