

atom. We have here a consistent explanation for the difference in the atomic weights of the elements, any other differences in the properties of the various elements, we may with this view of matter conceive as depending not, as so vaguely expressed by Dalton, upon the inherent differences in the nature of atoms, but more consistently with the generalization that phenomena are interpretable by motion, depending upon the nature of the motions set up in the atoms.

This theory has been developed in explanation of chemical phenomena in a remarkable work entitled "Elements of the Economy of Nature" by Dr. Macvicar. In this work figurative representations of the atoms of the various elements are even attempted, and from their inspection the author has been led to predict the possibility of the resolution of some of the elements into simpler bodies. We know, as yet, too little of atoms to have much confidence in these figurative representations. Future investigations may indeed reveal their nature and permit of their dynamic formulation, but at present we shall have to rest with the conclusion that atoms are compounds, without attempting to form a definite idea of their special configuration.

These ultimates, however minute, must be conceived of as extended, and consequently must have size and form; for, if matter in its ultimate analysis is resolved, as Bayma in his molecular physics maintains, into material points, having location but not extension, it will be difficult to see how, by the aggregation of any number of such unextended points, extended bodies result. Extension, as our first experiences tell us, is a primary property of matter, that property in virtue of which it occupies space. To deny it this property, is to do away with matter altogether, and it is perfectly absurd to talk about *material* points, having location but not extension. Boscovich in his famous mechanical theory more consistently denies the existence of matter altogether, and assumes, instead of material points, centers of force which by their interaction give rise to the various phenomena we witness. "But no arrangement of centers of force, however complicated," as Clerk Maxwell very pertinently remarks, "can account for the fact, that a body requires a certain force to produce in it a certain change of motion, which fact we express by saying, that the body has a certain measurable mass. No part of their mass can be due to the existence of the supposed centers of force." Berthelot, the eminent French philosopher, maintained, that the atoms of the elements are composed of the same matter, distinguished only by the nature of the motions set up in them; and Henry St. Claire Deville after him, declared "that when bodies deemed to be simple combine with one another, they vanish, they are individually annihilated. For instance he maintains, that in "Sulphate of Copper", there is neither Sulphur nor Oxygen, nor Copper. Sulphur, Oxygen, and Copper are composed each of them by a distinct system of vibrations of one energy and one single substance. The compound Sulphate of Copper answers to a different system, in which the motions are confounded that would produce the respective individualities of its elements, Sulphur, Oxygen and Copper." But what conception can we form of such vibrating oscillating atomic weights? How can vibration account for the constant weight ratio in which the atoms of the different elements enter into combina-