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KG
11366
v.299



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1078phae.proj 13015

R 45

Reduction of photometric observations in this book, so far as previously made in the book, checked by Miss Saunders Sept., 1875. List of errata found by her pasted below.

Changes made					Omit- understand	
Page	h	m			Page	
26	9	30		zero	11 — 21	Transit of Venus
32	8	12		zero	51 + 51	Const. B. A.
33	8	38 + 8	43	39 Drac.	62 — 67	Eclipse Const. B. A.
34	9	0		zero	70 + 71	Const. B. A.
36	9	16 + 9	21	zero	74 — 77	Diopter, etc.
37	9	25 + 9	28 + 9	36 μ Sag.	91 + 92	Eclipse, etc.
38	9	53 + 9	59	36 Oph.	104	Thunder, storm
40	8	54		zero	120 — 128	Phot. Ω.
41	8	50		α Urs. Min.	154 — 157	Eclipse, etc.
42	9	24		zero	181	Eclipse
59	8	58 + 9	9	ε Sagittæ	195	Eclipse
78	8	22		ψ Drac.		
80	8	47		zero		
82	9	23		zero		
83	9	51 + 9	54	β Lyrae		
86	10	14 + 10	16	61 Cygni		
87	10	28 + 10	31	zero		
100	9	15		zero		
111	8	51		zero		
123	7	7		Phot. Ω		
129	8	24		μ Bootis		
~~129~~	~~9~~					
131	9	24		ν² Cor.		
134	8	36 + 9	16	σ Cor.		
135	9	27 + 9	45	ν Cor. & 42 Herc.		
137	9	32		zero		
139	8	16		β Lyrae		
141	8	56 + 9	2	σ Coronæ		
143	9	40	~~Zero~~	zero		
146	10	45		51 Cephei		
147	10	54		zero		
148 149	11	25		λ Urs. Min.		
150	11	58		zero		
152	12	50		zero		
164	10	10		λ Urs. Min.		
165						
188	8	28		51 Cephei (discussion)		
190	9	51		η Herc.		
197	7	27		zero		
200	11	26		β Lyrae		
209	7	25		ζ Urs. Maj.		
211	7	45		zero		
212	8	4		zero		
215	9	5 + 9	13	λ Urs. Min.		
167	8	40		λ Urs. Min. (discussion)		
168	9	12				

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The within observations of Aug 5. 1878 should properly ~~go~~ go in Book 8.

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1878 May 5, 21^h mean time.
Cloudy, sun somewhat visible.
Measures of distance of plate from lens with jaw micrometer by L. Waldo.

Before transit ☿.

N. End Photog. Telescope. Dist from fine brass plumbline (centre) to the Surface of the photog. lens nearest the photog. house.

(1)	21^h 10^m	60°.5 *	6.in 045	
	21^h 17^m	60°.	6. 035	
			6. 040	

S. End. Photog. Telescope. Dist. from the fine brass plumbline (centre) to the surface of the nickel reticule plate nearest the photog. lens.

(2)	21^h 25^m	61°.5 * *	5.in 620	
	21 30	62.2	5. 620	
			5. 620	

(3) N. End. Photog. Tel. Same as (1)

21	31	60.0	6.in 035
21	33	60.0	6. 040
			6. 040

* N end the. Camilla 29573
** S. " " Camilla 3235

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May 5, 1878

Plate	1st contact	
1	27	20
2		37
3		48
4		55
5	28	3
6		12
7		22
8		30
9		37
10		44
11		50
12		57
13		5
14		12
15		19
16		26
17		33
18		40
19		46
20		52
21	29	2
22		8
23		15
24		22
25		30

left in rack
(afterwards developed; no trace of Mercury).
Exposures all short

29 by chronograph.

This plate without value; sun set too low on the screen; but the clouds were too thick for any result of consequence.

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May 5, 1878

left in rack

Corrections for chronometer times
−1m 10.1

~~2~~ 1 39 10 ~~B 2~~ short exposure

10.1 by chronograph

Plate marked 2 by a scratch in the varnish.

−1 10.1 1 41 0 B 1 (time a little doubtful) medium exposure

(40 − 59.7 by chronograph)

Plate marked 3 by a scratch in the varnish

−1 10.1 43 55 B 2 long exposure

55.0 by chronograph

Plate marked 4 by a scratch in the varnish

These plates afterwards developed. No trace of Mercury seen at first. On closer examination afterwards, it appears, but indistinctly.

Arm east

Corrections for chronometer times
−1m 10.1

By chronograph

1 52 10 short C 73 1 52 10.2

−1 10.1 55 30 med. 74 55 30.3

−1 10.1 58 5 long 75 58 5.2

Found image had run off to the following side, so that the last two may have failed to get Mercury. Gave directions to lessen rate of clock, & reset image

Arm West

By chronograph

−1 10.1 2 4 40 short C 76 2 4 40.2

−1 10.1 7 10 med 77 2 7 10.2

−1 10.1 9 25 long 78 2 9 25.3

Arm East

−1 10.1 13 35 short C 79 2 13 35.2

−1 10.1 16 0 med 80 pen not marking

−1 10.1 18 10 long 81 2 18 10.3

Arm West

−1 10.1 22 20 short C 82 2 22 20.2

−1 10.1 25 5 med 83 25 5.3

−1 10.1 27 25 long 84 27 25.3

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May 5, 1878

Corrections for chronometer times							By chronograph
				Arm East			
−1m 10.2s	3	19	40	Short	C 85		3 19 40.2
−1 10.2		24	45	Med.	86		23 45.2
−1 10.2		26	10	Long (rattle after it)	87		26 10.3
				Arm West.			
−1 10.2	3	29	30	Short (rattle)	b 88		29 30.2
−1 10.2		32	55	Med "	89		32 55.3
−1 10.2		36	10	Long (two rattles)	90		Sun not marking
				Arm East			
−1 10.2	3	39	25	Short (rattle)	b 91		39 25.2
−1 10.2		42	0	Med. (")	92		42 0.2
−1 10.2		44	15	Long (")	93		44 15.3
				Arm West			
−1 10,2	3	47	45	Short (rattle)	b 94		47 45.2
−1 10.3		49	35	Med. (")	95		49 35.3
−1 10.3		51	20	Long (")	96		51 20.3

				Arm West		
−1 10.3	4	43	55 (55.3 by chronograph)	Medium (rattle ½ minute later)	B 03	Mercury does not appear on this picture; perhaps it is concealed by some of the marks on the ruled plate.
−1 10.3		45	45 (45.3 by chronograph)	½ " ")	B 04* medium	
−1 10.3		48	45 (45.3 by chronograph)	(rattle) rattle long	B 05†	
				Sun coming out a little		
−1 10.5	b	17	23	(rattle ½ min. later) short	‡ B 06	
−1 10.5		19	5	(rattle ½ " ") short	§ B 07	

*Plate marked 6 by a scratch in the varnish
†Plate marked 7 " " " " " "
‡Plate marked 8 " " " " " "
§Plate marked 9 " " " " " "

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May 5 1878

Corrections for chronomet. times						By Chronograph.
		Arm West				
$-1^m\ 10^s.5$	6 24 45	v. short	no rattle	6 97		6 24 45.1
− 1 10.5	27 30	medium	(rattle)	6 98		27 30.2
− 1 10.5	29 25	rather long	(")	99		29 25.2
		Arm East				
− 1 10.5	31 20	v. short	(")	6 100		31 20.1
− 1 10.5	37 0	medium	(")	101		37 0.2
− 1 10.5	38 50	rather long	(")	102		38 50.2
		Arm West				
− 1 10.5	42 10	short	(")	6 103		42 10.2
− 1 10.5	43 35	med.	(")	104		43 35.1
− 1 10.5	45 5	rather long	(")	105		45 5.1
− 1 10.5	46 20	short	(")	B Φ	8	46 20.1
− 1 10.5	48 28	short	(")	22	9	48 28.1
− 1 10.5	51 50	v. short	(")	25	10	51 50.1
		Arm East				
− 1 10.5	53 55	v. short	(")	6 106		53 55.0
− 1 10.5	55 35	med.	(")	107		55 35.1
− 1 10.5	57 25	rather long	(")	108		57 25.2

Therm. 82.5 (Casella 3235)
— " — outside 67. (Casella 29563)

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May 5, 1878

By chronograph	Corrections for chronometer times					
	−1m 10.6					
7 22 40.0		7	22	40	v. short (rattle)	C. 109 clear
26 10.2	−1 10.6	26	10		medium (rattle)	110 some clouds
28 45.2	−1 10.6	28	45		rather long "	111 clearer
					Arm East	
30 30.1	−1 10.6	30	30		short (rattle)	B 11
					Arm West	
31 59.7	−1 10.6	32	0		v. short (rattle)	C 112
42 5.1	−1 10.6	42	5		medium (" ")	113 cloudy
					Therm. 81	
					" outside 66½	
Chronographs not working	−1 10.6	53	15		rather long	C 114 clearer.
					~~Arm East~~	
					Therm. 77½	(Casella 3235)
					outside 65	(Casella 29563)
					Arm East	
8 15 35.1	−1 10.6	8	15	35	short	C 115
					8 50 Therm. 74	(Casella 3235)
					" outside 63	(Casella 29563

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May 5, 1878

Second contact plate (left in rack).

No result; clouds.

1	8h	59	10
2			24
3			34
4			40
5			46
6			53
7			59
8	9h	0	5
9			11
10			18
11			27
12			34
13			40
14			45
15			50
16			56
17	9h	1.	1
18			6
19			11
20			16
21			21
22			27
23			34
24			39
25			44

(44.3 by chronograph)

Thermr. 74 (Casella 3235)

(outside) 63½ (Casella 29563)

Rattle just after $9^h\ 5^m\ 0^s$

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May 5, 1878

Measures of distance of plate from lens by L. Waldo.

After transit ☿.

(1) N. End photog. Telescope (Same as (1) p. 11).

6^h	32^m	62°.8	$6^{im}.030$
		63.0	6. 030
			6. 030

(2) S. End photog. Tel. (Same as (2) p. 11)

6^h	38^m	70.0	$5^{im}.595$
			5. 595
			5. 600

(3) N. End photog. tel. (Same as (3) p. 11)

6^h	45^m	61°.5	$6^{im}.037$
			6. 038
			6. 037

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May 5, 1878

Observations of the Level of the photog. telescope

E. Walbo. Obs.

1878. May 5d.4

Engineers Level Stackpole & Bro. No 1494.
Herbst Transit pointed on the small dot marking the center of the reticule plate.

		d	d
(1)	Engineers level	7.2	40.2
(2)	" " reversed in Ys	5.4	38.5

(1) being on the Herbst transit
(2) " " " " " but the level telescope being reversed in the Y's from (1)

(3)	Engineers level	9.0	42.0
(4)	" " reversed in Ys	7.5	40.5

(3) being on the reticule plate
4 " " " " " but the level telescope being reversed in the Y's from (3).

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1878 May 6d 9 P.M.

On Herbst. Tr	6.0	38.8
	5.0	37.7
On Ref. plate	6.7	39.6
	6.8	39.8
On Hubb. Tr	4.7	37.8
	3.7	37.0
On Ref. plate	6.3	39.5
	5.0	38.4

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July 1st 1878. Bat 260°

95 Herculis

8 05 3.7 < a dis. U dis 45°.6"

95.2 91.5

186.5 92.0 [b regarded as pa any. 260°]

278.5

563.9 183.5

281.95 91.75

140.975 45.875

8 14 98.5 U. dis. 250° 5"

182.4 83.9

276.4 < 87.5 a. dis.

363.9

921.2 171.4

460.6 85.7

230.3 42.85 P

8 18 6.6 < b disappears U. dis 250 5"

92.3

185.8 93.5

278.0 93.6

557.7 187.1

139.425 46.775

8 20 6.1 < a disap. P dis 20° 5"

95.4 89.3

189.2 87.5

276.7

567.4 176.8

283.7 88.4

141.85 44.0

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July 1, 1878

by C. H. Smith

8 37	129.0	20.8	ℓ dr.	270° 4"
	149.8			
	308.8	22.1		
	330.9			
	918.5	42.9		
	459.25	21.45		
	229.62	10.72		
8 35	222.1	14.0	ℓ dr.	90° 4"
	236.1			
	42.8	14.8		
	57.6	28.8		
	558.6	14.4		
	2793		♀ Virginia	
8 46	139.65	7.2		
	43.3	16.9	P. obs.	60° 3"
	60.2			
	~~[221.5 ℓ]~~		slipped out of frame	
	[219.5	20.0		
	239.5	36.9		
	562.5	18.45		
	140.62	9.23		
8 50	133.2	16.0	P. obs.	180° 3"
	149.2			
	311.4	21.1		
	332.5			
	926.8	37.1		
	463.15	18.55		
	231.58	9.28		

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July 1, 1878

ϕ Virginis

8 54 132.4 16.0 U. obs. 190° 3"
148.4
312.9 15.9
328.8
922.5 31.9
461.25 15.95
230.62 7.98

2d U last reading
B looks lighter

8 56 42.8 15.5 U obs. 30° 3"
58.3
222.2 16.6
238.8
562.1 32.1
281.05 16.05
140.52 8.03

σ Scorpii

9 7 132.6 10.0 U. obs. 180° 4"
142.6
313.5 8.3
321.8
910.5 18.3
455.25 9.15
227.63 4.57

Images flowed,

9 13 44.0 7.8 U. obs. Images 0° 4"
222.8
51.8 8.4
231.2
549.8 16.2
274.9 8.1
137.45 4.05

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July 1, 1878

α Serpentis

9 20 46.8 1.0 U. obs. Images 90° 8″
47.8 A out of field
226.9 1.0
227.9
549.4 2.0
274.7 1.0
137.35 0.5
135.5 1.0 U. obs. Images 270° 6″
136.5
317.8 1.6
319.2
909.0 2.6
227.25 0.65

9 30 316.0 Obs. 265° 6″
316.9 0.9
~~137.8~~ 139.1 1.3
909.8 2.2
454.9 1.1
227.45 .55

9 35 47.0 0.7 80° 6″
47.7
226.5 1.2
227.7
548.9 1.9
274.45 .95
137.23 .47

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July 1, 1878

Constant Plot I by B Aquilae.
P. Obs.

9 30	2.02	Only explanation suggested for such small readings is that Arcturus sat a chair and looked obliquely into telescope thus making part of direct ray.
	2.90	
	2.75	
	2.19	
	2.50	
	236	
	2.472	
9 43	3.48	Ob. B Aquilae
	3.25	
	3.11	
	3.56	
	3.53	
	1.93	
	3.386	
9 50	3.50	S Obs. B Aquilae
	2.80	
	3.11	
	2.75	
	2.87	
	.03	
	3.006	

~~Personal Equation by Stopwatch. P.E. in stopping equal to that of starting.~~

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July 1, 1878

Constant Photometer I by [illegible]

10 10 3.23 P. obs. α Aquilae

3.55

3.33

3.42

3.24

1.77 Seeing (P.) 7, 5, 6.

3.354

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1878 July 2

Constant photometer I, by α Aquilae

8 45 2.10 I. obs. Star often lost in clouds,
3.09 Refocussed after 1st setting
3.15
3.90
3.00
4.02
~~3.252~~ 3.210

α Aquilae

9 14 3.65 II. obs.
3.06 In 3 first readings star seems faint
3.19 and possibly was not α Aquilæ, as on
3.20 readjusting between third & fourth the
3.44 images seemed quite bright.
3.308

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July 2, 1878

Photometer 4

16 Drac. & 17 Drac. (A)

8 55 96.1 U. obs. 190° 12"
180.0 16 disappears
83.9
277.1
5.2 88.1

558.4 172.0
279.2 86.0
139.6 43.0

8 59 6.9 U. obs. 190° 12"
82.2 75.3 16 disappears
191.7
265.4 73.7

546.2 149.0
273.1 74.5
136.55 37.25

9 3 17 Drac. U. obs. 45° 5"
19.1 48.8
67.9
198.5 63.0
261.5

547.0 111.8
273.5 55.9
136.75 27.95

9 6 113.2 U. obs. 200° 5"
167.5 54.3
289.5 58.5
348.0

918.2 112.8
459.1 56.4
229.55 28.2

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July 2, 1878

17 Drac

9 13 S. obs.

Image 200° 3″

109.1 65.7
174.8
287.4 62.9
350 3
921.6 128.6
230.4 32.15

9 17 S. obs. 350 3

16.9 57.1
74.0
202.1 64.7
266 8
559.8 121.8
279.9 30.45
139.95 16 & 17 Drac (A)

9 29 S. obs.

Image 190° 12″

4.0 16 disappear
95.2 ~~91.0~~ ~~85.1~~ 91.2
180.6 ~~93.0~~ 93.0
273.6
553.4 184.2
138.35 46.05

9 35 S. obs. 200 12

1.8 M disap.
102.1
180.0 77.9
279.0
262.9 82.8
160.7
281.45 80.35
140.72 40.18

Seeing S 7, 6, 7
a 6, 5, 5

Found on beginning the last set that the photometer had slipped down a little, and replaced it. ~~Read~~ The focus seemed bad in the previous set. No doubt the instrument had slipped each time set circles

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1878phae.proj.1301S

July 3d 1878

8 7 μ Draconis U Ms. 135° 4"

5.3 90.9 a dis.
96.2
184.8 91.2
275.8
561.9 182.1
280.95 91.05
140.47 45.52

8 12 96.5 86.1 30° 8"
182.6
275.4 87.3
362.7 173.4
~~9~~ 97.2 86.7
~~233.8~~ 43.35
229.30

Constant Phot I ∝ Aquilæ P. to

8 29 3.28
2.92
2.82
2.93
3.62 (rej.?) image on edge of prism
3.34
.29
3.058 ~~448~~

8 35 3.27 Same U dis
2.80
3.07
3.26
2.80
.22

3.044

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July 3, 1878

C E

39 Draconis S. obs.

8 27 a t b b = mer cent. 180° 4″

35.4 26.4
61.8
215.6 28.6 Seeing bad
244.2 55.0
557.0 27.5
139.25 13.75

8 31 119.3 36.9 L obs. 45° 4′
156.2
297.3 41.3
338.6 78.2
911.4 39.8

8 38 ~~277~~ 227.85 a b c 19.55 B E 130° 14″
120.5
151.0 30.5 Bright image of a out of field
303.2 30.4
333.6 60.9
908.3

~~224.57~~ 224.07 15.22

8 43 31.4 S. obs. 140° 14″
64.9 33.5
211.2 36.6
247.8
555.3 ~~68.1~~ 70.1
277.65 ~~34.05~~ 35.05
138.82 17.02 17.52

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1878phae.proj.1301S

July 3, 1878

B E

39 Draconis. a b

8 48 35.3 25.3 u 140° 14'

60.6

216.3 24.2

240.5

552.7 49.5

276.35 24.75

138.17 12.38

8 51 125.1 24.4 u

149.5

304.5

333.5 29.0

912.6 53.4

456.3 26.7

228.15 13.35

C E

a b B 80° 2"

8 54 125.2 25.0

150.2

304.5 32.1

336.6

916.5 57.1

458.25 28.55

229.12 14.27

9 0 33.0

66.9 33.9 190° 8"

Seen easily.

214.5 33.1

247.6

56~~4~~2.0 67.0

28~~3~~1.0 33.5

~~14.0~~ 16.75

14 0,5

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1878phae.proj.1301S

July 3, 1878

/ Cincinnati - Phot. I.

8 48 2.91 Sch α Aquilæ
2.39
2.30
2.28
2.29
2.17
2.434

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1878phae.proj.1301S

July 3, 1878

μ Sagittarii & comp. at 315° B

9 13	45.2		P. obs. 270° 7″
	52.9	9.7	
	225.5		
	234.5	9.0	
	560.1	18.7	
	280.05	9.35	
	140.02	4.67	
9 16	137.7		P. obs. 60° 7″
	145.2	7.5	
	315.2		
	322.7	7.5	
	920.8	15.0	
	460.4	7.5	
	230.20		
	~~230.02~~	3.75	

μ Sagittarii B comp. at 135° C

9 20	46.2		P. obj. 70° 5″
	52.3	8.1	A out of field
	225.4		
	233.3	7.9	
	559.2	16.0	
	279.6	8.0	
	139.8	4.0	
9 21	133.3		P. obs. 220°
	143.8	10.5	
	316.4		
	325.7	9.3	
	919.2	19.8	
	459.6	9.9	
	279.8	4.95	

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1878phae.proj.1301S

July 3, 1878

μ Sagittarii & comp. at 135°0

9 25 133.6 U. obs. 200° 6"
143.1 9.5 A out of field
316.8
325.8 9.0
919.53 18.5
459.56 9.25
229.82 4.62

9 28 45.6 U. obs. 45° 5"
55.1 9.5
225.8
235.2 9.4
561.7 18.9
285.85 9.45
140.42 4.72

μ Sagittarii & comp. at 315°0
A in field

9 32 135.0 U. obs. 45°0 5"
145.8 10.8
314.9
325.2 10.3
920.9 21.1
460.45 10.55
230.22 5.27

9 36 46.5 U. obs. 270° 5"
226.1 7.7
54.2
233.9 7.8
560.7 15.5
280.35 7.75
140.17 3.87

1878phae.proj.1301S

July 3, 1878

21 Sagittarii

U. obs. Not measurable

36 Ophiuchi

9 53 98.8 U. obs. { 270° 3″ Pos. angle assumed 195 }
1868 88.0 *15° disappears
278.2
363.9 85.7
927.7 173.7
4 613.85 86.85
2 231.92
2 206.92 43.42

9 59 98.1 U. obs. 160° 3″
1858 195° disappears 88.0
276.8
370.0 88.0
933.7 176.1
4 ×6.85 88.05
2 233.42
2 208.42 44.02

10 7 5.5 S. obs 140° 3″
98.9 93.4 ~~195° dis~~ 15° dis
186.4 91.5
277.9
568.7 184.9
284.35 92.45
142.17 46.22

10 17 7.9 94.5 195 dis 270° 3″
102.4
194.8 81.5
276.3
581.4 176.0
145.35 44.0 Compl. 46.0

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1878phae.proj.1301S

Resolved ζ Draconis.
I ran the companion Angle 170° 10"
Confirmed by D. & R.

