zero, but from half an undulation. Of the two partial systems of waves that interfere, in the case considered, that which belonged to the ordinary pencil in the crystal passes, as an extraordinary one, through the analyzing plate. Now it is a law, susceptible of demonstration, but which it would lead us too far aside at present to demonstrate—that in the transition from an ordinary to an extraordinary refraction, half an undulation is gained. With the other portion of the interfering pencil, no such transition takes place. Half an undulation then has to be reckoned in addition to the phase-difference due to the simple passage of the two rays through the crystal—just as is the case in the Newtonian reflected rings, and with the same result.

(162.) If we follow out the same chain of reasoning in the case when the analyzing plate is parallel to the polarizing one, the conclusions will be identical up to this last step. But here the cases differ. Neither of the interfering pencils here at its entry into the second tourmaline undergoes extraordinary refraction, and there is accordingly no semi-undulation to be added to the phase-difference. The rings, therefore, will have the characters of the transmitted series of Newton's colours.

(163.) In the generality of uniaxal crystals, the tints of the rings, when the crystal itself is colourless (or as nearly as its colours will allow), follow a succession identical with that of the Newtonian colours of their plates. I have elsewhere called attention, however, to several instances of deviation from this rule, some of which are of so remarkable a nature as to deserve special mention.