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Astronomical & thermometrical observations made
at the confluence of the Miss. & Ohio Rivers.

Ellicott

National Oceanic and Atmospheric Administration

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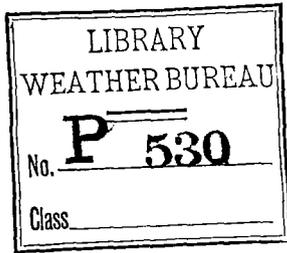
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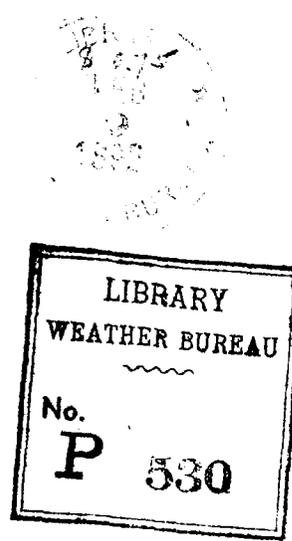
Am. Phil. Soc.
1862

VEGETABLE.

“ I TAKE the pleasure of giving you an account of a singular blossom, which I discovered last May,* in digging of a mill-race, on Opeckon creek, † through a rich bottom of low ground, covered, in general, with well grown large timber, of various kinds, particularly oak, poplar, and walnut, several of which trees are from three to four feet through, standing on the ground through which the race was dug. The curiosity is this, that between five and six feet under ground, chiefly a loomy, solid clay, one of the diggers discovered a blossom, not in full bloom, nearly of the colour of the lilac, which struck his attention. He called me to see it, not knowing what it could be. Upon viewing it, I recollected the form, and told the diggers it was the same kind of blue flower, which had grown upon the surface of the ground adjacent, and was then faded. In order to prove it, I desired one of the men to dig up the root of the one under ground, and the one upon the surface, which, upon examination, proved to be the very same kind. The body of earth where the plant was found must have been formed perhaps some centuries, by reason of the uncommon size of the timber which it contained, and from which the most heavy part of the mill-timber was procured.”

* The year is not mentioned.

† A branch of the river Potomak, in Virginia.



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No. XX.

Philadelphia, August 4th, 1800.

DEAR SIR,

Read Aug.
15, 1800. WITH this you will receive my astronomical, and thermometrical observations, made at the confluence of the Mississippi, and Ohio rivers, in Dec. 1796, and Jan. 1797, at Natchez in the years 1797 and 1798—likewise at the city of New Orleans, in Jan. and Feb. 1799, to which are added the observations on the transit of ϑ made at Miller's plantation on the Coenecuch, commonly, (though erroneously), called the Escambia.—The astronomical observations made at the confluence of the Mississippi, and Ohio rivers, the equal altitudes of the sun at Natchez, with the observations made at New Orleans, are entered according to the civil account, for the purpose of bringing the thermometrical observations into the journal, in the manner they are generally registered.

The observations made on the boundary between the United States, and his Catholic Majesty, will constitute a separate paper, and of very considerable length, in which the longitudes, of a number of points in the line are determined, both by lunar observations, and the eclipses of α 's satellites. This work, will probably be ready for the society some time the ensuing winter.

Astronomical,

*Astronomical, and Thermometrical Observations, made at
the Confluence of the Mississippi, and Ohio Rivers.*

1796.

Dec. 18th. Arrived at the confluence of the Mississippi, and Ohio rivers about 2 o'clock in the afternoon.—Cloudy all day.—Thermometer 24° in the air at sun set, and 34° in the water.

19th. Pitched a tent, and set the clock up in it.—Cloudy all day, except a short time about noon.—Thermometer by Fahrenheit's scale 9° at sun rise, rose to 19° ; fell to 12° at sun set, and to 11° at 9^h P. M.

20th.

Equal altitudes of the Sun.

A. M. $10^{\text{h}} 23' 54''$. P. M. $1^{\text{h}} 37' 37''$.

Cloudy, except about $1\frac{1}{2}$ hours before and after noon, which accounts for the equal altitudes not being taken farther from the meridian.—Cleared off in the evening.—Thermometer 11° at sun rise, rose in the afternoon to 22° , fell to 11° at 9^h P. M.

Immersion of the 3d satellite of Υ observed at 9^h 8' 47'' P. M. Magnifying power of the telescope 120— Υ being very low, and attended with an uncommon tremour, which rendered the observation somewhat doubtful.

21st. Flying clouds all day, but disappeared in the evening.—Thermometer 11° at sun rise, fell to 8° at 10^h A. M. rose to 9° at noon, fell to 3° at 7^h P. M.

Emerision of the 1st satellite of Υ observed at 6^h 56' 0'' P. M. Atmosphere a little hazy.—Magnifying power of the telescope 120.

The

1796. The weather was so intensely cold, that although a pot of live coals was kept in the tent near the clock, the thermometer which was fixed to the case, fell to 4° , and the clock stopped at 5^{h} the next morning.
- 22d. Keen north wind; with squalls of light snow.—Clear in the evening.—Thermometer 5° below \circ at 8 o'clock A. M.—rose to 1° above \circ at 2^h P. M.—fell 5° below \circ at 9^h P. M.—Both rivers on account of the vast bodies of ice, thrown up in a variety of positions, make a romantic, and to us (on account of our boats) an alarming appearance.
- 23d. Clear day. Wind from the N. W. Thermometer $7\frac{1}{2}^{\circ}$ below \circ at 8^h A. M. 6° below \circ at 10^h A. M. 1° above \circ at noon, 8° at 2^h P. M. and at 8^h P. M. 7° .
- 24th. Clear day. Thermometer 7° at 9^h A. M.— 17° at 1^h P. M.—and 7° at 8^h P. M.

Traced a meridian by the circum-polar stars.

- 25th. Clear day. Thermometer 7° at sun rise, rose in the afternoon to 17° . Applied the magnetic needle to the meridian, and found the variation to be $7^{\circ} 15'$ east.

Set up a small zenith sector of about 19 inches radius. Face to the east.

- 26th. Cloudy in the afternoon. Thermometer 10° in the morning, rose to 17° .

☉'s preceding limb on the meridian at	11 ^h 59' 45 th
Subsequent do. at	12 2 9

Centre at	12 0 57
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27th.

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Dec. 27th. Clear day. Thermometer 3° at sun rise, rose to 33° in the afternoon.

☉'s preceding limb on the meridian at	12 ^h 0' 33"
Subsequent do, at	12 2 57
Centre at	12 1 45

28th. Clear day. Thermometer 8° at sun rise, rose in the afternoon to 33° .

Equal altitudes of the Sun.
A. M. 9^h 40' 2". P. M. 2^h 24' 56".

Emerfion of the 1st fatellite of μ observed at 8^h 48' 38"
P. M. μ very low, the atmosphere hazy, and the belts scarcely discernible. Magnifying power of the telescope 120.

29th. Clear a short time about noon. Thermometer 17° at sun rise, rose in the afternoon to 45° .

30th. Cloudy with light snow during the day.—Clear in the evening. Thermometer 32° in the morning, rose to 35° in the afternoon.

31st. Cloudy in the evening and night. Thermometer 21° at sun rise, rose in the afternoon to 45° .

Equal altitudes of the Sun.
A. M. 9^h 53' 7". P. M. 2^h 16' 25".

Observed zenith distance of α Lyræ . . . 1^o 37' 23" N.

1797. Clear and calm in the morning, flying
Jan. 1st. clouds in the afternoon.—From 10^h A. M. till noon, three fine luminous circles appeared in the atmosphere, similar to those described

by Dr. Smith in his opticks*. Thermometer 21° at sun rise, rose in the afternoon to 40° .

2d. Cloudy with snow the whole day.—Thermometer 16° at sun rise, rose in the afternoon to 28° , and fell to 19° at sun set.

3d. Cloudy till noon, clear in the afternoon and evening. Thermometer 6° at sun rise, rose in the afternoon to 18° , fell to 10° at 8^h P. M.

Observed zenith distance of α Cygni	. 7° 35' 32" N.
do. β Andromedæ	2 25 38 S.
do. β Medusæ	3 11 46 N.

4th. Cloudy in the morning, the remainder of the day clear. Thermometer 12° at sun rise, rose in the afternoon to 37° , fell to 16° at sun set.

Equal altitudes of the Sun.

A. M. 9^h 26' 36". P. M. 2^h 47' 6.5".

Observed zenith distance of α Cygni . 7° 35' 29" N.

Turned the face of the Sector to the west.

Observed zenith distance of β Andromedæ	2° 30' 24" S.
do. β Medusæ	3 7 5 N.

5th. Clear all day. Thermometer 23° at sun rise, rose in the afternoon to 42° , fell to 30° at sun set.

Equal altitudes of the Sun.

A. M. 9^h 42' 21". P. M. 2^h 32' 31".

Observed

* Book Second, Chap. 11th.

