

*Sect. 7.—Conclusion of the History of Greek Astronomy.*

I MIGHT now proceed to give an account of Ptolemy's other great step, the determination of the Planetary Orbits; but as this, though in itself very curious, would not illustrate any point beyond those already noticed, I shall refer to it very briefly. The planets all move in ellipses about the sun, as the moon moves about the earth; and as the sun apparently moves about the earth. They will therefore each have an Elliptic Inequality or Equation of the centre, for the same reason that the sun and moon have such inequalities. And this inequality may be represented, in the cases of the planets, just as in the other two, by means of an eccentric; the epicycle, it will be recollected, had already been used in order to represent the more obvious changes of the planetary motions. To determine the amount of the Eccentricities and the places of the Apogees of the planetary orbits, was the task which Ptolemy undertook; Hipparchus, as we have seen, having been destitute of the observations which such a process required. The determination of the Eccentricities in these cases involved some peculiarities which might not at first sight occur to the reader. The ecliptical motion of the planets takes place about the sun; but Ptolemy considered their movements as altogether independent of the sun, and referred them to the earth alone; and thus the apparent eccentricities which he had to account for, were the compound result of the Eccentricity of the earth's orbit, and of the proper eccentricity of the orbit of the Planet. He explained this result by the received mechanism of an eccentric *Deferent*, carrying an *Epicycle*; but the motion in the *Deferent* is uniform, not about the centre of the circle, but about another point, the *Equant*. Without going further into detail, it may be sufficient to state that, by a combination of Eccentrics and Epicycles, he did account for the leading features of these motions; and by using his own observations, compared with more ancient ones (for instance, those of Timocharis for Venus), he was able to determine the Dimensions and Positions of the orbits.<sup>38</sup>

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1762 seconds; that is, 248 seconds, or 4 minutes 8 seconds, less than in the former case. [The two quantities are in the proportion of 8 to 7, nearly.]—*Littrow's Note.*

<sup>38</sup> Ptolemy determined the Radius and the Periodic Time of his two circles for each Planet in the following manner: For the *inferior* Planets, that is, Mercury and Venus, he took the Radius of the *Deferent* equal to the Radius of the Earth's orbit, and the Radius of the *Epicycle* equal to that of the Planet's orbit. For these Planets, according to his assumption, the Periodic Time of the Planet in its Epi-