

other portions which still continue in obscurity. When the Newtonian philosophy had explained so many mechanical facts, by the two great steps,—of resolving the action of a whole mass into the actions of its minutest particles, and considering these particles as centres of force,—attempts were naturally soon made to apply the same mode of explanation to facts of other different kinds. It was conceived that the whole of natural philosophy must consist in investigating the laws of force by which particles of different substances attracted and repelled, and thus produced motions, or vibrations *to* and *from* the particles. Yet what were the next great discoveries in physics? The action of a galvanic wire upon a magnet; which is not to attract or repel it, but to turn it to the *right* and *left*; to produce motion, not *to* or *from*, but *transverse* to the line drawn to the acting particles; and again, the undulatory theory of light, in which it appeared that the undulations must not be longitudinal, as all philosophers, following the analogy of all cases previously conceived, had, at first, supposed them to be, but *transverse* to the path of the ray. Here, though the step from the known to the unknown was comparatively small, when made conjecturally it was made in a direction very wide of the truth. How impossible then must it be to attain in this manner to any conception of a law which shall help us to understand the whole government of the universe!

3. Still, however, in the laws of the luminiferous ether, and of the other fluid, (if it be another fluid) by which galvanism and magnetism are connected, we have something approaching nearly to mechanical action, and, possibly, hereafter to be identified with it. But we cannot turn to any other part of our physical knowledge, without perceiving that the gulf which separates it from the exact sciences is yet wider and more obscure. Who shall enunciate for us, and in terms of what notions, the general law of *chemical* composition and decomposition? sometimes