

The Loess Formation of Kansas.

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Table of Contents.

I. Introduction.

A. Picture.

- a. Love and acquaintance with Nature.
- b. Description.
- c. Inspiration drawn from Nature.

B. Nature's preparation for man.

- a. Preparation.
- b. Crowning effort of Nature — man.

II. Loess Formation of Kansas.

A. History.

a. Quaternary Period.

1. Glacial Epoch.

2. Champlain "

3. Terrace "

b. Cause of Lake Agassiz.

c. Extent of Missouri River flood-plain.

B. The Deposit.

a. Its extent.

b. Derivation of word "Loess".

c. General appearance of deposit.

1. Yellow, 2. Character.

3. Unstratified.

d. Cause of unstratification.

e. Amount of deposit.

f. Effect of erosion.

g. Composition.

h. Presence of organic fossils.

i. Shells, mammals, etc.

i. Top of Blue Mount artificially made by Indians.
Loess.

j. Here presented is a practical home study.

The picture is beautiful, but not always the same! Love for the picture grows with our growth, and ideas change with better acquaintance. Look at the picture. Some shaded vale, clothed with the harmonious colors of nature; dancing water sparkling and flashing here and there through the green, a rugged hill beyond giving strength and majesty, and an atmosphere of complete rest pervading all. Thus may Nature come, — love in her look, and strength in her mien; or she may appear in a sterner garb, rough, sharp-angled, so strong and mighty in appearance, so grand she awes us. Still she draws us nearer, she invites better acquaintance, and leads us on and on, yet only giving glimpses of the great past, and of the eternal future. But from the depth of the past, and the grandeur of the future which we feel is to come, she inspires better labor, higher aspirations, and sends enthusiasm which conquers all obstacles.

In preparing this earth for our home, Nature has not spared herself. Time has been counted as nothing. Continents have been lowered and covered with the seas, and limestone was there in the process of formation. Then land was lifted above the sea, and covered with a great vegetable

growth, forming our coal and iron. So she spent ages. The world now teeming with vegetable and animal life; then a time of turmoil and changing of the form of the continents, and of the life upon them, and after ages of preparation came her crowning effort - man appeared.

In this short essay I wish to call attention to a very small part of Geology. - The Loess formation of Kansas. Not much has been written on this subject, and I am inexperienced, so I ask the reader not to judge my ideas of this formation too severely.

During the first part of the Quaternary period, there are evidences that the northern part of North America was raised from a thousand to two thousand feet and the whole continent covered with a sheet of ice, the same as Greenland is today. Then the climate grew milder, and this ice-sheet was changed into a great glacier, slipping on all sides into the sea. When it reached the sea immense icebergs were formed and floated away.

When the surface of the land began to be changed and moulded. Great moraines are traced and show the extent of this mighty glacier. During this time of ice melting, it was

a time of floods.

There were three periods of glaciers, as is shown by the moraines, and the periods between must have been long, for in our case there is a forest bed between the tills. By a period of glacier, I mean, that the glacier melted a great deal, then for some reason the temperature was lowered, and the ice stopped melting, then came another period of warmth, and the glacier again advanced, depositing another moraine.

There are two theories regarding the surface erosion. All are agreed in thinking it the work of ice, but some claim it was done through icebergs scraping the bottom of a shallow sea, the other is the glacier theory which seems the more logical.

Then came the Champlain Epoch, or a time of depression of from five hundred to a thousand feet. This was lower than the Great Lakes are today. A great flood was the result. The ocean can be traced far up the St. Lawrence River. Then came the Terrace Epoch, when the land was slowly lifted. Old sea margins, it is said, can easily be traced.

But the flood in the north and west was probably due to a great extent to the retreating

glacier. It acted as a barrier to drainage. The greater part of the continent naturally drains in two directions, north and south, the water shed being near the northern boundary of what is now the United States. The great glacier cut off the outlet to the north, so held back the water, and a great lake was formed, which geologists named in honor of the noted geologist Agassiz. This lake was probably forced to drain south into the Mississippi River basin. It also probably affected the Missouri River, and increased its flood plain.

