

Optics, like Astronomy, has for its object of inquiry, first, the laws of phenomena, and next, their causes; and we may hence divide this science, like the other, into *Formal Optics* and *Physical Optics*. The distinction is clear and substantive, but it is not easy to adhere to it in our narrative; for, after the theory had begun to make its rapid advance, many of the laws of phenomena were studied and discovered in immediate reference to the theoretical cause, and do not occupy a separate place in the history of science, as in Astronomy they do. We may add, that the reason why Formal Astronomy was almost complete before Physical Astronomy began to exist, was, that it was necessary to construct the science of Mechanics in the mean time, in order to be able to go on; whereas, in Optics, mathematicians were able to calculate the results of the undulatory theory as soon as it had suggested itself from the earlier facts, and while the great mass of facts were only becoming known.

We shall, then, in the first *nine* chapters of the History of Optics, treat of the Formal Science, that is, the discovery of the laws of phenomena. The classes of phenomena which will thus pass under our notice are numerous; namely, reflection, refraction, chromatic dispersion, achromatization, double refraction, polarization, dipolarization, the colors of thin plates, the colors of thick plates, and the fringes and bands which accompany shadows. All these cases had been studied, and, in most of them, the laws had been in a great measure discovered, before the physical theory of the subject gave to our knowledge a simpler and more solid form.