1867phae.proj..292S

KG
11365
292

IV 9.

Observations with E. Equid[illegible]l.
(Original.)
Vol. 9.
1867 Jan 23 to Apr 23

Sold by Thomas Groom & Co., Stationers, India Building, 82 State Street, Boston.

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η Cassiopeae

36 Andromedae

γ Andromedae

new — Σ 1074

3037

3062

ζ Cancri

1216

12 Lyncis

1104

836

1338

new — 157 Lyncis

new — 1457

new — ι Leonis 1536

new — 1595

ε Arietis

new — 133

new ε Hydrae

new 42 Comae · $13^h\ 3^m.4$ $+18^\circ\ 14'$

Σ 412

η Orionis

W v 520

42 Orionis

Lal 10567

Σ 323 ?

942 ?

Lal 2362

94 Ceti

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1867 Jan 23 Wednesday

Turned to Stry. Z. +13° Sto 318

Star observed for (91) Jan 19 still in place.

Uranus. F.W. Seeing good.

Stellar focus adjusted. (~~also finder~~)

	to read	coma.	
Diameter	28.9		Could not see the Satellites
	49.47	49.00	

G. M. T. Seeing good. What there is of it.

Direction. Cannot measure distances

4th satellite — preceding

4 · H	5~~6~~ m	90 + 174 45
	52	90 + 172 15
	5 52 45	174 40
	5 ~~3~~ 30	175 35
	5 4 00	171 40

3d Satellite

preceding

55	90 + 190 5
55 55	188 1
56 30	188 5
57 5	189 35
58	191 17

So faint Cannot measure distances

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must be variable (JW)

$6^h\ 10^m$ Sirius. Companion distinctly seen by W & S. ^

	JW			comc.
	99 0	50.05		48.98
Parallel to line of	98 15	.02		49.00
eyes	100 1	02	very unsteady	01
	100 15	49.94		48.96
	100 0	50.04		98
	99 45			99

Companion appears reddish to JW.

$90° + 5° 0'$ cannot measure satisfactorily in this manner
$5°$ owing to brightness of large star

Companion well seen notwithstanding thick haze

S. M. S- No star visible to naked eye except Sirius
Star instead Companion faint.

$96° 10$ frightfully unsteady Lips haze
$95\ 32$ not so good as first
$95\ 25$

Comc

$90° + 5\ 22$	~~49~~ 99	48.92. 92. 93, 92. 94
$6\ 30$	49 97	
$6\ 17$	49 98	hazy night in dist & angle

JW

93 45 ~~Bad~~
99 15 }
not good enough to be
combined with the others.

$90° + .3°$

comc. (probably has been changed)

48.95
95
93
92

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1967phot.proj., 2926

Trapezium θ Orionis. JW

No 6. 90 + 323 25

from near star of trapezium (preceding it.)

Upper line of trapezium

40	25
40	0
39	15
39	3
39	8
mean 39	34

Further obsns. prevented by clouds.

Companion of Sirius seen much better than the sixth star of the trapezium.

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1867 Jan 24 Thursday

3h 10m Zodiacal light remarkably conspicuous. Vertex about at δ Piscium. Base extending from W [illegible] 18° or 20° to S. Middle obscured by clouds. (JW & SMS)

12 Lyncis (Σ 948) JW Seeing remarkably good.

	AB			AB	
	218	15		49.17	coms.
wires	216	10	~~B > A in brilliancy~~	.18	
parallel	217	20		23	
to	216	20	A brighter than B.		
eyes.	217	50			
mean	217	11			

	AC				
	227	20	C precedes.	49.87	Coincid
"	224	25	obscured by clouds.	77	48.93
	224	50		81	48 94
	223	0		86	.94
	226	0		80	
mean	225	7		80	

Obsns. interrupted by clouds.

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Sirius 9 MS (No gas illumination.)

5h 40m 99 22 Companion not quite as well seen as last night.
98 12 Air fully as clear, apparently, and no moon.
99 15

Air becomes clearer

90+

5	35	49.94	
6	58	50.02	best distance yet measured companion well seen on wire
6	25	07	nearly as good
6	45	49.98	
4	52	50.00	

48.89
94
93
94
95
93

Seeing worse. Tried to measure direction in the ordinary way, but could not see the companion.

7h 30m ζ Cancri. Could not be sure of elongation of principal star. Seeing poor.

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1867 Jan 25 Friday

$2^h\ 45^m$ Zodiacal light ~~hardly~~ not so bright as last night, but apparently more haze. Vertex at δ Piscium. Base obscured by cloud. G.M.S.

Sirius G.M.S.

Companion well seen when first looked at, notwithstanding ~~this~~ haze, which presented the appearance of a driving snow storm in the telescope, numerous particles crossing very rapidly (from W to E. ~~It is thus~~ if remembered right.) Clouds closed over before any measures could be taken.

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Jan 27 Sunday

Uranus G M S

	by chron 236	90 +			
	4 48	169 20	59.09	} Double weight to distances; satellite best seen in this set.	
3d Satellite f.		168 25	59.085		
Stars on wires	53	168 27	59.07		
				comic.	
				55.91	
				94	
	56	168 3	52.28	95	
Planet in		168 38	52.45	94	
middle	5 0	168 20	52.29	95	
				92	Wires vertical on retina in all these measures.
Stars on wires	6	168 53	59.39		
	8	168 5	59.45		
	12	103 58	51.25		
4th Satellite	13	104 50	59.30	55 93	Wires horizontal on retina
s.f.	14	104 15	51.32	92	
	17	104 20	51.36	92	
Stars on wires		103 25	51.39	92	
				55.930 mean	

58.40
36
38 Diameter in direction of 4th Satellite.

Limb not well defined, though the stars were steady.

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Mars. G. M.S.

Seen perhaps better than ever before.
markings occasionally very distinct.

S Pole greenish and so well defined.



space a, dusky red.
space c b d dark, point b darkest of all.

limb yellow, as usual.

N. Pole intensely bright

~~90 + 155 1/2~~ °

angle b

$6^h\ 35^m$	58.79	$90 + 155\frac{1}{2}$
36^m	58.75	" $149\frac{1}{2}$

(in this direction)
coincidence on following limb
58.32
32

preceding limb 59.80
59.85

N. Pole very bright, and seems to project from the general line of the limb.

Line b c well defined
" b d poorly "

N Pole direction
[170° 12'] reject
185 50
185 15 } Seeing better
185 5

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$7^h 5^m$ Sirius. Both W. & S. felt pretty sure of having seen the companion, but too faint & unsteady to measure. Seems bluish to W.

Obsns. so far with power no 4.

Trapezium θ Orionis. W. cannot see the sixth star.
changed to No 2.

J.W. Thinks there is some spirality in the n. fr. angle of nebula.

Rest a good deal mottled but no spirality.

~~Observation~~

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Mars. G. M. S.

Seen perhaps better than ever before. markings occasionally very distinct.

S Pole greenish not so well defined.



space a, dusky red.
space b d dark, point b darkest of all.

limb yellow, as usual.

N Pole intensely bright

~~90 + 155 1/2~~

angle b

6h 35m	58·79	90 + 155 1/2
36m	58·75	" " 149 1/2

(in this direction)
coincidence on following limb
58·32
32

preceding limb 59·80
59·85

N. Pole very bright, and seems to project from the general line of the limb.

Line bc well defined
" bd poorly "

N Pole direction
[170° 12'] reject
185 50
185 15 } Seeing better
185 5

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1867phae.proj..292S

$7^h\ 5^m$ Sirius. Both W. & S. felt pretty sure of having seen the companion, but too faint & unsteady to measure. Seems bluish to W.

Obsns. so far with power no 4.

Trapezium θ Orionis. W. cannot see the sixth star.
changed to No 2.

J.W. Thinks there is some spirality in the n. f. angle of nebula

Rest a good deal mottled but no spirality.

~~Observation~~

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Jan 28 Monday

3 55.5

Double star ~~2 33.5~~ -16 10.3 Mags. 9 & 10 JW

222 50 Comp. sf.

3h 20m 225 5 vernier read on side of companion.

224 55

	comic
58.71	57.80
58.65	80
80	81

stars become quite faint before completion of measure

90 + 131 50

stars perp. to line of eyes.

~~3 1~~

~~2 59~~ -16 10.3 Both 9 may

	comic.
270 30	59.62 57.795
269 45	65 81
3 35 269 30	67
270 45	69
268 15	

90 + 180 45

Stars parallel to eyes.

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Uranus jw 90 +
3 53 212 5

3d Satellite 4 0·5 212 45 61·10
1·7 61·40 Stars on wires
nf. 2·7 213 55 61·34 Same coincd.
5·0 61·25

≠
90 +
Coinc. changed
4 8 312

4th Satellite Coincd.
~~12~~ ~~3 6 2~~
14 rej. [53·74 2] 57·66
sf. 17 310 0 53·00 69 wire e
20 52·97 69
24 307 15 53·02 67
26·5 53·02 74
28·5 308 30 53·17 67

Σ 1037 jw 219 40
219 15 measure of direction very difficult
221 0 Components equal
221 45
220 40

33·00 poor light on wires; afterward seem to be wrong
~~33~~
32·95 32·70
93 70 Coinc.
97 63 ? wire
70
70
69 69

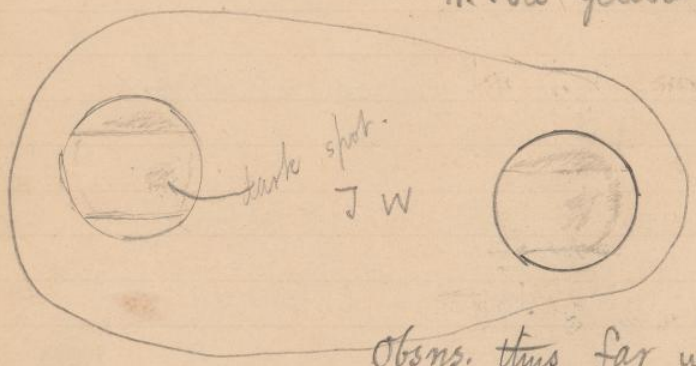
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Mass J W white at S. Pole nearly twice as wide as that at N Pole, = ½ radius of the planet.



red spot a. out very well defined
space b is dark.
S. Pole greenish.
N. Pole yellow, very bright.
} S M S



Obsns. thus far with power no 3.