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Observed the times, and distances of the D's nearest limb from that of the ☉ as follows:

	Times.			Distances.			
	h	'	"	°	'	"	
P. M.	2	50	53	84	15	20	Error of Sextant + 7".
	2	52	56	84	16	0	
	2	54	40	84	16	30	
	2	58	43	84	18	20	
Means	2	54	18	84	16	32	

Observed zenith distance of α Lyræ .	1° 33' 28" N.
do. α Cygni .	7 31 19 N.
do. β Medusæ .	3 7 5 N.

6th. Cloudy in the morning, clear in the afternoon.—Thermometer 24° at sun rise, rose in the afternoon to 34°, fell to 12° at sun set.

Observed zenith distance of β Medusæ .	3° 7' 17" N.
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7th. Clear day, wind N. W.—Thermometer 7° below 0 at sun rise, 5° below 0, at 9^h A. M. rose to 19° in the afternoon, fell to 0 at sun set.

Observed zenith distance of α Lyræ .	1° 33' 37" N.
do. α Cygni .	7 31 27 N.
do. β Andromedæ .	2 30 6 S.
do. β Medusæ .	3 7 17 N.

Turned the face of the Sector east.

8th. Clear day. Thermometer 7° below 0 at sun rise, rose in the afternoon to 29° above 0, fell to 10° at 7^h P. M.

Observed zenith distance of α Lyræ .	1° 37' 40" N.
do. β Andromedæ .	2 25 47 S.
do. β Medusæ .	3 11 49 N.

Z 2

9th.

ASTRONOMICAL AND

9th. Clear day. Thermometer 3° below 0 at sun rise, rose in the afternoon to 42° , fell to 32° at sun down.

Observed zenith distance of α Lyræ	1° 37' 40" N.
do. β Andromedæ	2 25 56 S.
do. β Medusæ	3 11 27 N.

Latitude

Latitude deduced from the Zenith Distances.

Face of the Sector East. Observed Zenith Distances.

		β Andromedæ.	β Medusæ.	α Lyræ.	α Cygni.
		° ' "	° ' "	° ' "	° ' "
1796.	Dec. 31st.	.....	.....	1 37 23 N.	.....
1797.	Jan. 3d.	2 25 38 s.	3 11 46 N.	.....	7 35 32 N.
	4th.	.....	.....	.....	7 35 29 N.
	8th.	2 25 47 s.	3 11 49 N.	1 37 40 N.	.....
	9th.	2 25 56 s.	3 11 27 N.	1 37 40 N.	.....
	Means	2 25 47 s.	3 11 41 N.	1 37 34 N.	7 35 30.5 N.
4th. Face of the Sector West.					
	4th.	2 30 24 s.	3 7 5 N.	.....	.....
	5th.	.....	3 7 5 N.	1 33 28 N.	7 31 19 N.
	6th.	.....	3 7 17 N.	.....	.....
	7th.	2 30 6 s.	3 7 19 N.	1 33 37 N.	7 31 27 N.
	Means	2 30 15 s.	3 7 11 N.	1 33 32.5 N.	7 31 23 N.
	Mean. Face of the sector east ..	2 25 47 s.	3 11 41 N.	1 37 34 N.	7 35 30.5 N.
	Correct observed zenith distances .	2 28 1 s.	3 9 26 N.	1 35 33.2 N.	7 33 26.7 N.
	Refractions	+ 2.5	+ 3	+ 1.5	+ 7.5
	Correct zenith distances	2 28 3.5 s.	3 9 29 N.	1 35 34.7 N.	7 33 34.2 N.
Mean declinations	Jan. 4th 1797.....	34 32 26.7 N.	40 09 55.9 N.	38 36 1.2 N.	44 33 41.5 N.
	Aberration	+ 7.2	+ 9.7	-3.1	+ 4.3
	Nutation	- 7.1	-5.2	-0.9	-4.1
	Correct declinations	34 32 26.8 s.	40 10 0.4 N.	38 35 57.2 N.	44 33 41.7 N.
	Correct zenith distances applied ..	+2 28 3.5 s.	-3 9 29 N.	-1 35 34.7 N.	-7 33 34.2 N.
	Latitudes	37 0 30.3 N.	37 0 31.4 N.	37 0 22.5 N.	37 0 7.5 N.

ASTRONOMICAL AND

	°	′	″
Latitude by β Andromedæ	37	0	30.3
do. . . β Medusæ	37	0	31.4
do. . . α Lyræ	37	0	22.5
do. . . α Cygni	37	0	7.5
Mean Latitude	37	0	22.9 North.

Longitude deduced from the eclipses of \mathcal{U} 's satellites and
one lunar observation.

	°	′	″	Daily gain.
1796. Dec. 20th. Clock too fast mean time	2	10		
Stopped on the 23d by the extreme cold.				/ "
26th. Clock too slow mean time	0	38		
27th. do.	0	19.5	. . . 0	18.5
28th. do.	0	7.5	. . . 0	12
31st. Clock too fast mean time	0	38.5	. . . 0	15.3
1797. Jan. 4th. do.	0	54.5	. . . 0	4
5th. do.	1	2.0	. . . 0	7.5

The immersion of the 3d satellite of \mathcal{U} was observed on the 20th of December at 9^h 8' 47" P. M. as before noted: The clock by equal altitudes of the sun taken on that day appeared to be too fast 2' 10" mean time, and gained by subsequent observations at a mean rate about 10" per diem. The clock was therefore too fast at the time of the observation 2' 14", the observation was of course made at 9^h 6' 37" P. M. mean time, to which add 1' 13" the equation of time, the sum 9^h 7' 50" will be the apparent time of the immersion, which taken from 15^h 2' 34" the apparent time at Greenwich by the theory, will leave 5^h 54' 44" for the difference of meridians.

An emersion of the first satellite of \mathcal{U} was observed on the 21st of December at 6^h 56' 00" P. M. The clock at that time by admitting the mean daily gain to be 10" was too fast 2' 25" mean time, the observation was therefore made at 6^h 53' 35" mean time, to which add 0' 46" the equation of time, and the sum 6^h 54' 21" will be the apparent time of the observation, which deducted from 12^h 49' 29" the apparent time at Greenwich by the theory, will give 5^h 55' 8" for the difference of meridians.

Another emersion of the 1st satellite of \mathcal{U} was observed on the 28th of December at 8^h 48' 38" P. M. The clock at that time was about 1" too slow mean time. The observation was therefore made at 8^h 48' 39" mean time, from which deduct 2' 44" the equation of time, and the remainder 8^h 45' 55" will be the apparent time of the observation, which deducted from 14^h 41' 53" the apparent time at Greenwich by the theory, will give 5^h 55' 58" for the difference of meridians.

On the 5th of January 1797, at 2^h 54' 18" P. M. by the clock, the distance between the nearest limbs of the \odot and J was observed to be 84° 16' 39" the clock at the time of observation was 1' 2" too fast mean time, the observation was therefore made at 2^h 53' 16" mean time, from which deduct

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deduct 6' 15" the equation of time, and the remainder 2^h 47' 1" will be the apparent time of the observation. The observed distance corrected for parallax refraction, &c. will answer to about 8^h 42' 22" at Greenwich, by which the difference of meridians appears to be about 5^h 55' 21".

By supposing the observation on the 3d satellite of \mathcal{L} , with the lunar observation to be equivalent to either of those on the 1st satellite, the mean longitude will be had as below.

	h	'	"
Longitude by the 3d satellite	5	54	44
do. by the lunar observation	5	55	21
Mean	5	55	2.5
do. by the 1st satellite on the } 21st of December	5	55	8
do. by do. on the 28th of } December	5	55	58
Mean	5	55	22.8 = 88° 50'

42" west from Greenwich, or $5^{\text{h}} 54^{\text{m}} 47.8^{\text{s}} = 13^{\circ} 41' 57''$ west from the city of Philadelphia.

The foregoing observations were made under very unfavourable circumstances, the weather intensely cold, and not a sufficient number of tents to secure our instruments, and cover our men: our store-boat having been left behind, and was frozen up near the mouth of the Wabash river till about the 20th of January. The spirits in the vessel in which the plummet of the sector was suspended were frequently congealed, and what appeared somewhat singular, was that the spirits began to freeze on the outside of the vessel very near to the upper edge, from which it extended in prongs, like bucks-horns, and did not congeal within till the spirits fell about $\frac{1}{8}$ of an inch below the upper edge.—The vessel was $1\frac{1}{2}$ inches in diameter.—The ice on the outside did not appear to contain a full proportion of spirit. Although the observations were made under unfavourable circumstances, I have no reason to suppose them liable to any material objection, and therefore presume that the determinations of the latitude, and longitude, of the confluence of the two rivers are sufficiently correct for geographical purposes, notwithstanding

standing a difference of about 2 degrees in longitude, and 14 minutes in latitude, from Mr. Hutchins's map.

1797.

