

peculiar and not sufficiently investigated diaphanic condition of individual strata of our atmosphere. Hevelius states distinctly that, during a total eclipse on the 25th of April, 1642, the sky was covered with brilliant stars, the atmosphere perfectly clear, and yet, with the different magnifying powers which he employed, not a vestige of the Moon could be seen. In other cases, likewise very rare, only separate parts of the Moon are feebly visible. During a total eclipse, the disk generally appears red; and, indeed, in all degrees of intensity of color, even passing, when the Moon is far distant from the Earth, into a fiery and glowing red. While lying at anchor off the island of Baru, not far from Carthagena de Indias, half a century ago (29th of March, 1801), I observed a total eclipse, and was extremely struck with the greater luminous intensity of the Moon's disk under a tropical sky than in my native north.\* The whole phenomenon is known to be a consequence of refraction, since, as Kepler very correctly expresses himself (*Paralip. Astron. pars Optica*, p. 893), the Sun's rays are inflected† by their passage through the at-

\* "On conçoit que la vivacité de la lumière rouge ne dépend par uniquement de l'état de l'atmosphère, qui réfracte, plus ou moins affaibli, les rayons solaires, en les enfléchissant dans le cône d'ombre, mais qu'elle est modifiée surtout par la transparence variable de la partie de l'atmosphère à travers laquelle nous apercevons la Lune éclipcée. Sous les tropiques, une grande sérénité du ciel, une dissémination uniforme des vapeurs diminuent l'extinction de la lumière que le disque lunaire nous renvoie."—Humboldt, *Voyage aux Régions Equinoxiales*, tom. iii., p. 544; and *Recueil d'Observ. Astronomiques*, vol. ii., p. 145. "It may easily be understood that the intensity of the red light does not depend solely upon the state of the atmosphere, which refracts more or less feebly the solar rays by inflecting them into the shadow cone, but that it is especially modified by the variable transparency of that part of the atmosphere across which we perceive the eclipsed Moon. Under the tropics a great serenity of sky, a uniform dissemination of vapors, diminish the extinction of the light which the lunar disk sends toward us." Arago observes: "Les rayons solaires arrivent à notre satellite par l'effet d'une réfraction et à la suite d'une absorption dans les couches les plus basses de l'atmosphère terrestre; pourraient-ils avoir une autre teinte que le rouge?"—*Annuaire* for 1842, p. 528. "The solar rays reach our planet by the effect of a refraction, and subsequently to an absorption (partial) in the lower strata of the Earth's atmosphere. How can they have any other colors than red?"

† Babinet declares the reddening to be a consequence of *diffraction*, in a memoir as to the different share of the white, blue, and red lights which are produced by the inflection. See his *Reflections upon the Total Eclipse of the Moon on the 19th of March, 1848*, in Moigno's *Répertoire d'Optique Moderne*, 1850, tom. iv., p. 1656. "La lumière diffractée qui pénètre dans l'ombre de la Terre, prédomine toujours et même a été seule sensible. Elle est d'autant plus rouge ou orangée