

large quantity of water, after undergoing in the leaves, as in a chemical laboratory, the double processes of exhalation and aeration, has become much more highly charged with nutriment; and that nutriment has been reduced to those particular forms and states of composition which render it applicable to the growth of the organs; and the other purposes of vegetable life. This fluid, therefore, corresponds to the blood of animals, which, like the elaborated sap, may be regarded as fluid nutriment, perfectly assimilated to that particular kind of organization, with which it is to be afterwards incorporated. From the circumstance of its being sent back from the leaves for distribution to the several organs where its presence is required, it has received the name of the *returning sap*, that it might be distinguished from the crude fluid which arrives at the leaves, and which is termed the *ascending sap*.

The returning sap still contains a considerable quantity of water, in its simple liquid form; which was necessary in order that it might still be the vehicle of various nutritive materials that are dissolved in it. It appears, however, that a large proportion of the water, which was not exhaled by the leaves, has been actually decomposed, and that its separated elements, the oxygen and the hydrogen, have been combined with certain proportions of carbon, hydrogen, nitrogen and various earths, metals and salts, so as to form the proximate vegetable products, which are found in the returning sap.

The simplest, and generally the most abundant of these products, is that which is called *Gum*.* From the universal presence of this substance in the vegetable juices, and more

* According to the investigations of Dr. Prout, 1000 grains of gum are composed of 586 grains of the elements of water, that is, of oxygen and hydrogen, in the exact proportions in which they would have united to form 586 grains of water; together with 414 of carbon, or the base of carbonic acid. This, according to the doctrine of chemical equivalents, corresponds to one molecule of water, and one molecule of carbon. Phil. Trans. for 1827, p. 584.