Feb. 24th. Arrived at Natchez.
 27th. Encamped at the north end of the village.
 28th. Set up the clock.
 March 1st. Set up the large zenith sector, with the face to the east.

3d. *Equal altitudes of the Sun.*
 A. M. 9^h 50' 11". P. M. 2^h 9' 11".

The observed times, and distances of the ☉'s and ♃'s nearest limbs.

Times.			Distances.			
h	'	"	°	'	"	
2	54	35*	59	46	0	
2	56	18	59	46	40	
2	59	20	59	47	0	Error of the Sextant 0".
3	0	38	59	47	20	
3	3	53	59	47	50	
Means	2	58	58	59	46	58

Repeated.

Times.			Distances.			
h	'	"	°	'	"	
3	45	6	60	2	10	
3	48	18	60	2	30	
3	51	22	60	2	40	
3	52	45	60	3	0	Error of the Sextant 0".
3	54	37	60	4	40	
3	56	39	60	4	50	
3	58	47	60	5	20	
4	0	34	60	5	40	
Means	3	54	16	60	3	51

Repeated.

* All the observations connected *with*, or dependent upon *time*, are entered as observed by the clock, and will therefore require a correction to reduce them to *mean solar time*, which may readily be done from the *statement* of the errors of the clock, with its rate of going, to be found at the end of each course of observations.

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Repeated.

	h	'	"	o	'	"	
	4	24	18	60	11	55	
	4	26	15	60	12	30	
	4	28	14	60	13	20	Error of the Sextant 0".
	4	29	50	60	13	35	
	4	32	5	60	14	20	
Means	4	28	10	60	13	8	

4th. The observed times, and distances of the ☉'s and ♃'s nearest limbs.

	Times.			Distances.			
	h	'	"	o	'	"	
	2	6	22	72	5	30	
	2	7	34	72	5	50	
	2	8	29	72	6	30	Error of the Sextant 0".
	2	9	29	72	6	40	
	2	10	23	72	7	0	
	2	11	44	72	7	30	
Means	2	9	0	72	6	29	

Repeated.

	h	'	"	o	'	"	
	4	47	45	72	57	0	
	4	49	26	72	57	30	
	4	51	10	72	57	40	
	4	52	16	72	58	20	Error of the Sextant 0".
	4	53	31	72	58	20	
	4	54	30	72	58	40	
	4	55	19	72	58	40	
	4	56	21	72	59	0	
Means	4	52	17	72	58	9	

		h	'	"	s.
5th.	Observed zenith distance of Pollux	3	2	58	s.
	do. Castor	0	45	56	n.
	do. Pollux	3	03	1	s.
	do. β Tauri	3	7	59	s.

ASTRONOMICAL AND

6th. *Equal altitudes of the Sun.*
 A. M. $9^h 37' 57''$. P. M. $2^h 18' 54''$.

The observed times, and distances of the \odot 's and J 's nearest limbs.

Times.			Distances.			
h	'	"	o	'	"	
2	32	57	98	11	20	
2	34	2	98	11	40	
2	35	10	98	12	0	
2	36	4	98	12	0	
2	36	49	98	12	30	Error of the Sextant 0''.
2	37	38	98	12	50	
2	38	33	98	13	20	
<hr/>			<hr/>			
Means	2	35 53	98	12	14	

	o	'	"	
7th. Observed zenith distance of β Tauri	3	7	57	s.
do. Castor	0	45	55	N.
do. Pollux	3	2	58	s.

8th. *Equal altitudes of the Sun.*
 A. M. $9^h 23' 42''$. P. M. $2^h 31' 26''$.

	o	'	"	
Observed zenith distance of β Tauri	3	8	0	s.
do. Castor	0	45	56	N.
do. Pollux	3	2	56	

9th. Turned the face of the sector west.

	o	'	"	
10th. Observed zenith distance of Pollux	3	4	0	s.
do. Castor	0	44	55	N.
do. Pollux	3	3	59	s.

11th, 12th, and 13th. Cloudy with constant, but not heavy thunder.

14th. Cleared off very early in the morning with a violent gale of wind which blew down a number of the tents, and pushed in the side of the one we used for the observatory against the clock, where it rested till the gale was over, which did not exceed 15 minutes.

Equal

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Equal altitudes of the Sun.
A. M. 9^h 41' 58". P. M. 2^h 7' 36".

Observed zenith distance of β Tauri . 3 8 58 s.

15th, and 16th. Cloudy with some thunder and a little rain.

17th. Observed zenith distance of β Tauri . 3 8 58 s.
do. Castor . 0 44 57 N.
do. Pollux . 3 3 56

The observed times, and distances of the \odot 's and \updownarrow 's nearest limbs.

Times.			Distances.			Error of the Sextant 0".
h	'	"	o	'	"	
20	57	41	109	43	40	
20	59	55	109	42	30	
21	1	44	109	41	20	
21	2	51	109	40	30	
21	4	35	109	39	30	
21	5	49	109	39	00	
Means	9	1 49	109	41	5	

18th. *Equal altitudes of the Sun.*
A. M. 9^h 13' 10". P. M. 2^h 31' 38".

19th. Observed zenith distance of β Tauri . 3 8 54 s.
do. Castor . 0 44 50 N.
20th. do. β Tauri . 3 8 55 s.

21st. Stopped the clock and set it forward about 9 minutes.—Screwed up the pendulum bob.

Equal altitudes of the Sun.
A. M. 9^h 53' 24". P. M. 2^h 3' 43".

The observed times, and distances of the ☉'s and ♃'s nearest limbs.

Times.			Distances.			
h	'	"	o	'	"	
21	18	5	65	50	30	
21	21	28	65	50	0	
21	23	29	65	50	0	
21	24	12	65	49	20	Error of the Sextant 0'.
21	25	7	65	48	40	
21	26	17	65	48	0	
21	29	17	65	47	30	
Means	9	23	55	65	49	9

Repeated.

Times.			Distances.			
h	'	"	o	'	"	
21	30	35	65	46	40	
21	31	40	65	46	30	
21	33	19	65	46	30	
21	34	41	65	46	0	Error of the Sextant 0'.
21	36	10	65	45	30	
21	37	43	65	45	20	
21	39	14	65	45	0	
Means	21	34	46	65	45	56

22d. Observed zenith distance of β Tauri . $3^{\circ} 8' 57''$ s.

The observed times, and distances of the ☉'s and ♃'s nearest limbs.

Times.			Distances.			
h	'	"	o	'	"	
21	42	32	54	49	20	
21	43	35	54	48	50	
21	44	28	54	48	20	Error of the Sextant 0'.
21	45	40	54	48	10	
21	46	32	54	48	00	
Means	21	44	33	54	48	32

23d. Observed zenith distance of β Tauri . $3^{\circ} 8' 56''$ s.

The

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The observed times, and distances of the ☉'s and ♃'s nearest limbs.

Times.			Distances.			
h	'	"	o	'	"	
21	21	16	43	53	10	
21	23	7	43	52	40	
21	24	13	43	52	20	
21	25	15	43	52	10	
21	26	52	43	52	00	
Means	21	24	9	43	52	28

Error of the Sextant 0".

From this time I was too much occupied in other concerns, occasioned by the different commotions in the country, to attend to a regular series of observations till October; there are therefore but few entered till that time.

28th. *Equal altitudes of the Sun.*
A. M. 9^h 28' 32". P. M. 2^h 26' 43".

April 7th. Observed zenith distance of Castor . 0° 44' 56" N.

From this time, till the 4th of June no attention was paid to the clock, it ran down several times.

June 12th. *Equal altitudes of the Sun.*
A. M. 8^h 58' 4". P. M. 3^h 8' 50".

Immersion of the 1st satellite of ♃ observed at 15^h 28' 25".—Belts tolerably distinct, magnifying power of the telescope 120.

17th. *Equal altitudes of the Sun.*
A. M. 8^h 54' 41". P. M. 3^h 13' 49".

26th. Clock removed from the tent, into a house where I went to reside myself, but on account of the sickness which prevailed on the river, I removed in July with my people about seven miles into the country and encamped, where

where I remained till the 27th of September, and then returned to the village of Natchez.

28th. Cleaned the clock and set it a-going.

Immersion of the 1st satellite of Υ observed at $14^h 30' 10''$.—Belts distinct, magnifying power 120.

29th.

Equal altitudes of the Sun.
h, " h, "

A. M. $8^h 53' 21.5$. P. M. $3^h 5' 17.5$.
Doubtful 2 or 3 seconds.

30th.

Equal altitudes of the Sun.

A. M. $8^h 59' 44''$. P. M. $2^h 58' 35''$.

Immersion of the 1st satellite of Υ observed at $8^h 59' 19''$. Belts distinct, magnifying power 120.

Oct. 2d. Prepared to observe an eclipse of the 4th satellite of Υ . The satellite was not eclipsed, neither am I convinced that it touched the shadow of Υ , it was very distinct, and appeared when nearest, to be its full diameter from the body of the planet.

