XIX. *On the Computation of the Sun's Distance from the Earth, by the Theory of Gravity: In a Letter to* Mathew Maty, *M. D. Sec. R. S. from the Rev.* Mr. Horsley, *F. R. S.*

S I R,

Read June 1, 1769.

A LITTLE Treatise, that has lately been published, against Dr. Stewart's method of determining the distance of the Sun by the theory of gravity, has put me upon re-considering a subject which I had long dismissed from my thoughts. I am far from being convinced that Dr. Stewart's conclusions are " erroneous upon " his own principles," as his antagonist affirms; and I am well satisfied that there is no error in the principles themselves. I have always been sensible that an extreme precision was requisite in determining the mean quantity of the solar force affecting the moon's gravity towards the earth, in order to obtain an accurate estimation of the distance; and this circumstance was mentioned by me, in a paper that I communicated to the Society about two years ago *, before it had been remarked, that I knew of, by any other writer upon the subject. I must now declare, that the imperfection of the method arising from this

* See Philof. Tranf. vol. LVII. for 1767, p. 179. 183.

circumſtance is much greater than I was at firſt aware of. I owe this better information entirely to the reviſal of Dr. Stewart's Theorems, not to any thing that has been written upon the ſubjeƈt by others. I find that if I increaſe the mean quantity of the ſun's diſturbing force, as determined by Dr. Stewart in the 9th propoſition of his Supplemental Traƈt, and by myſelf, in my former paper, by $\frac{1}{29000}$th part of itſelf, I obtain, by my own method of computation, $9'' \, 3'', \, 394$ for the Sun's mean horizontal parallax ; which ſeems to be ſo nearly the mean of the quantities of the parallax deduced from the beſt obſervations of the tranſit of 1761, that it would be ridiculous to ſet up, any longer, the concluſions of this theory in oppoſition to obſervation. It is much more probable that the theory ſhould err in ſo ſmall a matter as $\frac{1}{29000}$th of the Sun's diſturbing force, than that obſervation ſhould err in more than $\frac{2}{9}$, that is nearly in $\frac{1}{4}$ of the whole quantity in queſtion. I beg the favour of you to communicate this to the Society.

I have the honour to be, Sir,

Your moſt obedient,

and moſt humble ſervant,

Oxford, May 5,
1769.

Samuel Horſley.