Arcturus, and Aldebaran, and as in modern times has been incontrovertibly proved with respect to many others. The bright star Arcturus has, during the 2100 years (since the times of Aristillus and Hipparchus) that it has been observed, changed its position in relation to the neighboring fainter stars $2\frac{1}{2}$ times the moon's diameter. Encke remarks "that the star μ Cassiopeiæ appears to have moved $3\frac{1}{2}$ lunar diameters, and 61 Cygni about 6 lunar diameters, if the ancient observations correctly indicated its position." Conclusions based on analogy justify us in believing that there is every where progressive, and perhaps also rotatory motion. The term "fixed stars" leads to erroneous preconceptions; it may have referred, in its earliest meaning among the Greeks, to the idea of the stars being riveted into the crystal vault of heaven; or, subsequently, in accordance with the Roman interpretation, it may indicate fixity or immobility. The one idea involuntarily led to the other. In Grecian antiquity, in an age at least as remote as that of Anaximenes of the Ionic school, or of Alcmæon the Pythagorean, all stars were divided into *wandering* (*ἄστρα πλανώμενα* or *πλανητά*) and *non-wandering* fixed stars (*ἀπλανεῖς ἀστέρες* or *ἀπλανῆ ἄστρα*).* Besides this generally adopted designation of the fixed stars, which Macrobius, in his *Somnium Scipionis*, Latinized by *Sphæra aplanes*,† we frequently meet in Aristotle (as if he wished to introduce a new technical term) with the phrase *riveted* stars, *ἐνδεδεμένα ἄστρα*, instead of *ἀπλανῆ*,‡ as a designation for fixed stars. From this form of speech arose the expressions of *sidera infixa cælo* of Cicero, *stellas quas putamus affixas* of Pliny, and *as-*

* Pseudo-Plut., *De plac. Philos.*, ii., 15, 16; Stob., *Eclog. Phys.*, p. 582; Plato, in the *Timæus*, p. 40.

† Macrob., *Somn. Scip.*, i., 9–10; *stellæ inerrantes*, in Cicero, *De Nat. Deorum*, iii., 20.

‡ The principal passage in which we meet with the technical expression *ἐνδεδεμένα ἄστρα*, is in Aristot., *De Cœlo*, ii., 8, p. 289, l. 34, p. 290, l. 19, Bekker. This altered nomenclature forcibly attracted my attention in my investigations into the optics of Ptolemy, and his experiments on refraction. Professor Franz, to whose philological acquirements I am indebted for frequent aid, reminds me that Ptolemy (*Syntax*, vii., 1) speaks of the fixed stars as affixed or riveted; *ὥσπερ προσπεφυκότες*. Ptolemy thus objects to the expression *σφαῖρα ἀπλανής* (*orbis inerrans*); "in as far as the stars constantly preserve their relative distances, they might rightly be termed *ἀπλανεῖς*; but in as far as the sphere in which they complete their course, and in which they seem to have grown, as it were, has an independent motion, the designation *ἀπλανής* is inappropriate if applied to the sphere."