XXXII. *Obſervations on the Tranſit of* Venus *over the Sun, on the 6th of* June 1761: *In a Letter to the Right Honourable* George *Earl of* Macclesfield, *Preſident of the Royal Society, from the Reverend* Nathaniel Bliſs, *M. A.* Savilian *Profeſſor of Geometry in the Univerſity of* Oxford, *and F. R. S.*

To the Right Honourable the Earl of Macclesfield, *Preſident of the Royal Society.*

My Lord, June 11, 1761.

Read June 11, 1761. THE preſent bad ſtate of health of my worthy friend and collegue Dr. Bradley, his Majeſty's Aſtronomer, prevented him from making the proper obſervations of the tranſit of Venus on Saturday morning laſt; and conſequently, has deprived the public of ſuch as would have been taken by ſo experienced and accurate an obſerver. But as the doctor was pleaſed to deſire me to attend at the Royal Obſervatory, to ſupply his place, I have preſumed to lay before your Lordſhip, and the Royal Society, the obſervations I there made, with great care, and as much accuracy, as the unfavourable ſtate of the heavens would permit. The inſtruments we propoſed to uſe, were a reflecting teleſcope, of two feet focal length, to which was fitted Mr. Dollond's micrometer, both executed by Mr. Short. There were ſome additions neceſſary to be

be made to that inſtrument, which could not be completed before Tueſday evening, the 2d inſtant, and which we received at the Obſervatory, early the following morning. But as it is abſolutely neceſſary, that the teleſcope ſhould be nicely adjuſted to diſtinct viſion, for the obſerver's eye, otherwiſe the apparent angle, meaſured by the micrometer, will not be exactly true; and as the eyes of different obſervers may vary very much; the weather was ſo very unfavourable, that I had not ſo much as one opportunity of ſeeing any celeſtial object, whereby I might fit it to the proper focus of parallel rays for my eye. Mr. Green therefore, Dr. Bradley's aſſiſtant, was the only perſon who could uſe that inſtrument, having adjuſted it to his eye ſome time before. The inſtrument I made uſe of myſelf, was an exquiſite micrometer, of the old form, made by the late Mr. Graham, adapted to an excellent refracting teleſcope of 15 feet focal length. The ſky was ſo very cloudy the morning of the tranſit, and the apparent probability of its clearing up ſo very ſmall, that we almoſt deſpaired of being able to make any obſervation; for we had but one glimple of the ſun, and that only for about half a minute, till half an hour after ſeven o'clock. We then prepared to obſerve the diſtance of Venus from each limb of the ſun, on the chords parallel to the equator, by Mr. Green, with the reflecting teleſcope, and its micrometer; and I myſelf, with the refracting teleſcope, and the old micrometer, obſerved differences of right aſcenſion and declination from the conſequent and ſouthermoſt limb of the ſun.

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The weather was more favourable at your Lordſhip's own obſervatory at Shirburn-Caſtle, where the Reverend Mr. Hornſby, Fellow of Corpus-Chriſti College in Oxford, attended, to aſſiſt Mr. Phelps and Mr. Bartlett, your own obſervers. Mr. Hornſby has favoured me with a copy of the obſervations there made; and writes, that though the morning ſeemed very unpromiſing, yet the clouds began to diſperſe about half an hour after five, moving ſlowly towards the eaſt. He then made many obſervations of the differences of Venus and the ſun's limb in right aſcenſion and declination, in the ſame manner which I uſed at the Royal Obſervatory, the ſky free from clouds, and the air tolerably clear. I ſhall not at preſent lay theſe obſervations, or my own, or Mr. Green's, before your Lordſhip and the Society, as the ſhortneſs of the time will not permit me to examine how well they correſpond with each other, or what degree of exactneſs may be depended upon from them.

The continual ſwift motion of flying clouds, of different denſities, over the diſk of the ſun, were no ſmall prejudice to our obſervations at Greenwich, till the end of the tranſit was approaching, when it was tolerably clear, a ſmall hazineſs only remaining. We obſerved the internal contact of Venus with the ſun's limb, Mr. Green having taken off the micrometer with the two feet reflector, Mr. Bird, mathematical inſtrument-maker in the Strand, with a reflector of 18 inches focal length, of his own making, and myſelf with the refractor, the teleſcopes uſed by Mr. Bird and myſelf magnifying about 55 times, that by Mr. Green 120 times, June 5th, 1761, at

20h

20h 19′ 00″ apparent time, all three agreeing to the ſame ſecond. The final egreſs by Mr. Green and myſelf, was only one ſecond later than by Mr. Bird, at 20h 37′ 9″ apparent time. At 20h 26′ 56″, by the mean of five obſervations, the center of Venus was north of the ſun's ſouth limb in declination, by my micrometer 3′ 20″. The diameter of Venus was once meaſured by Mr. Green, with Dollond's micrometer, 57″; by Mr. Canton in Spital-Square, being the mean of three good obſervations, with the ſame kind of micrometer, 58″. The ſun's horizontal diameter was obſerved by Mr. Bird, with the reflector, 31′ 36″, which I ſuſpect is three or four ſeconds too large, as the teleſcope was not accurately adjuſted for parallel rays to his eye.

The internal contact was obſerved by Mr. Hornſby, on the north ſide of the obſervatory at Shirburn-Caſtle, with an excellent 12 feet teleſcope and micrometer, made by Mr. Bird, of the old form; and by Mr. Phelps, on the ſouth ſide, with your Lordſhip's 14 feet teleſcope; the teleſcope uſed by Mr. Hornſby magnifying 68 times, and that by Mr. Phelps about 55 times; by Mr. Hornſby at 20h 15′ 10″ apparent time, by Mr. Phelps four ſeconds later, Mr. Bartlet counting the clock, which each obſerver could hear. Mr. Phelps loſt the final contact, by miſtaking the teller of the clock. Mr. Hornſby makes it at 20h 33′ 17″; but ſuppoſes it to have happened a few ſeconds later; for, at 20h 33′ 12″, it was not quite gone off the ſun, when he was obliged to move his eye-ſtand, and 20″ after, it was certainly totally emerged. They make the diameter of Venus 56″, and Mr. Hornſby, by a mean of twelve obſervations, made

made a little before and after the noon of the 5th, makes the diameter of the ſun at right angles to the equator, with his micrometer, 31′ 32″. At 20h 12′ apparent time, Mr. Hornſby, by one obſervation, makes the center of Venus north of the ſun's ſouth limb in declination, 3′ 26″. The latitude of the obſervatory at Shirburn-Caſtle is 51° 39′ 22″, being to the north of the Royal Obſervatory 10′ 43″. The difference of longitude between them has been determined, by ſome former obſervations, to be 4′ 1″, that of Shirburn being to the weſt. Theſe are all the obſervations which are come to my knowlege, and which I think, at preſent, worthy the attention of your Lordſhip, and the Royal Society. If the others ſhould hereafter appear to be ſo, they ſhall be laid before you, by

Your Lordſhip's

and their moſt obedient

humble ſervant,

Nathaniel Bliſs.