Seeing 7, 6, 7.

1878 July 4.

Photometer H

ν Bootis

8 45
35.7
61.6 25.9
215.6
243.6 28.0
556.5 53,9
278.25 26.95
139.12 13,47

E. obs. Images 355° 4"

8 47
130.1
150.1 20.0
308.6
331.8 23.2
920.6 43,2
460.3 21.6
230.15 10.8

E. obs. Images 190° 4"

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1878phae.proj.1301S

July 4, 1878

8 49 129.0 24.0 S Obs. 183° 4'
153.0
308.2 22.8
331.0
921.2 46.8
230.3 11.7

8 54 41.0 23.3 150° 4'
64.3
219.0 24.1
243.1
567.4 47.4
288.7 23.7
3
~~144 1.85~~ 11.85
141.85

9 0 121.8 Unk Bottom 210° 3"
160.6 38.8
301.2
343.1 47.9
926.7 80.7
463.35 40.35
231.67 20.17 ~~Unk Book~~

9 02 30.4 Unk. to 45° 3"
71.9 41.5
210.0
253.4 43.4
565.7 84.9
282.85 42.45
~~594~~ 220 3
141.42 21.22

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1878phae.proj.1301S

July 4 1878

Photometer I. Constant

8 47 3.43 P. Obs. α Ursae Minoris
3.03
3.27
3.11
2.96
.80
3.16

8 50 2.89 α Obs
3.31
3.68 not so bright
2.87
3.13
.888
3.178
6

8 58 1.73 S Obs. Object supposed to be Polaris.
1.80
1.81 Reject this one.
~~5.34~~ Probably images of different objects.
1.78 Not verified before beginning, but taken
~~1.76~~ as found in the field. After these settings
the prism was accidentally shifted. Then verified
position of prism by terrestrial light, refocussed
and set on Polaris.

9 24 reflected image seen to be
9 15 37.2 rej. too near edge of prism on opening
aperture to full width
3.17
3.81
2.76
3.69
2.23 looked rather faint on examination, but
.16 not known to be erroneous.
3.032

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1878phae.proj.1301S

July 4, 1878

44 Bootis

9 15 89.4 U dbs 220° 3"
190.9 77.6
268.5 220° dbs. ? faint
16.0 73.4
564.8 151.0
282.4 75.5
141.2 37.75

9 18 105.8 76.7 U dbs 40° dbs 90° 4"
182.5
285.0 74.8
359.8
933.1 151.5
238.27 37.87 P. Sto.

9 22 2.4 220° faint disc disappears
104.9 68.7
173.6 90° 3"
287.6 74.8
568.5 143.15
142.12 35.88

9 24 15.3 74.4 P. Sto. 200° 3"
89.7 < 220° disappears
192.3 75.9
269.2
566.5 150.3
283.25 75.15
148.62 37.57

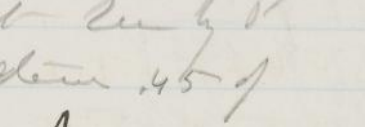
Seeing 7, 4, 6

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1878phae.proj.1301S

Looked at Jupiter to measure variation in its brightness & different portions of its disk

At 9 55 dark shadow of S P
appeared by S at distance .45 of
planet diameter from A



At 10 5 that has reached center of planet

July 5th 1878. Found a second discharge
on the Micrometer I. of. mins. above
It is probable that this discharge existed also
on July 4th and 3

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1878phae.proj.1301S

July 5, 1878

θ Serpentis

8. 10 — P. obs. Images 220° 5″

10.3		
	78.6	
88.9		
	75.2	
191.7		
266.9		
557.8	153.8	
278.9	76.9	
139.45	38.45	

8 13 — P. obs. 90° 5″

0.0		
	74.4	
102.3		
	73.7	
176.7		
286.3		
565.3	148.1	
282.65	74.05	
141.33	37.02	

~~Image~~ Shutter has probably been cutting off small part of objective in this and last.

8 15 — P. obs. 100° 4″

0.0		
	79.6	
100.2		
	79.2	
179.8		
280.8		
560.8	158.8	
280.4	79.4	
140.20	39.70	

8 17 — P. obs. 110° 4″

9.2	81.3	
90.5		
190.3	80.9	
271.2		
561.2	162.2	
280.6	81.1	
140.30	40.55	

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1878phae.proj.1301S

July 5, 1878

ε Lyrae

8 44	35.9		U. obs. Images 135° 15″
	60.4	24.5	Image A out of field
	247.9	21.6	
	239.5		
	553.7	46.1	
	276.85	23.05	
	138.43	11.52	
8 47	122.8		U. obs. Images 135° 15″
	151.9	29.1	
	302.4	32.5	
	334.9		
	912.0	61.6	
	456.0	30.8	
	228.00	15.40	
8 50	~~319~~		S obs. 140° 15″
	125.8		
	149.5	23.7	
	308.6	25.0	
	333.6		
	917.5	48.7	
	458.75	24.35	
	229.37	12.17	
8 55	39.4		S obs. 140° 15″
	60.0	20.6	
	215.3	23.5	
	238.8		
	553.5	44.1	
	276.75	22.05	
	138.37	11.02	

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1878phae.proj.1301S

July 5, 1878

Photometer I. Constant.

P. Obs. γ Aquilae

8 47

3.85
3.17
3.61
2.98
3.26
3.374

8 53

U. Obs.

3.49
3.65
3.10
3.16
3.16
3.352

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1878phae.proj 1301S

July 5, 1878

3 Lagittae

Decl. circle 18.5

Hour " 18 3h 9m 8

19 17

S. Pt. 85° 5"

9 5

128.7 21.5
150.2
310.2 17.9
328.1
917.2 39.4
458.6 19.7
229.30 9.85

9 10

S. Obs. 290° 5"

39.5 19.6
59.1
218.9 22.2
241.1
558.6 41.8
279.3 20.9
139.65 10.45

9 16

N. Obs. 300° 5"

38.9 19.9
58.8
218.6 22.1
240.7
557.0 42.0
278.5 21.0
139.25 10.50

9 19

N. Obs. 80° 4"

129.4 20.6
150.0
308.8 21.4
330.2
918.4 42.0
459.2 21.0
229.60 10.50

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1878phae.proj.1301S

July 5, 1878

0^2 bygni $\S$ Pxx 63

9 30 36.0 S. obs. Images 250° 25″
60.6 24.6
218.0
239.8 21.8
554.4 46.4
277.2 23.2
138.60 11.60

Principal star reddish
Secondary star yellowish

9 37 125.2 27.6 I. obs. 250° 25″
152.8
305.4 26.5
331.9
915.3 54.1
457.65 27.05
228.82 13.53

9 42 123.9 29.5 II. obs. 270° 30″
153.4 B bluish
304.2 28.5
332.7
914.2 58.0
457.1 29.0
228.55 14.50

9 44 36.4 26.1 II. obs.
62.5
211.8 27.8
239.6
550.3 53.9
275.15 26.95
137.58 13.48

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1878phae.proj.1301S

July 5, 1878

61 Cygni

9 55	10.6		U. obs.	100° 5"
	88.4	77.8		
	189.8			
	267.6	75.8		
	556.4	153.6		
	278.2	76.8		
	139.10	38.40		
9 58	108.2		U. obs.	270° 4"
	175.3	67.1		
	286.6			
	356.1	69.5		
	926.2	136.6		
	463.1	68.3		
	231.55	34.15		
10 2	104.6		P. obs.	80° 3"
	175.2	70.6		
	284.2			
	353.4	69.2		
	917.4	139.8		
	458.7	69.9		
	229.35	34.95		
10 5	86.0		P. obs.	300° 3"
	195.3	71.0		
	15.0			
	261.3	66.0		
	557.6	137.0		
	278.8	68.5		
	139.40	34.25		

Seeing (S.) 5, 6, 4.
(P.) 7, 6, 5.
(U.) 7, 6, 6.

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1878phae.proj.1301S

July 6 1878.

Constants of Photometer. I Sky

7 45	3.62	0.0	S. obs.
	2.72	0.3	
	3.45	0.1	
	1.18	2.1	
	0.65	3.5	
	1.01	2.7	
	2.92	0.2	
	1.83	1.3	
	0.85	2.9	
	3.81	0.10	
	2.10	0.9	
	2.46	0.7	
	1.61	1.5	
	1.05	2.6	
	2.69	0.4	
	2.14	1.0	
	1.28	2.0	
	1.86	3.0	
	1.53	1.7	
	2.44	0.6	
	3.87	0.0	
	1.44	1.9	
	1.02	2.5	
	1.24	2.2	
	1.94	1.2	
	0.34	5.0	
	1.60	1.6	
	1.18	2.3	
	0.41	4.5	

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1878phae.proj.1301S

3.88	0.0
0.91	2.8
2.11	0.8
1.06	2.4
2.41	0.5
1.41	1.8
1.95	1.1
0.50	4.0
1.72	1.4
4.11	0.0

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1878phae.proj.1301S

July 6, 1878

ρ Hercules Clothed 8 12

8 15 20,3 65.1 Pobs. 120° 3″
85,4
197,9 68.0
265,9
569.5 133.1
284.75 66.55
142,38 33,27

8 20 111,3 64.5 Pobs. 0° 3″
175.8
290.0 65.3
355,3
932.4 129.8
466.2 64.9
233.10 32,45

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1878phae.proj.1301S

July 6, 1878

β Lyrae (A out of field)

δ 27	43.7	16.9	P. obs., Images	120° 3′
	60.6			
	224.3	17.3		
	241.6			
	570.2	34.2		
	285.1	17.1		
	142.55	8.55		
δ 30	44.2	16.1	S obs. reproached	110° 3″
	60.3			
	224.2	17.2		
	241.4			
	570.1	33.3		
	285.05	16.65		
	142.52	8.33		
δ 36	131.5	18.1	P. obs. reproached.	300° 3″
	149.6			
	313.2	19.5		
	332.7			
	927.0	37.6		
	463.5	18.8		
	231.75	9.40		
δ 39	132.2	17.8	S obs.	300″ 3″
	150.0			
	313.8	19.4		
	333.2			
	929.2	37.2		
	464.6	18.6		
	232.30	9.30		

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1878phae.proj.1301S

July 6, 1878

5 Serpentis

8 50 136.0 / 150.8 14.8 — P. obs. 330° ⌀ 6″

314.9 / 329.3 14.4

931.0 29.2

465.5 14.6

232.75 7.30

8 53 46.7 / 59.2 12.5 — P. obs. 90° 5″

227.2 / 239.2 12.0

572.3 24.5

286.15 12.25

143.07 6.13

8 57 46.6 / 61.8 15.2 — S obs 90° 5″

223.9 / 238.8 14.9

571.1 30.1

285.55 15.05

9 142.78 7.52

9 04 134.4 / 152.2 17.8 — S obs 315° 5″

315.2 / 331.1 15.9 stars not seen after making last setting

932.9 33.7

466.45 16.85

233.22 8.43

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1878phae.proj.13015

July 6, 1878

43 Herculis

9 21	41.0	17.6	P. obs. 270° 12"
	58.6		Images in line
	222.8		
	240.7	17.9	
	563.1	35.5	
	281.55	17.75	
	140.78	18.87	
9 23	129.0		P. obs. 270° 12"
	148.2	19.2	
	312.6		
	331.8	19.2	
	921.6	38.4	
	460.8	19.2	
	230.40	9.60	

44 Bootis

9 33	20.0	63.7	S obs 80° ~~360°~~ 3"
	83.7		Reflexussed before this set
	194.7	75.1	Use equiv 55 2 turns down
	269.8		Sector 63 2 turns
	568.2	138.8	out
	284.1	69.4	
	142.05	34.70	
9 42	105.1	72.9	S obs 250° 3"
	178.0		Reflexussed before this set.
	280.5		
	360.2	79.7	
	923.8	152.6	
	461.9	76.3	
	230.95	38.15	

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1878phae.proj.1301S

July 6, 1878

ι Bootis

Pol. 30° 6"

9 50

38.7
62.6 23.9
218.0 24.0
242.0
561.3 47.9
280.65 23.95
140.32 11.97

Pol. 310° 6"

9 58

127.8
153.9 26.1
308.1
331.0 22.9
920.8 49.0
460.40 24.5
230.20 12.25

Seeing 5, 4, 4 (S.)

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1878phae.proj.11301S

July 7th 1878.

Angular dist. of Double image from
cracked glass = part of Cassella's chromate
of mercury

35 33		
350 35		2° 28′
35 33		
350 36		2° 27
35 36		
349 8		2° 28′
351 41		distinct image

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1878phae.proj.1301S

July 7, 1878

July 7th Obs 8. θ Serpentis

8h 22m 137 Ads 25° 0' S

91.7 78.4 br dis.

194.2

268.4 74.2

567.6 152.6

283.8 76.3

141.9 38.15

8 27 0.0 fl dis 70° 3"

103.6 103.6

179.4

284.8 105.4 ∴ B = 104°

567.8 209.0

283.9 104.5

141.95 52.25 37.75

95 Hercules.

8 39 9.8 cut at 270 called A (really B)

100.1 90.3)a dis 70° 4"

189.2

277.3 88.1

576.4 178.4

288.2 89.2

144.1 44.60 ~~45.40~~

8 44 6.8)a dis 250° 3"

100.0 93.2

189.9

279.4 89.5

576.1 182.7

288.05 91.35

144.02 -45.67 Compl. 44.33

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1878phae.proj:13015

July 7, 1878

ε Lyrae

8 55 38.3 135 15

61.1 24.8

215.3

240.3 25.0

553.0 49.8

276.5 24.9

138.25 12.45

8 58 124 135 15

151.4 27.0

303.7

332.8 29.1

912.3 561

456.15 ~~14.50~~ 14.02

228.57 ~~7.25~~ ~~11.25~~

01

9 03 132.0 ζ Lyrae 290° 5'

154.8 21.8

309.8

332.9 23.1

930.5 44.9

465.25 22.45

232.62 11.23

9 09 43.0 120 4

61.8 18.8

222.3

241.6 18.3

9

568.7 347.1

8

284.35 ~~18.55~~ 19.05

142.17 ~~9.27~~ 9.52

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1878phae.proj.1301S

July 7, 1878

χ Cygni

9 17	131.3		70°	5°
	155.3	24.0		
	308.2			
	333.6	25.4		
	928.4	49.4		
	464.2	24.7		
	232.1	12.35		
9 20	41.2		250°	5°
	63.0	21.8		
	221.5			
	243.6	22.1		
	569.3	43.9		
	284.65	21.95		
	142.32	10.97		

61 Cygni

9 27	183		270	5
	87.0	68.7		
	1988			
	266.6	67.8		
	570.7	136.5		
	285.35	68.25		
	142.67	34.12		
9 30	110.6		100	5
	1789	68.3		
	290.7			
	360.2	69.5		
	940.4	137.8		
	470.2	68.9		
	235.1	34.45		

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1878phae.proj:13015

July 7, 1878

A yellow } stars marked
B blue }

σ^2 Cygni

9 36 125.8 JPX x 63 270° 35'
151.8 26.0 A out of field
305.8
332.6 26.8
916.0 57.8
458.0 26.4
229.0 13.2
9 39 40.1
62.9 22.8
216.3
241.7 25.4
561.0 48.2
280.5 24.1 9h 41m
140.25 12.05

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1878phae.proj.1301S

1878 July 7 (astronomical)

Boston

C.S. 1 L. 3451 — L.M.T. B. 394

21	15	29.0	14	10	0.0
	16	29.0		11	0.0
	17	29.3		12	0.0

14	59	45.5
	23	42.
15	23	29.5
7	5	30
22	28	57.5

Chronometer L. 3451

Photometer H

second

Jupiter's [illegible] satellite compared with third.

P. obs.

21	58	18	101.2
	59	57	180.3
22	1	16	181.8
		29.5	102.7
	2	27	102.9
	2	46	180.2
	3	4	103.5
		20	176.6
		33	105.7
			180.3
			141.5

79.1
79.1
77.3
73.1
74.6
76.64

38.32

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1878phae.proj.13019

July 7, 1878

Chronometer 7.3451

Jupiter's Second Satellite compared with Third.

P. obs.

22	4	17	100.8	√668 28340 141.70	79.2
		29	180.0		
		46	102.2		74.2
	5	1	176.4	√615 28075 140.38	
		14	104.7		73.5
		28	178.2		
		43	106.3		74.7
	6	56	181.0	√599 28495 142.42	
		21	103.2		76.2
		34	179.4		
			1412 2		278 75.56 37.78

projected on Jupiter's 2d Sat. = A shadow of 2d satellite (between two belts), compared with adjacent region of Jupiter

Jupiter out at 7°24'

P. obs.

22	9	40	87.6	103.7
	10	20	191.3	
		40	88.6	99.4
	11	20	188.0	
	12	10	268.0	103.7
		45	192.7	
	13	20	272.3	101.2
		50	14.1	
			8)1122.6	408.0
			140.32	51.0
				49.0

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July 7, 1878

Chronometer 7.3451

Jupiter's second satellite (near ecl/sat) compared with third.

P. obs. Images 150.° 3″

2	21	24	107.4			
		47	180.3	72.9		
		0	103.8	73.8		
		15	177.6			
		30	103.0	79.6		
		56	182.6			
	23	13	105.4	72.6		
		36	178.0			
		53	103.2			
24	11		179.3	76.1	37.50	Zeta 142.06
		28	104.7	75.9	75.9	
		39	178.6	72.9		
	5	5	105.7	75.6	75.6	
25	9	2	181.3	77.4		
		22	103.9	75.5	75.5	
		26	179.4	75.8		
		50	103.6	75.2	75.2	
26	9		178.8	75.0	75.55	37.77
		25	105.8	74.5	36.5	
		38	180.3	72.5	38.0	
		54	107.8	71.8	34.5	
27	7		180.6	71.4	38.3	
		23	109.2	65.1	33.1	
		37	174.3	65.4	32.0	
		50	108.9	60.7	33.4	
28	4		169.6	54.8	27.3	
		16	114.8	53.4	27.5	
		27	168.2	47.9	25.9	
		38	120.3	40.9	22.0	
		50	161.2		18.9	

141 4.9

8 | 33.60

142.50

15h	32m	20	20	29	
		35		42	
		51		58	
	33	4	21	11	
		20		27	
		34		41	
		47		54	
	34	1	22	8	
		13		20	
		24		31	
		35		42	
		47		54	

19 54

13

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July 7, 1878

Chronometer 7. 3451

29	2	122.7	33.5 35.0	19.6	23 6 20 57	142°.26 (last included)
	16	157.7 (bad)		15.4		142.33
30	3		Satellite ~~an~~ invisible; ~~Bad reading~~ in last reading image of third satellite ~~probably~~ mistaken for that of second.		35 43	

Limit of visibility of third satellite.

P. obs.

32	16	129.8	24.4			
149 37	28	154.2	5690 2845 1422.5			
32 26	45	130.2	24.6 24.05 12.25			
33	0	154.8				
	20	125.3	5660 2830 141.50	30.3		
163 41	33	155.6				
33 27	43 52	129.8				
34	0	155.3	25.5 5578 2790 13.95			
	44	130.3	2843 142.15	23.7		
35	11	154.0				
125 62 34 29	04 11					
340		141°.93	11	23.99		11.85

B. M. T.	B. S. T.	Z 3451
15 42 00.0		22 47 44
15 45 00.0		22 50 46.5

The haze rendered it difficult to trace the satellite very near its limit of visibility

Computed time = 14 59 45.5 W. M. T.
23 41.1

15 23 27 C. M. T.

