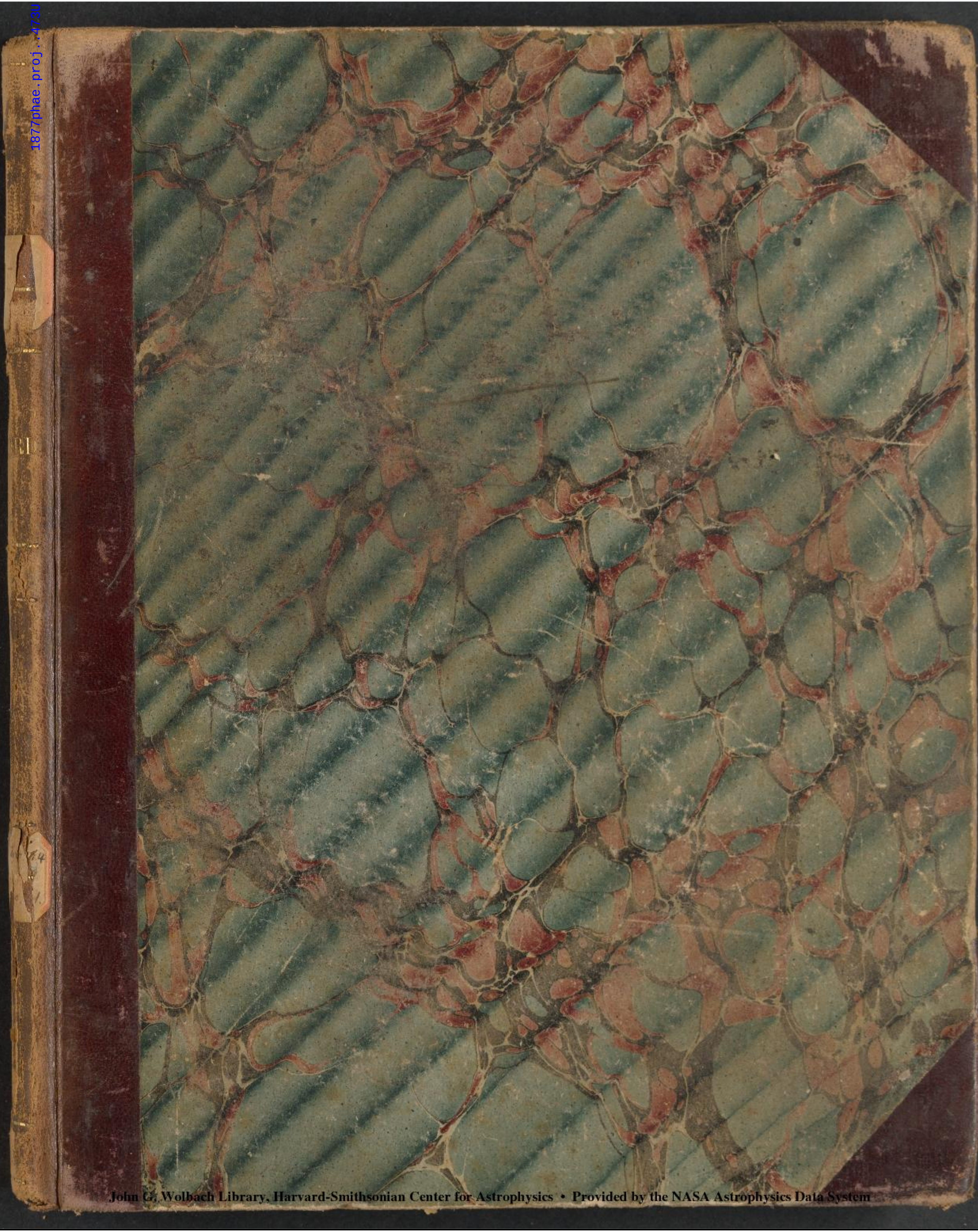

14
1.

R 30 KG 11365.472

Reduction of photometric observations in this book, so far as previously made in the book, checked by Miss Saunders, Sept., 1878. List of errata found by her pasted below.

