combine with, the oxygen of the air, or undergo a higher degree of oxidation. Oxygen is absorbed without uniting with carbon; and carbonic acid is disengaged, the carbon and oxygen of which must be derived from matters previously existing in the blood*.

Transformations of existing compounds are constantly taking place during the whole life of a plant, in consequence of which, and as the results of these transformations, there are produced gaseous matters which are excreted by the leaves and blossoms, solid excrements deposited in the bark, and fluid soluble substances which are eliminated by the roots. Such secretions are most abundant immediately before the formation and during the continuance of the blossoms; they diminish after the development of the fruit. Substances containing a large proportion of carbon are excreted by the roots and absorbed by the soil. Through the expulsion of these matters unfitted for nutrition, the soil receives again with usury the carbon which it had at first yielded to the young plants as food, in the form of carbonic acid.

The soluble matter thus acquired by the soil is still capable of decay and putrefaction, and by undergoing these processes furnishes renewed sources of nutrition to another generation of plants; it becomes *humus*. The cultivated soil is thus placed in a situation exactly analogous to that of forests and meadows; for the leaves of trees which fall in the forest in autumn, and the old roots of grass in the meadow, are likewise converted into humus by the same influence: a soil receives more carbon in this form than its decaying humus had lost as carbonic acid.

Plants do not exhaust the carbon of a soil in the normal condition of their growth; on the contrary, they add to its quantity. But if it is true that plants give back more carbon to a soil than they take from it, it is evident that their growth must depend upon the reception of nourishment from the atmosphere in the form of carbonic acid. The influence of humus upon vegetation is explained by the foregoing facts in the most clear and satisfactory manner.

Humus does not nourish plants by being taken up and assimilated in its unaltered state, but by presenting a slow and lasting source of carbonic acid, which is absorbed by the roots, and is the principal nutriment of young plants at a time when, being destitute of leaves, they are unable to extract food from the atmosphere.

In former periods of the earth's history, its surface was covered with plants, the remains of which are still found in the coal formations. These plants—the gigantic monocotyledons, ferns, palms, and reeds—belong to a class to which nature has given the power, by means of an immense extension of their leaves, to dispense with nourishment from the soil. They resemble in this respect the plants which we raise from bulbs and tubers, and which live while young upon the substances contained in their seed, and require no food from the soil when their exterior organs of nutrition are formed. This class of plants is even at present ranked amongst those which do not exhaust the soil.

The necessity of the existence of plants such as these at the commencement of vegetation, must now be apparent. Humus is a product of the decay of vegetable matter, and therefore could not have existed to supply the first plants with the food necessary for the development of the more delicate kinds. Hence the plants capable of flourishing under such circumstances could only be those which receive their nourishment from the air alone. By their decay, however, the soil in which they grew became supplied with vegetable matter, and the progress of vegetation must have furnished to the earth materials adapted for the development of those plants, which depend upon nutriment contained in the soil, until those organs are formed which are destined for the assumption of nourishment from the atmosphere.

The plants of every former period are distinguished from those of the present by the inconsiderable development of their roots. Fruit, leaves, seeds, nearly every part of the plants of a former world, except the roots, are found in the brown coal formation. The vascular bundles, and the perishable cellular tissu, of which their roots consisted, have been the first to suffer decomposition. But when we examine oaks and other trees, which in consequence of revolutions of the same kind occurring in latter ages have undergone the same changes, we never find their roots absent.

The verdant plants of warm climates are very often such as obtain from the soil only a point of attachment, and are not dependant on it for their growth. How extremely small are the roots of the *Cactus. Sedum*, and *Sempervivum*, in proportion to their mass, and to the surface of the leaves! Large forests are often found growing in soils absolutely destitute of carbonaceous matter; and the extensive prairies of the Western Continent show that the carbon necessary for the sustenance of a plant may be entirely extracted from the atmosphere. Again, in the most dry and barren sand, where it is impossible for the nourishment to be obtained through the roots, we see the milky-juiced plants attain complete perfection. The moisture necessary for the nutrition of these plants is derived from the atmosphere, and when assimilated is secured from evaporation by the nature of the juice itself. Caoutchouc and wax, which are formed in these plants, surround the water, as in oily emulsions, with an impenetrable envelope by which the fluid is retained, in the same manner as milk is prevented from evaporating by the skin which forms upon it. These plants, therefore, become turgid with their juices.

