No. 18.—Four feet, hard blue limestone.
No. 19.—One and one-half feet, bitumuous shale.
No. 20.—One and five-sixths feet, bitumuous coal.
No. 21.—Two and one-fourth feet, bitumuous and yellow shale.
No. 22.—Five feet, hard gray limestone.
No. 23.—Nine feet, yellow and blue shale.
No. 24.—Sixteen feet, blue and purple shale.
No. 25.—Five feet, bitumuous shale.
No. 26.—One-half foot, coal.
No. 27.—Six feet, blue and yellowish argillaceous shale.
No. 28.—Four feet, hard blue limestone.
No. 29.—Two feet, shale.
No. 30.—Six feet, buff and gray limestone.
No. 31.—Twelve feet, bluish gray shale.
No. 32.—Two-thirds foot, coal.
No. 33.—Four feet blue sandy shale.
No. 34.—Missouri river water.

The upper coal measures overlie these middle coal measures to the west, and the lower coal measures underlie them below Lexington.

The clays and shale of the coal measures usually make a poor soil as in England and Pennsylvania, but in Lafayette county, all the coal rocks are so deeply buried beneath the bluff marls, they have very little influence on the soils.

ECONOMICAL GEOLOGY—SOIL.

The usual process of forming soils on the suface of solid rocks, such as the surface of Missouri was before the clays, gravel, sands and soils were placed over the solid rocks, is a very slow process. The action of the winds, the rains, and the frosts would slowly decompose the rocks into sand, clay, and marls. Plants would grow on these clays and marls, and animals would live on the plants; and when the plants and animals died they would make up the necessary organic matter and thus the soil would be formed. But the process would be an extremely slow one. It would take a thousand years to form a foot of soil by this process. And when the solid rock is so near the surface, the soil is of small comparative value.

But if some vast mill of the gods would grind up the rocks to the depth of some fifty or one-hundred feet and then sort out the finest and best material and place it on top to the depth of from five to fifty feet, a first rate soil would be formed in a few years, since all the mineral elements would be provided in vast abundance and in the best possible condition to receive the decaying plants and animals to complete the soil. This is just what has been done for central and northern Missouri.

The great glaciers which swept over the whole of North America from the pole to our latitude ground up the rocks and left the material to the depth of from a few inches to more than a thousand feet. A lake was then formed over Missouri and the adjacent parts of Iowa, Nebraska, and Kansas and the rivers washed the best soil material out of the ground-up rocks spread over the regions to the north and west and into the lakes, where it was deposited as the "bluffs," the best soil material in the world. Thus Missouri has in the Bluff the best soil materials of the rocks in all the States and Territories to the north and west as far as the Rocky Mountains and the Saskatchewan.

PLANT FOOD IN LAFAYETTE SOILS.

It may be well to ask attention to the vast amount of plant food in the soils of Lafayette; but more particularly to the amounts found in the sub soils resting upon and formed out of the rich marls of the bluff.

To show at a glance the amount of plant food in the soil itself, and then in each foot of depth below the soil, I have prepared the following table, which presents an average of all the varieties of soils resting on the bluff, from the richest Hackberry land to the poorest White Oak, and the amount for each foot in depth for the first three feet and also for one foot at he depth of twelve feet below the surface. Other portions between the third and twelfth foot and below are equally rich.

Table showing the amount of various elements of plant food in each foot of the Lafayette soils resting on the Bluff as all the upland soils do.

	1st. foot,	2d. foot.	3d. foot.	12th. foot.
Lime	19.166 lbs.	16,117 lbs.	29.494 lbs.	26.484 lbs.
Magnesia	13.329 "	30.927 "	18.184 "	18.818 "
Potash	13.310 "	32.234 "	17.413 "	40.420 "
Soda	7.157 "	7.405 "	11.343 "	104.544 "
Phosphoric Acid	12.868 "	11.157 "	13.996 "	1.491 "
Organic Matter	269.636 "	253.381 "	142.310 "	46.787 "
Sulphuric Acid	3.180 "	2.990 "	4.051 "	not known.
Chlorine	.405 "	.429 "	.664 "	not known.
Carbonic Acid	not known.	not known.	not known.	44.605 lbs.

This table shows these soils as rich in plant food, save the organic matter at a depth of three feet as they are at the surface, even a little richer in phosphoric acid, soda, potash, chlorine, and sulphuric acid. At twelve feet below the surface the amount of plant food is still greater, except in organic matter and phosphoric acid.

Farmers usually cultivate less than one foot of their soils, and when the plant food is exhausted they use fertilizers, at great expense of money and labor to supply the plant food. But the farmer on these Missouri soils,