wheat crop on these light soils. At the foot of the South Mountain there are soils somewhat peculiar and differing from those last described. They have less of iron, being lighter in color than the generality of the soils of this section, and are compact, cold, heavy and wet. The first step in the improvement of these should be under drains. The mode in which these act in improving land, is by relieving it of its superabundant water, thereby making the soil more permeable to the air, and allowing the changes to go on it such as I have heretofore spoken of necessary to vegetation. On these soils, air-slacked lime is preferable to the water-slacked lime, as they already are very thoroughly decomposed, and require no more disintegration than can be effected by the decay of the vegetable matter (humus) in the soil. Air-slacked lime in this case makes the soil much more loamy, and improves its texture far more than water-slacked or quick lime.

The very reason that these latter soils should be treated with air-slacked lime is, as I have said, because their constituents have already become very much disintegrated. On the other soils this is not the case, they therefore, require such lime as will more powerfully decompose them; as this is water-slacked lime, it should be applied *always* to the land when it is first broken up by the plow, then harrowed in; by this means it becomes more thoroughly incorporated with the soil and performs the uses for which it was intended much more thoroughly than if not so mixed. As to the best mode of applying the various other manures necessary to these soils, I refer to the directions for their use under their appropriate heads and to my former reports on this subject.

The deficiencies as to nutrient substances will now be mentioned. First, phosphate of lime or bone-earth—this does not exist in *large* quantities in any of the soils of this valley, but still in quantities sufficient to produce good crops. Admitting even that these soils at one time contained the same quantity, yet it must be apparent that they could not at present contain it alike; those soils which have been freely cultivated and badly manured will have it in smaller proportions than those which have been more kindly treated. And even if they all have the same quantity of stable or barn-yard manure applied to them, yet the supply of phosphate of lime or bone-earth will vary in the same proportions as the manure is well or badly taken care of. In the way in which unfortunately this manure is preserved or rather not preserved, a large part of its phosphate of lime is lost by being carried off in the water which runs from the stable and barn-yards; this water is always highly charged with carbonic acid, produced by the decomposition of the vegetable matter in it, and when so charged, it readily dissolves phosphate of lime, and so our farmers lose by