the white oak lands as little as sixty eight hundredths of one per cent. In some of the light sandy soils in Caroline, Dorchester, Somerset, Worcester, and in those lying on both sides of the Chester river, occasionally a fraction less, .64. As a general rule, the quantity of it in the soil decreases, as we go down the Shore.

ALUMINA.

Pure clay or alumina is another of the constituents of all soils. It, like iron, is the oxide or rust of a metal call aluminum which never exists naturally in its pure state. "The different kinds of clay of which pipes, procelain and earthenware are made, consists of hydrate of alumina, in a greater or less degree of purity." It has not the same important action as iron in the human economy, but its uses in the soil are very nearly the same, giving it tenacity and firmness, absorbing, like it, moisture and food from the atmosphere, forming "true salts" with ammonia, and having, like it, the properties of an acid or an alkali; of an acid, by uniting with alkaline bases such as potassa, lime and baryta; and, of an alkali, by forming salts, with acids. Our red and yellow clays are by no means pure alumina, but silicates of alumina and the per oxide of iron, united with lime, magnesia, and sometimes with potash, and very rarely with soda—that is, pure sand chemically united to these substances. It varies in soils from (.72) seventy-two hundreths of one per cent. in light sand soils, to as much 5.25 in others. In those soils which are commonly called "pipe clay or white oak soils," it is not in such proportions as persons usually imagine, being very rarely over 3.75 per cent. and sometimes as little as 1.02 per cent. in them. Where it exists in the proportion of from nine to ten per cent. good building bricks may be made. In the clay from which the *best* Baltimore bricks are produced, I have never found more than 19.50 per cent. of alumina. Sand in a very fine state of division, as is the case in the "pipe clay or white oak soils" may be a substitute to a certain extent, for both iron and clay.

LIME.

The great use of this substance as a manure, and the frequent benefits that result from its application, make almost superfluous the bringing forward of any proofs of its necessity in a soil. Lime, like alumina, is the oxide or rust of a metal, never existing naturally in its pure state. The metal of lime is called calcium. Lime exists in a soil sometimes as carbonate, that is air slaked lime, but most generally as silicate, that is chemically united to silicic acid, or sand. In the human body in union with phosphoric acid, it forms a very large part of the bones. It exists in combination with different acids in the root, stalk, blade, and grain of all plants.

Besides the necessity of its presence to form the structure of plants, it performs many other important functions in a soil. It promotes the decomposition of vegetable matter, and thus causes