Proceedings of the Iowa Academy of Science

Volume 6 | Annual Issue Article 21

1898

Buried Loess in Story County

S. W. Beyer

each ten inches high and the top one eleven inches, the shelves being of one-fourth inch mesh galvanized iron wire netting.

In the top compartment is the heat regulator, which consists of a 100 cc. flask for a bulb, and a one-fourth inch glass tube with a double bend, to contain liquid and to receive the gas. One end of the tube passes through a rubber stopper into the flask, while the other end receives a smaller tube, reaching down toward the mercury in the lower curve. On the side of the small tube is a capillary opening, cut with a file, to permit a flow of gas when the opening at the end of the tube is closed by the rising mercury. The liquid used in the bulb is a solution of calcium chloride, and in the bend of the tube is mercury. Other liquids may be used.

The incubator was used last spring in class work in bacteriology and gave good satisfaction. The greatest variation in temperature observed was not over 2½ degrees, and this only when the room became quite cold. The usual variation was not over 1½ degrees. Experiment shows that the temperature in the incubator increases from the lowest shelf to the highest, if the burner is placed under the opening of the pipe, or near it; but if the burner is near the front of the incubator, or under the opening in the center, the temperature is nearly equable throughout.

BURIED LOESS IN STORY COUNTY.

BY S. W. BEYER.

The Iowan till is not known to be present in Story county. The trend of its southwestern margin which crosses Johnson, Iowa, Tama and Marshall into Hardin county, if maintained with reasonable constancy, would carry it safely beyond the confines of the county. The loess, the silty apron of the Iowan, although suspected to be present on account of the geographic position of the area and of certain topographic contours which are decidedly loess-like in character, was not recognized certainly until during the present field season. The loess is now known to appear at numerous points along the flanks of the deeper cuts in Indian Creek and Collins townships, in the

southeastern corner of the county, near the limit of the Wisconsin drift, and there are occasional exposures in Franklin and Washington townships, along the tributaries of the Skunk river and Squaw creek, in the west central portion of the region. It is to the latter occurrence that it is desired to direct attention.

The best exposures may be viewed on sections 5 and 34, in Washington township, along Clear and Walnut creeks respectively.

The Walnut creek section shows:	FEET.
Drift, yellowish above, bluish below (Wisconsin).....	20
Loess, sandy below.....	20
Clay, blue with much coarse gravel.....	exposed

The loess is silicious throughout and the upper four feet is distinctly joined and stained a faint yellow-brown along the joint planes. It grades downward into a massive, structureless, pale blue clayey silt which contains, in places, an abundance of root casts, wood fragments and black, Carbonaceous spots and emits a distinct swamp like odor. The entire deposit is highly calcareous and carries a rich gastropod fauna. Prof. B. Shimek identified the following forms, the majority of which are strictly terrestrial.

Zonitoides shimekii, (Pilsbry) P. & J.
Sphyradium edentulum alticola, (Ingersoll) P. &. J.
Pupa muscorum, *L.*
Bifidaria pentodon, (Say) Sterbi.
Vertigo ovata, Say.
Corulus fulvus, (Mull).
Polygyra multilineata, (Say) P. & J.
Pyramidula striatella, (Anth.) P. &. J.
Vallonia costata, (Mull) Sterbi.
Succinea lineata, Binn.
Succinea avara, Say.
Limnæa humilis, Say?

Loess concretions are relatively scarce and are diminutive in size. The deposit shows no signs of oxidation or leaching where the drift covering is thick; but where the covering is so far reduced as to afford imperfect protection from the weathering agents, both leaching and oxidation may be noted, and here, alone, are lime concretions to be found. It is obvious that little or no alteration took place prior to the deposition of the overlying drift.

The outcrop along Onion creek is an almost exact duplicate of the Walnut creek section. The drift mantle is thinner, and from two to five feet of loess has been stained to a yellowish buff, and loess concretions are more in evidence, thus attesting to the greater progress made in leaching. Here, again, the upper portion is distinctly jointed, while lower the deposit is apparently structureless. Gasterpod shells abound throughout, but only two species, not listed previously, appear—

Helicodiscus lineatus, (Say) Morse, and

Planorbis bicarinatus, Say,

both of which are terrestrial forms.

In connection with these deposits of buried loess, certain arenaceous to silty gray-brown deposits, remarkably homogeneous and devoid of pepples and bowlders, border some of the larger streams and are perhaps worthy of special mention. They are discussed here with the hope that they may throw some light on the process of loess accumulation. These highly-siliceous deposits flank the Skunk and the Squaw; are noticeably present along the lower course of Indian creek, but are more in evidence along the eastern margin of the Skunk river valley, below Bloomington. The deposits attain a maximum thickness of from three to five feet on the brow of the bluffs, thin rapidly inland and are scarcely recognizable more than a mile from the bluff scarp. These deposits are responsible for the heavy, sandy roads along so many of the streams in the Mississippi valley and are shunned alike by the teamster and the bicyclist. They are often known, locally, as "White Oak Soils," because that very well known and desirable species of oak finds in them a congenial host. The deposits are thoroughly oxidized and leached and appear to be wholly devoid of structural or bedding planes. The coarsest materials which enter into their composition are found nearest the flood plain, and the size of the grain diminishes gradually as the deposit feathers out away from the river. The source of the materials and the transporting agent are not difficult to apprehend. The process of accumulation is going on to-day. The wind, sweeping across the broad flood plain, gathers up such material as can be transported and moves it toward the restraining bluffs. Perhaps only the very finest materials are given continuous passage for any considerable distance. But through successive short excursions, the coarser silt-particles

