

10 THE FITNESS OF THE ENVIRONMENT

to the means of the atomic weights of chlorine and iodine, of calcium and barium, and of sulphur and tellurium respectively. More general relationships between the atomic weights and properties of the elements were first pointed out by Newlands in 1864 and were extended by Mendeléeff and Lothar Meyer a little later. Out of these studies has arisen the law that the properties of the elements are periodic functions of their atomic weights.

The essential characteristics of this law are best illustrated by a consideration of the relative volumes occupied by atoms of the various elementary substances, the so-called atomic volumes, which may be expressed by dividing atomic weights by specific gravities. The facts are graphically represented upon the accompanying diagram, where atomic weights are plotted horizontally, atomic volumes vertically.

Beginning with lithium the volumes fall to boron and carbon, then rise irregularly to sodium. A second fall leads to aluminium, a second rise to potassium, and then the rises and falls of the curve are repeated until, among the elements of higher atomic weight, gaps break the continuity of the relationship. On the whole curve similar elements occupy