Changes made in mean — Record 30 —

Page	h	m			
11			✓		Zero of Photometer E.
13	0	15	don't understand		✓ no correction.
18	9	8	+9	20	✓ Zeros corrected.
29	9	0			✓ Enceladus
40	7	55			✓ Correction in a dynameter measure
41	8	30			✓ " " " "
42	9	22			✓ α Pisc.
43	9	55			✓ " " .
49	20	43			✓ Sky
59	5	28			✓ Zero
66	1	42			✓ Artificial star
71	6	38			✓ γ Lyrae
74	6	27			✓ β Cygni
76	7	47			✓ ξ Aquar.
77	8	10			✓ Zero
84	9	48			✓ μ Cygni
89	8	18	(2)		✓ ξ Cephei
91	9	20			✓ κ Ceph.
95	6	26			✓ Zero
102	9	18			✓ γ Arietis
103	9	35	106		✓ γ Arietis ✓ Mean deviation
110	7	53			✓ ψ Cygni
111	8	58			✓ First computation right.
114					✓ Zero
134	5	23	+5	43	✓ ✓ 26 & ψ Cygni
135					✓
139	9	25			✓ Zero
140	9	47			✓ Zero
141	5	14			✓ Zero
157	5	35			✓ Art. satellite Venus.
182	8	4			✓ Iapetus; Titan
183	5	15			✓ ξ Aquar.
114	5	41			✓ Zero
117					✓ Zero
118					✓ β Cygni
184					✓ ξ Aquar.

K G 11365.472

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Nov. 14, 1877

Observations with the E. Equatorial
Nov. 14th. 1877. 22h. Sky partially cloudy.
Zero of Wheel E.

14.738
.744
.746
.747
.749
284

14.74~~52~~ 48

22.10 Aperture 5" r eye contrast of E. & sky.

20.97 20.802
20.74
20.75
20.74
20.81
51
l eye
20.74 20.492
20.48
20.39
20.46
20.39
246

Wh. U. do.

22 20 22.00
22.02 21.786
21.23
21.50
22.18
493

Nov. 14, 1877

22 24 W. U. obs 15" very bright

40.51
40.53 Opened too wide
40.83 reject.
41.69
37.37

Same ECP

22 30 33.84 l. image Cannot be rendered brighter than ~~light of the~~ right image.

inclined circle ⦶

22.12 5" ap. W. U. obs

20.85 21.564

21.10

22.10

21.70

7.87

A. S. obs making the settings by alternately increasing and decreasing the reading of the micrometer.

23 5 21.42 dec. 21.072

20.94 inc.

21.40 dec.

20.50 inc.

21.10 dec.

536

E. C. P. obs

23 8 20.23 incr. 20.706

20.85 decr.

20.67 incr.

20.72 decr.

21.06 incr.

353

Nov. 15, 1877

Constant of photometer E. by artificial star in room over library. Star formed by pin-hole in pasteboard placed over opening in one of the south shutters.

E. C. P. obs.

0h 10m 27.26 increasing reading
26.53 decr. 26.524
26.68 incr.
26.30 decr.
25.85 incr.
26 2

A. S. obs.

0h 15m 29.53 dec. 28.420
28.14 inc
27.59 dec
32.86 2526 Reading 32.86 rejected for reason given below.

Found that the brightness of the hole was liable to considerable change with the angle at which it was viewed, so that the reflected and direct images might not be images of the same object. Tried pasting a piece of oiled paper over the hole and setting the prism vertically over the lens.

E. C. P. obs.

0 50 25.65 incr. 27.096
28.11 decr.
27.91 decr.
27.37 incr.
26.44 decr.
35.48

Nov. 15, 1877

A. S. obs.

0 55 26.08 inc. 27.614

27.96 dec

27.59 inc

28.13 dec.

28.31 inc

38.07

1 10 W. U. do.

26.02 inc. 27.080

26.99 inc

28.31 dec.

26.70 dec.

27.38 inc

35.40

At 2^h the light from the hole not bright enough. Substituted lantern shining on a quartz sphere placed behind a large hole. Two images one brighter than the other. Both images considered in making the settings. E. C. P. obs.

2 30 24.12 incr.

25.92 decr. 24.800

24.75 incr.

24.42 incr.

24.79 decr.

400

2 33 A. S. obs

23.25 incr 24.070

25.48 dec.

23.63 inc.

24.07 dec.

23.92 inc.

Nov. 15, 1877

Diaphragm removed and replaced by the diaphragm called No. 3 in previous work of this kind. This diaphragm was put between the object-glass and the light; that used in the previous readings of this day was beyond the object-glass.