and even fine sand-grains eventually reach the brow of the bluff and are deposited in the reverse order of their fineness*. The position of these deposits is determined, essentially by the surface contours. The wind, crossing the valley, impinging against the hill's flanks, is deflected upward, and, coming in contact with the still air above, loses velocity, and, being unable to carry its load further, deposits it over the brow of the hill. In this location its position is reasonably secure, though the entire assemblage of deposits possesses the proclivities of the sand dune and may progress bodily inland. This process of wind transport and accumulation of materials may readily be witnessed. During early spring and late autumn, when large tracts of bottom land are unprotected by vegetation, dust storms are common and, often during a single "blow," a measurable deposit is accumulated. If this be true now, how much greater must have been the efficiency of the winds, which blew across the mud flats, before vegetation had time to reclaim the valleys, so recently vacated by the Wisconsin ice?

The prevailing winds for central Iowa during spring and fall are from the west and hence the greater accumulation of æolian deposits on the eastern flanks of the streams.

These deposits are worthy of more than passing notice, when viewed analytically, on account of their striking similarity, in many respects, to the loess. Structurally, texturally and in composition and distribution, there is a remarkable resemblance. Both are essentially devoid of stratification planes, possess a uniform, open texture, are highly siliceous, being composed chiefly of silt and fine sand, and appear to be genetically related to the chief watercourses, along which they attain their maximum development. True, the loess is usually highly calcareous, but this may readily be referred to a difference in the condition of the materials drawn upon, and

*A most luminous and helpful discussion of wind erosion, transport and deposition, will be found in Professor Udden's memoir, entitled "The Mechanical Composition of Wind Deposits," published by the Lutheran Augustana Book Concern, of Rock Island, Ill., 1898 The subjoined table gives the approximate maximum distances over which quartz fragments of different dimensions may be lifted by moderately strong winds in single leaps.

Gravel (diameter from 8—1 mm.)	A few feet.
Coarse and medium sand (Diam. 1—1-4 mm.)	Several rods.
Fine sand (Diam. 1-4—1-8 mm.)	Less than a mile.
Very fine sand (Diam. 1-8—1-16 mm.)	A few miles.
Coarse dust (1-16—1-32 mm.)	200 miles.
Medium dust (1-32—1-64 mm.)	1,000 miles.
Fine dust (1-64 mm, and less)	Around the globe.

be wholly independent of the process of accumulation. It is now pretty generally conceded that the loess is genetically related to the Iowan drift,—perhaps the overwash from that sheet. It is also well known that the Iowan carried the largest and freshest bowlders of any sheet and it is reasonable to suppose that the finer materials were equally fresh at the time they were deposited. This is evidenced by the Iowan drift itself, the surface, only, showing any signs of weathering. The mud flats were, doubtless, much more important then than now, and if atmospheric circulation was equally as vigorous as at the present time, wind erosion and deposition would be much more widespread and important, and the rate of accumulation might be so much accelerated that oxidation and leaching of the rock meal would be imperfect or almost wholly wanting. The loess deposits, which have been protected by the Wisconsin drift, lend credence to this view. The exposures near Kelly and Ames are not only unoxidized and unleached, but still retain their original blue color, which is so characteristic of unaltered secondary deposits. These deposits also emphasize the extremely short time interval between the deposition of the loess and the Wisconsin advance. The loess, where unprotected, is a straw to gray-brown throughout, and the lime concretions sufficiently attest that incipient leaching has begun. In places where the deposit has neither lost by erosion nor gained by deposition, the leaching zone varies from two to four feet in thickness and is identical with the wind accumulations along the streams of to-day. The former, in all probability, originated through the rapid accumulation of perfectly fresh materials from the extensive mud flats and overwash plains, which formed an apron to the Iowan till sheet, while the latter represents the much slower assembling of the leached and oxidized materials from the alluvial plains of to-day.

While the processes which obtained during the two sets of deposits cannot be demonstrated to have been identical, their inherent resemblances and environments are certainly very striking. Aside from the comparisons already made, they are very closely related faunally. Professor Shimek* has shown, that with few unimportant exceptions, the loess molluscs were all air-breathers, whose habitat must have been very similar to that which prevails in the Iowa-Nebraska region of to-day.

*The exhaustive memoirs which embody the results of this keen, conscientious observer and conservative writer may be found in the recent volumes of these proceedings.