

desire to avoid as much as possible all reference to theory. The laws which he has obtained, however, belong to elliptically-polarized light in the sense in which the term was introduced by Fresnel." And the identity of the light produced by metallic reflection with the elliptically-polarized light of the wave-theory, is placed beyond all doubt, by an observation of Professor Airy, that the rings of uniaxal crystals, produced by Fresnel's elliptically-polarized light, are exactly the same as those produced by Brewster's metallic light.

6. *Newton's Rings by Polarized Light.*—Other modifications of the phenomena of thin plates by the use of polarized light, supplied other striking confirmations of the theory. These were in one case the more remarkable, since the result was foreseen by means of a rigorous application of the conception of the vibratory motion of light, and confirmed by experiment. Professor Airy, of Cambridge, was led by his reasonings to see, that if Newton's rings are produced between a lens and a plate of metal, by polarized light, then, up to the polarizing angle, the central spot will be black, and instantly beyond this, it will be white. In a note,¹⁵ in which he announced this, he says, "This I anticipated from Fresnel's expressions; it is confirmatory of them, and defies emission." He also predicted that when the rings were produced between two substances of very different refractive powers, the centre would twice pass from black to white and from white to black, by increasing the angle; which anticipation was fulfilled by using a diamond for the higher refraction.¹⁶

7. *Conical Refraction.*—In the same manner, Professor Hamilton of Dublin pointed out that according to the Fresnelian doctrine of double refraction, there is a certain direction of a crystal in which a single ray of light will be refracted so as to form a *conical pencil*. For the direction of the refracted ray is determined by a plane which touches the wave surface, the rule being that the ray must pass from the centre of the surface to the point of contact; and though in general this contact gives a single point only, it so happens, from the peculiar inflected form of the wave surface, which has what is called a *cusp*, that in one particular position, the plane can touch the surface in an entire circle. Thus the general rule which assigns the path of

¹⁵ Addressed to myself, dated May 23, 1831. I ought, however, to notice, that this experiment had been made by M. Arago, fifteen years earlier, and published: though not then recollected by Mr. Airy.

¹⁶ *Camb. Trans.* vol. ii. p. 409.