

detail, as the inequality which follows from the hypothesis of a small *Epicycle*, turning uniformly on its axis, and carrying the sun in its circumference, while the centre of this epicycle moves uniformly in a circle of which the earth is the centre. This identity of the results of the hypothesis of the Eccentric and the Epicycle is proved by Ptolemy in the third book of the "Almagest."

The Sun's Eccentric.—When Hipparchus had clearly conceived these hypotheses, as *possible* ways of accounting for the sun's motion, the task which he had to perform, in order to show that they deserved to be adopted, was to assign a place to the *Perigee*, a magnitude to the *Eccentricity*, and an *Epoch* at which the sun was at the perigee; and to show that, in this way, he had produced a true representation of the motions of the sun. This, accordingly, he did; and having thus determined, with considerable exactness, both the law of the solar irregularities, and the numbers on which their amount depends, he was able to assign the motions and places of the sun for any moment of future time with corresponding exactness; he was able, in short, to construct *Solar Tables*, by means of which the sun's place with respect to the stars could be correctly found at any time. These tables (as they are given by Ptolemy)¹ give the *Anomaly*, or inequality of the sun's motion; and this they exhibit by means of the *Prosthapheresis*, the quantity of which, at any distance of the sun from the *Apogee*, it is requisite to add to or subtract from the arc, which he would have described if his motion had been equable.

The reader might perhaps expect that the calculations which thus exhibited the motions of the sun for an indefinite future period must depend upon a considerable number of observations made at all seasons of the year. That, however, was not the case; and the genius of the discoverer appeared, as such genius usually does appear, in his perceiving how small a number of facts, rightly considered, were sufficient to form a foundation for the theory. The number of days contained in two seasons of the year sufficed for this purpose to Hipparchus. "Having ascertained," says Ptolemy, "that the time from the vernal equinox to the summer tropic is $94\frac{1}{2}$ days, and the time from the summer tropic to the autumnal equinox $92\frac{1}{2}$ days, from these phenomena alone he demonstrates that the straight line joining the centre of the sun's eccentric path with the centre of the zodiac (the spectator's eye) is nearly the 24th part of the radius of the eccentric path; and that

¹ Syntax. l. iii.