5h 20m Zodiacal light still quite conspicuous. Base from 3° N of W to 7° S of W about; vertex about midway between α Arietis and α Cetŭ.

6h 25m Sirius. Companion better seen with power no 4 than 3. Power no 4 J.W.

			Coinc.
95	30	52·33	51·29
97	10	38	29
98	30	39	285
98	15	38	80
97	15	40	

Companion reddish · seen well on wire, better defined than yet seen, and easily measured.

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Trapezium θ Orionis Sixth star 90 +

fw 140 45 51·65
66
63

6h 45m 140 45 65
142 30

becomes blurred.

upper line of trapezium 40° 30′
39 5
stars parallel to eyes. 40 55
40 20
39 50
mean ~~40~~° 8′

5th star
from nearest star of trapezium. 354 20
356 15
355 50
357 15
357 5
mean 356 9

81 49
87 52

preceding pair of trapezium 318 40
318 40
318 0
318 15
318 10
318° ~~17~~ 21



lower line 231 25
231 40
230 15
229 15
229 40
230° 27

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following pair

292	15
292	10
288	45
290	30
291	0
mean 290	56

for upper & lower brace stars parallel to eyes.

" preceding & following " perp. to eyes.

ζ Cancri close pair pW 304 10 Smaller star also appears double
                        303 30
                        306 15
γ² 40   304 20

G M s 304 58 companion preceds
       303 32
       302 17 poorer measure ½ wt.
       302 13

Dist. a mere est 51.31
Coinc 51.25

Dist est. by pW from 0".6 to 0".75

Obsns. with power no 5.

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Σ 1216 JW

$8^h\ 25^m$ 228 45 unsatisfactory

distance about 0".5

ω Leonis Cannot separate ∴ Power no 4.

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1867 Jan 29 Tuesday

Stellar focus adjusted by J W to read ~~28·0~~ 28·8

Seeing not so good as last night.

Sweeps in S. declination for double stars by J W.

$3^h\ 40^m\ -16^\circ\ 53'$	52 45	both 9 mag	
	52 15		coinc.
	53 30		
$3^h\ 45^m$		54·15	51·34
		·02	33
		53·95	34
		·95	

U. M. S. estimates 10 mag. 10.5 smaller star preceding
J. W. adopts this estimate

4^h Zodiacal light of unusual brilliancy
15 degrees at the horizon (broad) i.e. from W to 15° S W
and extending upwards to the Pleiades (and the zenith) tapering
to a point there

$4^h\ 17^m$ Z. 84° G. M. S. Seeing not very good
St. Prosp. to edges comp fol.

239° 20′		
241 10		
238 50		
241 16		
		Coinc
90+152° 45′	51.05	51, 31 · 30 · 31
150 40	51.10	

This star appears to be W. 1550 being preceded by 1544 12s.5 on the same parallel.

1552 also follows to the south, apparently. The stars are in a pretty rich cluster.

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1867 Jan. 29 Tuesday

Satellites of Uranus G. M. S.

		90+257 14	54	
3rd. Satellites	4h 44m 0s		24 82	line of stars
	45 51	90+258.5	49 73	perpendicular
nearly north	47 6	258.7	49 79	to eyes.
	48 5	255.47	49 77	
	4927	256.15	49 67	

coinc.
57.31
57.32

4th Satellite South f.

4h 53m 22s	90+332.15	55.82
54 46	331.45	56.00
56 36	332.30	55.77
57 56	331.55	55.56
59 23	332.25	55.89

coinc.
51.32

Mars. S. could see nothing different upon it from last night. Seeing not as good.

trapezium in Orion Davis observer

232° 35′ lower base.
231 30
229 30

90°

			coinc.
90	324 25	53.89	51.88
	324 10	53.90	51.90

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Sirius

6. 25 Companion not visible. D. & S. Power no 4.

Sky quite clear.

Trapezium in Orion. G.M.L.

following pair.

fifth star visible.
Sixth star seen with extreme difficulty. if at all.

Stars perp. to eyes.

290.25
289.44
288.50
290.27
290.8

upper pair

Stars parallel to eyes.

38.55
39.43
40. 2
39.44
38.50

right eye
Stars parallel to eyes.

preceding pair

Stars perp. to eyes

318.13
317.28
317.43
318.45
318.21

observations made with right ~~with~~ eye

preceding pair.

317.0
317.44
317.31
317.38
316.48

observations made with left ~~eye~~ eye

upper pair

41.21
41.06
41.2
39 30
41.15

left ~~eye~~ eye

(Left eye commonly used)

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θ Orionis for zero of position circle.

80.32 ϕ 260.32
80.31 " 260.31

Power no 4.

Star near meridian for zero.

80.27 ϕ 260.27.
80.25 ϕ 260.25.
80.38 ϕ 260.38.

Σ 1104

		Dist.	coinc.
Companion n. p.			
Stars parallel to ~~wire~~ eyes	35.32	52.77	52.96
	39.57		95
	38.50		94
	41.58		
seeing poor.	38.43		
7h 15m			

W M D	32 0	
	35 0	
	33 38	
	32 22	
	30 52	
J W	31 45	Can only measure elongation

Power no 3
answers better

36 0
36 30

Power no 2

33 30
37 15 best measure by W.
37 35

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~~W W D~~
~~Power no 2.~~

ξ Ursae Majoris. Seeing too poor for measures.

1867 Jan 30 Wednesday

3h 30m Zodiacal light Base about from W 2° to 22° S.
Vertex at the Pleiades

Pretty bright auroral arch. ~~Upper~~ Vertex of upper limb of well defined part at 3h 30m (chron 236) about 4° or 5° W of η Ursae Majoris at the same altitude with this star.
Incomplete at eastern end. (G.M.S)

Stellar focus adjusted by J W to read 28.95

Σ 84 JW
close companion

4h 15m	238 45	Verging toward small one. (which follows)	
	241 45	(unsatisfactory)	
	241 45		
	242 30		
	239 40		

(27)°
~~53.93~~ ~~53.12~~ ~~51/2 dist .40~~ reject

52.29 52 74 ~~25/2 .225~~
Mic wire on comp. on finished star

Position Circle 260° 35' W. 1552 South

Δδ
51 27 ±
51 24

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Jan 30 Wednesday

W 15-44 preceding precisely on same parallel

Position 170° 35′ Coincidence s-2.69 .69

15-52 s-0.21
15 44 70.94

Faint Companion 56° 40′ Comp. precedes
54 16 coinc
56 0 s-1.10 s 2 70
s1.18
.16

3d Satellite too much mixed up with stars to be observed

~~4~~ Satellite following

5-h 11m	90+ 1° 0′	48.5-3	extremely faint disc of planet much obscured
13	35-9 0′	48 2-9	
15-	0° 0′	48 7 5-	
17	35-8 50	48 5-6	
18	35-8 44	48 5-3	

Coinc
s-2.72 .73 .73 .70

Mars. Too much blurred for observation.

Sirius: Companion not visible.

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January 30 (Wednesday) 1867.

Mnemosyne. Observer G.M.S.

Weiss.	15-26	Δα	Position circ	170° 55′
7	12m	76.32		260 35′
	13	76.35		
	15 45′	76.39		
	14 25′	76.46		
	14 55′	76.37		

planet pillows

Miss Mead E.

			Coincid
19	5′	75′.87	78.73
	30′ 30″	.76	.70
	20	.79	.71
	20 20	.74	
	30	.73	
	21 30	.79	
	21 55′	75′.75′	
	22 00	75′.83	

planet north

Δδ = b e – diff here

	Δα		
29	Δα = 80.45′	78.74	Micrm [illegible] west
29 55′	.49	~~78~~.79	
30 35′	80.34	74	
31	.47	76	
31 30	80.48		

ω Leonis. Power no 3. Cannot separate.

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Feb 1 Friday

Cluster of Σ 844. JW

Close companion 241 45
241 15
241 50

JW estimates following component 1m.5 fainter than the other.

3h 55m

Double distance

51.28 | 0.31
50.66

Faint companion not more than 11th mag.

Both discs same size

one wire coarse
the other fine 51.30 | 0.305
50.69

50.225
49.69

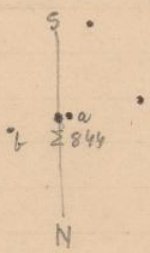
~~0.378~~ 2.68

Faint comp.

~~5~~30 15'
54 32
53 15
~~52~~

52.64
59
64
62
66
68
52.638

come'
51.01
50.96
51.02
.00

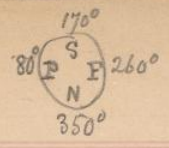


a = ~~fainter~~ comp.
b = faint comp.
no other star following in the vicinity.

(G M S)

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Double star found by J W

$6^h\ 3^m.5 + 5^\circ\ 30'$

10 may. comp very faint dist. 8" estimated

Comp. foll. 216 50
216 30

$4^h\ 50^m$ 51 9.5
51 00 Comes
9.5 = dist G. M. S

90 + 128 20

$6^h\ 0^m + 5\ 1$ Mays 10 & 11. or less if anything

Comp. prec. 46 45 52.60
45 0 51.03

$5^h\ 10^m$ Zodiacal light fainter than usual, owing to haze. (G M S)

γ Cancri J W

304 2 Quite unsteady .. Smaller star (i.e distant
304 50 component) also seems double.
304 50

$5^h\ 30^m$

Distant component from mean of two
49.38 double distances.
50.58

50.68
49.43 Seeing bad.

Position
116 15
116 20
115 25
116 30
116 30

Note June 23, 1881. The distances was probably measured first, and then the position settings taken with the transverse wire. In that case, a correction of 90° for the position angle is required.

