

red, mountain, or flame-like elevations, which, if not seen for the first time, were at all events more distinctly visible during the eclipse of the Sun of the 8th of July, 1842, when they were simultaneously noticed by several of the most experienced observers, have led astronomers to assume the existence of a third envelope of this kind. Arago, in a treatise devoted to the subject,* has with much ingenuity tested the several observations, and enumerated the grounds which necessitated the adoption of this view. He has at the same time shown that since 1706 similar red marginal protuberances have been eight times described on the occasion of total or annular solar eclipses.† On the 8th of July, 1842, when the apparently larger disk of the Moon entirely covered the Sun, the Moon's disk was observed to be surrounded not only by a whitish light,‡ encircling it like a crown or luminous wreath, but two or three protuberances were also seen, as if originating at its margin, and were compared by some observers to red jagged mountains, by others to reddened masses of ice, and again by others to fixed indented red flames. Arago, Laugier, and Mauvais at Perpignan, Petit at Montpellier, Airy on the Supergea, Schumacher at Vienna, and numerous other astronomers, agreed perfectly in the main features of the final results, notwithstanding the great differences in the instruments they employed. The elevations did not always appear simultaneously; in some places they were even seen by the naked eye. The estimates of the angles of altitude certainly differed; the most reliable is probably that of Petit, the director of the Observatory at Toulouse. He fixed it at 1' 45'', which, if these phenomena were true *sun-mountains*, would give an elevation of 40,000 geographical miles; that is to say, nearly seven times the Earth's diameter, which is only 112th part of the diameter of the Sun. The consideration of these phenomena has led to the very probable hypothesis that these red figures are emanations within the third envelope—*masses of clouds* which illumine and color the photosphere.§ Ara-

* Arago, in the *Annuaire* for 1846, p. 271-438.

† Id., *Ibid.*, p. 440-447.

‡ This is the white appearance which was also observed in the solar eclipse of the 15th of May, 1836, and which the great astronomer of Königsberg very correctly described at the time by observing "that although the Moon's disk entirely covered the Sun, a luminous corona still encircled it, which was a portion of the Sun's atmosphere." (Bessel, in Schum., *Astr. Nachr.*, No. 320.)

§ "Si nous examinions de plus près l'explication d'après laquelle les protubérances rougeâtres seraient assimilées à des nuages (de la troisième enveloppe), nous ne trouverions aucun principe de physique qui