

Telescopes, although in a much less degree, unfortunately also give the stars an incorrect and spurious diameter; but, according to the splendid investigations of Sir William Herschel,* these diameters decrease with the increasing power of the instrument. This distinguished observer estimated that, at the excessive magnifying power of 6500, the apparent diameter of Vega Lyræ still amounted to $0''36$. In terrestrial objects, the form, no less than the mode of illumination, determines the magnitude of the smallest angle of vision for the naked eye. Adams very correctly observed that a long and slender staff can be seen at a much greater distance than a square whose sides are equal to the diameter of the staff. A stripe may be distinguished at a greater distance than a spot, even when both are of the same diameter. Arago has made numerous calculations on the influence of form (outline of the object) by means of angular measurement of distant lightning conductors visible from the Paris Observatory. The *minimum* optical visual angle at which terrestrial objects can be recognized by the naked eye has been gradually estimated lower and lower from the time when Robert Hooke fixed it exactly at a full minute, and Tobias Mayer required $34''$ to perceive a black speck on white paper, to the period of Leeuwenhoek's experiments with spider's threads, which are visible to ordinary sight at an angle of $4''\cdot7$. In the recent and most accurate experiments of Hueck, on the problem of the movement of the crystalline

image of each star of the group on the retina, and substitute a small circle for each point of the former general image; these circles will impinge upon one another, and the different points of the retina will be illumined by light emanating simultaneously from many stars. A slight consideration will show, that, excepting at the margins of the general image, the luminous air has, in consequence of the superposition of the circles, the same degree of intensity as in those cases where each star illumines only one single point of the retina; but if each of these points be illumined by a light equal in intensity to the concentrated light of a star of the seventh magnitude, it is evident that the dilatation of the individual images of contiguous stars can not prevent the visibility of the whole. Telescopic instruments have the defect, although in a much less degree, of giving the stars a sensible and spurious diameter. We therefore perceive with instruments, no less than with the naked eye, groups of stars, inferior in intensity to those which the same telescopic or natural sight would recognize if they were isolated."—Arago, in the *Annuaire du Bureau des Longitudes pour l'an 1842*, p. 284.

* Sir William Herschel, in the *Philos. Transact.* for 1803, vol. 93, p. 225, and for 1805, vol. 94, p. 184. Compare also Arago, in the *Annuaire pour 1842*, p. 360-374.