1867phae.proj...322w

KG
11365
322
N39

Observations with E. Equatorial

Oct 22 1867 to Feb 1 1868

Vol. 6.

(Copy.)

J. L. FAIRBANKS, Stationer, 136 Washington Street, Boston.

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KG 11365.322

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KG-11365-322

Chron 236. Correction & rate

	M T	Chron − Clock		Corr. to Clock	Chron Corr. to Chron.	Put back 5m	Rate
Nov 4	0h	+0	53·7	−6·5	−1	0·2	gaining 5s·9
6	14h	+1	9·8	−5·8	−1	15·6	6s·3
13	10h	+1	56·9	−1·8	−1	58·7	6·1
17	10h	+2	23·3	+0·2	−2	23·1	3·0
21	13h	+2	38·3	+2·8	−2	35·5	5·4
Dec 5	10h	+4	2·0	+12·0	−3	50·0	losing 0·5
18	13h	+4	8·7	+25·0	−3	43·7	1·0
21	3h	+4	9·3	+29·0	−3	40·3	

Clock − Chron Ran down.

Started Dec 26							gaining
27	3h	−0	51·9	+36·9	−0	15·0	0·1
Jan 17	9h	−1	26·4	+68·7	−0	17·7	

Ran down Mar 8

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1867 Oct 22 Tuesday
23 Wednesday

Prisms of spectroscope adjusted to minimum deviation. Telescope turned on sky.
Measurement of Fraunhofer lines with micrometer screw.

				mean	
D_1	9·225	·235	·240	9·233	GMS Side of cross wires apparently
D_2	268	261	272	267	toward knob used for bisection.
mean	253	251	256	·253	
b_1	13·810	819	820	13·816	
b_2	901	912	910	908	
b_3	941	952	949	947	
E_1	13·150	130	150	13·143	
E_2	175	175	175	175	
C	6·446	450	462	6·453	
F	16·751	750	760	16·754	
G	25·243	250	217	25·237	Extremely faint.

Sky not bright enough to continue measures.

Oct 23 Wednesday

Zero of pos. 260·1 C S Peirce
260·37 GMS

W II 57 and Leto

0	38	41			34·41	CSP	
	45	11			33·98		
	49	46			34·10		
0	44	33			34·163	−14·657	Planet south
1	8	25·2			48·82		
		34·1			·83		
		41·7			·81		
	10	47·2	+2	22·0	48·820		Planet fell.
		56·1		22·0			
	11	4·1		22·4			
	11	22·1					
		33·0					
		42·0					
		44·0?		21·9			
	13	55·0		22·0			
	14	4·1		22·1			
1	12	26	+2	22·067			

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1867 Oct 24 Thursday

			2 dist		
ζ Aquarii		195·8			CSP
		194·3	49·29		
		194·2	48·51		
		194·77			
			49·20		
	90+	282·8	48·52		
		283·6			
			49·14		
		193·20	48·47		
			49·20		
			48·52		
			49·207		
			48·505	0·351	
	22h 57m	193·0			WMD
		194·0	49·33		
		193·5	48·51		
		193·8			
		192·8	49·29		
			48·49		
		193·42			
			49·30		
			48·44		
			49·29		
			48·50		
			49·302		
			48·485	0·408	
P XXII 219		279·6	49·264		CSP
		280·2	48·574		
		278·9			
		278·6	49·226		
		281·7	48·513		
		279·80	49·224		
			48523		
			49·236		
			48·552		
			49·237		
			48·546	0·348	
Σ 2964		247·3	49·824		} from
		247·9	47·983		
		248·0			
		247·6	49·882		
		247·5	47·932		
		247·66	48·11		
			49·85		
			49·84		
			48·23		
			49·90		
			48·06		
			49·859		
			48·063	0·898	

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Σ 103					280·4	49·52			
					279·1	48·35			
					279·7				
					279·4	49·42			
					280·2	48·30			
					279·76	49·40			Bad
						48·58			
						49·447			
						48·416	0·518		
W I 366		2	25	14·3				SMS	
and				22·9					
Aglaia				31·0					
			26	33·8	+1	19·5			
				42·0		·1			
				50·3		·3			
			27	44·7					
				53·2					
			28	1·3					
			29	4·1		·4			
				12·8		·6			
				20·8		·5			
			29	49·1			48·94		
				57·6			95		
			30	6·0			97		
			31	8·6		·5	48·953		
				16·7		·1			
				25·0	+1	19·0			
	mean	2	29	3	+1	19·333			
			36	6			53·10		
			40	35			09		
Zero			43	7		260°0	05		
	mean	2	39	56			53·080	+4·127	Planet north
W II 57		2	50	23			28·12		
and Leto			52	12			04		
			54	6			24		
			56	0			27		
	mean	2	53	10			28·167	−20·790	
				30·8					
		2	58	39·0					
				47·3			48·96		
							93		
			59	49·8	+1	19·0	98		
				58·2		·2			
		3	0	6·5		·2	48·957		
			0	29·1					
				37·3					
				45·7					
			1	48·1		·0			
				56·3		·0			
			2	4·7		·0			
	mean	3	1	53	+1	19·078			
			2	18·6					
				26·9					
				35·2					
			3	37·7		·1			
				46·0		·1			
				54·3		·1			

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1867phae.proj..322W

1867 Friday Oct 25 and Oct 27 Sunday

248·2
·0
·1
4
248·17 — 49·558 — CSP Power no 3.

Lost through haze

160 Ceti = Σ 91

205·0
204·8
205·6
206·5
204·0
205·18 — 48·46 — Power no 4.

" "

Clouds prevented further work.

Oct 27 Sunday

Neb h 4775 — WSP. Nothing to add to catalogue description

4779 — " " "

4799 — = 4801. Rossé's description "S nf to sf" confirmed. Appeared resolvable to CSP who saw at angrate 3 bright points in it.

4802 — Does not appear "faint" to W or P. W considers it quite bright } Description otherwise
P " " rather " } correct.

4807 — Appears to CSP a little elongated, principally p to f, a little s to n, (in the direction of a long line of stars at the end of which is the nebula. JW.) (One bright point in it. CSP.)

W I 417 & Daphne

2	1	21		100·32	GMS Planet north.
	2	0		40	
	2	49		19	
	3	17		45	
	3	43		43	
2	2	38		100·358 + 26·282	
2	6	24·9	− 0·3	7411	Planet precedes.
		32·8	·2	06	
		41·1	·3	08	
				06	
	6	25·2		07	
		33·0			
		41·4		74·076	
	6	50·9	2		
		58·7	3		
	7	7·2	5		
	6	51·1			
		59·0			
		7·7			
	7	18·2	5		
		26·2	5		
		34·5	4		
		18·7			
		26·7			
		34·6			

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2	7	47.4	−0.5	
		55.2	5	
	8	3.7	.3	
		47.9		
		55.7		
	8	4.0		
	8	13.0	4	
		20.9	.2	
		29.3	.5	
	8	13.4		
		21.1		
		29.8		
2	7	26	−0.373	

Double star noticed by SMS
α 1h 44m
δ −1° 16′

Components 10 & 11; distance about 6″
Planet north on e.

W I 354 & Aglaia

2	30	26		23.80	
	31	2		75	
	31	47		77	
	32	19		53	
	33	14		57	
	33	41		63	
2	32	5		23.675	+50.401
2	35	35.1	−18.6		
		44.1	5		
		51.6	.7		
		53.7			
	36	2.6			
		10.3			
	36	28.6	.6		
		37.5	.6		
		45.3	.7		
		47.2			
		56.1			
	37	4.0			
	37	18.9	4		
		27.8	5		
		35.4	−18.7		
		37.3			
		46.3			
		54.1			
2	36	36	−18.589		

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1867 Oct ~~25~~ 27 Sunday

W II 57 &
Leto

2	50	30.3				
		39.3				
		47.0				
	52	25.8	−1	35.3		
		34.8		.2		
		42.3		.6		
	54	1.1				
		10.0				
		17.9				
	54	50.7		.5		
		59.7		.3		
	55	7.1		.8		
	56	26.2				
		35.0				
		42.9				
	56	58.3		.7		
	57	7.2		.7		
		15.0	−1	35.5		
	58	34.0				
		42.9				
		50.5				
2	52	54	−1	35.51		

2	59	47		86.05	
3	1	7		86.01	
	2	19		85.92	
	2	49		85.83	
	3	36		85.97	
3	1	56		85.956	−36.996
				48.99	
				94	
				96	
				95	
				.96	
				48.960	

W II 1076 &
Nemausa

3	15	3			82.89	
	16	7			82.95	
	17	23			83.00	
	18	6			08	
	19	8			13	
	19	52			15	
	21	14			31	
	22	16			83.19	
3	18	42			83.088	−34.128
	23	39.5	−1	57.5		
		47.1		.3		
		56.1		.2		
	25	37.0				
		44.4				
		53.3				
	26	5.8		.2		
		13.2		.2		
		22.2		.3		
	28	3.0				
		10.4				
		19.5				
3	25	0	−1	57.28		

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Telescope reversed to E. of pier
Zero of wos. 80·0

Set for Aglaia but clouds prevented obsn. 3 M.S.

Oct 31 Thursday

Σ 3008

87·8
86·0
89·1
87·8
89·2
89·5
87·8 2 dist.

48·33
49·58

48·28
49·49

48·32
49·58

48·28
49·59

48·302
49·560

mean 88·17 0·629

CSP Stars dancing
Good observation.

Σ 2995

320·9
319·8
321·0
319·9
319·8

mean 320·70 0·498

Southern star a little the larger

48·37
46
36

49·38
39
35

48·377
49·343

conc
48·84
86
87
84
87

48·862

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Oct 31 Thursday

Z 23

355·5
356·9
355·4
357·5
357·2
356·2

356·50

Bad

0·966

47·94
93
97

47·947

49·88
89
87

49·880

Neptune

Satellite not visible to GMS or CSB after long watching, light excluded

Nebula near Daphne. s.p.

Angle of pos. from a small star s.p. the nebula

151°
152

Nebula, Daphne, ♅

W I 390

				Nebula	Daphne	
3	30	2·0	−1	35·3		
		10·6		34·4		
		18·5		35·1		
		13·0	−1		24·3	
		21·0			·0	
		29·5			·1	
	31					
		37·3				
		45·0				
		53·6				
	32					
		28·3		35·2		
		35·9		35·5		
		44·9	−1	35·0		
		39·1			4	
		47·1			3	
		55·8			·1	
	34					
		3·5				
		11·4				
		19·9				
3	31	23	−1	35·08		
3	30 31	34	−1		24·20	
3	34	35 12			71·99	
	36	37 12			71·88	
	37	38 57			72·16	
3		37 7			72·010	−23·100 Daphne
3		40 30			90·84	
		42 48			·31	
3		42 2			90·487	−41·577 Nebula

Nebula and Daphne both south on wire d.

Best; 2 wt.

GMS very faint = * 14 mag. 1'·5 diameter. Round. Well marked nucleus. Precedes h 345 nearly on the same parallel.

Note June 10, 1880. For the place of this nebula 1867.0 see p. 11.

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				conc.
				48·92
				90
				91
				48·910
W I 257	3	56	32	40·27
and Iglaia		58	0	23
		59	36	09
	4	1	16	32
		2	45	25
	3	59	38	40·232 −8·678
	4	3	51·3	
		4	0·0	
			8·1	
		5	14·7	+1 23·4
			23·1	·1
			31·3	·2
		5	46·1	
			54·6	
		6	3·0	
		7	9·1	·0
			18·0	·4
			26·1	·1
		9	11·2	
			19·9	
			28·0	
		10	34·3	·1
			43·0	·1
			51·1	·1
	4	7	48	+1 23·17
Zero of pos.				80·0 which has been used.

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1867phae.proj..322w

1867 Nov 1 Friday
2 Saturday

Jupiter — $22^h\ 36^m$ — CSP

Polar diam.

69·77
74
69·755 — 4·260

Equatorial

69·44
51
45
39
69·447 — 4·568

coinc
74·00
01
03
02
74·015

Clouds prevented further observations.

Nov 2 Saturday

35 Piscium = Σ 12 — CSP — Large, faint, unsteady. Companion south

0	10	19·5	72·95	
		20·1	84	
		21·4	91	
		20·9	92	
		22·2		
		20·82	72·905	1·138

75·19
75·17
75·180
coinc
74·01
02
00
74·010

Chron 23b

Note May 6, 1884. Last record in book N 38 for error of chronometer in September; first record in this book for Nov. 1, with this remark "put back 5m"; hence probably this chronometer was 6m fast on Nov. 2, being 1m fast after alterations.

Satellite of Neptune — GMS

0	42	137·0		
	45	318·1		
	57·6		50·46	
	59·5		54	
1	1·2		57	
		90° +		
	3·5	49·7	47·25	
	6·3	49·8	24	
mean 0	54·2	138·65		
mean 0	59·1		50·514	1·644
mean 1	4·9		47·245	1·625

½ wt.

Satellite north foll.

coinc
48·87
84
87
48·870

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1867phae.proj...322w

Note June 10, 1880. h 322, 323 here means G.C. 322, 323.

In setting for Daphne the following new nebulae were found by G M S near the double neb. h 322 323. They are numbered 1 2 3 4 in order of R.A.

	Transits by Clinton 2.36		CSP recording			Mean Δα
1			2h 53m 51.7	3h 7m 3.1	3h 10m 36.0	0 13.7
2	2h 17m 7.3	2h 17m 38.1	54 5.0	17.2	49.8	0 15.2
h 322 323	22.2	52.9	2h 20m 30.2	2h 23m 12.0	54 20.8	33.0		1 28.0
Arg Z −1° 190			21 58.2	24 39.9 (19.8)				
4			22 39.9	25 23.2 (1.1)	56 31.3	9 43.9		0 42.1

Neb. 3 follows h 322 323 about 2°

Neb. 1 & h 322 323 — Neb 1 south of h 322 323 Conic with d

24.18
24.53
24.355 −24.515

2 & h 322 323 — Neb 2 south of h 322 323 Conic with d

34.65
48
34.565 −14.305

3 & h 322 323 — Neb 3 north of h 322 323 Conic. with d

6.65
16
6.405 +42.465

Arg Z −1° 190 & h 322 323 — Conic. with e; Neb h 322 323 south of Arg Z −1° 190

19.70
62
19.660 −54.350

Arg Z −1° 190 & Neb 4 — Neb 4 south of Arg Z −1° 190 Conic with d.

