

XXXVII. *An Account of an Observation of the Transit of Venus, made at Isle Coudre near Quebec. In a Letter to the Reverend Nevil Maskelyne, Astronomer Royal, from Mr. Thomas Wright, Deputy Surveyor of the Northern District of America.*

Quebec, June 15, 1769.

S I R,

Read Nov. 16, 1769. I WAS prevented landing at the bay of Gaspée, as I purposed (by blowing, thick weather); but, however, I had the good fortune to reach the island of Coudre, where I landed, with all my apparatus, the 30th of May; and took up my abode at a house well situated, in every respect, for my purpose. The next morning I had a carpenter, who fixed my clock, very firm and perpendicular, against a beam of the house. I immediately set it a-going by my watch, which had not been set to true time for almost a fortnight; but, however, I doubt not but that the following observations of corresponding altitudes will shew exactly the time, as

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also

also the regular rate of going of the clock, which I did not venture to adjust, my time being short.

As it is likely I may stay here some time, and all next winter, I shall endeavour to make such observations as may be useful in further settling the longitude here.

Captain Holland observed the external contact, but not the internal, being prevented by clouds. He has sent them to you by this opportunity.

I am,

S I R,

Your most obedient,

humble servant,

Tho. Wright.

Corresponding double altitudes of the Sun's lower limb, taken with a brass sextant, by reflection, from a saucer of oil, so placed as not to be the least disturbed with wind.

Thursday, June 1, on the north-west side of the island of Coudre, in latitude $47^{\circ} 16' 30''$, determined by several observations of two altitudes, with the interval of time shewn by the time-piece.

Morning, June 1.	Dou. alt.	Afternoon.	Compared separately give
h ' "	o ' "	h ' "	h ' "
At 8 29 45	75 38	At 4 8 54	12 19 19
8 32 52	76 42	4 5 37	12 19 14
8 35 50	77 43	4 2 39	12 19 14
8 38 31	78 38	4 0 0	12 19 15
8 40 53	79 26	3 57 24	12 19 08
8 43 34	80 20	3 55 0	12 19 17
<hr/>		<hr/>	
8 36 54 Mean		4 1 36 Mean	12 19 15 Mean
16 01 36		Add 12	
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7 24 42 Interval		16 01 36	
<hr/>		<hr/>	
3 42 21 Half Interval			
8 36 54 Time in the morn.			
<hr/>			
12 19 15			
-00 00 06	Equat. of corresponding alt.		
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12 19 09	Time shewn by clock at apparent noon		
+2 35	Equation of time—from apparent noon		
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12 21 44	Clock too fast for mean time		
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Friday, June 2.

	Morning.			Dou. alt. ☉ low. limb.		Afternoon.			Compared separately.		
	h	'	"	o	'	h	'	"	h	'	"
At	8	54	28	84	19	3	42	20	12	18	24
	8	56	40	85	00	3	40	12	12	18	26
	8	58	50	85	45	3	38	02	12	18	26
	9	2	34	87	00	3	34	13	12	18	24
	9	4	2	87	27	3	32	45	12	18	24
	8	59	19	Mean		3	37	30	Mean		
	15	37	30			12					
	6	38	11	Interval		15	37	30			
	3	19	5 $\frac{1}{2}$	Half Interval							
	8	59	19								
	12	18	24 $\frac{1}{2}$	Equat. of corresponding altitudes							
			-4								
	12	18	20 $\frac{1}{2}$	Clock too fast for apparent time							
		+2	26	Equation of time—from apparent							
	12	20	46 $\frac{1}{2}$	Clock too fast for mean time							
		21	44	Clock too fast at noon of June 1							
		o	57 $\frac{1}{2}$	Clock has lost in 24 hours							

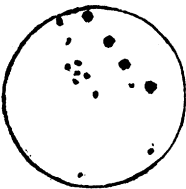
Saturday, June 3, the morning cloudy, no altitudes taken.

	h	'	"	
At	2	49	22	by the clock, I happened to take my eye off from the very point where I afterwards found the external contact happened, imagining I saw it something more to westward; but, finding my mistake, I returned to the former point, where I found Venus had made a very small
	2	50	25	imprefion at 2 ^h 50' 25", as is set down in the margin.
	3	07	48	time when Venus appeared compleatly round to the eye, and to appearance rather detached, and joined by a small dark thread or ligament, which prevented the rays of light from appearing.
	3	08	19	time when the rays of light just appeared, at the internal contact.

The

The following is the above times, as shewn by the clock, reduced to apparent time, by allowing a proportion of 57 seconds, its regular losing in 24 hours; as appears by the preceding and the following corresponding altitudes.

h	'	"	'	"	h	'	"		
2	49	22	—	17	32	—	2	31 50	apparent time of the 1st observation.
2	50	25	—	17	32	—	2	32 53	apparent time of the 2d observation.
3	7	48	—	17	31	—	2	50 17	ap. time of 1st obs. of internal contact.
3	8	19	—	17	31	—	2	50 48	ap. time of 2d obs. of internal contact.



The appearance of Venus at the internal contact, when joined by a small thread to the Sun's limb; as also the spots of the Sun, as observed at the time of the transit, and two days before.

