its composition serves, in some form or other, to nourish their tissues, is considered by many as so firmly established that any new argument in its favour has been deemed unnecessary; the obvious difference in the growth of plants according to the known abundance or scarcity of *humus* in the soil, seemed to afford incontestible proof of its correctness. Yet this position, when submitted to a strict examination, is found to be untenable, and it becomes evident from most conclusive proofs, that *humus*, in the form in which it exists in the soil, does not yield the smallest nourishment to plants.

"The facts which we have stated in the preceding pages prove that the Carbon of plants must be derived exclusively from the atmosphere."—*Leibig's Agricultural Chemistry.*

Notwithstanding all these "facts" adduced, we still believe that the plants which we cultivate derive most of their nutriment from the mould or *humus*. We know that houseleek, and some kinds of Cactus, (Prickly Pear,) and also many Lichens, draw most of their food from air and water, and we are convinced that every plant which we cultivate derives a part (but we think the smaller part) of its nutriment from the same sources. We have often seen new land which had a proportion of mould, cultivated without manure, the mould and the fertility of the soil constantly decreasing, till at the end of ten years no mould could be seen, and the land was no longer worth cultivating. Of this *humus* or mould it should be observed there are endless variations, from the peat and coarse turf produced by the decay of the productions of the most barren soils, to the fine soapy mould formed from the plants which grow on the richest. When the farmer finds a very thick layer of this last on his new land, he expects that it will produce large crops for a long time, nor is he ever disappointed in his expectations.

Among the "facts" addeced, we find some very problematical assertions. "Let us now enquire whence the grass in the meadow, or the wood in the forest, receives its Carbon, since there is no manure—no Carbon has been given it for nourishment? and how it happens, that the soil thus exhausted, instead of becoming poorer, becomes every year richer in this element? A certain quantity of Carbon is taken every year from the forest or meadow in the form of wood or hay, and in spite of this, the quantity of Carbon in the soil augments; it become richer in humus."—*Leibig.* The Chemist is here in error,—his "facts" are not as he has stated; a natural meadow which has never been mowed or grazed, but on which all the grass falls and decays, holds its own, and in some cases improves, but when it is mowed and the hay removed from it, it has, in every instance that we have seen, grown poorer, except it was annually flowed by water, which brought a considerable portion of alluvial soil upon it. Mowing soon destroys the blue joint grass, which is replaced by a much inferior sedge, and on many meadows, constant mowing reduces the sedge so much that it is found best to allow the grass to rot on the ground every alternate year. The soil also in the old forest, which has never been disturbed by the axe, is found to be more fertile than on tracts where part of the wood has been carried away for a considerable number of years. "It is not denied that manure exercises an influence upon the developement of plants; but it may be affirmed with positive certainty, that it neither serves for the production of Carbon, nor has any influence upon it, because we find that the quantity of Carbon produced by manured lands is not greater than that yielded by lands that are not manured."—*Leibig.* Every farmer knows that manure will greatly increase a crop of hay, and consequently the quantity of Carbon. '2755 lbs of hay contain 1111 lb of Carbon.'

"It is universally admitted that humus arises from the decay of plants. No primitive humus, therefore, can have existed—for plants must have preceded the humus.—*Leibig.*

Where is the proof? Is it more difficult to create humus than plants?

"Large forests are often found growing in the soils absolutely destitute of carbonaceous matter."

We have spent years in "forests," but have always found the poor soils covered with turf, and the rich with fine mould. In seeming contradiction to these assertions, Leibig states that when plants first begin to grow, they are nourished by carbonic acid gas formed from the union of a portion of the mould with the oxygen of the air. After the leaves are grown, he thinks that plants take all their food from the atmosphere. Agricultural Chemistry is a new science, and the most that has been published upon it, has been written by men who had very little knowledge of practical farming. It is not strange, that in this stage of the science, opinions should be advanced that will be hereafter abandoned as more knowledge is acquired. We would wish that Dr. Bond, or some other person would ascertain by experiment, whether Carbonated Ammonia can be decomposed by Gypsum at a common temperature. Leibig says that it is slowly effected, but he repeats it with such confidence, that he ought to have more than conjecture for it. Any cheap material to mix with heaps of manure that would prevent the escape of Ammonia would be useful.

For the Colonial Farmer.

ELEMENTS OF AGRICULTURAL CHEMISTRY AND GEOLOGY.

[Continued from No. 10]

THE STRUCTURE OF PLANTS AND ITS USES.

The substances which we have viewed as constituting the food of plants, when taken into the system of a vegetable, have entered into a Chemical and vital laboratory, where they are destined to undergo a series of changes, ending in their assuming forms and properties very different from those which originally belonged to them. It is therefore necessary that we should consider the organs of plants; the vessels or utensils as it were, which nature employs in converting the unorganized matter of the soil and air, into food for men and animals.

The *general structure* of all plants is nearly the same. The wood of the hardest tree, as well as the stem of the most delicate herb, is composed of an immense number of very small tubes and cells, whose sides consist of woody matter, enclosing cavities suited for containing or transmitting sap or other fluids. These cells and tubes assume many different forms, varying from those of nearly round bags or bladders, to those of long pipes, sometimes extending through the whole length of a plant. They also differ very much in dimensions, direction, and mode of management; and it is to these differences that we must ascribe the various degrees of coarseness and fineness, toughness and brittleness, hardness and softness, which we observe in the wood of different trees, as well as the various kinds of texture which appear in the organs of every individual plant. To examine these varieties of structure, and the purposes which they serve, is a pursuit full of interest and instruction; for the present, however, we must content ourselves with a very general outline of the subject, taking for our example the structure of trees, which are the largest and most perfect specimens of vegetation.

The trunk and branches of a tree, may be viewed as consisting of three parts—Bark, Wood, and Pith. The *Bark* consists of