8.67
78
8.725 −40.145

Hence we have for all the nebulae, referred to Arg Z − 1° 190;

	Δα	Δδ		
1	−1m 56.9	−78.865	= −12′ 53″	Fainter than no 2, but brighter than no 3.
2	−1 43.2	−68.655	= −11 13	Bright in middle (CSP)
h 322 323	−1 28.0	−54.350	= −8 53	Stellar (CSP).
3	−1 26.0	−11.885	= −1 56	Extremely faint & small
4	+0 42.1	−40.145	= −6 33	Elongated; small, (2 nuclei?)

giving for 1867.0

Note June 10, 1880. Hence places for 1880.0 by differences from G.C. 322, 323

1	1	18	43.9	−2	6	5	1h 18m 26.3	−2° 7′ 54″	Note Nov. 16, 1880. 24h. −1° 190 was observed with the Bruce meridian circle, Vol. VI, so that more accurate places can be had. The neb. of Oct. 31 is compared with N. I 390
2	1	18	57.6	−2	4	25	1 18 40.0	−2 16 14	
h 322 323	1	19	12.8	−2	2	5	1 18 55.2	−2 3 54	
3	1	19	14.8	−1	55	8	1 18 57.2	−1 56 57	
4	1	21	22.9	−1	59	45	1 21 53	−2 1 3/4	
The neb. of Oct 31	1	22	11.1	−1	38	21	1 21 53.5	−1 40 10	

Daphne & Arg Z −1° 190			Δδ	CSP	Planet north
	1	50	93.37		
		[52.5]	40		
		55.0	51		
		56.5	93.08		
		58.5	92.87		
	1	54.50	93.246	+44.376	
	2	4.7	84.74	Δα cos δ	Planet foll.
		6.6	94		
		9.0	63		
		13.5	84.78		
	2	8.45	84.772	+35.902	

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1867phae.proj..322W

:12

1867 Nov 2 Saturday
4 Monday

Zero of pos. 80.1
.2

Aglaia &	3	17	26.33	Δδ	GMS
W I 257		18	36		
		19	35		
		19	31		
		20	23		
	3	19.1	26.316	−47.738	Planet south
	3	22	66.56	Δα cos δ	
		23	43		
		23	39		
		24	51		
		24	37		
	3	23.7	66.452	−7.602	Planet frec.
			74.08		
			07		
			04		
			05		
			03		
			74.054		

1867 Nov 4 Monday

Regions of Europa and Thisbe charted. Positions of two stars in that of Thisbe measured. No 2. afterward proved to be the planet. GMS.

		chron 236			
W$_2$IV 717 and	5	26.3	26.51		
Star no 1.		27.5	72	Δα cos δ	
		28.4	57		
		29.0	54		
		27.8	61		
	5	28.20	26.590	−22.304	No 1 precedes. Comp. on d
		31.0	14.05		
		32.9	13.77		
		33.5	77		
		34.2	95		
		35.0	67	Δδ	
		35.7	86		
		36.5	90		
		37.5	13.83		
	5	34.54	13.850	−35.044	No 1 south " "
		52.8	26.54		
		53.5	62		
	5	53.15	26.580		
Star no 1 &		43.5	30.81		
Thisbe		44.3	86	Δδ	Thisbe south " "
		45.4	80		
		46.8	85		
		48.5	82		
	5	45.70	30.828	−18.066	

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1867phae.proj...322W

Nov 4 Monday
5 Tuesday

5	56·8	27·80	Δα cos δ	Thisbe precedes
	58·0	28·01		Comp. on e.
	59·0	27·83		
6	0·3	·78		
5	58·52	27855	−46·135	

coinc d
48·91
92
87
89
88

48·894

coinc. e
74·01
73·98
99
97
74·00

73·990

Hence
Thisbe 8
W I 717

			Δα cos δ
5	58·52		−68·439
			Δδ
5	45·70		−53·110

Nov 5 Tuesday

Chron 23b

Two satellites of Jupiter as a double star

JW

0	20?	80·6		
		79·5		
		79·8		
		79·6		
0	22·9	80·6		
0	21·5	80·02		
	24·0	74·60		
	24·3	601		
	25·0	585		
	25·3	59		
	25·6	609		
0	24·84	74·597	0·607	
0	26·0	73·34		
	·2	34		
	·5	39		
	8	39		
	·9	33		Blazing considerably
	27·7	·38		
0	26·68	73·362	0·628	

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1867phae.proj..322w

1867 Nov 5 Tuesday

W XXI 1312 and double star found by J W Sept 29

mean

61·12
·13
61·125 +12·265

GMS

Double star north.

48·86
·86
48·860

Hence, position of star for 1867·0

chron 236

0 41 38·9
47·8
55·3

21 59 8
−2 42 30

43 19·8 +1 40·9
29·4 41·6
36·4 41·1

mean +1 41·2

Stars found by GMS Oct 18 examined and found to be Oelta. 22773, 531 & 751.

Thisbe & a 12 mag. near by.

chron 236

1 31·5
32·3
33·0
33·8
34·2

1 32·96

57·24
46
28
45
40

57·366 +16·624

Δ α cos δ

1 36·7
[37·3]
38·0
38·8
[39·5]

1 38·06

71·28
18
17
09
20

71·184 −2·806

Δ δ

73·99
99
98

2 50 20·1
30·0
36·9

−41·6
·2
·3

74·00
73·990

Europa & W IV 266

2 51 1·7
11·2
18·2

51 45·1
54·9
52 1·7

26·5
36·1
43·1

53 56·1
6·1
13·1

4
·2
4

·8
·6
−41·5

37·9
47·7
54·6

Planet preceds

~~south on d.~~

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	2	54	52		68·27		Planet south on d.
		56	8		27		
		57	33		34		
		59	48		38		
	2	57	5		68·315	−19·455	
	3	7	5·0	− 42·0			
			12·8	41·7			
			21·7	41·8			
			47·0				
			54·5				
		8	3·5				
		8	16·5	41·9			
			24·1	42·1			
			33·2	− 41·9			
			58·4				
		9	6·2				
			15·1				
mean	2	58	13	− 41·63			
Arg Z +10°	3	7	10·9	− 36·1			The declination of this star in
no 562 &			18·8	35·7			the zones seems to be wrong.
W IV 266			27·7	35·8			
	3	8	22·6	35·8			
			30·1	36·1			
			39·3	− 35·8			
				− 35·88			
	3	0	39		82·96		
		2	0		83·06		
		[3	17]		82·95		
		[4	34]		82·84		
		5	51		82·97		
	3	3	16		82·956	−34·096	
W$_2$ III 908	3	40	5·1				CSP
and Eurynome			13·3				
			22·6				
		41	8·4	+1 3·3			
			16·4	·1			
			25·8	·2			
		41	55·5				
		42	3·4				
			12·5				
			58·7	·2			
		43	6·8	4			
			15·9	·4			
	3	42	12	+1 3·27			
	3	[47	17]		35·27		
		48	46		13		
		50	15		08		
		51	51		·03		
	3	49	32		35·128	−38·862	
					74·01		
					73·99		
					99		
					94		
					73·990		

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1867 Nov 6 Wednesday

Note Dec. 9, 1880. For corrections of time pieces see p. 0. For 82 Aq. −74.6 W.XXII 1203 −6.0

Chron 236

Emm. of 82 Aquarii 2 5 8.0 ± 0.5 GMS Observed with portable equatoreal from W. balcony.

Zero of pos. 259.6 .5 .0 .3 .8 3

mean 259.42

south clock

Thisbe and comp. star of last night

2	33	41	65.10	Δδ	
	34	53	13		
	36	6	03		
	37	28	39		
	38	35	16		
2	36	8	65.162	−16.265	Planet south on d

2	40	10.5	−38.0	
		22.2	37.9	
		28.5	37.9	
		48.5		
	41	0.1		
		6.4		
	41	25.9	38.2	
		37.4	38.0	
		44.1	−38.2	
	42	4.1		
		15.7		
		22.3		
2	41	0	−38.03	

4 Aurigae and Thisbe

	44	26.5			Planet about 10'.5 south.
		38.3			
	45	34.0	+1	7.5	
		45.9		7.6	

south clock

Emm. of W XXII 1203 3 9 4.0

Em. of 82 Aquarii lost. Star faint; moon's limb blazing violently.

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W_2 III 842 & Eurynome	3	26	34.0				GMS
			39.9				
			50.7				
		30	9.8	+3	35.8		
			15.7		.8		
			26.9		36.2		
		32	43.9				
			50.0				
		33	0.9				
		36	19.5		35.6		
			25.4		.4		
			36.6		.7		
	3	33	20	+3	35.75		
		38	58			46.44	
		39	58			47	
		40	50			59	
		41	35			29	
	3	40	5			46.427	−2.450
						48.89	
						90	
						90	
						48.897	
W IV 255 and Europa	3	46	12			42.98	+5.917
		53	47			43.08	+5.817
		49	35			35.33	+5.88
						41.21	
		51	9			35.44	+5.93
						41.37	
		52	31			35.56	+5.74
						41.30	
	3	50	39				+5.857
	3	56	52.3	−1	0.6		
		57	0.9		0.7		
			8.5		0.9		
			52.9				
		58	1.6				
			9.4				
		58	25.4		0.9		
			34.1		1.3		
			42.2	−1	1.0		
		59	26.3				
			35.4				
			43.2				
	3	57	47	−1	0.90		

Micrometer wire placed successively on the two objects.

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1867 Nov 9 Saturday

Prisms adjusted to min. dev. (see Oct 22.)

Line	Prisms readjusted		other lines		SMS			Means	
F	16·770	16·780		16·835					
	768	790		832					
	745	795		831					
	762	805		828					
	730	805		830					
	16·755	16·795	16·438	16·831	16·523			E 16·794	
			430		533			16·481	
			16·434		16·528				
b_3	13·932							16·168	
	920		16·120		16·210				
	917		120		220				
	930	b_{23} 13·955	16·120	13·970	16·215		15·870	15·875	
	950	951		971		15·610	880		
	13·930	950	15·032	967	15·080	605		15·608	
b_2	13·877	950	048	980	075				
	878	940	15·040	980	15·078			15·059	
	872	13·949		13·973				b_{23} 13·941	
	868								
	881							b_1 13·823	
	13·875								
								13·445	
b_1	13·780	13·821			13·865				
	785	809			872			E_{12} 13·149	
	780	811			878				
	785	811	13·420	13·461	875			12·723	
	783	820	418	481	868				
	13·783	13·814	419	471	13·872			12·398	
								D 9·255	
E_2	13·142								
	130							8·984	
	145	E_{12} 13·161		13 172					
	140	13·140		198				C 6·399	
	147	125		170					
	13·147	157		182				B 5·345	
		148		175					
		13·148		13·179					
E_1	13·104		12·700	12·743					
	110		715	732					
	103		12·708	12·738					
	100								
	100		12·363	12·430					
	13·103		382	427					
			12·368	12·428					
D	9·238	9·235			9·305				
	250	219			303				
	225	230			300				
	220	240			299				
	221	241			300				
	9·231	9·233	8·963	9·000	9·301				
			963	012					
			8·963	9·006					
C	6·405	6·380			6·421				
	398	382			420				
	400	400			410				
	400	371			408				
	393	376			417				
	6·399	6·382			6·415				
B			5·349						
			342						
			343						
			344						
			346						
			5·345						

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1867phae.proj..322W

1st Star found 1867 Aug 17 follows ~~Σ 2847~~ Oeltz. 19188-9 about 3m, 14' north of it. giving for 1867.0 $\alpha = 19^h\ 6^m$ $\delta = -29°\ 29'$. Region too low to see the duplicity, though the larger star n.f. had that appearance. S.M.S.

Oeltz. 22454		72·8	49·34		CSP	Power no 3.
found by S.		72·6	31			Stars parallel to eyes.
		74·3	33			Mags. 9 & 9. (S.M.S.)
		72·8				
		74·4	49·327			
	mean	73·38	48·70	0·313		
			69			
			71			
			48·700			
W XXII 465		20	49·20		JW	Only seen well occasionally
found by Alvan Clark		18·9	18			
		15	24			
		15	49·207			
		20				
		18 best	48·81			
			95			
	mean	17·8	94	0·153		
			48·900			
20 Pegasi		36·6	49·12		CSP	Equal mags.
		33·7	14			
		34·0	16			
		34·8				
		35·8	49·137			
	mean	34·98	48·83	0·153		
			83			
			83			
			48·830			
Zero of pos.		80·5				
		·6				
		6				
	mean	80·57				
"changed a little		80·1				
		·2				
		79·7 best				
		4				
		4				
	mean	79·88				
Σ 2847		53·2	49·10			Stars hazy but sometimes showing finely.
		49·5	12			
		51·0	13			
		53·0				
		48·3	49·117	0·143		
	mean	51·00	48·83			
			83			
			83			
			48·830			

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1867phae.proj..322w

1867 Nov 11 Monday
13 Wednesday

37 Pegasi cannot be resolved.

≡ 280

1.4	49.375	
3.3	43	
4.5	37	
4.6	40	
3.8	40	
3.0	40	
3.7		
mean 3.47	49.396	0.406

coinc
48.99
99
98
49.00
00
98
99
48.990

Nov 13 Wednesday

W 0 113 Mags. 8 & 12, Companion due north. Distance about 6".
found by GMS to be double

	south clock	true sid. t	mean time	
Imm. 111 Tauri	0 7 27 ±1/3 s 2	0 7 25.4	8 36 42.1	GMS Moon's limb blazing very much.
Em. " "	lost; attention turned to wrong place; first seen about 2 seconds			
before	0 50 13	0 50 11	9 19 21	

Imm. 115 Tauri

first take	1	40	54.3							
second "		41	11.9							
mean	1	41	3.1	1	41	1.3	10	10	2.7	Very uncertain
Em.	2	5	34.5	2	5	32.7	10	34	30.0	well observed; 0s.5 too late. (This correction has been applied in reading off the record.)

5 meteors seen by E. Goodfellow from 11h to 13 1/2h
6 " " " C S Peirce 11 to 13 3/4
33 " " " " " 13 3/4 to 14 1/4
3 " " " " " 14 1/4 to 15

Clouds then came on.

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1867.plate.proj.:322w

Neptune Satellite not visible to S. or P. air clear & seeing fair.
Set on ♆ 0 113 but clouds prevented measures.

Nov 16 Saturday

	watch time		90° +		GMS	
Satellite of Neptune S. p.	9	9.7	224.8	47.54		Good measure; 2 wt.
		13.7	228.7	39		
		17.5	225.6	61		
	9	13.65	226.95	47.482	1.558	
		20.5	227.6	50.90		
		23.5	225.0	74		
		25.7	222.8	49		½ wt.
		27.8	226.9	60		
	9	24.19	225.97	50.710	1.670	
				coinc.		
				49.06		
				05		
				01		
				04		
				04		
				49.040		
mean of all	9	18.92	226.46		1.614	Satellite very faint. Measures made with extreme difficulty.
Corr. to watch, fast. of sid. time	8	17.2				

1st ♈ sidereal time 0h 52m; see below.

♆ 0 113

	161.6		
	161.4		
	160.3		
	90° +		
	252.2	49.72	
	250.1	75	
	250.3	74	
		49.737	0.697
		48.28	
		26	
		31	
mean		48.283	0.757
mean	160.97		0.727
Zero of prs.	259.3		
	259.3		
mean	259.30		

Region of Galatea charted. Clouds came on.

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1867phae.proj..322w

1867 Nov 18 Monday

Double near Σ 2995 found by CSP	195·8		CSP	Too faint to measure distance, but very wide
	199·5			
	191·8			
	196·5			
	195·8			
	195·5			
	195·82			
Another brighter	157·8	45·71		
	154·6	30		
	159·1	57		
	158·4			
	157·2	45·527		
	158·9			
		52·57		
	158·17	97	3·556	
		38		
		52·640		
Σ 2995	138·6	49·46		
	140·0	54		
	141·2	55		
	140·6	64		
	140·0	67		
	141·8	58		
	140·37	49·573	0·529	
Note July 15, 1881. This star is called W.O 802 in the original, but probably incorrectly.	134·3	49·84		
	135·5	74		
	133·8	81		
	134·5	76		
	134·3	80		
		78		
	134·48	·788		
Zero of position	258·7			
	·8			
	258·75			
		come		
		49·11		
		09		
		03		
		48 99		
		98		
		49·07		
		06		
		05		
		04		
		05		
		02		
		09		
		03		
		07		
		05		
		02		
		48·99		
		49·044		

Observer thinks something must be the matter with his eye tonight

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1867phae.proj..322w

W O 715 found to be double by G.M.S. — GMS Mags. 8 & 11. Companion North following, angle of position about 40°, distance about 6″.

Satellite of Neptune — Not visible after long attention. Seeing poor

P O 251

	219·0			
	219·7			
	220·0			
	219·1			
90 +	131·1	51·08		
	129·8	51·15		
		51·14		
	219·78	51·123	2·032	
		47·05		
		03		
		10		
		47·060		

84 Ceti

	203·7		Companion extremely faint v. p.
	202·6		
	203·15	49·51	0·466 A mere estimate.

P III 98 — Seeing too poor for measures.

Region of Saldea examined but without result.

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1867phae.proj..322w

1867 Nov 19 Tuesday

~~XXII~~ 33	2·1	49·99	CSP	Seeing not very good
	3·0	98		
	2·9	97		
	0·9	55		Stars parallel to eyes.
	4·1	52		
	4·3	52		
	2·8			
	2·87	49·755		
Double star				
about 11 -11	101·8			Line joining brightest in
n. f. the above	101·9			each double
in same field	101·85			
		78·99		Principal star in P XXII 33
		90		Nearest " " the other
		78·945		
This				
New double	288·2	74·94		Stars perp. to eyes.
	288·8	95		
	288·2	93		
	288·2	95		
	288·35	74·942		

Satellite of Neptune seen but too faint to be measured. SMS

Obsns. interrupted by Clouds.

