Moon, since the latter, according to Bouguer, is 300,000 less bright than the Sun. The degree of illumination of the nuclei visible to us, *i. e.*, of the dark body of the Sun illumined by reflection from the walls of the opened photosphere, the interior atmosphere from which the penumbræ are generated, and by the light of the strata of our terrestrial atmosphere through which we see it, has been strikingly manifested on the occasion of several transits of Mercury. When compared with the planet, whose dark side was turned toward us, the near and darkest nuclei presented a light brownish-gray appearance.* The admirable observer, Counselor Schwabe, of Dessau, was particularly struck by this difference of blackness between the planet and the nuclei, in the transit of Mercury on the 5th of May, 1832. On the occasion of my observing the transit of this planet in Peru, on the 9th of November, 1802, in consequence of being engaged in measuring the distances from the threads, I was unfortunately unable to make any comparison between the different intensities of the light, although Mercury's disk almost touched the nearest dark spot. Professor Henry, of Princeton, North America, had already shown, by his experiments in 1815, that the Sun's spots radiate a perceptibly less heat than those portions on which there were no spots. The images of the Sun and of a large spot were projected on a screen, and the differences of heat measured by means of a thermo-electrical apparatus.†

Whether rays of heat differ from rays of light by a difference in the lengths of the transversal vibrations of ether, or whether they are identical with rays of light, but that a certain velocity in the vibrations which generates very high temperatures is requisite to excite the impression of light in our organs, the Sun, as the main source of light and heat, must nevertheless be able to call forth and animate magnetic forces on our planet, and more especially in the gaseous strata of our atmosphere. The early knowledge of thermo-electrical phenomena in crystallized bodies (such as tourmaline, boracite, and topaz), and Oersted's great discovery (1820) that every conducting body charged with electricity exerts a definite action on the magnetic needle during the continuation of the electrical current, afforded practical evidence of the correlation of heat, electricity, and magnetism. Basing his deductions on the idea of such an affinity, Ampère, who ascribed

* Mädler, *Astr.*, p. 81.

† *Philos. Mag.*, ser. iii., vol. xxviii., p. 230; and Poggend., *Annalen.* bd. lxviii., p. 101.