

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

A JOURNAL of my OBSERVATIONS at
HAMMERFOST.

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.
- 2 — 12 Carried the instruments on shore: the carpenters working at the observatory.
- 5 — 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 \mathcal{L} and the index to N^o 14. It vibrated on each side of the perpendicular $1^{\circ} 30'$.
- 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 $\frac{1}{2}$ May 20, in the evening; when I took the following equal altitudes of the Sun.

May

17 May 20	Sun		West.		Sun		East.		Point on the quadrant.
	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		
☉ 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.

☽ 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.

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

1769 3 May 30	Sun L. limb. h ' "	West. Up. limb. h ' "	Sun	East.	Point.
	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
3 May 31	2 ^d wire. h ' " 16 34 33½	3 ^d or middle wire. " " 35 19 37 35+	4 th wire. " " 36 4½		Sun's first east limb passed the transit. Last or west limb passed at midnight.
Zen. dist. Sun's upper limb 86° 47' 50".					
4 June 1	Sun Up. limb. h ' "	East. 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.	East. L. limb.	Sun	West.	Point.
	h ' "	h ' "			
	53 31	0 0 33½			} 57,40
	59 20	0 6 27			
	-----	12 29½			
2 June 2 at noon.	Very hazy.				
	1st wire.	2d wire.	3d or middle wire.	4th wire.	5th wire.
	h ' "	' "	' "	' "	' "
	4 39 39	0 40 24	41 10	41 55	42 40
	-----	-----	43 27	-----	-----

Sun's W. limb passed the transit.
E. limb passed ditto.

Zen. dist. of the Sun's upper limb 48° 5'.50"

The pendulum of the clock now vibrates 1° 20' on the left hand, and 1° 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. 0 19 12 to the right of 0 on the adjusting scale. Ditto with micrometer 0 0 17 to the right.— Long eye-piece and narrow little speculum 0 0 7 to left of 0.— Long eye-piece and broad little speculum 0 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.

2 June 2	Sun L. limb.	West. Up. limb.	Sun Up. limb.	East. L. limb.	Point.
	h ' "	h ' "	h ' "	h ' "	
	10 55 1	-----	-----	22 21 37	} 70,40
	11 00 26	11 7 2	22 20 26½	27 3½	
	-----	12 28	25 50½	32 26	
	11 15 50+	11 22 31-	21 53 48½	22 0 37	} 72,20
	21 21	28 3	59 23	6 9½	
	26 55	33 41:	22 4 56½	11 39	

Computing from this point, the Sun passed the meridian at 10^h 44^m 3^s.4, 2 per clock.

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1769		Sun		West.		Sun		East.		Point.
June	2	L. limb.	Up. limb.	Up. limb.	L. limb.	Up. limb.	L. limb.	Point.		
		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-		2d wire.	3d wire.	4th wire.	Sun's east or first limb passed the transit at midnight.					
night.		16 41 28	43 13½	43 59½	Ditto west limb.					
		-----	45 30½	-----						

Zen. dist. of the Sun's upper limb 86° 32' 57". Outer arc 92 1 9 Grand Sec. Ver.

		Sun		East.		Sun		West.		Point.
June		Up. limb.	L. limb.	L. limb.	Up. limb.	Up. limb.	L. limb.	Up. limb.		
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	
		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	
		18 45½	25 24	7 14½	13 49					
		24 13	30 55	12 45	19 20					

Computing from this point, the Sun passed the meridian at 4^h 46' 2", 52 per clock.

Computing from this point, the Sun passed the meridian at 4^h 46' 3", 48 per clock.

The mean 4^h 46' 3".

Hence the clock is 11", 13 slow of sidereal 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 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	' "	
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 completely 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.	10th	10th	10th	h	'	"	o	'	"	
2	3	23	3	0	20	21	13	48	$\frac{1}{2}$	18	51	9	The verified fine of light
		7	44	2	13	18		9		16	39	1	Ditto
		10	30	2	9	20		54	3	15	27	4	Ditto
		13	33	2	5	23		57		14	6	14	Ditto
		22	5	4	17	32		27	$\frac{1}{2}$	30	22	8	Dist. of cusps
		24	57	4	19	35		19		30	52	7	Ditto
		30	4	1	6	40		25	$\frac{1}{4}$	8	13	15	Verified fine of light
		33	37	1	4	43		57	6	7	33	6	Ditto

L 1 2

Time

Time, clock Micrometer						Ap. time						Value of microm.	
1769	h	'	"	inch.	25th	h	'	"	o	'	"		
½ June 3	2	38	55	1	3	23	49	14	7	7	13	9	Verfed fine of light
		41	3	1	4	21	51	52	2	7	41	3	Ditto
		44	8	1	6	7	54	6	8	8	7	9	Ditto
		47	20	1	8	19	57	38	3	8	54	2	Ditto
		50	35	1	11	21	22	1	27	9	51	7	Ditto
	3	1	4	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	12½						
				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.	'	"	25th	"
1	6	13.08	1	0,746
2	12	26.16	2	1,492
3	18	39.24	3	2,238
4	24	52.32	4	2,984
5	31	05.40	5	3,730
			10	7,460
			15	11,190
			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

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 Hammerfoft.

		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 eclipse of the Sun with those made at Greenwich),

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. *Alro-*