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1867phae.proj, .292S

Double star $7^h\ 9^m.5$ $-9°\ 1'$ Σ 1060 JW

			Double dist.	
Comp. folls.	327	20	49.27	50.735
	327	5	35	75
$6^h\ 50^m$	327	50	285	735
			30	.77

Sirius companion seen occasionally, ~~but a measure would~~

a 273° 0′ not a good measure (better reject.)

Star 6 39.5 −20 35 Mags. 10 & 11.

				coinc.
Comp. foll.	262	0	51.80	51.00
	263	45	82	00
	265	0		

Star 6 40 −20 40 in a loose cluster. Very close if double at all. Direction about ~~80° NP~~. 100° N to E. Independent est. of JW & S.M.S.

Star 6 44.5 −20 45 Mags. 9 & 10.5

				coinc.	
comp. north.	4°	2′	51.81	50.80	very good meas.
	0	15			
	2	15			

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Σ 1104 JW Much better seeing than on the 29th.
double disk

32 35	49.535	49.54	49.52
34 45	50.18	50.14	50.11
35 3			
35 5 best so far			
36 15			

Σ 1216 208 7h 55m
231 better

Schjellerup no 12. Comp. north. (Components nearly equal)

358 40	49.545	49.57	
359 5	50.13	50.095	
1 30 (careless measure) ½ wt.			
359 45			
359 25			
	49.68	49.61	49.07
	50.07	50.14	49.585 best.

8 Sextantis (can see that it is double but cannot be sure of direction) Prevailing seems to be 265° on pos. circle Power 1200.

Power 800 { 260° 0′ Star extremely unsteady. though well separated.
258 40

w Lyncis see it double. Prevailing direction 241 15
9 M S 225

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Schjellerup no 14. 89 15 Components nearly equal.

89 55 Comparison preceding.

91 45

47.84
49.30 coinc. } Power of 800

Power no 3.

	coinc	
51.9~~3~~5	50.33	
935	35	Better measures than the previous one.
865	35	
91	35	

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Feb 4 Monday

Seeing magnificent

95 Ceti JW
$2^h\ 50^m$

271 20 Comp. foll.
264 15 poorer
262 50 poorer yet

Power no 5.

Too faint for further measures.

Set for Σ 1037 but clouds closed over.

Feb 5 Tuesday

Sirius JW
$7^h\ 20^m$

~~Satellite~~ Companion seen occasionally, but seeing quite poor.

Clouds prevented farther work.

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Feb. 6. Wednesday. 1867.

12 Lyncis observer G. M. S. Seeing very good

Close pair A B B.A. C

Chronmt 236

			A C	dist	
4h 38m	210° 17′	Stars parallel	45°22′	48.47	
	215 0	to	45 31	48.39	
	214 30		45 50	.43	best
	213 43		45 28	.45	
	213 35		46 1	48.44	
mean	213 25		mean 45 38		
		Cenic mchanges	Cenic	49.32 .33 .33 .34	
dist =	49 49	49.31			
	.50	.37			
	.48				
	.50				
	.50				

Σ 1037 J. W. Double dist

217 28	50.49	50.51	50.525
219 10 5h 5m	.11	.095	.105
214 45			
218 15	0.19	0.208	0.210
218 20			

Turned on Uranus & Mars. Seeing too poor for measures or drawing.

A. Z. 331 and (91)

	Δα	G.M.S	Cenic	Cenic	Δδ	Mars South
5h 48m 50s	22.80	Mars precedes	25° 25′	5h 54 35′	56.42	
	23.09		25. 26	55	56.27	
	23.04		25. 24	55 25	56.25	
50.00	23.00		25.	55 40	56.20	
51 00	22.88			56 0	56 35′	
				56 20	56.17	
5h 59 25′	23.15			56.35′	56.29	
59 50	22.99					
6 0	22.94					

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1867phae.proj..292S

Feb

Jan. 6 Widnesday



Sirius. G.M.S. Observer

6h 55m Images perfect but tremulous

6h 9m 45s 94° 25'
98 47'
96 14'
9 dont see it.

7h 39 Weisse VI. 109. S.W thought it's character with power 600
Could not be measured. I could not seperate it.

Weisse VI 1291 G.M.S
Power nro 6 (861)

7h 46m 52° 30' (rough measure)
44°.
49 30

Comp. foll.

} Both stars identified by comparison with the neighboring ones in Weisse Catal.

Weisse
Sjellerup Nro. 14. alias ^ X 242 G.M.S

8h 25m 342° 13' stars perpendicular to eye companion South
344 50'
341 28' Distance estimated, without on the stars
341 13'
344 15"

75 29
75 20
dist .09

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Feb

~~Feb~~.6 Wednesday 1867

Schjellerup No 12 H.M.S.

Companion Slightly fainter north - perf. to eyes

$8^h 38^m$	178°25'	dist - Estimated	
	175 45	75".29	Coincidences not changed from the last -
	176 58	75".18	
	178 47		
	177 59		

Schjellerup No. 13

$8^h 47^m$	90 + 179°30'	75".2	Cones astigm
	180 28	75.96	75.19.17.17.17.17
	180 44	75 89	
	92 10		Components nearly equal -
	93 13		preceding very little fainter
	92 28		

ζ Cancri close pair

$9^h 0^m$	290 25'		not worth while to measure more, seeing not good enough
	292 5		

Distant Companion -		from mean of close pair. Scale -	Coincidences
90 +	123° 15'	49.60	50.18
+	123 0	49.60	50.19
+	125 16	49.63	50.20
+	125 40	49.60	50.19

35°	25'
35	13
34°	12

W & S.

w Leonis - Could not separate.

for w Leonis Zero of direction

80° 46	80° 46	80° 45'
260 46	260 46	260 45'

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1867 Feb 7 Thursday

Moon JW

Remarkably bright spot on dark portion limb, about ½ field of Power no 2 from apparent lower limb at 3h 35m. Train in following direction. Dark limb portion generally unusually bright (unequally so of course) but this spot much more brilliant than any other.

W II 328 9M.

Star of last night still in place. One of the charted stars gone.

Asteroid No. 91.

	41.28	Good	75.19	Planet South following
3h 8m	41.46	Mean	75.21	
	41.52	wire	75.18	
			75.22	Pos. circle 170 45
			75.20	

3 Satellites

Satellites faint, but Seeing excellent.

6h 9m 25s				
10 10	90°+89° 15′	53.64	Satellite nearly north	
11 55	90+90 58	53.68	Coinc. 50.17	
13 0	90+90 55	53.64	50.20	
13 55	90+90 10	53.58	50.20	
14 30	90+89 45	53.65		

Disc of planet admirably defined.

4th Satellite S. preceding

					Diameter in direction of meridian		
6 17 30	90°+219° 15′	46.05	Coinc. Same	49.79	50.64	85″	425″
19 25	220 5	45.98	50.20	49.77	65	89	445
20 20	218 45	46 01	50.22	49.80	58	78	390
21 20	219 10	46.09		49.78	61	83	415
23 5	218 45	45.90		49 78	66	88	440

Pos circle 260 45

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1867 Feb. 7 Thursday

Uranus 50.66 49.70 horizontal threads
65 49.74
63 49.79 ~~good~~ tolerably good Pos. circle 170 95
62 49.74
63 49.71
49.76

This diameter appears longer to the eye than the other.





Mars GMS 7h 40m

South Pole light green
limb yellow
centre dusky red
North Pole nearly white very brilliant and seems even to protrude.

Sirius

7h 55m

90 +
189 30 48.11
184 50 48.08
185 50 .06
187 10 06
186 53 10
10
come
98 20 49.20
98 16 .19
99 42 20
98 8

GMS.

Companion very well seen.

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Obsns so far with power no 4. (since the adenoid.)

Σ 1216 G M S Identified by comparison with Arg. Zone.

Examined very carefully with powers 4, 5, & 6.

Could detect no duplicity. Possibly a very close companion n.p.

for which circle reads about 216°.

Feb 10 Sunday

Bright spot on dark portion of moon. observed Feb. 7. JW. Power wor. 1.

Wire tangent to dark limb at point nearest to spot 216° 20' 21.55

4h 30m conc. 50.29

Diameter about 2 rev.

Train not visible, but spot seen Feb 7

bright enough to be seen easily with illuminated wires.

very decidedly Brighter than when seen on Dec. 15

Σ 622 JW

4h 50m ~~Horribly dis~~ Seeing too bad for measures even with power no 2. High wind.

4h 50m Σ 1104 Seeing still too bad for measures.

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Feb 12 Tuesday

Occultation of Aldebaran &c obscured by clouds.

Feb. 15 Friday

Moon JW & GMS.

Crater Linné appears white and bright without definite edges.

5h Aristarchus just appears on edge of bright part. Is probably the bright spot observed on Feb. 7. but exhibits no remarkable appearances. 8 10

α Geminorum. Double image. Not worth while to measure.

7h 45m Σ 1037. Seeing too poor for measures.

Flying clouds and haze all the evening.

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1867 Feb 17 Sunday

Chron 236

Immersion of ξ Leonis 6 21 22.7 ± 0.3 Dark limb

Emersion 7 21 6 ± 0.5 Bright "

G M S. Obs.

Posture. Aristarchus & Keplers, at ($7^h.55^m$ nw)
140° 0'
(Kepler, s.p.) Power no 1.

Aristarchus & Copernicus
A little pr. 100° 48'
Nearly in the center of the apparent ellipse of the crater of Aristarchus is an intensely bright very small point.
From the following edge of the crater. (position of wires 170° 45')
Scale 51.01, 51.01.
Coincidence 50.10, 50.11
~~Northern~~ edge of crater dark comparatively, & ill defined.
~~Southern~~ Southern edge also ill defined, though much better than the southern.
~~Preceding~~ edge straight & as well defined as northern.
~~Following~~ edge bright & very well defined
Position of Pr. edge
175° 15' 177° 45'
There is a bright line s. fol. Aristarchus pointing directly toward the brightest central point & tangent to a small crater quite near to Aristarchus.
Angle of position for this line.
~~200~~ 212° 40' 212° 17'
Distance from bright point to point of tangency
Scale 52.96
Coincidence 50.08
Distance from bright point to beginning of bright line
51.76 51.92 51.88
Coincidence 50.10

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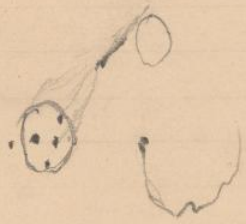


West



Three bright points within the the Crater and several ~~be~~ smaller ones. Bright Streams ~~issuing~~ from two of the points within the Crater towards the Crater above - and also from a bright point a out of the Crater

The "bright streams" are ~~at least~~ as distinct as most of the bright lines represented in Madlers Chart



Drawing of Aristarchus by G.M.S.