7th.

Equal altitudes of the Sun.

A. M. $9^h 2' 10''$. P. M. $2^h 54' 14''$.

From this time, till the beginning of January following, it was with difficulty I could fit up long enough to make an observation, owing to a severe fever.

18th.

Equal altitudes of the Sun.

A. M. $8^h 58' 41''$. P. M. $2^h 56' 52''$.

25th.

Emergence of the 1st satellite of Υ observed at $5^h 55' 12''$.—Belts distinct, magnifying power 120.

26th.

Equal altitudes of the Sun.

A. M. $9^h 9' 25''$. P. M. $2^h 47' 5''$.

Nov. 22d. Clock ran down, wound it up, set it a-going, and lowered the pendulum bob.

24th.

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24th. *Equal altitudes of the Sun.*
 A. M. 9^h 28' 26". P. M. 2^h 38' 35".

Emerfion of the 1st fatellite of Υ obferved at 8^h 7' 33".
 —Belts diftin&th, magnifying power 120.

26th. *Equal altitudes of the Sun.*
 A. M. 9^h 30' 44". P. M. 2^h 37' 48".

Dec. 1st. Thermometer rofe to 78°.—Mufquitoes very troublefome at night.

2d. Thermometer 50° at fun rife, fell to 47°.—Cloudy.

3d. Thermometer 22° at fun rife, rofe to 35°.—Snow and hail without intermiffion till 6^h P. M. when it cleared away with a ftrong N. W. wind.

Observations on a lunar eclipfe.

	h	'	"
Beginning	8	38	34
Beginning of total darknefs	9	37	35
End of total darknefs	11	18	59
End of the eclipfe	12	18	12

During the above obfervation the thermometer was at 20°.

4th. Thermometer 18° at fun rife, rofe to 33°.—Mr. Dunbar's thermometer was at 17° in the morning.

Equal altitudes of the Sun.
 A. M. 9^h 17' 7". P. M. 2^h 57' 35".

5th. Thermometer 20° at fun rife, rofe to 37°.

6th. Thermometer 18° at fun rife, rofe to 39°.

Equal altitudes of the Sun.
 h ' "
 A. M. 9 25 15.5. P. M. 2 51 24.5.

7th. Thermometer 30° at fun rife, rofe to 49°.

Emerfion

Emerfion of the 2d fatellite of Υ obferved at $7^h 56'$
 $31''$.—Belts diftinct, magnifying power 120.

8th. Thermometer 33° at fun rife, rofe to 51° .

Equal altitudes of the Sun.
 A. M. $9^h 56' 15''$. P. M. $2^h 22' 19''$.

9th. Thermometer 30° at fun rife, rofe to 47° .
 —Cloudy.

10th. Thermometer 28° at fun rife, rofe to 56° .

11th. Thermometer 40° at fun rife, rofe to 60° .

12th. Thermometer 52° at fun rife, rofe to 75° .
 —Cloudy part of the day.

13th. Thermometer 60° at fun rife, rofe to 75° .
 —Flying clouds.

14th. Thermometer 63° at fun rife, rofe to 75° .
 —It was 74° at 9^h in the evening, a thunder
 guft at midnight.

15th. Thermometer 46° at fun rife, rofe to 50° .
 —Flying clouds.

16th. Thermometer 30° at fun rife, rofe to 51° .

Equal altitudes of the Sun.
 A. M. $9^h 28' 0''$. P. M. $2^h 58' 15''$.

17th. Thermometer 50° at fun rife, rofe to 55° .

Emerfion of the 1ft fatellite of Υ obferved at $8^h 24' 30''$.
 —A little hazy, but the belts were middling diftinct, mag-
 nifying power 120.

18th. Thermometer 43° at fun rife, rofe to 54° .

Equal altitudes of the Sun.
 A. M. $9^h 50' 14''$. P. M. $2^h 38' 8''$.

19th. Thermometer 30° at fun rife, rofe to 53° .
 —Cloudy with fome cold rain.

20th.

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20th. Thermometer 34° at sun rise, rose to 51° .
 —Cloudy with cold rain.—Cleared off at night with a N. W. wind.

21st. Thermometer $17\frac{1}{2}^{\circ}$ at sun rise, rose to 37° .

Equal altitudes of the Sun.

A. M. 9^h 46' 43.5. P. M. 2^h 44' 58.5.

22d. Thermometer 23° at sun rise, rose to 41° .
 —Cloudy.

23d. Thermometer 28° at sun rise, rose to 37° .
 —Flying clouds.

24th. Thermometer 41° at sun rise, rose to 50° .

*Emerison of the 1st satellite of Υ observed at $10^h 21' 1''$.
 —A little hazy, belts middling distinct, magnifying power 120.*

25th. Thermometer 55° at sun rise, rose to 60° .
 —Cloudy with a little rain.

26th. Thermometer 64° at sun rise, fell to 40° .
 —Cloudy with a N. E. wind.

27th. Thermometer 22° at sun rise, rose to 39° .
 —Wind N. W.

28th. Thermometer 28° at sun rise, rose to 54° .

29th. Thermometer 31° at sun rise, rose to 52° .

30th. Thermometer 53° at sun rise, rose to 65° .
 —Heavy rain.

31st. Thermometer 55° at sun rise, rose to 57° .
 —Heavy rain.

1798.
 Jan. 1st. Thermometer 31° at sun rise, rose to 67° .

Equal altitudes of the Sun.

A. M. 9^h 50' 10". P. M. 2^h 53' 43".

2d. Thermometer 48° at sun rise, rose to 61° .
 —Cloudy.

At 15 minutes after 8 o'clock A. M. stopped the clock about 19 minutes by my watch, and lowered the pendulum bob a small matter, but scarcely discernible with a magnifying glass.

- 3d. Thermometer 45° at sun rise, rose to 52° .
 4th. Thermometer 47° at sun rise, rose to 63° .
 —Cloudy great part of the day.

Immersion of the 3d satellite of \mathcal{J} } Belts distinct, magni-
 observed at . . . $6^{\text{h}} 36' 51''$. } fying power 120.
Emergence do. at . . . $8 36 23$. }

- 5th. Thermometer 27° at sun rise, rose to 67° .

Equal altitudes of the Sun.
 A. M. $9^{\text{h}} 33' 5''$. P. M. $2^{\text{h}} 36' 44''$.

- 6th. Thermometer 37° at sun rise, rose to 61° .
 —Cloudy.
 7th. Thermometer 55° at sun rise, rose to 72° .
 —Rain.
 8th. Thermometer 55° at sun rise, rose to 73° .

Equal altitudes of the Sun.
 A. M. $9^{\text{h}} 41' 30''$. P. M. $2^{\text{h}} 30' 55''$.

Emergence of the 2d satellite of \mathcal{J} observed at $7^{\text{h}} 22' 12''$.
 —Belts distinct, magnifying power 120.

- 9th. Thermometer 35° at sun rise, rose to 62° .

Equal altitudes of the Sun.
 A. M. $9^{\text{h}} 40' 21''$. P. M. $2^{\text{h}} 32' 52''$.

Emergence of the 1st satellite of \mathcal{J} observed at $8^{\text{h}} 23' 10''$.
 —Belts distinct, magnifying power 120.

- 10th. Thermometer 24° at sun rise, rose to 66° .
 —Cloudy.

11th.

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- 11th. Thermometer 23° at sun rise, rose to 61° .
—Cloudy with some rain.
- 12th. Thermometer 27° at sun rise, rose to 57° .
—Cloudy.
- 13th. Thermometer 50° at sun rise, rose to 65° .
—Cloudy part of the day with rain.
- 14th. Thermometer 62° at sun rise, fell to 55° .—
Heavy rain.
- 15th. Thermometer 37° at sun rise, rose to 60° .

Equal altitudes of the Sun.

h	'	"	h	'	"
A. M.	9	29	10.5.	P. M.	2 48 20.
Doubtful 3 or 4 seconds.					

Emerison of the 2d satellite of \mathcal{J} observed at $9^{\text{h}} 58' 28''$.
—Belts obscure, the planet and satellites very tremulous.—
Magnifying power 120.

- 16th. Thermometer 32° at sun rise, rose to 69° .

Equal altitudes of the Sun.

A. M.	9 ^h	23'	55''.	P. M.	2 ^h	54'	20''.
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Emerison of the 1st satellite of \mathcal{J} observed at $10^{\text{h}} 19' 19''$.
—Belts tolerably distinct, magnifying power 120.

- 17th. Thermometer 33° at sun rise, rose to 76° .
- 18th. Thermometer 34° at sun rise, rose to 64° .
- 19th. Thermometer 40° at sun rise, rose to 60° .
—Cloudy with some rain.
- 20th. Thermometer 54° at sun rise, rose to 71° .
—Cloudy.
- 21st. Thermometer 53° at sun rise, rose to 68° .
—Cloudy with rain.
- 22d. Thermometer 67° at sun rise, rose to 76° .
—Cleared off with a N. W. wind.
- 23d. Thermometer 22° at sun rise, rose to 46° .

