

great intensity of the light returned at a certain angle; and the referring the different colors to the *different quantity of the refraction*; and both these steps appear indubitably to be the discoveries of Descartes. And he informs us that these discoveries were not made without some exertion of thought. "At first," he says,⁹ "I doubted whether the iridal colors were produced in the same way as those in the prism; but, at last, taking my pen, and carefully calculating the course of the rays which fall on each part of the drop, I found that many more come at an angle of forty-one degrees, than either at a greater or a less angle. So that there is a bright bow terminated by a shade; and hence the colors are the same as those produced through a prism."

The subject was left nearly in the same state, in the work of Grimaldi, *Physico-Mathesis, de Lumine, Coloribus et Iride*, published at Bologna in 1665. There is in this work a constant reference to numerous experiments, and a systematic exposition of the science in an improved state. The author's calculations concerning the rainbow are put in the same form as those of Descartes; but he is further from seizing the true principle on which its coloration depends. He rightly groups together a number of experiments in which colors arise from refraction;¹⁰ and explains them by saying that the color is brighter where the light is denser: and the light is denser on the side from which the refraction turns the ray, because the increments of refraction are greater in the rays that are more inclined.¹¹ This way of treating the question might be made to give a sort of explanation of most of the facts, but is much more erroneous than a developement of Descartes's view would have been.

At length, in 1672, Newton gave¹² the true explanation of the facts; namely, that light consists of rays of different colors and different refrangibility. This now appears to us so obvious a mode of interpreting the phenomena, that we can hardly understand how they can be conceived in any other manner; but yet the impression which this discovery made, both upon Newton and upon his contemporaries, shows how remote it was from the then accepted opinions. There appears to have been a general persuasion that the coloration was produced, not by any peculiarity in the law of refraction itself, but by some collateral circumstance,—some dispersion or variation of density of the light, in addition to the refraction. Newton's discovery consisted in

⁹ Sect. ix. p. 193.

¹⁰ Prop. 35, p. 254.

¹¹ *Ib.* p. 256.

¹² *Phil. Trans.* l. vii. p. 3075.