

washed out by a large mass of water rapidly passing through it. Indeed, on all this variety of soils we must recommend deep plowing, and on the stiff heavy parts of it, the turning in of green clover crops. *With regard to the nutrient manures necessary to meet its deficiencies, I can best advise that phosphate of lime, whether in the form of Phosphatic guanos, bone dust, or superphosphate of lime, be but sparingly applied, and that only on soils that have been a long time in cultivation and not well manured.* Where these soils are deep and have been well improved, the use of stable manure preserved as I have directed, with the addition of one hundred pounds of good Peruvian guano to the wheat crop, will supply an abundance of phosphoric acid to soils that have been well improved with a deep soil, that is, 'one where the shales do not come near to the surface,' for a full rotation. On these shallow soils phosphoric acid in some form is necessary, because they do not contain it in sufficient abundance to meet the wants of a large crop. This defect can be readily explained. The phosphate of lime, whose valuable constituent is phosphoric acid, is liable to continual depreciation in soils from two causes: first, removal by crops; secondly, its removal by the rain water, which dissolves and carries it off; its supply is afforded by two ways, first, its direct supply by means of manures containing this substance, and secondly, its deposition in the soil in being brought up from the subsoil during droughts, the beneficial influences of which I have explained in my former Reports. On soils which have but little depth, and whose subsoil is impermeable to water, no supply of phosphoric acid or any other mineral substance can be received by the agency of the latter cause; they are therefore liable to continual loss of this substance by reason of the two foregoing causes, and are deprived of any supply by drought; they, therefore, other things being equal, will soonest become deprived of their soluble saline ingredients, and soonest of those which exist in the least quantity, therefore only on shallow soils and hill sides should substances containing phosphate of lime be applied.

On these soils sulphuric acid and chlorine are deficient, and are to be supplied by plaster of Paris and common salt, according to directions before given.

Adjoining these soils and separated from them by an almost imperceptible gradation, for they run into each other so imperceptibly that we can hardly tell exactly where the one ends, and the other begins, is a class of soils known as

*Slate Soils.*—These are a continuation of those found in Frederick County, and differ materially from the red land described above. The slates from which the soils overlying them are formed, are either mica slate, talc slate, chlorite slate, and blue or roofing slate, the composition of all of these is in an agricultural point of view, so nearly allied as to render any separate description of them unnecessary; besides this they are so intimately mixed, that it would require almost innumerable, certainly, with the means at my disposal, an impossible number of analyses to determine the special composition of each.

The land drained by the water of Little Pipe Creek and its tributary branches, are composed mainly from the disintegrated particles of these rocks or slates; they have by various influences become thoroughly decomposed, have been well manured, and well cultivated, and are equal in production to the average of the best in our State. These lands are formed from the same rocks, and have the same composition in every particular, with all the lands in this section of the State underlain by the slates which I have above spoken of, why should some of these be barren and some so productive? why should the soils of the same formation on Parr's Ridge, running through the County to Manchester, and the Pennsylvania line, be generally unproductive? We must look to their mechanical texture for an explanation of their different degrees of fertility. Most of the soil in this part of the county, as it has been formed, has been washed off, and there has not been enough of it left to meet the wants of plants, in retaining a sufficiency of moisture for their support, or a sufficiency of nutrient materials to develop their growth or structure.