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July 8, 1878 Constant Phot I sky

7 50

4.1 #	0.0
1.57	1.4
0.80	4.4
2.08	1.1
1.30	1.8
2.36	0.5
1.27	2.4
2.08	0.8
0.83	2.8
0.48	4.5
1.08	2.3
4.29	0.0
1.95	1.6
0.29	5.0
1.81	1.2
0.97	2.2
1.04	2.5
1.30	1.9
2.22	0.6
1.58	1.7
0.80	3.0
1.19	2.0
4.22	0.0
2.60	1.0
2.69	0.4
1.00	2.6
1.66	1.5
2.28	0.7
2.11	0.9
4.08	0.0

S. 0 to.

In this set the diaphragms were put on by J. F. McCormack. The observer knew when the 0.0 aperture was to be used. The tube was set so that the end of its wide portion was 3 inches from the end of the tube into which it slides, instead of $2\frac{3}{8}$ inches as heretofore. This set should not be included with the previous ones, but will indicate the effect of a changed focus.

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July 8, 1878

0.97	2.9
1.79	1.3
2.77	0.2
0.90	2.7
0.60	3.5
1.15	2.1
2.64	0.1
2.61	0.3
3.97	0.0

B.A.C. 5827 U. obs.

8 34

21.0	52.4	Image 280° 4"
73.4		
201.8	51.0	
252.8		
549.0	103.4	
274.5		
137.25	51.7 / 25.85	
108.6	56.3	90 4
164.9		
292.1	55.9	
348.0		Seeing good.
913.6	112.2	
456.8	56.1	
228.40	28.05	

8 41

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July 8, 1878

B.A.C. 5827 continued

8 44 clouds

S. obs. Refocussed

Images 90° 3"

Clouds; seeing bad.

Observer turned away the images thinking he had made four measures

113.7 52.5
166.2
293.6

51.1

344.7

9 1/4 58.12 163.6
5 9.1 5 1.8
22 9.55 28.90

8 52

S. obs.

Images 300° 3"

Seeing rather better.

17.8
59.9
77.7
202.4
53.7
256.1

5540 163.6
277.0 56.8
138.50 28.40

Set on ν² Coronae; clouds.

About 10

Lunar halo; measures with divider.

S. obs.

Diameter	Semidiameter;
25 1/4	13 moon to inner
25 1/8	11 3/4 edge of tolerably
24 7/8	well defined parts.

Halo very indefinite; measures agree better than would be expected.

Diopter constant still to be determined.

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1878phae.proj.13019

July 8, 1878

21 Sagittarii

9 12 133.6 160.7 157.6 301.6 341.2 — U. obs. Images 25° 2″

Reexamined and rejected as too bright — 24.0 — 36.7*

39.6

First reading suspected by recorder to be 10° wrong; observer tried again after end of second set; 118.2

Consequently 118.2 / 123.6 / 120.9 adopted

1209.6 / 157.6 / 301.6 / 341.2 / 921.3 — 460.65 — 230.33 — 76.3 — 38.15 — 19.08

9 18 35.4 69.9 214.4 247.9 — U. obs. Images 240° 2″

34.5 — 33.5

clouds in both sets delayed observing —

563.8 / 281.90 — 68.0 — 17.00

Clouds prevent S. from observing this star —

V^2 Coronæ U. obs.

Companion plainly but clouds interfered —

~~9 52~~ 42 Herculis

10 2 146.72 144.55 134.14 316.3 325.9 — U. obs. 270° 5″

145.6 — 11.2 — 9.6

922.2 / 461.1 / 230.55 — 20.8 / 10.4 / 5.20

10 8 45.4 44.5 — U. obs. 120° 5″

Clouds

Seeing variable 5 5 5

Observation of eclipse of Jupiter's first satellite missed by error in supposition that the time given in Bk B 28 was Washington time.

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1878phae.proj.1301S

1878 July 9

~~Constant of photometer~~ I by sky

1 35	3.86	0.0	S. obs.
	2.40	0.3	
	2.63	0.1	
	0.82		

Adjusted pencils & recommenced.

7 40	3.49	0.0	
	2.67	0.3	
	2.93	0.1	
	1.22	2.1	Clouds of different degrees of darkness; field of prism sometimes perceptibly wanting in uniformity.
	0.64	3.5	
	0.98	2.7	
	2.86	0.2	
	1.84	1.3	
	0.85	2.9	
	2.34	0.9	
	2.39	0.7	
	1.57	1.5	
	0.91	2.6	
	3.80	0.0	
	2.61	0.4	
	1.98	1.0	
	1.16	2.0	
	0.74	3.0	
	1.43	1.7	
	2.22	0.6	
	1.34	1.9	
	0.95	2.5	
	3.82	0.0	
	1.24	2.2	

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1878phae.proj.13019

July 9, 1878

1.98	1.2
0.28	5.0
1.42	1.6
1.08	2.3
0.38	4.5
0.85	2.8
2.31	0.8
4.27	0.0
1.04	2.4
2.58	0.5
1.38	1.8
1.98	1.1
0.47	4.0
1.570	1.4
3.84	0.0

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1878phae.proj.1301S

July 9, 1878

Cloudy most of the evening

β Lyrae Photometer H. Bright image out of field,

9 50 36.3 S. obs. Images 300° 5"

60.7 24.4

214.1

238.0 23.9

549.1 48.3

274.55 24.15

137.26 12.07

9 57 124.5 S. obs. 140° 5"

147.9 23.4

306.7

332.7 26.0

911.8 49.4

455.9 24.7

227.95 12.35

Seeing 5, 7, 7.

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1878phae.proj.13019

1878 July 10

ϕ Virginis. Companion seen after some watching & thought to be measurable.

8 36

132.9	18.4	
151.3		
314.4	16.8	
331.2		
929.8	35.2	
464.9	17.60	
232.45	8.80	

I. obs. Images 170° 4"

Refocussed & readjusted.

8 55

41.0	18.8	
59.8		
220.4	21.9	
242.3		
563.5	40.7	
281.75	20.35	
140.88	10.17	

I. obs. Images 40° 4"

Observation barely possible.

9 16 η Lupi

133.4	13.8	
147.2		
313.0	13.7	
326.7		
920.3	27.5	
460.15	13.75	
230.07	6.88	

I. obs. Images 90° 8"

9 21

42.7	16.7	
59.4		
220.9	16.9	
237.8		
560.8	33.6	
280.4	16.8	
140.20	8.40	

I. obs. Images 300° 8"

Much easier than ϕ Virginis, although as near the horizon.

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1878phae.proj.1301S

July 10, 1878

42 Herculis

9 46 44.10
55.8 11.8
223.1
236.7 13.6
559.6 25.4
279.8 12.70
139.90 6.35

S. obs. Images 0° 6″

9 53 135.0
145.8 10.8
316.4
325.7 9.3
922.9 20.1
461.45 10.05
230.73 5.03

S. obs. Images 240° 6″

Seeing 6, 8, 6.

Constant of diopter.
July 11, 1878, 0h,
Measures of an angle constructed about 45°; in inches.
24, 24, 24,
Another, also about 45°
$23\frac{15}{16}$, $23\frac{15}{16}$, $23\frac{15}{16}$.
Another, ~~about~~ the tangent of which is about $\frac{1}{2}$
$15\frac{1}{2}$, $15\frac{1}{2}$.
Another, the tangent of which is about $\frac{2}{3}$
$18\frac{3}{4}$, $18\frac{3}{4}$
Another, equal to the last by construction, $18\frac{5}{8}$, $18\frac{19}{32}$
Another, the tangent of which is about $\frac{3}{2}$, $26\frac{5}{8}$, $28\frac{11}{16}$.
Last angle rather too wide for correct diopter.

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1070phae.proj.13013

July 10, 1898

Radius, right arm of diopter, $18\frac{9}{16}$ inches.
" left " " " $18\frac{3}{16}$ " } mean $18\frac{3}{8}$
Distance of centres $0\frac{5}{8}$ "
Estimated distance from centres to optical centre of eye $15\frac{1}{2}$ inches.

Same distance by measure of 1st constructed angle	14.79 inches.
" " " " " 2d " " "	14.70 "
" " " " " 3d " " "	15.17 "
" " " " " 4th " " "	14.96 "
" " " " " 5th " " "	14.68 "
" " " " " 6th " " "	14.90 "
" " " mean of these measures (made chiefly to get an angle of 45°, the approximate diameter of a halo)	14.87 "

But the construction was liable to a constant error, so that these results may be all too small, although the estimate is probably too large. The instrument is perhaps accurate enough to make it worth while to determine its constant by measures of distances between objects. After it is determined the instrument will read angles directly.

Taking 15 inches for the constant, the measures of the halo of July 8 (p. 68), are as follows:

Diameter measures.

12.625	12.5625	12.4375	1.10123	1.09908	1.09471
24.625	24.50	24.25	8.54303	8.54227	8.54046
13.64	13.69	13.81	9.64426	9.64135	9.63517
	Semidiameters		23° 47′	23° 39′	23° 21′
	Diameters		47° 34′	47° 18′	46° 42′

Semidiameter measures.

6.50	5.875	0.81291	0.76901
12.625	11.125	8.49080	8.48798
17.30	17.51	9.30371	9.25699
	Half semidiameters	11° 23′	10° 15′
	Semidiameters	22° 46′	20° 30′
	Diameters	45° 32′	41° 0′

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July 12th Oh 1878

Diathragms used for contact of Rh.T
Each measured twice first along diag reading through number next along diam at right angles.

1	20.00	19.99	+1	20.00	93	.301	−.001
2	19.08	19.07	+1	19.07	81	.281	−1
3	18.26	18.25	+1	18.26	79	.262	0
4	17.48	17.46	+2	17.47	71	.242	0
5	16.73	16.78	−5	16.76	1676	.224	+2
6	16.88	15.98	+1	15.99	77 76	1600 .204	+2
7	15.23	15.23		15.23	75	.183	+1
8	14.48	14.49	−1	14.48	55	.161	−1
9	13.93	13.93		13.93	67	.144	+2
10	13.25	13.26	+1	13.26	65	.123	+1
11	12.62	12.61	+1	12.61	46	.101	−1
12	12.15	12.14	+1	12.15	67	.085	+3
13	11.49	11.48	+1	11.48	49	.060	−2
14	11.00	10.98	+2	10.99	50	.041	+1
15	10.48	10.50	−2	10.49	44	.021	−1
16	10.04	10.06	−2	10.05	43	.002	0
17	9.63	9.62	+1	9.62	46	.983	+1
18	9.16	9.16		9.16	46	.962	0
19	8.70	8.70		8.70	32	.940	−2
20	8.37	8.39	+2	8.38	48	.923	+1
21	7.89	7.91	−2	7.90	27	.900	−2
22	7.63	7.63		7.63	32	.883	+1
23	7.31	7.30	+1	7.31	39	.864	+2
24	6.92	6.92		6.92	33	.840	−2
25	6.61	6.55	+6	6.58	26	.819	−3
26	6.35	6.31	+4	6.33	25	.801	+1
27	6.07	6.08	−1	6.08		.784	+2

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July 13, 1878

28	5.68	5.67	+1	5.67	31 14	.754	−8
29	5.53	5.53		5.53	24	.743	+1
30	5.28	5.29	−1	5.29	16	.723	+1
35	4.13	4.13		4.13	82	.616	−6
40	3.30	3.32	−2	3.31	69	.520	−2
45	2.53	2.62	−1	2.62	48	.418	−4
50	2.14	2.15	−1	2.14		.330	+8

Σ .30
.42

46 .0015

+70 66 .002 .005

−37
+28

Mean dev. = .005 mags.
Mean dev. = .02 mags.

−.3 +2

Ellis. −5, 25, 26
.03 .06 .03 cms.

3 2 0 / 5 .03
2 4 3 / 9 3
2 2 0 / 4

Σ Σ diff. diameter of holes = .44 cms.
Mean " " " = .013 cms

Omitting 5, 25, 26 Σ = .30 cms Mean = .01

See R 25, 60

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1878phae.proj.1301S

July 13th 1878

γ Draconis

8 17	104.4	64.2	Sol.	80° 4"
	168.6			
	287.4	59.1		
	346.5			
	906.9	123.3		
	453.45	61.65		
	226.73	30.82		
8 17	18.3	58.5	Sol.	230° 4'
	76.8			
	198.7	54.6		
	253.3			
	547.1	113.1		
	273.55	56.55		
	136.77	28.28		
8 22	14.6	66.6	Prob.	250° 3"
	81.2			
	194.7	64.5		
	259.2			
	549.7	130.1		
	274.85	65.55		
	137.43	32.78		
8 25	110.8	52.0	Prob.	100° 4"
	162.8			
	291.0	56.8		
	347.8			
	912.4	108.8		
	456.2	54.4		
	228.10	27.20		

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July 13, 1878

γ Lupi

8 34 131.8 17.8 P. obs. 90° 5″

149.6

313.2 14.4

327.6

922.2 32.2

461.1 16.1

230.55 8.05

8 36 40.3 P. obs. 300° 5″

57.5 17.2

220.8 18.2

239.0

557.6 35.4

278.8 17.7

139.40 18.85

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1878phae.proj.1301S

July 13, 1878

36 Ophiuchi

8 44 7.6 — P. obs. 140° 3″

98.3 83.8

182.1 — star at 226° disappears

277.3 90.3

565.3 174.1

282.65 87.05

141.33 43.52

8 47 4.3 89.8 — P. obs. 290° 3″ — star at 46° disappears.

94.1 ~~92.6~~

186.7 89.5 — star at 46

276.2 ~~88.1~~

561.3 179.3

280.65 89.65

140.32 44.82

8 51 4.9 88.1 — S obs 280° 3″ — star at 46° disappears

93.0

188.1 82.7

270.8

556.8 170.8

278.4 85.4

139.20 42.70

8 56 7.8 ~~86.5~~ — S obs 150° 3 — star at 226° dis.

93.3 90.7

184.0

274.6 — recorded from memory some time later

93.2

559.7 183.9

279.85 91.95

139.92 45.97

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July 13, 1878

BAC 5827

9 7	22.2		Probs.	300° 6″
	77.1	54.9		
	202.4			
	255.5	53.1		
	557.2	108.0		
	278.6	54.0		
	139.30	27.00		
9 10	110.2		Probs.	70° 6″
	166.2	56.0		
	291.3			
	344.8	53.5		
	912.5	109.5		
	456.25	54.75		
	228.12	27.38		

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1878phae.proj.1301S

July 13, 1878

μ Sagittarii

C 114°

9 18

42.4 8.7

Sch. 35° 6"

A out of field

51.1

220.6

230.4 9.8

544.5 18.5

272.25 9.25

136,12 4.63

9 23

132.3 9.6

Sch 240° 6"

141.9

310.9

320.5 9.6

905.6 19.2

452.8 9.6

226.40 4.80

B 315°

220° 6"

9 28

~~220.6~~

133.2 7.8

S. obs.

A out of field

141.0

311.9

319.1 7.2

905.2 15.0

452.6 7.5

226.30 3.75

9 31

40.4 7.8

S. obs.

85° 6"

48.2

222.8

230.9 8.1

542.3 15.9

271.15 7.95

135.58 3.97

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1878phae.proj.13019

July 13, 1878

β Lyrae

9 45 — 129.8 — 19.4 — P. obs. 300° 3"
A out of field
149.2
311.6 — 18.6
330.2

920.8 — 38.0
460.4 — 19.0
230.20 — 9.50

9 47 — 40.1 — 18.5 — P. obs. 120° 3"
58.6
221.7 — 20.3
242.0

562.4 — 38.8
281.2 — 19.4
140.60 — 9.70

9 51 — 42.7 — 15.0 — S obs 115° 3"
57.7
212.9 — 16.5
239.4

562.7 — 31.5
281.35 — 15.75
140.67 — 8.88

9 54 — 128.0 — 22.3 — S obs 280° 3"
150.3
312.3 — 19.1
331.4

9 × 2 = 18.0 — 41.4
4 × 6 = 24.0 — 20.7
23.50 — 10.35

seeing 5, 4, 4 (J.)

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1878phae.proj.1301S

1878 July 15

36 Ohmichi

P. obs. 280° 4"

Geo Rozy

8 31 113.2 56.1 θ Serpentis S. obs. 325° 6"
169.3
291.1 54.3
345.4
919.0 110.4
459.5 55.2
229.75 27.60

8 38 24.4 50.9 S. obs. 170° 6"
75.3
205.7 49.2
254.9
560.3 100.1
280.15 50.05
140.08 25.02

8 43 27.3 47.0 P. obs. 160° 6"
74.3
205.8 51.8
257.6
565.0 98.8
282.5 49.4
141.25 24.70

8 46 115.5 56.7 P. obs. 330° 4"
172.2 Passing clouds
285.6 68.0
353.6
926.9 124.7
463.45 62.35
231.72 31.18

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1878phae.proj.1301S

July 15, 1878

48 σ^2 Cygni & P.XX 63

9 ~~46~~ 122.4 P. obs. In line. A out of field
153.8 31.4 Images 270° 40"
304.9 29.4 Companion blue
334.3

915.4 60.8
457.7 30.4
228.85 15.20

51
9 ~~49~~ 34.3 P. obs. Images 270° 40"
61.2 26.9

217.0 26.9
243.7

556.4 53.8
278.2 26.9
139.10 13.45

9 55 365 24.5 S obs. Images 270° 30"
61.0
215.7 29.3
245.0

558.2 53.8
279.1 26.9
139.55 13.45

9 57 125.2 24.8 S obs 270° 30"
150.0 ?
308.6 22.6
331.2

915.0 47.4
457.5 23.7
228.75 11.85

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1878phae.proj.1301S

July 15, 1878

61 Cygni Pola 110° ~~290°~~ 4"

10 05 104.2 63.8
168.0
283.0 66.5
349.5

904.7 130.3
452.35 65.15
226.17 32.57

10 8 12.4 72.1 Sobs. 265° 4"
84.5
190.7
260.9 70.2

548.5 142.3
274.25 71.15
137.13 35.58

10 14 11.6 Pobs. 275° 5"
83.5 71.9
190.8
260.9 70.1

~~5~~ 6.8 142.0
~~2~~ 3.4 71.0
~~1 4 1 7~~ 0 35.50
136.70

10 16 107.6 Pobs. 110° 5"
172.2 64.6
287.0 67.3
354.3

921.1 134.9
460.55 ~~66.45~~ 65.95
230.27 ~~33.22~~ 32.97

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1878phae.proj.13015

July 15, 1878

χ Cygni

10	23	128.3	20.4	P. obs.	70° 5"
		148.7			
		306.5	23.0		
		329.5			
		913.0	43.4		
		456.5	21.7		
		228.25	10.85		
10	25	35.7	22.5		
		58.12			
		216.6	21.8	P. obs.	240° ~~5~~ 4"
		238.4			
		548.9	44.3		
		274.45	22.15		
		137.22	11.07		
10	28	37.2	21.6	Schs	240 4"
		58.8			
		116.2	22.8		
		239.0			
		551.2	44.4		
		~~270.6~~ 273.6	22.2		
		~~135.30~~ 137.80	11.10		
10	31	125.9	20.9	Schs	60° 4"
		146.8			
		302.2	29.3		
		331.5			
		906.84	50.2		
		453.X2	25.1		
		226.~~50~~ 60	12.55		

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1878phae.proj.1301S

July 15, 1878

ζ Sagittae S obs.

10 38	150.7	22.3	270° 3″
	153.0		
	311.0	22.1	
	333.1		
	927.8	44.4	
	463.9	22.2	
	231.95	11.10	

S. obs.

10 42	40.3	22.7	85° 3″
	63.0		
	223.1	17.4	
	240.5		
	566.9	40.1	
	283.45	20.05	
	141.73	10.02	

P. obs.

10 47	~~224.3~~		80° 3″
	41.6	22.0	
	63.6		
	222.9	20.4	
	243.3		
	571.4	42.4	
	285.7	21.2	
	142.85	10.60	

P. obs.

10 50	131.7	24.9	290° 3″
	156.6		
	313.2	19.5	
	332.7		
	934.2	44.4	
	467.1	22.2	
	233.55	11.10	

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1878phae.proj.1301S

July 15, 1878

ε Sagittae

10 57 | 125.8 | 27.9 | P. obs. In line 120° 20"
153.7 |
301.3 | 30.9 | Out of field
332.2 |
913.0 | 58.8 |
456.5 | 29.4 |
228.25 | 14.70 |

10 57 | 35.6 | 24.1 | P. obs. 120° 20"
59.7 |
216.5 | 27.1 |
243.7 |
555.5 | 51.3 |
277.75 | 25.65 |
138.88 | 12.82 |

11 0 | 29.8 | 32.0 | Sobs 100° 15"
61.8 |
214.0 | 29.4 |
243.4 |
549.0 | 61.4 |
274.5 | 30.7 |
137.25 | 15.35 |

11 2 | 122.0 | 29.8 | Sobs 100 15"
151.8 |
299.3 | 35.1 |
334.4 |
907.5 | 64.9 |
453.75 | 32.45 |
226.87 | 16.22 |

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1878phae.proj.1301S

July 15, 1878

36 Ophiuchi

11 13 7.6 P. obs. 300° 3″
9 6.0 88.4 — star at 40° disappears
189.5
276.3 86.8
569.4 175.2
284.7 87.6
142.35 43.80

11 16 9.1 P. obs. 120° 4″
9 9.6 — star at 220° disappears.
184.8 85.2
278.5 90.6
572.0 175.8
286.0 87.9
143.00 43.95

Ø 7.345 1 B. 394
19 26 47½ 11 5 0 0 49 44.5
28 48 52 0 51 44.5
near conjunction

19 26 +3.5
20 12 −19.5
54 −7.5

Seeing 4, 7, 6. (P.)
4, 3, 4. (P.)

