Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

PHILOSOPHICAL
TRANSACTIONS:

IV. Extract of a letter from Mr. George Witchell, F. R. S. and Master of the Royal Academy at Portsmouth, to Charles Morton, M. D. Sec. R. S. inclosing some account of a solar eclipse observed at George's Island, by Captain Wallis; and several astronomical observations made at Portsmouth

Mr. George Witchell, F. R. S.

Phil. Trans. 1772 **62**, 33-41, published 1 January 1772

Email alerting service Receive free email alerts when new articles cite this article - sign up in the box at the top right-hand corner of the article or click here

To subscribe to *Phil. Trans.*, go to:
http://rstl.royalsocietypublishing.org/subscriptions

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

IV. *Extract of a Letter from Mr.* George Witchell, *F. R. S. and Maſter of the Royal Academy at* Portſmouth, *to* Charles Morton, *M. D. Sec. R. S. incloſing ſome Account of a Solar Eclipſe obſerved at* George's Iſland, *by Captain* Wallis; *and ſeveral Aſtronomical Obſervations made at* Portſmouth.

To Cha. Morton, Sec. R. S. &c.

SIR,

Read Feb. 13, 1771. I Beg the favour of you to lay before the Royal Society, an extract of a letter to me from Captain Wallis, containing an obſervation of a ſolar eclipſe, which happened during his ſtay at George's Iſland, from which I have calculated the difference of meridians between that place and Greenwich.

To this I have ſubjoined ſome aſtronomical obſervations, which have been made here by Mr. Bradley and myſelf, both before and ſince the building of the Obſervatory belonging to the Academy; which, if they ſhould prove acceptable to the Royal Society, will induce us to take every opportunity of con-

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

continuing to tranſmit them, as we ſhall always eſteem it a peculiar happineſs to be able to contribute any thing, that may be deemed worthy of their notice.

I am, SIR,

Your moſt obedient,

humble ſervant,

Royal Academy, Portſmouth,
Auguſt 9, 1771.

G. Witchell.

Extract of a Letter from Captain Wallis, June 20th, 1771.

——— " Saturday, July 25th, 1767, being at " anchor in his Majeſty's ſhip Dolphin in harbour, " went on ſhore on a low point of land, not above " four feet higher than the ſea, and obſerved an " eclipſe of the Sun, as below. Latitude, by the " mean of many obſervations, 17° 30′ South, lon- " gitude, by various obſervations of the diſtance of " the Sun from the Moon, between 149° 30′ and " 149° 50′ Weſt from London.

" By

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

	h	′	″		h	′	″
By the master's watch at	7	6	0	A. M. the ⊙'s altitude was 8° 43 on the quadrant,	7	5	20
By my watch at . .	7	3	20	without any correction. Hence the app. time			
By the master's watch at	8	13	0	A. M. the ⊙'s altitude was 22° 52′ on the quadrant,	8	12	12
By my watch at . .	8	10	12	without any correction. Hence the app. time			

	h	″	″		h	′	′
" The eclipse began, by the master's watch, at .	6	52	30	A. M. Apparent time,	6	51	50
" By my watch, at	6	49	50				
" The end of the eclipse, by the master's watch, at	8	1	48	A. M.	8	1	0
" By my watch, at	7	59	0				
				" Duration	1	9	10

" We were not certain of the instant of the beginning of the eclipse, from a little negligence ; but " very certain of the end."

Remark.

As the Sun's altitudes are given, without any correction, I suppose they were taken by bringing down the image of the Sun, till it appeared bisected by the visible horizon : I have therefore recomputed the time, by allowing for the dip and refraction, which, together, amount to 8′. This correction makes the apparent time of the beginning $6^h\ 51'\ 12''$, and the end $8^h\ 0'\ 37''$; hence the duration of the eclipse was $1^h\ 9'\ 25''$; but, by a careful computation from Mayer's new Tables, the duration should have been $1^h\ 13'\ 20''\frac{1}{2}$, which is almost about 4′ longer than the observation affords ; but, as it is remarked that the beginning was not exactly taken, and the Moon entering very obliquely on the Sun, the defect in 4′ would be but little. It seems most reasonable to attribute the whole of the error to the beginning of the eclipse. I have therefore deduced the longitude from the end, and

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

make it to be 9^h 55′ 55″ West from Greenwich, or 148° 58′¼, which is 41′½ less than the mean result of the lunar observations, which, considering all circumstances, is not, in my opinion, a very great difference for the first observations that were ever made upon this island.

Astronomical Observations made at the Royal Academy, Portsmouth.

