

the degradation of which they were formed, or as aqueous formations of different periods and ages, appearing in distant regions throughout the surface of our globe, to which they were conveyed by rivers and streams or by mighty floods, as they occurred in former ages.

The soil (the upper portion of these masses) consists, according to the above, of *Quartz-Sand*; of smaller or larger *fragments of rocks* which still remain undecomposed; and of *Clay*, impregnated with Silicates of Potash and Soda, Lime, Magnesia, Oxyds of Iron, &c. A fertile soil, however, requires besides these ingredients, comparatively small quantities of some other substances, viz: such as contain Phosphoric Acid, Sulphuric Acid and Chlorine, the origin of each of which is also easily explained. For Phosphoric Acid is the constituent of Apatite, (Phosphate of Lime)—a mineral which, though in small quantities, is diffused through almost all rocks of all ages, and consequently carried along with the products of their degradation. Sulphuric Acid originates from Sulphurets, combinations of metals with sulphur, which also are more generally diffused through rocks, and which under the influence of the atmospheric Oxygen, are converted into the sulphates of the corresponding metals as already explained. Chlorine in its combination with Soda, (common Salt,) we meet in abundance in sea-water; in the waters of fountains and also in small quantities in rain-water.

Another substance which is never absent in cultivated soils, is *Humus*. It has already been mentioned, that after death, the constituents of organic bodies (the organs) become exposed to the destroying influences of the atmosphere, which finally converts them into Water, Carbonic Acid and Ammonia. In the meantime, between death and total conversion into these three constituents of the atmosphere, the remaining organic parts run through many phases of decomposition, and in this period form the so called *Humus*; a substance which, therefore, in every moment changes its composition. With every new crop we take from our soils, we also supply them with new quantities of *Humus*, which originates from those parts of the plants that remain upon the soil. For this reason, a soil cannot become poorer in *Humus* though its quantity is constantly diminished by decomposition.

THE CONSTITUENTS OF PLANTS, AND THE FORMS IN WHICH THEY ARE ASSIMILATED.

A plant, or any part of it, when heated to a proper degree of heat in the open air, burns, and produces volatile substances, which in gaseous form are diffused through the atmosphere, whilst only a comparatively small part of the original plant remains as an incombustible, earthy substance, called the ash.