Sect. 4.—Period from Hipparchus to Ptolemy.

WE have now to speak of the cultivators of astronomy from the time of Hipparchus to that of Ptolemy, the next great name which occurs in the history of this science; though even he holds place only among those who verified, developed, and extended the theory of Hipparchus. The astronomers who lived in the intermediate time, indeed, did little, even in this way; though it might have been supposed that their studies were carried on under considerable advantages, inasmuch as they all enjoyed the liberal patronage of the kings of Egypt.¹⁷ The "divine school of Alexandria," as it is called by Synesius, in the fourth century, appears to have produced few persons capable of carrying forwards, or even of verifying, the labors of its great astronomical teacher. The mathematicians of the school wrote much, and apparently they observed sometimes; but their observations are of little value; and their books are expositions of the theory and its geometrical consequences, without any attempt to compare it with observation. For instance, it does not appear that any one verified the remarkable discovery of the precession, till the time of Ptolemy, 250 years after; nor does the statement of this motion of the heavens appear in the treatises of the intermediate writers; nor does Ptolemy quote a single observation of any person made in this long interval of time; while his references to those of Hipparchus are perpetual; and to those of Aristyllus and Timocharis, and of others, as Conon, who preceded Hipparchus, are not unfrequent.

This Alexandrian period, so inactive and barren in the history of science, was prosperous, civilized, and literary; and many of the works which belong to it are come down to us, though those of Hipparchus are lost. We have the "Uranologion" of Geminus,¹⁸ a systematic treatise on Astronomy, expounding correctly the Hipparchian Theories and their consequences, and containing a good account of the use of the various Cycles, which ended in the adoption of the Calippic Period. We have likewise "The Circular Theory of the Celestial Bodies" of Cleomedes,¹⁹ of which the principal part is a development of the doctrine of the sphere, including the consequences of the globular form of the earth. We have also another work on "Spherics" by Theodosius of Bithynia,²⁰ which contains some of the most important propositions of the subject, and has been used as a book of in-

¹⁷ Delamb. A. A. ii, 240. ¹³ B. c. 70. ¹⁰ B. c. 60. ²⁰ B.C. 50.