

by Aristotle*—follows the idea of its immeasurability. Separate portions only have been rendered accessible to measurement, and the numerical results, which far exceed the grasp of our comprehension, become a source of mere puerile gratification to those who delight in high numbers, and imagine that the sublimity of astronomical studies may be heightened by astounding and terrific images of physical magnitude. The distance of 61 Cygni from the Sun is 657,000 semi-diameters of the Earth's orbit; a distance which light takes rather more than ten years to traverse, while it passes from the Sun to the Earth in 8' 17".78. Sir John Herschel conjectures, from his ingenious combination of photometric calculations,† that if the stars in the great circle of the Milky Way which he saw in the field of his twenty-feet telescope were newly-arisen luminous cosmical bodies, they would have required 2000 years to transmit to us the first ray of light. All attempts to present such numerical relations fail, either from the immensity of the unit by which they must be measured, or from the high number yielded by the repetition of this unit. Bessel‡ very truly observes that "the distance which light traverses in a year is not more appreciable to us than the distance which it traverses in ten years. Therefore every endeavor must fail to convey to the mind any idea of a magnitude exceeding those that are accessible on the earth." This overpowering force of numbers is as clearly manifested in the smallest organisms of animal life as in the milky way of those self-luminous suns which we call fixed stars. What masses of Polythalamia are inclosed, according to Ehrenberg, in one thin stratum of chalk! This eminent investigator of nature asserts that one cubic inch of the Bilin polishing slate, which constitutes a sort of mountain cap forty feet in height, contains 41,000 millions of the microscopic *Galionella distans*; while the same volume contains more than 1 billion 750,000 millions of distinct individuals of *Galionella ferruginea*.§ Such estimates remind us of the treatise named *Arenarius* (*ψαμμίτης*) of Archimedes—of the sand-grains which might fill the universe of space! If the starry heavens, by incalculable numbers, magnitude, space, duration, and length of periods, impress

* Aristot., *De Cælo*, 1, 7, p. 276, Bekker.

† Sir John Herschel, *Outlines of Astronomy*, 1849, § 803, p. 541.

‡ Bessel, in Schumacher's *Jahrbuch für* 1839, s. 50.

§ Ehrenberg, *Abhandl. der Berl. Akad.*, 1838, s. 59; also in his *Infusionsthierchen*, s. 170.