

*XLI. Introduction to the following Observations, made by Messieurs Charles Mafon and Jeremiah Dixon, for determining the Length of a Degree of Latitude, in the Provinces of Maryland and Pennsylvania, in North America; by the Reverend Nevil Maskelyne, B. D. F. R. S. Astronomer Royal.*

Read Nov. 24,  
1768.

**M**ESSIEURS Charles Mafon and Jeremiah Dixon, who observed the last transit of Venus over the sun, at the Cape of Good Hope, under the direction of the Royal Society, had been since engaged, by the Right Honourable Lord Baltimore and the Honourable Mr. Penn, to settle the limits between the provinces of Maryland and Pennsylvania, in North America; which they performed partly by trigonometrical, and partly by astronomical observations.

In the course of this work, they traced out and measured some lines lying in and near the meridian, and extended, in all, somewhat more than 100 miles; and, for this purpose, the country in these parts being all over-grown with trees, large openings were cut through the woods, in the direction of the lines, which formed the straightest and most regular, as well as extensive vistas that, perhaps, ever were made.

Messieurs

Messieurs Mafon and Dixon perceived that a most inviting opportunity was here given for determining the length of a degree of latitude, from the measure of near a degree and half. Moreover, one remarkable circumstance very much favoured the undertaking, which was, that the country, through which the lines run, was, for the most part, as level as if it had been laid out by art.

The astronomical observations had been taken with an excellent sector of six foot radius, constructed by Mr. Bird, the first which ever had the plumb-line passing over and bisecting a point at the centre of the instrument. This instrument was so exact, that they found they could trace out a parallel of latitude by it, without erring above 15 or 20 yards; in doing which, it should be observed, that they generally used the same stars, commonly 6 or 8 or 10 in number, at the several stations, and made a double set of observations at each station, with the limb of the sector turned both to the east and to the west. This sector had been set up at the northermost point of the lines before-mentioned as proper for determining the length of a degree of latitude. In order to determine the difference of latitude between this point and the southermost point of the lines, or the amplitude of an arch of a meridian contained between their parallels, it was necessary that the sector should be also set up at the southernmost point, and the like observations repeated there, upon the same stars, which had already been observed at the northermost point.

This plan of a measure of a degree in North America, Messieurs Mafon and Dixon submitted to  
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the consideration of the Council of the Royal Society, and offered to carry it into execution, at the expence of the Society, if they thought proper. The Council determined that so useful and important a work should be completed, and accordingly sent out instructions to Messieurs Maſon and Dixon for the regulation of their operations; particularly requiring them to measure the lines carefully over-again with fir-rods, which they sent to them, together with a braſs ſtandard, of 5 foot, with which the rods were to be compared frequently, and the difference noted, and alſo the height of the thermometer at the time; for the lines had been all meaſured before with a ſtandard chain, which, though ſufficient for the common purpoſes of ſurveying, was by no means to be depended upon in ſo nice an operation as that of meaſuring a degree of latitude. The Honourable Mr. Penn was pleaſed, at the requeſt of the Royal Society, to grant the further uſe of his ſector, before mentioned, and other inſtruments, to the obſervers, for compleating this meaſure.

The method purſued in this work, is, that which the level diſpoſition of the country pointed out. But the reſult may be expected to be more accurate on this account, as meaſures taken in a ſtraight line, and on a level ſurface, are known to be capable of great exactneſs; and no adventitious errors are here introduced from any poſſible errors of a chain of triangles. Meſſieurs Maſon and Dixon having alſo determined the angle which the oblique line made with the meridian, by proper aſtronomical obſervations, and the amplitude of the arch of their meridian line by ſeveral obſervations of zenith diſtances of fixed ſtars,  
made

made at both ends of the meridian, with the limb of the sector turned both east and west at each extremity ; this measure of a degree seems to me to be as well stated, and as much to be depended on, as any that has been made ; and will, I presume, be thought a valuable addition to the other measures of degrees, which have been taken with great care and pains, by various learned men, particularly the members of the Royal Academy of Sciences at Paris, who have acquired so much just reputation by their valuable labours bestowed on this subject.

It may not be improper to remark, that the level disposition of the country this degree passes through, which, as I understand, also obtains further to the south, and, in a great measure, to the north of the limits of the same, gives some advantage to this measure, with respect to the use that may be made of it in inquiring into the figure of the earth ; as there is no room for suspicion that the plumb-line of the sector could be deflected materially from its proper position by the attraction of any mountain, or even elevated ground of a more moderate height, continued for a great length ; which latter circumstance, not taken notice of before, the learned Father Boscovich has shewn, may produce a very considerable deviation of the plumb-line, in the elaborate treatise of the measure of a degree of the meridian between Rome and Rimini, taken by himself and his learned coadjutor, Father Le Maire.