

As, according to Du Séjour's calculation, the longest possible duration of a total eclipse of the Sun can not be more than 7m. 58s. at the equator, nor more than 6m. 10s. for the latitude of Paris, the decrease of daylight which is recorded by the annalists may, on account of its duration for many hours, possibly be referred to one or other of the three following and very different causes: 1. A disturbance in the process of the evolution of light, as it were a diminution of intensity in the photosphere; 2. Obstructions (such as a greater and denser formation of clouds) in the outermost opaque vaporous envelope investing the photosphere, by which the radiation of solar light and heat is impeded; 3. The impure condition of our atmosphere, arising, for instance, from the obscuring (mostly organic) meteoric dust, rain, or sand-rain, such as is described by Macgowan to have continued for several days together in China. The second and third of these causes do not require the occurrence of a diminution of the electro-magnetic light process, perhaps (of the perpetual polar light*), in the solar atmosphere, but the last-named cause excludes the visibility of stars at noon, of which such frequent mention is made in these mysterious and vaguely-described obscurations.

Arago's discovery of *chromatic polarization* has not only confirmed the existence of the third and outermost envelope

1547, before the battle between Charles V. and the Duke of Saxony, the Sun appeared for three days as if it were suffused by blood, while at the same time many stars were visible at noon." "Refert Gemma, pater et filius, anno 1547, ante conflictum Caroli V. cum Saxonix Duce, Solem per tres dies ceu sanguine perfusum comparuisse, ut etiam stellæ pleræque in meridie conspicerentur." Kepler (in *Stella Nova in Serpentario*, p. 113) further expresses his uncertainty as to the cause of the phenomenon; he asks whether the diminution of the Sun's light be owing to some celestial causes: "Solis lumen ob causas quasdam sublimes hebetari" whether it be owing to the wide diffusion of some cometary substance, "materia cometica latius sparsa," for the cause can not have originated in our atmosphere, since the stars were visible at noon. Schnurrer (*Chronik der Seuchen*, th. ii., p. 93) thinks, notwithstanding the visibility of the stars, that the phenomenon must have been the same as the so-called "Höhenrauch," for Charles V. complained before the battle "that the Sun was always obscured when he was about to engage with the enemy." "Semper se nebulæ densitate infestari, quoties sibi cum hoste pugnandum sit." (Lambert, *Hortens. de bello German.*, lib. vi., p. 182.)

* Horrebow (*Basis Astronomiæ*, 1735, § 226) makes use of the same expression. Solar light, according to him, is "a perpetual Northern light within the Sun's atmosphere, produced by the agency of powerful magnetic forces." (See Hanow, in Joh. Dan. Titius's *Gemeinnützige Abhandlungen über natürliche Dinge*, 1768, p. 102.)