

ness, and extent, falling to the share of that set which the position of the analyzer most favours.

(161.) It is manifest that these colours originate in the interference of two series of undulations propagated with different velocities within the crystal, and which therefore must necessarily belong the one to the ordinary, the other to the extraordinary, pencils into which the incident light is divided, which, as before shown, travel with different velocities within its substance. These pencils, however, during their progress through it, are proceeding in different directions (by reason of the double refraction of the medium) and are oppositely polarized—so that, while within the crystal, they cannot interfere. Their interference, then, must be accomplished after their emergence, when their directions have been again reduced to parallelism, and they have been (wholly or partially) brought to a common plane of polarization by the action of the second tourmaline. Let us, therefore, examine how this is brought about. And first, along the vertical arm of the *black* cross, the whole of the incident light being polarized in the plane of a vertical section of the crystal containing its axis, will pass into the ordinary pencil, and none into the extraordinary—so that there will be nothing to interfere with it: and emerging wholly polarized in that plane, will be wholly stopped by the analyzing tourmaline—the result being darkness. But if this tourmaline be turned 90° round in its own plane, it will be wholly transmitted, and the arm of the cross in question will be white. As regards the horizontal arm of the cross, in