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1878phae.proj.13019

July 15, 1878

Detached cat by clear time 18.0
19h 38 39.5 disk 56 17.5
56.

J. 3451 Computed 54 min ~~Full aperture.~~
19h 49 25 0.80 5" aperture
19h 50 17.5 1.28 15" " 145.5
50. 1.43 ~~36.4~~
51 20.5 1.26 ~~47~~ 487 5-1 4.6 28.9
50.5 0.90 ~~+34~~ 1.2 18 50 57.6
138.5
12
25 8.5 ~~46.6~~
52 13 1.09
34.5 1.53 26.6
53 1.0 1.27 613 53 5.6 52 58.6
1.226
36.0 95
88.0
40
328.
65.6
54 3.5 1.29
43.5 90 12 18 36. +28. 40.0
55 19.0 .64 19 11.5 63.5 35.5
39.5 .48 32. 84. 20.5
~~to.~~

0

limit of visibility
.57

A 3451 B 394 C. m. I
20 11 55 12 35 0 34 44.5
12 55 36

11 54 27.4
23 41

Computed 12 18 8

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1878phae.proj.1301S

July 15th 1878 23h 20m

Diameter of Cap of S. Equatorial

20.00 + 10.24 = 30.24

4.73

25.51 = diam cap.

4.72
469
472
479
12
4.73

Cap Phot B

Aperture Cato used in Contact of Phot I by Ster.

86.352 — 63387
95.798 — 70.849
7.446 — 7.462
62
7.454 time = diam

66302 — 89.666
59387 — 82806 — proves from
6.915 — 6.860
860
875
6.937 time = diam

7.454 | 24
72 — .3106
25 — 254
24
14
12424
15530
6212
7.8924

6937 | 24
48 — .28904
213 — 254
192
21.7
11561
14520
57808
7.34616

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1878phae.proj.13019

July 16 1878

95 Herculis

8 32 97.0 P. obs. 30° 3"

190.2 83.4

273.6 star at 80° disappears about 40°

6.8

90.2

567.6 173.6

283.8 86.8

141.90 43.40

8 35 7.8 P, obs, 220° 3"

92.0 99.3 — star at 80° disappears

191.3

276.2 91.6

567.3 190.9

283.65 95.45

141.82 47.72

8 37 0.2 Sds. 160° 4"

98.0 82.3 — star 80 dis.

180.3

281.6 78.6

560.1 160.9

280.05 80.45

140.03 40.23

8 40 4.5 89.9 — 80 dis Sds 20° 4"

94.4

189.4 82.9

272.3

560.6 172.8

280.3 86.4

140.15 43.20

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1878phae.proj.1301S

July 16, 1878

β Lyrae

8 46	39.8		P. obs. 150° 5″
	57.0	17.2	Out of field
	219.3		
	242.4	23.1	
	558.5	40.3	
	279.75	20.15	
	139.62	10.08	
8 49	121.2		P. obs. 270° 5″
	151.3	30.1	
	308.1		
	334.2	26.1	
	914.8	56.2	
	457.4	28.1	
	228.70	14.05	
8 52	126.0		S obs. 270 5″
	150.5	24.5	
	307.5		
	332.8	25.3	
	916.8	49.8	
	458.4	24.9	
	229.20	12.45	
8 55	40.0		S obs. 140.5
	59.9	19.9	
	219.4		
	239.1	19.7	
	558.4	39.6	
	279.2	19.8	
	139.60	9.90	

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1878phae.proj.13015

July 16, 1878

17 χ Cygni.

9 04 40.0 21.9 S obs 50° 4″
61.9
219.8
241.1 21.3
562.8 43.2
281.4 21.6
140.70 10.80

Chron. 7.3451
17h 4m 22s,5
5 22.5

B. 3948
9h 24m 0s near coincidence
9 25 0

Time by 7.3451
17 26

Jupiter P. obs.

Shadow on upper edge of lower belt.

Mean time
10 3

χ Cygni.
124.6 22.4
147.2
306.7 20.2
326.9
905.6 42.6
452.8 21.3
226.40 10.65

S. obs. 200° 4″

Seeing 3, 7, 6. (S.)
4, 6, 6. (P.)

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1878phae.proj.1301S

July 17, 1878

X Cygni

9 26 125.8 24.6 P. obs. Images 250° 5"
150.4
306.2 25.3
331.5
913.9 49.9
456.95 24.95
228.47 12.47

9 28 38.7 21.3 P. obs. Images 60° 5"
60.0
218.1 19.5
237.6
554.4 40.8
277.2 20.4
138.60 10.20

59 Lacertis must take precedence
S obs 30° 4"

9 47 122.8 40.5
163.3
302.2 40.0
342.2
930.5 80.5
465.25 40.25
232.62 20.13

9 52 32.9 36.3 265° 4"
69.2
215.1 37.6
252.7
569.9 73.9
284.95 36.95
142.47 18.47

seeing 3, 7, 7. (S.)

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1878phae.proj.13015

July 19th 1878

7 52 γ Draconis Robs. 270° 5"

20.1 57.2
77.3
200.2 56.2
256.4
554.0 113.4
277.0 56.7
138.50 28.35

7 55 Pobs. 100° 5"

112.2 56.1
168.3
278.1 288.4 doubles 288.7
351.3 62.9
288.2
920.2 119.0 278 appears half a magnitude too bright
460.1 59.5
230.05 29.75

8 14 17 Draconis Near Zenith
Pobs. Images 290° 3"

19.6 67.7
87.2
199.8 65.9
265.7
572.2 133.6
286.1 66.8
143.05 33.40

8 16 Pobs. 40° 3"

113.2 60.7
173.9
296.1 55.0
351.1
934.3 115.7
467.15 57.85
233.57 28.93

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1878phae.proj.1301S

July 19, 1878

16 & 17 (A.) Draconis

8 21

0.7
89.1 88.4
183.9
270.0 86.1
543.7 174.5
271.85 87.25
135.92 43.63

P. obs. In line. Images (16 from 17)
16 disappears. 40° 20″

8 24

3.8
95.8 92.5
178.3
271.3 92.5
549.2 175.0
274.6 87.5
137.30 43.75

— 17 disappears.

P. obs. Images 40° 20″

η Lupi

8 39

41.3
56.2 14.9
221.4
236.1 14.7
555.0 29.6
277.5 14.8
138.75 7.40

P. obs. Images 90° 5″

8 41

128.3
149.0 20.7
308.2
326.8 18.6
912.3 39.3
456.15 19.65
228.07 9.83

P. obs. Images 310° 5″

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1878phae.proj.1301S

July 19, 1878

~~8~~

α Virginis ~~5 obs.~~

~~8 44~~ & Photometer I.

8 52

0.88	P. obs.
1.03	
0.89	
0.92	
0.91	
0.926	

8 54

.79	S obs
.72	
.63	
.66	
.59	
0.678	

α Lupulis

9 5

2.39	S. obs.
2.87	
2.55	
2.54	
3.30	
2.730	

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July 19, 1878

Photometer H.

α Serpentis

9 15 — 228.2 — .2 — P. obs. Images 2 60° 10″

228.4

228.2 — .9

229.1

49.4 — .4

49.8

48.8 — .9

49.7

1281.6 — 2.4

~~307.9~~ — .6

~~275.95~~ — .30

138.95

9 21 — 139.3 — .3 — P. obs. Images 6 60° 10″

140.6

317.1 — .6

318.7

915.7 — 2.9

457.85 — 1.945

228.93 — .72

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1878phae.proj.13019

July 19, 1878

5 Serpentis

9 31 131.7 15.9 P. obs. Images 300" 5"
147.6
313.8 14.5
328.3
921.4 30.4
460.7 15.2
230.35 7.60

9 33 42.8 15.1 P. obs. Images 80" 5"
57.9
224.8 12.1
206.9
562.4 27.2
281.2 13.6
140.60 6.80 Comp B too bright for Phot. I.

9 54 η Serpentis Sidus Photometer I.
4.38
5.74
5.14
5.22
5.80
128
5.256

10 0 4.85 P. obs.
4.32
4.25
4.26
4.63
231
4.462

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1878phae.proj.1301S

July 19, 1878

Photometer H

η Serpentis

10	6	46.5	3.2	P. obs. Images 80° 70"
		49.7		
		226.5	3.7	
		230.2		
		552.9	6.9	
		276.45	3.45	
		138.22	1.73	
10	8	135.4	3.5	P. obs. Images 80° 70"
		138.9		
		316.9	4.5	
		321.4		
		912.6	8.0	
		456.3	4.0	
		228.15	2.00	
				S obs. Images 80° 60"
10	10	135.0	4.1	
		139.1		
		316.2	5.6	
		321.8		
		912.1	9.7	
		456.05	4.85	
		228.03	2.42	
10	14	46.3	4.2	S obs 80° 60"
		50.5		
		226.5	4.3	
		230.8		
		554.1	8.5	
		277.05	4.25	
		138.53	2.13	Seeing 7, 8, 6 (6)

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1878phae.proj.13019

July 20th, 1878. aC; B.

39 Draconis, AB and C.

8 24	123.5	28.1	P. obs.	180° 15"
	151.6			About of field
	302.4	28.5		
	330.9			
	908.4	56.6		
	454.2	28.3		
	227.10	14.15		
				Same 180° 15"
8 30	34.2	24.6	P. obs.	
	58.8			
	213.9	39.3		Partly clouds
	244.2			
	551.1	54.9		
	275.55	27.45		Seeing 2,5,5
	137.78	13.72		

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1878phae.proj.1301S

July 21, 1878

Remarks Storm. July 21st 1878

Black

1	3	51					
2							
3							
4							
	4	32	51	33	6.5	3	
		33	19		33.	36	hazy
		34	22		34.3		
			42		56		ft.
		35	1		19 ±		ft-
		36	51	37	6		ft-
		36	44		49.6		
		37	29		31.5		extinct Crab Neb
		38	8		13 ±		
			245		1		
			335		48		
					cloud under		
	43		29		38		ft-
	45		18		25		ft-
	50		12		—		ft-
	55		11		39 - 56.10	?	most extinct

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1878phae.proj.13019

July 24th 1878

C

8.06 125.4 31.239 Draconis. A, B 80° 3"
156.6 P. obs.
305.3 30.5
335.8
923.1 61.7
461.55 30.85
230.78 15.43

8.13 31.6 40.0 P. obs.
70.6 200° 3"
214.0 32.7
246.7
561.9 72.7
280.95 36.35
140.47 18.17

α Virginis Anal. St. a dark gr.
B " br. "
8 32 1.77 P. obs.
1.45
1.51
1.16
1.45
234
1.468

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1878phae.proj.1301S

July 21, 1878

μ Sagittarii d .b
                .*
8 44 B.C. two bright ad large .c
      D a misty light

21 Sagit Cent ad Rem

α Bootis P. obs.

9 0 59
     59
     59
     62
     64
    .606

9 5½ Limit of Visibility – α Bootis
                             P. obs.
      29
      29
      23
      28
      28
     .274

ρ Bootis P. obs.

9 13 3.17
      2.82
      2.86
      3.05
      2.72
     2.924

γ Bootis cent nebulae

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1878phae.proj.13015

July 21, 1878

μ Bootis

q 43	32.4	31.2	A and of field is line
	63.6		30″ 120°
	207.6	39.6	P. obs. 120° 30″
	247.2		
	550.8	70.8	
	275.4	35.4	
	137.70	17.70	
q 46	120.2	36.9	Lam
	157.1		P. obs. 120° 30″
	303.8	30.6	
	334.4		
	915.5	67.5	
	457.75	33.75	
	228.87	16.88	Lacj 8, 5, 2

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1878phae.proj:1301S

July 22d 1878

B. Negus

q 04	37.2	200	
	57.2		
	214.7	27.6	
	242.3		
	551.4	47.6	
	275.7	23.8	
	137.85	11.90	

P. obs. 5" 140°
140° 5"

q 10 Much trouble from clouds
only clear a interval

5 300°
P. obs. 300° 5"

q 24	125.2		
	149.7	24.5	
	306.4		
	333.3	26.9	
	914.6	51.4	
	457.3	25.7	
	228.65	12.85	

110 Hel.

q 33	136.2		
	138.4	2.2	
	317.8		
	320.2	2.4	
	912.6	4.6	
	456.3	2.3	
	228.15	1.15	

P. obs. 70° 7'

q 38	46.6		
	48.6	1.8	
	227.5		
	228.3	0.8	
	551.2	2.6	
	275.6	1.3	
	137.80	0.65	

P. obs. 280° 10'

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1878phae.proj.13019

July 22, 1878.

110 Her. 4 Phot. I

a B C

Pictures.

2.32
2.10
2.74
3.12
3.85

413
2.826

Comp C. was nearer than B but by a little greater distance about .7

Seeing 8, 5.5

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1878phae.proj:1301S

July 23d 1878. C

39 Draconis a.

8 30 121.8 36.1 S.Sh. 50° 3"
157.9
300.5 42.8
343.3
923.5 78.9
461.75 39.45
230.87 19.72

8 36 ~~185~~
30.3 37.6
67.9
210.2 41.9
252.1
560.5 79.5
280.25 39.75
140.13 19.88

8 44 33.2 37.1 P.obs. 240° 3"
70.3
210.1 40.2
250.3
563.9 77.3
281.95 38.65
140.97 19.32

8 46 122.6 32.6 P.obs. 120° 2"
155.2
305.8 35.5
341.3
924.9 68.1
462.45 34.05
231.23 17.03

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1878phae.proj.13015

July 23, 1878 B

39 Daphne a. ☉

8 51	124.3	28.0	Obs 160° 20″
	152.3		in line A out of field
	300.3	31.7	
	332.0		
	909.9	59.7	
	454.95	29.85	
	227.47	14.92	
8 57	31.4	34.6	Obs 160° 20″
	66.0		
	209.7	31.3	
	241.0		
	548.1	65.9	
	274.05	32.95	
	137.03	16.48	
8 59	34.9	28.7	Obs 200° 20″
	63.6		
	214.0	25.9	
	239.9		
	552.4	54.6	
	276.2	27.3	
	138.10	13.65	
9 03	122	29.9	Obs. 200° 20″
	151.2		
	303.2	31.6	
	334.8		
	912.5	61.5	
	456.25	30.75	
	228.12	15.37	

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1878phae.proj.1301S

July 23, 1878

110 Herculis

9 16

135.3
138.4 3.1
317.7 1.9
319.6
911.0 5.0
455.5 2.5
227.75 1.25

P. obs. 250° 5"
A out of field

9 21

47.6 1.5
49.1
226.5 1.8
228.3
551,5 3.3
275.75 1,65
137.88 0.83

P. obs. 30° 10"

9 30

46.0 1.9
47.9
~~229.4~~
229.3 reject
~~230.0~~
226.7 2.2
228.9
549.5 4.1
274.75 2.05
137.37 1.02

S obs 30° 10"

{ clock stopped repeatedly; occasional clouds or haze. }

10 5

139.4 } 139.3
139.2 } 2.1
137.2
316.8 1.4
318.2
911.5 3.5
455.75 1.75
227.88 0.88

P. obs. 180° 10"

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1878phae.proj.1301S

July 23, 1878

Constant of Plate K (Jupiter).

q 32	142.6	~~47.9~~ 25.3	P. obs.
	167.9		
	321.0	27.0	
	348.0		
	9795	52.3	
	48975		
	244.87	13.07	
	1426	23.5	P. obs.
	166.3		
	321.9	25.4	
q 53	347.3		
	9783	48.9	
	48915		
	244.58	12.22	
q 55	141.7	23.9	P. obs.
	165.6		
	320.8	27.0	
	347.8		
	9759	50.9	
	48795	25.45	
	243.97	12.72	

Seeing 7, 6, 6. (P. S.)

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1878phae.proj:1301S

July 24th 1878

μ Bootis Schr 150° 30"

in line A out of field

8 28	115.3	44.5	
	159.8		
	300.7	34.5	
	335.2		
	911.0	79.0	
	455.5	39.50	
	227.75	19.75	
8 32	32.2	35.7	Schr 120° 30"
	67.9		
	206.9	40.0	
	246.9		
	553.9	75.7	
	276.95	37.85	
	138.47	18.92	
8 35	30.0	34.2	Pisbr. 150° 35"
	64.2		
	211.1	37.6	
	248.7		
	554.0	71.8	
	277.0	35.9	
	138.50	17.95	
8 38	120.0	36.2	Pisbr.
	156.2		
	298.7	38.2	
	336.9		
	911.8	74.4	
	455.9	37.2	
	227.95	18.60	

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1878phae.proj.13015

July 24, 1878

Photometer

α Boötis

8 44 0.58 P. obs.
.63
.51
.57
.67
0.592

8 46 .51 S obs
.57
.59
.47
.54
0,524

ζ Boötis

9 04 2.75 decr. S obs
2.35 incr.
2.69 decr.
2.42 incr.
2.90 decr.
5)11
2.622

9 9 3.18 P. obs.
3.18
3.20
3.19
2.88
3.186

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1878phae.proj.1301S

Photometer H. July 24/1878

42 Hercules

9 32	137.8	8.4	S.obs.	90	6"
	146.2				
	319.8	9.1			
	328.9				
	932.7	17.5			
	466.35	8.75			
	233.18	4.38			
9 36	46.2	11.6	S.obs.	290°	6"
	57.8				
	228.7	9.2			
	237.9				
	570.6	20.8			
	285.3	10.4			
	142.65	5.20			
9 40	46.7	10.9	P.obs.	290°	10"
	57.6				
	228.3	9.9			
	238.2				
	570.8	20.8			
	285.4	10.4			
	142.70	5.20			
9 42	137.4	8.4	P.obs.	90°	5"
	145.8				
	320.0	8.3			
	328.3				
	931.5	16.7			
	465.75	8.35			
	232.88	4.17			

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July 24, 1878

V^2 Corvage

9	58	135.3	11,3	P. obs,	Images in line: 330° 40″
		146.6			Foot of field
		308.8	14,4		
		323.2			
		913.9	25.7		
		456.95	12.85		
		228.47	6.42		
10	1	44.2		P. obs.	330° 40″
		55.4	11.2		
		223.0	10.2		
		233.2			
		555.8	21.4		
		277.9	10.7		
		138.95	5.35		
10	5	40.5	15.0	S obs.	
		33.5			330° 55″
		222.5	12.5		
		335.0		must be 235.0	
		553.5	27.5		
		276.75	13.75		
		138.38	6.87		
10	14	134.8	12.2	S. obs.	330 55″
		147.0			
		307.6	16.4		
		324.0			
		913.4	28.6		
		456.7	14.3		
		228.35	7.15		

Seeing 8, 8, 8. (S.)

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1878phae.proj:1301S

July 26, 1878

Thurston No. 1 (substitute for Delamater) first tried on July 22d. on 24th Mr. G. brought it again to the Observatory with his pinion set ready for use.

July 26th (?) 1878

Ready for ~~Use~~. Pinion 10 - 101

Initial holes read for. and 1.60 div. CS. Mic = .067 =

= 1.7 mms = 50"

10.0

23.4 205

43.9 210

64.9 199

84.8

90 div = 9 holes = 50"

100 = 20

10 = 8

24.8 to 1.0 edge dy. move for

14.6

39.4 to 15.6 cent. dy. = 22.8 cms = radius

20' to 8' should be 12.8

total length find = 165.4 cms.

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1878phae.proj.1301S

July 27th 1878. Middle in afternoon even too hazy

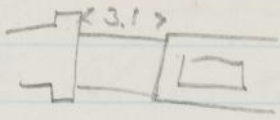
Sun came out of cloud just before Sunset tried shut K

Mr. Clark called it wrong. tried Sc. a Trojan and Alcor. Images good but could not bring both into field at same time

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1878phae.proj:1301S

July 28th 1878 = 3.08 Mid Obst I.
Wires 3.1 cms.



Dist centres Objectives Sem at. 10 14.7 7'
" " " 1.00 35.8 18'

Dia. obj. to axis 17.6 cms.

