

line fifteen miles south of the Illinois and Indiana corner-stone, and passing eastward five miles and three-quarters, then turning northward, taking in the town of Griffith and becoming much broader, it bears northeast and connects with the other ridge near Ross, half way across the county. This ridge seems to have been once washed by Lake Michigan's "proud waves." South of these main ridges and large sand barriers are four special sand banks or small ridges that are worth inspection. One is three miles west of the north end of Red Cedar Lake, a large bank on the West Creek Bluff out of which a few years ago a number of human skeletons were taken. The second is on the northeast shore of that lake, where, also, human skeletons, some twenty in number, were taken out in 1880, and where is now a known, undisturbed Indian burial ground. The third is one mile and a half west of Crown Point, near one of the head branches of Deep River. It is known as the Beaver Dam and is near a large marsh. The fourth is three miles and a half east of Crown Point, near one branch of Deep River. In the north part of Crown Point sand comes within a few feet of the surface, but some prairie soil now lies over it.

The immense bed of sand over the Kankakee marsh region, some five miles in width, is covered by several feet of muck. Unlike the deep white and yellowish sand of Lake Michigan, this marsh sand makes excellent roadbeds, five, north and south, marsh roads having been made with it.

No time now remains for noticing what these few facts indicate in regard to the physical conditions here somewhere back in the mighty past.

ACCOUNT OF A MORAINAL STONE QUARRY OF UPPER SILURIAN LIMESTONE NEAR RICHMOND.

That boulders, or rock fragments in some form are to be found in the track of a glacier, is one of the most familiar of phenomena. From Maine to Minnesota, and beyond, these fragments are in a direction southerly, with greater or less deviation, from the rock masses to which they previously belonged. Lines of boulders, pebbles, sand and rock-paste are strung along or spread in the course of the ice sheet; granite from granite quarries, gneiss from gneiss beds, quartz from quartz veins, conglomerate from conglomerates, copper from copper deposits, and so on from wherever they were formed in place.

But that an acre, more or less, of stratified rock should be grasped, *en masse* in the great ice palm and dragged or shoved for miles is not so common.

Professor Orton, in the Geological Report of Ohio, Vol. III, page 385, mentions a mass of Clinton Limestone sixteen feet thick and covering three-quarters of an acre, quite below its geological horizon and resting on glacial clays and gravels which separate it from the blue limestone of the Cincinnati rock beneath.

The subject of this paper is a mass of upper silurian rock, Niagara limestone, or more likely, Niagara and Clinton. It is clearly a drift deposit and was originally the greater part of an acre in extent. It is difficult to say just what is its area as it extends back from the hill-slope, where it is exposed, under a heavy deposit of later, modified drift. The Evansville & Richmond Railroad, which was never finished further than the road bed, cut through it a few years since to its full depth, or very nearly. Portions of the border of this rock moraine had been exposed for time unknown by erosion. A mixture of clay, sand and a variety of small boulders separates this deposit from the Hudson River rock of the Lower Silurian.

Fig. 1 gives a view for near 70 yards east and west. It has been five years since the rocks were cut through, and as a consequence the superposed loose material has drifted over the ledges and into the crevices, partially obscuring the promiscuous jumble of the separate masses. Still it can be seen that the coarse chunks of various sizes and forms are jammed together at all angles.

Fig. 2 represents an instance of a large block glaciated on the under side. The use of a glass will aid in discerning the well-marked striae. One or more observers who have examined the deposit are of the opinion that the rock was glaciated from above while in place, and subsequently inverted, but the repeated occurrence of such under-polishing and the finding of it nowhere but at the bottom, would seem to indicate that it was caused by sliding over the surface below. Furthermore, some of the blocks, while being shoved along, appear to have tilted upward in front, and as a result were rounded off at the heel. Much of the rock is thick-bedded and very compact. Other portions are softer, disintegrate very easily, are stained brown by iron oxide, and are composed mainly of crinoid fragments. The harder rock contains various species of corals and brachiopods, and occasionally the trilobites *Calymene niagarensis* and *Illoenus daytonensis*.

Large bowlders of this limestone are found for a mile and more south and southwest from the main moraine. All must have been removed from a point eight, ten or twelve miles north. The fine exposure of striated bed-rock at Thistlethwaite's pond, two miles to the north, has the striae pointing south 26° west, which is very nearly in line with this morainal deposit.



Fig. 1. North Side of Cut—East and West. Extent near 70 yards. Shows how the rock masses tip at all angles. G. The ledge, that is polished on under side, as in Fig. 2.



Fig. 2. Nearer view of a mass, marked M in Fig. 1, showing glacial surface on under side—W. W to E, six feet.



Fig. 3. R. R. fill from material blasted out of cut.



Fig. 4. West end of moraine as shown by erosion in creek bank below point W in Fig. 1.
M, M, M, masses buried in talus. P, pit from which rock has been quarried.