

INTRODUCTION.

WE enter now upon a new region of the human mind. In passing from Astronomy to Mechanics we make a transition from the *formal* to the *physical* sciences;—from time and space to force and matter;—from *phenomena* to *causes*. Hitherto we have been concerned only with the paths and orbits, the periods and cycles, the angles and distances, of the objects to which our sciences applied, namely, the heavenly bodies. How these motions are produced;—by what agencies, impulses, powers, they are determined to be what they are;—of what nature are the objects themselves;—are speculations which we have hitherto not dwelt upon. The history of such speculations now comes before us; but, in the first place, we must consider the history of speculations concerning motion in general, terrestrial as well as celestial. We must first attend to Mechanics, and afterwards return to Physical Astronomy.

In the same way in which the development of Pure Mathematics, which began with the Greeks, was a necessary condition of the progress of Formal Astronomy, the creation of the science of Mechanics now became necessary to the formation and progress of Physical Astronomy. Geometry and Mechanics were studied for their own sakes; but they also supplied ideas, language, and reasoning to other sciences. If the Greeks had not cultivated Conic Sections, Kepler could not have superseded Ptolemy; if the Greeks had cultivated Dynamics,¹ Kepler might have anticipated Newton.

¹ *Dynamics* is the science which treats of the Motions of Bodies; *Statics* is the science which treats of the Pressure of Bodies which are in equilibrium, and therefore at rest.