

*nissima ad alcuna delle maggiori, e che però quella fusse altissima, potrebbe accadere che qualche sensibil mutazione succedesse tra di loro.*” “Wherefore I do not believe,” says Galileo, in his third discourse (Giornata terza), “that all the stars are scattered over a spherical superficies *at equal distances from a common center*; but I am of opinion that their distances from us are so various that some of them may be two or three times as remote as others, so that when some minute star is discovered by the telescope close to one of the larger, and yet the former is highest, it may be that some sensible change might take place among them.” The introduction of the Copernican system imposed, as it were, the necessity of numerically determining, by means of measurement, the change of direction occasioned in the position of the fixed stars by the earth’s semi-annual change of place in its course round the sun. Tycho Brahe’s angular determinations, of which Kepler so successfully availed himself, do not manifest any perceptible change arising from parallax in the apparent positions of the fixed stars, although, as I have already stated, they are accurate to a minute of the arc. For this the Copernicans long consoled themselves with the reflection that the diameter of the earth’s orbit ( $165\frac{1}{3}$  millions of geographical miles) was insignificant when compared to the immense distance of the fixed stars.

The hope of being able to determine the existence of parallax must accordingly have been regarded as dependent on the perfection of optical and measuring instruments, and on the possibility of accurately measuring very small angles. As long as such accuracy was only secure within a minute, the non-observance of parallax merely testified to the fact that the distance of the fixed stars must be more than 3438 times the earth’s mean distance from the sun, or semi-diameter of its orbit.\* This *lower* limit of distances rose to 206,265 semi-diameters when certainty to a second was attained in the observations of the great astronomer, James Bradley; and in the brilliant period of Fraunhofer’s instruments (by the direct measurement of about the tenth part of a second of arc), it rose still higher, to 2,062,648 mean distances of the earth. The labors and the ingeniously contrived zenith apparatus of Newton’s great cotemporary, Robert Hooke (1669), did not lead to the desired end. Picard, Horrebow (who worked out Römer’s rescued observations).

\* Bessel, in Schumacher’s *Jahrb. für* 1839, s. 511.