CHAPTER III.

Inductive Epoch of Hipparchus.

Sect. 1.—*Establishment of the Theory of Epicycles and Eccentrics.*

ALTHOUGH, as we have already seen, at the time of Plato, the Idea of Epicycles had been suggested, and the problem of its general application proposed, and solutions of this problem offered by his followers; we still consider Hipparchus as the real discoverer and founder of that theory; inasmuch as he not only guessed that it *might*, but showed that it *must*, account for the phenomena, both as to their nature and as to their quantity. The assertion that "he only discovers who proves," is just; not only because, until a theory is proved to be the true one, it has no pre-eminence over the numerous other guesses among which it circulates, and above which the proof alone elevates it; but also because he who takes hold of the theory so as to apply calculation to it, possesses it with a distinctness of conception which makes it peculiarly his.

In order to establish the Theory of Epicycles, it was necessary to assign the magnitudes, distances, and positions of the circles or spheres in which the heavenly bodies were moved, in such a manner as to account for their apparently irregular motions. We may best understand what was the problem to be solved, by calling to mind what we now know to be the real motions of the heavens. The true motion of the earth round the sun, and therefore the apparent annual motion of the sun, is performed, not in a circle of which the earth is the centre, but in an ellipse or oval, the earth being nearer to one end than to the other; and the motion is most rapid when the sun is at the nearer end of this oval. But instead of an oval, we may suppose the sun to move uniformly in a circle, the earth being now, not in the centre, but nearer to one side; for on this supposition, the sun will appear to move most quickly when he is nearest to the earth, or in his *Perigee*, as that point is called. Such an orbit is called an *Eccentric*, and the distance of the earth from the centre of the circle is called the *Eccentricity*. It may easily be shown by geometrical reasoning, that the inequality of apparent motion so produced, is exactly the same in