them; our observations ranging over very large distances in space and time, from the particles immediately before us in artificial flames to the vibrations of atoms of distant stars, which must have taken millions of years to reach us. "I do not think," says Clerk-Maxwell,[1] "that the perfect identity which we observe between different portions of the same kind of matter can be explained on the statistical principle of the stability of the averages of large numbers of quantities, each of which may differ from the mean. . . . For if the molecules of some substance, such as hydrogen, were of sensibly greater mass than others, we have the means of producing a separation between molecules of different masses, and in this way we should be able to produce two kinds of hydrogen, one of which would be somewhat denser than the other. As this cannot be done, we must admit that the equality which we assert to exist between the molecules of hydro-

[1] 'Theory of Heat,' p. 329, &c. Cf. also many passages in the articles on "Atom," "Molecule," "Constitution of Bodies," &c., reprinted in the second volume of 'Scientific Papers'; *inter alia*, p. 483: "But the equality of the constants of the molecules is a fact of a very different order. It arises from a particular distribution of matter, a *collocation*, to use the expression of Dr Chalmers, of things which we have no difficulty in imagining to have been arranged otherwise. But many of the ordinary instances of collocation are adjustments of constants, which are not only arbitrary in their own nature, but in which variations actually occur; and when it is pointed out that these adjustments are beneficial to living beings, and are therefore instances of benevolent design, it is replied that those variations which are not conducive to the growth and multiplication of living beings tend to their destruction, and to the removal thereby of the evidence of any adjustment not beneficial. The constitution of an atom, however, is such as to render it, so far as we can judge, independent of all the dangers arising from the struggle for existence. Plausible reasons may, no doubt, be assigned for believing that if the constants had varied from atom to atom through any sensible range, the bodies formed by aggregates of such atoms would not have been so well fitted for the construction of the world as the bodies which actually exist. But as we have no experience of bodies formed of such variable atoms, this must remain a bare conjecture."