

before the discovery of the elliptic orbit of the planets, he ascribed a rectilinear and not a closed revolving course, were regarded by him, in 1608, in his "new and singular discourse on the hairy stars," as having originated from "celestial air." He even added, in accordance with ancient fancies on *spontaneous generation*, that comets arise "as an herb springs from the earth without seed, and as fishes are formed in the sea by a *generatio spontanea*."

Happier in his other cosmical conjectures, Kepler hazarded the following propositions: that all the fixed stars are suns like our own luminary, and surrounded by planetary systems; that our sun is enveloped in an atmosphere which appears like a white *corona* of light during a total solar eclipse; that our sun is so situated in the great cosmical island as to constitute the center of the compressed stellar ring of the Milky Way;* that the sun itself, whose spots had not then been discovered, together with all the planets and fixed stars, rotates on its axis; that satellites, like those discovered by Galileo round Jupiter, will also be discovered round Saturn and Mars; and that in the much too great interval of space between Mars and Jupiter,† where we are now acquainted with seven asteroids (as between Venus and Mercury), there revolve planets which, from their smallness alone, are invisible to the naked eye. Presentient propositions of this nature, felicitous conjectures of that which was subsequently discovered, excited general interest, while none of Kepler's cotemporaries, including Galileo, conferred any adequate praise on the discovery of the three laws, which, since Newton and the promul-

Nébuleuses et de la Matière diffuse en Etoiles). Compare *Cosmos*, vol. i., p. 144 and 152.

* Compare the ideas of Sir John Herschel on the position of our planetary system, vol. i., p. 141; also Struve, *Etudes d'Astronomie Stellaire*, 1847, p. 4.

† Apelt says (*Epochen der Geschichte der Menschheit*, bd. i., 1845, s. 223): "the remarkable law of the distances, which is usually known under the name of Bode's law (or that of Titius), is the discovery of Kepler, who, after many years of persevering industry, deduced it from the observations of Tycho de Brahe." See *Harmonices Mundi libri quinque*, cap. 3. Compare, also, Cournot's Additions to his French translation of Sir John Herschel's *Astronomy*, 1834, § 434, p. 324, and Fries, *Vorlesungen über die Sternkunde*, 1813, s. 325 (On the Law of the Distances in the Secondary Planets). The passages from Plato, Pliny, Censorinus, and Achilles Tatius, in the Prolegomena to the *Aratus*, are carefully collected in Fries, *Geschichte der Philosophie*, bd. i., 1837, s. 146-150; in Martin, *Etudes sur le Timée*, t. ii., p. 38; and in Brandis, *Geschichte der Griechisch-Römischen Philosophie*, th. ii., abth. i., 1844, s. 364.