ASTRONOMICAL AND

Equal altitudes of the Sun.
A. M. 9^h 13' 47". P. M. 3^h 8' 2".

The observed times, and distances of the ☉'s and ♃'s nearest limbs.

Times.			Distances.			
h	'	"	°	'	"	
3	23	15	74	27	5	
3	24	36	74	27	15	
3	26	24	74	27	40	
3	27	25	74	28	0	
3	28	34	74	28	10	
3	29	34	74	28	30	
3	30	25	74	28	50	Error of the Sextant 0".
3	31	16	74	28	55	
3	32	8	74	29	0	
3	33	4	74	29	30	
3	33	46	74	29	40	
3	34	28	74	30	00	
Means	3	29	35	74	28	33

The observed times, and distances of the ♃'s western limb from Aldebaran.

Times.			Distances.			
h	'	"	°	'	"	
9	54	11	45	34	0	
9	55	14	45	33	30	
9	58	59	45	31	20	
10	0	6	45	30	40	
10	1	3	45	30	40	Error of the Sextant 0".
10	2	5	45	30	20	
10	3	10	45	29	10	
10	4	53	45	28	0	
10	6	6	45	27	20	
Means	10	0	39	45	30	33

24th. Thermometer 18° at sun rise, rose to 49°.
—N. W. wind.

Equal altitudes of the Sun.
A. M. 9^h 22' 58". P. M. 2^h 59' 21".

25th. Thermometer 48° at sun rise, rose to 60°.
26th.

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- 26th. Thermometer 66° at sun rise, rose to 76° .
 —Cloudy.
 27th. Thermometer 49° at sun rise, rose to 61° .
 28th. Thermometer 34° at sun rise, rose to 63° .

Equal altitudes of the Sun.
 A. M. $9^{\text{h}} 11' 52''$. P. M. $3^{\text{h}} 11' 51''$.

- 29th. Thermometer 55° at sun rise, rose to 76° .
 30th. Thermometer 66° at sun rise, rose to 82° .
 31st. Thermometer 67° at sun rise, rose to 81° .
 Feb. 1st. Thermometer 59° at sun rise, rose to 81° .
 —Cloudy with some rain.
 2d. Thermometer 64° at sun rise, rose to 76° .
 3d. Thermometer 63° at sun rise, rose to 80° .
 —Cloudy.
 4th. Thermometer 66° at sun rise, rose to 78° .
 —Flying clouds.
 5th. Thermometer 55° at sun rise, rose to 79° .
 6th. Thermometer 61° at sun rise, rose to 71° .
 —Cloudy with a little rain.
 7th. Thermometer 54° at sun rise, rose to 80° .

Equal altitudes of the Sun.
 A. M. $9^{\text{h}} 30' 53''$. P. M. $2^{\text{h}} 53' 48''$.

- 8th. Thermometer 51° at sun rise, rose to 66° .
 —Heavy rain last night and this day.
 9th. Thermometer 33° at sun rise, rose to 57° .
 —Wind N. W.

Equal altitudes of the Sun.
 A. M. $9^{\text{h}} 4' 35''$. P. M. $3^{\text{h}} 19' 50''$.

Emerison of the 2d satellite of Υ observed at $7^{\circ} 2' 52''$.
 —Belts distinct, magnifying power 120.

- 10th. Thermometer 31° at sun rise, rose to 50° .
 11th. Thermometer 55° at sun rise, rose to 70° .
 12th.

12th. Thermometer 61° at sun rise, rose to 78° .

Equal altitudes of the Sun.

A. M. $9^{\text{h}} 1' 43''$. P. M. $3^{\text{h}} 22' 28''$.

13th. Thermometer 64° at sun rise, rose to 80° .
—Cloudy with a little rain.

14th. Thermometer 61° at sun rise, rose to 81° .

15th. Thermometer 55° at sun rise, fell to 50° .
—Some rain.

16th. Thermometer 40° at sun rise, rose to 55° .
—Cloudy in the forenoon.

*Immersion of the 3d satellite of Υ observed at $6^{\text{h}} 51' 32''$.
—Belts middling well defined, magnifying power 120.*

17th. Thermometer 30° at sun rise, rose to 49° .
—Cloudy with a heavy rain at night.

18th. Thermometer 50° at sun rise, rose to 56° .
—Cloudy.

19th. Thermometer 42° at sun rise, rose to 55° .
—Cloudy.

20th. Thermometer 40° at sun rise, rose to 54° .
—Cloudy part of the day.

21st. Thermometer 41° at sun rise, rose to 66° .

Equal altitudes of the Sun.

A. M. $9^{\text{h}} 39' 19''$. P. M. $2^{\text{h}} 43' 4''$.

End of the observations at the Town of Natchez.

1797. The rate of the clock's going, at the town or village of Natchez.

Clock too slow mean time March	3d.	6th.	8th.	14th.	18th.	20th.	Daily loss.
	12	32.4	5.5	33.6	45.3	18.0	11.0
do.			26.6				10.5
do.							11.2
do.							17.9*
do.							16.3

* The alteration in the going of the clock after the 14th must have been occasioned by the tent being blown against it, as mentioned on the 15th.
Stopped

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Stopped the clock and raised the pendulum bob.

	'	"	Daily gain.
do. 21ft.	8	40.1	"
do. 28th.	7	26.2	6.6

From this time till the 4th of June the clock was but little attended to, and ran down several times.

	'	"	Daily loss.
Clock too fast mean time June 12th	3	55	"
do. 17th	3	40.6	2.9

June 26th. The clock was taken down and removed into a house, where it was not attended to till September 28th.

	'	"	Daily gain.
Clock too fast mean time Sept. 29th.	9	30.4	"
do. 30th.	9	39.5	9.1
do. Oct. 7th.	10	47.4	9.7
do. 18th.	12	53.0	11.4
do. 26th.	14	24.3	11.4

Nov. 22d. Clock ran down, wound it up, set it a-going and lowered the pendulum bob.

	'	"	Daily gain.
Clock too fast mean time Nov. 24th.	16	22	"
do. 26th.	16	28	3
do. Dec. 4th.	16	30	0.2
do. 6th.	16	37	3.5
do. 8th.	16	38.5	0.7
do. 16th.	16	40.5	0.2
do. 18th.	16	44	1.7
do. 21ft.	16	52	2.7
do. 1798. Jan. 1ft.	17	31	3.5

1798.

Jan. 2d. Stopped the clock about 19 minutes and lowered the pendulum bob.

Clock too slow mean time Jan. 5th.	1	21	"
do. 8th.	1	20	0.3 daily gain.
do. 9th.	1	22	2.0 daily loss.
			1.0 do.

do.

do.	.	.	.	.	15th.	.	1	28.2	.	"	0.8	daily gain.
do.	.	.	.	.	16th.	.	1	28	.	"	2.3	daily lofs.
do.	.	.	.	.	23d.	.	1	44	.	"	1.0	daily gain.
do.	.	.	.	.	24th.	.	1	43	.	"	1.7	daily lofs.
do.	.	.	.	.	28th.	.	1	50	.	"	3.5	do.
do.	.	.	.	Feb.	7th.	.	2	24.6	.	"	5.5	do.
do.	.	.	.	.	9th.	.	2	35.6	.	"	2.0	do.
do.	.	.	.	.	12th.	.	2	41.6	.	"	1.3	do.
do.	.	.	.	.	21ft.	.	2	53.5	.	"		

1797.

The results of the observations made at Natchez for the Longitude.

March	3d.	Longitude west from Greenwich by a lunar	h	'	"
		observation the D from the ☉.	6	6	24
		do.	6	6	41
		do.	6	5	54
	4th.	do.	6	6	33
		do.	6	5	37
	6th.	do.	6	4	27
	17th.	do.	6	5	48
	21ft.	do.	6	5	2
		do.	6	6	34
	22d.	do.	6	5	34
	23d.	do.	6	6	37
June	12th.	do. by an immersion of the 1st fatellite of ♃	6	6	5
Sept.	28th.	do.	6	6	23
	30th.	do.	6	6	13
Oct.	25th.	do. by an emerfion of do.	6	6	15
Nov.	24th.	do.	6	5	58
Dec.	3d.	by the beginning of the lunar eclipse	6	5	36
		do. beginning of total darknefs	6	6	6
		do. end of total darknefs	6	5	29
		do. end of the eclipse	6	5	38
	7th.	By an emerfion of the 2d fatellite of ♃	6	6	5
	17th.	do. 1ft fatellite	6	5	58
	24th.	do. do.	6	6	12
1798.	Jan. 4th.	By an immersion of the 3d fatellite	5	58	11
		do. emerfion do.	6	0	47
		The immersion of the same fatellite by	}	6	2
		de Lambre's Tables			
		Emerfion of do. by de Lambre's Tables	6	4	57
	8th.	Emerfion of the 2d fatellite	6	5	43
	9th.	do. 1ft	6	5	57
	15th.	do. 2d	6	5	27
	16th.	do. 1ft	6	5	45

23d.

