

question whether those stars yet exist which we now see shining.* We are astonished to meet with this happy conjecture in a work whose intellectual author was far behind his cotemporaries in mathematical, astronomical, and physical knowledge. The velocity of *reflected* solar light was first measured by Römer (November, 1675) by comparing the periods of occultation of Jupiter's satellites; while the velocity of the *direct* light of the fixed stars was ascertained (in the autumn of 1727) by means of Bradley's great discovery of aberration, which afforded *objective* evidence of the translatory movement of the earth, and of the truth of the Copernican system. In recent times, a third method of measurement has been suggested by Arago, which is based on the phenomena of light observed in a variable star, as, for instance, Algol in Perseus.† To these astronomical methods may be added one of terrestrial measurement, lately conducted with much ingenuity and success by M. Fizeau in the neighborhood of Paris. It reminds us of Galileo's early

* In speaking of the deceptions occasioned by the velocity of sound and light, Bacon says: "This last instance, and others of a like nature, have sometimes excited in us a most marvelous doubt, no less than whether the image of the sky and stars is perceived as at the actual moment of its existence, or rather a little after, and whether there is not (with regard to the visible appearance of the heavenly bodies) a true and apparent place which is observed by astronomers in parallaxes. It appeared so incredible to us that the images or radiations of heavenly bodies could suddenly be conveyed through such immense spaces to the sight, and it seemed that they ought rather to be transmitted in a definite time. That doubt, however, as far as regards any great difference between the true and apparent time, was subsequently completely set at rest when we considered . . ."—The works of Francis Bacon, vol. xiv., Lond., 1831 (*Novum Organum*), p. 177. He then recalls the correct view he had previously announced precisely in the manner of the ancients. Compare Mrs. Somerville's *Connection of the Physical Sciences*, p. 36, and *Cosmos*, vol. i., p. 154, 155.

† See Arago's explanation of his method in the *Annuaire du Bureau des Longitudes pour 1842*, p. 337-343. "L'observation attentive des phases d'Algol à six mois d'intervalle servira à déterminer directement la vitesse de la lumière de cette étoile. Près du maximum et du minimum le changement d'intensité s'opère lentement; il est au contraire rapide à certaines époques intermédiaires entre celles qui correspondent aux deux états extrêmes, quand Algol, soit en diminuant, soit en augmentant d'éclat, passe pour la troisième grandeur."

"The attentive observation of the phases of Algol at a six-months interval will serve to determine directly the velocity of that star's light. Near the maximum and the minimum the change of intensity is very slow; it is, on the contrary, rapid at certain intermediate epochs between those corresponding to the two extremes, when Algol, either diminishing or increasing in brightness, appears of the third magnitude.