

A POSSIBLE CAUSE OF OSARS.

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On the 20th of April, 1901, there fell in north-eastern Ohio an unusually heavy snow covering the ground to a depth of from twenty inches on a level to seven feet in drifts. The snow came very rapidly and went very rapidly. During the period of rapid melting strong currents of water flowed beneath the snow which in some cases carried along much sediment. It was my good fortune to observe a point near the borders of a gently sloping plowed field where one of these streams, becoming clogged, rose to the surface and flowed for a short distance over the dense snow, spreading the abundant sediment, which it carried in a sinuous belt along its channel. After a time the stream deserted this surface channel and found a new one beneath the snow. As the snow melted the belt of sediment which had accumulated in the channel on its surface gradually settled, and when the snow had disappeared it rested upon the turf that bordered the plowed field as a miniature osar.

While it is rightly assumed that the surface of the glacial ice-sheet was for the most part clean and free from earthy deposits, yet near its southern margin there may have been much sediment on its surface. Streams of great force and volume, heavily laden with glacial detritus, flowed beneath the ice, and it is possible, and even probable, that the shifting of the melting ice, undermined by the flowing waters, and the displacement of the loose material of the deep moraine as the ice reacted upon it, would occasionally clog the channels of these streams and compel them to find new ones. In most cases the new courses would be beneath the ice as before, but it is reasonable to assume that sometimes the obstructed stream, like the rill in the snow-field described above, would rise through some crevasse and flow for a time over the surface of the ice. Such a stream would have its rapids swept clean of sediment, and its stretches of deep and sluggish water in which would accumulate belts of sand and gravel. When the stream deserted its ice channel, as it surely would in time, these sinuous belts of sediment would lie almost undisturbed upon the surface of the glacier, and they would be left finally, when the ice had disappeared, as ridges over the surface of the land, forming what glacialists call osars, or serpent kames. Indeed, such surface accumulations would be far less likely to be disturbed and obliterated by subsequent changes than would those gravel belts which, in spite of the many difficulties involved, it has been assumed, might be formed beneath the ice by subglacial streams.

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