green stained glasses in solar observations, which had been proposed seventy years earlier by Apian (Bienewitz), in the *Astronomicum Cæsareum*, and had also been long in use among Belgian pilots.* The neglect of this precaution contributed much to Galileo's blindness.

As far as I am aware, the most definite expression of the necessity for assuming the existence of a dark solar sphere, surrounded by a photosphere, grounded upon direct observation after the discovery of the Sun's spots, is first to be met with in the writings of the great Dominique Cassini,† and belongs probably to about the year 1671. According to his views, the solar disk which we see is "an ocean of light surrounding the solid and dark nucleus of the Sun; the violent movements (*up-wellings*) which occur in this luminous envelope enable us from time to time to see the mountain summits of the non-luminous body of the Sun. These constitute the *black nuclei* in the center of the Sun's spots." The ash-colored penumbræ surrounding these nuclei had not then been explained.

between 1618 and 1626. This period includes the years for which Scheiner published his own observations at Rome in his *Rosa Ursina*. The Canon Tarde believes those appearances to be the transits of small planets, because "l'œil du monde ne peut avoir des ophthalmies," "the eye of the universe can not experience ophthalmia." It must justly excite surprise that the meritorious observer, Gascoigne (see *Cosmos*, vol. iii., p. 61), should, twenty years after Tarde's notice of the Borbonic satellites, still have ascribed the Sun's spots to a conjunction of numerous planetary bodies revolving round the Sun in close proximity to it and in almost intersecting orbits. Several of these bodies, placed, as it were, one over another, were supposed to occasion the black shadows. (*Philos. Transact.*, vol. xxvii., 1710–1712, p. 282–290, from a letter of William Crabtree, August, 1640.)

* Arago, *Sur les moyens d'Observer les taches Solaires*, in the *Annuaire pour l'an* 1842, p. 476–479; Delambre, *Hist. de l'Astronomie du Moyen Age*, p. 394; and his *Hist. de l'Astronomie Moderne*, tom. i., p. 681.

† *Mémoires pour servir à l'Histoire des Sciences*, par M. le Comte de Cassini, 1810, p. 242; Delambre, *Hist. de l'Astr. Mod.*, tom. iii., p. 694. Although Cassini in 1671, and La Hire in 1700, had declared the Sun's body to be dark, otherwise trustworthy and valuable text-books on astronomy still continue to ascribe the first idea of this hypothesis to the meritorious Lalande. Lalande, in the edition of 1792, of his *Astronomie*, tom. iii., § 3240, as in the first edition of 1764, tom. ii., § 2515, merely adopts the older view of La Hire, according to which "les taches sont les éminences de la masse solide et opaque du Soleil, recouverte communément (en entier) par le fluide igné;" "the spots are the elevations of the solid and opaque mass of the Sun, covered by an igneous fluid." Alexander Wilson, between the years 1769 and 1774, conceived the first correct view of a funnel-shaped opening in the photosphere.