XLIV. *An Account of the late Tranſit of* Venus, *obſerved at* Hawkhill, *near* Edinburgh. *In a Letter to the Aſtronomer Royal, from* James Lind, *M. D. at* Edinburgh. *To which are added ſome Remarks by the Aſtronomer Royal; and further Particulars relative to the Obſervations communicated in other Letters.*

Hawkhill, 5 June 1769.

SIR,

Read Dec. 7, 1769. I HAVE the pleaſure to tranſmit to you the account of our obſervations at this place. James Hoy, our young obſerver, obſerved in the houſe, on the ground-floor, in the room with the houſe-clock, with the $3\frac{1}{2}$ feet achromatic teleſcope with triple object glaſs; Lord Alemoor obſerved on the floor above, with the 18 inch reflector, and a watch that ſhewed ſeconds, ſet a few minutes before the tranſit began, and compared after each contact; I was in the obſervatory, where I uſed my own 2 feet achromatic teleſcope, a mathematical inſtrument maker counting ſeconds from the clock. The following is the account of all our obſervations:

	Ext. cont.	Int. cont.	
	Mean time.		
	h ′ ″	h ′ ″	
Lord Alemoor	6 57 33	7 14 32	18 inch reflector
James Hoy	6 57 30	7 14 35	$3\frac{1}{2}$ f. achromatic, mag. 150
Dr. Lind	6 57 41	7 14 37	2 f. achromatic, magn. 100

In the internal contact, James Hoy differed from the other gentleman and me two minutes, he calling it 12 minutes, and we 14 minutes; which of us is wrong, will be no difficult matter to determine. In the internal contact we all obſerved the black ligament or protuberance, which was not broke for ſome ſeconds after the regular circumference of Venus ſeemed to be within the Sun; and the obſervation we ſend you was, as near as we could judge, about the time this protuberance was going to break. Lord Alemoor alſo, and he only, obſerved regular circumferences of the Sun and Venus in contact, at $7^h\ 14'\ 10''$, mean time.

The morning promiſed ill, yet we got 9 very good altitudes of the Sun near the prime vertical. About noon the day was terrible, with thick clouds, and like ſettled rain. You may imagine how we felt. About two o'clock the wind began to change from the ſouth to the weſtward; about three o'clock it was weſt, and the clouds breaking; ſo that we got 5 very good correſponding altitudes. There was, about 4 o'clock, a very hard thunder ſhower, and calm, after which the wind began to blow briſkly from the north-weſt; the clouds blown away, and thoſe near the horizon depreſſed and held down, the Sun ſhone clearer than I ever ſaw it, and not a cloud was to be ſeen in that quarter. It remained ſo till after both contacts; when, not half a minute after, ſmall flying clouds paſſed over the Sun, and ſhewed us how much we were obliged to kind heaven for the very favourable opportunity we had of making our obſervations. It appeared, I aſſure you, as if Providence had withdrawn the clouds over head, and held down thoſe near the

the horizon, for that very purpoſe. The night continued equally clear and ſerene, as did the morning, till after the eclipſe; half an hour after which it began to overcaſt, and put on the ſame cloudy appearance it has wore for ſome months paſt. Although the morning was ſo favourable, yet we loſt the beginning of the eclipſe, from being too long in getting to our poſts; however, I here ſend you the contacts, with the different ſpots of the Sun, and its end moſt exactly. If you obſerved the ſpots, it will, I imagine, be as exact as if the beginning and end only had been obſerved.

I am,

SIR,

Your moſt obedient,

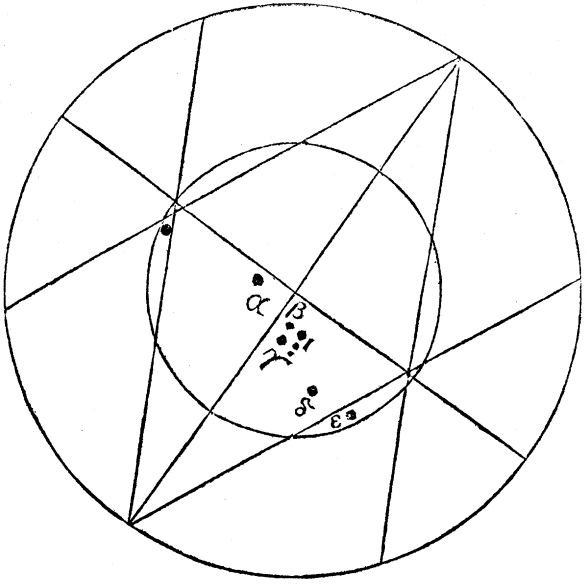
humble ſervant,

James Lind.

P. S. I hear the day proved alſo very favourable at Glaſgow.

Mean

Mean times of the contacts of the Moon's limbs, with the ſpots of the Sun, June 3, 1769.



			Mean time. h	′	″
☾'s S. E. limb with	α	Ext. contact	18	47	33
		Center	18	48	1
		Int. contact	18	48	18
	β	Center	18	59	20
	γ	Ditto	19	1	18
	δ	Ditto	19	9	9
	ε	Ditto	19	18	23
☾'s W. limb with	α	Int. contact	19	37	18
		Center	19	37	47
		Ext. contact	19	38	15
	β	Center	19	51	16
	γ	Ditto	19	52	47
	δ	Ditto	20	3	46
	ε	Ditto	20	15	9
	End of the eclipſe		20	17	30

Remarks

Remarks by the ASTRONOMER ROYAL.

