

bottoms and bottom prairie, it lies higher on the bluffs and highlands adjacent to the river valleys.

The bluff which underlies the soil in all the highlands of the county consists of a sandy marl more or less stratified and varying in thickness from a few inches to more than one hundred feet. This vast deposit was evidently formed in one of those lakes which were formed as the ice of the glacial period melted away. This lake extended over northern Missouri, eastern Kansas, and southeastern Nebraska and southwestern Iowa. * The Missouri, Sioux, Platte and Kansas rivers flowed in this lake from the north and west, bringing into it the rich marls ground out of the rocks to the north and west by the great glaciers of the drift period. These bluff marls constitute the rich subsoils of all the uplands of Central Missouri. The marls of the bluff are a little coarser and more sandy on the bluffs adjacent to the rivers, as the finer materials were washed out by the subsiding waters of the streams where the land was changed and the lake drained off and the rivers became more and more rapid, until they found their present condition.

The bluff is by far the most valuable formation in the Mississippi valley. It is a vast storehouse of plant food, agricultural wealth.

Organic Remains. The fossils of the bluff are very numerous and interesting.

I have collected from it, of the *Mammalia*, two teeth of the *Elephas primigenius*, mastodon, the jaw bone of the *Castor fiber Americana*, the molar of a *Ruminant*, and the incisor of a *Rodent*; of the *Mollusca*, seventeen species of the genus *Helix*, eight *Limnaea*, eight *Physa*, three *Pupa*, four *Planorbis*, six *Succinea*, and one each of the genera *Valvata*, *Amnicola*, *Helicina*, and *Cyclas*, besides some others not determined.

These *lacustrine*, *fluvial*, *amphibious* and *land* species indicate a deposit formed in a fresh-water lake, surrounded by land and fed by rivers. These facts carry back the mind to a time when a large portion of this great valley was covered by a vast lake, into which, from the surrounding land, flowed various rivers and smaller streams. We see the waters peopled with numerous mollusks, the industrious beaver building his habitation, the nimble squirrel, the fleet deer, the sedate elephant and huge mastodon, lords of the soil. There must have been land to sustain the elephant and mastodon and helices, fresh water and land for the beaver, and fresh water for the cyclas and limnea.

Some geologists have supposed the marls back from the river which have a more jointed structure, are boulder clay and belong to the drift. This opinion, they think, is confirmed by the small pebbles sometimes found in these marls; but these pebbles would be very easily carried out

* See page 89 for further explanation of this matter. Also, page 79 for Prof. Swallow's scale of the Missouri rocks.—HISTORIAN.

into the lake by ice floating from the shores or from the many rivers flowing into it.

The evidence that the surface marls of the interior belong to the same formation as the marls on the river bluffs, is shown by the facts, they are continuous with the river bluff marls, they contain the same fossils, and have the same chemical composition, and about the same lithological characters. When both have been exposed to the weather, no one can distinguish them by the lithological characters.

THE DRIFT.

The drift which is so abundant in North Missouri, is very sparingly developed on the south side of the Missouri river. Where seen in Lafayette it rests immediately on the consolidated rocks of the coal measures, beneath the marls of the bluff just described. These limited deposits consist of sands and pebbles, containing some small boulders, called *Lost Rocks*.

But these deposits are so limited as to be of little economical importance.

COAL MEASURES.

The lower and middle coal measures are found to underlie the whole of the highlands of Lafayette county. These rocks are limestones, sandstones, clays, marls, shales, iron and coal variously interstratified.

The following section taken at Lexington will show the character of the middle coal measures of this county:

- No. 1.—Bluff marls.
- No. 2.—Five feet calcareous gray sandstone, in thin ripple marked strata.
- No. 3.—Thirty feet silico-argillaceous shale. This is also exposed at Owen's landing.
- No. 4.—One foot bituminous shale.
- No. 5.—Eight feet purple, blue and green shale.
- No. 6.—One-half foot, bituminous coal.
- No. 7.—Six feet, blue clay and marlite full of fossils.
- No. 8.—Ten feet, indurated brownish sandstone in thick beds.
- No. 9.—Six feet, purple, blue and green shales.
- No. 10.—Four feet, buff and gray limestone.
- No. 11.—Five feet, bluish green shales.
- No. 12.—Eight feet blue and gray argillo-calcareous sandstone.
- No. 13.—Twelve feet, blue, green and yellow shales and clays.
- No. 14.—Two feet, buff slaty limestone.
- No. 15.—Five feet, hard gray limestone.
- No. 16.—Eight feet, blue and black shale and marlite.
- No. 17.—One and one-half feet, bituminous shale.