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1867phae.proj..322w

P XXIII 69	266.6 266.2 267.0 267.2 266.8	49.58 58 62 best (2 wt) 59 60		CSP	Stars parallel to eyes Power no 2.
	266.76	49.598	0.554		Stars unsteady
W 0 802	292.1 292.7 291.2 291.8				Stars perp. to eyes. Power no 4.
	291.95	49.11 ??(rej.) 15 14 145 14			Stars par. to eyes
		49.144	0.100		

Suspected another double star, the first of a trapezoid $\alpha = 0^h 41^m$ $\delta = +4^\circ 6'$
Fixed wires moved at this point; coincidence changed.

Satellite of Neptune Invisible to S & P.

Polar diam.		2 dist 49.162 142 146		GMS	
		49.150	0.160		
		48.857 862 860			
		48.860	0.130		Little confidence felt in measures
		coinc 49.000 48.998 970 994 994 979 995			
		48 990			
W 0 715	131.3 131.8 132.5	49.70 72 69 72		CSP	
	131.87	49.708	0.724		Comp. n.f.
		48.986 973 008 973 992 986 982 983 978 983			
		48.984			

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1867phae.proj..322w

1867 Nov 21 Thursday

Region of Antiope charted.

G.M.S.

Europa & W III 1182.

A fixed star & W III 1119. Region mistaken

chron 236

4	10·2	69·33	Δδ	Planet north
	11·0	26		
	11·5	36		
	12·0	16		
	12·7	44		
	13·8	36		
	14·4	27		
4	12·23	69·311	+20·286	
4	16·9	61·58	Δα cos δ	Planet fell.
	17·8	61		
	19·4	63		
	19·9	57		
	20·5	60		
4	18·90	61·598	+12·573	
		49·04		
		03		
		00		
		03		
		04		
		01		
		49·025		

Eurynome & Lal. 6551

4	38	6·2			
		15·6			
		23·3			
4	40	25·2	+2	19·0	
		34·4		18·8	
		42·2		18·9	
4	41	18·9			
		27·9			
		35·6			
4	43	37·6		18·7	
		46·8		18·9	
		54·5		18·9	
4	42	10	+2	18·87	
4	45	16		64·50	−9·660 coinc. e. Planet south

Telescope had to be reversed

4	58	19	58·99	−9·970 coinc. d.
5	0	57	59·09	−10·070
	4	16	59·18	−10·160
4	57	10		−9·965

74·15
17
16
74·160

Note, Nov. 20, 1877. In this reduction the position of wire d is taken as determined just above 49.025, or 49.02; that of wire e as determined opposite 74.160 or 74.16; interval accordingly 25.14.

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1867phae.proj..322W

Lal. 6551 &
a 13 mag.
·s. f.

5	11	52·5	
		58·1	
	12	9·3	
	12	51·2	+ 58·7
		56·8	58·7
	13	8·3	59·0
			+ 58·80

A fixed star
~~Lal. 6551~~ &
a star 9.5 mag.
s.f. on d

Chron 236

5	49·7	
	51·4	
	52·4	
	53·4	
5	51·47	
5	55·5	
	56·6	
	57·0	
	57·7	
5	56·70	

76·23	−27·210
57·84	
71	Δ α cos δ
85	
78	
57·795	+ 8·781
62·51	Δ δ
42	
40	
41	
62·435	+13·421
49·03	
02	
99	
01	
02	
49·014	

Is this star Arg. Z. 577 ?

This star ~~follows~~ precedes
Arg Z 964 40ˢ·5
8ᵀ·52 south of it.
making its approx. place for 1867·0
α 5ʰ 28ᵐ 16ˢ
δ +23° 30′ 40″

Chron. 236 fast of sid. clock
2ᵐ 38ˢ·3 (eye & ear.)

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1867phae.proj..322w

1867 Nov 26 Tuesday

~~38 Piscium~~
35 Piscium

19·7	50·193		CSP	Stars perp. to eyes.
19·7	197			Must have been the wrong star;
19·8	194			
19·5	194			
19·7	200			
19·68	50·196	1·196		

Searched for suspected double of Nov. 21 but a small cloud or something prevented its being found. Afterward thought I saw it double.

Stars growing nebulous.

≤ ~~87 32~~

44·5	49·365		Power no 6.
44·1	449		
46·7	336		Wrong star.
46·8	342		
49·1	408		
48·3	380		
46·58	49·360	0·360	

42 Ceti

1·7	49·106		Stars very large & dancing
3·7	124		
4·6	140		very bad seeing
4·1	126		
4·2	139		Right star.
7·0			
4·22	49·127	0·127	

P I 123

130·0			3d Power. Stars perp. to eyes.
136·8			
137·5			
141·1			
142·2			
137·52			
142·1			Power no 5
141·0			
140·5			
141·20			

Chronometer fast $2^m\ 2^s$; see p. 0.

Satellite of Neptune n.f.

Chron 23b

2	43·2	90+ 53·3	50·23	GMS	
	48·3	51·8	02		
	50·1	50·3	09		
	53·7	49·0	03		
	58·0	51·0	·19		
2	50·64	141·08	50·112	1·115	
			Coine		
			49·00		
			00		
			48·99		
			48·997		

Zero of pos. 79·2 CSP

CSP thought at first he saw something close to the planet on the left, but did not see the known satellite; whence he doubts his obsn. afterwards is positive that there is an appearance of something, in 110° less position than satellite

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1867phae.proj..322W

and at the distance of 1".5 or 2" from the edge of the planet.

Europa &		3	15	13		55.97	Δδ	Planet south on d.
W III 1119			17	17		56.01		
			19	15		20		
			21	10		13		
			23	5		08		
	mean	3	19	12		56.078	−7.078	
		3	28	7.1				
				19.1				
				23.8				
			28	56.4				
			29	56.4				
				1.2				
		3	26	35.9	−1	31.2		
				47.9		31.2		
				52.3		31.5		
			28	7.1				
				19.1				
				23.8				
			28	44.4		31.4		
				56.4		31.5		
			29	1.2		31.1		
			30	15.8				
				27.9				
				32.3				
	mean	3	27	51	−1	31.32		
W III 1182			33	16.0	+3	0.2		
				28.0		0.1		
				32.3		0.0		
	mean				+3	0.10		
Eurynome &		4	2	34.3	−2	51.6		
W III 474				46.2		.7		
				51.2		.5		
			5	25.9				
				37.9				
				42.7				
			6	28.1	−2	51.9		
				40.3		.7		
				45.1		.7		
			9	20.0				
				32.0				
				36.8				
	mean	4	4	43	−2	51.68		
		4	11	1		50.59		Planet south on d.
			12	1		55		
			12	47		70		
			13	27		61		
	mean	4	12	19		50.612	−1.612	
						49.01		
						48.99		
						49.00		
						49.000		

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1867phae.proj..322w

1867 Nov. 27 Wednesday

Heb. h. 5079

Σ 23

356·0
6·8
5·2
5·6
6·6

356·04

49·888
948
960
49·954
50·044
49·962

49·961 0·960

CSO Small. f.B. 6M. Star 9·10 mag. f.

1st power

Searched for double star of Nov. 21. Cloud again.
Searched for Neptune's satellite without success.

Heb 160 = Σ 91

27·7
24·1
25·7
25·1
22·9

25·70

2d Power

Too faint to observe.

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ζ Piscium

105·2
106·5
105·0
106·7
104·4
105·2
105·7
106·0

105·59

CSP Stars parallel to eyes.
Seeing bad. Stars large moving.

51·81
82
77
85
70
88

51·805 2·801

Wind blows telescope.

Chron 236

BAC. 1244 & Europa

3	9·8		96·26		GMS
	10·8		60		
	12·4		15		
	13·2		49	Δα cos δ	
	14·4		50		
3	12·12		96·400	−47·396	Planet fr. on d.
3	17·2		65·13		
	18·3		03		
	19·3		16	Δδ	
	20·0		19		
	21·0				
3	19·16		65·138	−16·134	Planet s. on d.

corne
49·02
48·97
49·02
·00
·01

49·004

Faint companion of BAC 1244 14 mag. s.p.

zero of pos.
259·1
·1

302
304

50·39
·22

303·0 50·305 1·301

Region of Galatea charted.

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1867phae.proj..322w

1867 Dec 1. Sunday

P XXIII 69	154·2	52·36		CSP	2d Power
	155·4	69			
	155·7	40			
	154·3				
	154·6				
	154·84	52·483	3·458		
Z 23	176·4	50·08			Stars large & watery occasionally disappearing.
	174·2	03			
	176·9	49·98			
	175·2	98			
	177·3	91			
	176·3	98			
		99			
		97			
		50·01			
	176·05	49·992	0·967		
P O 251	219·6				Seeing bad, dome too warm.
	219·6				
	218·3				
	217·8				
	219·0				
	218·4				
	218·78				
		51·06			
		03			
		10			
		07			
		10			
		51·072	2·047		
Z 86	5·0				Stars perf. to eyes.
	5·8				
	187·5				Seeing better
	186·9				
	186·5				
	6·34				
		50·30			
		35			
		36			
		33			
		33			
		50·334	1·309		
H2 Ceti	187·3				Power no. 4. Stars perf. to eyes. No use trying to measure the distance.
	184·0				
	182·4				
	186·7				
	182·0				
	185·2				Therm. in dome 27°
	182·3				
	183·41				

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1867phae..proj...322W

α Piscium

202·3
0·2
1·9
3·7
2·2

202·06

1st Power; stars perf. to eyes.
Cannot measure dist.

84 Ceti

202·9
1·7
3·1
1·4
2·3
1·3
1·8

202·07

49·61
60
59
56
64
60
55

49·593 0·568

Seeing very much better

Σ III 98

288·0
290·3
285·2
284·9
288·8

287·44

Dist. not worth observing.

Galatea &
BAC 1377

Chron 236

3 43 10·0 −2 50·5
20·5 50·0
28·0 49·5

46 0·5
10·5
17·5

3 59 24·5 50·0
34·5 50·0
41·5 50·0

4 2 14·5
24·5
31·5

−2 50·00

GMS

Obsd. by eye & ear.
Planet preceding, about 3′ north.

Faint Through clouds.

Obscured entirely.

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1867phae.proj..322w

1867 Dec 2. Monday

8 o 251

CS8 Clouds prevented seeing

Ceti 160 = Σ 91

205·5
206·4
205·0
206·6
205·6
205·82

2d Power stars perp. to eyes.

49·56
55
47
54
57
49·538 0·513

Brighter star s.f.

P I 123

319·5
318·6
318·3
319·1
318·2
318·74

3d Power. Stars perp. to eyes

Seeing hardly good enough for so close a star. Stars jumping

49·15
18
18
18
17
49·172 0·147

α Piscium

Cannot be observed.

66 Ceti

300·0
299·5
299·0
298·7
298·3
299·2
299·12

1st Power. Stars parallel to eyes.

50·70
55
67
64
60
58
68
50·631 1·606

50·65
62
64
62
64
50·634 1·609

3d Power

84 Ceti

207·0

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1867phae.proj...322w

				coinc		8th Power
				49·032		
				030		
				032		
				022		
				022		
				011		
				028		
				016		Both wires cannot be brought to
				037		
				020		a focus at once.
				013		
				013		
				49·023		
Note May 28, 1880. The coincidence adopted on 1.34 seems to be 49.025. This gives triple weight to the result of the first set, disregarding the numbers of observations.						
				033		6th Power
				032		
				037		
				032		
				037		
				030		
				029		
				028		
				028		
				033		
				49·032		
Zero of pos			258·9			1st Power
			258·9			
W III 306	4	11	38·0			GMS
			47·3			
and Eurynome			55·0			
		13	7·3	+1 29·3		
			16·3	·0		
			24·1	·1		
		13	43·3			
			52·3			
		14	0·2			
		15	12·2	28·9		
			21·5	29·2		
			29·1	28·9		
	4	14	18	+1 29·07		
				zero		south.
	4	17	53	259·1	76·16	Comp. on d.
		19	47	·0	15	
		21	41	·1	10	
	4	19	47	259·07	76·137	+27 165

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1867phae.proj..322W

1867 Dec 2 Monday
3 Tuesday
4 Wednesday

B.A.C 1377
& Galatea

4	36	53		50·19	(½ wt)
	42	55		39	
	47	35·9	−3 45·1		
		46·4	·5		
		52·9	·1		
	51	21·0			
		31·9			
		38·0			
	52	56·2	·9		
	53	7·1	·8		
		13·8	·3		
	56	42·1			
		52·9			
		59·1			
4	58	46		47	
5	2	57		50·44	
4	50	26	−3 45·45		
4	52	18		50·399	−1·374

Planet south on d.
This obsn. gives as the correction to the B. J. ephemeris
$-1^m 20^s$ $-2'.4$

Dec 3 Tuesday

A fixed star observed for Concordia.

Dec 4 Wednesday

Regions of Antiope and Concordia charted.

Turned on Uranus but found the seeing too bad for measures.

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1867phae.proj...322w

51 Piscium			266·3	51·81		CSP	Stars parallel to eyes
			266·0	83			
			265·8	85			
			266·1	85			
			266·8	84			
			266·4				
			266·23	51·836	2·804		
160 Ceti = Σ 91			205·1	49·48			Observed with power no 5
			204·7	51			
			204·4	50			
			204·7	48			
			204·0	51			
			204·58	49·496	0·463		
42 Ceti			182·8	49·16			"
			183·7	19			
			183·0	18			
			183·2	18			
			184·3	16			
			184·5				
			184·6				
			183·73	49·174	0·141		
α Piscium			198·9	49·37			6th Power
			199·4	35			
			199·5	37			Star moving
			201·7	39			
			200·9	38			Extinguished in cloud
			201·3				
			201·3				visible at intervals.
			200·43	49·372	0·339		
				clouds.			
Antiope &		6 36	40·4	−2 55·4		SMS	Planet precedes.
W₂ V 610			53·3	·5			
		39	35·8				
			48·8				
		6 46	54		93·02 ½ wt		
		52	14		26		
		55	44		30		
		7 0	46		34 ½ wt		
	mean	6 53	56		93·247	−44·181	Planet south on d.
		7 5	42·2	−2 56·3			
			47·7	·1			
		6	5·5	·4			
		8	38·5				Observation caught between clouds
			43·8				
		9	1·9				
	mean	6 54	14	−2 55·94	49·05		Corr. of ephem. A. N. No 1666
					06		from this obsn.
					06		
					08		Δα Δδ
					08		−0ᵐ 41ˢ −0′ 59″
					49·066		

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1867phae.proj..322w

1867 Dec 7 Saturday

Σ 23	0 16	355·2 ·3 ·4 9 ·1 355·38	50·04 00 97 61 99 two close 63 98 50·003	CSP	Large star white, lower a little greyish, Persp. to eyes. 3d Power Colors afterwards given as Large slightly bluish lower purple.
Zero of Pos.		78·9 79·1 ·3 ·0 79·07			
O 0 251	0 47	39·2 ·3 4 ·8 ·2 39·38	51·14 09 10 04 13 14 07 51.101		Stars large and dim. Persp. to eyes; 3d Power.
Seeing not good enough for 42 Ceti					
Σ 125	1 22	350·7 0·2 0·4 1·5 2·0 3·7 2·3 351·54	52·80? 75 Careful 83? 63 Star dim 74 Pretty good 85 82 77 81 52·778		Persp. to eyes There is another double n.f. 2d Power
		351·2 0·8 2·9 2·1 2·8 2·5 352·05	This requires to be 51·678 to agree with other obs.		

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1867phae.proj..322w

Coincidence without gas illum. by light of moon

49.028
030
025
023
026
030
026
49.027

5th Power

84 Ceti

26.4
22.2
24.1
23.0
24.3
24.00

2d Power; perp. to eyes.
Stars so very different in size that it is hard to measure position

49.58
47
51
61
61
52
49.550

Clouds came on at 2h 46m

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1867phae.proj..322W

1867 Dec 8 Sunday

160 Ceti

Air quite too hazy for any observing. CSP.

1h 30m Looked again; found it still too hazy for work.

