substance, which appeared stranger still, and which in the sequel was found to be no less important. I speak of the facts which were afterwards described under the term *Polarization*. Huyghens was the discoverer of this class of facts. At the end of the treatise which we have already quoted, he says,[1] "Before I quit the subject of this crystal, I will add one other marvellous phenomenon, which I have discovered since writing the above; for though hitherto I have not been able to find out its cause, I will not, on that account, omit pointing it out, that I may give occasion to others to examine it." He then states the phenomena; which are, that when two rhombohedrons of Iceland spar are in parallel positions, a ray doubly refracted by the first, is not further divided when it falls on the second: the ordinarily refracted ray is ordinarily refracted *only*, and the extraordinary ray is only extraordinarily refracted by the second crystal, neither ray being doubly refracted. The same is still the case, if the two crystals have their *principal planes* parallel, though they themselves are not parallel. But if the principal plane of the second crystal be perpendicular to that of the first, the reverse of what has been described takes place; the ordinarily refracted ray of the first crystal suffers, at the second, extraordinary refraction *only*, and the extraordinary ray of the first suffers ordinary refraction only at the second. Thus, in each of these positions, the double refraction of each ray at the second crystal is reduced to single refraction, though in a different manner in the two cases. But in any other position of the crystals, each ray, produced by the first, is doubly refracted by the second, so as to produce four rays.

A step in the right conception of these phenomena was made by Newton, in the second edition of his *Opticks* (1717). He represented them as resulting from this;—that the rays of light have "sides," and that they undergo the ordinary or extraordinary refraction, according as these sides are parallel to the principal plane of the crystal, or at right angles to it (Query 26). In this way, it is clear, that those rays which, in the first crystal, had been selected for extraordinary refraction, because their sides were perpendicular to the principal plane, would all suffer extraordinary refraction at the second crystal for the same reason, if its principal plane were parallel to that of the first; and would all suffer ordinary refraction, if the principal plane of the second crystal were perpendicular to that of the first, and con-

[1] *Tr. Opt.* p. 252.