

the same kind as it would have been, to discover all the inequalities of the moon's motion without the aid of the doctrine of gravity. We will enumerate some of the phenomena which thus employed and perplexed the cultivators of optics.

The fringes of shadows were one of the most curious and noted of such classes of facts. These were first remarked by Grimaldi<sup>1</sup> (1665), and referred by him to a property of light which he called *Diffraction*. When shadows are made in a dark room, by light admitted through a very small hole, these appearances are very conspicuous and beautiful. Hooke, in 1672, communicated similar observations to the Royal Society, as "a new property of light not mentioned by any optical writer before;" by which we see that he had not heard of Grimaldi's experiments. Newton, in his *Opticks*, treats of the same phenomena, which he ascribes to the *inflexion* of the rays of light. He asks (Qu. 3), "Are not the rays of light, in passing by the edges and sides of bodies, bent several times backward and forward with a motion like that of an eel? And do not the three fringes of colored light in shadows arise from three such bendings?" It is remarkable that Newton should not have noticed, that it is impossible, in this way, to account for the facts, or even to express their laws; since the light which produces the fringes must, on this theory, be propagated, even after it leaves the neighborhood of the opaque body, in curves, and not in straight lines. Accordingly, all who have taken up Newton's notion of inflexion, have inevitably failed in giving anything like an intelligible and coherent character to these phenomena. This is, for example, the case with Mr. (now Lord) Brougham's attempts in the *Philosophical Transactions* for 1796. The same may be said of other experimenters, as Mairan<sup>2</sup> and Du Four,<sup>3</sup> who attempted to explain the facts by supposing an atmosphere about the opaque body. Several authors, as Maraldi,<sup>4</sup> and Comparetti,<sup>5</sup> repeated or varied these experiments in different ways.

Newton had noticed certain rings of color produced by a glass speculum, which he called "colors of thick plates," and which he attempted to connect with the colors of thin plates. His reasoning is by no means satisfactory; but it was of use, by pointing out this as a case in which his "fits" (the small periods, or cycles in the rays of light, of

<sup>1</sup> *Physico-Mathesis, de Lumine, Coloribus et Iride*. Bologna, 1665.

<sup>2</sup> *Ac. Par.* 1738.

<sup>3</sup> *Mémoires Présentés*, vol. v.

<sup>4</sup> *Ac. Par.* 1723.

<sup>5</sup> *Observationes Opticæ de Luce Inflexâ et Coloribus*. Padua, 1787.