are once excited, they retain the impression of light which they have received, so that the disappearance, obscuration and change of color in a star are not perceived by us to their full extent. The phenomenon of scintillation is more strikingly manifested in the telescope when the instrument is shaken, for then different points of the retina are successively excited, and colored and frequently interrupted rings are seen. The principle of interference explains how the momentary colored effulgence of a star may be followed by its equally instantaneous disappearance or sudden obscuration, in an atmosphere composed of ever-changing strata of different temperatures, moisture, and density. The undulatory theory teaches us generally that two rays of light (two systems of waves) emanating from one source (one center of commotion), destroy each other by inequality of path; that the light of one ray added to the light of the other produces darkness. When the retardation of one system of waves in reference to the other amounts to an odd number of semi-undulations, both systems endeavor to impart simultaneously to the same molecule of ether equal but opposite velocities, so that the effect of their combination is to produce rest in the molecule, and therefore darkness. In some cases, the refrangibility of the different strata of air intersecting the rays of light exerts a greater influence on the phenomenon than the difference in length of their path.*

The intensity of scintillations varies considerably in the different fixed stars, and does not seem to depend solely on their altitude and apparent magnitude, but also on the nature of their own light. Some, as for instance Vega, flicker less than Arcturus and Procyon. The absence of scintillation in planets with larger disks is to be ascribed to compensation and to the naturalizing mixture of colors proceeding from different points of the disk. The disk is to be regarded as an aggregate

by Galileo, Scaliger, Kepler, Descartes, Hooke, Huygens, Newton, and John Michell, which I examined in a memoir presented to the Institute in 1840 (*Comptes Rendus*, t. x., p. 83), are inadmissible. Thomas Young, to whom we owe the discovery of the first laws of interference regarded scintillation as an inexplicable phenomenon. The erroneousness of the ancient explanation, which supposes that vapors ascend and displace one another, is sufficiently proved by the circumstance that we see scintillations with the naked eye, which presupposes a displacement of a minute. The undulations of the margin of the sun are from 4″ to 5″, and are perhaps owing to chasms or interruptions, and therefore also to the effect of interference of the rays of light." (*Extracts from Arago's MSS. of* 1847.)

* See Arago, in the *Annuaire pour* 1831 p. 168.