

These investigations were published¹⁴ in 1821. In succeeding years, Fresnel undertook to extend the application of his formulæ to a case in which they ceased to have a meaning, or, in the language of mathematicians, became *imaginary*; namely, to the case of internal reflection at the surface of a transparent body. It may seem strange to those who are not mathematicians, but it is undoubtedly true, that in many cases in which the solution of a problem directs impossible arithmetical or algebraical operations to be performed, these directions may be so interpreted as to point out a true solution of the question. Such an interpretation Fresnel attempted¹⁵ in the case of which we now speak; and the result at which he arrived was, that the reflection of light through a rhomb of glass of a certain form (since called *Fresnel's rhomb*), would produce a polarization of a kind altogether different from those which his theory had previously considered, namely, that kind which we have spoken of as *circular polarization*. The complete confirmation of this curious and unexpected result by trial, is another of the extraordinary triumphs which have distinguished the history of the theory at every step since the commencement of Fresnel's labors.

But anything further which has been done in this way, may be treated of more properly in relating the verification of the theory. And we have still to speak of the most numerous and varied class of facts to which rival theories of light were applied, and of the establishment of the undulatory doctrine in reference to that department; I mean the phenomena of depolarized, or rather, as I have already said, *dipolarized* light.

Sect. 5.—Explanation of Dipolarization by the Undulatory Theory.

WHEN Arago, in 1811, had discovered the colors produced by polarized light passing through certain crystals,¹⁶ it was natural that attempts should be made to reduce them to theory. M. Biot, animated by the success of Malus in detecting the laws of double refraction, and Young, knowing the resources of his own theory, were the first persons to enter upon this undertaking. M. Biot's theory, though in the end displaced by its rival, is well worth notice in the history of the subject. It was what he called the doctrine of *moveable polarization*. He conceived that when the molecules of light pass through

¹⁴ *An. Chim.* t. xvii.

¹⁵ *Bullet. des Sc.* Feb. 1823.

¹⁶ See chap. ix.