Proceedings of the Iowa Academy of Science

Volume 8 | Annual Issue Article 35

1900

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number of species that it would be a mere accident to discover the organism. As said heretofore it seems to me to be reasonable that the milk formed a favorable medium for the growth of the organism, and be it specially remembered that Mr. Briley, from his own testimony, failed to wash the cans with boiling water as should have been done. The milk cans could easily have been contaminated, and the failure on his part to wash the cans, it seems to me, made it not only possible but probable that these germs propagated in the milk.

A comparison of the water of the Briley well and the college effluent shows that the Briley well had a greater amount of contamination than the college effluent from the sewage filter beds.

DRIFT EXPOSURE IN TAMA COUNTY.

BY T. E. SAVAGE.

A few months ago, in making some improvements in the roadbed of the Chicago & Northwestern Railroad, a deep cut was made in a hill about three miles west of the city of Toledo, in Tama county, Iowa, where the following section was exposed:

5. Fine grained, yellowish colored loess clay without gravel or bowlders..... 4½
4. Bed of sand in alternating bands of finer and coarser grained material 8
3. Bed of clay, containing numerous pebbles and bowlders.... 24
2. Band of brown colored, somewhat sandy soil, containing impressions of vegetable remains and a few bits of wood, 1½
1. Bed of bluish colored clay, with numerous pebbles and bowlders down to the base of the exposure..... 16

In the section given above, Number 5 is the common fine grained loess that forms the surface soil over most of the neighboring region. It contains no pebbles nor bowlders, nor any calcareous matter, as shown by the want of action when treated with hydrochloric acid. It is of a yellowish color in the upper part, becoming tinged with brown in the central and lower portions.

Number 4 is a bed of loose sand, in which the layers of finer grained material alternating with those of coarser texture indicate a deposit along the bed of a stream in which the strength of the current was variable. This sand bed contains no trace of calcium carbonate throughout its entire thickness. It was probably laid down by the waters which resulted from the melting of the Kansan ice.

Number 3 is a thick bed of clay, which bears numerous pebbles and bowlders of various sizes. Many of the lighter colored bowlders have partially decayed, and are so rotten that they can be broken apart with the hands. For a depth of four feet from the top the material has a somewhat reddish appearance. This color gradually changes with the depth through yellow and gray to the bluish color of the main body of clay. In the upper portion are several pockets and lentils of rather fine-grained sand. The bed is cut by numerous joints and cracks into prismatic and irregularly shaped blocks and fragments. It is calcareous throughout, hydrochloric acid producing vigorous effervescence at the very top, immediately below the layer of sand, as well as in every portion of its depth.

Number 2 is a layer very different in character from that which overlies it, or from that which is found below. It is dark brown in color and is largely composed of more or less perfectly decayed vegetable matter mixed with a soil which contains a considerable amount of sand. Near the upper portion of this layer may be found a few fragments of wood and bits of roots and darker colored patches of carbonaceous material. The bed contains no trace of calcareous matter. It forms a conspicuous band eighteen to twenty-four inches in thickness, which is exposed at this horizon for a distance of forty rods.

Number 1 is a bed of drift which resembles in many respects Number 3 above. Many of the pebbles and bowlders which it carries are beautifully polished and striated. In the lower portion it is bluish gray in color, but to a depth of three or four feet from the top the clay has a slightly reddish tinge. This red color, however, is not so marked as in the oxidized surface materials of the

Kansan drift. This bed is not cut up into irregular blocks by the presence of such numerous joints and cracks as appear in the clay found in Number 3 above. At the top of this number, just below the soil band, the calcareous matter has been entirely leached out for a depth of eighteen to twenty-four inches. At a depth of thirty inches from the top there is in some places a slight action in response to hydrochloric acid, and in the other places at