Chron 236

Calliope &
Arg. Z. + 30°
no 1098

4	31.5		43.60	GMS	Planet s. f.
	32.9		59		
	34.0		45	Δα cos δ	
	34.7		30		
	35.4		18		
4	33.76		43.424	−5.596	
	38.2		47.34		
	38.8		20		
	39.4		41		
	40.4		39	Δδ	
	41.2		44		
4	39.60		47.356	−1.664	
			conc.		
			49.02		
			03		
			01		
			49.020		

Egeria &
W₂ VI 282-3

5	5 17		38.11		
	7 17		05		
	9 17		38		
	10 44		35		
	12 20		53		
5	8 57		38.284	−35.949	Planet south.
			conc		
5	15 24.0		74.23		
	37.4		24		
	46.4		23		
	16 8.2	+ 44.2	74.233		Planet fell.
	22.3	.9			
	31.0	.6			
	17 3.1				
	16.6				
	25.5				
	17 47.5	5			
	18 1.1	.5			
	10 0	.5			
	18 26.3				
	39.9				
	48.7				
	19 10.9	.6			
	24.3	.4			
	33.0	.3			
5	17 56	+ 44.80	+ 50.10		

Wires set at 179.2 by mistake; at least found so next night.

Hence the true Δα =

+ 44.s50 + Δδ tan 10° sec δ

= + 50.s10

Corr. to ephem. ☿

Δα	Δδ
− 3.s7	+ 18″

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1867phae.proj.:322w

		Chr. 236					
Egeria &	2	57·3		59·80		GMS	Planet fr.
W₂V 282·3		59·1		62			
	3	0·0		70	Δα cos δ		
		0·8		72			
		1·5		57			
	2	59·74		59·682	−14·534		
	3	3·1		62·30			Planet north on e.
		4·0		·25			
		4·7		·30			
		5·3		·25	Δδ		
		6·2		·26			
	3	4·66		62·272	+11·944		
				74·24			
				26			
				18			
				19			
				21			
				24			
				23			
				22			
Calliope &	3	36	12·4	−1	2·5		
Arg Z + 30°			23·7		2·4		
no 1098			31·2		2·8		
		37	14·9				
			26·1				
			34·0				
		37	49·5		2·6		
		38	0·7		3·0		
			8·3		3·0		
			52·1				
		39	3·7				
			11·3				
			29·0		2·9		
			46·1		2·9		
			47·9		3·1		
		40	31·9				
			43·0				
			51·0				
	mean	3 38	1	−1	2·80		
		42	25		43·23		
		44	40		43·14		
		46	20		42·88		
		47	50		43·10		
		49	20		42·96		
	mean	3 46	7		43·062	+31·154	Planet north on e.
					74·19		
					20		
mean of 10 comic.					74·216		Corr. to ephem. Δα −3ˢ·5 Δδ +16″

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1867phae.proj..322W

1867 Dec 10 Tuesday

Σ 23	$0^h\ 10^m$	174.4 175.5 174.9 174.9 174.4 174.82	50.06 50.10 too wide 49.98 50.23 50.12 49.98 good 50.00 careful 50.09 49.98 careful 49.99 49.99 50.047	CSP	Therm. before opening dome 20 F. 1st Power; star perf. to eye Blue stellar nebula precedes star a little north of it. Observer has no doubt that the truth is 49.99 or between 49.98 & 50.00
Nebula & Σ 23	0 50		58.78 $\Delta\alpha \cos\delta$ −9.75 52.65 $\Delta\delta$ +3.62		Note June 10, 1880. Hence $\Delta\alpha$ 6.42 $\Delta\delta$ 35".48 ($\delta = -0°\,26'$) The object was again observed Dec. 11 (decl. 45) and decided to be a star.
160 Ceti = Σ 91	0 50	205.2 .1 .8 .9 .0 205.40	49.51 54 58 65 51 49 49.547		2d Power. Therm. 16°
Near 66 Ceti $\alpha = 2^h\ 56^m$	2 0	190.6 191.8 191.0 193.0 190.4 191.36	49.57 68 69 58 38 49.580	WMD	Therm 15°
Immersion of BAC 1526	clock time 2 15 5.4	true sid time	true mean time	CSP	Observed with Chronograph Note Dec. 9, 1880. By book 019, clock slow $16^s.7$.
Emersion	3 28 3.3				
Σ 787 cannot be resolved.					
330 Tauri = Σ 742		277.0 276.4 274.0 275.7 274.3 274.2 275.27	74.60 59 58 58 61 61 74.595		

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1867phae.proj..322w

12 Lyncis	$4^h\ 40^m$	34·0			GMS	Power no 4
A B		33·4				Stars parallel to eyes.
		34·5				
		35·1				
		34·3				
		34·26	2 dist			
			49·21			
			19			
			17			
			21			
			19			
			49·194	0·130		
			48·92			
			97			
			92			
			94			
			92			
			48·934			
			conc			
			49·08			
			06			
			07			
			49·070			
$\frac{A+B}{2}$. C		90°+ 132·6	48·12			"
		132·5	12			
		133·0	14			
		42·1				
		41·7				
		42·4				
		42·38	48·127	0·943		
14 Lyncis		102·4	49·14			Seeing poor stars distinctly seen only by glimpses. Distance only an estimate. Parallel to eyes.
		103·0	14			
		102·6				
		102·67	49·140	0·070		
PYI 174		40·0				Parallel to eyes
		39·1				
		41·1				
		42·4	2 dist.			
		90+ 131·0	48·70			
		132·1	67			
			48·685			
		129·0	49 61			
		133·1	·59			
		40·98	49·600	0·458		

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1867 Dec 10 Tuesday

Σ 1037

209.9
206.2
206.0
207.0

207.28

Seeing too poor for distance
Perp. to eyes.

Zero of pos.

259.3
.3
.3
8.8
9.3

259.20

Σ 1119

183.0
0.2
2.0

181.73

The following of two on
the same parallel
Perp. to eyes.
Companion north.

49.42
38

49.400 0.370

coinc
49.02
02
34
04

49.030

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1867phae.proj...322w

Σ 23 what precedes is a star.

Chron 236

0h 10m

51·94 Δδ
94
81
79
86
95

51·882 +2·852

watch time
7h 8m

38·37
43
49 Δα cos δ
61
71
46

38·512 −0·518

CSP

Note June 10, 1870. See p. 42 for observation of object preceding Σ 23, and then taken for a nebula.

Watch 8m fast

13
16

7 20

Star has come out & I now see distinctly with 1st power that it is a star of 12 mag

38·50
67
39·00

38·723 −10·307

Chron 236

84 Ceti

209·8
6·5
5·0
4·5
3·8
2·7

205·38

1st Power

1/4 wt. to this series.

49·63
70
66
77
48
44
66
65

49·624 0·594

1/10 wt to this series.

Clouds.

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1867phae.proj..322w

1867 Dec 16 Monday

Chronometer 3m 45s fast; acc p.o.

Satellite of Neptune		Chron 236	90°+	50·80	1·775	GMS	
		1 24·3	53·6	47·38	1·645		
		27·2	50·4				
	mean	1 25·8	142·0	corne	1·710		Satellite s. f. excessively faint; observations very doubtful.
				49·04			
				01			
				49·025			
Star north frec. ≤ 23				51·35		CSP	
				67			
				58			
				73	Δδ		
				73			
				49			
				51·592	+2·567		
					Δα		
				59.64	−10·615		
≤ 23			357·0	50·02			
			4·3	02			
			6·8	00			
			6·9	00			
			6·6	03			
			356·92	50·014	0·989		A fine measurement; 2 wt.
Triple star found Oct 2						GMS	
AB			52·4	49·49			A = 9 mag
			51·9	48			B = 10·5 " following
			51·1				C = 12 " south.
			52·4				
			51·95	49·485	0·460		
AC			317·7	47·60			
			315·7	55			
			313·3				
			316·5				
			315·80	47·575	1·450		

Same 12 mag. star in place of Arg. Z. +14° no 577 as on Nov. 21.

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1867phae.proj..322w

Zero of position 79·2 GMS

Galatea &
W. IV 33

	5	48	12			17·10	
		51	4			19	
		53	20			24	
mean	5	50	52			17·177	+57·053
	5	58	5·3				
			14·3			74·25	
			22·5			22	
						23	
		59	30·1	+1	15·8	22	
			38·2		·7	74·230	
		59	50·3				
	6	0	59·3				
			7·5				
		1	6·4		16·1		
			15·0		15·7		
			23·2		15·7		
		1	54·1				
		2	2·9				
			11·6				
		3	10·0		15·9		
			18·8		·9		
			26·9		·9		
	6	1	35	+1	15·84		

Thisbe &
W$_2$ III 1183

	6	13	18·2	−1	54·5		
			27·8		·2		
			36·2		·6		
		15	12·7				
			22·0				
			30·8				
		15	44·9		4		
			54·1		5		
		16	3·0		3		
		17	39·3				
			48·6				
			57·3				
		18	12·9		3		
			22·1		6		
			30·7		·6		
		20	7·2				
			16·7				
			25·3				
	6	15	55	−1	54·44		
		22	3			54·57 ($\frac{1}{2}$ w1)	
		25	15			40	
		27	43			38·	
		25	36			54·426	−5·401

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1867phae.proj..322w

1867 Dec 17 Tuesday

Antiope

and W.2 TT 1406

	7	53	37.1					
			46.9					
			55.0					
	8	1	3.2	+7	26.1			
			12.8		25.9			
			21.3		26.3			
		4	15			46.96		
		14	40			94		
		16	20			47.04		
mean	8	11	45			46.980	−27.250	Comp. on e.
		19	3.8					
			13.9					
			21.7					
		26	29.0	+7	25.2			
			39.4		25.5			
			47.0		25.3			
mean	8	13	56	+7	25.72			

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1867phae.proj...322w

51 Piscium	0^h 0^m	85·6	52·80	CSP	Stars parallel to eyes 1st power
		86·0	80		
		85·5	81		
		85·8	92		
		86·1	93		
			89		
			74		
			77		
			96		
			64		
		85·80	52·826		
P 0 251		37·5	51·10		
		37·9	10		
		38·1	08		
		38·4	08		
		39·7	07		
		39·0			
		38·8			
		38·49	51·086		
42 Ceti	0 10	8·7			5th Power; seeing hardly good enough for position, not good enough for distance
		5·2			
		4·6			
		2·9			
		3·6			
		5·00			
Σ 125	0 30	352·1	51·81		3d Power stars perp. to eyes. Is not one of these double?
		·1	77		
		·7	61		
		351·6	68		
		3	63		
		3	61		
			66		
		351·85	69		
			51·682		
			51·60		2d Power
			75		
			67		
			65		
			70		
			51·674		
Satellite of Neptune	not visible to			SMS	
P III 98		106·7	49·65	CSP	
		110·4	68		
		111·6	62		
		109·2	64		
		112·4	73		
			59·		
		110·12	62		
			49·647		

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1867phae.proj..322w

1867 Dec 18 Wednesday

32 Eridani

1.1	49.71		Stars perp. to eyes.
2.1	73		
3.4	73		
4.1	73		
6.1	49		
5.0	89		
5.1	71		
6.7			
6.3			
6.7			
4.66	49.756		

Galatea 2
W TV 33

GMS

5 31	15.7			
	21.0			
	32.4			
	54.2	[38.5		
32	2.1	.1		Reject this set; wires almost invisible from poor illum.
	10.2	37.8]		
32	48.7			
	57.0			
	5.7			
33	26.5	37.8		
	34.9	.9		
	43.7	38.0		
34	12.3			
	20.9			
	29.3			
	50.2	37.9		
	58.7	.8		
35	6.8	.5		
5 34	16	+37.82		
40	22	-	[96.46]	Illum. bad
41	49		96.13	
43	50		95.93	
45	18		96.14	
46	15		96.00	
5 44	18		96.050	+47.012
			49.03	
			03	
			05	
			05	
			03	
			49.038	

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1867phae.proj...322W

Antiope &
W_2 IV 1406

6	12	2			43·58	
	14	29			·21	
	16	40			57	
6	14	24			43453	−30·747 Comp. on e.
6	19	10·0				
		21·1				
		27·9				
	25	48·4	+6	38·4		
		59·5		·4		
	26	6·5		·6		
	27	5·4				
		16·2				
		23·2				
	33	43·1		37·7		
		54·4		38·2		
	34	1·2		38·0		
6	29	56	+6	38·22		

Imm. of k
Virginis lost (circuit broken)

	sid. clock.			true sid. t			true mean t.				
Emersion	12	26	6·6	12	26	32·1	18	36	10·8	GMS	on chronograph. well observed probably 0ˢ3 late. This correction has been applied.

Note Dec. 9, 1880. By book 0,19, the clock was slow 26ˢ1; hence true sid. time 12 26 32.7. On p. 0 of this book the correction +25.0 for 13ʰ m.t. seems to be too small.

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1867phae.proj..322w

1867 Dec 19 Thursday

Chronometer fast 8m 45s; see f.o.

		Aiyon 236	90+				
Satellite of Neptune	1	57.4	47.0	50.63		SMS	
		59.7	46.5	57			
	2	0.7	46.0	51			
				50.570	1.532		
	2	1.5	47.0	47.53			
		2.4	47.0	40			
		3.3	49.7	51			
				47.480	1.558		
	2	4.7	134.1				
		5.8	134.3				
		7.2	137.0				
		8.1	137.1				
		13.0	90+ 49.0	47.38	1.66		
		14.0	46.8	50.55	1.51		
	mean 2	4.82	136.79				
	mean	4.00			1.555		
Σ 125			350.2	51.67		CSB	Fine observing; double wt.
			349.8	70			
			349.8	69			
			350.0	67			
			350.1	685			
			349.98	51.685			
P III 98			107.9				Seeing fine
			106.5				
			104.3				
			104.7				
			106.0				
			106.7				
			105.8				
			106.1				
			106.0				
			102.9				
			104.7				
			105.60				
Galatea & W IV 33	5	24 22.4				SMS	Planet follows.
		31.2					
		39.6					
		24 23.2		+0.8			
		31.9		.7			
		40.0		4			
		48.2					
		56.9					
		25 4.8					
		48.9		7			
		57.5		6			
		25 5.3		5			

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1867phae.proj..322w

5	25	11·7			
		20·0			
		28·2			
		12·3	+0·6		
		20·9	·9		
		28·9	·7		
	25	35·5			
		43·9			
		51·9			
		36·2	·7		
		44·6	·7		
		52·5	·6		
5	25	8	+0·66		
5	32	30		87·03	Comp. star south on d.
	33	47		86·86	
	34	57		86·97	
	35	38		86·92	
	36	58		87·07	
5	34	58		86·970	+37·932

Region of Concordia Started.

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1867phae.proj..322w

1867 Dec 26 Thursday

Satellite of Neptune not seen after long watching $1^h\ 0^m$ GMS

≤ 125

170·8
172·1
171·2
171·2
170·3

171·12

CSP Stars tolerably steady for p. two eye

51·70
68
66
68

51·680

zero of fws.

RAC 8281
& Planet (93)

79·4
79·3

GMS

2 25 36·4
42·0
53·0

27 ·6·3 +1 29·9
·12·0 30·0
·22·8 29·8

·49·2
27 ·54·4
28 ·25·7

29 ·19·4 30·2
·24·5 30·1
29 ·35·3 29·6

30 ·21·8
·27·1
·38·1

31 ·57·0 30·1
·57·1 30·0
32 ·8·8 29·9

2 29 31 +1 29·96

35 7
38 0
40 13

2 37 47

45·21
30
32

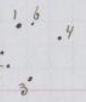
45·277 −28·891

74·17
14
15
20
16
16

74·168

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1867phae.proj..322w

Sixth star of Trapezium θ Orionis from 1st		222·8 224·1 227·0 224·3 225·4	49·30 29 30 28 28		CSP	 Seeing fine
		224·72	49·290			
Fifth from 2d.		178·4 177·4 179·3 179·6 181·1	49·502 526 520 542 532			
		179·16	49.524			
Sixth from 1st		231·8 230·7 230·3 232·3 229·6	49·42 41 39 35 40		WMD	
		230·94	49·394			
	Chron 236	90+				N.B. Fixed wires apparently moved here.
3d Satellite of Uranus	4 57·7 5 6·4 1·8	263·3 269·5 268·9	53·57 53·39 ·49		CSP	Satellite north Chronometer 15s fast; see p. 0
	4 59·97	177·23	53·783	3·653		
	5 10·1 11·8 14·2 16·4	264·5 265·2 263·0 263·2	53·40 55 21 43		GMS	
	5 13·12	173·97	53·397	3·567		
4th Satellite	5 20·5 22·2	3·5 2·3	54·24 31			Satellite preceding
	5 21·35	92·90	54·275	4·445		
W₂ VI 1870-1 and Parthenope	6 55 22·7 31·0 40·2				GMS	
	58 25·8 34·1 43·3	+3 3·1 3·1 3·1				
	58 59·0 7·5 15·6					
	7 2 2·0 10·4 19·3	3·0 2·9 2·7				
	2 52·7 3 0·6 9·9					
	5 55·2 6 3·6 12·6	2·5 2·7 2·7				
	7 2 13	+3 2·87				

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1867phae.proj..322w

1867 Dec 26 Thursday

			Zero			
7	11	45	258·8	42·54		
	16	18	258·8	51		
	21	13		55		
7	16	25		42·533	−32·431	Planet south
				74·96		
				93		
				98		
				98		
				97		
				74·964		
				corne. d		
				49·83		
				80		
				82		
				85		
				79		
				84		
				88		
				83		
				84		
				82		
				49·830		
Sirius			273·7			
			273·4			
				51·02	1·19	Seeing not good enough for more.