By means of two oblong smoked glasses with different shades, made to slide in a groove fixed to my telescope, the phenomenon appeared very distinct and pleasing to the eye, notwithstanding the weather was a little hazy, and very much so, near the horizon. The thermometer stood at 74 degrees at the time of observation, and the weather was remarkably close and sultry two days before, and quite calm till an hour before the transit happened, when it began to blow very fresh. June 4, the weather continued much the same, and about 9^h 30' in the evening, we had a shock of an earthquake, which lasted about four seconds, and alarmed all the inhabitants of the island.

The weather, at the time of the transit, was not clear enough to observe the least appearance of an atmosphere round the planet, supposing there really had been one.

Saturday

Saturday, June 3, corresponding double altitudes of the Sun's lower limb for midnight, taken in a faucer of oil.

June 3, Aft noon.			Altitude.	Morn. June 4.			Compared separately.				
h	'	"	o	'	h	'	"	h	'	"	
At	4	4	25	76	58	8	29	41	12	17	03
	4	6	43	76	10	8	27	21	12	17	02
	4	8	34	75	33	8	25	26	12	17	0
	4	10	42	74	50	8	23	20	12	17	01
	4	12	52	74	08	8	21	11	12	17	02
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	4	8	39	Mean		8	25	24	Mean		
	20	25	24			12					
<hr/>								<hr/>			
	16	16	45	Interval		20	25	24			
<hr/>								<hr/>			
	8	08	22½	Half Interval							
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	4	08	39								
<hr/>								<hr/>			
	12	17	01½	Time of midnight as shewn by clock							
			+9	Equat. of corresponding altitudes							
<hr/>								<hr/>			
	12	17	10½	Clock too fast for apparent time of midnight							
			+2	Equation of time—from apparent							
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	12	19	21½	Clock too fast for mean time							
	20		47	Clock too fast, June 2, at noon							
<hr/>								<hr/>			
	1	25½		Clock has lost in 36 hours							
		57½		Clock lost in 24 hours by the preceding observations							
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		28½		Clock lost in 12 hours by the present observation,							
				which is very near at the same rate.							

Double altitudes, taken with a sextant, in a faucer of oil, for finding the lat. of the place of observation.

June 4, morn.			Alt. ☉ l. limb.	Afternoon.	Doub. alt. ☉ l. limb.						
h	'	"	o	'	h	'	"				
At	10	34	7	115	12	2	1	50	114	36	} There is 3' to be subtracted from the half ∠ for the er- rors of quadrant.
	10	36	44	116	00	2	4	32	113	46	
	10	37	40	116	13	2	6	24	113	20	
	10	39	26	116	38	2	8	05	112	50	

By

By the first of the above observations with a supposed lat. = $47^{\circ} 15'$, being the result of a former observation, and the Sun's declination (corrected for the longitude) = $22^{\circ} 31' 51''$ N. and half the elapsed $\sphericalangle = 1^{\text{h}} 43' 51''\frac{1}{2}$ the latitude will be found = $47^{\circ} 16' 51''$, N.

By the second observation, computed in the like manner, the latitude will be $47^{\circ} 16' 41''$, N.

The place of observation on the island of Coudre, by an actual survey, bears from Quebec, N. $41^{\circ} 30'$, E. by the true meridian, distance 55 statute miles, = 52 marine; which gives D. latitude = $39'$ and Dep. $34' = 50'$ D. longitude = $3' 20''$ of time between Quebec and Coudre.

I have here mentioned every particular relative to the observation, and as it really happened, that you might, with greater certainty, correct any errors that may be found therein.

To prove the time ascertained by corresponding equal altitudes, those altitudes taken within an hour of the transit might be worked separately, remembering to subtract $3'$ from the single altitude for the error of the quadrant.

Remarks by the ASTRONOMER ROYAL.

THE instruments made use of by Mr. Wright, in the foregoing observations, were a 2 feet reflecting telescope; a pendulum clock beating half seconds; a brass Hadley's sextant, of about 15 inches radius, with a magnifying glass to read off the observations; and a rectangular reservoir for holding quick-silver,

silver, or any other fluid, which is sheltered from the wind by two glass sides inclined to one another, and ground truly plane: this last for taking the Sun's double altitude by reflection with the Hadley's sextant. By a more accurate calculation of the times than Mr. Wright has used, I find the equation of corresponding altitudes, for the noon of June 1 to be $-5''$, 0, June 2 $-4''$, 5, and June 3 for midnight $+9''$, 6. Hence the true time of noon, by the clock, June 1, was $12^h 19' 10''$, 0; June 2, $12^h 18' 20''$, 0; and June 3, midnight, $12^h 17' 11''$, 1; and hence the true time of noon, June 3, should be $12^h 17' 34''$, 1, and the clock is losing $46''$ per day on apparent time. Hence the apparent times of Mr. Wright's 4 observations will come out as follows:

App. time.

h ' "

- | | | | |
|---|----|----|--|
| 2 | 31 | 53 | No visible impression made by Venus yet. |
| 2 | 32 | 56 | Venus had made a small impression. |
| 2 | 50 | 19 | Venus appeared completely round to the eye, and rather detached, and joined by a ligament. |
| 2 | 50 | 50 | The rays of light appeared at the internal contact. |

Taking Isle Coudre to bear N. $41^\circ 30'$ East from Quebec, distant 55 statute miles, as, Mr. Wright says, was found by an actual survey; the distance in geographical miles is 47,65. Therefore the place of observation is $35' 41''$ north of Quebec, and $31' 34''$ east of it, = $46' 32''$ difference of longitude, = $3 6''$ of time.