Hawkhill is ſaid by Dr. Lind to be about 1½ miles N. E. of Edinburgh. It is the ſeat of Lord Alemoor, one of their judges, who is fond of aſtronomy, and has built a ſmall obſervatory there with a moveable roof, upon Mr. Smeaton's plan, which I ſent to Dr. Lind. The correſponding altitudes, for determining the time of the obſervations of the tranſit of Venus, were taken, by reflection, from a baſon of quickſilver or treacle, with a braſs Hadley's ſextant, made by Mr. Ramſden; the ſurface of the fluid being defended from the wind by a glaſs ground truly plane. They find that the equal altitudes ſeldom differ above two or three ſeconds in determining the time of noon; ſo that, by taking a great many at once, and taking the mean, they think they cannot fail of coming very near the truth. I have examined the equal altitudes made about the time of the tranſit, and the times of the contact are given corrected in the foregoing account. The clock in the obſervatory ſeems to go pretty well, though it only beats dead quarter ſeconds; it has a mahogany pendulum, and was made by Mr. Cummins. In the houſe was a clock beating ſeconds, and ſet, by means of the other, in the afternoon, before the beginning of the tranſit. The latitude of the place was alſo determined by meridian altitudes, taken by reflection with the ſextant, and, by the mean of 10 obſervations, which all agree within the compaſs of 2 minutes, is 55° 57′ 37″ N. The end of the Solar eclipſe was obſerved

obſerved by two perſons with the two achromatic teleſcopes, with treble object glaſſes, and they agreed to a ſecond.

Dr. Lind writes, another time, that, being from home, at Lees, near Coldſtream, 7 miles weſt of Berwick, he obſerved the latitude of the place about $55^{\circ}\ 37'$.

The foregoing particulars are extracted from letters received from Dr. Lind. He has alſo communicated to me the following obſervations of the tranſit of Venus and Solar eclipſe, made by the Reverend Mr. Brice, at Kirknewton, as follows:

I here likewiſe ſend ſome obſervations, made in our neighbourhood, by the Reverend Mr. Bryce, Miniſter at Kirknewton. He is a very good aſtronomer, and is a writer in the Philoſophical Tranſactions. Kirknewton is in lat. $55^{\circ}\ 54'\ 30''$ N. and about 17 miles W. of Hawkhill, from meaſuring it on Lawrie's map of the environs of Edinburgh.

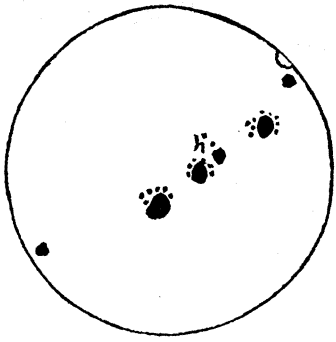
The clock had been tried by ſeveral tranſits of a fixed ſtar, and always found to meaſure time ſo exactly, that in the ſpace of five days it did not differ one ſecond from the truth; it was alſo examined by taking equal altitudes of the Sun, and found to be $18''$ ſlow. The day was cloudy, with flying ſhowers, till about two o'clock in the afternoon; then it grew ſomewhat clear, and about four the Sun ſhone out exceeding bright, when I obſerved carefully the ſpots upon the Sun; the brightneſs continued till about $15'$ before 7^{h}, when a cloud came over the Sun, which was not ſeen till $6^{h}\ 55'\ 40''$ mean time, as ſhewn by the clock, and then Venus had made a ſenſible

ſenſible impreſſion upon the upper limb of the Sun's zenith, and $\frac{1}{10}$th, as I judged, upon the Sun.

	h	′	″
Half on the Sun, as we thought,	7	3	55
Internal contact clearly ſeen	7	11	55
18″ added for the clock too ſlow		+	18
	7	12	13
And if Venus takes 19′ from the firſt impreſſion to the internal contact, the tranſit began at	6	53	13
Seen going till the Sun ſet in a cloud near the horizon	8	24	39

When near the horizon, Venus's edge was full of notches and protuberances, and ſhe appeared as if moving round like a wheel.

Eclipſe of the Sun, 4 June, common reckoning.



	h	′	″
(1) Beginning of the eclipſe	6	27	50
(2) The 1ſt impreſſion made a little above the line of the ſpots upon the Sun's diſk			
(3) The Moon's edge touches the great ſpot	6	56	5
(4) 1ſt cluſter of ſpots touched	6	57	0
(5) Covered at	7	0	0
(6) Cuſps of the Sun upon an horizontal line	7	6	45
(7) Another ſpot touched	7	7	25
(8) Spot on the Sun's north limb touched	7	16	44
(9) 1ſt ſpot of the cluſter emerged	7	50	20

(10) 2d ſpot of the cluſter emerged 7 50 40
(11) 3d ſpot of ditto emerged 7 51 32
(12) Spot on the north limb emerged 8 13 40
(13) Eclipſe ended 8 15 50
(14) Laſt impreſſion made at the ſpot upon the north limb of the Sun, and the whole eclipſe ſeen very diſtinctly, from the beginning to the end.
(15) An evident irregularity in the under edge of the Moon, which entered upon the ſouth ſide of the Sun, and traverſed it from ſouth to north.
(16) Fahrenheit's thermometer ſtood all the while, in the ſhade, at $53°\frac{1}{4}$, and continued ſo for ſeveral hours after.

N. B. The clock 18″ ſlow to be added to the ſeveral obſervations.

N. B. The internal contact is, when the thread of light was compleated.

From the above obſervation, and from every one of any credit, we Hawkhill gentlemen are late in the external contact.

XLV. *Obſer-*