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1867phae.proj.,322W

	Chron 236					
W₂V 709 & Beatrix	6 35·0		53·06		9 MS	
	36·1		52·95			
	37·0		72			
	38·1		69			
	38·9		76			
	6 37·02		52·836	+2·956		Planet following
	41·7		30·79			
	42·5		79			
	43·3		71			
	44·0		71			
	45·0		88			
	6 43·30		30·776	−19·104		Planet south
	50·3		52·19			
	51·8		52·11			
	53·0		51·86			
	56·3		51·51			
	58·5		51·64			
	6 53·78		51·862	+1·982		
			49·90			
			87			
			88			
			88			
			87			
		zero of pos.	49·880			
W₂VI 1870-1 & Parthenope	7 28·0	79°·1	53·68			
	30·8	·2	62			
	32·9		72			
	34·4		51			
	36·2		56			
	7 32·46		53·618	+3·754		Planet north
			49·88			
			88			
			84			
			86			
			87			
			49·864			
	7 39 48·9					
	40 0·2					
	6·2					
	40 45·8	+56·9				
	57·4	57·2				
	41 3·1	56·9				
	41 17·6					
	29·1					
	35·1					
	42 14·4	56·8				
	25·9	56·8				
	31·8	56·7				
	47·9					
	59·3					
	43 5·2					
	44·5	56·6				
	56·0	56·7				
	44 2·0	56·8				
	7 42 24	+56·82				

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1867phae.proj..322W

1867 Dec 28 Saturday

Satellites of Uranus hardly visible if at all.

Julia 2

W₂ VII 1618-9

8	9	49·1	−1	36·6		Planet preceding
	10	1·8		36·6		
		8·1		36·9		
	11	25·7				
		38·4				
		45·0				
	12	10·8		[36·3]		
		23·1		36·8		
		29·3		37·0		
	13	47·1				
		59·9				
	14	6·3				
	14	28·5		36·8		
		40·8		37·1		
		47·3		36·9		
	16	5·3				
		17·9				
		24·2				
8	12	21	−1	36·84		
		17·9			40·69	Planet north
		20·3			[40·11]	
		22·6			40·82	
		25·5			40·61	
		28·3			40·29	
		30·4			40·47	
8		24·94			40·576	+ 9·284
					49·85	
					86	
					87	
					86	
					87	
					49·860	

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1867phae.proj..322w

2 86 7.6 7.2 8.5 7.9 7.3 — 7.70 CSP 3d Power

51.13 14 17 14 14 — 51.144

42 Cotè Quite irresolvable

Nebula 351 Many small stars, but positively no nebula visible.

36 Andromedae Barely elongated cannot be measured.

Nebula 589 Nothing seen

coinc.
49.75 77 78 76 79 — mean 49.770

783 801 798 799 793 — mean 49.795

777 760 777 778 778 767 782 777 777 770 — mean 49.774

mean of all 49.778

Note June 15, 1880. See original record, N 11, for remarks on weather, which was too unfavorable for seeing nebulae.

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1867phae.proj..322w

1867 Dec 30 Monday

Chronometer fast 15^s; rate 1.0

Satellite of Neptune n.f.

GMS

Chron 236		90°+			
2	25.5	39.7			
	30.0	40.0	51.04		
	31.7	43.5	23		
	34.5	43.2	12		
			51.130	1.310	
	36.7	44.0	48.40		
	39.5	40.8	26		
	42.5	39.8	37		
	45.0	127.5			
			48.343	1.477	
			49.82		
			81		
			83		
			82		
			82		
			49.820		
mean	2	35.75	131.06	1.394	

Planet (94) 8

W 0 431

Chron 236					
3	8.7		52.68		Planet foll.
	12.5		53.12		
	13.5		53.28		
	14.3		53.22		
	16.0		53.09		
Obsn. interrupted by clouds.					
4	14.0		55.97		"
	15.5		56.08	$\Delta\alpha \cos\delta$	
	17.0		56.13		
	18.3		56.10		
4	16.20		56.070	+6.212	
4	20.5		15.11		
	22.0		32	$\Delta\delta$	Planet south
	23.3		17		
	24.3		42		
	25.5		09		
4	23.12		15.222	−59.784	
			49.87		
			84		
			83		
			86		
			.86		
			49.858		
			75.01		
			00		
			00		
			02		
			00		
			75.006		

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1867phae.proj.:.322W

Search
for Antiope, three stars compared in declination.

zero of hrs
79·0

W₂ IV 1279
& Antiope

6	~~50~~	3·5		
		14·1		
		21·2		
6	52	25·0		
		35·6		
		42·7		
	53	40·2	+1	15·2
		51·3		15·7
		58·4		15·7
	54	14·8		
		25·3		
		32·5		
	55	30·6		15·8
		41·1		15·8
		48·1		15·6
	56	25·7		
		36·6		
		43·7		
	57	41·3		15·6
		52·0		15·4
		59·1		15·4
7	0	10·5		
		21·7		
		28·6		
	1	25·9		15·4
		36·8		15·1
		43·9		15·3
6	57	17	+1	15·50

Planet following

7	4·9	38·44
	7·1	31
	9·1	55
	11·3	38
	13·4	39
7	9·16	38·414 — 36·590

Planet south

conc
75·02
00
99
01
00
75·004

Region of Panopaea charted.

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1867phae.proj..322W

1868 Jan 2 Thursday

3 Andromedae		2 dist.			
	356·3	50·00		CSP	4th power
	357·7	49·95			Star perp. to eyes
	357·4	50·00			
	358·4				Seeing bad; star tremulous.
	356·6				
	357·28	49·983	0·146		
		49·70			
		68			
		69			
		49·690			
		coinc. measured on moon.			
		49·823			
		832			
		822			
		828			
		827			
		49·825			
		853			Beginning (first contact of wires)
		860			
		860			
		859			
		867			
		859			
		49·860			
		793			End (last contact)
		788			
		788			
		788			
		780			
		790			
		49·788			
		49·824			mean of first & last contacts.

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1867phae.proj.:322w

36 Andromedae		0·0	50·005	CSP	Better than last night.
		359·2	49·977		
		0·0	50·008		
		359·4	49·999		
		359·8			
		359·68	49·997		
66 Ceti		118·9	51·44		5th Power; star parallel to eyes.
		118·9	45		
		119·3	44		
		119·1	43		
		119·2	42		
		119·08	51·436		
		zero of pos			
		78·8			
		78·9			
		78·85			
P III 98		109·3	50·465		4th Power; stars parallel to eyes.
		107·9	470		
		107·7	500		
		110·2	480		
		108·7	500		
		109·2			
		108·3			
		108·76	50·483		
32 Eridani?		4·8			Stars perp. to eyes.
		5·1			
		4·95			
ν Orionis	1 & 2	218·6	51·14		
1 2·5 6 3 4		218·6	12		
		219·4	15		
		218·5	07		
		218·8	16		
			17		
		218·78	51·135		
	2 3	289·6	50·96		
		287·0	51·06		
		286·9	51·02		
		290·7	50·98		
		289·8	51·00		
			51·00		
		288·80	51·003		
	3·4	230·3	51·71		
		229·9			
		229·4			
		230·1			
		229·9			
		229·92			

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1867phae.proj..322w

1868 Jan 5 Sunday
6 Monday

Star $7^h\ 30^m$ $-24°\ 24'$ looks double. Power no 3. Seeing poor

Bright yellow 5 mag 7 45 $-24°$ 34 (= ξ Argus.)

Jan 6 Monday

Imm. of γ Tauri 0 5 0.5
0.8

mean 0.7 0 5 50.7 5 2 49.5

GMS by beat of sounder on chronograph (corr. of $-0^s.7$ applied

Emersion Lost.

CSP

Σ 323

247.7
8.9
7.8
9.3
9.0

248.54

2d Power
Star parallel to eyes

51.10
02
06
03
02

51.046

Coincidence

49.85
85
862
863
882
872
853
852
863
862
854
862
853

49.860

[49.76
77]
778
782
775
785
792
781
785
784
793
787
789

49.785

mean 49.827 5

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Jan. 6. Monday
7 Tuesday

	clock time	true sid. t.	mean t.		
Imm. 70 Tauri	3 8 5·7	3 8 56·9	8 5 24·7		
Em. " "	4 22 32·9	4 23 24·1	9 19 39·7		
Imm Rumk. 1203	4 51 9·3	4 52 0·6	9 48 11·5		
Imm 75 Tauri	Lost, coming too near that of ♃.				
" ♃ Tauri	5 2 1·5	5 2 52·8	9 59 1·9		
" Rumk 1210	5 5 44·4	5 6 35·7	10 2 44·2		
Em. ♃ Tauri ?	5 50 50·7	5 51 42·0	10 47 43·1		Perhaps only an accidental tap as the rattle following the obsn. failed to record.
Imm BAC 1391	5 59 38·5	6 0 29·8	10 56 29·5		
Em. 75 Tauri	6 2 12·0	6 3 3·3	10 59 2·6		
Em. Rumk. 1203	not tried for, coming too near that of 75.				
Imm. BAC 1394	Lost, circuit broken				
Em. Rumk 1210	6 21 52·6	6 22 44·0	11 18 40·0		
Em. BAC 1391	7 10 49	7 11 40·4	12 7 28·4	SMS	Two taps at $7^h\,11^m\,0^s.1$ & $11^s.7$ Emersion estimated to precede 1st tap as much as second follows it.
Em. 1394	Lost star too faint				
Imm. 1406	7 37 54·2	7 38 45·6	12 34 29·2		Corr. of $-0^s.5$ applied.
Em.	not tried for, being near imm. of α Tauri				
Imm α Tauri	8 47 14·7 14·2				By sounder on chronograph corr. of $-0^s.5$ applied
mean	14·4	8 48 5·9	13 43 38·1		
Em. α Tauri	9 42 46·1	9 43 37·7	14 39 0·8		Corr. of $-0^s.5$ applied

Jan 7 Tuesday

Imm. 115 Tauri	1 52 13·2	1 53 5·7	6 45 50·0	CSP	
Em. " "	2 6 20·6	2 7 13·1	6 59 55·1		

Clouds prevented obsn. of 115 Tauri.

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1868 Jan 9 Thursday

Imm. f. Gemin.	4	41	37.0				GMS ± 5s Furious wind & seeing atrocious.
Em. probably	5	15	51				
	5	16	2.0				Star first seen
			11.6				distance from limb doubled
			23.4				" " " tripled
							Note Dec. 10, 1880. By book O 19 clock 55s.4 slow. The probable time of emersion would seem to be nearer 50s than 5s.
				zero			
				259.2			
Hebe & W VII 180	7	16.6			77.12		Planet north
		18.3			10		
		20.0			39		
		21.5			16		
		23.3			50		
	7	19.94			77.254	+27.450	
	7	25	6.9				Planet foll.
			13.9				
			23.6				
		26	10.7	+1	3.8		
			17.8		3.9		
			27.2		3.6		
		26	44.7				
			51.6				
		27	1.2				
		27	48.4		3.7		
			55.2		3.6		
		28	5.0		3.8		
		28	26.1				
			33.2				
			42.9				
		29	29.9		3.8		
			37.0		3.8		
			46.5		3.6		
	7	27	57	+1	3.73		

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Julia &
W_2 VII 1227

7	39	36·3	− 6·8
		44·8	6·3
		55·6	6·5
		43·8	
		51·1	
	40	2·1	
		15·0	
	40		− 6·7
		23·1	6·6
		34·0	6·7
	40	21·7	
		29·7	
		40·7	
	40	49·2	− 6·7
		57·2	6·7
	41	8·1	6·7
	40	55·9	
	41	3·9	
		14·8	
	41	24·9	− 6·4
		32·5	6·8
		43·9	6·5
	41	31·3	
		39·3	
		50·4	
7	40	40	− 6·62

Planet prec

7	47·5		74·55	
	48·2		57	
	48·7		60	
	49·3		50	
	50·2		58	
7	48	47	74·560	−24·756

Planet south.

49·82
81
80
80
79
49·804

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1867phae.proj..322W

1868 Jan 10 Friday

Dome warm. Moon nearly full. CSP.

66 Ceti

298.3
298.9
298.9
299.6
299.2 good
298.86

48.18
156
20
18
14
48.171

3d Power
Stars parallel to eyes

Suspect it is too close.

84 Ceti

204.3
207.6
203.8
202.6
201.0
203.86

Stars perp. to eyes.
2d Power
Stars moving very violently
Obsn. considered worthless

P III 98

285.3
284.7
286.3
287.3
287.7
288.5
287.3
286.3
286.68

50.450
485
340
370
384
417

39 Eridani

196.9
198.0
199.0
197.4
194.4
197.74

50.45
53
55
51
51
50.510

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				XVIII		These measures taken by putting the movable wire first on one side, then on the other, of the large star.
				50·32		
				83		
				mean 57		
				30		
				89		
				mean 60		
				37		
				81		
				mean 58		
				35		
				87		
				mean 61		
				28		
				67		
				mean 48		
				50 568		
ζ 570			267·7			
			268·1			
			268·2			
			267·9			
			268·3			
				51·065		
				072		
				037		
				51·037		
				50·984		
			268·04	51·039		
Parthenope & Arg. Z. +20° no 1638	7	32 16·9	−29·3		GMS	Gas froze up, thawed it out to observe Parthenope
		26·7	·4			
		34·2	·6			
		32 46·2				
		56·1				
		33 3·8				
		33 11·7	5			
		21·6	5			
		29·1	·6			
		41·2				
		51·1				
		58·7				
		34 10·1	4			
		19·9	·3			
		27·4	·6			
		39·5				
		49·2				
		57·0				
	7	33 22	−29·47			Planet precedes
	7	36·4		65·47		
		37·2		41		
		38·3		38		
		38·8		49		
		39·5		51		
	7	38 4		65·452	−15·661	Planet south. Gas froze up again.

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1867phae.proj..322w

1868 Jan 11 Saturday
12 Sunday

Gas frozen up in tube below floor, so that no measures could be made.

W II 1007 not visible
1008 brilliant

GMS

Im m. 18 Leonis 5 27 1.4 ± 2^s

Note Dec. 10, 1880. By book C 19, clock slow at immersion 58^s.4; at emersion 58^s.5.

comc measured on moon

49.81
80
80
79
79
78
77
78
79
80

mean 49.791

Em. 18 Leonis 6^h 32^m? 41^s.7 By sounder. Pen did not mark.

Turned to B.A.C. 3345 (R Leonis) to observe immersion, but did not see it. Star probably not at its maximum.

Search for doubles. Seeing poor.

Faint one about 20' s.p. 20° Oeltz. 7254 Dist. about 3" Mags. 11.
Hence for 1868.0 7^h 35^m.4 − 22° 22'

Jan 12 Sunday

B.A.C. 2057 or P VI 82 (supposed variable by Piazzi) has about the same magnitude as in the Durchmusterung (7.8) by comparison with W VI 456 immediately following (7.5)

41 Tauri appears 1/2 or 3/4 mag. < φ.

According to Argelander (Durchm.) 41 is 5.1
φ is 5.5

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1867phae.proj.:322w

Nebula 604 Somewhat elongated. Just halfway between two stars p. & f. so that they are just at the edge of the field when this is in the middle. (C.S.P.)