Holes $\frac{160}{2400} = \frac{1}{15}$ with 1.69 mms = ~~51"~~ 50.8 on circle a large

11.2	4.1
15.3	4.8
20.1	3.9
24.0	4.4
28.4	4.5
32.9	3.9
36.8	4.8
41.6	3.5
45.1	4.1
49.2	4.6
53.8	
42.6	= 10 mms. -

1 mm = 4.26 div. = 1 Lunds
1 div =

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1878phae.proj.1301S

July 28, 1878

Ready

14.3 = 14.9 mms

41.1 / 268 — 244 — 240 — 183 — 570 = 4.39

21.0 / 6.1

1 mm = 4.3 div.

14.3 × 43 = 429, 572, 6149

143 / 43 = 3.3, 129, 140

$D = 11.6 \text{ mms} + \frac{R}{4.3}$

$D = 11.6 + .233R$

100 / 43 = 233, 86, 140, 129, 110

$D' = 5.8 + .116R$

6828.5 / 206265 = 30".2, 204855, 14100

116 / 1000 = .862, 928, 720, 696, 240

D	Ready
6'	1.72
8	18.9
10	36.1
12	53.4
14	70.6
16	87.9
18	105.1

1.72 × 2 = 3.44, 86.2, 87.9

60 / 69 = 8.7, 552, 480

1' = 6.9 div. 1 div. = 8".7

55° = Alt. dia crossing of Rigel.

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July 28, 1878

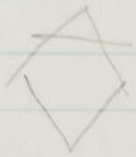
Name of Plate of Phot H

Next removed



in Image next > & fold through ⊖





5.06 Mid. Phot. K a Sun with disk and colored glass
focus K at about 8.4 cms = 3 3/4"



at 300° A. Tech. to B.
" 210° or 30°, " par. " "

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July 28, 1878

Comparison of light of Sun with that of Cloudy sky
Miller Lee. at 80.

7.07	Light of Sky near Sun			
	46.7	17.3	yellow	dist from edge
	64.0	17		half dia Sun
	126.3	18.0		
	242.3	6		
7.10	49.8	11.3	green	
	61.1			
	229.6	11.2		
	240.8			
7.14	50.8	14.7	Red	dist to edge
	65.5			of Sun.
	228.6	13.2		
	241.8			
7.17				

Silly 7.18
Sil. 7.19

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1878 July 28

Photometer 20 on East Equatorial

Jupiter's satellites.

Position circle readings.

9 30

62° 42′ P. obs.
63 10 — On looking again, image out of place
62 42
62 30
62 31

Mizar & Alcor

Micrometer circle

9 45

46.0 P. obs.
46.2
46.1
46.3
45.9

9 50

46.3 P. obs.
46.4
46.3
46.5

46.4 ± .075

± ".66

P.E. 1 obs = ".57

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1878phae.proj.1301S

Position circle July 28, 1878

q 55	63° 30	-3	Pivots.
	63 32	-1	
	63 37	+3	
	63 3/4	+1	
	63 33	±2	

Focus of photometer Lo.
45.5

∴ 890" measured 4 times with av. dev. of 2'
17" = av. dev. ".4 or prob. err. ".34

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1878phae.proj.1301S

July 29th. 1878.

Focus of Phot I, 54 mm.

Phot K 93 & 33 on Arlington Heights.

Clock B. 394	4	29	0
Chron. 7. 3451	13	0	7

1st. contact expected	4	57	36
Time by 7. 3451	13	28	43

Photometer L.

Time by ⊙ 7. 3451
13 9

Sun and sky Clouds, passing & close to edge.

9.8	90°	P. obs.
100.0		
179.2	99.5	
278.7		
	189.7	
	47.42	

13 10

7.7	87.3	P. obs.
95.0		
196.8	75.9	
272.7		
	163	
	81.6	
	40.8	

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1878phae.proj.13015

~~29~~ 9 July 29, 1878

1st Contact 13 29 55½ P. obs.
— 12 half seconds.
= 13 29 49.5 by ~~R.~~ F. 3451

Aperture 5" Inst E. Equatorial
58 42.5

Clock B 394	6	49	0	
Chronometer F. 3451	15	20	30	near coincidence
Clock B 394	6	50	0	
Chronometer F. 3451	15	21	30	

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1878phae.proj.1301S

July 30 to Oct 8 78

Dean Bonstick Comte Lebrun Lyelija = 100 cms
" Acton Brien 43.8 cms.
" " 44.4 "

Angular deviation of double image prisms (quartz)
23 hr. Ang. dev. Dale to Brien Lenses.
det. by Cabell transit P. dec.

184° 37'
184 14'
185 9'
184 37'

Dev. = 1°

Mean pairs 22.75 = 8.15 14.6 cms

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1878phae.proj.13019

July 31st 1878. per Boston.

8 7	30.2	35.2	In line a bit of field
	65.4		130° 35"
	206.2	38.6	
	244.8		
	546.6	73.8	
	273.3	36.9	
	136.65	18.45	
8 10	115.6	41.3	130° 35"
	156.9		
	300.3	37.1	
	337.4		
	910.2	78.4	
	455.1	39.2	
	227.55	19.60	
8 14	120.0	30.3	S Sho clouds frequent
	150.3		190° 30"
	300.5	32.1	
	332.6		
	903.4	62.4	
	451.7	31.2	
	225.85	15.60	
8 24	26.7	~~33.8~~	S Sho 110° 30"
	60.9	34.2	
	213.8	27.7	
	240.5		
	542.9	~~61.5~~ 61.9	
	271.45	~~30.75~~ 30.95	
	135.73	~~15.37~~ 15.47	

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1878phae.proj.1301S

Aug. 2 1878

Photometer

α Bootis

8 18 0.59 P. obs.

.72

.64

.68

.73

336

0.672

8 20 .74 S. obs

.56

.74

.68

.72

344

0.688

ρ Bootis

8 27 3.69 P. obs.

3.46

3.66

3.88

3.82

351

3.702

8 31 2.59 S. obs

moved star nearer

reflected image after first setting.

2.25

2.33

2.14

2.29

1490

2.380

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1878phae.proj.13019

Aug. 21 1878.

γ Bootis Comp. estimated twice by R.
Companion suspected by S. but nearer than 20″ if seen at all

σ Coronae Comp not seen by R. nor by S.
Photometer H

9 01 V^a Coronae R. obs. 340° 30″ in line

430		
526	9.6	
2225		
2306	8.1	
5487	17.7	
2744.35	8.85	
1372.18	4.43	

9 7 P. obs. 340° 30″

1336		
1442	10.6	
3098		
3209	11.1	
9085	21.7	
4542.5	10.85	
2271.2	5.42	

9 10 S. obs. 320° 25″

1340		
1445	10.5	
~~3084~~		~~Vector ran off.~~
3128	8.3	
3211		
9124	18.8	
4562	9.4	
2281.0	4.70	

9 24 320° 25″

442	9.6	
538		
2230		
2308	7.8	
5318	17.4	
2759.5	8.7	
	4.35	

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1878phae.proj.1301S

Aug 2, 1878

42 Herculis

9 35	43.4		P. obs,	70° 5"
	51.4	8.0		
	225.2			
	235.2	10.0		
	555.2	18.0		
	277.6	9.0		
	138.80	4.50		
9 38	134.6		P. obs,	300° 5"
	145.9	11.3		
	312.3			
	323.3	11.0		
	916.1	22.3		
	458.05	11.15		
	229.02	5.57		
9 41	134.2		Sobs	300° 5-4
	146.6	12.4		
	311.9			
	323.0	11.1		
	915.7	23.5		
	457.85	11.75		
	228.93	5.88		
9 47			Sobs.	90° 5 4

Fog

Seeing (9.) 6, 6, 6.

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1878phae.proj.13013

~~110 Herculis~~ 1878 Aug. 3

Photometric H

σ Coronae, A; B

8 12 104.8 68.7 P. obs. 140° 3"
173.5
280.7 71.3
352.0
911.0 140.0
455.5 70.0
227.75 35.00

8 15 15.2 P. obs. 250° 3"
87.3 72.1
190.4 75.0
265.4
558.3 147.1
279.15 73.55
139.58 36.77

8 18 182 cloud.
nebel

8 28 16.9 69.2
86.1
197.6 68.2
265.8
566.4 137.4
283.2 68.7
141.6 34.35

8 31 ~~135.5~~ P. obs. 135° 3"
101.3 71.5
172.8
281.4 73.4
354.8
910.3 144.9
455.15 72.45
227.58 36.23

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1878phae.proj.1301S

Aug. 3, 1878

σ Coronae, A, C

8 36 — P. dbs. — 140° 8″ — A out of field

41.3	8.8	
49.1	7	
224.7		
231.9	7.2	
547.6	15.0	
273.5	~~8.0~~ 7.5	
136.75	~~4.0~~ 3.75	

8 39 — Ado — 300° 8″

132.2	11.6
143.8	
309.1	13.7
322.8	
907.9	25.3
453.95	12.65
226.98	6.33

8 45 — Sdo — 340° 8″ — A out of field

night — clouds

9 16 — 335° 8″

129.9	15.3
145.2	
305.0	19.6
324.6	
904.7	34.9
452.35	17.45
226.17	~~8.72~~

9 20 — Sdo — 140° 8″

~~140.5~~	
43.1	7.2
50.3	
123.5	7.7
231.2	
548.1	14.9
274.05	7.45
137.03	3.73

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1878phae.proj.1301S

Aug. 3, 1878

ν Coronae

9 27	43.3	8.5	Adv	330° 30'
	52.8	9		
	223.1	8.3		
	231.4			
	550.6	17.8		
	275.3	8.9		
	137.65	4.45		
	134.2	8.6	Adv.	330° 30"
	142.8			
	312.2	8.2		
9 32	320.4			
	909.6	16.8		
	454.8	8.4		
	227.40	4.20		
	42 Hercules		Sdv.	90° 4
9 42	135.8			
	145.5	9.7		
	317.0			
	328.9	7.9		
	923.2	17.6		
	461.6	8.8		
	230.80	4.40		
9 45	44.3		Sdv	300° 4"
	53.0	9.7 / 8		
	226.9	8.5		
	235.4			
	559.6	18.42		
	279.8	9.1 / 4.55	86 / 4.30	
	139.90			

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1878phae.proj.1301S

Aug 3, 1878

110 Herculis

9 57 47.6 1.8 P. obs. 0° 10″
49.4
226.4
228.5 2.1
551.9 3.9
275.95 1.95
137.97 0.98

10 1 137.8 2.2 P. obs. 220° 8″
146.0
315.7 2.1
317.8
911.3 4.3
455.65 2.15
227.82 1.08

10 10 140.0 1.5 S obs. 175° 4″
138.5
316.9 1.7
318.6
914.0 3.2
457.0 1.6
228.50 0.80

10 18 47.0 2.3 S obs. 10° 5″
49.3
228.0 1.6
229.6
553.9 3.9
276.95 1.95
138.47 0.98

Seeing (J.) 8, 7, 7

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1878phae.proj.13013

1878 Aug. 5 Photometer H.

8 41 σ Coronae, A & C.

P.obs. 320° 8″

43.1
539 10.8
223.8
233.2 9.4
554.0 20.2
277.0 10.1
138.50 5.05

8 44 134.8
144.3 9.5
311.6
321.5 9.9
912.2 19.4
456.1 9.7
228.05 4.85

P.obs. 150° 8″

8 47 134.0 10.2
144.2
278.2 5.1
139.1

Sdw. 120° 8″

clouds.

σ Coronae, A; B.

9 2 22.6 57.8
80.41

P.obs. 40° 3″

clouds.

9 32 199.0 63.0
262.0

P.obs. 90° 3″

~~48~~ 40 120.8
~~23~~ 20 60.4
~~15~~ 60 30.2

564.0
282.0
141.00

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Aug. 5, 1878

σ Coronæ, A; B

9 42 | 19.1 | 62.6 | Pole 90° 3"
81.7
200.7 | 59.0
259.7
561.2 | 121.6
280.6 | 60.8
140.30 | 30.40

9 50 | 106.3 | Pole 220° 3"
178.3 | 72.0
286.2 | 69.7
355.9
926.7 | 141.7
463.35 | 70.85
231.68 | 35.43

9 52 | 110.0 | 66.8 | Sole 220° 4"
176.8
292.7 | 76.0
358.7
938.2 | 142.8
469.1 | 71.4
234.55 | 35.70

9 56 | Sole. 90° 3"

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1878phae.proj.13013

Aug 7th 1878.

Sachs for Reading of Satellite IV. Long focus.

β Lyrae D. Hs. 120° 5"

8.09

	41.4	
	58.3	16.9
	222.6	
	241.5	18.9
	563.8	35.8
	281.9	17.9
	140.95	8.95

8 13 Ribs. 300° 5"

	130.5	
	148.6	18.1
	310.6	
	330.4	19.8
	920.1	37.9
	460.05	18.95
	230.02	9.47

8 18 Schs 290° 6"

	128.5	21.7
	150,2	
	310.8	
	333.8	20.0 (3)
	923.3	43.7 (4)
	461.65	~~21.85~~ 22.35
	230.83	~~10.92~~ 11.17

8 24 110° 6"

	43.0	
	605	17.5
	220.0	
	241.8	21.8
	565.3	39.3
	282.65	19.65
	141.33	9.83

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Aug. 7, 1878

	σ Cassiopeiae		a C.	
8 36	131.2	15.8	Sol.	300° 5" A B B in field
	147.0			
	313.2	19.2		
	332.4			
	923.8	35.0		
	461.9	17.5		
	230.95	8.75		
8 43	47.0	9.2	S B B	180° 5"
	58.2			
	225.6	11.41		
	237.0			
	565.8	20.6		
	282.90	10.3		
	141.45	5.15		
8 47	45.7	9.1	P. obs.	120° 5" A B B out of field
	54.8			
	226.7	8.1		
	234.8			
	562.0	17.2		
	281.0	8.6		
	140.50	4.30		
8 49	136.0	11.2	P. obs.	310° 5"
	147.2			Image of A B B looks
	313.6	12.2		blurred.
	325.8			
	922.6	23.4		
	461.3	11.7		
	230.65	5.85		

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Aug. 7, 1878

δ Coronæ a b

9 52 19.8 69.7 Sch 90° 3"
89.5
199.8 67.2
287.0
576.1 136.9
288.05 68.45
144.02 34.22

9 56 107.9 Sch 200° 3"
178.9 71.0
290.2
358.4 78.2
935.4 149.2
467.7 74.6 69.60
233.85 37.3 34.80

9 2 105.3 63.2 Pl. obs. 200° 3"
178.5
285.2 75.4
363.6
935.6 138.6
467.8 69.3 74.30
233.90 34.65 37.15
23.1 59.6 80° 3"
82.7
201.3 66.0
9 06 267.3
574.4 125.6
287.2 62.8
143.6 31.40

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Aug 7, 1878

ζ Draconis

9 14	47.3	10.4	Pol.	340° 3"
	57.7			
	226.4	8.9		
	235.3			
	566.7	19.3		
	283.35	9.65		
	141.67	4.83		
9 16	137.7	7.5	Pol.	100° 3"
	145.2			
	317.4	7.4		
	324.8			
	925.1	14.9		
	462.55	7.45		
	231.27	3.72		
9 19	135.2	6.6	Sdv	90° 3"
	144.8			
	318.5	6.0		
	324.5			
	926.0	12.6		
	463.0	6.3		
	231.50	3.15		
9 23	47.2	7.1	Sdv	310° 3"
	54.3			
	228.4	7.5		
	235.9			
	565.8	14.6		
	282.9	7.3		
	141.45	3.65		

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Aug 7, 1878

λ Hrs. Min.

P. obs. Images 60" apart

9 40 359.2 — 10 Read 0° index, to the right
92.8 — right hand image disappears
177.4 93.6 26 46.6 46.5 −0.8 −1.1 +1.3 +1.6
273.6 96.2 28 47.0 47.3 −0.4 −1 +2.3 +2.0
90 30 189.8 34 48.4 48.1 +1.0 +.7 +3.1 +3.4
451.35 94.9 98 47.8 48.1 +0.4 +.7 +3.1 +2.8
225.175 47.45 2.45 2.6 98
.65 2.45
.049 .186

9 42 12 — right — P. obs. Images 20" apart
94.3 93.1 27 — left hand image disappears
179.7 94.8 19 46.2 −.8 +1.2
274.5 19 46.9 −.1 +1.9
549.7 187.9 69 47.7 +.7 +2.7
274.85 97 9395 47.1 +.1 +2.1
137.42 46.97 1.7 2 1.7 7.9
.42 1.97
.32 .130

9 43 0.9 — −.8 P. obs. Images 10" apart
93.1 92.2 1.4 45.7 −.3 +.7
180.4 −1.3 46.4 +.4 +1.4
272.3 91.9 .6 46.3 +.3 +1.3
546.7 184.1 4.1 45.6 −.4 +.6
273.35 92.05 1.02 1.4 4.0
136.67 46.02 .35 1.00
.27 .76

9 45 5.0 +.7 P. obs. Images 5" apart
94.2 89.2 −1 44.3 −.7
183.8 −5 44.9 −1
274.4 90.6 1 45.5 +.5
557.4 179.8 1.4 45.1 +.1
278.70 89.90 .35 1.4
139.35 44.95 .35
.27

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1878phae.proj.1301S

Aug 7, 1878

X Ur. Mer

9 46 2.8 47.5 -2.5 Pict. Image 3" apart

98.2 95.4 47.9 +2.9 +1.4 +2.5

185.7 +1.8 +2.7

274.6 88.9 4.3 .7 -1.8 -7

561.3 ~~.3~~ 184.3 6.5 6.5 6.5

280.65 5.3 92.15 1.62 1.62 1.62

140.32 46.07 .123 .123

9 50 ~~3.6~~ ~~100.6~~ ? in dis. ~~0~~ Sols. Image 90° 3"

5.1 +3.3 ~~9.2~~ 46.7 +3.0 +1.7

150.8 95.7 ~~145.7~~ 95.7 10 49.0 +5.3 +4.0

191.1 9 ~~3.2~~ 40.7 -3.0 -4.3

X 270.4 ~~89.3~~ 79.3 14 ~~38~~.6 +5.7 -6.4

617.4 567.4 ~~235.0~~ 195.0 175.0 6.6 16.4 16.4

308.70 283.7 +17.50 97.5 87.5 1.65 4.1 4.10

X 154.35 141.85 ~~+58.75~~ 46.25 43.75 .312 .312

9 56 7.0 7 Sols 43.4 -1.35 -1.6

97.0 90.0 7 45.7 +1.0 +.7

186.2 1 45.1 +.4 +1

275.0 88.8 13 43.7 -1.0 -1.3

565.2 178.8 .7 3.7 3.7

282.6 89.4 .92 .92

141.30 44.70 .070 .070

9 58 5.5 43.4 13 1.6 1.6 45.9 +1.2 10" +1.9

94.1 88.6 45.2 5 2 +.2 42.7 -2.0 -2.3

182.9 46.0 13 1.0 +1.0 48.5 +3.8 +3.5

X 555.7 ~~560.7~~ 178.9 44.3 4 7 -.7 41.8 -2.9 -3.2

277.85 282.85 89.45 35 35 9.9 9.9

138.92 141.42 44.72 .87 .87 ~~2.47~~ 2.47

.066 .066 ~~.188~~ .188

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1979phae.proj.13015

Aug 7, 1878

10 1 35 8.6
93.8 95.2
177.2
273.2 96.0
902.8 191.2
451.4 95.60
225.70 47.80

21 Sds 70"
11 47.1 -.7 +2.1
35 48.1 +.3 +3.1
25 48.5 +.7 +3.5
92 47.5 -.3 +2.5
230 2.0 11.2
.5 2.80
.038 .213

10 4 1.0
88.2 ~~86.8~~ 87.2
179.7
272.8 93.1 93.1
X 541.7 179.9 180.3
270.85 89.95 90.15
135.427 44.97 45.07

6 Sds 60"
22 44.4 .7 -.6
7 42.8 2.3 -2.2
11 45.7 .6 +.7
59 47.4 2.3 +2.4
1.47 5.9 5.9
1.47
.112 .112

51 Cephei

Dists. 5" Position of image

10 36 359.5 94.3 P. obs. 22 next 00 index 90°
93.8 47.2 +1.3 +.5 +2.2
180.6 21 47.1 +1.2 +.4 +2.1
X 2730 183.7 92.4 1867 11 46.1 +1.2 -.6 +1.1
906.9 91.85 93.35 13 46.3 -.4 +1.3
453.45 45.92 46.67 67 1.67 1.9 6.7
226.72 .42 1.67
.032 .127

NU 38 5.7 83.6 36 P. obs. 180°
89.3 41.4 -1.0 -3.6
183.7 86.0 42.2 -.2 -2.8
269.7 169.6 43.4 +1.0 -1.6
548.4 84.80 42.6 +.2 -2.4
274.2 42.40 24
137.1 .60 .046 .198 10.4 2.60

