explained by the position of their orbits and their distance from the Sun. It would seem to indicate, in some individuals, the existence of an inherent process of condensation, and an increased or diminished capacity of reflecting borrowed light. In the comet of 1618, and in that which has a period of three years, it was observed first by Hevelius that the nucleus of the comet diminished at its perihelion and enlarged at its aphelion, a fact which, after remaining long unheeded, was again noticed by the talented astronomer Valz at Nismes. The regularity of the change of volume, according to the different degrees of distance from the Sun, appears very striking. The physical explanation of the phenomenon can not, however, be sought in the condensed layers of cosmical vapor occurring in the vicinity of the Sun, since it is difficult to imagine the nebulous envelope of the nucleus of the comet to be vesicular and impervious to the ether.*

The dissimilar eccentricity of the orbits of comets has, in recent times (1819), in the most brilliant manner enriched our knowledge of the solar system. Encke has discovered the existence of a comet of so short a period of revolution that it remains entirely within the limits of our planetary system, attaining its aphelion between the orbits of the smaller planets and that of Jupiter. Its eccentricity must be assumed at 0·845, that of Juno (which has the greatest eccentricity of any of the planets) being 0·255. Encke's comet has several times, although with difficulty, been observed by the naked eye, as in Europe in 1819, and, according to Rümker, in New Holland in 1822. Its period of revolution is about $3\frac{1}{3}$d years; but, from a careful comparison of the epochs of its return to its perihelion, the remarkable fact has been discovered that these periods have diminished in the most regular manner between the years 1786 and 1838, the diminution amounting, in the course of 52 years, to about $1\frac{8}{10}$th days. The attempt to bring into unison the results of observation and calculation in the investigation of all the planetary disturbances, with the view of explaining this phenomenon, has led to the adoption of the very probable hypothesis that there exists dispersed in space a vaporous substance capable of acting as a resisting medium. This matter diminishes the tangential force, and with it the major axis of the comet's orbit. The value of the constant of the resistance appears to be somewhat different before and after the perihelion; and this may, perhaps, be as

* Arago, in the *Annuaire*, 1832, p. 217–220. Sir John Herschel, *Astron.*, § 488.