

vestigation of the construction of the universe, and who was the first to recognize the immeasurable distance of the region of fixed stars from our small planetary system ; nay, he even conjectured the two-fold motion of the earth round its axis and round the sun ; to Seleucus of Erythræa (or of Babylon),* who, a century subsequent to this period, endeavored to establish the hypothesis of the Samian philosopher, which, resembling the views of Copernicus, met with but little attention during that age ; and, lastly, to Hipparchus, the founder of scientific astronomy, and the greatest astronomical observer of antiquity. Hipparchus was the actual originator of astronomical tables among the Greeks,† and was also the discoverer of the precession of the equinoxes. On comparing his own observations of fixed stars (made at Rhodes, and not at Alexandria) with those made by Timochares and Aristyllus, he was led, probably without the apparition of a new star,‡ to this great discovery, to which, indeed, the earlier Egyptians might have attained by a long-continued observation of the heliacal rising of Sirius.§

A peculiar characteristic of the labors of Hipparchus is the use he made of his observations of celestial phenomena for the determination of geographical position. Such a connection between the study of the earth and of the celestial regions, mutually reflected on each other, animated through its uniting influences the great idea of the Cosmos. In the new map of the world constructed by Hipparchus, and founded upon that of Eratosthenes, the geographical degrees of longitude and latitude were based on lunar observations and on the measurements of shadows, wherever such an application of astronom-

* The latter appellation appears to me the more correct, since Strabo, lib. xvi., p. 739, quotes, " Seleucus of Seleucia, among several very honorable men, as a Chaldean, skilled in the study of the heavenly bodies." Seleucia, on the Tigris, a flourishing commercial city, is probably the one meant. It is indeed singular that Strabo also speaks of a Seleucus, an exact observer of the tides, and terms him, too, a Babylonian (lib. i., p. 6), and subsequently (lib. iii., p. 174), perhaps from carelessness, an Erythræan. (Compare Stobæus, *Ecl. Phys.*, p. 440.)

† Ideler, *Handbuch der Chronologie*, bd. i., s. 212 und 329.

‡ Delambre, *Histoire de l'Astronomie Ancienne*, t. i., p. 290.

§ Böckh has entered into a discussion, in his *Philolaos*, s. 118, as to whether the Pythagoreans were early acquainted, through Egyptian sources, with the precession, under the name of the motion of the heavens of the fixed stars. Letronne (*Observations sur les Représentations Zodiacales qui nous restent de l'Antiquité*, 1824, p. 62) and Ideler (in his *Handbuch der Chronol.*, bd. i., s. 192) vindicate the exclusive claim of Hipparchus to this discovery.