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1878phae.proj.1301S

Aug. 9, 1878

51 Cephei P. obs. 135°

10 40	3,4	91.7	45.3	+.9	+.3
	95.1		46.4	+2.0	+1.4
	185.1	86.1	43.6	-.8	-1.4
	271.2	177.8	42.5	-1.9	-2.5
	554.8	88.9		5.6	5.6
	277.4			1.40	1.40
	138.70	44.45		.106	106
10 42	5.1	87.2	P. obs.		225°
	92.3		42.7	-1.0	-2.3
	183.2	87.6	44.5	+.8	-.5
	270.8		44.6	+.9	-.4
	551.4	174.8	43.0	-.7	-2.0
	275.7	87.4		3.4	5.2
	137.85	43.70		.85	1.30
				.065	.099
10 45	3.3	92.7	S obs	90°	5° O Index Corr
	96.0		45.0	-2.7	0 -2.2
	179.0	96.0	47.7	.05	+2.7 +.5
	275.0		49.3	+.62	+4.3 +2.1
	553.3	188.7	46.7	-1.05	+1.7 -.5
	276.65	94.35		5.3	8.7 5.3
	138.32	47.17		1.32	2.17 1.32
				.100	.165 1.00
10 49	10.0	96.2	S obs.		45°
	86.2		36.8	-4.1	-8.2
	181.7	87.5	39.4	-1.5	-5.6
	269.2		45.6	+4.2	+.1
	547.1	163.7	42.4	+1.5	-2.6
	273.55	81.85		11.3	16.5
	136.77	40.92		3.82	4.12
				.290	.313

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1878phae.proj.13019

Aug 7, 1878

10 51 10.8 81.5 Sobs +60° 0°

92.3

182.2 89.0

271.2

556.5 170.5 38.3 -4.3 -6.7

278.25 85.25 43.2 +.6 -1.8

139.12 42.62 46.9 +4.3 +1.9

42.1 -.5 -2.9

9.7 13.3

2.42 3.32

.184 .252

10 54 9.5 80.4 Sobs ~~42.5°~~ 3/57

~~89.9~~

~~184.8~~ 79.8 39.3 -.7 -5.7

267.9 41.1 +1.1 -3.9

41.0 +1.0 -4.0

5548 ~~555.1~~ 160.2 38.8 -1.2 -6.2

277.402 ~~77.55~~ 80.10 4.0 19.8

138.701 ~~38.771~~ 40.05 1.00 4.95

.076 .376

X Ures. Min. Pobs. 0° 5-11

11 9 2.4 46.9 +.6 +1.9

950 92.6 45.7 -.6 +.7

183.7 45.6 -.7 +.6

276.2 92.5 46.9 +.6 +1.9

557.3 185.1 2.5 5.1

278.65 92.55 .62 1.27

139.32 46.27 .047 .097

11 10 1.8 Pobs. 45°

95.7 93.9 47.9 +.5 +2.9

182.8 46.0 -1.4 +1.0

278.6 95.8 46.9 -.5 +1.9

558.9 189.7 48.9 +1.5 +3.9

279.45 94.85 3.9 9.7

139.72 47.42 .97 2.42

.074 .184

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1878phae.proj.1301S

Aug. 7, 1878

	Obs. Min.		P. obs. 90°		
11 12	359.4		49.0	+1.0	+4.0
	97.5	98.1	49.1	+1.1	+4.1
	184.4		47.0	−1.0	+2.0
	275.2	93.8	46.8	−1.2	+1.8
	913.5	191.9		4.3	11.9
	456.75	95.95		107	2.97
	228.37	47.97		.081	.226
11 14	4.9		P. obs.	135°	
	92.0	87.1	43.5	+.4	−1.5
	185.9		43.6	+.5	−1.4
	271.1	85.2	42.5	−.6	−2.5
	553.9	172.3	42.7	−.4	−2.3
	276.95	86.15		19	7.7
	138.42	43.08		.47	1.92
				.036	.146
11 19	7.8		P. obs.	180°	
	89.7	81.9	40.6 / 6.7	−2.7	−1.2 −4.4
	185.4		41.3	−1.5	−.5 −3.7
	270.9	85.5	43.0 / 7.5	+.2	+1.2 −2.0
	553.8	167.4	42.5	+.3	+.7 −2.5
	276.90	83.70			3.6 12.6
	138.45	41.85			.90 3.15
11 21	6.8		P. obs.	225°	.068 .239
	90.8	84.0	41.5	−.9	−3.5
	184.9		42.5	+.1	−2.5
	270.7	85.8	43.4	+1.0	−1.6
	553.2	169.8	42.4	0	−2.6
	276.6	84.90		20	10.2
	138.30	42.45		.50	2.55
				.058	.194

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1878phae.proj.13015

Aug. 7, 1878

ℓ Ursæ Min. Pobs. 270°

11 23	6.7		42.1	+1.2	-2.9	
	89.4	82.7	40.6	-.3	-4.4	
	189.2		39.6	-1.3	-5.4	
	270.1	80.9	41.3	+.4	-3.7	
	555.4	163.6		3.2	164	
	277.70	81.8		.80	4.10	
	138.85	40.90		.061	.312	

Pobs. 315-0

11 25	7.6		
	93.8	86.2	
	186.8		
	270.3	83.5	
	558.5	41.75	169.7
	278.25	20.87	42.42
	139.12		

41.5	-.9	-3.5		
44.7	+2.3	-.3		
42.3	-.1	-2.4	Dec 57.7.5	
41.2	-1.2	-3.8	P 7.7.6	
	4.5	103		
	1.12	2.57		
	.085	.195		

Jupiter I; II Pobs.

11 34	95.7		
	171.6	75.9	I disappears.
	278.0	77.6	75.9
11 35	355.6		77.6
	900.9	153.5	153.5
	450.45		76.75
	225.23		38.37
11 39	94.1	83.5	I dis. Sobs
	177.6	83.5	
	277.7	81.1	
	358.8	81.1	
	908.2	164.6	164.6
	454.1	82.3	
	227.05	41.15	

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1878phae.proj.1301S

Aug. 7, 1878

Jupiter I ; II.

11 42	94.2	81.1		Pl. obs.
	175.3		81.1	
	280.8	73.2		
11 44	354.0		73.2	
	904.3	155.3	154.3	
	452.15		97.15	
	226.07		38.57	
11 48	97.6	78.0		Pl. obs.
	175.6		78.0	
	278.9	76.8		
11 49	355.7		76.8	
	907.8	155.8	154.8	
	453.90		77.4	
	226.95		38.70	
11 52	98.2	75.9		Pl. obs.
	174.1		75.9	
	280.0	78.3		
11 53	358.3		78.3	
	910.6	154.2	154.2	
	455.36		77.10	
	227.65		38.55	
11 57	96.2	82.0		Pl. obs.
	178.2	82.0		
	277.6	78.1		
11 58	355.7	78.1		
	907.84	160.1		
	453.45	80.05	60.1	
	226.97	40.02		

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1878phae.proj.13015

Aug 7, 1878

Jupiter I ; II

P. obs.

12 2 95.0 85.1
180.1 85.1
277.0 83.0
12 3 360.0 83.0
912.1 168.1 168.1
456.05 84.05
228.02 42.03
12 4 94.8 84.0
178.8 84.0
282.8 72.0
12 5 354.8 72.0
911.2 156.0 156.0
455.60 78.0
227.80 39.00
12.6 95.8 76.8
172.6 76.8
279.7 74.1
12 7 353.8 74.1
901.9 150.9 150.9
450.95 75.45
225.47 37.72
12 7 94.2 80.5
174.7 80.5
275.2 80.2
12 8 355.4 80.2
899.5 160.7 160.7
449.75 80.35
224.87 40.17
12 9 0 Satellite gone.

P. obs. Images in contact with Jupiter

P. obs. Satellite half gone

P. obs.

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1878phae.proj.1301S

Aug 7, 1878

γ Pise. Anst. Comp. seen with Phot I
not with Phot II.

β Pise Anst.

12 50 126.8 19.9 100° 6"
146.7 19.9
308.4 16.6
325.0 16.6
906.9 36.5
453.45 18.25
227.12 9.12

12 55 35.3 22.4 260° 5"
57.7 22.4
214.1 23.5
237.6 23.5
544.7 45.9
272.35 22.95
136.17 11.47

13 5 Saturn 'definition excellent. 7, 8, 7 1.?
'Jap 2d Ring Rh.

13 20 Jupiter. Pole
146.
124
194
186
192
191

4.33
1.722

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1878phae.proj.13015

Aug 7, 1878

13 29 Lilea R. A.

2,88
3,20
2,81
3,13
2,97
4.99
2.998

ν 3451 Bond, 394.

22h 59 22 = 13h 51 0 C.m.t. 44.5
23h 0 23 =
1 23

14 23 22
23 41

14 47/46
23 55 22 Predicted by ν 3451

~~Set reflecting image at 1.00~~

ν 3454 B 394

0 13 35 = 15 0 0
0 14 35 15 6 C.m.t.
15 4 44.5
5

23 0 +22
0 14 +10
0 02 12
56 13

14 23 22
23 41
47 3

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Aug 7, 1878

Jupiters Sats.

13 58
1.17
1.29
1.34
1.14
1.20
1.14
1.228

14 2
1.59
1.75
1.50
1.86
1.42
3.12
1.624

P. obs.

Set reflected image at 1.00

P. obs. reappearance of Jupiter I,

Chron. 7 3115-1 Photometer E. J

Reappearance

14h 47 ~~48~~m	23	23h	56m	10s	32	
	55			42	16	0.64
48.						
~~49~~	11			58	15	0.79
	26		57	13	12	.86
	38			25	22	.80
49.						
50.	0			47	31	.97
	31		58	18	32	1.33
50	3			50		1.16

clock stopped

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1878phae.proj.13015

Aug 7, 1878

Chron. 7.3451 Photometer 8. J

0h	0m	29s	1.59	
		45	1.40	
		57	1.41	
	1	13	1.30	
		27	1.47	
		171	217	2.17
		29' 34.2	1.434	1.434
		0m 580		

14h 52m 100.

	2	49	1.52	
	3	10	1.413	
		30	1.23	
		45	1.40	
	4	0	1.28	
		134	186	1.86
	3m	270	1.372	1.372

14h. 55m. 39o. Ch 1

Seeing 4.4.3

Satellite apparent within violet haze surrounding Jupiter. Disk large, ruddy; contrasts in consequence very difficult

1878phae.proj.1301S

+.05 = 5.45

Hailstorm Aug 9th. 5.40. P.M.

1st Weight 1 oz - Greatest Diameter 2 in
Least " " 1 1/4 in
2d " 1 7/10 oz - Greatest " 2 in
3d " 2 1/10 - Least " 1 6/10 in
Greatest " " 3 in x 2.2 1.8
Least
4th " 1 7/10 oz - Greatest " "
5th 3 together 5 3/10 oz -
6th altogether - 8 1/2 oz -



5 concentric layers. Light and dark

+.05 = 6.00

7th 1 7/10 oz - Diameter. 2 in at 5.55.
in one 11 layers.

6. in oval dish
3 in tumbler in icehouse. 1 in tumbler in study -

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Aug. 9, 1878

Mr. Leavitt brought one clover which weighed $8\frac{3}{4}$ oz. picked up within five minutes after fully. Largest clover quarter of an hour after fully weighed $4\frac{1}{4}$ oz. Greatest diameter $2\frac{1}{4}$ inches.

1 clover + tumbler	$= 4\frac{7}{8}$	tumbler	$= 3\frac{1}{8}$
3 clover	$= 7\frac{1}{8}$	"	$= 2\frac{5}{8}$
6 " " dish.	$16\frac{3}{4}$	dish	$= 10$

$1.75 \quad \frac{4.5}{2} = 1.5 \quad \frac{6.37}{6} = 1.06$

1 = 1.75
3 each 1.5
6 " = 1.06

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1878phae.proj.1301S

Aug 9, and Aug 11, 1878

Aug. 9th 1878, Thunder Showers. Hail in afternoon. Rain at 9.15 Jupiter emerged from cloud at 9.35 & Rudra below.

9 40 × Ugs. Min. 4.0 lower limb Sdo. 0° 5"
98.0 94.0
189.2 88.6
277.8
569.0 182.6
284.5 91.3
142.25 45.85
9 43 6.8

Clouds

Aug 11, 1878

~~Aug. 11, 1878.~~

~~Belgrad~~ S. obs.

Clock would not run.

D.M. + 89°.3

8 37 0.4 95.4 P. obs. 90° 5"
95.8
182.7 94.9
277.6
556.5 190.3
278.25 95.15
159.12 47.58

right hand image disappears

48.7 +2.1 +3.7
46.7 -.9 1.7
46.4 -1.2 1.4
48.5 +.9 3.5
4.1 10.3
1.02 +2.57
.078 .195

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1878phae.proj:13015

Aug 11, 1878

~~Aug 11, 1878~~
~~ζ Leporis~~
~~8 38~~ DM + 89° 3 ~~ζ Lep~~

8 41

0.0		
100.3	100.3	
177.0	99.9	
276.9		
5754.2	200.2	
277.1	100.1	
1378.55	50.05	

P. obs. 135° 5″

48.5	-1.5	3.5
51.8	+1.5	6.8
51.5	+1.5	6.5
48.4	-1.6	3.4
	64	202
	1.60	5.05
	.122	.384

8 43

2.8	
96.1	93.3
181.2	96.6
277.8	
557.9	189.9
278.95	94.95
139.47	47.47

P. obs. 180° 5″

46.7	-.8	1.7
46.6	-.9	1.6
48.3	+.8	3.3
48.3	+.8	3.3
	.33	9.9
	.82	2.47
	.062	.185

8 45

2.2	
94.2	92.0
188.4	87.0
275.4	
560.2	179.0
280.1	89.5
140.05	44.75

P. obs. 225° 5″

47.8	Focus	2.24
47.7		
44.2	+3.1	+2.8
41.6	-.5	-.8
45.4	-3.1	-3.4
	+.7	+.4
	7.4	7.4
	1.85	1.85
	.141	.141

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1878phae.proj.1301S

Aug. 11, 1878

9m DM +89° 3 Stars 229 Ly α Ursae Min.

8 55 4.8 90.4 Sdo 90° 5'

	95.2		44.6	-.8	-.4
	183.2	91.1	45.8	+.4	+.8
	274.3		46.2	+.8	+1.2
	557.5	181.5	44.9	+.5	-.1
	278.75	90.75		2.5	2.5
	139.37	45.378		.62	.62
				.47	.47

9 0 Sdo 135° 5'

	358.7	96.5	50.4		
	95.2		46.1	+2.8	+5.4
	184.4	93.8	44.7	-1.5	+1.1
	278.2		49.1	-2.9	-.3
	916.5	190.3		+1.5	+4.1
	458.25	95.15		87	109
	229.12	47.57		8.192 2.17	2.72
				.146	.207

9 4 0.5 96.8 Sdo 180° 5'

	97.3		49.0		
	182.6	95.2	46.9	+1.0	+4.0
	277.8		48.3	-2	+2.8
	558.2	192.0		-11	+1.9
	279.10	96.0		+3	+3.3
	139.55	48.0		3.6	12.0
				2.9065	3.00
				.068	.228

9 7 10.5 84.6 Sdo 225° 5'

	95.1		39.9		
	183.3	89.5	44.7	-3.6	-5.1
	272.8		47.1	+1.2	-.3
	561.7	174.1	47.4	+3.6	+2.1
	280.85	87.05		-1.1	-2.6
	140.42	43.52		9.5	10.1
				2.37	2.52
				.180	.192

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Aug 11, 1878

Limit of visibility of image nearest the 90 vernier.

90°

9	11	30.3		P. obs. Image at 270° out of field.
		61.8	31.5	
		208.6		
		244.2	35.6	
		549	67.1	
		272.45	33.55	
		136.22	16.77	
9	14	122.8		P. obs. 270°
		153.3	30.5	Image at 90° out of field
		300.4		
		336.3	35.9	
		912.8	66.4	
		456.4		
		228.20	16.80	
9	18	123.8		S obs. 270°
		151.8	28.0	
		303.5		
		331.2	27.7	
		910.3	55.7	
		455.15	27.85	
		227.57	13.92	
9	20	31.6		S obs.
		60.2	28.6	
		213.9		
		239.8	25.9	
		545.5	54.5	
		272.75	27.25	
		136.37	13.62	

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Aug 11, 1878

	Hrs. Min.		
9 25	136.6		Limit of visibility
	138.3	1.7	P. obs. Image at 270°
	316.5		
	317.4	0.9	
	908	2.6	
	454.4	1.3	
	227.20	0.65	
9 28	46.2		P. obs. Image at 90°
	46.4	0.2	No point of disappearance perceptible.
	228.1		
	228.8	0.7	No point of disappearance perceptible
	549.5	0.9	
	274.75		
	137.37	0.22	
9 30	46.7		S obs. 90°
	46.7	0	No point of disappearance
			no point as faint as limit selected in drawing previous obs.
	467	0.0	
9 34	317.4		S obs. 270°
	317.4	0	
	138.0		
	138.2	2	
	911.0		
	4555		
	2277.5	.05	

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1970phae.proj.13013

Aug. 11, 18-78

51 Cephei Limit of visibility

9 52	44.2	5.8	Prob.	Image at 90°
	50.0			
	224.4	5.5		
	229.9			
	548.5	11.3		
	274.25	5.65		
	137.12	2.82		
9 55	135.3	5.9	Prob.	Image at 270°
	141.2			
	313.3	6.2		
	319.5			
	909.3	12.1		
	454.65			
	227.32	3.02		
9 58	135.8	5.1	Sch.	270°
	140.9			
	314.4	4.4		
	318.8			
	909.9	9.5		
	454.95	4.75		
	227.47	2.37		
10 3	45.0	4.9	Sch.	90°
	49.9			
	225.0	4.7		
	229.7			
	549.6			
	274.80			
	137.40	2.4		

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Aug. 11, 1878

λ Urs. Min. Limit of visibility

10 10	132.5		Pols. Image at 270°
	143.1	9 10.6	
	311.4		
	321.6	10.2	
	908.6	~~9.5~~ 208	
	454.3	~~9.7~~ 10.4	
	227.15	~~4.9~~ 5.20	
10 12	42.3	11.1	Pols. Image at 90°
	53.4		
	222.2		
	233.3	11.1	
	551.2	22.2	
	275.6	11.1	
	137.80	5.55	
10 14	43.2	9.0	Sdw Image at 90°
	52.2		
	227.9	8.0	
	230.9		
	549.2	17.0	
	274.6	8.5	
	137.30	4.25	
10 21	132.0	10.0	Sdw. Image at 270°
	142.0		
	312.9	9.2	
	322.1		
	909.0	19.2	
	454.5	9.6	
	227.25	4.8	

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1879phae.proj.13015

Aug 12th 1878. Opened dome at 6.30

B 39 4 — T. 34 51

6 51 0 — 16 19 3.0

52 — 16 20 3.0

Jupiter's clouds at time of eclipse. Dept too strong & slender.

λ Ursæ Minoris

Images 90 Distance 5

Effect of variation of focus

At focus reading 2.m25 P. Obs.

Reading 2.05

8.6	92.3	45.3	−.5	+.3
100.9		47.0	+1.2	+2.0
187.6	90.8	46.3	+.5	+1.3
278.4		44.5	−1.3	−.5
575.5	183.1		3.5	4.1
	91.55		.87	1.02
287.75	45.77		.066	.078
143.88				

Reading 2.15

					Corr
6.9	91.9	47.6	.0	+2.6	.0
98.8		44.3	−2.3	−.7	−3.3
186.9	98.4	47.6	0	+2.6	0
285.3		50.8	+3.2	+5.8	+3.2
577.9	190.3		5.5	11.7	6.5
	95.15		1.37	2.92	1.62
288.95	47.57		.161	.342	.086
144.47					.974
					1.134
					.12312

Focus reading 2.27

292
87
2044
2336
25400

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Aug 12, 1878

Reading 2.25

8 0

9.6 93.8
103.4
188.3 95.5
283.8
189.3
94.65
47.32

585.1
292.55
146.27

46.7 -.6 +1.7
47.1 -2 +2.1
48.0 +.7 +3.0
47.5 -.2 +2.5
1.7 9.3
.42 2.32
.032 .176

Reading 2.35

7.6 92.6
100.2
186.4 101.0
287.4
193.6
96.80
48.40

581.6
290.80
145.40

48.7 +3 +3.7
43.9 -4.5 -1.1
50.0 +1.6 +5.0
51.0 +2.6 +6.0
9.0 15.8
2.25 .395
.171 .300

Reading 2.45

8 8

8.0 93.8
101.8 < 270° disappr.
187.2 96.8
284.0
190.6
95.3
47.65

581.0
290.50
145.25

2.8 47.2 -.4 +2.2
1.3 46.6 -1.0 +1.6
6.7 48.0 +.4 +3.0
3.5 48.8 +1.2 +3.8
3.0 10.6
.75 2.65
.57 .201

5.5
Sato

Readings for focus

2.22 right
2.25 left "
2.21 right "
2.31 left "
2.21 right "
2.24

± .032

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1970phae.proj.13015

Aug. 12, 1878

S Ari.