Plants thrive in powdered charcoal, and may be brought to blossom and bear fruit if exposed to the influence of the rain and the atmosphere; the charcoal may be previously heated to redness. Charcoal is the most "indifferent" and most unchangeable substance known; it may be kept for centuries without change, and is therefore not subject to decomposition. The only substance which it can yield to plants are some salts, which it contains, amongst which is silicate of potash. It is known, however, to possess the power of condensing gases within its pores, and particularly carbonic acid. And it is by virtue of this power that the roots of plants are supplied in charcoal, exactly as in humus, with an atmosphere of carbonic acid and air, which is renewed as quickly as it is abstracted.

In charcoal powder, which had been used for this purpose by Lukas for several years, Buchner found a brown substance soluble in alkalies. This substance was evidently due to the secretions from the roots of the plants which grew in it.

A plant placed in a closed vessel in which the air, and therefore the carbonic acid, cannot be renewed, dies exactly as it would do in the vacuum of an air-pump, or in an atmosphere of nitrogen or carbonic acid, even though its roots be fixed in the richest mould.

Plants do not, however, attain maturity, under ordinary circumstances, in charcoal powder, when they are moistened with pure distilled water instead of rain or river water. Rain water must, therefore, contain within it one of the essentials of vegetable life; and it will be shown, that this is the presence of a compound containing nitrogen, the exclusion of which entirely deprives humus and charcoal of their influence upon vegetation.

* The examination of the air expired by consumptive persons, as well as of their blood, would doubtless throw much light on the nature of phthisis pulmonaris. Considered in a chemical point of view, the decomposition of the blood, as it takes place in the lungs, is a true process of putrefaction. (See Part II.) The lungs are also the seat of the transformation of the various substances contained in the blood. It certainly well merits consideration, that the most approved remedies for counteracting or stopping the progress of this frightful malady are precisely those which are found most efficacious in retarding putrefaction. Thus, it is well known that much relief is afforded by a residence in works in which empyreumatic oils are manufactured by dry distillation, such as manufactories for the preparation of gas or sal-ammoniac. For the same reason, the respiration of wood vinegar (pyroligneous acid), of chlorine, and certain of the acids, has been recognised as a means of alleviating the disease.

NEWS.

The Queen has given birth to another Prince.

THE TAHITI TROUBLE.—The oppression of the French at Tahiti, bids fair to be a serious and troublesome matter. There is a strong majority in France who violently oppose any concessions to the English, and a strong party in England, embracing nearly the whole kingdom, who are determined that reparation shall be done. England has been insulted in the person of her official, and a policy has been adopted by France, which it will not do to suffer. Guizot, the French Minister, is reported to have said, that to accede to what England demands would cost him his head, and Louis Philippe his throne. What will be the result, we anxiously wait to know. Mr. Pritchard, the much abused missionary and consul, has escaped the French at Tahiti, and arrived in England. His unexpected appearance created a great sensation. The poor Queen is left to contend with the usurpers alone. At the last accounts, the natives were so exasperated at their treatment, as to have resolved on taking vengence.—*New York Evangelist.*

ANTI-SLAVERY.—The tenth anniversary of the Glasgow Emancipation Society was recently held, and numerously attended. George Thompson, Dr. Burns, and Elizur Wright, are mentioned among the speakers. Dr. Burns took rather a sombre view of the anti-slavery cause in this country, which, if he knew us better, he would be apt to modify. He said "he could not agree with that part which congratulated the Society on the flourishing progress of