their substance, or 44 of carbonic acid to 56 of lime. Now, the quantity of carbon, when separated from the oxygen, would be equal to one eighth of the whole mass of limestone; and, as all the ancient limestone formations were deposited under the ocean, we cannot suppose that this carbon was derived from the vegetable kingdom. Could the carbon be separated from the limestone in the great calcareous ranges of the Jura and the Alps, it would form a bed of pure carbon, nearly a thousand feet in thickness, through the vast extent of these mountains: and were we forced to admit that this carbon was derived from organic secretion, we should rather look to the animal than the vegetable kingdom for its origin; as no small portion of many calcareous mountains is composed of animal remains, and calcareous beds are forming in our present seas, of great extent and thickness, by the accumulation of shells and coral.

M. Adolphe Brongniart, in a recent work on vegetable fossils, has ingeniously suggested another origin for vegetable carbon: he admits, as I have done, that carbon is an original element in the composition of the globe, and its atmosphere. He supposes that the atmosphere of the ancient world, might contain more carbonic acid than at present. This would be highly favorable to the rapid growth of plants; and, in proportion as the plants absorbed the excess of carbonic acid (fixed air), they would render the atmosphere more pure, and fit it for the future respiration of animals.

Bitumen, which is composed of carbon and hydrogen, is known to exude from the lava of recent volcanoes; and the volcanic tufa in Auvergne, which covers a vast extent of surface, is, almost every where, intermixed with bitumen. In hot weather I have seen it trickling out of the tufa in considerable quantities, resembling melted pitch. As the ancient volcanoes of that district broke out from beneath the granite, we may fairly infer, that the bitumen which abounds in the volcanic tufa is as much a mineral substance as the sulphur which accompanies volcanic eruptions, or which is sublimed from the vapors of quiescent volcanoes.

Though the carbon that exists as a constituent part in some primary rocks may be derived from the mineral kingdom, there can scarcely remain a doubt, that wood-coal and common coal are of vegetable origin. Wood-coal, or brown coal, is found in low situations, and appears to have been formed of heaps of trees buried by inundations under beds of clay, sand, or gravel. The woody parts have probably undergone a certain degree of vegetable fermentation, under the pressure of the incumbent earthy matter, by which they have been carbonized and consolidated. In some specimens of this coal, the vegetable fibre or grain is perceptible in one part, and the other part is reduced to coal. The vegetable principles which this coal contains, united with bitumen and charcoal, have been already stated. In black or common coal, the vegetable extract and resin are destroyed, and the charcoal and bitumen alone remain; but