1769. May 9th, at 8^h 13′ 9″, apparent time, Mr. Bradley observed the immersion of ζ II^{orum} by the Moon, uncertain to a few minutes, on account of the strong twilight. The emersion was not taken.

The transit of Venus, and solar eclipse, next morning, were both observed here; but, having then no better instrument for determining the going of the clock, than an indifferent Hadley's sextant, I do not think the observations worthy of being laid before the Society; and, for the same reason, omit the observations of the comet.

1770. April 7th, at 11^h 23′ 33″, apparent time, by Mr. Bradley's observation, the Moon occulted ε Ω^{is}. My time was within 2″ or 3″ the same; but we did not observe the emersion. This occultation was observed both at Greenwich, by Mr. Maskelyne, and at Oxford, by Professor Hornsby; by comparing which, it appears that this place is West of Greenwich 4′ 24″½ of time, and that Oxford is West of Greenwich 4′ 58″½.

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

1770. April 28, at $9^h\ 48'\ 13''$, apparent time, Mr. Bradley and I, both at the ſame inſtant, obſerved the immerſion of $\zeta\ \delta^1$ by the Moon. The emerſion was not taken. By comparing this with Mr. Maſkelyne's obſervation, our longitude comes out $4'\ 23''\frac{1}{4}$ Weſt from Greenwich.

1770. July 21ſt is marked for an eclipſe of Juptiter's fourth ſatellite in the Nautical Almanac; but the Connoiſſance des Temps notes it as a conjunction only, and remarks, that the ſatellite would raſe the ſhadow, without diſappearing; which we found to be true, for we both ſaw the ſatellite the whole time which is marked for its duration, though, at the middle, it appeared extremely faint.

Theſe obſervations were made before our Obſervatory was finiſhed; but that being completed in the month of September, and furniſhed with an excellent (though ſmall) mural quadrant and tranſit inſtrument, both made by that eminent artiſt Mr. John Bird, we began to obſerve meridian tranſits, from which I ſhall ſelect thoſe that were made for determining the ſolſtices, and the oppoſitions of the three ſuperiour planets, which I ſhall tranſcribe, juſt as they were taken, excepting only making the neceſſary allowance for the error of the line of collimation.

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

Obſervations for determining the Solſtices.

		App. zen. diſt. of the ⊙'s V.L.	App. zen. diſt. of the ⊙'s L.L.	Baro-meter.	Thermo-meter.	Hence the app. zen. diſt. of the Sun's center.
		° ′ ″	° ′ ″			° ′ ″
1770.	Dec. 9.	73 21 40.3	73 54 5.1	29.76	37	73 37 52.7
	12.	73 36 41.8	74 9 25.0	29.78	46	73 53 3.4
	14.	73 44 22.0	74 16 58.2	29.87	44+	74 0 40.1
	21.	73 56 41.0	74 29 13.1	29.37	43+	74 12 57.0
	22.	73 56 20.0	74 29 8.1	29.94	38½	74 12 44.0
	29.	73 42 27.2	74 15 0.4	29.62	48½	73 58 43.8
1771.	Jan. 3.	73 18 18.0	73 51 3.6	29.23	46	73 34 40.8
1771.	June 18.	27 5 45.4	27 37 42.2	29.82	64+	27 21 43.8
	19.	27 4 52.7	27 36 32.1	30.03	66½	27 20 42.4
	20	27 3 52.0	27 35 44.4	30.11	71+	27 19 48.2
	21.	27 3 33.6	27 35 26.0	30.12	70	27 19 29.8
	22.	27 3 51.0	27 35 29.4	30.11	67½	27 19 40.2
	24.	27 5 17.1	27 37 3.5	30.06	67	27 21 10.3
	25.	27 6 43.2	27 38 32.0	30.04	72½	27 22 37.6

	° ′ ″
By comparing theſe obſervations together, I make the true zenith diſtance of the Sun's center, at the Winter Solſtice, to be	74 16 13.4
And at the Summer Solſtice	27 19 51.6
Therefore, the diſtance of the tropics	46 56 21.8
Half	23 28 10.9
By Mr. Mayer's Tables, the decrement of the obliquity, in three months, is	0.1
Hence the mean obliquity, December 21, 1770 .	23 28 11.0
And June 21, 1771	23 28 10.8
Therefore, the latitude of the Obſervatory, by theſe obſervations, is	50 48 2.4 North.

