

aperture." He rightly considers this observation as of the most essential value. "This," he says, "was not known by those who began to consider the waves of light, among whom are Mr. Hooke in his *Micrography*, and Father Pardies; who, in a treatise of which he showed me a part, and which he did not live to finish, had undertaken to prove, by these waves, the effects of reflection and refraction. But the principal foundation, which consists in the remark I have just made, was wanting in his demonstrations."

By the help of this view, Huyghens gave a perfectly satisfactory and correct explanation of the laws of reflection and refraction; and he also applied the same theory, as we have seen, to the double refraction of Iceland spar with great sagacity and success. He conceived that in this crystal, besides the spherical waves, there might be others of a spheroidal form, the axis of the spheroid being symmetrically disposed with regard to the faces of the rhombohedron, for to these faces the optical phenomena are symmetrically related. He found⁷ that the position of the refracted ray, determined by such spheroidal undulations, would give an oblique refraction, which would coincide in its laws with the refraction observed in Iceland spar: and, as we have stated, this coincidence was long after fully confirmed by other observers.

Since Huyghens, at this early period, expounded the undulatory theory with so much distinctness, and applied it with so much skill, it may be asked why we do not hold him up as the great Author of the induction of undulations of light;—the person who marks the epoch of the theory? To this we reply, that though Huyghens discovered strong presumptions in favor of the undulatory theory, it was not *established* till a later era, when the fringes of shadows, rightly understood, made the waves visible, and when the hypothesis which had been assumed to account for double refraction, was found to contain also an explanation of polarization. It is *then* that this theory of light assumes its commanding form; and the persons who gave it this form, we must make the great names of our narrative; without, however, denying the genius and merit of Huyghens, who is, undoubtedly, the leading character in the prelude to the discovery.

The undulatory theory, from this time to our own, was unfortunate in its career. It was by no means destitute of defenders, but these were not experimenters; and none of them thought of applying it to

⁷ *Tracts on Optics*, 237.