

parts of vegetables, in order to afford them the requisite supply of materials to complete their structure, be very great indeed. In order to ascertain approximately the amount of water absorbed by the roots and exhaled by the leaves of any species of vegetable, in a given time, he may enclose a leaf while yet attached to the tree, in a dry phial, the weight of which he has previously ascertained. After cutting off the communication between the interior of the phial and the surrounding atmosphere, by means of a cork so placed as not to compress the stem of the leaf, and luted with some fatty substance, he will soon observe the interior of the phial to become dim with moisture, and the water which is given off by the pores of the leaves will trickle down the sides of the vessel and remain at the bottom. If he now carefully weigh the phial, and observe the difference between the weight so obtained and before the introduction of the leaf, he will arrive approximately at the amount of water exhaled, from which data a calculation can be made of the quantity given off by the whole vegetable, thus exhibiting that millions of pounds weight of water are exhaled by the leaves on the trees covering an acre of wooded land, during the course of a summer; the chief object of which extraordinary supply is to convey a sufficient amount of metallic and other substances into the interior of plants, to assist in building up their structure.

Among the multitude of silent yet most interesting operations performed by vegetables, in the exercise of the various functions of their parts, there are none more indicative of design on the part of their great Originator and Sustainer, than their wonderful adaptation to the wants and necessities of other organized beings, holding a higher rank in the scale of creation. A simple experiment informs the student that vegetables under the influence of the sun's rays, absorb carbonic acid from the atmosphere, decompose it in the interior of the leaf, assimilate the carbon and give off the oxygen. Let a leaf be placed under an inverted glass filled with water, and exposed to the direct rays of the sun, small globules of gaseous matter will be observed to form on the surface of the leaf, and detaching themselves one by one as they increase in size, they will rise and collect in the upper portion of the vessel. If use is made of a large glass containing several leaves, and a grain of chalk, together with a drop of vinegar, be placed in the water, the operation will proceed with much rapidity, and a sufficient amount of gas be collected to allow of its being transferred to a phial and then tested, by plunging into the phial the glowing wick of a recently burning taper—the taper will be relighted and consume away rapidly, emitting a brilliant and vivid flame. The gas in the phial consists of pure oxygen, given off by the leaves after the decomposition of carbonic acid absorbed by them.

The student will however remember, that a portion of the air we inhale is converted by the respiratory process into carbonic acid—the oxygen of the atmospheric air uniting with the carbon of the blood). Were no means provided for consuming the enormous quantity of carbonic acid generated annually by the respiration of animals, combustion, and the decomposition of vegetable matter, the atmosphere would, in the course of time, become unfit for the support of animal life. Vegetables, however, are so organized, that the very substance which, if it were much increased in quantity, would prove hurtful to animals, and is, notwithstanding, a necessary consequence of the healthy performance of the various functions of their parts, constitutes the food of plants;