Σ 1216 Seeing not good enough to obtain an elongation of it

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1867 Feb 18 Monday

Moon $5^h\ 30^m$

(a b)

A bright stream runs from cone (b) nearly following the principal one in Aristarchus, not noticed last night

Position circle Aristarchus to Keppler 138° } Rough measures.
Principal cone (a) to b 74° }

Air very wavy.

Bright line in which the streams united last night, hardly so conspicuous; but the air is hazy.

GMS

Clouds soon afterward came on.

b

Feb 19 Tuesday

GMS.

$6^h\ 0^m$ α Geminorum } Seeing too bad for measures.
Z 1037 }

Tried several times on the moon, but found too much haze.

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Feb 22 Friday

7h 40m Sirius. 9 M.S.

Air clear and seeing good though unsteady perhaps owing to wind. Companion not certainly discernible. Power no 3.

Uranus 4th Sat. south.

8h 12m	90 + 260 53	45·87	corno	Stars parallel to eyes.
18	262 25	45·82	50·11	
			50·10	

3d Satell fil.

26	350 18	53·21	50·10
29	350 20	53·33	

Measures made with great difficulty owing to faintness of satellites. Moon just rising.

Σ 1037 Power no 4.

33	32	
31	31	Stars parallel to eyes.
29	30	
30	28	
30	5	

Distance estimated. wires not on stars
50·00
corne. unchanged
50·11

Σ 1338 (157 lynais) Power no 4. Companion south.

9h 20m

201	15	Perf. to eyes	50·27	corne 50·09
202	48		29	08
201	45		28	07
				08
202	47	Pair. to eyes.	Position very uncomfortable. Star near zenith	
206	25			

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42 Comae ~~Duplic~~ Cannot separate well enough to measure.

Σ 1595 Identified by comp. with Arg. Z.

Two stars in the place

	21° 15′	52.99	
$10^h 15^m$	21° 5′	53.02	90° + 293° 15′

coinc. same as before

Neither appears double but seeing much poorer than at first.

Moon. Seeing abominable, owing probably to heat of house. nearly over which it is.

Σ 1457 Identified by comp. with Arg. Z.

Cannot separate well enough to measure.

Seeing not very good even on the meridian.

$10^h 50^m$

ν Leonis. Can see the comp. about following, with powers 4 & 2 but seeing is too poor for measures.

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Moon $11^h\ 25^m$

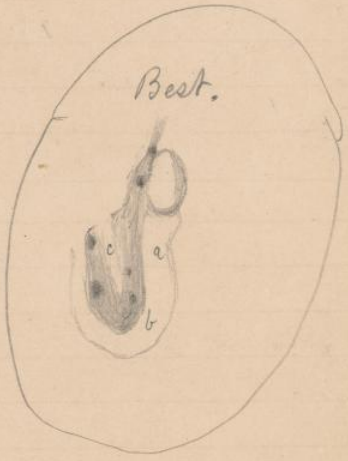


Bright streams seem to run a little inside the edge of Herodotus as represented above. There is a bright point in them on the edge, and the three cones of Aristarchus have nearly the configuration represented. Air still too wavy for accurate drawing or measures.

Linné appears as a simple white spot, in marked constrast to Bessel and the many other well marked craters near by.

Moon $12^h\ 30^m$





Space ab purple, perhaps only ~~a~~ complementary to the slightly yellow light of the crater. (In the drawing dark stands for bright, and light for dark. Decided notch in the brightness of the crater as represented at c. Crater Herodotus ~~also~~ purple inside except on the side opposite the bright streams. ~~Another~~ fourth cone or nucleus seems to be in Aristarchus as represented, and also another in the

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bright streams, farther from Aristarchus than the one previously observed. 8

Seeing better than earlier, but not so good as last Sunday. Feb 17.

Cannot trace any lines in the bright streams, leading to the cones or elsewhere.

Feb 24 Sunday

16h 45m Immersion of η Librae lost on account of thin clouds. Star not visible.

Aristarchus very brilliant though not distinctly visible owing to clouds. Same six bright points as Feb 22.

The part (a) of the edge of Herodotus remarkably bright also, especially at one point. Point c of Aristarchus brighter than any other.



Seems to be a bright line ab.

Lenine on dark part. Not seen.

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1867 Feb 25 Monday

$6^h\ 30^m$



Enclosed figure formed by dark lines ABCD pretty well seen; lines AB and CD the darkest, especially angle B. Planet sensibly gibbous, as represented.

Mars. 9 M S.

Sirius. Companion unusually distinct. Perhaps better seen than ever before.

	1st	276° 18′	276° 22′	277° 13′	277° 24′	278° 30′
	2d	90+189° 18	187° 10	———		
		45 03	45 12	45 19		

Coinc.
43.95 43.93
43 91
43.91
43.90
43.92

7^h

Alvan Clark
45.12 279° 0′
.03
03

9 M S
90+ 187 8 45.05 43.91
90
91

Uranus

4th Sat. foll.						coinc. unchanged
$9^h\ 27^m$	66° 28′	$9^h\ 43^m$	90+ 338 30	48.26		43.93
32	66 58	47	336 0	48.18		95
34	68 0	50	337 55	48.19		92
3d south						
37	207 14	52	120 28	40.61		95
39	206 16	55	119 30	40.54		95
41	205 33	9 57	120 10	40.69		96

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Feb 25 Monday

Σ 1457 GMS

well separated with power no 4

38 34 Fainter star precedes.
32 45
38 18 Estimate of distance by placing the wires at one
36 20 side 43.01
32 16 42.94 0.07

α Lewis

Cannot be sure of separation. Several images. Star occasionally appears single.

ι Lewis

11h 15m

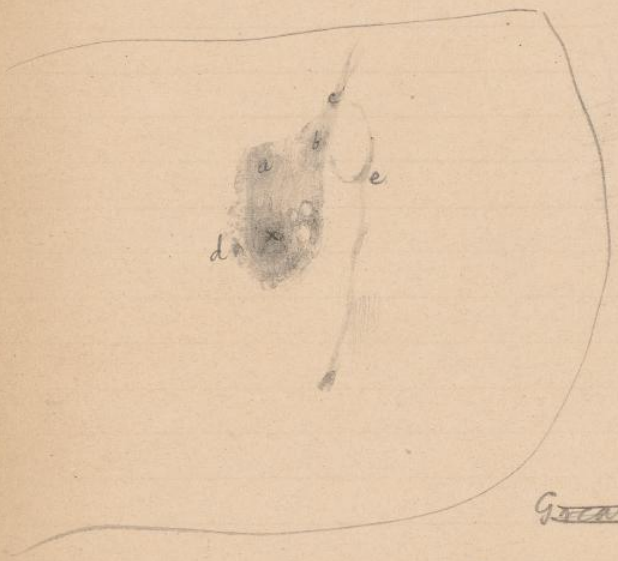
91 12 } Companion follows.
94 2 }
94 14 } Poor measures. Double image.
94 45 }
98 0 }

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Feb 25 Monday

17h 15m Drawing made of Aristarchus with death on black board. (GMS)



Three dark spots (represented in the annexed drawing by white ones) very conspicuous, about in the places of the bright spots of yesterday. No very definite bright points. Brightest part of the crater about at the point marked x. ~~Greatest brightness~~ Other maxima at a, b, & c.

~~Indefinite~~ Appearance of mottled brightness outside the crater on the preceding side, and a rather conspicuous point near d. It is thought; but of this, it being put in from memory afterward, observer does not feel confident.

Brightness of part e of limb of Herodotus and bright line running from it noticed as last night.

Power no. 2. seeing not being good enough for a higher

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Feb 26 Tuesday

$5^h\ 45^m$ Zodiacal light conspicuous

Base about due W.
vertex midway between Aldebaran & the Pleiades.

Σ 3037. companion South, preceding. Power no. 3.
Stars persp. to eyes.

Rather unsteady owing to wind

	scale	double dis.	coine
312.32	42.63	43.27	42.94
312.27	.61	.23	.93
312.28	.68	.27	.93
312.47	.67		
372.47			
mean 312 40	42.648	43.257	42.933

0.304

WMD
315 35
314 15
314 50
314 55
315 0

Transits over wires of finder.

$6^h\ 56^m\ 10^s$ Σ 3037
~~57 1~~ Ninth mag 10' South
57 17
~~59 0~~
59 12 7th may 30' South 9th may also ~~diss~~ about 15' South, a little preceding

Agrees with Arg. Zones in which Σ 3037 is
Zone + 59° No 2769

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η Cassiopeae

			Stars par. to eyes
		Companion	S. f.
40.30	90 + 309.0	42.29	42.95 coinc.
40.52	90 + 310.3	42.25	42.95
41.00	90 + 309.55	42.28	
40.10		42.27	
40.31			

Sirius W. M. D.
105 4 Could not see it afterward.
G.M.S. – companion seen but not well enough for measuring. Much fainter than last night. No trace perceptible

W VI 1291. G. M. S. Comp. not visible, Seeing quite poor

~~5-5.38~~

Mars. Seeing too poor for a drawing.

Uranus. 4th Sat. following.

		Scale	
8h. 36m. 23s.	90 + 3.57.	5-2.38	Stars perp. to eyes.
37 47	90 + 4.50	5-2.27	power no. 4.
9h 40 23	90 + 4.58	5-2.26	coinc.
41 30	90 + 6.5	5-2.48	48.22.
43 5	90 + 4.45	5-2.32	48.22
44. 25	90 + 4.45	5-2.30	48.26
45 35	90 + 5.0	5-2.21	48.26
46			48.24.