Note June 17, 1880. If the power was No. 1 the field was about 12'; if No. 2, 9'; No. 3, 7'.

Satellite of Neptune invis. to S. or P.

Nebula 826 Not resolvable. Follows upper of three little stars.

Nebula in Orion C.S.P.

1. The great branch s.f. on S.P. B's drawing is hardly sharp enough in outline; more like Herschel's.
2. The grand triangle leaves off sharply at p. side like B's not like H's.
3. Down the middle of triangle is black line like H's not B's.
4. The curl N.p. triangle is doubtful though something like it is certainly there.
5. The spot n.f. is hardly as three fold ⋎ as B. makes it.
6. The general tendency of the n.p. lines is to a convexity towards n.f. side.
7. The curve on the n.p. side with convexity facing f. is well represented.
8. The dark spot close to triangle s.p. is well represented.
9. So is Gulf n.f. with bar across it.
10. The spokes at apex pointing s.f. are hardly as marked as represented.
11. I cannot see a trace of the line running from star s.f. of apex of triangle nearly continuous with s.f. side.
12. The spot n.f. I should represent thus (drawing in original.)

B. has something of this also. But I cannot believe that this has not become more decided since he drew it.

I might make many other obsns. but give the most certain.

N.B. The sixth star of trapezium is not visible tonight.

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1867phae.proj..322w

1868 Jan 15 Wednesday

Search for doubles. G.M.S.

Found

Oeltz. 3392 1868·0 $4^h\,42^m\,3^s$ −21° 2′.7 Mags. 8 & 11. Dist 3″ Pos. 345° N to E

Anonyma following, Oeltz. 4145 $1^m\,30^s$ just one field of power nol. north of it,
1868·0 $5^h\,34^m\,6^s$ −20° 31′ Mags 7½ & 8½ Dist 8″ Pos. 115° N to E

Companion of Sirius 97°.1 Not well enough seen for more measures

Imm. l^2 Virginis on bright limb 10 33 H1 Two taps, at 39ˢ.7 & 43ˢ.3; thought to be about 1ˢ after 1st one, certainly before last.

Em. " " on dark limb. 11 48 27.5 Probably 0ˢ.5 late, which correction has been applied.

Note Dec. 10, 1880. By book 019, clock slow 65ˢ.7 at immersion, 65ˢ.8 at emersion.

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1867phae.proj.:322w

Neb. 1362 GMS Nebulosity well marked

1359 " not " "
1373 would hardly have been noticed.
1375

1565 Perhaps 4s diam.; several stars indistinctly seen in or through it; one plainly, about 1/3 of radius from centre to n.p. limb in which direction the nebula seems a little elliptical; ratio of axes say 5 to 6.

1567 Δα cos δ

and a 9.5 mag. star following 31.78 Neb. 1567 has a wisp of light
= Oeltz. 7260 67 apparently, on s.p. & n.f. sides.
93
52
72
95
80
92
83
84

This gives for 1860.0

31.796 − 18.086 Neb. prec. 7 35 40.4
Δδ −17 52 59
according to catal.

49.56 7 35 41.2
46 −17 53 22
55

49.523 −0.359 Neb. south.

coinc

49.88
90
87
88

49.882

Note Sept. 14, 1880.
Recomputation makes the place of the nebula for 1860, resulting from the figures 18.586 and 0.359, $7^{h}\,35^{m}\,41^{s}.5$ $-17°\,52'\,58''$

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1867phae.proj..322w

1868 Jan 17 Friday

Nebula 600 CSP

vB. curdled, elong. sl. sp. & nf; 7 stars in same field of first power

Nebula compared with nearest. Nebula n.p.

				Δδ		
			46·78			
			44			
			28			
			74			Nebula rather gradually brighter in the middle
			61			
			46·570	+ 3·262		
			57·09	Δα cos δ		Irresolvable with 3d power.
			02			
			80			
			62			
			58·13			
		55·8	57·532	− 7·700		
		57·2				
		55·9				
		56·8				
		56·5				
		56·44				
	Chron 236					Chronometer fast 18s; 2cc f. 0
		90° +	2 dist.			
Satellite of Neptune n.f.	3 10·5	44·5	51·51		GMS	Power no 3.
	15	43·5	40			
	17	43·6	47			
			51·460	1·628		
	17·9	43·9	48·38			
	18·8	45·0	46			
	20·9	43·9	21			
			48·350	1·482		
	28·8		51·52			Double weight
	29·9		38			
	31·5		39			to each obsn. in
	35·6		51			
	36·1		45			
			51·450	1·618		this
	32·3		48·19			
	32·8		17			set of
	33·3		23			
	33·9		26			
	34·5		24			distances. or triple
			48·218	1·614		to the mean.
			conc			
			49·84			
			84			
			82			
			83			
			83			
			49·832			
3	16·68	134·07		1·555		
3	32·87			1·616		3 wt. to this result for dist.

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1867phae.proj.:322w

Great Nebula in Orion

CSP. Confirmed most of the obsns. made last week (meaning Monday of this week.)

SMS

Nebula 1696. A nebula v.F. R. about 4 or 5^s diam. precedes W VIII 1057 2^m 46^s
A small star (10 mag) precedes the nebula about 5^s, 7$'$.50 north of W VIII 1057
The star is perhaps 10″ north of the nebula.
Star afterward found to precede W VIII 1057 by 2^m 50^s
This gives for the nebula

1860.0	8^h 38^m 18^s	+13° 7′ 42″	
according to catalogue	38 44	+13 5 17	but none is visible in this place.

Note Sept. 15, 1880. Place for 1860 of star? 8^h 38^m 23.5^s +13° 7′ 52″

Cluster Nebula 1698. This appears to consist of a trapezium of four 10 mag. stars.

Nebula 1707. An e.F. neb. precedes W$_2$ VIII 1058 45^s .95′ of field of power no 1. north of it.
This gives for

1860.0	8^h 42^m 2^s	+19° 33′	
according to catalogue	8 42 1	+19 31.7	

Query if this nebula is not several e e F stars?

Note Sept. 15, 1880. Observation perhaps too rough, especially in declination, to serve as correction to G.C.; seems to identify the nebula.

Nebula 1704 appears round. There may be a v.F. & S. one following about 2^s on the same parallel, but I cannot be quite sure.

Nebula 1699 A neb. or perhaps e F star precedes 1704 54^s 1/3 of field of no 1. south of it.
This gives for 1860.0

	8 40	29	+19 31
according to catal.	40	20	+19 32.2

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1867phae.proj..322w

1868 Jan 17 Friday

Chronometer fast 18^s; see f.o.

		Chron 236	90°+			
4th satellite of Uranus n.f.	10	25·0	60·5	45·43		GMS
		28·0	59·2	28		
			119·85	45·355	4·477	
		30·0	60·0	54·30		
		32·8	61·6	32		
			150·80	54·310	4·478	
	mean	10 28·95	150·32		4·478	
3d satellite of Uranus s.f.		37·8	101·8	46·34		
		40·0	100·0	51		
				46·425	3·407	
		41·5	102·3	53·35		
		43·5	99·7	66		
				53·505	3·675	
	mean	10 40·70	190·95		3·541	

Note June 16, 1880. Coincidence here assumed
49·832 as at foot of f.74.

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1867phae.proj.1322w

Neb. 604 CSP

It is not gpf mbM but quite uniform, at least in this light. The above drawing (see original) represents it, only it is too decided. A star can hardly be brought into the same field. Hence I do not measure it.

605 Much fainter than 604 & larger, not mbM. Round, not at all elongated. It is so large that a measure will mean but little.

709 Very correct description by Herschel.

5510 and Arg Z +5° no 306

53·6
59·5
55·0
mean 56·03 54·46 4·63

886 and W IV 715

Δδ
89·73
37
58
91
69
89·656 −39·824

Δα about −1ˢ
Δα about −14ˢ

Δδ
58·60
31
28
58·397 −8·515

GMS Nebula n.f.
Nebula e F.

This gives for 1860·0 for the neb.
α 4 32 59·7
δ −0 49 27
and for the star
α 4 33 13·7
δ −0 48 4

Nebula ~~has~~ precedes a 9·5 mag. star

south of star

Four transits by eye & ear gave 13ˢ·5 13ˢ·0 12ˢ·5 12ˢ·9 mean 13ˢ·0 for Δα of this star from W IV 715.

The neb. corresponds with description, but looks also resolvable. Sometimes cB. Clouds passing.

Note June 16, 1880. Coincidence here assumed 49.832 as at foot of p. 74.

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1867phae.proj..322W

1868 Jan 19 Sunday

θ Orionis

Nebula

CSB

Six stars visible; whole nebula exceedingly fine.
Many fine stars visible in triangle, and the following is a correction of my drawing of last week (see original)
Curl given by B and sp corner of triangle perhaps seen
Streamers south of 3 stars & sp of star sp of vertex not seen

Companion not seen

Sirius

Neb. 459 and a star north

Note June 17, 1880. By a diagram in the original this star is nsp; there is another more p.

Σ 651

	Δδ	
59.46		Next to impossible to see nebula and wires at once.
58		
60		
59.513	15.487	Coincidence with e; neb. south.
	Δα cos δ	
56.48	6.65	Coinc. d. Mere guess, it is too faint

107.3	
106.6	
106.5	
106.8	
106.7	
106.9	
106.80	
51.28	
30	
36	
31	
37	
51.324	

Neb 1437 & Arg Z + 8 no 1429

Note Sept 14, 1880. The G.C. place of the nebula reduced to 1855, with the distances 84".95, 110".39, found on this page, gives the D.M. place of No. 1429 very well. If we assume the nebula to be No. 1427 its elongated shape probably caused an error in the D.M. observation.

63.57		[Neb. 1437 = Arg Z + 8° no 1427. GUS]
32		
49		
70		
71	Δδ	
63.558	11.442	Nebula s. f. Coinc. e.
65.67		Nebula bright; like a comet see drawing in original.
75	Δα cos δ	
75		
81		
[illegible]	9.255	
65.745	[illegible]	Coinc. e also probably.

Note June 17, 1880. Coincidence with d here assumed 49.832 as at foot of p. 74; interval de assumed 25.168, so that the coincidence with e is assumed 75.000. The value adopted for this interval de in the present reduction is 24.990, which makes the coincidence with e 74.822. Hence the three measurements with e give the results 150".03, 110".39, 88".95.

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It cleared at about midnight

Nebulae 1791, 1792, 1794 } All seen; the second fainter than the SMS others; supposed to be about 4/10 of the distance from A.Z. + 20° no 2298 to no. 2299, very slightly following the line, 1° or even less. Gas not working, could not measure.

This would give for 1860·0 $9^h\ 9^m\ 4^s$ $+20°\ 36'.3$
$9\ 9\ 5$ $+20\ 37.8$ according to catal.

1743 Looked for carefully but not seen; region certainly identified. Is it not identical with 1730, about 5^m preceding? This was well seen; would be marked pB.

2319 — Much the brightest of the four; should consider the star following to be 10 mag.

2320 } There seems to be one nebula 6' due south of 2319 perhaps also another
2321 } another 7' south 6^s following 2319; (probably = 2321) but 2320 is not visible 4^s foll 30" north of this one;

2326 — Corresponds with description in catalogue.

2321 and the other two? near it are e or ec F, would hardly have been suspected without close attention.

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1867phae.proj..322W

1868 Jan 22 Wednesday.

Note June 14, 1880. Coincidence d 49.820 (p. 82). } de 25.188
e 75.008 (p. 81). }

Satellite of Neptune not visible.
Neb. 692
& a star s.p.
= Oeltz. 2223

GMS

71·18	Δδ	CSP	B	R	cL	
71.66						
42.15						
72.14						
71.06						
71.20						
72.46						
			This gives for 1860.0			
			3	15	33·4	−15 54 15
71·693	+21·873	catal	3	15	36·2	−15 53 52
58·80	Δα cos δ					
15						
22						
58·28						
57·76						
58·242	+8·422					

Note June 19, 1880.

21.873	8.422
437	164
21.438	82".54
214".36	

139°.3

Neb 1005
and a (10 mag)
star n.p.

67·83	Δδ
82	
84	
51	
42	
41	
67·638	−17·818
56·79	Δα cos δ
57.09	
56.80	
56.96	
56.58	
56·844	+7·024

17.818	7.024
356	140
17.462	68".84
174".62	

35.76	18.85
·172	·38
350".4	184".7

" and W IV 1333

	Δα cos δ	This gives for 1860.0				
85·58	+35·76	4	59	51·6	−3	31 19
	Δδ					
68·67	+18·85	catal. 4	59	55·9	−3	33 0

Great nebula in Orion very fine. Some of the finest points in the drawing seen. For example, the 3 faint stripes nearly n & s bending towards p at the p. extremity & the w. f. stripe nearly p & f at the S. part. But there is only a doubtful streamer from p. of the 3 stars and a suspicion of one from f. one. None visible from middle one. Whence I think those streamers are too decided in the drawing.
Many stars visible in triangular part of nebula.

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1867phae.proj.322W

Sirius

	100·1			SMS
	97·4			
	97·8			
	95·4			
	96·5			
	97·44			
	90° +			
	190·8	74·14		
	189·4	·07		
	190·10			
mean	98·20	74·105	0·903	
		conc		
		75·00		
		01		
		02		
		02		
		74·99		
		75·008		

Planetary neb.
1574 & 3 v.S. stars near

star north (14 mag)	168·1			Perp. to eyes.
	165·8			
	165·7			
	166·53			
		58·20		
		57·98		
		58·69		
		58·69		
		58·92		
		58·496	8·676	
" sf. (15 mag)	113·7			Par. to eyes
	114·8			
	112·0			
	113·50			
		55·65		
		35		
		·75		
		55·583	5·763	
" sf (15 mag)	56·9			" " "
	54·8			
	52·1			
	52·2			
	54·00			
		57·98		
		92		
		98		
		57·960	8·140	

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1867phae.proj..322w

1868 Jan 22. Wednesday

Neb. 1589 Diam. about 3′; star of 9 mag. very near its north limit about 1/10 of diam. inside.
Three or four small stars visible in it but the nebula irresolvable.

coinc
49·83
80
82
80
85
49·820

Neb 1632
= B A C 3073 Cannot say that it is certainly nebulous. It may be so.

Zero of position
79·6
6
5
3
4
4
3
4
3
4
79·42

Power no 3

Neb 2041 &
11 mag. nf.
90·0
·0
·0
·0
89·7
89·94

59·10
19
31
35
34
59·258 9·388

Nebula 2038 the brighter of the two; both have nuclei; that of 2041 perhaps somewhat elongated in position N 50° to E or about 20° < than the position of the 11 mag star.

2038 &
2041
98·4
6
·0
·2
98·30

97·29
19
35
97·245 47·375

49·86
86
87
89
87
49·870

2037 Not visible; but the sky is perhaps not very clear; has been hazy in parts.

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1867phae..proj.,322w

Planetary neb. 2102
=Lal. 20204

(see catal.)
Perhaps slightly blue, but not more so than planetary nebulas usually are.
Has the usual sparkling appearance.

diameter

52·98
72
56
84
98
53·18
26
25

52·971 3·101

satellite
South
13 mag.

176·7
176·2
175·8
175·3
175·8

175·96

34·25
33·94
95
88
94

mean 33·992 15·878

90+ 87·0 65·42
38
89·0 56
88·0 68
71

178·00 65·550 15·680

mean 176·72 15·779

star of 11 mag

56·7
57·0
56·5
56·2
56·0

56·48

80·47
46
76
64
66

80·598 30·728

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1867phae.proj..322W

1868 Jan 23 Thursday
24 Friday

Cleared at 10, but owing to high temperature and moisture, dew formed so fast as to prevent obsn.

Jan 24 Friday

CSB.

coincidences

75·00
74·97
98
99
75 00
74 99
99
75 00
74·99
75·00

mean 74·991

49·85
87
87
86
87

mean 49·864

49·868
871
868
863
878
863
861
867
845
873

mean 49·866

Neb. 932
and a star close by sp.

61·46
31
60·94
61·09
05

61·170 11·305 Δδ

Shows well; oB R bM.