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23d.	By a lunar observation, the ν from the \odot .	} h ' "
	do. the ν from Aldebaran.	6 4 41
Feb. 9th.	By an emerfion of the 2d fatellite	6 5 6
16th.	By an immerfion of the 3d do.	6 5 2
	do. by de Lambre's Tables	5 59 25
		6 3 26

The longitude of Natchez is ftated in the 4th volume of the Transactions of the American Philofophical Society, page 451, at $16^{\circ} 15' 46''$ west from Philadelphia, or $91^{\circ} 29' 16''$ which is equal to $6^{\text{h}} 5' 57''$ west from Greenwich.—That determination includes all the foregoing obfervations previous to the 10th of January, except the immerfion, and emerfion of the 3d fatellite* on the 4th of that month, which from the imperfection of the theory were omitted.

VOL. V. C c Result

* I have lately been furnifhed by Jofe Joaquin de Ferrer, an ingenious Spanifh gentleman, with a number of valuable aftronomical obfervations, which he has made at different places on this continent: among them there are three on the eclipses of Jupiter's fatellites made at la Guaira, which correpond with an equal number of mine made at Natchez.—They are the following:

		Apparent Time.
		h ' "
1798.	{ Emerfion of the 3d fatellite of ν obferv- ed by Mr. de Ferrer at la Guaira } { Obferved at Natchez }	10 9 51
Jan. 4th.		8 31 51
		h ' "
	Difference of meridians	1 38 0
do. 8th.	{ Emerfion of the 2d fatellite of ν obferv- ed by Mr. de Ferrer at la Guaira } { Obferved at Natchez }	8 54 11
		7 15 58
		h ' "
	Difference of meridians	1 38 13
do. 9th.	{ Emerfion of the 1ft fatellite of ν obferv- ed by Mr. de Ferrer at la Guaira } { Obferved at Natchez }	9 54 40
		8 16 31
		h ' "
	Difference of meridians	1 38 9
	Mean	1 38 7.3

The telefcopes ufed by Mr. de Ferrer and myfelf were both acromatic, and nearly of the fame magnifying power, (that is about 120), the difference of the meridians will therefore require no correftion on account of the difference of the inftruments, and may be fafely taken as above ftated: by which it appears that the town of Natchez, is $1^{\text{h}} 38' 7''.3$ or $24^{\circ} 31' 49''$ west of la Guaira.—The latitude of la Guaira as determined by Mr. de Ferrer is $10^{\circ} 36' 40''$ N.

ASTRONOMICAL AND

Result of the observations for the latitude of Natchez.

Observed Zenith Distances of the following Stars.

Face of the Sector East.

		β Tauri.	Castor.	Pollux
		o ' "	o ' "	o ' "
1797.	March 4th.			3 2 58 s.
	5th.	3 7 59 s.	o 45 56 N.	3 3 1
	7th.	3 7 57	o 45 55	3 2 58
	8th.	3 8 0	o 45 56	3 2 56
Means		3 7 58.7	o 45 55.9	3 2 58.2

Face of the Sector West.

	9th.			3 4 0
	10th.		o 44 55	3 3 59
	14th.	3 8 58		
	17th.	3 8 58	o 44 57	3 3 56
	18th.	3 8 54		
	19th.		o 44 50	
	20th.	3 8 55		
	22d.	3 8 57		
	23d.	3 8 56		
April	7th.		o 44 56	
Means		3 8 56.3	o 44 54.5	3 3 58.3
Means face east		3 7 58.7	o 45 55.9	3 2 58.2
Means		3 8 27.5	o 45 25.2	3 3 28.2
Refractions		+3.1	+0.7	+3
True zenith distance		3 8 30.6	o 45 25.9	3 3 31.2

Mean declinations March 15th.	28 25 20.3 N.	32 19 1.9 N.	28 30 10.7 N.
Aberrations	+1.7	+2.1	+0.8
Nutations	-1.0	+6.9	+3.4
Semi. ann. equations	+0.5	+0.4	+0.3
True declinations	28 25 21.5	32 19 11.3	28 30 15.2
True zenith distances applied	+3 8 30.6	-o 45 25.9	+3 3 31.2
Latitudes N.	31 33 52.1	31 33 45.4	31 33 46.4

	o ' "
Lat. by β Tauri	31 33 52.1
do. Castor	31 33 45.4
do. Pollux	31 33 46.4
Mean lat. N.	31 33 48 nearly.

Astronomical

THERMOMETRICAL OBSERVATIONS. 191

Astronomical, and Thermometrical Observations, made at the City of New-Orleans on the Mississippi.

1799.

- Jan. 10th. Set up the clock, thermometer 70° in the afternoon.
 11th. Cloudy all day, thermometer 73° in the afternoon.
 12th. Cloudy with mist, thermometer 72° in the morning, fell to 65° in the evening.
 13th. Cloudy in the afternoon, thermometer 70° in the morning, fell to 64° in the evening.
 14th. Clear, thermometer 62° in the morning, rose to 63° in the afternoon.

Equal altitudes of the Sun.

A. M. $9^{\text{h}} 6' 42''$. P. M. $2^{\text{h}} 53' 3''$.

Emerſion of the 1st ſatellite of \mathcal{J} obſerved at $6^{\text{h}} 10' 37''$ P. M.—Night clear, belts diſtinct, magnifying power 120.

- 15th. Clear day, thermometer 61° at ſun riſe, roſe in the afternoon to 68° .

Equal altitudes of the Sun.

A. M. $8^{\text{h}} 52' 25''$. P. M. $3^{\text{h}} 6' 48''$.

Set up the Sector of fix feet radius. Face to the eaſt.

Obſervations on the paſſage of the \mathcal{D} over \mathcal{J} , and three of his ſatellites.

	h	'	"	
2d. Satellite immerſed at	5	35	26	
1ft. do.	5	41	7	
\mathcal{J} began to immerſe at	5	44	5	
\mathcal{J} immerſed at	5	46	22	
4th. Satellite immerſed at	5	53	47	P. M.
1ft. do. emerged at	7	2	0	
\mathcal{J} began to emerge at	7	4	42	
\mathcal{J} emerged at	7	6	50	
4th. Satellite do. at	7	16	48	

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The 3d fatellite at the time of its immerfion was obfcured by a fmall cloud, and as it emerged about the time that γ was $\frac{2}{3}$ emerged, it was not attended to fo accurately, as to entitle it to a place among the obfervations.

- 16th. Cloudy with rain, thermometer 62° at fun rife, fell in the afternoon to 59° .
 17th. Cloudy with rain, thermometer 58° at fun rife, rofe in the afternoon to 67° .
 18th. Cloudy, thermometer 59° in the morning, rofe in the afternoon to 61° .
 19th. Clear, thermometer 56° at fun rife, rofe in the afternoon to 66° .

Equal altitudes of the Sun.

A. M. $9^h 10' 47''$. P. M. $2^h 46' 10''$.

		o	'	"	
Obferved zenith diftance	β Andromedæ	4	36	28	N.
do.	β Tauri	1	31	6	S.
do.	Caftor	2	22	15	N.
do.	Pollux	1	26	35.5	S.

- 20th. Clear in the morning, cloudy in the evening, thermometer 60° at fun rife, rofe in the afternoon to 69° .

Obferved zenith diftance α Coro. Borealis $2^\circ 32' 52''$ S.

Equal altitudes of the Sun.

A. M. $9^h 40' 27''$. P. M. $2^h 15' 49.5''$.

- 21ft. Cloudy all day, clear in the evening, thermometer 60° in the morning, rofe to 69° in the afternoon.

Emerfion of the 1ft fatellite of γ obferved at $8^h 2' 9''$ P. M.—Belts diftinct, magnifying power of the telefcope 120.

		o	'	"	
Obferved zenith diftance	β Tauri	1	31	10	S.
do.	Caftor	2	22	14	N.
do.	Pollux	1	26	31.5	S.
					22d.

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22d. Clear day, thermometer 61° at sun rise, rose in the afternoon to 72° .

Equal altitudes of the Sun.

A. M. $9^{\text{h}} 36' 39''$. P. M. $2^{\text{h}} 18' 18''$.

	o	'	"	
Observed zenith distance β Andromedæ	4	36	29	N.
do. . . β Tauri	1	31	9	S.
do. . . Castor	2	22	12.5	N.
do. . . Pollux	1	26	35.5	S.

23d. Clear day, thermometer 66° at sun rise, rose in the afternoon to 74° .

	o	'	"	
Observed zenith distance α Coro. Borealis	2	32	51	S.
do. . . β Andromedæ	4	36	30	N.

