

and will be brightest when the crystal marks E and W. The first of these images is polarized *in the plane* NS passing through the ray, and the second *in the plane* EW, perpendicular to the other. And these rays are *oppositely* polarized. It was further found that whether the ray were polarized by reflection from glass, or from water, or by double refraction, the modification of light so produced, or the nature of the polarization, was identical in all these cases;—that the alternatives of ordinary and extraordinary refraction and non-refraction, were the same, by whatever crystal they were tested, or in whatever manner the polarization had been impressed upon the light; in short, that the property, when once acquired, was independent of everything except the sides or *poles* of the ray; and thus, in 1811, the term “polarization” was introduced.⁴

This being the state of the subject, it became an obvious question, by what other means, and according to what laws, this property was communicated. It was found that some crystals, instead of giving, by double refraction, two images oppositely polarized, give a single polarized image. This property was discovered in the agate by Sir D. Brewster, and in tourmaline by M. Biot and Dr. Seebeck. The latter mineral became, in consequence, a very convenient part of the apparatus used in such observations. Various peculiarities bearing upon this subject, were detected by different experimenters. It was in a short time discovered, that light might be polarized by refraction, as well as by reflection, at the surface of uncrystallized bodies, as glass; the plane of polarization being perpendicular to the plane of refraction; further, that when a portion of a ray of light was polarized by reflection, a corresponding portion was polarized by transmission, the planes of the two polarizations being at right angles to each other. It was found also that the polarization which was incomplete with a single plate, either by reflection or refraction, might be made more and more complete by increasing the number of plates.

Among an accumulation of phenomena like this, it is our business to inquire what general laws were discovered. To make such discoveries without possessing the general theory of the facts, required no ordinary sagacity and good fortune. Yet several laws were detected at this stage of the subject. Malus, in 1811, obtained the important generalization that, whenever we obtain, by any means, a polarized ray of light, we produce also another ray, polarized in a contrary

⁴ *Mém. Inst.* 1810.