E. C. P. obs.

2 43 18.61 incr. 18.910
19.06 decr.
19.02 incr.
19.03 decr.
18.83 incr.
455

A. S. obs.

2 50 18.20 inc. 18.888
19.18 dec. Images more ragged to small image than before.
19.13 inc. +8
19.20 dec.
18.73 inc.
444

1st Diaph used has diam of about 7.3mm.

E. C. P. obs. 18.980

2 55 19.34 inc.
19.13 dec.
18.80 incr.
18.78 dec.
18.85 inc.
4.90

Nov. 15, 1877

3.0 a.S. do.

19.47 dec. 19.088
18.76 inc
19.43 dec.
18.78 inc
19.00 dec
.44

Dia 1st aperture.

61.865 46.083 at R.A.
68.733 52900
6.868 6.817

6.842

2d aperture, irreg. III.

65.736 54.575
62.780 51.685
2.956 2.890

2.923

6.842
57017
399119
6862
7.241

2923
2436
7
17052
2923
3.093

Nov. 15, 1877

Nov 15th 1877 Determination of portion of object glass covered by diaphr

Chord about 7 16; that is when a ruler was placed before the object-glass so that its edge was in line with the edge of the diaphragm, the segment of the object-glass marked off by the edge of the ruler had a base of 6 or 7 inches.

16 mms.
13 mms.
15 mms.
} These measures were made of the greatest depth of the segment formed by using a wide piece of pasteboard instead of the ruler as above.

12 mms end of scale { In this measure the end of a rule was pushed on from the margin of the object glass until it began to appear.

A.S. at object-glass: E.C.P. at other end of telescope

17
20
mms. } E.C.P. at object-glass; A.S. at other end.

Mean 15.4

Dynameter, E.C.P. obs.

14.430 5.429
14.453 5.424
14.442 5.427

9.015

5.214 14.745
5.204 14.687
5.209 14.716

9.507
9.507

Dynameter Brought as near prism in eye-piece as possible.

14.495 5.356
14.482 5.353
14.488 5.355

9.133

$\frac{53}{950}$ 397

$\frac{333}{96}$ $\frac{126}{5}$ 13.1

Nov. 16, 1877.

Photometer E; ~~comparison~~ of Saturn & Iapetus; E.C.P. obs.

Mars & Saturn Vernier 0 at left A S

	261.8	213.1	263.04	
	259.6	212.0	210.16	
9.05	262.2	211.8	52.88	26.44
Mars too bright	266.7	203.9	473.20	236.60
	264.9	210.8		
	3152	508		
	263.04	210.16		

9 08 V to left

	357.2	299.4	352.22	
	353.7	303.5	301.76	
	353.3	302.6	50.46	25.23
	350.2	304.1	653.98	326.9~~8~~9
	352.7	299.2		
	1711	1508 8		
	352.22	301.76		

Index 0 to right. E.C.P. obs.

9 15	120.0	172.3	173.80	
	118.8	171.5	119.20	
	121.8	175.6	54.60	27.30
	119.9	175.2	29300	14650
	115.5	174.4		
	960	490		
	119.20	173.80		

Index V to right

9 20	260.9	208.7	260.62	
	262.1	212.8	212.44	
	258.0	211.2	4818	24.09
	260.2	214.4	4~~8~~3.0~~6~~ 7 1	~~241.53~~ 236.53
	261.9	215.1		
	3031	622		
	260.62	212.44		

Nov. 16, 1877

Japetus 16.768

E C P

16.88
16.89
16.40
17.09
16.58
33.84
16.768

Satellite following ~~Dione~~ Tethys

20.12 19.180
19.59
9.05 18.78
18.34
19.07
95.90
19.180

9.08 W. U. obs. Sat. foll. ~~Dione~~ Tethys

19.26 19.490
19.83
19.44
19.04
19.88
245
19.490

Japetus W. U. obs.

9 15 17.73 17.472
17.42
17.47
17.42
17.32
236
17.472

Nov. 16, 1877

W. Equatorial. ~~Constant~~
of photometer F. E. C. P. obs.

258.8	267.4	268.60	
258.8	269.3	259.18	
259.7	269.3	9.42	4.71
259.8	268.8	527.78	263.89
258.8	268.2		
59	430		

A. S. obs. getting clouds

258.5	271.0	270.65	
257.9	270.3	258.2	
253.5 clouds.		12.45	6.22
261.99		528.85	264.42
253.99			

9 45±

Nov 17th 1877.

