a crop of nutritious bulbs weighing thirty tons, and of leaves weighing ten tons.

Now, as the manufacturer who desires to acquire the knowledge of the best means of conducting the processes of his art commences by making himself acquainted with the nature and properties of the materials which he employs; so must the farmer, the manufacturer of food, as the first step to the improvement of his far more important operations, endeavour to acquire a knowledge of the properties of the substances from which food is formed, and especially of those materials which, when not supplied by nature in sufficient quantities, must, by his exertions, be placed in the soil. Formerly men were content to speculate upon this subject; but now, in place of conjecturing, they make experiments; and by the refined processes and apparatus of modern chemistry, plants have been analyzed,—that is, separated into the parts of which they are composed,—so that we are enabled, as it were, to count the number and ascertain the weight of every brick which is employed in building up their beautiful structure. The first experiment which the chemist makes upon a plant shews him that it consists of two parts possessing very opposite characters. When he places in a vessel used for such purposes—a crucible, as it is termed—a portion of a plant, and exposes it to a strong heat, it takes fire and burns, and he discovers that a part of it is combustible and disappears into the air, and that another part of it is left in the vessel as incombustible ashes. From the mushroom to the oak, plants are found to consist of a part that is combustible and a part that cannot be consumed. The great bulk of every plant, that is, from 90 to 99 lbs. in every 100 lbs. that we consume, is dissipated by heat; or, in other words, is converted into gaseous, invisible substances, like the gas that illumines our streets.

We will, in the first place, inquire what is the nature of the large portion of the plant which disappears. That portion, which is frequently termed the organic portion of the plant, has been found, when examined, to be composed of not more than four substances, derived by the growing plant from air and water. The first of these, and that which forms the chief bulk of this part of the plant, is a hard, black, solid substance, a pure kind of charcoal, termed carbon. This is insoluble in water; but in every part of the world it is found forming a compound with a gas named oxygen, which is an ingredient of that great ocean of vapor that surrounds our planet, and which we call the atmosphere. The compound which the union of carbon and oxygen forms, is named carbonic acid, and constitutes about two gallons out of every five thousand gallons of the air we breathe. Carbon is an invariable constituent of plants, and wherever a fire burns, vegetable matter, as in the manure heap, decays, or an animal breathes, carbonic acid is produced. This compound is also locked up in immense quant ties in limestone rocks. It is a constituent of the bones of animals, and is also, in volcanic countries, given out in large quantities, in the gaseous state, from fissures in the earth. It is soluble in water, and therefore we find it in the waters of our springs and rivers. It is this gas that gives soda water and the various fermented drinks tl eir agreeable briskness. In the laboratory of the chemist and soda water manufacturer, it is prepared by the action of an acid upon some of its compounds.

When the chemist pours some vinegar or vitriol upon pieces of limestone, he produces a bubbling up, or effervescence, as when a soda powder is prepared. The cause of the disturbance in both cases is the same—the carbonic acid gas confined in the compound being set free, and escaping rapidly in its gaseous form. Carbonic acid gas is also driven off from limestone when it is burned in the kiln It is produced in large quantities in our bodies, and it is necessary to the continuance of health that we should constantly throw it off. This we do in breathing. The air that we draw into our lungs contains only two gallons of this gas in five thousand gallons, but when we expire it again, it is found to contain, in the same quantity, about two hundred gallons. Thus, what is injurious to our existence is thrown off from our bodies, and together with the carbonic acid produced by the fires burned over the earth, and which, if allowed to accumulate in the air, would render it as prejudicial to animal life as the fermenting vat of the brewer, is beautifully adapted for the support of the plants which are to afford us food, and which have their leaves furnished with innumerable pores to draw it into their structure, where its carbon is employed as one of the materials for building up our crops. Being soluble in water, it is also dissolved and carried down to the soil with every shower of rain, and thus its injurious accumulation in the air is prevented, and the health and harmony of creation preserved.

The next most important ingredient we find in the organic part of plants, is also one of the most portant and extensively diffused substances in na-