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.

S I R,

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-

continuing to tranfmit them, as we fhall always efteem it a peculiar happinefs to be able to contribute any thing, that may be deemed worthy of their notice.

I am, S I R,

Your moft obedient,

humble fervant,

Royal Academy, Portfmouth,
August 9, 1771.

G. Witchell.

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

——— " Saturday, July 25th, 1767, being at
" anchor in his Majefty's fhip Dolphin in harbour,
" went on fhore on a low point of land, not above
" four feet higher than the fea, and obferved an
" eclipfe of the Sun, as below. Latitude, by the
" mean of many obfervations, 17° 30′ South, lon-
" gitude, by various obfervations of the diftance of
" the Sun from the Moon, between 149° 30′ and
" 149° 50′ Weft from London.

" By

	h	′	″		h	′	″
" By the mafter'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 ⎭			

	h	′	″		h	′	″
" By the mafter'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 eclipfe began, by the mafter's watch, at .	6	52	30 ⎫ A. M. Apparent time,	6	51	50
" By my watch, at	6	49	50 ⎭			

	h	′	″		h	′	′
" The end of the eclipfe, by the mafter'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 inftant of the beginning of the eclipfe, from a little negligence ; but " very certain of the end."

REMARK.

As the Sun's altitudes are given, without any correction, I fuppofe they were taken by bringing down the image of the Sun, till it appeared bifected by the vifible 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 eclipfe was 1^h 9′ 25″; but, by a careful computation from Mayer's new Tables, the duration fhould have been 1^h 13′ 20″$\frac{1}{2}$, which is almoft about 4′ longer than the obfervation 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 feems moft reafonable to attribute the whole of the error to the beginning of the eclipfe. I have therefore deduced the longitude from the end, and

make

make it to be 9^h $55'$ $55''$ Weſt from Greenwich, or $148°$ $58'\frac{1}{4}$, which is $41'\frac{1}{4}$ 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 $4'$ $24''\frac{1}{2}$ of time, and that Oxford is Weſt of Greenwich $4'$ $58''\frac{1}{2}$.

I

1770. April 28, at 9ʰ 48′ 13″, apparent time, Mr. Bradley and I, both at the fame inftant, obferved the immerfion of ζ ♉¹ by the Moon. The emerfion was not taken. By comparing this with Mr. Mafkelyne's obfervation, our longitude comes out 4′ 23″¼ Weft from Greenwich.

1770. July 21ft is marked for an eclipfe of Juptiter's fourth fatellite in the Nautical Almanac; but the Connoiffance des Temps notes it as a conjunction only, and remarks, that the fatellite would rafe the fhadow, without difappearing; which we found to be true, for we both faw the fatellite the whole time which is marked for its duration, though, at the middle, it appeared extremely faint.

Thefe obfervations were made before our Obfervatory was finifhed; but that being completed in the month of September, and furnifhed with an excellent (though fmall) mural quadrant and tranfit inftrument, both made by that eminent artift Mr. John Bird, we began to obferve meridian tranfits, from which I fhall felect thofe that were made for determining the folftices, and the oppofitions of the three fuperiour planets, which I fhall tranfcribe, juft as they were taken, excepting only making the neceffary allowance for the error of the line of collimation...

Obſervations for determining the Solſtices.

			\pp. zen. dift. f the ☉'s V.L.			App. zen. dift. of the ☉'s L.L.			Baro- meter.	Thermo- meter.	Hence the app. zen. dift. of the Sun's center.		
			o	′	″	o	′	″			o	′	″
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	48⅘	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 obli- quity, 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

For the Oppofition of the ☀ and ♂.

	Time per clock.	Meridian Tranfits.	App. zen. dift.	Barom.	Therm.
Days.	h ′ ″		° ′ ″		
1770. Dec. 10.	5 18 58½	β Leporis paffed 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 Oppofition of the ☀ and ♄.

	Time per clock.	Meridian Tranfits.	App. zen. dift.	Barom.	Therm.
. Days.	h ′ ″		° ′ ″		
1771. Febr. 1.	9 1 51+	Saturn paffed 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	18¾
	9 16 32	α Hydræ.			
	29 5+	ο Leonis.			

For

For the Oppofition of ☉ and ♃.

Days.	Time per clock. h ′ ″	Meridian Tranfits.	App. zen. dift. ° ′ ″	Barom.	Therm.
1771. July 12.	16 15 41	Antares paffed 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.			
	31 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.

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

The

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

Day.	Time per clock.			Meridian Tranſits.	App. zen. diſt. of the ☽.			Barom.	Therm.
	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.