Observations made alternately in different quadrants.

6.10 Venus Jupiter. E. C. P. obs. Photometer C, without telescope.

[illegible]

			0
~~253.8~~			
252.1	222.6	340.3	312.9
251.3	222.4	343.5	313.2
251.2	219.8	344.2	310.6
250.8	223.0	344.6	311.9
250.4	221.9	342.6	312.8
58	97	152	114
251.16	221.94	343.04	312.28

251.16
221.94
29.22
473.10
14.61
236.55

343.04
312.28
30.76
655.32
15.38
327.66

Photometer E on East Equatorial. β Aquarii and Companion. E. C. P. obs.

6 45 22.25 — 22.092
22.35
21.84
22.72
21.30
.46

Position angle and distance of a fainter and more distant companion compared by estimation with those of the companion just measured.

fainter Comp. Ang 30° [illegible] dist 3.5 at most. E.C.P.
65° " 3 - 3.5 G.S

6 50 21.84
21.89 — 21.952
22.06
21.25
22.10
476

Nov. 17, 1877

α Aquarii & comp. E. C. P. obs.

7 3 Companion bluer than chief star.

20.20 19.480
18.95
19.72
19.18
19.35
4740

A. S. obs

7 10 20.57 20.422
20.40
20.47
20.14
20.53
211

Clouds.

Nov 18th 1877. Looked for Mimas abt 6. Not seen although Hyperion was plainly visible

1 37 20
21 37
23 14

Mars & Saturn. Photometer C, without telescope, Readings taken alternately in different quadrants.
A. S. obs.

	Index O to the left.		Index V to the left	
6 31	263.0'	210.0	353.9'	301.3
	84.2	27.7	173.8	121.0
	262.0	211.7	357.6	300.2
6 45	85.5	29.8	172.9	118.1
	147	192	182	3[illegible]6
	263.68	214.80	174.55	117.65

263.68
214.30
49.38
477.98
174.55
117.65
56.90
291.20

Nov. 14, 1877

Moon through hole in foil attached to prism compared with Neptune seen direct; Photometer E. E. C. P. obs. Moon moved after every setting, so as to have different parts of it seen through the hole.

6 55 15.10 15.094
15.17
15.09
14.99
15.12
47

7.0.1 A. S. obs Moon thro. hole. Neptune
15.23 15.138
.21
.11
.06
.08
69

E. C. P. 7.12
15.18 15.136
.07
.11
.21
.11
64

Vesta & Mars. E. C. P. obs. Aperture 5 inches.

9 5 18.70 .482
18.53 17.964
17.34
17.67
17.58

Nov. 17, 1877

9.12 Vesta Mars A.S. Aperture 5 inches
17.88 17.952
17.99
17.83
18.09
17.97
476

Vesta & Mars E.C.P. obs. Aperture 5 inches,
9 17 17.61 17.756
17.77
18.08
17.60
17.72
378

Vesta & Saturn. E.C.P. obs. Aperture 5 inches
9 23 21.31 21.408
21.48
21.87
21.15
21.23
20 4

A.S. obs.
9 27 22.57 changed focus after this measures
21.02 21.204
21.03
20.93
20.53
6.02

E. C. P. obs. Nov. 17, 1877

Mars & Saturn; photometer C without telescope; readings in different quadrants in alternation

	Index V, to the right			Index O, to the right	
9 53	209.5	262.5	262.42	174.1	115.8
	210.4	262.8	210.75 51.67	173.7	119.0
	210.8	262.1	473.17	173.6	117.7
	212.3	262.3	173.37	172.1	119.6
	3 0 210.75	262.42	118.02 55.35 291.39	1 5 173.37	321 118.02

Vesta looked at again and identified by its movement with respect to Weisse 23h No. 519.

Looked for Mimas, not seen.

Thur. 18 Oct. 1877 opened dome at 4.40

4.47 Coll. at 5°

20.32 20.480

20.45

20.34

20.55

20.74

240

20.480

- 15 inches

4.51 32.11 31.696

32.23

31.53

31.63

30.98

848

31.696

Telescope east of pier, α Aquilae in the middle of the field. Decl. circle reads 191° 40'. Decl. of star + 8° 33' (1877.0) On this side the readings increase going north.