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Uranus 3rd. Sat. preceding.

		Scale.	Corrc.
9h 10m 30s	90 + 159.50	45.14	48.24
11 40	158.60	45.06	48.25
12 50	157.33	45.05	≠
20 25	159.30	45.11	
21 36	160.23	45.10	

ε Hydrae. companion South.

	Scale	double dist
309.46	48.58	47.93
309.16	48.58	47.94
309.36	48.54	47.91
310.38		
309.37		

Stars perp to eyes

ε Hydrae for zero of position circle.

260.51	80.52
260.30	80.30

(·) Principal star looks elongated thus; but as companion occasionally looks the same, it is probably owing to double image.



Aristarchus 15h 30m

Power 3.

Black spots of yesterday united and considerably larger; Some what mottled especially in lower part.

Maxima of brightness not so well marked as before except perhaps the principal one.

Bright spot d and general mottling outside on preceding side noticed again.

Various faint patches of light on dark part of moon but nothing specially conspicuous.

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1867 Feb 27 Wednesday

9 M S.

5 50 Zodiacal light ~~eeeeeeeth~~ about the same as last night

Vertex nearer the Pleiades than Aldebaran.

Σ 412 208° Rough setting ~~without~~ illum. Power no 2.

Configuration in finder. •412

Identified from Arg. Zones.

Not so much appearance of elongation with No. 4.

Search for Stephan's comet.

					coinc
Sirius	90+	6	58	49·28	48·26
		6	12	·31	·26
		5	43	·23	·26
				·28	
				·35	

97 47

97 52

Seeing poor and becoming worse; star blurring and very unsteady.

Σ 1104 39 3

40 33

faintest star precedes. 39 28

8h 15m

					coinc.
	90+	309	14	47.03	47.28
		310	45	47.05	26
					28
					29
					·28

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Uranus

4th Satellite foll.

		90 +		
8h 43m		34 12	52.62	Stars furn. to eyes
47		33 20	.51	
48		33 33	.49	
3d Sat. fr.		90 +		
55		201 15	44.98	" "
56		200 16	45.05	
9 0		201 16	45.03	

conc.
48.25
26
25

ε Hydrae

311	5
314	16
312	17
308	0
mean 311	24

9h 15m

Seeing wretched. Too bad for more measures.

Yellow color of principal star very remarkable; noticed also last night.

Mars. The usual appearances indistinctly seen.

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1867phae.proj...2925

1867 Feb 28 Thursday

W VIII 1066 & Mnemosyne. G.M.S

	α	Δα cos δ	b
10	49·0	17·37	
	50·5	31	
	52·5	20·28	

Coincidence with wire d, unchanged from last night; (about 48·25)

a b

Stars a & b about 10′ south of 1066

Both precede it.

1066

Clouds came on before more measures could be made.

Mar 2 Saturday

Comet 1867 I (JW) and W IV 108

	Δα cos δ		Δα cos δ
Chron 236			
9 43	44·16	Coinc. with d.	9 57·8 44·80
44·2	43·71	comet precedes.	
45·9	43·30	Comet v about 40″ in diam. definite nucleus, about	
46·5	43·66	faint.	= * 10 mag.
47·3	43·38		

Mar 2. Saturday.

	Δδ	
50·8	59·59	coinc. with b.
52·2	59·13	comet north.
53·1	58·28	
53·8	58·06	
54·3	58·16	

W IV 108	10	2	44·5	comp. star
123		3	37·5	another about 8′ north
128		3	53·5	" " " "

Circle 4h 7m.5 +29° 37′

48·28 coinc with d.
30
30
29
31

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1867 Mar 5 Tuesday

Chron 236

Comet	1867 · I	$9^h\ 43^m$	$120°\ 30'\ 14''$	Dec circle
	JW	$9^h\ 44.^m0\ 27^s$	$5^h\ 28^m\ 40^s$	hour "
		$9\ 52^m$	120 30 44	
		~~9 56~~	5 36 18	

	$10^h\ 9^m\ 30^s$	two wires C x d on comet
GMS	76.44 Arg Z. +30° No 65 ?	wire was on comp. star
		Comet south
	10 13 26.5 Arg Z +30° No 65 ?	
	10 16 45 comet ?	not sure (clouds)
		~~Losing the comet.~~
		comet not seen, place as remembered.

JW	5 36 0	122° 59' 4"	2d mag star.	(ι Aurigæ)
	10 24 33			

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Mar 8 Friday

Tried for comet at $6^h\ 30^m$ and at 9^h but found haze too thick to see it.

Σ 1037 J W

Stellar focus very much out; adjusted to read 29.25

		Double dist.	
30	25	47.45	47.42
32	14	47.10	47.10
$10^h\ 5^m$ 30	45		
31	0		
32	30		

Haze prevented further measures.

Mnemosyne & G M S.

983 978

W VIII ~~448~~ 448. ~~983~~.

11	28.7	54.69	~~41.07~~ Planet prec. on b.
		~~54.57~~	
	32.8	~~41.34~~	41.34
	35.5	54.88	
	36.8		41.34

978

40.4	36.76	
41.5	75	Planet north on e.
42.5	90	
44.0	58	

983

46.5	79.84	
48.0	94	Comp star on e.
48.8	80.00	Planet north
49.6	.08	

73.30
25 Conc. with e
27
28
27

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Mar 8 Friday.

978 on wire b

11	57.0	14.74		Coincide with b
	58.0	.59		28.31
			983 on wire b.	29
				29
12	0.5		1.27	31
	1.7		1.26	33
				32

ω Leonis

Could make nothing of it. Power no 4.
Seeing not good, however.

1867 Mar 11 Monday

Micrometer removed to have a new position circle cut.

Moon J W.

Linné and Aristarchus both on dark part; neither of them visible. Air not very clear.

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Mar 14 Thursday

Moon 7h JW Seine a small dull white spot, edges indefinite.
Aristarchus just discernible. (on dark part)

7h 30m. Search for Comet 1867. I.

Mar 18 Monday

Filar micrometer replaced. Stellar focus adjusted to read 28.9

Sirius JW Companion visible but stars much too unsteady for measures.

" " "

ε Hydrae

Drawing by GMS



Moon 10h

Streams from Aristarchus to Herodotus
At least As Bright as those about Copernicus, however, much fainter than at last lunation. Light of crater not much less than before. JW

Edge of crater distinctly visible all round. Crater egg-shaped as represented above. Circle indistinctly marked, above Herodotus, somewhat resembling a crater.
Shadow very distinct on preceding side of Aristarchus GMS

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Lenne not decidedly different from the other small craters on the Mare Serenitatis, except Bessel which shows a distinct outline. JW.

Σ 1457 Seeing still much too poor for measures.

1867 Mar 19 Tuesday

8h 30m Sirius ∫ W. Seeing good
Position circle reads to tenths of a degree.

102·8
100·2
101·8
103·6
101·5
103·5
102·5

mean 102·27

Companion much more distinct with no 4 than with no 3.

Wires parallel to eyes.

Seeing getting worse, rapidly.

47·725 }
734 }
675 not so well seen as in the first two
83
825
715 better
753 "
~~47·755~~
77
70

47·7482
46·595
592
59
58
585

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Σ 1216 JW

$8^h 21^m$ 36° suspected. } pretty decided elongation between these directions
28

Power 1243

ε Hydrae JW

$8^h 35^m$ 139·3 comp. prec.
143·5
144·2 wires parallel to eyes.
139·2
145·1
140·0
mean 141·88

Double dist.
47·03 46·97 47·02 46·97
46·21 46·215 46·185 46·21

$12^h 15^m$ 157 Lyncis JW

26·5 Double dist. 46·84 ·86 ·87 ·84
28·3 ·36 ·36 ·37 ·37
30·2 0·24 ·25 ·25 ·235
29·4
28·6
31·0
28·6
mean 28·94

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γ Leonis JW. $12^h\ 40^m$

12 Double	47.02	46.97	47.01	46.92	46.93	46.97
dist.	46.18	46.20	27	28	275	31
	.42	.385	.37	.32	.328	.33

59.8°
60.6
61.8
63.5 very unsteady
61.5
63.5

ν Leonis JW

97.3	46.95		
97.2	46.29	0.33	
98.0	94		parallel to eyes
98.0	27	.335	
98.8	94		
95.5	32	.31	
	92		
	31	.305	

ξ Ursae Maj. JW

Double dist.

280.2	~~45.27~~	Distance cannot be measured well.
278.9	86	
279.4		persp. to eyes
278.2		
278.2		

$13^h\ 20^m$

Star for zero of pos. circle GMS

Power no 3.

84.55°	84° 30′
84.30	84° 20′
84.50	84° 27′

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Lunar eclipse

Beginning 14 19 55 chron 236 JW

14 28 Eclipsed portion bluish gray; sky adjoining purplish. or drab

Occultation of stars by the ☽ Observer G. M. S

Middle 14 39 17

1st.	14 39 17	disappear	Northern & pointer
2d	14 39 41	" "	

Stars about 1' apart.

14 46 Limb eclipsed begins to be red; bluish gray on preceding part.

Aristarchus in penumbra; streams no longer visible, except as a mass,

15 57 " in shadow; visible in finder, though no other point is.

15 15 Principal crater of Aristarchus remains complete, the streams have almost faded away, and Herodotus entirely so.

Linné in edge of shadow, seen with difficulty, not unlike many other specks on surface.

Edge of moon in deepest shadow coffee color, sky adjacent dark green near moon, lighter farther from it.

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Mar 20 Wednesday

Sirius J W 7h — Companion not visible owing to haze.

Search for Comet 1867.I

B.C A. — 11 Monocerotis J W 7h 40m — Power no 4.

	43·5		71·4	
	45·2		71·2	
AB	41·8	BC	68·8	
	42·5		68·8	
	44·2		70·5	Stars blazing.
	44·2		72·5	
	43·57			

47·27		46·84	
·31		46·34	0·25
·275		46·83	
34		36	·235
34		46·865	
		375	245
comc			
46·56			
62			
615			
615			
58			
605			
60			

Seeing became too poor for further measures. Double image. Haze & halo round moon.

