gave the existing geological features to this part of the continent, and fitted it for sustaining vegetable and animal life.

Originally all the inorganic matters required for the growth of plants were locked up, so to speak, in solid rock, and it was not until the commencement of the changes that have been described, that the plant began to flourish.

When we take into view the composition and structure of the various geological formations, in connection with the fact that during the upheaval of the rocks the strata are usually upturned so as to present their edges to the surface, we would expect to find many varieties of soil. Not only do those of different districts vary from each other; but in the same farm, even in the same field, we find two or more kinds of soil differing materially from each other. This is strikingly illustrated in those of the metamorphic district, (No. 5.)

The rocks of this region generally dip from 40° to 60°, and consist (as was stated in Chap. III.,) of gneiss, mica, slate and hornblende slate, with the intrusive rocks before described. In some localties there are considerable areas of gneiss, producing a soil of medium quality, when the proportion of quartz is small; but a dry sandy soil where the latter largely predominates. But when, as is the fact in numerous localities, there are intercalations of hornblende slate of greater or less thickness, we have a much better soil. The reason of this is that the gneiss furnishes little else required by the plants besides silica, potash and soda, whilst the hornblende slate adds to these lime and magnesia and even phosphoric acid. It also disintegrates more readily than gneiss.

In the northwestern portions of this range, where the mica slates prevail with intercalations of hornblende, we find differences in the soils from causes nearly similar.

Many illustrations might be given among the different formations in all the upland counties, but it will be better to withhold them until final and minute surveys can be made.

Examples may, however, be referred to within the cretaceous, (No. 21,) as well as in the tertiary and post tertiary.

Some of the lower cretaceous clays are so fine and stiff that water can scarcely pass through them, and they also resist the entrance of air; they become a stiff mud when wet, and crack open when dry. When the bed is thin, with a light sub-soil, they can be drained and made productive, but this is impracticable upon a thick bed of clay except at great expense.

In the same field we find sometimes an outcrop of a bed of this kind adjacent to one of sand, and where the two become somewhat mixed; the soil is more manageable and capable of being made highly productive. Parts of this formation consist of sandy clays with a good clay sub-soil produced by the