∴ Reading for R Scuti (1877.0) 177° 27'.

Setting of decl. circle for D.M. +33° 3587 (comparison star h for χ Cygni) 216° 31' telescope east of pier.

Starting from this star W.U. identifies comparison stars c, g, m, n, the last of which has a 'faint' companion pretty close (about 10") About 12 magn.

pos. angle 140°. χ Cygni identified, noticed to be red, and at present 11th magn. Transit by stop watch gives interval between χ Cygni & comparison star as 1m 30.1s. The manuscript list in book R 27, p. 116, makes the interval 1m 31s.

W. U. also identifies comparison stars k and l.

Reading of decl. circle for χ Cygni, telescope east of pier, 215° 42'.

χ Cygni Compar with α Cygni

k   α Cygni & Comp. stars of χ Cygni

22.25   22.686   E. C. P.
23.00
21.90
22.65
23.63
1343
22.686

7.50

l
1880   20.054
20.30
20.44
20.47
20.26
10027
20054

Nov. 19, 1877

n

18.57 18.586

18.57

18.62

18.70

18.47

293

18.586

m

19.07 18.710

18.93

18.70

18.40

18.45

4355

18.710

c

20.53 19.882

20.25

19.39

19.41

19.83

9941

8.20 19.882

g

18.84 18.352

17.93

18.10

18.47

18.42

41.76

18.352

Nov. 19. 1877

~~Mimas~~ Enceladus ECP

8.45 17.43 17.410
17.56
17.33
17.37
17.36
205
17.410

Japetus

17.81 17.634
17.69
17.44
8.50 17.55
17.68
317
17.634

Hyperion

8.55 16.51 (very faint 16.386
16.26
16.32
16.43
16.41
193
16.386

9.00 ~~Mimas~~ Enceladus

17.57 ~~17.644~~ 17.244
17.30
17.05
17.28
17.02
~~88~~122
~~17.644~~
17.244

Nov. 19, 1877

Iapetus, W. U. obs.

9 13 16.14 16.184
16.33
15.90 Hazy: Iapetus ill defined.
16.22
16.33
3092
16.184

The southern of the two satellites preceding Saturn

9 25 17.80 17.736
17.61 Saturn in field
17.58
18.01
17.68
3868
17.736

Iapetus A S obs

9.32 16.69 16.598
16.73
16.19
16.53
16.85
299
16.598

Southern of two

~~9.35~~ 9.42 16.37 16.764
16.94
17.07
16.67
16.77
3382
16.764

Nov. 19, 1877

Titan, with 5 inch cap on object glass
W. U. Obs.

9 53 17.59 17.810
17.36
18.07
17.95
18.08
3905
17810

9 55 AS Obs
18.23 18.294
18.36
18.47
18.06
18.35
147
18.294

10.00 17.79 17.860 ECP
18.17
17.79
17.95
17.60
3930
17860

Nov. 20, 1877

Nov 20th. 1877.

Contacts 15" aperture;

4 47 32.94

32.67 32.764

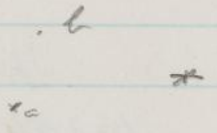
32.94

32.95

32.32

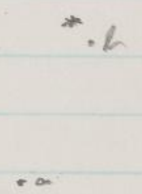
382

α Aquilae



b ? 15m.

γ Aquilae



b = 13m.

Japetus A.S. No 6.0

Mimas not seen after looking carefully

16.72

16.60 16.446

16.36

16.38

16.17

223

Sat foll.

6 10 16.30 16.146

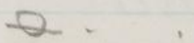
16.09

16.28

16.03

16.03

73



Nov. 20, 1877

E. C. P. obs. Satellite next Saturn on following side.

6 23 18.60

18.55 18.432

18.32

18.17

18.52

21 6

Iapetus E. C. P. obs.

17.23 16.806

16.46

16.78

16.55

6 30 17.01

.403

Photometer F on E. Equatorial.

