and all through ancient and mediæval philosophy, figured as one of the occult causes or forces which regulate the behaviour of living and dead matter. That the force of attraction alone would result in an accumulation of all matter in one body was of course recognised, and a second arbitrary and occult force—that of repulsion—was introduced as a counteracting or balancing agent.

23. Attraction and repulsion.

In Newton's system of the universe the balancing force was found to be that of an inherent initial motion which matter, in consequence of its mass or inertia, maintained in addition to the motion due to gravitation. If motion and inertia were able to account for the apparent repulsion of bodies at a distance, it might be that they could also account for their apparent attraction. This idea, though expressed about the time when the Newtonian gravitation formula was established, did not meet with serious attention till far on in our century other lines of thought led to similar views.[1] The phenomena of attrac-

[1] Newton himself seems to have looked for a mechanical explanation of gravitation. Long before the publication of the 'Principia' he laid before the Royal Society a paper containing "a hypothesis explaining the properties of light" by the assumption of an "ætherial medium, much of the same constitution with air, but far rarer, subtiler, and more strongly elastic" (Letter to Oldenburg, January 25, 1675-76, given in Brewster's 'Memoirs of Sir I. Newton,' vol. i. p. 390 *sqq.*), which might explain magnetic and electric phenomena, as well as those of gravitation, and especially light. And in a letter to Robert Boyle, of 28th February 1678-79 (Brewster, vol. i. p. 409), he reverts to this subject. Having, however, in the course of the next decade found it more useful to work out the mathematical conclusions to be drawn from the phenomenon of gravitation, which was a fact and not a hypothesis, he abandoned the metaphysical part of the subject, the question how gravitation was to be explained, "finding" (as Maclaurin says in his account of Newton's discoveries) "that he was not able, from experiment and observation, to give a satisfactory account of this medium and the manner of its operation in producing the chief phenomena of nature." And in his letter to Boyle, as well as in a later one to Halley (20th June 1886, Brewster, vol. i. p. 439), he carefully distinguishes between the results of the 'Principia' and