

frozen than when in the liquid state, is one of the chief mechanical causes in destroying the cohesion of rocks and stones. It is a well known fact that this increase of the bulk of water, when frozen, is able to overcome *any resistance, however great*, which may oppose it. Compared to it, gunpowder and steam sink into insignificance. In autumn, during rains, we find mountainous countries very moist; caverns and fissures, which exist in rocks are then filled with water, which gradually leaks through the smaller clefts, percolates through the pores, until finally, it pervades every part of the rock. With the first freeze the inclosed water is converted into ice, expands and bursts the rocks which oppose the expansion, which thus become converted into small fragments. In spring, when a thaw takes place, the rivers and streams which flow from the mountains are filled with water holding earthy particles in suspension, (the fragments of rocks broken by previous frosts,) which are borne down by the rivers to the various districts watered by them.

The mountain rivulets, nearly dried up in summer, become strong, and by their fall, rapid torrents in winter; forming thus a brisk and rapid communication between mountains and valleys. In a level country, rivers find a comparatively spacious bed; and when over-flowing their banks, deposit the material which they hold in suspension,—thus forming, according to the nature of the rocks through which their branches flow, a more or less rich soil.

The soil, the present subject of our consideration, is to be examined in a manner which, of course, must differ from the methods commonly applied to minerals, &c., as well in regard to a separation of the substantial from the unsubstantial, by which, most especially, time will be saved, as it must at the same time include an investigation into the nature of its composition in general and of the components in particular. On the condition and form in which those substances exist in the soil, depends entirely the mode of their participation in the development of plants, whether they partake directly or indirectly, as active, as reserved, or as passive components. An analysis which does not offer a full sight, into all these conditions, is nothing but a worthless work, from which neither practical nor theoretical conclusions can be drawn; and it is certainly not too much said when I pronounce the existence of the many analyses of soils, which are distributed through books or daily manufactured by Chemists, and which show every thing but that which is essential for the farmer to know, to be the reason of the discredit into which chemical agriculture is sunk in the minds of so many rational husbandmen. For it is important, besides the performance of a chemical analysis of soil, to take notice of its locality, physical properties, former improvements, and the condition in which the soil-constituents exist in it. It may be said that