

to the crystalline heavens; the planets (*ἄστρο πλανώμενα* or *πλανητά*), which move in an opposite direction, belong to a lower and nearer region."* As we find in Manilius, in the earliest ages of the Cæsars, that the term *stella fixa* was substituted for *infixa* or *affixa*, it may be assumed that the schools of Rome attached thereto at first only the original signification of *riveted*; but as the word *fixus* also embraced the idea of immobility, and might even be regarded as synonymous with *immotus* and *immobilis*, we may readily conceive that the national opinion, or, rather, usage of speech, should gradually have associated with *stella fixa* the idea of immobility, without reference to the fixed sphere to which it was attached. In this sense Seneca might term the world of the fixed stars *fixum et immobilem populum*.

Although, according to Stobæus, and the collector of the "Views of the Philosophers," the designation "crystal vault of heaven" dates as far back as the early period of Anaximenes, the first clearly-defined signification of the idea on which the term is based occurs in Empedocles. This philosopher regarded the heaven of the fixed stars as a solid mass, formed from the ether which had been rendered crystalline and rigid by the action of fire.† According to his

* According to Democritus and his disciple Metrodorus, Stob., *Eclog. Phys.*, p. 582.

† Plut., *De plac. Phil.*, ii., 11; Diog. Laert., viii., 77; Achilles Tat., ad. Arat., cap. 5, *Ἐμπ., κρυσταλλῶη τοῦτον (τὸν οὐρανὸν) εἶναί φησιν, ἐκ τοῦ παγετώδους συλλεγέοντα*; in like manner, we only meet with the expression *crystal-like* in Diog. Laert., viii., 77, and Galenus, *Hist. Phil.*, 12 (Sturz, *Empedocles Agrigent.*, t. i., p. 321). Lactantius, *De Opificio Dei*, c. 17: "An, si mihi quispiam dixerit *æneum* esse cælum, aut *vitreum*, aut, ut Empedocles ait, *aërem glacialum*, statimne assentiat quia cælum ex qua materia sit, ignorem." "If any one were to tell me that the heavens are made of brass, or of glass, or, as Empedocles asserts, of frozen air, I should incontinently assent thereto, for I am ignorant of what substance the heavens are composed." We have no early Hellenic testimony of the use of this expression of a glass-like or vitreous heaven (*cælum vitreum*), for only one celestial body, the sun, is called by Philolaüs a glass-like body, which throws upon us the rays it has received from the central fire. (The view of Empedocles, referred to in the text, of the reflection of the sun's light from the body of the moon (supposed to be consolidated in the same manner as hailstones), is frequently noticed by Plutarch, *apud Euseb. Præp. Evangel.*, 1, p. 24, D, and *De Facie in Orbe Lunæ*, cap. 5.) Where *Uranos* is described as *χαλκεος* and *σιδήρεος* by Homer and Pindar, the expression refers only to the idea of steadfast, permanent, and imperishable, as in speaking of brazen hearts and brazen voices. Völcker *über Homerische Geographie*, 1830, s. 5. The earliest mention, before Pliny, of the word *κρύσταλλος* when applied to ice-like, transparent rock-crystal, occurs in Dionysius Periegetes, 781, Ælian, xv., 8, and Strabo, xv., p. 717 Ca-