

Ohio Landscape Puzzle

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South of Reily, Ohio, a curious hill occupies the southern portion of the broad valley of Indiana Creek. The hill is a little to the east of Route 732 ($39^{\circ}25'38''\text{N}$, $84^{\circ}45'36''\text{W}$) see Reily, Ohio—Indiana quadrangle, and is within the Russell catena of soils over highly fossiliferous limestone of Ordovician age. (4)

It is the thought of this writer that a grit-laden stream flowed on the top and side of a glacier which filled the valley. The glacier appears to have removed the upland material between the hill and the south side of the valley, leaving the isolated hill. In addition to this the glacier molded the low gradient streams flowing down from the northern upland and shaped the blunt high gradient streams which flow in from the southern upland. The glacial stream left the deep layers of sand on the top of the hill (probably supplemented to a limited extent with wind-blown sand) and shifted flagstone near the hill into a re-aligned horizontal position. (1, 2, 3)

Within the realm of the early Wisconsin glaciation, the upland soils are of Russell catena. Bedrock is of Ordovician age and is a highly fossiliferous, easily fractured sort that breaks readily into cobbles about two inches thick and a foot square. Bedrock outcrops on the hill, and near it, are of this sort.

The hill is located on the south side of the broad valley of Indian Creek, but with bottom land separating the hill from the adjacent upland to the south. High bottom conditions are the rule in the adjacent valley with dissected terraces close to the upland. Streams entering the wide valley of Indian Creek from the north have a low gradient and are blunt in pattern with well defined down-cutting action. A quick glance at the hill south of Reily might lead one to believe that it is a simple erosional feature.

Viewed as a soils problem a different picture emerges. An intergrade of Fairmount and Wynn silt loam is the soil type found on the lower flanks of the hill. Fragments of limestone are common, but cover no more than ten percent of the soil surface. Patches of moneywort, a bog plant, are frequent on the steep slopes (about thirty percent) and appear to be supplied with water by seepage from the hillsides. Farther up on the hillside a Russell, Miami, Hennepin complex exists on slopes of about fifteen percent, with areas of Wynn interspersed. Very few limestone slabs are present and the wetland plants give way to grasses and low shrubs. The hill is capped by deep, very fine sand in which angular glacial pebbles are found. It is difficult, and in most cases unwise, to assign a soils name to such a small area. Coarse grasses grow on the hill's top and a single apple tree occupies the highest position on the hill.

The hill rises from a plateau of 750 feet to 790 feet. Its entire surface is convex with no erosional channels of as much as a foot. Little local erosion appears to have taken place.

The nearby upland to the south, beyond the one hundred feet or more of Genessee bottom soil which separates the hill from the upland, is a north-facing slope of Miami-Russell-Hennepin complex. The bog plant moneywort is much less common here than on the side of the isolated hill and fragments of limestone are not common. Deeply eroded gullies contain large limestone slabs which were probably dumped in by a farmer at the time that the land was in cultivation. A deeper gully to the immediate southeast of the hill shows bedrock limestone. Loose fragments in till seem to have been shifted slightly.

As additional evidence as to the nature of the hill south of Reily, Ohio, an examination of other high hills in the area is important. A little to the south of the church in Reily, and on the other side of Indian Creek, is a hill which is higher than the one first mentioned. (Location $39^{\circ}25'50''\text{N}$, $84^{\circ}45'40''\text{W}$; see Reily, Ohio-Indiana topo map). The second hill does not have the Fairmont Wynn complex on its lower flanks, but is of the Russell-Miami-Hennepin complex from bottom almost to the top. The top resembles the first hill in having deep, very fine sand with glacial fragments scattered throughout.

It is an interesting exercise to locate three other hills which are to the northwest of the second hill and to draw a line on the topo map connecting them with hill one or hill two. Why do all hills line up so neatly in a northwest-southeast direction? Are they related to the blunted valley appearance of the south side of Indian Creek?