Note June 19, 1880.
Coincidence d 49.865
e 74.991
Interval de 25.126

60·20
20
58
36

60·335 10·470 Δα cos δ

11.305 10.470
226 209
110.79 102.67

another star n.p.

68·11
67·85

67·980 18·114 Δα cos δ

18.114 30.821
362 616
177.52 302.05

Δδ

44·10
24
44·170 30·821

Conc. e.

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1867phae.proj.322w

Jan 24 Friday

Neb. 1202 — Found easily but fear a cloud is rapidly covering it.
[Note Sept. 10, 1880. The original gives a small sketch, by which the brightest part of the nebula seems to form a ring round the involved star.]

Nebs 1537 } 1538 } See nothing near the place but two of J.M.S. triple stars, thus; ∴ ∴

Δα = 4ˢ.5 preceding one a little north and precedes ΔZ 1975 (= W VII 734) 84ˢ. giving α for 1860·0 7ʰ 22ᵐ 40ˢ

Nebulous double star 1487		50·1			
		47·9			
		52·0			
	90+	143·8	48·50	1·36	Perf. to eyes.
		141·4	44	·42	
		141·1	51·40	54	
		142·0	52	·66	
		50·5			
mean		51·10		1·495	

Comparison with W VI 1883 n.f.	Δα			by chronometer (2 obs.)
	−2ᵐ 33ˢ			giving for 1860·0
			Δδ	6ʰ 57ᵐ 34ˢ −11° 6′ 38″
		60·88	−11·02	calcd. 6 57 33 −11 6 48
Companion of W VI 1883 11 mag. n.p.	90+	88·0	51·54	1·68
		89·8	48·06	1·80 — 47·06 in original.
		178·9		1·740 (Measured about 16″ Feb. 3)

Chronometer fast about 20ˢ; see 1.0.

4th Satellite of Uranus. e.p.	Chron 236				
	9 24	90+	67.5	45·39	4·47 Perf. to eyes. Power no 3
	27		67.1	32	4·54
	30		69·0	54·25	4·39
	32		67.6	29	4·43
	9 28·2		157·80		4·432
3d Satellite s.f.	9 35		31·0	52·98	3·12 Wind shaking telescope
	37		28·7	53·03	3·17
	39		29·7	46·70	3·16 Perf. to eyes; Power no 3.
	41		29·8	46·58	3·28
	9 38·0		119·80		3·182

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1867phae.proj..322w

1868 Jan 24 Friday

Neb. star 1532
= AZ +21°, 1609

Nebula nearly circular; star perhaps a little eccentric, toward preceding side, and a dark space in the nebula following it, giving a somewhat annular appearance on following side.

Diam. of neb. about 38" by rough setting of wires; or
⅓ of distance to AZ 1610 by estimate. = 34". Mean 36".

Comparison with AZ 1610

345·8
346·5
345·9

$\Delta\alpha \cos\delta = 10{\cdot}180 \sin 3^\circ 21' = 0{\cdot}595$
$\Delta\delta = 10{\cdot}180 \cos\ " \quad 10{\cdot}153$

Mean result { $\Delta\alpha\cos\delta = 0{\cdot}499$; $\Delta\delta = 10{\cdot}186$

Note Sept. 14, 1880.
The coincidency 49.830 used here appears to result from interpolation between the results found in pp. 84 and 87. The zero adopted for this period is 347°.24; hence the position angle in the present reduction is 3°.17, or 3° 10' instead of 3° 21', making $\Delta\alpha\cos\delta$ 0.562, $\Delta\delta$ 10.165. Hence the means will be $\Delta\alpha\cos\delta$ 0.482 and $\Delta\delta$ 10.188 or 4".72 " 99".84. Hence $\Delta\alpha$ 0s.29, $\Delta\delta$ 10".

Place of neb. for 1866 $7^h\ 20^m\ 5^s.5$ / $21^\circ\ 11'.5$ } agreeing well in δ with Es. C.

346·07 | 39·650 | 10·180 | Neb. star s. f.

Giving for 1866·0

39·61
65
60

$\Delta\delta$

$7^h\ 20^m\ 5^s.5$ } catal. 54s.4
$+21^\circ\ 11'\ 39"$ } 27"

39·620 | 10·210

49·44
42
42

$\Delta\alpha\cos\delta$

} Not worth much, owing to wind.

49·427 | 0·403

Neb. 2091

Seems to be an 11 mag. star, with a 14 mag. nebulous companion, north. No third star seen.

160·5
161·0

Power no 1 · perp. to eyes.

157·0
159·2

Power no 3

51·45 | 1·62
48·12 | 1·71

51·62 | 1·79
48·07 | 1·46

Power no 1

51·58 | 1·75
47·98 | 1·85

mean 159·42 | 1·747

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1867phae.proj.322w

Neb 2355 Not visible. Region identified from Arg. Zones.
S. fi. A Z 2472 is a somewhat nebulous 12 mag. star. what looks like

$\Delta\alpha = -14^s$ $\Delta\delta = 27.95 -$ coinc. $= -21.88$ (2 obs.)

This gives for 1860.0 $11^h\ 9^m\ 17^s$ + 5 21.4
according to catal. 11 9 8 + 5 17.4

Nebs. 2203, 2207 } v B v m B M. slightly much elongated s p to n f
2211. p B but not m b M; oval. decidedly elongated p, a little n, to f, a little s.

coinc.
49.83
82
82
80
79
49.812

Jan 25 Saturday
Cleared late.

S.MS

Neb 768 No special concentration of nebula in the place of Tempel's variable nebula in the Pleiades; (there is a 10 mag star, A Z 525, near the place) but a little preceding there is a broad band or fan of faint nebulosity beginning about 1' south of 23 Tauri (A Z 522) and 3 or 4^s preceding, and running south and a little preceding, about 12', widening from 1' to 6' or so, better defined on f than p side. Much like the tail of a comet. A Z 522 apparently involved.

A Z 522 (23 Tauri, BAC 1161) suspected to have a faint close companion p a little n, but seeing not good enough to be sure.

☞ (A Z 569 = BAC 1188) besides its principal companion has a v F one at about 1/5 the distance
Position estimated 10° > . (N to E) or (n to N.5) than that of principal comp.

A Z 532 & 533 each certainly 1/2 mag > 528

	Argel.	Struve	I should say
532 =	9.5	8.0	8.5
533	9.5		8.5
528	8.5		9.0

Note June 17, 1880.
See note of this date in original record book N 12. Tempel probably means the d and D, which he gives for those of the middle of the nebula, which, however, can only be recognized by looking at its edges on the following nights.

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1867phae.proj..322w

1868 Jan 30 Thursday

	coinc	measured	on moon
	44·868		CSB
	878		
	878		
	877		
	879		
	49·876		44·876 in original.
	49·808		
	799		
	795		
	793		
	796		
	49·798		
	49·837		Mean value of coincidences d.
Neb. 1185 & a star n.p.	49·50	Δδ	Tail not seen.
	63		
	59		
	65		
	52		
	49·578	25·422	Coinc. e. (assumed 75·00)
	67·63	Δα cos δ	Note Sept. 10, 1880. The interval d e adopted in the present reduction is 24.990, the sum of which and 49.837 is 74.827, which would be the place of e according to the coincidence with d above. But the coincidence with e, in the next page is 75.012, and the original reduction, with the assumed value 75.000, may be taken as it stands. Reduced to arc, the Δδ is 249″.14; the Δα cos δ 175″.53. The original says Δδ nearly equal to distance of fixed wires; hence e was the wires employed.
	83		
	58		
	90		
	51		
	67·690		
	79		
	79		
	76		
	88		
	69		
	81		
	72		
	67·777		Better set (double wt.)
mean	67·748	17·911	

Neb. 1483 No nebula; brilliant cluster with quite black ground in every part.

1473 A very wide double star with diffused nebulosity about northern ~~limit~~.

Companion of Sirius — GMS Not well enough seen for measures. Star tremulous and diffused

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1867phae.proj..322w

Neb. 1673 & a 12 mag. south

351·8
353·8
353·7
351·8
353·3

67·81
67
76
69
70

mean 352·88 67·726 7·286

12 mag. north. foll.

332·0
331·8
332·6
326·5
329·4
330·46

90 + 57·0 71·84
56·5 88
57·1 72·01
55·5 71·98
56·4 89

326·50 71·920

mean 328·48 3·092

conc
75·00
98
03
05
00

hardly enough light, gas not burning well.

Chronometer about 20s fast; 2m p.o

Uranus 75·012

Chron 236 90°+

4th Satellite n.f.

9 36·7 46·0 54·05 Perf. to eyes. Power no 3.
39·2 46·1 16
42·5 44·8 21

9 39·47 135·63 54·140 4·285
44·0 46·9 45·49
45·2 45·5 58 Satellite faint.
47·0 45·5 63

45·40 135·97 45·567 4·288

mean 9 42·44 135·80 4·286

90+

3d Satellite n.

49·2 100·6 46·75 Parallel. to eyes. " "
51·5 98·3 58

9 50·35 189·45 46·665 3·190

53·0 98·2 53·17 Satellite extremely faint; obsn. not worth much.
55·0 97·2 21

9 54·00 187·70 53·190 3·335

mean 9 52·18 188·58 3·262

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1867phae.proj..322W

1868 Jan 30 Thursday

		coinc		
		49·88		
		84		
		84		
		86		
		86		
		85		
		84		
		87		
		85		
		86		
mean		49,855		

Double neb.
1519 – 1520

	107·9			1519 the brighter & most distinct of the two.
	106·7			
	106·0			
	108·1			
	107·2			
	107·18			
90+	20·8	53·07		Power no 2
	21·1	30		
	20·7	23		
		53·200	3·345	
	21·0	46·44		
	19·0	49		These measures give
	20·0	46		position 60°4 dist = 33".0
	110·43	46·463	3·392	according to catal.
mean	108·80		3·368	" 45° " 60"

Neb. 2381 &
W XI 202

	Δα by chron.			
	–[31·8]			Power no 1.
	31·3			
	31·2			
	31·3			
	–31·27			
Zero of fws	79·4	37·47		These measures give for 1860·0
	·0	40		11 12 4·6 +3 43 49
	1	81		according to catal.
	79·17	37·560	+37·452	11 13 5·2 +3 43 48

Neb. n. f.

coinc e. (The α of Weisse is undoubtedly 1m too small.)

Note Sept. 28, 1880. Coincidence e 75,012 on f. 89.

Nebula 2381 has an elongation or wisp on both sides in direction about 30° n to ff. f

137·2 Measured.

Neb 2383 not visible.

Neb 2838 = M 99 examined; looks resolvable and v g b M; but no "3 branched spiral" seen.

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1867phae.proj...322W

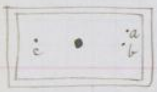
P III 98	105·2 106·5 108·3 109·3 106·8 107·22		C80	2d Power Stars blazing & unsteady. Companion n.p.
		50·60 47 49 50 54 50·520		Seeing getting worse
Σ 517	156·1 158·8 155·6 156·4 158·9 157·16			Seeing so bad that can hardly separate this star. Comp north. Perp. to eyes.
		50·25 23 30 21 24 50·246		These measures of distance have much less weight than their agreement indicates
~~Ilbh~~ Lal {9465 9469	119·9 120·6 120·2 120·9 119·4 120·26			Seeing better. Stars parallel to eyes.
		51·338 346 317 391 273 51·333		Following star decidedly the smaller. } both careful and accurate.
	breadth of image of star	50·16 16 18		
Sirius				Could see no companion

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1867phae.proj..322W

1868 Jan 31 Friday

several faint companions of τ Orionis



a

108·7
109·8
107·3
108·2
108·1

108·42

53·67
57
44
51
57

53·552 3·677 ~~·323~~

b doubtful

c

101·8
100·7
101·3
100·0
100·7

100·90

This companion is much fainter than a; very hard to see.

46·70
30
45

46·483 3·392

BAC 1188



AB

112·9
113·0
115·2
113·7
114·7

113·90

Stars furf. to eyes
" moving badly

48·78
44
72
73
79

48·752 1·123

Fear that in these distances A & C were a little mixed together.

AC

287·7
290·0
287·6
285·4
284·4

287·02

49·62
61
55

49·593 0·282

Distances poor

Difference of position AB to AC estimated as 10°; would trust to this estimate rather than to the measure.

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1867phae.proj..322w

GMS

Nebula 1191 (var. Chacornac.)

A small star precedes 17 907 to the south almost exactly in the place of the nebula. Position & distance as follows. Does not appear nebulous and there is no nebula visible in the field.

Half moon not yet set but sky clear. (Moon about 10° high and 50° from the nebula.)

90+	353·3	46·15		
		21		
		46·180	3·695	
90 +	353·3	54·71		
		78		
		54·745	3·870	
		81·1		
		81·3		
		81·0		
mean		82·00	3·782	

Probably 53·745 for I feel pretty sure of the 46·180. (Confirmed Feb. 3) [the original record for that date].

Note Sept. 10, 1880. The figures 82°.00 are presumably to be taken as the position reading; the 90° + 353.3 apparently denotes the settings for the distance measures, included with the rest in the mean 82.00.

Companion of Sirius not seen well enough for measures.

Chronometer fast about 20ˢ; see p.o.

Uranus 4th satellite

chr. 236

		90° +		
9	35·7	72·0	54·36	
	37·3	71·8	24	
	38·8	72·9	40	
	37·27	162·23	54·333	4·458
	40·5	71·0	45·50	
	42·8	74·8	45	
	44·7	73·4	46	
	42·67	163·07	45·470	4·405 ~~4·595~~
mean 9	39·97	162·65		4·432

3d satellite too near a small star to be measured.

Double neb. 2159 - 2160

b. 2159 + c ; 2160 +

a.

		90 +		
2160				
&		65·0	41·85	
a		65·5	91	
		155·25	41·880	7·995
2160				
&		57·5	37·28	
b		58·7	·16	
		148·10	37·220	12·655
2160				
&		156·1	43·55	
c		157·0	39	
		246·55	43·470	6·405
2159				
&		9·8	37·23	
a		9·0	24	
		99·40	37·235	12·640
2159				
&		95·7	34·21	
b		96·2	33·87	
		185·95	34·040	15·835
2159				
&		145·0	46·26	
c		144·6	·22	
		234·80	46·240	3·635

These measures appear to give assuming 79°.2 as the zero

From 2160

	a	b	c
Δα cos δ	−1·93	+4·56	+6·25
Δδ	+7·76	−11·81	+1·40

From 2159

Δα cos δ	−11·87	−4·36	−3·31
Δδ	+4·36	−15·17	−1·50

hence 2160 from 2159

Δα cos δ	+9·94	+9·12	+9·56
Δδ	−3·40	−3·36	−2·90

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1867phae.proj..322w

1868 Jan 31 Friday

		coinc.	
		49·88	Power no 3.
		89	
		88	
		87	
		86	
		86	
		87	
		87	
		88	
		89	
		49·875	

	90° +		
Neb. 2161 &			
a star s.f.	130·0	37·36	
	130·0	·28	
		·41	
	40·8		
	39·6		
mean	40·10	37·350	12·525

2157 nearly as bright as 2159 brighter than 2160.
2161 also f B. but its declination appears to be wrong. It is at any rate north of 2163, about 1'. The declinations of 2161 & 2163 seem to have been interchanged.

	90° +		
2276 &			
a star (12 mag)	20·0	40·12	
preceding	19·5	10	
	20·0	01	
		13	
	289·0		
	288·5		
	289·40	40·090	9·785

Nucleus elongated in direction
282 by circle, with a brush or wisp on each side, also in this direction.

Note Sept. 28, 1880. 282° is understood to be the circle reading, and hence 67° the direction of the elongation.

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1867phae.proj..322W

Σ 651 — 105·3, 105·6, 105·5, 106·8, 105·0 — 105·64

51·36, 48, 45, 35, 41 — 51·410

CSP Star parallel to eyes
3d Power

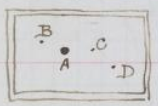
Give these distances ½ [the] wt.

Σ 622 — 354·2, 353·7, 354·0, 356·5 (½ wt), 355·0 — 354·48

50·18 better, 13, 17, 16, 17 — 50·162

Is this the star?
Stars moving badly
Note June 15, 1881. The original record gives a subsequent identification of the star which seems sufficient.