Turned the face of the Sector to the west.

Observed zenith distance of Pollux . $1^{\circ} 28' 16''$ S.

24th. Clear day, thermometer 68° at sun rise, rose in the afternoon to 77° .

Observed zenith distance of α Coro. Borealis $2^{\circ} 34' 34''$ S.

Equal altitudes of the Sun.

A. M. $8^{\text{h}} 54' 0''$. P. M. $2^{\text{h}} 59' 33''$.

The equal altitudes of this day are doubtful 2 or 3 seconds, from the violence of the wind.

Observed zenith distance β Andromedæ $4^{\circ} 34' 49''$ N.

The above zenith distance is doubtful, from the effect of the wind on the plumb-line.

	o	'	"	
Observed zenith distance β Tauri	1	32	47	S.
do. . . Castor	2	20	35	N.
do. . . Pollux	1	28	17	S.

25th. Heavy fog in the morning, thermometer 70° at 6 o'clock A. M. and 79° in the afternoon.

Observed

		°	'	"	
Observed zenith distance of β Andromedæ	4	34	46	N.	
do. β Tauri	1	32	50	S.	
26th. do. α Coro. Borealis	2	34	31.5	S.	

Clear till 9 o'clock A. M. afterwards flying clouds, thermometer 75° all last night, rose in the afternoon to 79° .

27th. Cloudy with fine rain—the thermometer continued at 77° all last night, fell to 68° at 2^h P. M. The wind which had been southerly since the 10th, shifted to the north, and the mercury fell to 56° in the evening.

Feb. 6th.

Equal altitudes of the Sun.
A. M. 9^h 18' 44". P. M. 2^h 23' 44".

7th. and 8th. Heavy rain, accompanied with sharp lightning, and heavy thunder.

9th. Clear—the thermometer 36° at sun rise, rose in the afternoon to 57° .

10th. Clear—the thermometer 30° at sun rise, rose in the afternoon to 60° .

Emerſion of the 2d ſatellite of \mathcal{J} obſerved at 9^h 10' 26".
—Very clear, belts diſtinct, magnifying power of the teleſcope 120.

11th. Clear—the thermometer 31° at sun rise, rose in the afternoon to 65° .

12th. Clear—hoar froſt—thermometer 38° at sun rise, rose in the afternoon to 71° .

17th. Clear—the thermometer 59° at sun rise, rose in the afternoon to 74° .

Equal altitudes of the Sun.
A. M. 9^h 33' 16". P. M. 1^h 57' 33".

Latitude

Latitude of the City of New-Orleans deduced from the Zenith Distances.

Face of the Sector East.

		β Andromedæ.	β Tauri.	Castor.	Pollux.	α Coro. Borealis.
		° ' "	° ' "	° ' "	° ' "	° ' "
1799.						
Jan.	19th.	4 36 28 N.	1 31 6 S.	2 22 15 N.	1 26 35.5 S.	2 32 52 S.
	20th.					
	21st.		1 31 10 S.	2 22 14 N.	1 26 31.5 S.	
	22d.	4 36 29 N.	1 31 9 S.	2 22 12.5 N.	1 26 35.5 S.	
	23d.	4 36 30 N.				2 32 51 S.
	Means	4 36 29 N.	1 31 8.3 S.	2 22 13.8 N.	1 26 34.2 S.	2 32 51.5 S.

Face of the Sector West.

	24th.	4 34 49 N.	1 32 47 S.	2 20 35 N.	1 28 16 S.	2 34 34 S.
	25th.	4 34 46 N.	1 32 50 S.			
	26th.					2 34 31.5 S.
	Means	4 34 47.5 N.	1 32 48.5 S.	2 20 35 N.	1 28 16.5 S.	2 34 32.7 S.
	Means face west	4 36 29 N.	1 31 8.3 S.	2 22 13.8 N.	1 26 34.2 S.	2 32 51.5 S.
	Means	4 35 38.2 N.	1 31 58.4 S.	2 21 24.4 N.	1 27 25.3 S.	2 33 42.1 S.
	Refractions	+ 4.5	+ 1.5	+ 2.3	+ 1.5	+ 2.5
	Correct zenith distances	4 35 42.7 N.	1 31 59.9 S.	2 21 26.7 N.	1 27 26.8 S.	2 33 44.6 S.
	Mean declinations, 23d Jan. 1799.	34 33 6.8 N.	28 25 23 N.	32 18 49 N.	28 29 53.2 N.	27 23 59.5 N.
	Aberrations	+ 7.0	+ 2.5	- 1.6	- 2.4	- 11.3
	Nutations	- 3.8	+ 4.6	+ 7.6	+ 7.5	- 1.2
	True declinations	34 33 10 N.	28 25 30.1 N.	32 18 55 N.	28 29 58.3 N.	27 23 47 N.
	Correct zenith distances applied	- 4 35 42.7 N.	+ 1 31 59.9 S.	- 2 21 26.7 N.	+ 1 27 26.8 S.	- 2 33 44.6 S.
Latitude	Latitudes	29 57 27.3 N.	29 57 30.0 N.	29 57 29.3 N.	29 57 25.1 N.	29 57 31.6 N.

	o	'	"
Latitude by β Andromedæ . . .	29	57	27.3
do. . . β Tauri . . .	29	57	30.0
do. . . Castor . . .	29	57	29.3
do. . . Pollux . . .	29	57	25.1
do. . . α Coro. Borealis . . .	29	57	31.6
Mean Latitude north . . .	29	57	28.7

The above determination differs but $16''.3$ from the latitude of New-Orleans as stated in the requisite tables, and which may have arisen from the observations being made in different parts of the city.

Longitude of the city of New-Orleans, deduced from the eclipses of \mathcal{U} 's satellites.

1799.		Daily los.			
		'	"	'	"
Jan.	14th. Clock too slow mean time . . .	9	56	. . .	37
	15th. . . . do.	10	33	. . .	36.5
	19th. . . . do.	12	59	. . .	38
	20th. . . . do.	13	37	. . .	36
	22d. . . . do.	14	49	. . .	36
	24th. . . . do.	16	1	. . .	38
Feb.	6th. . . . do.	24	27	. . .	25.4
	17th. . . . do.	29	6	. . .	

From the 24th of January, till I left New-Orleans, I was engaged in decking, and rigging a schooner, to transport our baggage, apparatus, and provisions along the coast, and therefore unable to attend constantly to the going of the clock, which was set up in a place much exposed, and probably the case was by some accident shifted a small matter between the 6th, and 17th of February, from the position it had when set up: This appears likely from the rate of the clock's going during that interval.

An emersion of the 1st satellite of \mathcal{U} was observed on the 14th of January at $6^h 10' 37''$ P. M.—the clock was then too slow mean time $10' 05''$, the observation was therefore made at $6^h 20' 42''$ mean time, from which deduct $9' 48''$ the equation of time, and the remainder $6^h 10' 54''$ will be the apparent time, which deducted from $12^h 12' 19''$ the apparent time at Greenwich by the theory, the remainder $6^h 1' 25''$ will be the difference of meridians.

An emersion of the 1st satellite of \mathcal{U} was observed on the 21st of January at $8^h 2' 9''$ P. M. The clock at the time of observation was $14' 34''$ too slow mean time, the observation was of course made at $8^h 16' 43''$ mean time, from which deduct $12' 0''$ the equation of time, and the remainder $8^h 4' 43''$ will be the apparent time of the observation, which deducted from $14^h 5' 43''$, the apparent time at Greenwich by the theory, the remainder $6^h 1' 00''$ will be the difference of meridians.

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On the 10th of February at 9^h 10' 26" P. M. an emerfion of the 2d fatellite of Υ was obferved, the clock was then 26' 26" too flow mean time, the obfervation was therefore made at 9^h 36' 52" mean time, from which deduct 14' 38" the equation of time, and the remainder 9^h 22' 14" will be the apparent time of the obfervation, which taken from 15^h 22' 5" the apparent time at Greenwich by the theory, the remainder 5^h 59' 51" will be the difference between the meridians.

The longitude given by the 2d fatellite, does not appear from the theory to be entitled to more than half the weight of either of thofe by the firft; this being admitted, the longitude will be had as below.

	Longitude west.
By the emerfion of the 1ft fatellite } on the 14th of Jan. }	. . 6 ^h 1' 25"
By . do. . on the 21ft of Jan. }	. . 6 1 25
By an emerfion of the 2d fatellite } on the 10th of Feb. }	. . 6 1 0
	. . 5 59 51
Mean	6 0 56 = 90° 14' west

from Greenwich, or 1^h 0' 21" = 15° 5' 15" west from Philadelphia.

The longitude of the city of New-Orleans is fet down in Robertfon's Navigation at 89° 54' 0" or 5^h 59' 36" west. In the requisite tables at 89° 58' 45" or 5^h 59' 55" W. and by the French academicians* at about 90° or 6^h west from Greenwich.—The difference is not confiderable, and perhaps the refult of my obfervations may agree with the foregoing authorities ftill more nearly, when compared with correfponding ones, or others made about the fame time, at any obfervatory the longitude of which has been accurately fettled.

