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Francis M. Fultz

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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.

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

BY FRANCIS M. FULTZ.

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 basin¹; 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

¹ Journal of Geology, p. 740, Vol. III, No. 7, 1895.

bed of several feet in thickness was passed through. In this gravel deposit well preserved bones were found. They were crushed into fragments by the drill, but a number of pieces, from one inch up to three inches long, were brought up in the wash. I saw these fragments about a week after they were discovered, and they had the appearance of having belonged to a living animal not longer ago than that time. Mr. Jennings, of New London, Iowa, who had charge of the drilling, told me that the bones had quite a fetid odor when first brought up. It was difficult to determine from what particular bones the fragments were, but I would place them as parts of the leg bones of some animal of slender build. Below the gravel bed the drill passed through a black deposit, which the well drillers call "sea mud," and which rests directly upon the blue shale of the Kinderhook, 231 feet below the surface.

A quarter of a mile north of the Aspelmeier well the rock bed is reached at a depth of less than thirty feet. It is the hard, compact limestone of the Upper Burlington. This shows a drop of over 200 feet in within a distance of 80 rods.

Half a mile south of the Aspelmeier well, on the farm of Fred Timmerman, there is another deep well which reaches a depth of 184 feet without striking rock. The bottom of the well is in a gravel deposit, which partakes of the nature of a forest bed. From it much woody matter was brought up.

A half mile still further south, making a mile south from the Aspelmeier well there is still another deep well. It is on the place of H. C. Timmerman. It reaches a depth of 188 feet without striking rock. It likewise terminates in a gravel bed containing much woody matter. In the two Timmerman wells the water rises seventy-five feet. When last heard from the Aspelmeier well was not furnishing a satisfactory supply.

These wells indicate an old channel of great depth, and of not less than a mile and a quarter in width. The width is probably much greater. Mr. Frank Leverett suggests that this ancient river bed was the water outlet of part of the territory now drained by the Skunk river.