

perimental means by which Dr. Young confirmed this principle, which is known in optics by the name of the *interference* of the rays of light, were as simple and satisfactory as the principle itself is beautiful; but the verifications of it, drawn from the explanation it affords of phenomena apparently the most remote, are still more so. Newton's colors of thin films were the first phenomena to which its author applied it with full success. Its next remarkable application was to those of diffraction, of which, in the hands of M. Fresnel, a late eminent French geometer, it also furnished a complete explanation, and that, too, in cases to which Newton's hypothesis could not apparently be made to apply, and through a complication of circumstances which might afford a very severe test of any hypothesis.

(289.) A simple and beautiful experiment on the interferences of polarized light due to Fresnel and Arago enabled them to bring Dr. Young's law to bear on the colors produced by crystallized plates in a polarized beam, and by so doing afforded a key to all the intricacies of these magnificent but complex phenomena. Nothing now was wanting to a rational theory of double refraction but to frame an hypothesis of some mode in which light might be conceived to be propagated through the elastic medium supposed to convey it, in such a way as not to be contradictory to any of the facts, nor to the general laws of dynamics. This essential idea, without which every thing that had been before done would have been incomplete, was also furnished by Dr. Young, who, with a sagacity which would have done honor to Newton himself, had declared, that to accommodate the doctrine of Huyghens to the phenomena of polarized light it is necessary to conceive the mode of propagation of a luminous impulse through the ether, differently from that of a sonorous one through the air. In the latter the particles of the air *advance* and *recede*; in the former, those of the ether must be supposed to *tremble laterally*.

(290.) Taking this as the groundwork of his reasoning, Fresnel succeeded in erecting on it a theory of polarization and double refraction, so happy in its adaptation