most barren, and soon die in richer spots. But the knowledge of the Botanist although it is an accurate guide to a certain degree, in directing his judgment to the value of uncultivated soils, and is valuable in preventing him from making bad speculations by introducing new objects of culture into a place which cannot admit of them; yet it is of little avail to examining soils under the immediate influence of cultivation. The experienced eye of the farmer supplies much of this defect. On too loose and poor soils the roots of barley and other grains are long, but the stems small and weak; but in a richer and more tenacious soil the roots are short, thick, and very closely set with fibrils. The reason of these circumstances is, that the root shooting out towards the spots where the stimulus of nutriment is in greater quantity, exhausts the little nourishment it can obtain in adding to its length, and, therefore, an insufficient supply is left for the stem and leaves; but in richer soils the whole of the fibrils being surrounded by nutritious matter, a greater quantity is actually taken up by much smaller surface of roots, and supplies more freely the herbaceous parts of the plants.

To ascertain the real nature of soils, chemistry must lend its assistance; and this mode of examination is undoubtedly the most certain. Sir H. Davy has, however, justly remarked, "that the results of analysis, considered as affording indications of fertility, must necessarily differ according to the variations of climate, situation, and other circumstances. Thus, the power of soils to absorb moisture ought to be greater in warm and dry countries, than in cold and moist ones; and when the quantity of argillaceous earth they contain is larger. Soils, likewise, which are elevated on declivities, ought to be more absorbent than those in the same climate situated in plains and valleys. The productiveness of soils must likewise be influenced by the nature of the subsoil, or the earthy and stony strata on which they rest. Thus, a sandy soil may sometimes owe its fertility to the power of the subsoil to retain water; and an absorbent clayey soil may occasionally be prevented from being barren, in a moist climate, by the influence of a substratum of sand or gravel." [Here follows the mode of examining soils, which will be given in a future number.]

Every farmer knows the fact, that many plants will grow only in certain soils; and his art consists in supplying to the natural soils that part which is most essentially necessary for their support. As we have proved that the components of all vegetable matter are carbon, hydroen, and oxygen, we must look for the supply of ese ingredients in the soil; and it is from wa- and decayed organic matter that they are doubtedly obtained. From this matter, then carbon is supplied; and as water only, and se substances which it can hold in solution, can be absorbed by the mouths of the roots of plants, the carbon, which is contained in the soil, separated from vegetable and animal matters by decomposition, must be dissolved in the water in order to be taken into the system of the plant; and it thus becomes their proper food.

If this view of the subject, be correct, the art of the husbandman and horticulturist must consist in applying those substances to the soil which will promote the growth of plants without over stimulating them. The different matters known under the titles of manures, which are employed for this purpose, must act in four ways to produce the effect required. 1st They must render the soils of the consistence which will enable them to retain a sufficiency of water; but not too much. 2. They must render it pulverulent to admit the roots of the plants to permeate and spread freely in it. 3. They must enable it to admit and retain air in its interstices; and 4, fit it to form carbon, and afford healthy stimuli to the vegetable irritability. The importance of a finely pulverized soil was first pointed out by Jethro Tull, in 1733; but although his ideas on this subject extended to an absurd degree, and led him to form a theory of vegetation altogether mechanical, yet the direction of the agriculturist to the importance of pulverization has been productive of most beneficial results. It allows of the easy extension of the roots of plants, admits a necessary supply of air during the process of germination, and assists those decompositions which are requisite for rendering manure useful.

The first place among the substances fit to answer the purposes already specified, is certainly due to lime. This substance acts upon soils either mechanically or chemically; and on the plants it acts physiologically. When in the state of carbonate, or united with carbonic acid, it is added to clayed soils, it acts mechanically by rendering them more free, loose, and pervious both to air, moisture, and the roots of plants; it acts chemically when it is deprived of carbonic acid, or is in the caustic state, by destroying worms, and other insects hurtful to young vegetables; and, by quickening the decomposition of their dead bodies, renders them useful to vegetation. In either state it neutralizes acids, and decomposes salt of iron and other injurious saline matters often contained in soils; and by the healthy stimulus it affords when in the state of quicklime, it invigorates vegetation both in young and mature plants. Lime also hastens the decomposition and solution of vegetable matter; and has been long known as a most useful manure when applied where half-decomposed vegetable matter abounds, as for example, in peat soils. The best corrective, therefore, for ground that has been too much dunged, is lime; and peat mosses, which consist of vegetable substances, the decay of which has been suspended by the formation of a peculiar acid in