erate shortly the different suggestions which Fresnel assimilated and worked up into his celebrated physical theory of light.

That light consisted in the motion of something was in the beginning of the nineteenth century a generally accepted notion among natural philosophers. It had been so ever since Olaus Römer[1] in the seventeenth century, from the observation of the hitherto unexplained delay in the disappearance of Jupiter's satellites during eclipses, had inferred, and Bradley[2] had later on con-

[1] The moons of Jupiter, of which two are visible to the naked eye, were clearly seen and described as one of the first discoveries with his telescope by Galileo in 1610, and published in his 'Sidereus Nuncius.' Owing to their continual and rapid change of position and their frequent eclipses, they were very soon considered to furnish a valuable means of determining the longitude at sea, and were repeatedly and very minutely observed. In the course of such observations by Cassini and Römer at Paris, the latter found, in 1675, that the period of occultation of the nearest moon varied. This variation he traced to the fact that the earth was moving towards or away from Jupiter. If light takes time to travel, the visibility of the phenomenon is necessarily thus anticipated or postponed. This was the first occasion on which data for the calculation of the velocity of light were forthcoming; the terrestrial experiments of Galileo having been inconclusive. Römer's explanation and calculation were accepted by most astronomers; they were confirmed by

[2] the phenomenon of aberration, discovered by Bradley. It is analogous to the observation we can make in a moving railway train if it rains; the drops at the window, though they be descending perpendicularly, yet appearing in a slanting direction, in proportion to the velocity of the train. Both phenomena involve the motion of light itself and the motion of the observer, who receives the luminous impression and locates it in space and time. The principle involved in Römer's discovery was later enunciated by Doppler, who maintained that the very short periods which belong to different colours of the spectrum, according to the undulatory theory, must suffer (like the longer periods in Römer's occultations) by the motion of the luminous object or of the observer in the line of sight. Although this theory was admitted in acoustics, it took some time before it was admitted in optics. Bolzano, Professor of Religious Philosophy and a colleague of Doppler at Prague, foretold as early as 1842 the great utility of the principle, and wrote: "I foresee with confidence that use will be hereafter made of it in order to solve—by observing the changes which the colour of stars undergoes in time—the questions whether and in which direction and with what