σ Orionis



AB — 111·2, 114·0, 112·8, 113·9, 115·6 — 113·38

AC — 85·8, 84·6, 84·8, 86·9, 85·5 — 85·52

AD — 108·9, 107·6, 107·8, 108·4, 107·3 — 108·00

BC — 97·7, 97·6, 97·2, 98·5, 99·0 — 98·00

BD — 109·3, 108·6, 109·1, 109·6, 109·4 — 109·20

CD — 119·0, 118·0, 118·8, 120·1, 119·3 — 119·04

Stars large blurred & moving

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1867phae.proj..322w

1868 Feb 1 Saturday

BC

52·31
38
33
41
37

52·360 2·499

BD

55·27
33
35
41
40

55·352 5·491

CD

53·04
52·97
53·00
02
03

53·012 3·151

Double found by C58
n.p. σ Orionis
Σ761, B and C

Δδ

60·10 from σ Orionis
31
25'
60·220 +10·359
65·14
24 Δα cos δ
28
65·220 −15·359

This double has stars almost exactly p. & f. The p. star is a little s. (1°)

Dist. 50·78
84
82
50·813 = 0·952

Arg Z + 29° no 1308 and Eurydice.

7 49 27·3
34·0
46·2
58 00
58·15
58 20 } ½ wt. each.
57·82
58·34

GMS

50 35·4 1 [8·1]
44·3 7·3
53·8 [7·8]
58·125 +8·264

Planet follows. extremely faint.
Planet north.

comc

52 58·5
8·3
17·5
49·87
87
86

Power no 3 for comc.

54 5·8 7·3
15·7 7·4
24·9 7·4
85
86
85
86

Pen failed to mark the times of declination measures.

54 46·7
56·3
5·7
86
87
86

Mean probably about 6m after the last transit.

49·861

May be assumed as 8h 4m

56 3·7 7·4
12·8 7·1

56 37·3
47·1
56·1

57 44·7 7·4
58 54·3 7·2
3·5 7·4

7 55 30 +1 7·32

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Nebulae observed in this volume.

The numbers refer to Sir. J.F.W. Herschel's large catalogue Phil. Trans. Vol 154 Part 1.

322-323 Nov 2 S 11
351 Dec 29 P 59
580 Jan 18 S 77
589 Dec 29 P 59
600 Jan 17 P 74
604 Jan 13 P 71 Jan 18 P 77
605 Jan 18 P 77
692 Jan 22 P 80
709 Jan 18 P 77
759 Jan 19 P 78
768 Jan 25 S 87
826 Jan 13 P 71
886 Jan 18 S 77
932 Jan 24 P 84
1005 Jan 22 P 80
1179 Jan 13 P 71 Jan 17 P 75 Jan 19 P 78 Jan 22 P 80
1185 Jan 30 P 88
1191 Jan 31 S 93
1202 Jan 24 P 85
1359 Jan 16 S 73
1362 Jan 16 S 73
1373 Jan 16 S 73
1375 Jan 16 S 73
1437 Jan 19 P 78
1473 Jan 30 P 88
1483 Jan 30 P 88
1487 Jan 22 S 85
1519 Jan 30 S 90
1520 Jan 30 S 90
1532 Jan 24 S 86
1537 Jan 24 S 85
1538 Jan 24 S 85
1565 Jan 16 S 73
1567 Jan 16 S 73
1574 Jan 22 S 81
1589 Jan 22 S 82
1632 Jan 22 S 82
1673 Jan 30 S 89
1696? Jan 17 S 75
1698 Jan 17 S 75
1699 Jan 17 S 75
1704 Jan 17 S 75
1707 Jan 17 S 75
1730 Jan 21 S 79
1743 Jan 21 S 79
1791 Jan 21 S 79
1792 Jan 21 S 79
1794 Jan 21 S 79
2037 Jan 22 S 82
2038 Jan 22 S 82
2041 Jan 22 S 82
2091 Jan 24 S 86
2102 Jan 22 S 83
2157 Jan 31 S 94
2159 Jan 31 S 93
2160 Jan 31 S 93
2161 Jan 31 S 94
2163 Jan 31 S 94
2203 Jan 24 S 87
2207 Jan 24 S 87
2211 Jan 24 S 87
2276 Jan 31 S 94
2319 Jan 21 S 79
2320 Jan 21 S 79
2321 Jan 21 S 79
2326 Jan 21 S 79
2355 Jan 24 S 87
2381 Jan 30 S 90
2388 Jan 30 S 90
2838 Jan 30 S 90
4775 Oct 27 w P 4
4779 Oct 27 w P 4
4799 Oct 27 w P 4
4802 Oct 27 w P 4
4807 Oct 27 w P 4
5079 Nov 27 P 30

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Double Stars observed in this volume.

Name	Σ		α 1870	δ		Dates, observers, and pages
35 Piscium	12	0	8·3	+8	6	Nov 2 P 10
38 Piscium	22		10·7	+8	9	Nov 26 P 28
	23		10·8	−0	24	Oct 31 P 8 Nov 27 P 30 Dec 1 P 32 Dec 7 P 38 Dec 10 P 42 Dec 16 P 46
49 Piscium	32		24·0	+15	19	Nov 26 P 28
51 Piscium	36		25·7	+6	14	Dec 5 P 37 Dec 18 P 49
W O 802			46·8	+2	36	Nov 21 P 25
36 Andromedae	73		48·0	+22	55	Jan 2 P 62 Dec 29 P 59 Jan 3 P 63
P O 251	80		52·7	+0	5	Nov 18 S 23 ~~Nov 21 P 25~~ Dec 1 P 32 Dec 2 P 34 Dec 7 P 38 Dec 18 P 49
	86	0	58·2	−6	10	Dec 1 P 32 Dec 29 P 59
160 Ceti (β)	91	1	0·5	−2	26	Oct 25 P 4 Nov 27 P 30 Dec 2 P 34 Dec 5 P 37 Dec 10 P 42
ζ Piscium	100		6·9	+6	53	Nov 30 P 31
	103		9·0	−2	2	Oct 24 P 3
42 Ceti	113		13·2	−1	11	Nov 26 P 28 Dec 1 P 32 Dec 5 P 37 Dec 18 P 49 Dec 29 P 59
	125		20·3	−0	49	Dec 7 P 38 Dec 18 P 49 Dec 19 P 52 Dec 26 P 54
P I 123	138		29·2	+6	59	Nov 26 P 28 Dec 2 P 34
Angryma			44·0	+1	53	Dec 16 S 46
α Piscium	202	1	55·3	+2	8	Dec 1 P 33 Dec 2 P 34 Dec 5 P 37
66 Ceti	231	2	6·1	−2	59	Dec 2 P 34 Jan 3 P 63 Jan 10 P 68
	280		27·6	−6	13	Nov 11 P 20
84 Ceti	295		34·5	−1	13	Nov 18 S 23 Dec 1 P 33 Dec 2 P 34 Dec 7 P 39 Dec 11 P 45 Jan 10 P 68
	323	2	45·8	+5	56	Jan 6 P 64
P III 98	422	3	30·1	+0	10	Nov 18 S 23 Dec 1 P 33 Dec 18 P 49 Dec 19 P 52 Jan 3 P 63 Jan 10 P 68 Jan 31 P 91
32 Eridani	470	3	47·8	−3	20	Dec 18 P 50 Jan 3 P 63
39 Eridani	516	4	8·2	−10	35	Jan 10 P 68
	517		9·3	+0	8	Jan 31 P 91
	570		29·0	−10	0	Jan 10 P 69
P IV 258	622		51·4	+1	28	Feb 1 P 95
Lal. 9465-9469		4	55·3	+1	25	Jan 31 P 91
	651	5	3·7	−7	14	Jan 19 P 78 Feb 1 P 95
τ Orionis			11·3	−7	2	Jan 31 P 92
380 Tauri (β)	742		28·6	+21	54	Dec 10 P 42
δ' Orionis	748		28·9	−5	29	Dec 26 P D 55 Jan 3 P 63
σ Orionis	762		32·2	−2	41	Feb 1 P 95
	787	5	38·2	+21	16	Dec 10 P 42
P VI 174	946	6	33·4	+59	34	Dec 10 S 43
12 Lyncis	948		34·7	+59	34	Dec 10 S 43
Sirius			39·4	−16	32	Dec 26 S 56 Jan 15 S 72 Jan 19 P 78 Jan 22 S 81 Jan 30 S 88 Jan 31 P 91 S 93

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Name	Σ	α	1870	δ		Dates, observers, and pages.
14 Lyncis	963	6	41·6	+59	36	Dec 10 S 43
	1037	7	4·7	+27	27	Dec 10 S 44
	1179	7	30·1	+34	0	Dec 10 S 44
Anonyma		19	6	−29	29	Nov 11 S 19
	2847	21	51·4	−4	7	Nov 11 P 19
20 Pegasi	~~2770~~ 2777		54·8	+12	30	Nov 11 P 19
Anonyma		21	59·3	−2	42	Nov 5 S 14
P XXII 33	2877	22	8·1	+16	33	Nov 19 P 24
ζ Aquarii	2909		22·1	−0	41	Oct 24 P D 2
W XXII 465			22·8	−0	52	Nov 11 W 19
37 Pegasi	2912		23·4	+3	46	Nov 11 P 20
P XXII 219	2944		41·1	−4	54	Oct 24 P 2
Oltz 22454			45·3	−22	24	Nov 11 P 19
	2964	22	53·0	−5	4	Oct 24 P 2
	2995	23	9·9	−2	18	Oct 31 P 7 Nov 18 P 22
P XXIII 69	3008		17·0	−9	10	Oct 31 P 7 Nov 21 P 25 Dec 1 P 32

Asteroids observed.

Hebe	6	Jan 9 S 66
Parthenope	11	Dec 26 S 55 Dec 28 S 57 Jan 10 S 69
Egeria	13	Dec 8 S 40 Dec 9 S 41
Calliope	22	Dec 8 S 40 Dec 9 S 41
Daphne	41	Oct 27 S 4 Oct 31 S 8 Nov 2 S 11
Aglaia	47	Oct 24 S 3 Oct 27 S 5 Oct 31 S 9 Nov 2 S 12
Nemausa	51	Oct 27 S 6
Europa	52	Nov 5 S 14 Nov 6 S 17 Nov 26 S 29 Nov 30 S 31
Leto	68	Oct 23 P 1 Oct 24 S 3 Oct 27 S 6
Galatea	74	Dec 1 S 33 Dec 2 S 36 Dec 17 S 47 Dec 18 S 50 Dec 19 S 52
Eurydice	75	Feb 1 S 96
Eurynome	79	Nov 5 P 15 Nov 6 S 17 Nov 21 S 26 Nov 26 S 29 Dec 2 S 35
Beatrix	83	Dec 28 S 57
Thisbe	88	Nov 4 S 12 Nov 5 S 14 Nov 6 S 16 Dec 17 S 47
Julia	89	Dec 28 S 58 Jan 9 S 67
Antiope	90	Dec 5 P 37 Dec 17 S 48 Dec 18 S 51 Dec 30 S 61
	93	Dec 26 S 54
	94	Dec 30 S 60

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Miscellaneous.

3d & 4th Satellites of Uranus	Dec 26 S 55 Dec 28 S 58 Jan 17 S 76 Jan 24 S 85 Jan 30 S 89 Jan 31 S 93
Satellite of Neptune	Oct 31 S P 8 Nov 2 S 10 Nov 15 S P 21 Nov 16 S 22 Nov 18 S 23 Nov 19 S 24 Nov 21 S P 25 Nov 26 S 28 Dec 16 S 46 Dec 18 S 49 Dec 19 S 52 Dec 26 S 54 Dec 30 S 60 Jan 13 S P 71 Jan 17 S 74 Jan 22 S 80
Diam. of Neptune	Nov 21 S 25
Jupiter	Nov 1 P 10 Nov 5 W 13
Solar spectrum	Oct 22 S 1 Nov 7 S 18
Fixed stars compared with each other	Nov 5 S 15 Nov 21 S 27 Nov 4 S 12 Nov 21 S 26 Nov 21 S 27 Nov 26 S 29 Dec 10 P 42 Dec 11 P 45 Dec 16 P S 46 Jan 11 S 70
Meteors	Nov 13 E Goodfellow P 20
Occultations	Nov 6 S 16 Nov 6 S 16 Nov 13 S 20 Dec 10 P 42 Dec 18 S 51 Jan 6 S 64 P S 65 Jan 7 P 65 Jan 11 S 70
{Star near nebula 1191 (var. Chacornac)}	Jan 9 S 66 Jan 15 S 72 Jan 31 S 93

New double stars found

		α	1870 δ	
W O 113	O	8·0	−13 28	Nov 13 S 20 Nov 16 S 21
W O 715	O	42·0	− 2 29	Nov 18 S 23 Nov 21 P 25
Anonyma	1	44	− 1 15	Oct 27 S 5
Anonyma				Dec 10 D 42
23 Jauri (suspected)	3	37·6	+23 32	Jan 25 S 87
BAC 1188	3	42·2	+23 27	Jan 25 S 87 Jan 31 P 92
BAC 1244	3	54·7	+ 9 38	Nov 30 S 31
Oeltz. 3392	4	42·1	−21 2	Jan 15 S 72
near σ Orionis	5	32·0	− 2 39	Feb 1 P 96
Anonyma	5	34·2	−20 31	Jan 15 S 72
W VI 1883	7	0·6	− 11 6	Jan 24 S 85
Anon (suspected)	7	30	− 24 24	Jan 5 S 64
Anonyma	7	35·5	− 22 22	Jan 11 S 70
near P XXII 33	22	8·4	+16 35	Nov 19 P 24

New nebulae found

1	18·9	− 2 5	Nov 2 S 11 See D'Arrest's last catal.
	19·1	− 2 3	Nov 2 S 11 " " " " "
	~~19·4~~	~~− 2 1~~	~~Nov 2 S 11~~
	19·4	− 1 54	Nov 2 S 11
	21·5	− 1 59	Nov 2 S 11
	22·3	− 1 37	Oct 31 S 8 Nov 2 S 11

See page 42, S 23

Supposed new satellite of Neptune. Nov 26 P 28

zero of position: Oct 23 P S 1 Oct 24 S 3 Oct 30 S 7 Oct 31 S 9 Nov 2 S 12 Nov 6 S 16 Nov 11 P 19 Nov 16 S 21 [Nov 30 S 31 Dec 2 P 35] [Dec 26 S 54 Dec 28 S 56 Dec 28 S 57 Dec 30 S 61 Jan 9 S 66] Nov 18 P 22 Nov 26 P 28 Dec 7 P 38 Dec 10 S 44 Dec 17 S 47 Jan 22 S 82 Jan 30 S 90

real or suspected variables: Nov 21 S 27 Dec 16 S 46 (Jan 11 S 70 R Lewis) Jan 11 S 70 Jan 12 S 70 Jan 25 S 87

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Zero of position.

Date		circle reading	no of obs.	Product (no obs) × (circle read − 259°)			
1867 Oct	23	260·13	3	3·39			
	24	260·0	1	1·00			
	30	80·0	1	1·00			
	31	80·0	1	1·00			
Nov	2	80·15	2	2·30			
	6	259·42	6	2·52			
	11	80·57	3	4·71			
			17	15·92	mean	79° 94	345°54
		changed					
	11	79·88	5	4·40			
	16	259·30	2	60			
	18	258·75	2	− 50			
	26	79·2	1	20			
	30	259·1	2	20			
Dec	2	258·90	2	−20			
	7	259·07	4	28			
	10	259·20	5	100			
	17	259·20	1	20			
	26	79·35	2	70			
		258·80	2	− 40			
	28	79·15	2	30			
	30	79·0	1	00			
1868 Jan	9	259·2	1	20			
	22	79·42	10	420			
	30	79·17	3	51			
See next vol Feb	4	79·10	5	50			
	16	79·18	5	90			
		changed Feb. 18	55	13·09	mean	79°·24	349·24

1877 June 18. This volume checked except for double stars.

Note May 28, 1880. See notes of this date in N 36, 99 and subsequent books. The practice of retaining the reticule in one position seems still to increase, and for the latter part of this book, at least, a list of coincidences might probably be drawn up. Still, as the observations are clearly wiped, this may not be worth while. In reductions this record must be looked through before deciding what coincidences should be used.

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