The above obſervations were chiefly taken by Mr. Bradley. Thoſe which follow are what I took about the time of the late oppoſitions of the ſuperior planets, in which, as well as the preceding obſervations, the apparent zenith diſtances are thoſe which were taken by the 96th arc, on which we chiefly depend, though the difference between the two arcs ſeldom ariſes to more than three or four ſeconds.

For

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

For the Oppoſition of the ☉ and ♂.

	Time per clock.	Meridian Tranſits.	App. zen. diſt.	Barom.	Therm.
Days.	h ′ ″		° ′ ″		
1770. Dec. 10.	5 18 58½	β Leporis paſſed the middle wire.			
	20 51—	δ Orionis.			
	36 49—	Mars	24 41 6.0	29.87	28⅓
	43 19	α Orionis.			
13.	5 12 24—	β Tauri.			
	31 35	Mars	24 38 11.4	29.76	42½
	43 21+	α Orionis.			
	6 1 37	η Geminorum.			
16.	5 26 22½	Mars	24 36 55.5	29.80	47½
	43 21	α Orionis.			
17.	5 12 24½	β Tauri.			
	24 40	Mars	24 36 15.6	29.91	43
	43 21	α Orionis.			
20.	5 4 7—	Rigel.			
	19 40:	Mars	24 36 25.6	29.16	43
	37 29+	α Orionis.			

For the Oppoſition of the ☉ and ♄.

	Time per clock.	Meridian Tranſits.	App. zen. diſt	Barom.	Therm.
Days.	h ′ ″		° ′ ″		
1771. Febr. 1.	9 1 51+	Saturn paſſed the middle wire.	32 48 20.8	29.89	42
	16 26—	α Hydræ.			
2.	9 1 32	Saturn	32 46 53.4	30.07	42+
	16 26½	α Hydræ.			
7.	8 32 58+	ε Leonis.			
	59 57½	Saturn	32 39 27.6	30.04	28
	9 29 4+	ο Leonis.			
10.	8 59 1½	Saturn	32 35 9.5	29.72	18⅔
	9 16 32	α Hydræ.			
	29 5+	ο Leonis.			

For

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

For the Oppoſition of ♃ and ♅.

	Time per clock.	Meridian Tranſits.	App. zen. diſt.	Barom.	Therm.
Days.	h ′ ″		° ′ ″		
1771. July 12.	16 15 41	Antares paſſed the middle wire.			
	18 0 21½	μ Sagittarii.			
	9 44—	η Serpentis.			
	14 7½	λ Sagittarii.			
	19 39 8½	Jupiter	72 40 43.8	29.87	57½
13.	7 28 52½	⊙'s preceding limb.			
	51 8+	⊙'s following limb.			
	19 38 34	Jupiter	72 41 52.5	30.18	57+
14.	7 32 53	⊙'s preceding limb.			
	35 10+	⊙'s following limb.			
	19 37 59	Jupiter	72 43 22	30.26	61
15.	7 36 55	⊙'s preceding limb.			
	39 12	⊙'s following limb.			
	16 15 35+	Antares.			
	19 37 23	Jupiter	72 44 57.1	30.12	59
17.	7 44 56—	⊙'s preceding limb.			
	47 12+	⊙'s following limb.			
	16 15 31	Antares.			
	19 36 14½	Jupiter	72 47 50.7	29.92	65
23.	8 8 46	⊙'s preceding limb.			
	11 0½	⊙'s following limb.			
	16 15 19½	Antares.			
	19 32 48	Jupiter	72 55 47.3	30.21	60½

An Occultation of λ Libræ by the Moon.

	App. time.	
Day.	h ′ ″	
1771. April 2, at	13 7 9½	λ Libræ emerged from the Moon's limb. Mr. Bradley makes the time 3″ later. The immerſion was not taken.

The

Downloaded from http://rstl.royalsocietypublishing.org/ on July 19, 2018

The Moon's Paſſage over the meridian, near the ☌.

	Time per clock.	Meridian Tranſits.	App. zen. diſt. of the ☽.	Barom.	Therm.
Day.	h ′ ″		° ′ ″		
1771. April 28.	2 19 54	Sun's preceding limb paſſed the ſecond wire		29·74	44
	24 4	Sun's following limb paſſed the fourth wire			
	14 17 23+	Moon's preceding limb paſſed the middle wire	Upper limb 66 13 13.9		
	19 40+	Moon's following limb	Lower limb 66 45 48.1		

It being very clear this evening, when the Moon paſſed the meridian, we were in hopes of getting a good obſervation of the lunar eclipſe, which happened ſoon after; but the air did not long continue in that ſtate, but became ſo hazy, that we could not get any certain obſervations.