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1867 Mar 21 Thursday

Obsns. for zero of position and middle of field 9 M S.

	Mic. head below	Star on mic. wires nearly on meridian
84° 43′	51·54	
29	53	
36	61	
	Mic head above	
21	76	
24	76	
13	72	

ε Hydrae

9h 45m	313·8	51·30	51·30	51·28	51·28	51·26	Stars perp. to eyes.
	314·2	51·95	51·98	52·00	51·96	51·98	
	313·0					
	311·4					
	311·7					

ω Leonis. Tried powers 4 5 7 & 8 but could not separate elongate it. Seeing pretty good, through stars are faint through haze.

Σ 1457 Too faint through haze to do anything with it.

ζ Cancri $\frac{A+B}{2}$. C Cannot separate 1 3 .

	Double. dist.		Coinc	
	39·5	51·25	50·05	50·64	Stars parallel to eyes.
	37·3	22	03	66	
	39·0	23	04	64	
	40·3	23	06	66	
	38·6	20	04	65	
	ι Leonis				
11h 20m	101·0	50·37	50·92	65	
	100·0	37	94	64	" " "
	100·2	36	90	65	
	103·3	35	94	65	
	103·8	35	94	65	

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1867phae.proj..292S

March 21 Thursday

$11^h 46^m$ Sid. time.

Sirius	64°.7	dist.	51".99	Mean	Parallel to yes
	66.1		51.98		
	65.9		51.99	51.987	
	67.0		51.27		
	66.6		.29		
	6		51.28	51.280	
		2 dist^{-1} =		.707	

March 26 Tuesday

Companion

Sirius Not seen well enough to measure. JW.

Mr. Clark's new double star near Procyon

348° rough setting without illumination. JW

Comet 1867. I ~~α Arg Z +34 1066~~ ~~84 27~~

First seen at $8^h 24^m$

	Δδ	Comet south extremely faint bears no illum.
$8^h 29^m$	54.52	Δα nearly the same following.
	51.74 coinc.	with small star adjacent

α 34.8 { Pos. angle 230°.5 Set without illum.

56.68 Distance ~~dist.~~ from mercury, but error will not exceed 5" (field being necessarily illum. to set wires)

coinc. same.

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G. M. S Position angle by heads of screws + 90°

$8^h 44^m 30^s$ 162° +90°

dist 58.97
51 75
~~7EE~~

Comparison star Δα precedes South
from Arg Z 1063 follows Arg Z 1063

8 55

34.75
34.69
64
72
81
68
62
70

coinc same as last

Δδ
37.75
.78
.86
.81
.86

coinc. Same
51.78
51.70
.68
.70
.71
65
68
69
69

Satellites of Uranus
10^h $18^m 20^s$
20 30

4th satellite
90 + 38.8
38.5

n. p.
35.86
35.81 ½ wt.
coinc
31.63 .64
31.63
31.64

G. M. S. observer
I, we could only
see 3° satellite by
glimpses could
not measure it

8° too faint to observe

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1867phae.proj..292S

Mr Clark's star again

20° S.M.S 10h 30m

Rough setting without illum.
(very doubtful.)

ε Hydrae J W Stellar focus adjusted.
10h 55m

321.5	52.09	52.08	52.05
317.6	51.28	51.31	51.30
317.0			
320.6			
321.0			
mean 319.54			

ν Leonis J W
11h 20m

98.1	51.95	52.01	51.97
100.5	34	51.41	38
100.5			
100.5			
96.0			
95.2			

γ Leonis J W
11h 40m

63.2	51.94	51.93	51.97
63.0	51.28	30	32
64.0			
62.8			
63.3			

15 Lyncis J W 12h 5m

~~29.4~~	51.88	.85	.88
~~30.4~~ 31.0	.44	41	.42
unsatisfactory 28.6			
33.2			
measures 32.8			

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1867phae.proj..292S

Mar 28 Thursday

Sirius W. & S. Companion not well enough seen for measures.
Somewhat hazy.

Mr. Clark's star near Procyon. JW $8^h\ 10^m$

E

353.9
348.3
348.0
350.0
354.8

Star neatly divided. Power no 3.
Seeing good.

mean 351.00

Distance about 0".5 ~~rather too close to~~ measure.

~

Comet 1867.1 & ~~W II~~ V 749. JW.

~~8^h 45.3 x W~~ Comet s. f.

90 +

8 48.3 326.6 49.09 Comp. star on wire a.

50.8 330.5 ~~49.20~~ star
~~50.00~~

55.0 50.00

9 1/2 5

Comp. on e

$5^m 9^s$ 61.° $5^r 8^s 5$ Come with d 5 171.70

9 65.3 ~~5~~ best Comet on d

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1867phae.proj..292S

Mar 28 Thursday.

Comet & W II. ♀ 749 GMS.

Chron 236

10	10·5	42·29	
	12·5	·43	Comet follows; comp star on e.
	15·0	·08	" covers a ~~small~~ 12 mag. star.
	19·0	46·20	Comet south; comp star on d
	20·8	46·11	
	22·5	45·71	
	24·5	45·95	
	28·5	40·16	Comet follows.
	29·5	39·82	
	31·0	39·73	

Coinc with d	51·76	e 76·73
	78	·74
	·76	·75
	·76	

Power no 3.

157 Lyncis $12^h\ 20^m$ GMS

	Double dist.	
208·4	51·85	51·48
209·0	85	51
208·9	84	50
208·5		
207·6		

Stars parallel to eyes

coinc
51·71
·69
·67

Star on mrid. for zero point 84° 27′
84 27′

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χ Virginis	190·1	52 47·10	51·23	
	190·5	12	21	Stars just to eyes.
	191·9	15	22	
	191·7	12	16	
	190·8	11	22	
		12	19	

Mar 29 Friday Comet & W_{II} V 880 GMS.

	Δα cos δ		
8	57·8	[40·62] rev. doubtful	Comp. star on a
	58·8	41·27	
chron 236	0·5	41·56	comet follows .
	2·0	42·31	
	3·5	42·36	
	Δ δ		
9	6·0	56·70	" on b
	7·8	56·47	
	9·5	56·66	comet north
	10·7	56·61	
	Δα Cos δ		
	17·4	44·82	
	18·2	44·84	

Coma	
b	a
31·71	26·64
67	61
64	62
68	64

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ν Leonis G.M.S. 11h 45m

98·0	51·33	51·95
98·7	44	92
102·0	39	98
99·6	43	93
100·0		

Stars parallel to eyes

Σ 1595 two stars in its place; region identified from Strg. Z. only one star given there. comic.

26·0	53·44	50·66
26·2	44	67
25·8	50	67
	43	

Stars about equal in magnitude

Neither separable with power no 4.

Parallel to eyes

Σ 1593

155·5	Power no 4	
159·7		
154·9	Power no 5	
152·9		

Too close to measure distance; perhaps 0".7

Perp. to eyes.

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1867phae.proj..292S

Mar 30 Saturday

1 Sirius J W

			coinc.	
280·1		53·05	[51·65]	Companion well seen at first; never better.
283		53·085	71	
282·3	twilight	52·86	73	
280·1		53·05	73·5	
283·5		52·94	70	
101·2	gas illum.	91		
		86		
		86		
		94 } good		
		915 } good		

Star near Procyon following Mr Clark's star J W

			coinc	
37°·2	51·87		51·68	Parallel to eyes.
36·3	86	8h 0m	68	
34·2	84		67	
30·3				
32·0				

Clouded suddenly.

Comet 1867·1 & ~~W II V~~ 1047 G M S

Chron 236

	Δα cos δ	Δδ	
10h 40m·0	37·94	56·78	Comet a little preceding a small star and about on its parallel. Pos. of star measured for Δδ; place remembered for Δα, illumination putting out the comet.
	comp. star on d	on b	
	comet precedes	comet north	
10 48·5	comet apparently covers this small star, (10 mag.) producing a slight nebulosity round it. Probably it is about 2" north of it, it being on its parallel at 10h 40m.		

the following one of a pair.

			coinc. d	b
39.11	Pos. of	56·58	51·65	31·66
·17	star	·59	70	65
comp. on d		comp. on b	65	68
			67	

11h 5m comet well seen following this small star but of the last degree of faintness.

(Cannot see Arg. Z. 1209 which should be 18'·7 north of comp. star.)

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Mar 30 Saturday

ζ Cancri Seeing two poor for measures. AB not separable. Power no 4.

ν Leonis	100·3	51·95	51·38	Parallel to eyes.
	101·1	93	41	
	100·8	96	36	
	100·0			
	101·0			

γ Leonis Parallel to eyes.

11h 50m	63·8		
	63·3		
	62·6		
			conc. (slightly changed inadvertently)
90 + 333·0		51·34	
		51·34	51·68
	332·0	34	67
			67
		52·02	
		01	
		03	

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1867phae.proj..2925

Mar. 31 Sunday

4. Transits of Lalande, Comet 1867 I over three wires.

~~5h~~ m

Δ S Comet south.

Comparison star on wire d.

Scale 42 02 42 06

Coincidences with ☉ 51 69 51 71

Unsuccessful attempt to observe comet.

43·18

43·10

Transits of Lal. 10683 and Comet over three wires. Comet follows.

☉		45.06		coinc. with d.
9 M S	Comp star on wire d.	44.67	Comet south.	51.72
		44.93		71

Transits over three wires. ~~No star in place of~~

Comet much more diffuse than last night.

J W. saw companion of Sirius before star could be seen with naked eye.

No star in place of Arg Z. 1209. A triple star about 6' north of ~~1208 = comp. star of last night~~. Lal. 10683

Brightest component about 11 mag.

•Lal. 10683

• 10 mag.
• 10 mag.

•.• Triple star.

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1867 Apr 2 Tuesday

Sirius JW 52.93 Seeing excellent. Comᵃ (with d)

7h 45m

	90	
	95	
	93	
	92	
	93	
	85	obviously a small measure by the sight.
	86	
	95	
	93	
52.915		Measures made by twilight.

