

## FOOD OF PLANTS.

"It is in vain for chemistry to discover or suggest, unless her discoveries and suggestions be adequately made known to those whose benefits they are most likely to promote."

In my last, I endeavoured to explain the source and application of carbon. I will now add a few words on the other three organic elements of vegetables.

Oxygen, although by itself it is a slight, inodorous, invisible gas; yet, when in combination with other gases, it is a chief ingredient in all animal and vegetable substances, and forms a full half of all that lives. When united in the proportion of eight atoms of oxygen, with one of hydrogen, it forms water. It also enters largely into the composition of the air we breathe, for the atmosphere is a compound body, viz: twenty three atoms of oxygen, and seventy seven atoms of nitrogen, with about one two-thousandth part of carbonic acid gas, all those gases rendered aerial by the expansive influence of heat. There are also constantly floating in the air, but forming no constituent thereof, variable quantities of ammonia and watry vapour. The oxygen gas in the atmosphere is the principle of combustion, and the vehicle of heat, and is absolutely necessary for the support of animal life; it accelerates the circulation of all the animal fluids, and is the most energetic and powerful agent that we are acquainted with, it is also as necessary to the growth and vigour of plants as to that of animals.

"LEAVES, LUNGS, and GILLS the vital ether breathe  
On earth's green surface, on the waves beneath."

All vegetables have the power of decomposing water, they combine part of its hydrogen, as well as of its oxygen, with the carbon of the atmosphere to form the vegetable compounds, oil, wax, gum, resin, sugar, &c. Oxygen is the basis of vital air, and the chief support of heat and life, and performs an important part in most of the changes which take place in the mineral, vegetable, and animal kingdoms.

Nitrogen also is an invisible gas, it is incapable of supporting flame or animal life, and has the effect of neutralizing the properties of oxygen gas, rendering it fit for respiration and combustion, and the compound possesses properties different from either of them separately, so as to be fitted for every purpose for which it was designed. Nitrogen is lighter than atmospheric air, and is copiously thrown off from the lungs and skin of man and other animals, the interval which there is between every inspiration, seems to have been designed, to allow time for the nitrogen gas, which is thrown off from the lungs to mount in the air, in order that a fresh portion of air may be taken in, so that the same air be not repeatedly breathed. The upper surface of the leaves of trees and other vegetables give out during the day a large portion of oxygen gas, which, uniting with the nitrogen gas thrown off by animal respiration, keeps up the equilibrium, and preserves the salubrity of the atmosphere. Nitrogen forms part of all animal substances. It is also the base of ammonia, and the nitric acid, hence we understand its value as a fertilizer, for it is favorable to plants, as they grow and vegetate freely in this gas. It seems to be the substance which nature employs in converting vegetable into animal substances, and to be the grand agent in animalization.

One hundred volumes of water absorb about four volumes of nitrogen gas, and bear it in solution to the roots, by which it may be conveyed directly into the circulation of plants. "When nitrogen in

any of its compounds is applied to young grass or sprouting shoots of corn, it hastens and increases their growth, it occasions a larger produce of grain, and this grain is richer in gluten and more nutritious in its quality."—Schubler, Agr.culture, Chemie, p. 170.

Hydrogen is also only known to us in the state of gas, although by recent experiments there may be reason to suspect that hydrogen gas is a metal in the æriform state. All kind of vegetables, when assisted by the rays of the sun, have the power of decomposing water; during which decomposition the hydrogen is absorbed, and goes to the formation of oil, resin, wax, &c., in the vegetable, while the oxygen combines with part of the caloric received from the sun, and is given out in the form of oxygen gas; so that in *this one operation*, nature gives nourishment, and provides materials of growth to the vegetable world, and at the same time renovates that vital principle in the atmosphere, which is necessary for the support of the animal creation. Surely nothing short of consummate wisdom could have conceived any thing half so beautiful in design, or so extensively and superlatively useful in effect. Water as it falls in rain through the air, or trickles along the surface of the land, absorbs the gases, and carries them with it wherever it goes, conveys them to the roots, and into the circulation of plants, making them all minister to the growth and nourishment of living vegetables, yielding now oxygen to one, and now hydrogen to another, as the production of the several compounds which each organ is destined to elaborate.

It is almost more than wonderful, that a substance which we know only in the state of thin air, should, by some incomprehensible mechanism, be bound up and imprisoned in such vast stores in the solid mountains of the globe, be destined to pervade and refresh all nature in the form of water, and be seen to beautify and adorn the earth, in the solid parts of animals and plants. But all nature is full of similar wonders, and every step we advance in the study of the principles of the arts of husbandry, we must mark the united skill and bounty of the same great contriver of all worlds. And as some excuse for my being so tediously particular about the four foregoing gases, is the fact that they are the raw material, the elementary substances of all animal and vegetable production in nature. To the agriculturist, therefore, an acquaintance with these four constituent parts of all that lives and grows on the face of the globe, is indispensable, for out of those four elements all the products of vegetable growth are elaborated.

There is another gas, a compound of two of the former. I allude to ammonia, which is vastly too important to be overlooked. Ammonia is composed of a mixture of three atoms of hydrogen, with one atom of nitrogen, its chemical character being (N. 1 H. 3.) The influence of ammonia on vegetation, is of a very powerful kind, it seems not only to promote the rapidity and luxuriance of vegetation, but to exercise a powerful control over the functions of vegetable life. All the salts of ammonia are very soluble in water; the ammonia, which rises into the air in the form of gas, combines with the carbonic acid, and is readily again washed down by rain and dews, and those salts of ammonia contained in, or added to the soil, are dissolved by the water which percolates through it, and are thus in condition to be taken up and appropriated by the roots of plants to the growth and perfection of the whole vegetable. Yours, &c.,  
ADDERBURG.