Reading 2.04

δ 28

7.6 < 90° disappears
100.7
187.6
283.2
579.1
289.55
144.77

93.1
95.6
188.7
94.35
47.17

47.2 0 +22
45.9 -1.3 +9
47.2 0 +22
48.4 +12 +34
2.5 87
.62 2.17
.047 .165

Reading 2.14

4.6 96.2
100.8
184.9 97.2
282.1
574.4
286.20
143.10

193.4
96.70
48.35

18.5 +2 +3.5
47.7 -.6 +2.7
48.2 -1 +3.2
49.0 +7 +4.0
16 13.4
.40 3.35
.030 .253

Reading 2.24

5.0 89.8
94.8
186.6 94.6
281.2
567.6
283.80
141.90

184.4
92.2
46.10

46.9 +.8 +1.9
42.9 -3.2 -2.1
45.3 -.8 +.3
49.3 +3.2 +4.3
8.0 8.6
2.00 2.15
.152 .163

Reading 2.34

δ 40

6.2
98.4 92.2
189.0 93.6
282.6
576.2
288.1
144.05

185.8
92.9
46.45

47.8 +1.4 +3.8
44.4 -2.0 -.6
45.0 +1.4 0
48.6 +2.2 +3.6
7.0 8.0
1.75 2.00 1.75
.133 .152

Reading 2.44

δ 52

2.2
99.6 97.4
183.5 96.1
279.6
564.9
282.45
141.22

193.5
96.75
48.37

49.0 +6 +4.0
48.4 0 +3.4
47.7 -7 +2.7
48.4 0 +3.4
13 13.5
.32 3.37
.024 .256

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Aug. 12, 1878

Settings for focus, λ Ursae Minoris

8 57

2.13	2
2.07	4
2.12	1
2.08	3
2.15	4
2.110	14
	.028

U. obs.

4 2
6 0
7 1
3
1

9

9 7

8.6 Reading 1.91 U. obs.

100.5 — image at 90° disappears

189.2 91.9 85.1 44.6 +3 −.5

274.3 47.4 +3.2 +2.4

572.6 1770 43.9 −.3 −1.1

286.30 88.50 41.2 −3.0 −3.8

143.15 44.25 68 7.8

1.75 1.95

.133 1.48

9 12

10.4 Reading 2.01 U. obs.

99.7 89.3 44.9 +1 −1

190.5 90.0 44.4 −4 −6

280.5 1793 44.8 +0 −2

581.1 89.65 45.2 +4 +1

290.55 44.82 9 11

145.27 .22 .37

.017 .028

9 15

9.8 Reading 2.11 U. obs.

96.4 86.6 43.9 +2 −1.1

190.2 88.2 42.7 −10 −23

278.4 43.5 −2 −1.5

574.8 1748 44.7 +10 −.3

287.40 87.40 24

143.70 43.70 .60 .52

1.30

.046 .099

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1078phae.proj.13013

Aug. 12, 1878

λ Urs. Min.

9 17 9.0 Reading 2.21 N. obs.

99.0	90.0	46.2	+.9	+1.2
190.8	91.2	43.8	-1.5	-1.2
282.0	181.2	44.4	-.9	-.6
580.8	90.60	46.8	+1.5	+1.8
290.40	45.30		4.8	4.8
145.20			1.20	1.20
			.091	.091

9 20 7.6 Reading 2.31 N. obs.

99.8	92.2	46.0	+.7	+10
189.0	89.2	46.2	+.9	+12
278.2	181.4	44.6	-.7	-.4
574.6	90.70	44.6	-.7	-.4
287.30	45.35		30	30
143.65			.75	.75
			.057	.057

Reading 2.24

9 26 11.4 83.1 41.2 S obs -2.2 -3.8

94.5		41.9	-1.5	-3.1
187.1	90.4	45.5	Angle 0° Dist. 5" +2.1	+.5
277.5	173.5	44.9	+1.5	-.1
570.5	86.75		7.3	7.5
285.25	43.37		1.82	1.87
142.62			.138	.142

9 28 12.4 89.4 43.0 Angle 45° Dist. 5"

101.8		46.4	-2.4	-2.0
187.7	92.2	47.7	+1.0	+1.4
279.9	181.6	44.5	+2.3	+2.7
581.8	90.80		-.9	-.5
290.90	45.40		6.6	6.6
145.45			1.65	1.65
			.125	.125

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1878phae.proj.1301S

Aug 12, 1878

9 30

8.2 92.4
180.6
184.0 96.3
280.3
573.1 188.7
281.55 94.35
143.27 47.17

3.6 192.1
105.7
185.8 94.5
280.3
575.4 196.6
287.70 98.30
143.85 49.15

Angle 90°

			S. obs.
45.1	-2.1	+.1	
47.3	+1	+2.3	
49.3	+2.1	+4.3	
47.0	-2	+2.0	
	45.2	8.7	
	1.12	.435	
	.085	.165	
~~44.1~~	50.2	+1.1	+5.2
~~48.0~~	51.9	+2.8	+6.9
	48.0	-1.1	+3.0
	46.5	-2.6	+1.5
		7.6	16.6
		1.90	4.15
		.144	.315

9 38

2.5 98.9
101.4
187.3 94.0
281.3
572.5 192.9
286.25 96.45
143.13 48.22

Angle 180°

50.6	+2.4	5.6
48.3	+1	3.3
45.8	-2.4	8
48.2	0	3.2
	4.9	11.9
	1.22	3.12
	.093	.245

9 40

8.3 89.9
98.2
186.1 91.4
277.5
570.1 181.3
285.05 90.65
142.52 45.32

Angle 225°

44.2	-1.1	-.8
45.7	+4	+.7
46.4	+11	+1.4
45.0	-3	0
	2.9	2.9
	.72	.72
	.055	.055

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1078phae.proj.13015

Aug 12, 1878

9 42	11.2	84.7	Angle 270° S. Ob.		
	95.9		42.3	-.6	-2.7
	190.0	87.0	42.4	-.5	-2.6
	277.0		43.5	+.6	-1.5
	57#.1	171.7	43.5	+.6	-1.5
	287.05	85.85		2.3	8.3
		42.92		.57	2.07
	143.52			.043	.157
9 44	11.8	83.3		Angle 315	
	95.1		41.3	-2	-3.7
	191.4	82.7	42.0	+5	-3.0
	274.1		41.7	+2	-3.3
	572.4	166.0	41.0	-5	-4.0
	286.20	83.0		14	140
		41.50		.35	3.50
	143.10			.027	.266

Photometer I

Iapetus not identified. Only one satellite, probably Titan, seen on the preceding side of Saturn. Two objects following Saturn.

Seeing P. 4, 6, 7

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1878phae.proj.1301S

Aug 14th 1878.

λ Ursae Minor. Under.

8 02 5.0 90.9 45.2 -1.2 90° +.2
95.9 45.7 -.7 +.7
182.6 94.9 47.6 +1.2 +2.6
277.5 47.3 +.9 +2.3
561.0 185.8 4.0 5.8
280.5 92.9 4.00 1.45
140.25 46.45 .076

8 06 3.7 92.2 Under. 20"
95.9 #46.7 +1.7
187.2 87.8 45.5 +.5
275.0 43.2 -1.8
561.8 180.0 44.6 -.4
280.9 90.0 44 1.10
140.45 45.00 .084

8 08 5.4 Under. 10"
98.2 90.8 46.3 +1.1 +1.3
187.6 44.5 -.7 -.5
277.6 90.0 44.4 -.9 -.9
566.8 180.8 45.9 +.7 +.9
283.4 90.4 3.4 3.6
141.70 45.20 .85 .90
.65

8 11 6.9 87.9 Under. 5"
94.8 44.2 +1.1
189.0 84.7 43.7 +.6
273.7 42.1 -1.1
564.4 172.6 42.6 -.5
282.2 86.3 3.3
141.10 43.15 .82
.062

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1878phae.proj.13018

Aug. 14, 1878

	λ Hrs. Min.		U. obs.	3"
δ 15	8.6	86.2	43.0	-.5
	94.8		43.2	-.3
	87.6	87.8	44.0	+.5
	275.4		43.8	+.3
	566.4	174.0		1.60
	283.2	87.0		.40
	141.60	43.50		.030
δ 24	4.8	88.6	U. obs.	0° 5"
	93.4		45.3	+.2
	184.5		42.3	-2.2
	277.8	93.3	45.6	+.1
	560.5	181.9	47.7	+2.2
	280.25	90.95		4.7
	140.13	45.47		1.17
			.04	.09
δ 28.	5.0	89.3	U. obs.	45° 5"
	94.3		45.0	+.7
	186.5	87.8	44.3	.0
	274.3		43.5	-.8
	560.1	177.1	44.3	0
	280.05	88.55		.15
	140.02	44.28		.037
			.05	.03
δ 32	4.4		U. obs.	90° 5"
	95.3	90.9	46.9	+2.9
	190.2	85.3	44.0	.0
	275.5		41.1	-2.9
	565.4	176.2	44.2	+.2
	282.7	88.1		6.0
	141.3	44.05		.150
			.07	.11

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Aug. 14, 1878.

λ Urs. Min.

8 35

5.8		
96.5	90.7	
186.5	89.8	
276.3		
365.1	180.5	
282.55	90.25	
141.27	45.13	

U. obs. 135° 5"

45.5	+.4
45.2	+.1
44.8	−.3
45.0	−.1
	9
	.22
.01	.02

8 40

5.0		
95.5	90.5	
182.0	91.4	
273.4		
555.9	181.9	
277.95	90.95	
138.98	45.47	

U. obs. 180° 5"

44.0	−1.5
46.5	+1.0
47.0	+1.5
44.4	−1.1
	51
	8.5 01.27
.04	.17

8 43

7.3	86.7	
94.0		
185.6	92.7	
278.3		
565.2	179.4	
282.6	89.7	
141.30	44.85	

U obs 225° 5"

44.0	−.8
42.7	−2.1
45.7	+.9
47.0	+2.2
	6.0
	.150
.04	.11

8 45

2.9	94.1	
97.0		
184.2	93.3	
277.5		
561.6	187.4	
280.8	93.7	
140.40	46.85	

U obs 270 5"

47.5	+.7
46.6	−.2
46.2	−.6
47.1	+.3
	181.0
	.45
.14	.03

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Aug. 14, 1878

λ Urs. Min.

U. obs. 315° 5″

49	91.8	46.3	+.5
96.7		45.5	−.3
185.8	91.6	45.4	+.4
277.4		46.2	+4
564.8	183.4		16
282.4	91.7		.040
141.20	45.85	+.06	.03

DM. +89° 3

U. obs. 0° 5″

9 4	9.5	80.8	40.6	−1.8
	90.3		40.2	−2.2
	185.8	89.0	44.3	+1.9
	274.8		44.7	+2.3
	560.4	169.8		8.2
	280.2	84.9		.205
	140.10	42.45	−.19	.16

U. obs. 45° 5″

9 8	7.4	88.9	45.0	+.5
	96.3		43.9	−.6
	188.4	89.0	44.0	+.5
	277.4		45.0	−.5
	569.5	177.9		.21
	284.75	88.95		.052
	142.37	44.47	−.04	.04

U. obs. 90° 5″

9 12	6.6	87.0	43.6	+1.1
	93.6		43.4	+.9
	188.8	83.1	41.4	−1.9
	271.9		40.7	−.8
	560.9	170.1		3.7
	280.45	85.05		.097
	140.22	42.52		
			−.19	.07

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Aug. 14, 1878

DM. +89° 3

9 16

1.5				
96.5	95.0	47.7	+.7	
182.8		47.3	+.3	
275.9	93.1	46.4	−.6	
556.7	188.1	46.7	−.3	
278.35	94.05		.19	
139.17	47.02	+.15	.047	
			.04	

U. obs. 135° 5"

9 25 51 Cephei

4.6	89.4	44.4		
92.0			+1.5	
187.5	84.3	43.0	+.1	
271.8		41.5	−1.4	
555.9	173.7	42.8	−.1	
277.95	85.85		.31	
138.97	42.92		.077	
		−.16	.06	

U obs. 0°

9 28

8.2	84.3			
92.5		41.6	+.1	
188.4	81.7	42.7	1.2	
270.1		41.4	+.1	
559.2	166.0	40.3	−1.2	
279.60	83.0		26	
139.80	41.50		.065	
		−.27	.05	

U obs. 45°

9 29

9.3	84.8			
94.1		41.2	−.5	
188.3	82.2	43.6	+1.9	
270.5		42.2	+.5	
562.2	167.0	40.0	−1.7	
281.10	83.5		4.8	
140.55	41.75		.115	
		−.25	.09	

U obs. 90°

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Aug. 14, 1878

9 32 2.7 91.2 Obs. 135°

93.9

184.5 88.1

272.8

553.7 179.3

276.85 89.65

138.42 44.83

45.7 +0.9
45.5 +0.7
43.9 −.9
44.2 −.6
.2 .1 3.1
.077
−.14 .06

Lyra

P. Pts.

9 44 126.1 21.3 by a 270° Dist. 5′ a out of field.

147.4

309.3 21.3

330.6 .1

913.4 42.6

456.70 21.3

228.35 10.65

9 48 39.1 17.6 P. Pts. 110° 5″

56.7

221.6 18.7

240.3

557.7 36.3

278.85 18.15

139.42 9.07

9 51 37.0 21.8 S. Pts. 80° 5″

58.8

218.8 20.0

238.8

553.4 41.8

276.70 20.90

138.35 10.45

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Aug 14, 1878

β Lyrae (contin.)

9 53

128.3
146.4 18.1
307.3
329.9 22.6

911.9 40.7
455.95 20.35
227.97 10.17

S. obs.
220° 5"

Japetus (?) & Saturn

36.6
36.4

S. obs.
Stf mated

10 16

Japetus -

1.53
1.32
1.59
1.44
1.58
1.492

P. obs.

10 18

0.94
0.85
1.22
0.91
0.85
0.954

S. obs.

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Japetus

10 22 1.44 U. obs.
1.51
1.53
1.32
1.26
1.412

Aug 17th 1878 1.00
tried Phot. Mer. Memorial Hall

8.30 tried Mer through clouds a Jupiter et B Capriconi
range about 60° to 240°. Images not steady & diffuse

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1878phae.proj.1301S

Aug. 18 1878

Photometer F.

μ Sagittarii Cloud.

110 Herculis

9 18 3.03 Pobs.
3.06
2.88
2.87
2.76
460
2.920

9 21 3.31 Sobs.
3.21
2.93
3.31
293
16 9

~~3.563~~
3.138

μ Sagittarii & companion preceding (P)
D too bright to measure Pobs., Sobs.

1878phae.proj.13015

Aug 19 at Cin 78

F.	S.T	B 394 B.m. 1.
19 20	36.	9h 28 0
21	35.5	29 0

Wash. time 9 20 10
23 42
Camb. time 9 42 52
f 34 51 19 35

29 0
21 35.5
7 25.5

42 52
7 25
35 27

37 42 52
14 10 48
19 32 4
3 12
Time by f. 3451 19 35 16

19 34 20	Jupiter partially clear satellite not seen		P. obs.
19 34 43	not seen		P. obs.
35 21	nearly clear; not seen.		P. obs.
36 59	satellite seen	J 44 5	P. obs.
37 12	1.25	Photometer J 18	
28	1.67	34	
40	1.55	46	
51	2.01	57	
38 8	2.95 in clouds.	45 14	

~~4.45~~
~~1.856~~

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Time by 7,345.1

aug 19, 1878

Cloudy most of the time.
Seeing good when clear
P. obs.

19h	45m	2,85
	47	2,68
		1,95
	49	2,57
		2,49
		254
		2.508

P obs.

19	50	3,31
		2,24
		2,25
		2,36
19	51	2,67
		283
		2,566

7 34.2

				5	44.5
19	58	42	10	6	0
19	59	42		7	0

+ 7 2,5 at 19 58

7 8.5 19 20

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1878phae.proj.1301S

1878 Aug. 20

Photometer H

λ Hrs. Min. Limit of visibility.

7 40

140.0 U. obs. Index Φ to the right
147.8 7.8 Image farthest from
319.0 index Φ (left hand image).
326.7 7.7
933.5 15.5
466.75 7.75
233.37 3.87

51.0
56.5 5.5

U. obs. Index V to the right
Readings from index V
Image farthest from index
V (left hand image).

230.2
235.6 5.4
573.3
286.65 10.9
143.33 5.45 2.73

λ Hrs. Min. Focus readings.

8 0

2.05 11 U. obs. Image at 270°
2.00 6 Index Φ to the right
1.90 4 " "
1.86 8 " "
1.90 4 " "
1.942 ± .066 33

1.88 2 U. obs. Image at 270°
1.84 2 Index V to the right.
1.90 4
1.84 2
1.82 4
1.864 ± .028 14

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1878phae.proj.1301S

Aug 20, 1878

	Hrs. Min.		Limit of visibility.
8 27	139.6	5.2	U. obs. Index ◇ to right.
	144.8		Image 270°
	320.6		
	324.6	4.0	
	929.6	9.2	
	464.8	4.6	
	232.40	2.30	
8 31	51.7		U. obs. Image 90°
	55.2	3.5	
	229.6		
	234.2	4.6	
	570.7	8.1	
	285.35	4.05	
	142.67	2.02	
8 55	DM. +89° 3		Limit of visibility
	137.4		U. obs. Image 90°
	147.5	10.1	
	318.3		
	329.0	10.7	
	932.2	20.8	
	466.1	10.4	
	233.05	5.20	
8 57	47.3		U. obs. Image 270°
	57.2	9.9	
	228.8		
	239.0	10.2	
	572.3	20.1	
	286.15	10.05	
	143.08	5.03	

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1878phae.proj.13015

Aug 20, 1878

2 Urs. Min. Limit of visibility.

9 5 52.4 0.4 U. obs. No point of
52.8 disappearance.
232.8 0.2 Image 270°
232.6
570.6 0.6
285.3 0.3
142.65 0.15

9 9 323.8 } rejected because focus was bad. U. obs. Image 90°
324.65 }
324.4 0.5
323.9
141.8 0.3
141.5
931.6 0.8
465.8 0.4
232.90 0.20

51 Cephei. Limit of visibility.

9 25 51.7 U. obs. Image 90°
52.4 0.7
232.8
233.3 0.5
570.2 1.2
285.1 0.6
142.55 0.30

9 30 143.8 U. obs. Image 270°
144.2 0.4
321.8
322.6 0.8
932.4 1.2
466.2 0.6
233.1 0.30

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1878phae.proj.1301S

Aug 20, 1878 ~~Limit of visibility~~

λ Ursæ Minoris S. ob.

Focus Readings.

9 40	2.09	7	90° Image
	2.01	1	
	2.00	2	
	1.99	3	
	2.02	0	
	2.022	.026	
9 45	2.08	6	S. ob. 270° Image
	2.00	2	
	2.10	8	
	2.00	2	
	1.90	12	
	2.016	±060	

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1878phae.proj.1301S

1878 Aug. 22. Limit of visibility

h	Hrs.	Min.			
				U. obs.	90° Image
7	40		48.4		
			55.8	7.4	0
			228.2		
			235.5	7.3	
			567.9	14.7	
			283.95	7.35	
			141.97	3.67	
			317.8		U. obs. 270°
			326.1	8.3	
			138.0		
			144.5	6.5	
			926.4	14.8	
			463.2	7.4	
			231.60	3.70	
2	Hrs.	Min	U. obs.	90°	No disappearance,
7	53		52.0		
			51.8	0.2	
			231.8		
			231.8	0.0	
			567.4	0.2	
			283.7	0.1	
			141.85	0.05	
					270°
			321.3		U. obs.
			321.7	0.4	
			142.5		
8	0		142.4	0.1	
			927.9	0.5	
			463.95	0.25	
			231.98	0.12	

Observer records for himself in all above observations.

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1878phae.proj.1301S

Aug. 22, 1878

DM. +89° 3

8 6

45.2
59.6
224.9
240.4
570.1
285.05
142.52

14.4
15.5
29.9
14.95
7.48

U. obs. 90°

U. records

8 15

325.6
325.4
315.9
136.2
148.4
926.0
463.0
231.50

325.5
9.6
12.2
21.8
10.9
5.45

U. obs. 270°

S. records

51 Cephei

8 25

51.2
51.9
230.8
231.9
565.8
282.9
141.45

0.7
1.1
1.8
0.9
0.45

U. obs. 90°

8 28

141.6
142.8
321.0
321.5
319.8

1.2
321.2
1.4

925.4
462.7
231.35

2.6
1.45
30
0.73
0.65

U. obs. 270°

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1878phae.proj.1301S

Aug 22, 1878

110 Herculis Phot I.

8 55
2.29
2.07
2.55
2.12
2.20
2.246

S. obs.

S. suspects that the star compared with the companion is not 110 Herculis. It is probably the star 5 f 110 Herculis and about as bright

9 5
2.68
2.70
2.47
2.51
2.32
2.536

U. obs.

Reset prism, taking greater pains to use the image rightly situated with regard to the end of the telescope.