Stars near χ Cygni compared with α Cygni

e

281.9 247.6 34.3 E C P Ob

278.2 245.9 32.3

33.3

Zero 263.40

Repeated

e

278.0 247.6 30.4 32.92 16.46

283.3 248.6 34.7

32.55

Zero 264.37

K

~~247.8~~ 296.7 66.5 65.95 32.97

233.2 295.2 65.4

7.30 230.6 .9

Nov. 20, 1877

e

212.0   307.6   95.6   Zero 265.20
221.6   3219.6   98.0   48.40
96.8

n

322.8   38 21.9   59.1   Zero 354.22
326.2   26.0   59.8   28.72
59.45

m

28.6   ~~322.8~~   Zero 355.05
21.4   320.6   68.0   ~~59.9~~
81.4 329.6   51.8   29.98
119.8

i

7.50   40 44.3   302.1   102.2 102.7   51.22   Zero 353.13
44.4   301.7   l disappears

g

39 35.6   307.7   87.9   Zero 353.85
38.5   313.6   84.9   43.20
172.8

c

~~44~~ 62.4   105.5   43.1   ~~43.00~~   Zero 84.00
62.6   105.5   42.9   21.50

h

73.1   96.4   23.3
73.3   96.6   23.3   ~~23.30~~ 11.65   Zero 84.85

d

62.1   105.2   43.1   21.77   Zero 82.72.
59.8   103.8   44.0
87.1

Nov. 20, 1877

η

91.8 75.0 16.8 16.8 8.4 Zero 83.70
92.4 75.6 16.8

Constant by α Cygni. E. C. P. obs.

8 25 — 81.0 85.4
81.6 85.2 85.46
80.9 85.5 81.10
4.36 2.18
80.7 86.0 6.56 83.28
81.3 85.2
55 23
81.10 85.46

Search for Brunhild (123)
interrupted by clouds.
D.M. + 19° 258
Setting of decl. circle telescope west of pier 342° 55'. At 1h 41m 36s by chron. B. 236 ~~[illegible]~~ the star being in the middle of the field, the hour circle reads 12h 15m 8s.

Nov. 21, 1877

Nov 21st 23.30 Recd card from Mr Clark saying that now was for photom. I was ready. On raising photometer found that zero had altered

14,668
,663 14.6638
656
,662
670
319

Zero on gas

0h 50m 14.680 14.6706
670
670
666
667
53

Carried photometer to the Clarks and on opening it found the cause of change in the zero to be that the pin holding the circle when had been turned 180°

~~Two~~ Sets of determinations of the zero in the two positions gave the following results:—

Nov. 21, 1887

~~3 45~~ 14.675 14.6656

3.8 h. 667

650

668

668

328

3.9

~~3 50~~ 14.728 14.7260

721

730

724

727

30

[illegible]

14.675

.687

.650

.668

.668

328

14.6656

14.728

.721

.730

.724

3 56 .727

30

14.7260

The change was undoubtedly made on Thursday Nov. 18th when the photometer was opened.

6638

6706

6656

200

6666

Nov. 23, 1877

Nov. 23rd 1877. Cleared after sunset.
Object E not returned by the Clarks
Search for Brunhild.

[illegible] 236. Chron. 23 34.8 49.6 10 14½ 343°40'
1 45.5
25 20.3
10

23h 39 52.6
40 21
9.5

23h 40 46.8
3 47 5
~~44~~ 20
~~44~~ 4.3

23 43 54.1

3 7.3
9.5
2 57.8

33.6

Heavy Clouds

Object G. completed and returned by Clarks Tuesday Nov. 27th

Nov. 28, 1877

Nov. 28th 1877.
4.15 Obs. G. Zeta [illegible]
~~28. Set. [illegible]~~ now setting B at 000.0
read A.

28.789
.786
.791
.802 to some ends
.813 closer to brighter light from object glass
.790
.778 ~~78.866~~ 28.78648
434

~~Set at 28.79~~ New set.
28.783
.787 28.~~7~~8.84 28.78.84
.791
.795
.786
42

set at 28.79

owing to back lash of B. setting of B for disappear of bands between 99.3 for dec. readings
set at A 28.77, B=99.7

A 28.76 B = 99.6
.75 99.9
000.0

Nov. 28 1877

Zero of A taken at 28.75 B reads 60.0

at B = 5.788 side of objective begins to cut off cause of eclipse of aperture

Contact.

5.81

5.48

5.73

finished on edge of dome

7 55 Equatorial Diameter of Saturn by the dynameter on the East Equatorial W. U. obs.

app.	8.847	11.010	rec.	11.0285
rec.	.850	11.049	app.	88635
app.	.876	.031	rec	2.1650
rec.	.881	.024	app	$1\underset{9}{8}.8920$
	854	114		

11

Hazy but seeing very good.

