

XXXV. *Observations made on the Island
of Hammerfoft, for the Royal Society.*
By Jeremiah Dixon.

A JOURNAL of my OBSERVATIONS at
HAMMERFOST.

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1769.
 ☉ May 7 At half past 10 A. M. anchored in Hammerfoft-Bay, near the town of Hammerfoft, on Hammerfoft-Island.
- In the afternoon went on shore, to find a proper place to observe in ; but found none.
- ☾ — 8 Went on shore again, to find a place ; and, after much search and travel, fixed upon one : but, though the best this or the adjacent islands could afford, is very difficult of access.
- ♂ — 9 Landed the house and observatory.
- ☿ — 10 Digging holes for fixing the clock-post, and stand for the transit-instrument. Note, the ground so much frozen and rocky, could not finish them this day.

1769.
 8 May 10 The carpenters, this day, put up the house, separate from the observatory; as there was not room left by the carpenter at Greenwich for fixing the transit-instrument.
- 24 — 11 Finished the digging, and fixed up the post for the clock; also put up that part of the observatory which moves round. Note, the post for the clock was 3 feet deep in the ground.
- 8 — 12 Carried the instruments on shore: the carpenters working at the observatory.
- 7 — 13 Fixed up the clock, and set it a-going. Note, The upper part of the bob of the pendulum was set to scratch, marked thus μ and the index to N^o 14. It vibrated on each side of the perpendicular 1° 30'.
- 9 — 14 Put up the quadrant. It was placed upon the stand provided for it. The stand stood on a large cask filled with water, very firmly fixed in the ground; and the box in the bottom of the stand filled with stones. Cloudy weather.
- Placed one thermometer without doors, and the other within the observatory; also placed the barometer in a proper place.
- Cloudy till 7 May 20, in the evening; when I took the following equal altitudes of the Sun.

h May 20	Sun	West.	Sun	East.	Point on the qua- drant.
	L. limb. h ' "	Up. limb. h ' "	Up. limb. h ' "	L. limb. h ' "	
	9 4 42	9 11 5	21 54 18	22 0 44	} 69 00
		16 26	59 37	6 5	
	15 16½	21 44	22 4 54	11 20	
	9 41 14	9 47 46—	21 17 33	21 24 6	} 72,00
	46 33	53 8	22 58	29 31	
	52 2—	58 33	28 20	34 50	
	10 6 1	10 12 40+	20 52 24	20 59 10	} 74,00
	11 28	18 9½	58 0	21 4 40	
	16 58	23 42—	21 3 27	21 10 7	
o May 21	10 12 13	10 18 53	} These correspond to the above point 74, taken in the morning.		
	17 43	24 26			
	23 16	30 3			

From the points 72 and 74, in the above sets of observations, I find the clock on the 21st, at noon, to be 12' 53" 2 too slow, and loses at the rate of 2" per day of sidereal time.

h May 22 Marked a meridian. The mark S° is distant about 2½ miles, and that N° about 2 miles. The situation would not allow me to have marks nearer.

Put the clock forward, to be nearer the right ascension of the mid-heaven.

This afternoon came on a most violent storm of wind, hail, and snow, which continued till Tuesday evening.

h	—	23	Cloudy, with snow, &c.
h	—	24	Ditto. Fixed the transit-instrument.
h	—	25	} Cloudy, snow, &c.
h	—	26	
h	—	27	
h	—	28	
h	—	29	

1769 May 30	Sun	West.	Sun	East.	Point.
	L. limb. h / "	Up. limb. h / "			
	9 29 28 34 48 40 6	9 35 56½ 41 17 46 35			} 65,00
	49 46½ 55 6 10 0 21	9 56 12 10 1 29 6 49			} 66,40
	14 4 19 22 24 43½	10 20 32 25 53 31 12			} 68,40
	10 38 31 43 53 49 18½	45 3 50 27½ 55 52			} 70,40
May 31	2 ^d wire. h / "	3 ^d or middle wire. / "	4 th wire. / "	Sun's first east limb passed the transit. Last or west limb, passed at midnight.	
	16 34 33½ - - - -	35 19 37 35+	36 4½ - - - -		

Zen. dist. Sun's upper limb 86° 47' 50".

June 1	Sun	East.			
	Up. limb. h / "	L. limb. h / "			
	23 46 5 51 28 56 50	23 52 34 57 58 0 3 20			} 63,00
	0 10 44 16 14 21 44	0 17 22 22 54 28 25			} 61,00
	0 31 46½ 27 23 43 3	0 38 34 44 14½ 49 58			} 59,20

1769 24 June 1	Sun Up. limb. h ' "	East. L. limb. h ' "	Sun	West.	Point.	
	53 31 : 59 20 -----	o o 33½ o 6 27 12 29½				} 57,40
	Very hazy.					
	1st wire. h ' "	2d wire. ' "	3d or middle wire. ' "	4th wire. ' "	5th wire. ' "	
♀ June 2 at noon. }	4 39 39 -----	o 40 24 -----	41 10— 43. 27	41 55 -----	42 40 -----	Sun's W. limb passed the transit. E. limb passed ditto.