The obfervations on the paffage of the \mathcal{D} over Υ , and three of his fatellites, before mentioned, will be reduced to apparent time, by adding 34" to each obfervation.

Observations made on the tranfit of \mathcal{V} in May 1799 at Miller's place on the Coenecuch river, commonly, (though erroneoufly), called the Efcambia, in lat. 30° 49' 33" N. by meafurement, from the fouth boundary of the United States, and due fouth from the end of two hundred and forty-eight miles, and one hundred and eighty-fix perches eaft from the Miffiffippi, in the parallel of 31° N. lat.

May 2d. The inftruments arrived in a boat from the head of Penfacola-Bay.

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* Exposition du calcul par de la Landé 1762.

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- 3d. Put up the clock and set it to apparent time nearly.

Equal altitudes of the Sun.
 $3^d 20^h 22' 34''.$ $4^d 3^h 37' 27''.$

4th. *Equal altitudes of the Sun.*
 $4^d 20^h 30' 17''.$ $5^d 3^h 29' 51''.$

5th. *Equal altitudes of the Sun.*
 $5^d 20^h 22' 47''.$ $6^d 3^h 37' 45''.$

- 6th. At 19^h ☿ appeared beautifully defined through a middling heavy fog on the face of the sun, at 21^h the fog disappeared.

The internal contact at the egress	}	h	'	"
was observed by myself at		22	45	24
The external do. at		22	48	29.5

The external contact is certain within the $\frac{1}{2}$ of a second.
 —Magnifying power of the telescope 200.

The internal contact at the egress	}	h	'	"
was observed by Capt. Stephen Minor, His Catholic Majesty's commissioner, at		22	46	21
The external do. at		22	48	14
Magnifying power of the telescope 35.				

The internal contact at the egress	}	h	'	"
was observed by my assistant Mr. David Gillispie at		22	46	21
The external do. at		22	47	59
Magnifying power of the telescope 25.				

Equal altitudes of the Sun.
 $6^d 20^h 15' 21''.$ $7^d 3^h 45' 36''.$

The

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The rate of the clock's* going deduced from the equal altitudes.

					Daily gain.
		'	"		'
May 4th.	Clock too fast mean time	3	23	.	0 11
5th.	. . do.	3	37	.	0 17
6th.	. . do.	3	51	.	0 15
7th.	. . do.	4	6	.	0 15

The clock was 4' 5" too fast mean time when the observations on the transit of ♃ were made, and the equation of time 3' 44" additive to the mean time, the difference therefore between 4' 5" and 3' 44" being deducted from the observations will give the apparent times.

*A Lunar observation made near the mouth of the Chatta-
hocha.*

It was my original intention to have taken charts of the southern parts of all the rivers intersected by the 31st degree of N. lat. and falling into the gulf of Mexico between the Mississippi, and St. Marks: But having no business up or down the Pascagola, (which is a large river and navigable for boats of burden many miles above the boundary), it was omitted.—The Chattahocha, or as it is sometimes called the Appalachianola, is a river of more importance than the former, and a map of it from the boundary to its mouth was a desirable object; but owing to the precipitate manner we had to leave the country in consequence of the hostile disposition of the Indians, and descending the river partly in the night, it was impossible to take a sketch of it with any tolerable degree of accuracy.—About 4 minutes of a degree north of the entrance of its western branch into St. George's Sound, I found the latitude to be about 29° 46' 51" N.—At the same place

D d 2 on

* The clock was well fastened to a post set 3½ feet in the ground, but being neither covered, nor surrounded by any building, and several hundreds of Indians in our camp, some individuals of whom were frequently leaning against the post, (though admonished to the contrary), which circumstance might produce a small irregularity in the going of the regulator.

on the bank of the western branch, the following observations were made to determine the longitude.

1799. Sept.	Watch N ^o 1.	Watch N ^o 2.	Double alt. ☉'s upper limb.	Error of Sextant add 10".
	d h ' "	d h ' "	o ' "	
	22 20 23 17	22 20 23 38	61 3 0	
	22 20 23 46	22 20 24 8	61 47 10	
	22 20 24 11	22 20 24 33	61 57 30	
	22 20 24 49	22 20 25 11	62 12 40	
	22 20 25 19	22 20 25 41	62 24 40	
	22 20 26 19.	22 20 26 42	62 49 50	
Means	22 20 24 37	22 20 24 59	62 2 28	

The observed times, and distances of the ☉'s and ☽'s nearest limbs.

d h ' "	d h ' "	Dist. of the limbs.	Error of Sextant add 10".
		o ' "	
22 21 0 8	22 21 0 34	74 45 0	
22 21 0 43	22 21 1 9	74 44 30	
22 21 1 24	22 21 1 49	74 44 30	
22 21 1 57	22 21 2 23	74 44 20	
22 21 3 20	22 21 3 49	74 44 0	
22 21 4 18	22 21 4 40	74 43 50	
22 21 4 38	22 21 5 6	74 43 40	
Means	22 21 2 20	74 44 16	

Watch N ^o 1.	Watch N ^o 2.	Double alt. ☉'s upper limb.	Error of Sextant add 10".
		o ' "	
22 21 7 58	22 21 8 26	79 14 0	
22 21 8 35	22 21 9 3	79 27 30	
22 21 9 8	22 21 9 37	79 40 30	
22 21 10 1	22 21 10 30	80 1 0	
Means	22 21 8 55	79 35 45	

The first and third sets of observations were made to determine the error of the watches and their rate of going. By the first set of observations watch N^o. 1 appeared to be too slow 13" and N^o. 2 too fast 9". By the third set made about 44½ minutes after the first, the watch N^o. 1 was too slow 23" and N^o. 2 too fast 6"—hence N^o. 1 lost 10" in 44½ minutes and N^o. 2 lost 3" nearly in same time. The errors of the watches reduced to the time of the lunar observation and applied to it will give 22^d 21^h 2' 41" for

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for the correct apparent time. The longitude of the place of observation was estimated at 5^h 39' west from Greenwich. From the latitude of the place, the apparent time of the observation, and the estimated longitude, the true altitude of the ☽'s centre comes out 64° 53' 52" and that of the ☉'s 38° 14' 50"—from which the longitude will be had as follows :

	o' "	
☽'s true altitude	64 53 52	
☉'s do.	38 14 50	
	<hr/>	
Difference true altitudes	26 39 2	
	<hr/>	
☽'s apparent altitude	64 29 58	
☉'s do.	38 15 56	
	<hr/>	
Difference apparent altitudes	26 14 2	
Apparent dist ☽'s and ☉'s centres	75 16 4	
	<hr/>	
Sum	101 30 6	
Difference	49 2 2	
	<hr/>	
$\frac{1}{2}$ Sum	50 45 3	S 9.8889664
$\frac{1}{2}$ Difference	24 31 1	S 9.6180087
☽'s apparent altitude	64 29 58	co. or c. S 0.3660068
☽'s true altitude	64 53 52	S 9.6276060
☉'s apparent altitude	38 15 56	co. or c. S 0.1050480
☉'s true altitude	38 14 50	S 9.8950616
	<hr/>	
		2)39.5006975
	<hr/>	
Difference true altitudes	26 39 2	19.7503487
$\frac{1}{2}$ Difference true altitudes	13 19 31	S 9.3626315
	<hr/>	
	67 43 46	T ^t 10.3877172
	<hr/>	
	67 43 46	c. S 9.5786170
	<hr/>	
	37 27 22.5	S 9.7840145
	<hr/>	
	2	
True distance	74 54 45.0	
Dist. at Greenwich at noon the 23 ^d 0 ^h	76 14 17	
Do. 23 3	74 45 57	
	<hr/>	
Difference between the 1st and 2d	1 19 32	P. L. 3547
Do. between the 2d and 3d	1 28 20	P. L. 3091
		<hr/>
		0456 = 2 ^h 42' 4"
		which

which added to 23 days will give for the time at Greenwich	23 ^d	2 ^h	42'	4''
from which deduct the apparent time of the observation	22	21	2	41
Longitude of the place of observation west	<hr/>			
	0	5	39	23

The above determination of the geographical position of the place of observation, is probably as correct, if not more so, than in our best charts. From this example it may be seen with what ease, both the latitudes, and longitudes of places may be determined on land for common geographical purposes with a good sextant, a well made watch with seconds, and the artificial horizon, the whole of which may be packed up in a box of 12 inches in length, 8 in width, and 4 in depth.

This paper being now carried to the length intended, and embracing the objects proposed, I have only to add that

I am with sincere esteem,

Your friend, &c.

AND^w. ELLICOTT.

Mr. ROBERT PATTERSON,
V. P. American Philo-
sophical Society.

No.