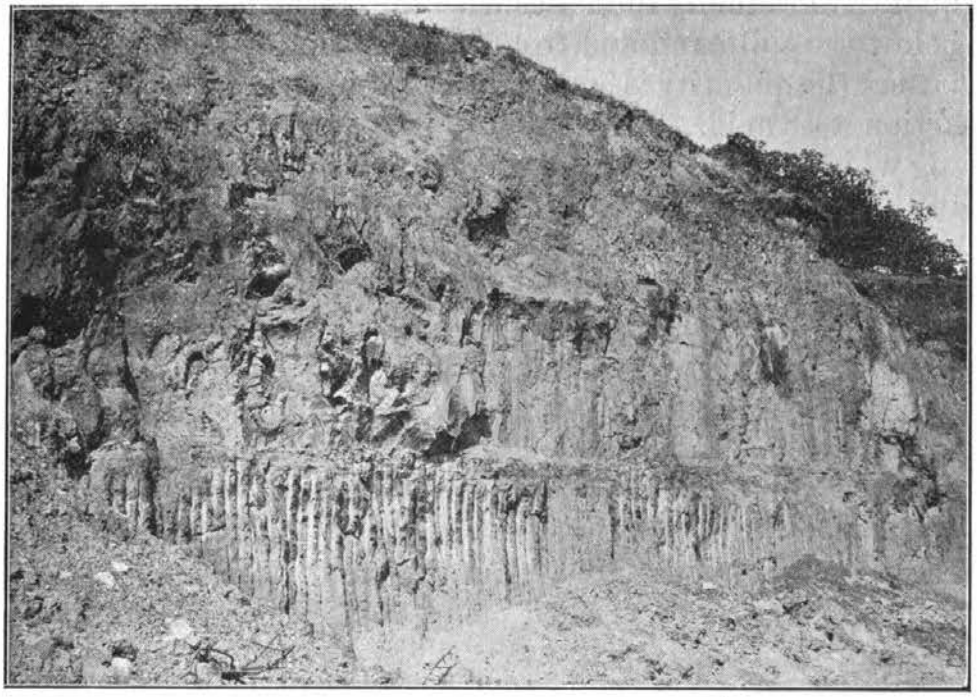

Fig. 16. Drift exposure along the C. & N. W. Ry., near Toledo, Iowa.

the same depth the acid produces no action whatever. At a depth of three feet the acid usually produces slight effervescence. At four feet in depth the action with acid is still stronger than at three, while at a depth of six feet from the top, and so on down to the base of the exposure, the acid never fails to produce a prompt and vigorous action.

CONCLUSION.

In the above exposure the following conditions seem to indicate the presence of two different drift sheets.

First. Buried soil. Lying between two thick beds of drift there is an apparent soil horizon, dark brown in color, in which are imbedded numerous small bits of wood and darker colored fragments of organic matter.

Second. Leaching. The bed of clay which overlies the soil horizon is very calcareous to the base. The soil band contains no trace of calcareous matter, nor does any such material appear for a depth of two feet below it. At a depth of thirty inches a slight quantity is present in the clay. This quantity gradually increases with the depth until at six feet below the soil band and from there to the base of the exposure the quantity is considerable as shown by the vigorous action with acid. This would indicate a long interval during which the old soil band was at the surface and subjected to the leaching effects of the atmosphere and of percolating water before it was buried by the overlying materials which were carried by a later sheet of ice.

Third. Oxidized zone. The reddish color of the clay to a depth of three or four feet below the soil horizon would indicate a period during which these materials were exposed to the oxidizing effects of the air. The oxidation resulted in the changing of the iron found in the clay from the form of carbonate, in which form it usually occurs in the blue clays, to that of the oxide known as hematite, in which form it imparts a reddish color to the clays when it is present.

The above exposure is about eight miles south of the border of the Iowan drift plain, and is within the area in which the Kansan drift forms the surface materials. It is thought by the writer, that Number 3 of the exposure represents the Kansan drift; Number 2, the soil horizon which represents the Aftonean interglacial period, while Number 1 is referred to the bowlder clay of the pre-Kansan drift sheet with its upper portion leached and partially oxidized as described above.