Comᵃ (with d)
51.69
70
74
66
67
69
51.692

97.2	Companion as persistent
102.0	
101.2	
99.8	and clear as any star
101.4	
100.6	in the heavens.
100.2	
99.6	
100.5	
99.4	

near Procyon.
Mr. Clark's star. Not seen well enough to measure.

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Comet 1867 I JW.

$8^h\ 30^m.5$



No good comparison star in the neighborhood. Comparison made with a small star (a.)

$\Delta\delta$ ~~54.67~~

45.30

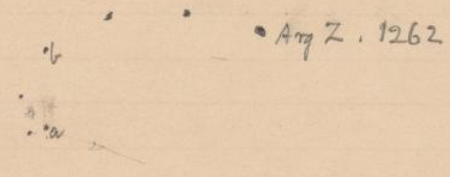
$\Delta\varphi \cos\delta = 0$

coinc. with c.

Comet south.

8 47.0 Comet on line a b.

8 54.6 187.°6 from (a) 58.07 coinc. with d.



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1867 Apr 3 Wednesday

Power no 4. { Sirius G M S $8^h\ 0^m$ Companion not visible with certainty
Mr Clark's star near Procyon not separable.

Stars . rather tremulous.

Transits of comet and W II V 1539 on chronograph.

	Δδ	
	25.82	Comet north on b.
Rattle at times	20.41	" " a
last rattle about 1^m too late	20.21	
	20.66	not recorded
	20.38	

Comic with a
26.72
.72

with b
31.73
.70

Comet precedes.

with a
26.68
69
71

Again.
Comet north on a

19.32
18.65
18.39
18.98

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Comparison of star (a) of last night with comp. star of tonight.

Transits over 5 wires. -

Star of last night on a		
" " tonight	mid wire 47.92	
	48.00	Telescope moved to second star without waiting.
third rattle on wrong star	———	
	47.89	
	47.93	waited.

Transits over 5 wires.

Gemmonia
& Oeltz. 11817

GMS Transits over 5 wires. Planet precedes.

		conc.
Planet on e.	59.88	76.72
north.	59.98	76.70
	60.03	76.73

Regulus J W

$13^h\ 0^m$ Green ~~light~~ on limb nearly northern ~~limb~~ 5°

perhaps a companion.

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1867 Apr 4 Thursday

Sirius GMS Power no 3.

Companion not visible with certainty. Seeing very poor.

Comp. star of Mar 26 and W II V 581

Transits over three wires. Star of Mar 26 precedes

Star of Mar 26 & W II V 525 Δ 8 69.44 Comp star on a

Transits over three wires. 67.50 Star of Mar 26 north on mic wire

Star of Mar 26 follows. 67.36

coinc with a

26.69
69
.72

Star of Mar 26 & W II V 581

34.02 on mic

34.24 Star Mar 26 on e

34.64

34.11

Clouds prevented further work.

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1867 Apr 5 Friday

γ Virginis. Double image. Seeing much too poor for measures.

W XII 826 and Iris. G.M.S. Planet s.f.

Comp. star on wire E.		14h	33.m 5	30.s 30.57
	Δ α cos δ		34	50 30.48
			35	25 30.56
			35	50 30.59
			36	15 30.52
Comp. star on wire E.		Δ δ	39	13 46.94
			39	45 47.09
			40	10 47.08
			40	40 47.10
			40	58 47.08
Comp. star on wire E.			43	15 31.13
			44	10 31.15
			44	40 31.13
			44	52 31.13
			45	10 31.19

Coincidence with E. 76.73
76.73
76.72

W XII 852 for O position. 84° 37'
84° 26'
84° 23'

Atalanta / Planet s.f.

Comp. star on E.	15h	23m 35s	62.04
		25 35	62.02
		26 45	61.78
Comp * on E.		32 55	23.38
		33 30	23.55
		34 5	23.58
		34 30	23.72
		35 15	23.45
		35 50	23.50
Comp * on E.		39 25	62.14
		40 5	61.80

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P. XIII 127. Seeing altogether too bad to measure

Apr 6 Saturday Comet 1867 I & Arg Z. + 35° No 1328. 9 M.S.
by chron 236

9	h 38	m.0	68.25	
		40.5	66.80	Comet precedes
		41.5	66.75	Comp on d.
		42.5	67.43	
		43.8	66.19	
		46.0	61.97	Comet north
		47.5	60.97	
		49.0	61.31	
		50.2	61.97	
		50.8	62.20	comic
		53.5	64.19	51.75
		54.3	65.30	75
		55.0	64.84	71
		56.0	64.68	71
9		56.7	64.46	72

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April 6 Saturday

	Δα Obscuds	
$12^h\ 31^m\ 20^s$	64.84	Isis (Asteroid) & W XII 826
31 55	65.04	Comp. star on wire b.
32 48	65.23	
34 12	64.78	

diaphragm screw inadvertently turned.

	Δδ	Com star on wire c Plant South
12 37 55	74.33	Come
38 30	74.09	77.00
38 50	74.16	00
39 20	74 23	76.96
39 40	74 26	98.
		77.03
		77.00

Apr 8 Monday

Occultation of B.A.C. 1526 lost through clouds.

Apr 9 Tuesday

Sirius G.M.S. $8^h\ 20^m$ Power no 3. Companion not visible, or barely so. Seeing wretched. Star a mere ball, at the best focus.

Immersion of small star $8^h\ 26^m\ 33^s.2$ Chron 236

angle 43° N to E. approximately.
on dark part of moon.

J.W. Aristarchus pretty well seen. Train also visible, toward Herodotus.

Spot also about = the train in brilliancy nearly north of Aristarchus for which circle reads 6° distance 55.46 − 54.53

Spot nearly half as large as Aristarchus but fainter. Como = mean of c & d.

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part of C easily
Dark limb visible to naked eye.
Aristarchus not visible in finder.

Immersion 10 13 51·1 9 MS Chron 236
Chron 236

Star n p BAC 1930 10 31 14·5

BAC 1930 10 31 28·5

" Emersion lost through faintness of star and waviness of limb. Star seen when some 10 sec. out at 11 30 35 approx.
All the immersions quite well observed.

Drifts 12/385" & Sat/Pho

		Δα
14	52 15"	46.31
	53 0	46.18
	54 15"	46.31
	54 37	46.19
	55" 0	46 13

	Δδ
56.55"	42.62
57.55"	42.62
58.10	42.61
58.40	42.49
59 5	42 50

	Δα
1 35"	46.05"
2 4	46.18
2 35"	46.16
3 18	46.23
3 55"	46.31

Planet follows — Meteor across field from C to Th about 7° with Planet N to SD

Comparison stars on α

Comp. Stars on α, Planet north

Result —
Fixed Star

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April 9

	Δα
13 6ᵃ 45ᵐ	61.75
7 8	61.73
7 30	61.64
8 3	61.67

Comp* on a. Planet n. f.

	Δδ
10,55	37.38
11,25	37.25
11 30	37.44
11 45	37.34
2 0	37 44

Comp star on a.

	Δα
14.00	61.30
14 25	61.31
14 50	61.22
15 00	61.22
15 15	61.34

Coincidence with a
26.98.99,96.96.96,

Apr 13 Saturday

V 1554

Δδ W_{II} − Arg. Z.1328 = Comp. star of Apr 6. G M S.

5 2 07	coincide with δ
5 2 08	
5 2 08	Transits on chronograph.
5 2.07	
5 2.05	

60.77	Rattle at time of setting on W−
60.44	W_{II} V 1554 on wire δ.

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Apr 11 Thursday

Moon. $7^h\ 45^m$ Crater Censorinus (Madler's chart) remarkably luminous. Linné very ill defined and quite faint. S.M.S.

$8^h\ 0^m$ ζ Cancri. Power no 3. Seeing too poor for measures.

Power no 3. Ring not visible with power no 1.

8 30 J.W. Linné shows a well defined ring through surround-ed with ill defined brightness. Confirmed by S.M.S.

Aristarchus barely visible. Whole dark edge of moon very distinct.

ζ Cancri J.W. $11^h\ 10^m$ Seeing still too poor to measure.

Eunomia and Oeltz. 11722 J.W.

Chron. 23h	$\Delta\alpha \cos\delta$	
11 27.3	40.90	Planet follows.
28.3	85	
28.8	84	Comp. star on b.
29.1	75	
29.5	88	
30.2	70	

	$\Delta\delta$	
33.8	85.72	Planet north.
34.4	86.00	Comp. star on b
35.2	85.86	
35.8	86.00	
36.2	85.95	
36.7	86.00	

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		$-\Delta\alpha \cos\delta$	
11	39.0	60.22	Comp. star on d.
	39.9	09	
	40.3	2[illegible]5	
	40.6	20	
	41.0	14	
	41.3	.06	

Set for Isis, but found the expected comp. star W XII 750 (9 Mag) not to be in the heavens.

Coinc. with b.	with d (measured next day by G M S)
32.07	52.04
05	04
05	04
03	04
05	

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Apr 13 Saturday

BAC 2420 and four stars S.p. in order of α, a b c d.

GMS. Transits on chronograph over 3 wires.

a 11 may
b 13 "
c 9 "
d 10 "

c · 2420
a c d 2420
a c d 2420
b c 2420

BAC 2420 on e. Rattle at times

	$\Delta\delta$	$\Delta\delta$
a	35·00	34·83
b	41·20	40·96
c	25·74 Oeltz.	26·15
d	28·86	28·43

All south preceding.

Obsns. of comp. star of Apr 6. Wrongly entered on last page of Apr. 9.

Obsns. of Eunomia and Oeltzen 11690-1. W M D

$\Delta\delta$ Comp. star on b.	Planet north, Coinc. with b	Rattle at times
66·68	32·06	
66·47	·10	
66·53	·01	
	·05	
	·08	
	·03	

Transits on chronograph. Planet follows.

12h 30m Moon Power nv 3. G M S. & W M D

Could not be sure of any distinct ring in Lenné.

