

though less conspicuously, to many other kinds of crystals. Huyghens had noticed the same fact in rock-crystal;⁵ and Malus found it to belong to a large list of bodies besides; for instance, arragonite, sulphate of lime, of baryta, of strontia, of iron; carbonate of lead; zircon, corundum, cymophane, emerald, euclase, felspar, mesotype, peridot, sulphur, and mellite. Attempts were made, with imperfect success, to reduce all these to the law which had been established for Iceland spar. In the first instance, Malus took for granted that the extraordinary refraction depended always upon an oblate spheroid; but M. Biot⁶ pointed out a distinction between two classes of crystals in which this spheroid was oblong and oblate respectively, and these he called *attractive* and *repulsive* crystals. With this correction, the law could be extended to a considerable number of cases; but it was afterwards proved by Sir D. Brewster's discoveries, that even in this form, it belonged only to substances of which the crystallization has relation to a single axis of symmetry, as the rhombohedron, or the square pyramid. In other cases, as the rhombic prism, in which the form, considered with reference to its crystalline symmetry, is *biaxal*, the law is much more complicated. In that case, the sphere and the spheroid, which are used in the construction for uniaxal crystals, transform themselves into the two successful convolutions of a single continuous curve surface; neither of the two rays follows the law of ordinary refraction; and the formula which determines their position is very complex. It is, however, capable of being tested by measures of the refractions of crystals cut in a peculiar manner for the purpose, and this was done by MM. Fresnel and Arago. But this complex law of double refraction was only discovered through the aid of the theory of a luminiferous ether, and therefore we must now return to the other facts which led to such a theory.

CHAPTER VI.

DISCOVERY OF THE LAWS OF POLARIZATION.

IF the Extraordinary Refraction of Iceland spar had appeared strange, another phenomenon was soon noticed in the same

⁵ *Traité de la Lumière*, ch. v. Art. 20.

⁶ Biot, *Traité de Phys.* iii. 330.