Back to the hill where our discussion started and back to the approach of geology from a soils standpoint. It is the thought of this writer that the hill covers a cone-like bedrock core and that the surface limestone fragments mixed with till have been *shifted*, or moved a very short distance from their place of origin. It is his further thought that the area no longer present between the upland to the south and the hill was removed not by simple erosion, but by the glacier at much the same time that the south face of the valley was molded. That it was molded is indicated by the blunted walls of the valley and short streams which contrast so strongly with the softly sloping stream pattern of the upland on the north side of the valley. Molded as well were the sides of the hill and shifted by glacial or water action were the flagstone fragments that occupy the lower walls of the hill. The seepage areas on the hill side give further credence to the thought of a relatively undisturbed cone of bedrock and weathered bedrock in the central portion of the hill.

None of these conditions are present at hill two, the central portion of which seems to be composed entirely of till, as is the bottom of an adjacent ravine. Hill two can then be thought of as dumped glacial till previously sorted by the glacier and molded to a limited extent by the glacier. Like hill one, it seems to have been subject to considerable water action by a flooded Indian Creek at time of glacial melting. It has suffered normal erosion in the interval between that time and the

present. The cap of sand on top of both hills might be explained by wind lifting and movement of small particles at some time following the greatest flood of melt water. This explanation does not account for the numerous pointed small glacial pebbles present on both hills. Were these moved up from the till by action of rodents? If so, a great deal of rodent action must have taken place. Perhaps it has; at this time there are numerous groundhog holes on hill two. High hills have been preferred by groundhogs for a long time.

Another logical explanation and the one most acceptable to this writer concerns a grit-laden stream flowing on the top and side of a glacier which filled the valley. The glacier may be thought of as being the same one that molded the hill and removed the bedrock and till which had previously joined the hill to the upland to the south. The present hill tops of hills one and two may have been the stream bed of that grit-laden stream. This glacier, or an advance associated with it, may have been the one which shaped the low sloping streams coming out of the north side of the valley and molded and blunted the south side of the valley, and shifted the flagstone re-aligning them in a more or less horizontal position.

Soil Descriptions

Fairmount-Wynn complex—rocky soils derived mainly from weathered limestone bedrock with varying amounts of the wind-blown silt known as *löss* on or near surface. Frequently found on steep slopes.

Russell-Miami-Hennepin complex—deep, well drained, brown soils with varying amounts of *löss* on or near surface. Gravel, limestone, or till is most often present at depths of ten to thirty feet. Frequently found on sloping land, and occasionally on very steep slopes.

Genessee—a well drained bottom soil associated with rivers flowing through areas of Wisconsin glaciation, or downstream of areas which have been subject to Wisconsin glaciation.

Very fine sand—No effort was made in this text to give a soils name to the very fine sand with numerous sharp glacial fragments found on the two hills. These areas have characteristics of several soils and may be considered as a complex.

Summary

Attention is directed to an oddly shaped hill in southwestern Ohio. The writer rejects the theory of the hill being formed as a simple erosional feature and presents the following viewpoint.

The hill has as its internal core a bedrock cone or block of Ordovician limestone, of the same age and origin as limestone outcrops on the upland to the south. The hill is separated from the upland by bottom land, but by bottom land which has not served as a bed of the river of the adjacent valley (Indian Creek). The surface of the hill consists of till and local limestone fragments which have been moved (or shifted) by glacial action and water movement. Limestone frag-

ments are far more numerous on the lower portions of the hill and this portion of the hill is moist with seepage sufficient to sustain the bog plant moneywort even in time of drought. The higher central portion of the hill's surface is till plastered to the sides of the hill. The surface of the top of the hill is deep very fine sand with numerous sharp glacial fragment.

The hill with its central limestone core was separated from the nearby upland by glacial removal of the bedrock and till. The hill was shaped and molded by the glacier and surface limestone slabs shifted and re-aligned by glacial action and melt water flooding. At one time a river ran on top of the glacier which occupied the valley of Indian Creek. At this time the fine sand with accompanying glacial fragments was deposited in the river bed. The top of the hill represents a portion of that old river bed.

Erosion is considered to be a factor in the hill's present shape, but is not thought to be the only factor, or a principal one.

Literature Cited

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