Seeing not very good.

12 40 γ Virginis. Multiple image. Measures ~~out of the~~ quite impossible.

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Apr 18 Thursday

Σ 1496 $10^h 30^m$ 9 M S. Identified by Arg. Zones.
No companion within 3′ of arc. Moonlight in field.

ι Leonis $11^h 30^m$
Seeing two poor for double star measures.

Sappho and ~~W~~ ~~XII~~ 262 ~~J W~~ Planet s. f.

~~11~~	~~46·8~~	~~63·26~~	
	~~47·7~~	~~63·10~~	
	~~48·2~~	~~62·80~~	
	49·5	62·69	
	50·0	62·53	Comp. star on d.
	50·5	62·55	
	50·8	62·65	
	51·1	62·67	
	55·3	21·11	
	55·8	21·23	
	56·9	21·18	
	59·0	21·12	Comp. star on c.
11	59·5	20·92	
12	0·3	20·85	
	0·6	20·97	
12	4·2	63·08	Comp star on d.
	4·5	62·74	
	5·0	62·73	
	5·4	62·82	
	6·0	62·69	

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Sappho and W XII 262 JW.

chron 236

		Δ α. cos δ	Planet s. f.
12h	12m.8	77.71	
	13.7	.62	
	14.2	.58	Comp. star on d.
	14.4	.40	
	14.9	.58	
	15.2	56	
		Δ δ	
12	18.2	91.61	
	18.9	.62	
	19.3	.56	star on d.
	19.8	.40	
	20.1	51	
	20.4	52	
12	24.5	77.08	Coinc. d
	25.4	76.80	52.11
	26.0	76.85	.13
	26.5	76.50	.09
	27.3	76.74	.14
	28.0	76.68	

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W XII 591 & Isis. JW.

Transits over three wires. Planet follows.
First taps on asteroid second comp. ν too soon; ~~repeat~~. o
about 0s.7

chron 236	Δ8	
~~13h 12m.3~~	~~77.90~~	
15.5	79.40	Comp. star on a. Planet north.
17.9	79.30	

Occultation (immersion) of 96 Virginis 0 ·5 M.S.
On chronograph.
Star faint and moon's limb blazing. Observation perhaps 5 or 6 seconds too soon. o

Aristarchus brilliant but not distinct. Streams visible but not distinct. ~~Faint~~ Spot nearly north, but not conspicuously bright.

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Apr 19 Friday

by JW

Star n.p. Regulus a few ' found to have a very faint companion nearly following.

76° very rough
82 estimated distance 3s

Comp follows

L. M. S.
86.5
90+174.2 pretty good

dist.	52 46 . 49	rough
Comic	52.07 . 07	

Σ 1457 JW

	double dist.		
39°.5	52.25	52.19	52.22
36.3	51.875	51.90	51.915
36.1			
35.0			
36.5			

mean 36°.68

Σ 1496 JW.
No companion visible. Power no 3 in this and the preceding obs not

Higher

~~Σ 1593~~ Powers of 600 & 800 tried but without certain result. Thought to be a close companion about north.

Σ 1593 12h 14m JW Could not separate it.

afterward. 90 + 61°. Seeing poor.

337.5
341

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γ Virginis $12^h\ 35^m$ J.W. Y.H.S

double dist.

11·2	50·56	50·49	51·48 good
10·5	51·34	51·41	50·49
9·4			
9·0	Star blazing very much		
9·9			

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1867 Apr 21 Sunday

Sirius JW	coine
53·065	52·020
150	005
110	020
165	52·000
065	51·980
mean	52·005

286·5
104·5
100·9
101·5

JW.

Obsn. at 7 50 PM Companion very conspicuous, though the hour angle was about 3 hours. The directions are not so good as on former occasions, but the distances are good.

Mr Clark's star near Procyon

	2 dist		
50	·885	·885	872
51·1095		·080	095
	105	·098	·111

Seeing good

Star following this one

	2 dist		
52·150	·135	·170	·146
51·815	·852	·875	·855

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⊕ 76 Cape of Good Hope Catal. 4311

45·2	52·44	52·40	52·44
44·4	51·67	51·64	51·71
45·5			
43·6			
43·8			

Σ 1593 Easily separated Power no 3 used ~~this~~ in this & previous obsns.

(332·3) reject			
338·7		50·83	857 849
334·5		51·125	185 168
337·6			
(334·5) extreme lower limit			Seeing very good
337·5			
mean 337·1			

Σ 1496 No companion whatever.

Star about 13^{m} revolutions north. just visible like one of satellites of Uranus.

γ Virginis

JW		G. M. S.			
14·1	50·59	51·465	189°.2	8,8	51,41	50.51
12·5	54	45	189,5	10.0	51.44	52
11·6	61	445	188.8	8.2	,42	50
13·3	53	51	189.2	10.0	,43	51
14·5	52	41	189.0	8.8	46	51
13.2		45	9.15			
	50 55·8	51.466			51.432	50.510
dist =	.454				.461	

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90 + 97.8
97.0
98.0
98.8
97.5

PXIII 127 G.M.S Comp. follows - beautifully separated

115.0	50.780	51.19	51.00
113.6	50.780	51.19	01
113.8	50.810	51.205	00
113.9	mean 50.790	1.195	.003
113.0			

Σ 1819 $12^h\ 50^m$ GMS finely separated

141.4	Stars parallel to eyes.	
140.1	2 dist.	
142.2	50.90	51.08
140.5	.91	.09
141.9		

Σ 1734 GMS

	coma	
161.3	52.07	51.97
159.8	07	00
159.9	06	99
157.8		99
		97

GMS

84.5	84° 26′	
Star for zero point 84.5	84 33′ (½ wt)	

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P 1867

Σ 1832 56° or greater, JW Too hazy to be sure of measures.

JW thought he saw a faint close companion preceding

Arg. Z +4° No 2844.

Σ 1879 Haze too thick to see it.

			2 dist.	
ξ Bootis		55.3	50.46	51.59
		56.2	44	62
	JW	55.9	40	58
		56.3	42	60
14h 0m		57.0	48	57

η Coronae. beautifully separated. Magnitudes equal.

323.3	49.87	50.14
321.2	86	13
322.1	85	15
320.2	86	13
320.3		

γ Coronae JW 166.5 GMS 142 comp. preceding
155.5

ξ Librae Seeing not good enough to measure D3.

Moon:

Direction of spot near Posidonius marked γ on Madler's map, as has been noticed before.
No crater visible in Linne. 67.°5 from Linne, which it much resembles. JW.

Distance 42.23 for Linne. Spot on b. come. with c 49.00

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Chron 236

Immersion of 24 Scorpii 16 15 15.5 ~~Doubtful~~. Somewhat doubtful; ~~thought~~ to be within 0s.5

Emersion lost. G.M.S.

Apr 22 Monday

ξ Bootis GMS

14h 0m	54.0	Stars persp. to eyes	
	54.6		
Power no 3	54.3	50.55	49.39
	54.0	48	39
	54.9	53	36
		53	37
		49	46

σ Coronae Stars parallel to eyes

	344.5	50.31	come. 49.98
	344.7	35	00
	343.8	~~stars very unsteady~~	99
14 15	344.5		99
	343.3	½ wt stars ill defined from wind	99

stars very ill defined on account of wind

stars much better defined

15h 0m	50.29	49.66
	30	67
	30	62
	28	65
	29	65

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λ Ophiuchi Power no 4 $15^h\ 20^m$

	Estimated dist.	conc.
321.0	50.09	49.93
323.9	04	96
324.2		97
323.0		96
322.5		95

Wires not on stars
Stars too unsteady for a real measure of distance

49 Serpentis $15^h\ 35^m$ Power no 3

Persp. to eyes.	27.1	50.35	49.51
	26.1	36	54
	25.4	37	54
	26.2	38	52
	25.1	36	55

Apr 23 Tuesday

Companion of Regulus. $10^h\ 15^m$ J.W.

Faint companion found Apr. 19 not visible.
W & S.

49 Leonis. Seeing very poor. ~~Images very diffuse~~, too ill defined ~~for measures.~~ to both observers. Star appears in finder about 1 mag. fainter than 44 Leonis which precedes it.

Σ 1431 observed by mistake.

49 Leonis afterward found, but seeing still too poor for measures. Star perhaps ½ mag < 48 Leonis. W. & S.

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Isis and W XII 578 JW.

Transits. Planet precedes.

$\Delta\delta$ " north. on b.

Chron 23h	64·18	Rattle at time
13 δ 18·2	20	"
20·2	17	"
21·0	34	"
	49	
23·5	35	
24·5	27	
	corne. b	
	29·93	
	97	
	94	
	90	
	94	
	95	
	93	

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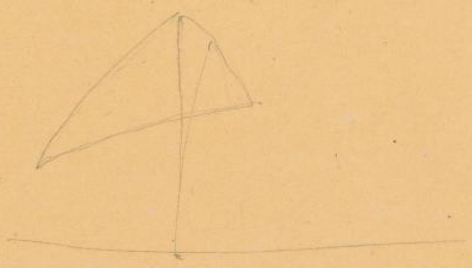
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Feb 10 12^h G.M.T

ι	24 56
Ω	359 42
α	$2^h 27^m = 36°45'$
δ	+10 44
Ω − α	322 57
9.8780 n	0.0980
9.2700 D	9.9923
	0.3326
9.1480 n	0.4229
	− 141
	−2.648
	−2.789
	19 43

pos. of moon's pole 340 17 Feb 10
pos. of spot 246 20

Diff = 66°

350 40
15 214 20
136 20



cos P P' sin

~~cos i sin δ + sin i cos δ~~

sin

α of moon's north pole = Ω − 90°

cos

$-\cos(\Omega - \alpha)\cot M = \cos\delta\cot i - \sin\delta\sin(\Omega - \alpha)$

$\cot M = \tan(\Omega - \alpha)\cdot\sin\delta - \cos\delta\cot i\sec(\Omega - \alpha)$

M = angle of pos. of moon's pole.

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1867phme..proj..492S

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