

the application of distinct and appropriate Ideas to a real series of Facts. The distinctness of the geometrical conceptions which enabled Hipparchus to assign the Orbits of the Sun and Moon, requires no illustration; and we have just explained how these ideas combined into a connected whole the various motions and places of those luminaries. To make this step in astronomy, required diligence and care, exerted in collecting observations, and mathematical clearness and steadiness of view, exercised in seeing and showing that the theory was a successful analysis of them.

*Sect. 3.—Discovery of the Precession of the Equinoxes.*

THE same qualities which we trace in the researches of Hipparchus already examined,—diligence in collecting observations, and clearness of idea in representing them,—appear also in other discoveries of his, which we must not pass unnoticed. The Precession of the Equinoxes, in particular, is one of the most important of these discoveries.

The circumstance here brought into notice was a Change of Longitude of the Fixed Stars. The longitudes of the heavenly bodies, being measured from the point where the sun's annual path cuts the equator, will change if that path changes. Whether this happens, however, is not very easy to decide; for the sun's path among the stars is made out, not by merely looking at the heavens, but by a series of inferences from other observable facts. Hipparchus used for this purpose eclipses of the moon; for these, being exactly opposite to the sun, afford data in marking out his path. By comparing the eclipses of his own time with those observed at an earlier period by Timocharis, he found that the bright star, Spica Virginis, was six degrees behind the equinoctial point in his own time, and had been eight degrees behind the same point at an earlier epoch. The suspicion was thus suggested, that the longitudes of all the stars increase perpetually; but Hipparchus had too truly philosophical a spirit to take this for granted. He examined the places of Regulus, and those of other stars, as he had done those of Spica; and he found, in all these instances, a change of place which could be explained by a certain alteration of position in the circles to which the stars are referred, which alteration is described as the Precession of the Equinoxes.

The distinctness with which Hipparchus conceived this change of relation of the heavens, is manifested by the question which, as we are told by Ptolemy, he examined and decided;—that this motion of the