Zen. dist. of the Sun's upper limb $48^{\circ} 5' 50''$.

The pendulum of the clock now vibrates $1^{\circ} 20'$ on the left hand, and $1^{\circ} 30'$ on the right.

This afternoon the Sun being pretty well defined, adjusted the focus of the telescope to my eye, as follows. — Short eye-piece and broad little speculum I. 20th. 25th.

o 19 12 to the right of o on the adjusting scale. Ditto with micrometer o o 17 I. 20th. 25th.

to the right. — Long eye-piece and narrow little speculum o o 7 to left of o. — I. 20th. 25th.

Long eye-piece and broad little speculum o 18 17 to the right. — These are the means of 8 or 9 trials each.

The spot near the Sun's center was thus defined.

♀ June 2	Sun L. limb. h ' "	West. Up. limb. h ' "	Sun Up. limb. h ' "	East. L. limb. h ' "	Point.	
	10 55 1 11 00 26 -----	----- 11 7 2 12 28	----- 22 20 26½ 25 50½	22 21 37 27 3½ 32 26		} 70,40
	11 15 50+ 21 21 26 55	11 22 31— 28 3 33 41 :	21 53 48½ 59 23 22 4 56½	22 0 37 6 9½ 11 39		} 72,20
						Computing from this point, the Sun passed the north point of the meridian at 16 ^h 44' 3" 4, 2 per clock.

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1769											
June 2	Sun		West.	Sun		East.	Point.				
	L. limb.		Up. limb.	Up. limb.		L. limb.					
	h	' "	h	' "	h	' "					
	11	37 3½	43 56½	21 32 1	21 39 3+	} ° 74.00					
		42 45	49 42	37 49	44 45						
		48 26	55 29:	43 33	50 25						
At mid- night.	2d wire.		3d wire.	4th wire.							
	h	' "	h	' "	h	' "					
	16	41 28	43 13½	43 59½	Sun's east or first limb passed the transit at midnight. Ditto west limb.						
		---	45 30½	---							
		---	---	---							
Zen. dist. of the Sun's upper limb 86° 32' 57". Outer arc 92 1 9										Grand Sec. Ver.	
June 2	Sun		East.	Sun		West.	Point.				
	Up. limb.		L. limb.	L. limb.		Up. limb.					
	h	' "	h	' "	h	' "					
June 2	---	---	23 10 35	10 11 30::	---	---	} ° 66.40				
June 3	23	9 26	15 52½	16 49	10	23 17½					
		14 38	21 9	22 9	---	---					
	23	24 20	30 46½	9 50 20	9	57 44-	} 65.00		Computing from this point, the Sun passed the meridian at 4 ^h 46' 2", 52 per clock.		
		29 37	36 3½	56 37	10	3 1					
		34 53::	41 20	10 1 58½		8 21					
	---	---	23 55 8	9 26 47	9	33 15½	} 63.00				
	23	54 00	---	32 12		38 36					
	---	---	0 5 53	37 33	---	---					
	0	13 18½	0 19 55	9 1 43	9	8 24	} 61.00		Computing from this point, the Sun passed the meridian at 4 ^h 46' 3", 48 per clock. The mean 4 ^h 46' 3".		
		18 45½	25 24	7 14½		13 49					
		24 13	30 55	12 45		19 20					
				Hazy.							
Hence the clock is 11", 13 flow of fidereal time, and loses at the rate of 6", 84 per day.											

By

By comparing the instant of time $16^h 44' 3''.42$ per clock the Sun passed the meridian under the Pole on the 2d of June, with the instant $16^h 44' 22''.05$ per clock, it passed the meridian mark per transit instrument, I find it is $18''.63$ later per transit, that is, the mark northward stands $18''.63$ too much to the east. Now by putting up another mark at the same distance as the first, so as to correspond to the second wire, and measuring the distance between this and the first mark, I find it to be 36 feet. This increased in the ratio of the zen. dist. $86^\circ 48'$ to rad. gives 36,057 feet for the space corresponding to $45'\frac{1}{2}$, the time of the Sun's passage from the second to the third or middle wire.

The reason of this increase is, that all the wires in a transit instrument, except the middle one, describe lesser circles, parallel to the middle one, which describes an azimuth.—Having got what space corresponds to $45'\frac{1}{2}$, we have, by proportion, 14.76 feet for the space, answering to $18''.63$, which the mark must be moved westward to be in the true meridian.

THE TRANSIT OF VENUS.

Time p. clock

1769	h	'	"	
2 June 3	13	40	00	Saw the planet Venus upon the Sun about half immersed.
		43	00	Not totally immersed.
		50	00	The planet seemed to be compleatly upon the Sun, but no thread of light: this was an instantaneous view, and through a thin cloud.
				The air all this time very hazy.
	19	47	00	Saw Venus upon the Sun's limb, the 2d internal contact being past. After this, all cloudy as before.

