

with the other remarkable laws which are usually cited in physical astronomy by the name of Kepler's laws, constitute undoubtedly the most important and beautiful system of geometrical relations which have ever been discovered by a mere inductive process, independent of any consideration of a theoretical kind. They comprise within them a compendium of the motions of all the planets, and enable us to assign their places in their orbits at any instant of time past or to come (disregarding their mutual perturbations), provided certain purely geometrical problems can be numerically resolved.

(297.) It was not, however, till long after Kepler's time that the real importance of these laws could be felt. Regarded in themselves, they offered, it is true, a fine example of regular and harmonious disposition in the greatest of all the works of creation, and a striking contrast to the cumbersome mechanism of the cycles and epicycles which preceded them; but there their utility seemed to terminate, and, indeed, Kepler was reproached, and not without a semblance of reason, with having rendered the actual calculation of the places of the planets more difficult than before, the resources of geometry being then inadequate to resolve the problems to which the strict application of his laws gave rise.

(298.) The first result of the invention of the telescope and its application to astronomical purposes, by Galileo, was the discovery of Jupiter's disc and satellites,—of a system offering a beautiful miniature of that greater one of which it forms a portion, and presenting to the eye of sense, at a single glance, that disposition of parts which in the planetary system itself is discerned only by the eye of reason and imagination (see 195.). Kepler had the satisfaction of seeing it ascertained that the law which he had discovered to connect the times of revolution of the planets with their distances from the sun, holds good also when applied to the periods of circulation of these little attendants round the centre of their principal; thus demonstrating it to be something more than a mere empirical rule, and to depend on the intimate nature of planetary motion itself.