

distinctly adduces the tides as evidence* that the attractive force of the moon (*virtus tractoria*) extends to the earth, and that this force, similar to that exerted by the magnet on iron, would deprive the earth of its water if the former should cease to attract it. Unfortunately, this great man was induced, ten years afterward, in 1619, probably from deference to Galileo, who ascribed the ebb and flow of the ocean to the rotation of the earth, to renounce his correct explanation, and depict the earth in the *Harmonice Mundi* as a living monster, whose whale-like mode of breathing occasioned the rise and fall of the ocean in recurring periods of sleeping and waking, dependent on solar time. When we remember the mathematical acumen that pervades one of the works of Kepler, and of which Laplace has already made honorable mention,† it is to be lamented that the discoverer of the three great laws of all planetary motion should not have advanced on the path whither he had been led by his views on the attraction of the masses of cosmical bodies.

Descartes, who was endowed with greater versatility of physical knowledge than Kepler, and who laid the foundation of many departments of mathematical physics, undertook to comprise the whole world of phenomena, the heav-

* "Si Terra cessaret attrahere ad se aquas suas, aquæ marinæ omnes elevarentur et in corpus Lunæ influerent. Orbis virtutis tractoriæ, quæ est in Luna, porrigitur usque ad terras, et prolectat aquas quacunque in verticem loci incidit sub Zonam torridam, quippe in occursum suum quacunque in verticem loci incidit, insensibiliter in maribus inclusis, sensibiliter ibi ubi sunt latissimi alvei Oceani propinqui, aquisque spaciota reciprocationis libertas." (Kepler, l. c.) "Undas a Luna trahi ut ferrum a Magnete." . . . *Kepleri Harmonice Mundi*, libri quinque, 1619, lib. iv., cap. 7, p. 162. The same work which presents us with so many admirable views, among others, with the data of the establishment of the *third law* (that the squares of the periodic times of two planets are as the cubes of their mean distance), is distorted by the wildest flights of fancy on the respiration, nutrition, and heat of the *earth-animal*, on the soul, memory (*memoria animæ Terræ*), and creative imagination (*animæ Telluris imaginatio*) of this monster. This great man was so wedded to these chimeras, that he warmly contested his right of priority in the views regarding the *earth-animal* with the mystic author of the *Macrocosmos*, Robert Fludd, of Oxford, who is reported to have participated in the invention of the thermometer. (*Harm. Mundi*, p. 252.) In Kepler's writings, the attraction of masses is often confounded with magnetic attraction. "Corpus solis esse magneticum. Virtutem, quæ Planetas movet, residere in corpore solis."—*Stella Martis*, pars iii., cap. 32, 34. To each planet was ascribed a magnetic axis, which constantly pointed to one and the same quarter of the heavens. (Apelt, *Joh. Kepler's Astron. Weltansicht*, 1849, s. 73.

† Compare *Cosmos* vol. ii., p. 327 (and note