Same

9 12
2.77
[3.90] rej. too bright on second look
3.07
2.86
2.63
2.60
2.786

S. obs.

9 20
3.08
3.13
2.81
3.14
2.90
3.012

U. obs.

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Aug 22, 1878

γ Herculis

9 34

d

0.94
1.20
0.98
0.88
1.18
1.036

S. obs.
B 140″ 265°
d 100″ 270°

9 41

B

1.97
2.17
2.50
2.75
2.51
2.380

S. obs.

9 51

B

2.74
2.82
2.98
2.40
2.51
~~2.710~~ 2.680

U. obs.

3.45 mean
2.690 mean

C

9 57

1.03
0.88
0.91
1.04
0.82
0.936

U. obs.

Seeing 8, 0,5. (S.)

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1878phae.proj.1301S

1878, Aug. 23 Phot H

α Ursæ Minoris Ulobs.

7 30 48.0 Images 0° 5″
52.8 4.8
228.2
233.4 5.2

562.4 10.0
281.2 5.0
140.60 2.50

Seeing 8, 2, 2 (U.)

Ulobs.

137.8 5.7
143.5
318.2 5.2
7 42 323.4

922.9 10.9
461.45 5.45
230.72 2.72

20° 5″

ζ Ursæ Majoris examined. Images very large and unsteady.

8 15 α Andromedæ 11U. obs.
139.6 50° 6
139.6
[138.8] rej. too bright second fork
140.8 1.2
320.2 1.6
321.8

922.4 2.8
461.2 1.40
230.60 0.70

49.7 1.1
50.8
229.7 1.2
8 27 230.9

561.1 2.3
280.55 1.15
140.28 0.58

230° 5″ U. obs.

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Aug 23, 1878

μ Sagittarii Phot I

Delayed by difficulty in adjusting Prisms.

9 7 faint preceding comp. S. obs.
too bright to measure.
Observation confirmed by U.

α Andromedae

9 28

2.30	U. obs.
2.15	
2.43	Difficulty in seeing both
2.04	images at same time
2.51	
2.286	

9 31 S. obs.

[3.16 mj.]

Pencils of light found to be badly adjusted - Difficulty remedied.

10 0

2.51	
2.28	
2.09	
2.26	
2.47	
2.316	

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1878phae.proj.13015

Aug. 23, 1878

Eclipse of Jupiter's 1st satellite.

Predicted Washington mean time of reappearance 12 42 15

23 42

Cambridge " " " " 13 5 57

α Lyrae Photometer I

10 58 1.46 S. obs.
1.25
1.24
1.19
1.29
1,286

α Urs. Min.

11 40 4.71 S. obs.
4,42
3.23
3.62
4.19
4.034

α Urs. Min. aperture 5 inches. S obs.

12 0 3.16
2.92
2.66
3.22
3.13
3.018

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1878phae.proj.1301S

Aug. 23, 1878

α Ursæ Min. Photometer H.

12 25 S. obs. 80° 6″

49.2
55.5 6.3
229.6
235.8 6.2
570.1 12.5
285.05 6.25
142.52 3.12

12 28 S. obs. 300° 6″

140.8
146.0 5.2
320.1
325.3 5.2
932.2 10.4
466.1 5.2
233.05 2.60

12 40 α Lyræ S. obs. 185° 5″

142.5
142.5 no disappearance
321.7
321.5 .2 / 4L2 / .05 no disappearance
928.2
464.1
232.05

Star not really measurable with photometer H.

Seeing 8, 5, 4

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1878phae.proj.13015

Aug. 23, 1878

Eclipse of Jupiter's Satellite I.

Time by
T. 3451

3451 394

C.M.T.

h m s
23 15 11.5 Reappearance

23 5 2.8 = 12 56.0 (Wash.) = 12h 55m 44.5 +18.3
G. Wash.

~~21.5~~

15	21.5	1.20	13h	5m	0s
	45.5	0.88			25
16	3.7	1.27			44
	21.1	1.42		6	1
	34.7	1.55			15
	50.8	1.62			31
200 17	10.8	1.74			51
	34.0	1.92		7	14
18	1.0	2.24			41
	37.5	2.67		8	17
19	3.5	2.68			43
	32.5	2.80		9	12
	56.0	2.39			36
20	26.5	2.38		10	6
	44.5	2.80	301		24
21	15.5	2.64	260		55
	175.0	20m 23.0		10m	3.0
	415 83				

71 23h 22m 2.28
2.74
2.25 146
2.29 2.92
1.90
2.292

		23	44.5
B394 ~~7.3451~~	13	24	0
7.3451 ~~B394~~	23	33	7.5
B.394	13	25	0
7.3451 ~~B394~~	23	34	7.5

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1878 Aug. 25

	B 394	6h	46m	0s	6h	50m	0s
	7 3451	17	1	58	17	5	58

445
13.5

Predicted reappearance of Jupiter I

Washington mean time	7h	11m	5s
		23	42
Cambridge mean time	7	34	47
		44	2
7 3451	17	50	45

Seeing 5, 1, 2, 1
Photometer S. S. obs.

Type by 7. B 3451

17h	51m	6s	Satellite visible
	51	29	0.73
	52	17	1.28
	52	57	1.30
	53	40	1.50
22	54	26	1.98
	55	27	1.65
	56	13	1.80
	57	0	1.73
			1.91
			1.84
	58	45	1.70
			1.796

34 44
35 7
4
5

16 24.5
52 44.5

B 394	7h	53m	0s		7h	55m	0s
7 3451	18	9	9		18	11	9

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1878phae.proj.13015

1878 Aug. 26 Phot II

2 Obs. Min

U. obs.

7 27

50.3 5.5
55.8
229.6 5.3
234.9
~~560~~ 0.6 10 8
~~288~~ 283 5.4
~~140.75~~ 142.65 2.70

Seeing 7 3 3

U. obs.

139.7 5.8
145.5
320.0 6.0
7 38 326.0 11.8
931.2 5.90
465.6
232.80 2.95

210 8

2 Obs. Min. Phot I U. obs.

7 53 5.15
4.73
3.80
4.01
3.70
4.278

15 in. aperture

Seeing 7 2 2

U. obs
5 in. aperture

8 18 2.18
1.99
2.00
1.73
2.11
2.002

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1878phae.proj.1301S

Aug 26, 1878

α Andromedæ U. Obs.

8 35

0.61
.69
.70
.61
.61
0.644

5 inches aperture.

15 inches aperture
U. Obs.

8 55

1.90
2.30
1.53
2.11
1.53
1.874

Tried η Draconis with Phot. I. too close and companion about as bright as artificial star.

η Draconis Phot. II

9 38

140.0 8.5
148.5

350° 3" U. Obs.

9

317.7 8.7
326.4

Seeing 8, 7, 5, 5

932.6 17.2
4663 86
2331.5 4.3

U. Obs.

9 50

49.0 8.3
57.3
228.6 7.7
2736.3

120° 2"

5711.2 16.0
2 85.60 80
142.80 4.0

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1878phae.proj.13015

Aug 26, 1878

α Lyræ Phot. EI U. Obs.

could not make bright image disappear.
It was at no time fainter than faint image.

10 13 1.20 Phot. I. 15 inches aperture.
1.03
1.23
1.14
1.08
1.136

5 inches aperture.
U. Obs.

10 25 0.57
.55
.55
.70
.61
0.596

Comparison of time-pieces.

B 394	$10^h\ 44^m\ 0^s$	$10^h\ 45^m\ 0^s$	
F 3451	21 4 34	21 5 34	
	10 42 44.5		
	20 42.5		

Predicted time of reappearance of Jupiter II.

Washington	11^h	56^m	8^s
		23	42
Cambridge	12	19	50
	10	20	34
			15
F. 3451	22	40	39

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Aug 26, 1878

α Lyræ — 5 inches aperture.

11 8

0.35 S. obs.
.34
.37
.33
.39
.356

11 26

1.22 15 inches aperture.
0.92
0.88 S. obs.
1.01
1.02
~~1.028~~
1,010

11 35

Faint star 250° & 150" from α Lyræ
1.02
0.92 S. obs.
0.87
0.95
0.91
0.934

11 42

0.68 N. obs.
0.96
0.88
0.74
0.80
0.812

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Aug 26, 1878 Photometer H.

Companion ζ Lyrae with Star 250° 150" from ζ.

S. obs. Images 340° 100" reckoning

11 55 97.2 B the principal star

abandoned; the observation was not practicable with any tolerable accuracy in the best position for the images which could be obtained. Perhaps however by taking a longer time to experiment than was available this evening, some position might be found in which the images should be a little nearer, without bringing either image of ζ Lyrae into the field.

Reappearance of Jupiter's Satellite II

Photometer I.

S. obs

Time by chronometer F. 3451

Satellite first seen

Phot. I.

5 22 40	3				58
	40	17	0.64	12h 19	12
		35	.83		30
		52	1.09		47
	41	18	1.14	20	13
		46	1.34		41
	42	15	1.51	21	10
		37	1.92		32
	43	9	1.89	22	3
					54
6	44	0±	2.17	23	36
		42±	2.23		54
	45	0	2.49	24	19
		25	2.75		
		54	2.56		48
	46	21	2.81		
		40	2.81		
		59	2.01		
	47	21	2.82		
		45	3.07		
		120	4.46		
		306	2.892		
		61			

Reflected image disturbed and reset. Time of next two settings not accurate.

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Aug. 26, 1878

Jupiter's Satellite II (continued)

22 48

2,33
2,51
2,44
2,77
2,62

2.67 2,534

2.534

S. obs.

Comparison of time-pieces.

B 394	12h	39m	0s	12h	40m	0s
f. 3451	22	59	53	23	0	53
		39	4 4.5			
		26	8.5			

Seeing (see p. 197) 7, 3, 3,
" 7, 2, 2,
(" 198) 8, 5, 5.

for the evening say 7, 4, 4,
which is a fair estimate for the seeing during the
observation of Jupiter.

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1878phae.proj.13019

Aug 27 & 1878.

Phot. H

ζ Ursae Majoris

7 8

27.3
75.0 47.7

211.2
258.0 46.8

571.5 94.5
285.75 47.25
142.87 23.62

180° 4" U. obs.

118.7 48.3
167.0

297.8 51.4
349.2

932.7 99.7
466.35 49.85
233.17 24.92

0° 4" U. obs.

39 Draconis.

7 29

128.2
160.5 32.3

Observation of this star not needed

μ ε Draconis. in clouds

7 43

131.2 29.7
160.9

309.6 30.4
340.0 60.1

941.7
470.85 30.05
235.42 15.03 μ

200° 2"

Very 5, 8, 7. for this star

39.0 31.2
70.2

221.8 30.6
252.4 61.8

583.4
291.70 30.90
145.85 15.45

90° 2"

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Aug 27, 1878

ε Bootis

~~ε Draconis~~

U. Ob.

8 12	38.2	35.3	0° 2"	
	73.5			
	218.6	35.9		
	254.5			
	584.8	71.2	Seeing for this ~~star~~	
	292.40	35.60	7, 4, 4.	
	146.20	17.80		
8 19	124.1	38.6	U. Ob. :	
	162.7		210 2" :	
	310.5	31.5		
	342.0			
	939.3	70.1		
	469.65	35.05		
	234.83	17.52		
8 ~~28~~	122.6	38.6	P. Ob.	190° 2"
	161.2			
	307.3	38.8		
	346.1			
	937.2	77.4		
	468.6	38.70		
	234.30	19.35		
8 30	37.2	35.1	P. Ob.	350° 2"
	72.3			
	219.5	29.1		
	248.6			
	577.6	64.2		
	288.8	32.10		
	144.40	16.05		

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1878phae.proj.13019

Aug. 27, 1878

γ Draconis P. obs.

8 49
140.6 6.8 110° 3"
147.4
319.7 7.9
327.6
935.3 14.7
467.65 7.35
233.82 3.67

8 53
109.55 { 63.3 } 63.25
54.77 { 63.2 }
{ 46.3 } 16.95 8.47
226.6

P. obs. Interval between images of a 3" poor.

abandoned on account of deterioration of seeing.

γ Draconis. Phot. I.

P. obs.

Not seen by P. or U.

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Aug 27, 1878

	β Draconis	Uds
9 27	128.8	20.2
	148.8	
	312.2	18.4
	330.6	38.6
	920.2	19.3
	460.10	9.65
	230.05	

Aab of field 100°4'

9 30	40.4	18.3	Uds 250°4'
	58.7		
	221.6	18.1	
	239.7		
	560.4	36.4	
	280.20	18.20	
	140.10	9.10	

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1878phae.proj.13019

Aug. 28, 1878.

ζ Ursæ Majoris. Phot. H

	26.2				
7 52	73.3	47.1	P. obs.	190°	5″
	204.4	49.7			
	254.1				
	568.0	96.8			
	279.0	48.40			
	139.50	24.20			
7 54	117.3	rej. – image wrong position	P. obs.	10°	5″
	166.6	50.0			
	116.6				
	293.6	48.7			
	342.3				
	919.1	98.7			
	459.55	49.35			
	229.77	24.67			
7 58	169.4	47.9	Ubs	5°	6″
	167.3				
	296.4	48.3			
	344.7				
	927.8	96.2			
	463.90	48.1			
	231.95	24.05			
8 0	27.5	47.5	Ubs	150°	6″
	75.3				
	205.7	50.4			
	256.1				
	564.6	98.2			
	282.30	49.10			
	141.15	24.55			

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1878phae.proj.1301S

1878 Aug. 29.

7 3 α (12) Canum Venaticûm. P. obs. 80° 5″

126.0	28.7
154.7	
305.0	31.3
336.3	
922.0	60.0
461.0	30.0
230.5	15.0

7 5 P. obs. ~~270°~~ 70° 5″

33.5	31.3
64.8	
215.4	30.9
246.3	
560.0	62.2
280.0	31.1
140.0	15.55

7 7 Obs. 250° 5″

30.8	36.4
67.2	
213.6	33.6
247.2	
558.8	70.0
278.4	35.0
139.20	17.50

7 10 Obs. 90° 5″

122.9	33.4
156.3	
303.3	34.5
337.8	
920.3	67.9
460.15	33.95
230.08	16.97

Seeing 6, 3, 7 El.

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1878phae.proj.13019

Aug. 29, 1878

ζ Ursæ Majoris. 15 in. aperture.

7 15 117.1 P. obs. 0° 5"
162.0 44.9
297.8 48.5
346.3
923.2 93.4
461.6 46.70
230.8 23.35

7 17 25.8 52.9 P. obs. 150° 5"
78.7
199.3 ~~61.0~~ ~~51.0~~
260.3 Seeing ~~6, 5~~ 5, 2, 5 S
564.1 113.9
282.05 56.95
141.02 28.47

7 23 27.3 5-4.1 P. obs, 5 inches aperture.
81.4 180° ~~5"~~ 5"
206.5 5-1.8
258.3
553.5 105.9
286.75 52.95
143.37 26.47

7 25 116.2 48.0 Pobs 350° 5"
164.2
297.6 50.5
348.3
926.3 98.7
463.15 49.35
231.57 24.65

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1878phae.proj.1301S

Aug. 29, 1878

ζ Ursæ Majoris U. obs. 355° 6" Aq 5"

7 29	114.8	48.8	
	163.6		
	297.8	52.0	
	349.8		
	926.0	100.8	
	463.0	50.4	
	231.5	25.2	
7 31	27.8	48.4	U. obs. 180° 4"
	76.2		
	209.6	47.6	
	257.2		
	570.8	96.0	
	285.40	48.0	
	142.70	24.0	

α (12) Canum Venat. P. obs. aperture 5 inches

7 36 next page. 270° 5"

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Aug. 29, 1878

α Can Ven. P. Obs. aperture 5 in.

7 36 270° 5-"

34.0 33.2
67.2
211.6 37.6
249.2
562.0 70.8
281.0 35.4
140.5 17.70

7 38 120.3 35.1 P. obs. 90° 5-" Aq 5
155.4
306.6 31.2
337.8
920.1 66.3
460.05 33.15
230.03 16.58

7 41 122.0 36.3 Robs 90° 5-' Aq 5
158.3
306.3 34.1
340.4
927.0 70.4
463.5 35.20
231.75 17.60

7 45 34.1 34.8 Robs 270° 5-' Aq 5
68.9
215.3 31.9
247.2
555.5 66.7
283.75 33.35
~~143.88~~ 16.68
141.38

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Aug. 29, 1878

α Ursæ Minoris.

7h 53 — P. obs. 20° 5″

138.2 5.4
143.6
319.8 5.3
325.1
926.7 10.7
463.35 5.35
231.68 2.67

7h 56 — P. obs. Images in line. 130°

50.3 1.5
51.8
229.7 1.7
231.4
563.2 3.2
281.6 1.60
140.8 .80

8 0 — P. obs. Images of A 40″ distant 150°

50.3 3.9
54.2
229.4 2.7
232.1
566.0 6.6
283.0 3.3
141.5 1.65

8 4 — P. obs. Images of A 18″ 210° 5″

49.8 5.8
55.6
229.1 4.6
233.7
568.2 10.4
284.6 5.2
4.1
142.0 2.60

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α Ursae Minoris - (contin.) P. obs.

8 7 50.0 5.8 Images of A 10"
55.8 Images in line 310°
218.4 6.9 Should be 228.4
235.3

569.5 559.5 127
284.75 279.75 6.35
142.38 139.88 3.17

8 9 49.9 7.7 P. obs. Images of A 5"
57.6
227.8 8.6
236.4

571.7 16,3 Seeing Obs. 7, 4, 5
285.85 8.15
142.93 4.07

8 17 49.3 5.2 Obs. 210° 5"
54.5
230.0 5.0
235.0

568.8
284.4 5.1
142.2 2.55

8 24 140.0 1.9 Obs. 110° in line
141.9 60"
318.7 2.5
321.2

921.8 44
460.90
230.45 1.1

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Aug 29, 1878

Uhe Angle 90°
Intensity ~~[illegible]~~ 40"

8 29	138.0	3.7
	141.7	
	319.6	3.1
	322.7	
	922.0	6.8
	461.0	3.4
	230.5	1.70
8 31	137.7	6.3
	144.0	
	317.9	6.5
	323.4	
	923.0	12.8
	461.5	6.4
	230.75	3.20
8 37	137.3	7.6
	144.9	
	317.7	7.9
	325.6	
	925.5	155
	462.75	77.5
	231.38	3.87
8 39	136.0	11.6
	147.6	
	317.2	9.0
	321.2	
	927.0	206
	463.5	10.3
	231.75	5.15

Uhe 10° 5"
Intensity 18"

Uhe in line 300°
Intensity 10"

Uhe Intensity 5"

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Aug 29, 1878

Limit of Visibility.

α Ursæ Minoris O Index at right

8 48 P. obs.

Image does not disappear

Limit of Visibility.

DM +89° 3 P. obs.

36.2
26.8
9 0 63.0 Image 90°
215.5
29.0
244.5
559.2 55.8
279.60 27.90
139.80 13.95

9 5 120.3
35.9
156.2 P. obs.
307.1
27.5
334.6 Image 270°
63.4
918.2
459.1 31.70
~~221.55~~ 229.56 15.85

Limit of Visibility.

λ Ursæ Minoris. P. obs.

9 11 43.2
10.9
54.1 Image 90°
226.9
11.7
238.6
562.8 22.6
281.4 11.3
140.70 5.65

9 13 135.2
10.5
145.7
315.2
9.8
325.0
921.1 20.3
460.55 10.15
230.27 5.07

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Aug 29, 1878

57 Cephei Limit of Visibility.

9 21 47.2 4.6 P. obs.
50.8
22 7.3
233.3 6.0 90°
559.6 10.6
279.80 5.3
139.90 2.65

9 25 137.9 5.5 ~~6.5~~ P. obs
143.4
316.9 58 270°
322.7
920.9 11.3
460.45 5.65
230.23 2.83

50 ± Japetus Phot. I

160 P. obs.
1.44
1.89
1.92
1.73
358
1.716

9 54 1.51 U obs.
1.46
1.40
1.33
1.54
224
1.448

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Aug 29, 1878

Jet.

Satn clearly brighter than Rhea & eye P.



U. obs.

a equal brightness with b, has a ruddier appearance than b

a two magnitudes brighter than c

Preceding ring of Saturn all of field

U. obs.

10 11

168.4 < b. dis

290.0 56.4

112.0

348.5 58.5

9189 114.9

45945 57.45

229.72 28.72

b does not give as sharp an image as a

P. obs.

10 22 285.8 < a disappears

347.4 61.6

112.0 53.7

165.7

9109 115.3

455.45 57.65

227.72 28.82

45.0

272.7

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Set at 45° + Zero Vitam seen, Rhea inside R.
a very much brighter & not seen R.

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1979plrae.proj..130IS