

receives those elements which are supplied to it from the atmosphere, and which may be regarded as the essential constituents of its food. Those who have seen a bulbous plant, the hyacinth for example, thriving vigorously in a glass of water, know that the presence of the soil is not a necessary condition of vegetable life; but to all those plants which are the subject of the farmer's care, the presence of the substances contained in it is absolutely indispensable. During the life of a plant, the carbonic acid which is taken into its circulation undergoes decomposition, its oxygen is given off from the leaves, while its carbon remains behind, and becomes a part of its structure: and, by certain processes, we are able to discover that it forms nearly 50 per cent. of all our cultivated plants.* Ammonia and water also undergo decomposition when absorbed by plants—the former yielding to them its nitrogen, the presence of which is necessary to the formation of some of the most valuable ingredients of our crops; and indispensable for the support and nutrition of animals using them as food and the latter supplying them with hydrogen, which is essential to the production of their starch and oil.

If we take some pieces of straw, or a few grains of wheat, and hold them on a piece of metal, a tea-spoon for example, over the flame of a lamp so as to heat them strongly, they will char and burn away, leaving only a small quantity of ashes. That which disappears is usually termed the **ORGANIC** part of the plant, and consists of the four substances, Carbon, Nitrogen, Hydrogen, and Oxygen, which have just been described as the elements supplied to the plant by the atmosphere. The incombustible matter which remains behind, when examined, is found to contain all those substances which the plant had withdrawn from the soil, and is termed the **INORGANIC** part of the plant. Again, if we take a piece of animal matter, such as a bone, and expose it to a strong heat, we find that a part of it also will be consumed, its organic part, and that an incombustible matter will be left containing nearly the same substances as were contained in the inorganic parts of wheat. During the decay and putrefaction of both plants and animals precisely the same thing occurs as we observe when we expose them to heat, their carbon, nitrogen, hydrogen, and oxygen, gradually escape into the atmosphere, from which they were originally derived, and there unite together once more to form the carbonic acid, the water, and the ammonia, which are destined in process of time, to build up the bodies of another generation of man and animals, and to clothe the face of the earth with a new vegetation. The inorganic part of a plant weighs considerably less than the organic, as is found upon repeating the simple experiment described above, with a portion of any vegetable substance. Burn, for example, 100 lbs. of potatoes, and we will not procure more than about four pounds of ash; yet this small portion of ash is as essential to the full growth of the potato as the 96 lbs. which we burn away.

* 100 parts of the following substances, when all their moisture has been expelled by drying, contain—

	CARBON.	HYDROGEN.	OXYGEN.	NITROGEN.
Wheat (the grain) ...	46.1	5.8	43.4	2.3
Oats do. ...	50.7	6.4	36.7	2.2
Potatoes.....	44.0	5.8	44.7	1.5

The quantity of dry material contained in 100 parts of those substances is, in Wheat, 85.5; Oats, 79.2; Potatoes, 24.1.