

large proportion of their weight dissipated, there being left behind only a small quantity of what are commonly called ashes. These are the inorganic, or mineral, whilst that part which has disappeared are the organic constituents of vegetable structure.

The part which has disappeared in the air is that portion of plants which was almost entirely obtained from it during their growth, the part remaining and called the ashes, the inorganic or mineral part, is that portion furnished entirely by the soil, because it does not and cannot exist in the air.

The part which is dissipated by heat, called organic or vegetable matter, forms by far the largest proportion of the weight and bulk of all vegetable and animal structures, composing generally from ninety to ninety-eight per cent. of their weight. But although the elements of organic matter form so large a proportion of the weight of all living bodies, yet they are not more essential to their existence than the inorganic or mineral portion. The elements or constituent parts of organic matter are carbon, oxygen, hydrogen, and nitrogen, which by their combinations with each other form, as I have said before, by far the largest part of the weight of all living bodies. These elements moreover constitute the water which is found in the earth, the matter of the atmosphere which we breathe, and also in combination with mineral matter a very large proportion of the solid part of the earth. Bodies existing so abundantly, so widely disseminated throughout the universe, are most important subjects for consideration and for attentive study. Their properties, nature, and uses should be well known by all who, in their occupation in life, strive to lift their minds above the earth and follow their callings with intelligence as well as mere brute strength.

C A R B O N .

Of all the components of vegetable life, carbon is the most abundant. In its pure state it exists as a solid, differing in this respect from the other three, which naturally exist in an aeriform or gaseous state. It is the essential principle of the different varieties of charcoal. It is abundantly formed by burning wood, with but slight access of air, and can also be produced in a very pure form from sugar, turpentine, starch and vinegar. The mineral called graphite or blacklead is almost pure carbon, and in the diamond it is perfectly pure and also crystalized. When united in certain proportions to oxygen, it then loses its solid, assumes the gaseous form, and performs a most important part in the process of vegetation. The compound thus formed is called carbonic acid, it extinguishes burning bodies, and even in moderate proportion is fatal to *animal* life. Where combustion does not take place from the presence of carbonic acid, animal life cannot exist. It is the presence of this gas which