squares of about ten acres, each according to the fall of the ground—the ditches being kept open, and no wood allowed in the hedges to grow, to constitute a shade to the ground.

ON THE FOOD OF PLANTS.

If the substances of which we speak are only to be regarded as excretions, or as an attempt made by the organs to relieve themselves of useless matter, it becomes necessary to explain how it happens that potash and soda, added to a soil deficient in alkalies, so powerfully assist vegetation. We can only understand the action of these substances, by supposing them capable of supplying an element necessary to the growth of vegetation, and perhaps they also in some way or other assist the chemical changes which are going on in the interior of the plant.

For certain plants it is necessary to admit the value of chalk or lime; and the importance of gypsum to certain of our cultivated plants, is also sufficiently well known to prevent it from being considered a substance to which they are indifferent. If it be also considered that silica, alumina, phosphoric acid, oxalic acid, &c., are not deposited indifferently in all portions of the plant, but in certain special determinate organs; that there is, therefore, on the part of these organs, a certain power of choice—a vital action, which enables them to separate those substances from the sap which they require, to the exclusion of others—it is difficult to assign any other reason for this well known arrangement, except that nature has prepared a special place for each of these substances, and has assigned them certain determined functions in the formation of the vegetable tissues.

These reflections conduct us to the conclusion that a great number of the earthy and alkaline substances, carried by the current of the sap into the circulation, are useful to vegetation, by giving them their full vigour, their proper size, and their diversified properties. We do not yet pretend to be able to assign to each one of these various substances its particular function in accomplishing these important ends. It may, perchance, be shown at some future time, that certain compounds are absorbed and assimilated by plants in the state in which they exist already in the soil, or in the manure. The science of vegetable chemistry is yet far short of perfection, and holds out the most brilliant results to those possessed of industry and skill necessary to investigate this difficult subject.

After having thus settled the first question proposed, another one arises—Do all plants make a similar consumption of the soluble materials present in the soil, or have they the power of selecting those most suitable to their wants? In a word, do the different species of plants require, each a different nutriment?

Plants even when grown in the same soil do not draw up a sap exactly identical. Saussure has proved in the most positive manner that the roots have the power of selection, though his experiments on the unequal absorption of different salts are not quite satisfactory; for instance, sulphate of copper, though soon causing the death of the plant, is absorbed in as large quantities as any of these compounds which are beneficial to vegetation. Saussure explains this anomaly by showing that in the case of the sulphate of copper, the roots were decomposed, and consequently, except at the commencement of the experiment, only acted mechanically. It was well ascertained that the substances present in any solution were absorbed in very different proportions where their substances were not, like the sulphate of copper, positively injurious—for instance, *Bidens* (bur-marygold ?), *Polygonum* (buckwheat?), absorbed the salts in the following proportions:—

	Bidens.		Polygonum.
Chloride potassium	16	...	14 7
Chloride sodium	15	...	13 0
Nitrate of lime	8	...	4 0
Sulphate of soda	10	...	14 4
Muriate of ammonia	17	...	12 0
Acetate of lime	18	...	8·0
Sulphate of copper	48	...	47 0
Gum	32	...	9 0
Sugar	8	...	29 0
Humus (*extrait de terreau*)	6	...	5·0

These experiments were repeated with the greatest care, and it was proved—1st, That plants absorbed all mineral substances when dissolved in water: 2nd, That they were absorbed in very different proportions, according to the plant experimented on; this absorption was also quite irrespective of the fluidity of the solution: and 3rd, That organic matter, when dissolved in water, is not in that shape absorbed by the roots, but decomposed by their influence, and then partially absorbed.

1. Without entering into the minute details of the experiments, the absorption of the following substances was proved—prussiate of potash, chloride of sodium, sulphate of copper, acetate of lead, chloride of barium, ioduret of potassium, and many others. The absorption of nitrate of silver, corrosive sublimate, and gallic acid, did not take place until after the death of that portion of the plant plunged into their solution.

2. When the plants were placed in a solution containing two salts in equal proportion, it was satisfactorily ascertained that they were absorbed in different proportions. Even when the salts were present in different proportions, this elective absorption was not deranged. In a solution containing three times as much common salt as nitre, a plant of *Chenopodium viride* (Goosefoot) absorbed much more nitre than common salt; whilst the contrary took place with *Solanum lycopersicum* (Nightshade). Other plants selected also common salt, and the *Tamarix* choose only sulphate of magnesia.

3. It was also ascertained that, when a plant