THE ECLIPSE OF THE SUN.

Time p. clock Micrometer

Ap. time

Value of microm.

h	'	"	Inch.	20th	25th
2	3	23	3	0	20
		7	44	2	13
	10	30	2	9	21
	13	33	2	5	12
	22	5	4	17	21
	24	57	4	19	11
	30	4	1	6	14
	33	37	1	4	11

h	'	"	o	'	"
21	13	48 $\frac{1}{2}$	18	51.9	
		18	9	16	39.1
	20	54.3	15	27.4	
	23	57	14	6.14	
	32	27 $\frac{1}{2}$	30	22.8	
	35	19	30	52.7	
	40	25 $\frac{1}{4}$	8	13.15	
	43	57.6	7	33.6	

The versed sine of light
Ditto
Ditto
Ditto
Diff. of cusps
Ditto
Versed sine of light
Ditto

L 1 2

Time

Time, clock Micrometer

Ap. time

Value of microm.

1769	h	'	"	Inch.	20th	25th	h	'	"	o	'	"	
June 3	2	38	55	1	3	23	49	14	7	7	3	9	Verfed line of light
	4	1	3	1	4	21 $\frac{1}{2}$	51	52	2	7	4	3	Ditto
	44	8				7	54	6	8	8	7	9	Ditto
	47	20		1	8	19	57	38	3	8	54	2	Ditto
	50	45		1	11	21	22	1	2	9	51	7	Ditto
	3	14	5	4	1		12	0	8	28	55	3	D ft. of cusps
	4	5		4	10	8	15	5	5	28	10		Ditto
	3	38	20				48	30					End of the eclipse
				5	1	12							
				5	1	12 $\frac{1}{2}$							
				5	1	12 +							
					3								

} Sun's diameter 31' 31"

Sub. for adjustment

○ June 4 Zen. dist. of the Sun's lower limb at noon 48° 23'

A Table shewing the minutes and seconds answering to the divisions of the micrometer scale.

Inch.	'	"	20th	'	"	25th	"
1	6	13 08	1	0	18,654	1	0,746
2	12	26 16	2	0	37,308	2	1,492
3	18	39 24	3	0	55,962	3	2,238
4	24	52 32	4	1	14,616	4	2,984
5	31	05 40	5	1	33,270	5	3,730
			10	3	6,540	10	7,460
			15	4	39,810	15	11,190
			20	6	13,080	20	14,920
						25	18,650

- June 4 Took the dip of the sea from the observatory, and found it to be nearly 21'.
Packing up the instruments.
- » June 5 Got all the instruments on board the Emerald.

A Table shewing the Height of the Mercury in Fahrenheit's Thermometer, within the Observatory, and without in the Shade, three Times per Day; and the Height of the Mercury in the Barometer once per Day, while at Hammerfest.

		Within observatory.			Without observatory. Barometer.			
		Morn.	Noon.	Even.	Morn.	Noon.	Even.	
1769								
May	15	—	32	—	—	32	—	27.3
	16	31	32	33	31	33	33	27.69
	17	31	36	32	31	35	31	27.69
	18	34	36	37	34	37	36	27.00
	19	34	38	39	35	39	38	27.83
	20	40	47	43	40	43	43	27.80
	21	36	36	30	36	36	30	27.70
	22	38	38	31	38	37	30	27.00
	23	36	36	35	36	36	35	27.93
	24	36	36	36	36	36	36	27.74
	25	33	34	31	33	34	31	27.60
	26	34	36	35	34	35	35	27.50
	27	33	37	37	33	37	37	27.90
	28	32	35	34	33	36	33	27.91
	29	36	39	34	36	39	33	27.74
	30	39	49	52	36	49	55	27.65
	31	50	50	46	50	50	46	27.71
June	1	43	43	40	43	43	40	27.90
	2	40	44	44	40	44	44	27.70
	3	41	42	40	41	42	40	27.60
	4	38	38	36	38	38	36	27.50

The Latitude of the Observatory is, per obs. June 2, at noon $70^{\circ} 38' 22''$
4, at noon $70^{\circ} 38' 23''$

Note, The error of the line of collimation of the quadrant did not, upon trial, appear to be any thing worth notice.

The altitudes, northward, are so low as not to be depended upon.

The longitude of the observatory is (by comparing the observations of the ecl'p's of the Sun with those made at Greenwich),

		h / "		
Per	1st measurement with the micrometer	1	34 40	These observations were made before the middle of the eclipse.
	2d ditto	1	34 35	
	3d ditto	1	34 44	
	13h ditto	1	35 7	These observations were after the middle.
	15h ditto	1	35 13	
	End of the eclipse	1	35 10	

$$1 \ 34 \ 55 = 23^{\circ} 43' 45''$$

East of the Royal observatory at Greenwich.

Jere. Dixon.

XXXVI. *Astro-*