

also thoroughly penetrates the soil itself, in the very body of which it is produced, becomes there dissolved in water, and in this form most fit to enter the rootlets of plants and to provide thus a nutriment which plants, in their first period of life, cannot appropriate to themselves otherwise, being without leaves at that time.

A regular supply of carbonic acid for the whole term of the growth of the plant can therefore be secured only by the co-operation of humus, or what is the same, by a proper mechanical texture of the soil, and experience teaches us, in accordance with this, that the beneficial influence of the humus on the production of crops is so great that two soils of equal capacity will, *mutatis mutandis*, yield average crops in proportion to the quantity of humus they contain.

*Ammonia*, finally, is the substance from which the plant derives all its nitrogen, or about one per cent. of its whole weight. It is, like carbonic acid, a product of the decomposition of organic matter, and therefore most intimately connected with the occurrence of humus. Far the greatest mass of the organic part of plants consists of carbon and the elements of water, (hydrogen and oxygen,) and becomes converted into humus as soon as the vital powers have ceased to exist in it. But there is a series of other organic compounds present in the plant, which, besides the above named elements, contain nitrogen as a constituent part; and as these compounds form the real nutritious matter of the vegetable food by being converted into blood, and subsequently applied to the production of the organs of the animal, they must necessarily accumulate in the animal body and re-appear in a more concentrated form in the carcass or the excrements of animals than they occurred in the body of the plant where they originated. These compounds, whether still existing in the plant or already transformed into constituents of the animal body, when they undergo a process of decomposition, produce humus and, besides, evolve ammonia in proportion to the quantity of nitrogen they contain. The ammonia becomes partly disengaged and is then diffused in the atmosphere, and is partly retained by, and incorporated with, the humus which is simultaneously formed with it.

The atmosphere which is thus constantly supplied with ammonia from organic bodies wherever existing in a state of decay, contains this substance in a considerable quantity, and, to judge from the result of analytical examinations of the atmosphere, sufficiently even to meet the wants of all the growing crops on earth. Practical experiments have also proven, in accordance with this fact, that plants can be raised and brought to perfect development without the aid of any other source furnishing ammonia but the atmosphere; and if the experience of practical farmers advises us