The rivers were at this time very much swollen, and the flood plain of the Missouri extended over much territory. A large part of Kansas was included in this flood plain, and it is the deposit made at this time which I shall try to describe, now that we have considered the probable cause of its existence.

The Loess deposit is not confined to the Missouri River alone; all along the Mississippi River there is a Loess formation, but it is of a different character.

The general appearance of the Loess deposit in Kansas is a yellowish-gray, or brownish loam. It is unstratified, and this is a peculiar

feature when we think of its being a deposit made in water. When we study the character of the soil along the upper part of the Missouri, we find it a soft, arenaceous strata of the Tertiary. It is somewhat chalky also. Soil easily transported. For this reason the Missouri river is today a muddy stream. At this time the waters were over burdened with sediment. When the plain was reached the current was not rapid enough to carry all the mud, and it was dropped, forming a deep layer of rich soil.

Before going farther in this discussion perhaps it would be well to tell how this strange word of Loess came to be applied to this formation. It is a German word which was given to a Tertiary formation along the Rhine, and supposed to have been deposited under similar conditions, and now any formation which is unstratified, and deposited by over burdened water, or by wind which has formed a deposit of much the same appearance, is called a Loess deposit.

The depth of the Missouri River Loess deposit was immense. On the bluffs bounding the river, after those years of erosion, it measures two hundred feet, and on the level plain it is

much thicker. Kansas was near the bank, we may say, of this great flood plain, so the deposit is not so deep here, although in places it is quite thick. In northeastern Kansas, the Loess is of the greater depth. In places reaching a thickness of one hundred and fifty feet. At Wyandotte it is one hundred feet. In the northeastern counties it has attained its greatest development, while in the south and west it thins out.

One of the means by which it may be recognized is the characteristic way it is effected by erosive elements. It is always effected in nearly a perpendicular line. If it forms the subsoil to which, and through which a river cuts its channel, that river's banks stand out in bold relief, and the soil, the black, organic loam above can be separated from it in almost a straight line. When the Loess is deep enough so as not to be hardened, it is easily spaded, and is good agricultural land. Its composition is silica.

8.2%, Calcium carbonate (CaCO_3) 9.7%, Magnesium carbonate (MgCO_3), 9.3%, Aluminum .7%, Ferric oxide (Fe_2O_3) 3.9%, the rest is organic matter.

The organic fossil remains are remarkably numerous in this Loess formation. One of the most striking geological formations in the state is

this deposit, and it is very rich in organic remains. They furnish a large field for investigation. Although the limestone strata of Kansas is great, and the coal deposit, although not great, furnishes an interesting study, still the Loess formation ought perhaps to interest the farmer the most, because it forms the basis of his land. It is a good sub-soil. It drains well. In places it is quite sandy. Sometimes it is found almost clayey in character, still it is virtually the same, and is a rich under soil.

In the strata there are found a great many shells, the Mollusca being very numerous. The mammals are especially interesting, because of the perfectness of the remains and their great number. Beside many others the elephant, deer, elk, the Rodents, and the remains of man have been found. Prof. Mason in this Loess deposit north of Blue Mtn. the remains of a large animal, an elephant which had tusks nine and a half feet long. He has placed it in the Kansas State Agricultural College Museum. It would seem that this great animal had come from higher land, probably seeking water. The flood plain was slowly drying up, but was then in the condition of a swamp, and the great animal was mired in the mud.

The Loess deposit is brought to our notice here in Manhattan, perhaps more strongly than in some parts of Kansas. The top of Blue Mount is of this material. The top of the hill is artificially formed. It was probably the work of the Indian, who made the hill a burying ground. They must have been diligent and patient workers, for we know that their only means for carrying was a basket. But they did it, and the earth they carried was this soft, and somewhat clayey sediment, which is called Loess.

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