

body above its equator, that is to say, the point at which gravity and centrifugal force are in equilibrium, must be the same as the altitude at which a satellite would rotate round the central body simultaneously with the diurnal revolution of the latter.* This limitation of the solar atmosphere in its present concentrated condition is especially remarkable when we compare the central body of our system with the nucleus of other nebulous stars. Herschel has discovered several, in which the radius of the nebulous matter surrounding the star appeared at an angle of $150''$. On the assumption that the parallax is not fully equal to $1''$, we find that the outermost nebulous layer of such a star must be 150 times further from the central body than our Earth is from the Sun. If, therefore, the nebulous star were to occupy the place of our Sun, its atmosphere would not only include the orbit of Uranus, but even extend eight times beyond it.†

Considering the narrow limitation of the Sun's atmosphere, which we have just described, we may with much probability regard the existence of a very compressed annulus of nebulous matter,‡ revolving freely in space between the orbits of Venus and Mars, as the material cause of the zodiacal light. As

* Laplace, *Expos. du Syst. du Monde*, p. 270; *Mécanique Céleste*, t. ii., p. 169 and 171; Schubert, *Astr.*, bd. iii., § 206.

† Arago, in the *Annuaire*, 1842, p. 408. Compare Sir John Herschel's considerations on the volume and faintness of light of planetary nebulae, in Mary Somerville's *Connection of the Physical Sciences*, 1835, p. 108. The opinion that the Sun is a nebulous star, whose atmosphere presents the phenomenon of zodiacal light, did not originate with Dominicus Cassini, but was first promulgated by Mairan in 1730 (*Traité de l'Aurore Bor.*, p. 47 and 263; Arago, in the *Annuaire*, 1842, p. 412). It is a renewal of Kepler's views.

‡ Dominicus Cassini was the first to assume, as did subsequently Laplace, Schubert, and Poisson, the hypothesis of a separate ring to explain the form of the zodiacal light. He says distinctly, "If the orbits of Mercury and Venus were visible (throughout their whole extent), we should invariably observe them with the same figure and in the same position with regard to the Sun, and at the same time of the year with the zodiacal light." (*Mém. de l'Acad.*, t. viii., 1730, p. 218, and Biot, in the *Comptes Rendus*, 1836, t. iii., p. 666.) Cassini believed that the nebulous ring of zodiacal light consisted of innumerable small planetary bodies revolving round the Sun. He even went so far as to believe that the fall of fire-balls might be connected with the passage of the Earth through the zodiacal nebulous ring. Olmsted, and especially Biot (op. cit., p. 673), have attempted to establish its connection with the November phenomenon—a connection which Olbers doubts. (Schum., *Jahrb.*, 1837, s. 281.) Regarding the question whether the place of the zodiacal light perfectly coincides with that of the Sun's equator, see Houzeau, in Schum., *Astr. Nachr.*, 1843, No 492, s. 190.