Mars .210 North & South ~~Polar~~ diameter of Mars.

9.212 10.683

Bob of pendulum fell off.

app	9.205	10.732	rec		
rec	.211	.681	app	Mean 9.2022	10.6940
app	.185	.671	rec		9.2022
8 23 rec.	.208	.692	app		1.4918
					19.8962

Nov. 28 1877

East & west diameter of Mars.

8 30 app 9.342 10.573 rec.
rec. .308 .561 app 10.5648
app .336 .578 rec 9.3302
rec .335 .547 app. 1.23~~56~~46
.3302 5648 19.89~~42~~30

E & W diameter of Mars A Sols.

8.35 app 10.593 9.340 rec
rec 622 9.340 app 10.6130
app 639 .255 rec 9.2812
rec 598 .190 app 1.3318
6130 .2812 19.8942

N & S diameter 22

app 10.759 9.174 rec
rec 695 .134 app 10.7225
app 746 .168 rec 9.1628
rec 690 .171 app 1.5597
.7225 .1628 19.8853

Polar of Saturn

9.00 app 10.942 8.900 rec 10.9402
rec .944 .880 app 8.9098
app .972 .932 rec 2.0304
rec .903 [.927 app cloud] 19.8590
.9402 .9098

Equat of Saturn

11.074 8.834 ~~11.808~~ 11.1010
.088 .912 ~~8.8.004~~ 8.8255
.170 .792 2.2755
.072 .764 19.9265
404 .502
8255

Nov. 28, 1877

9.22 Polar Diameter Saturn W. U. obs

8.942 10.890 ← images faint
8.939 10.909
.971 10.900 10.90.25
.919 10.911 8.94.27
.71 10 1.95.98
19.85.52

α Piscium

shot C - ECP
Interval of images
about 12"
reduced later to 6" ±

Index 0
37.0 64.2
101.2
220.6 60.34
281.0
639.8 124.56
159.95 31.125

~~9.45~~
9.45 A.S. obs End
213.0 Star towards edge of field
222.5 than at centre
197.5 Seeing getting decidedly bad
127.5
105.0

A.S. obs
9.52 38.6 63.4
102.0
220.0 66.1
286.1
646.7 129.5
161.67 32.37

Nov. 28 1877

[illegible]

9.55 38.5
121.8 to edge of field
107.2

9 55 40.6
106.5
65.9
223.0
280.7
57.37
650.8
123.24
162.70
30.805

Nov 29th 1877

[illegible] of [illegible] of [illegible] [illegible]

[illegible]

240 = 239.6

vertical

[illegible]
48.30
27.56

48.36
27.30
21.0.6

48.40
27.47
20.9.3

47.93
27.03
20.90

[illegible] [illegible] for [illegible]

~~46.66~~
~~27.18~~
~~19.48~~

~~48.50~~
~~27.00~~
~~21.50~~

47.93
27.00
20.93

horizontal

47.96
27.03
20.93

45°

48.44
27.54
~~20.00~~
20.90

45°

47.93
27.00
20.93

vertical

48.02
27.11
20.91

240 = 239.7

Nov. 28, 1877

Summary of obsvs

~~Vert. dia~~

21.06 vert. (rej.) ∴ 209.2 = ~~true~~ diameter of aperture of objective. as measured by paper scale

20.93 "

20.90 "

20.93 horiz

20.93 " 240.0 paper = 239.65 steel.

20.90 45° ∴ 209.2 paper = 209.5 mm = true aperture.

20.93 "

20.91 vert.

13

209.2 = mean

Nov. 30th Carried phot. C to Clarks to be altered so that double image prism may be moved to and from focus.

Zero of phot. G

0.2 0.14

0.6

0.6

0.3

0.2

7

ref

reflect [illegible] unpolished black velvet. interiors

Constant of phot. G.

4.55 2,242 2.1434

2.166.

2,053

2.128

2128

717

Nov. 30th 1877 Nov. 30, 1877

Constant of phot. G.

4,57	2.139
	,104
	,178
	,264
	.194
	379

too dark 3d mag stars vis

Positions angles & distances of faint stars from 5 Lyrae by estimation. E.C.P. obs.

a	50°	100″
b	320	70
c	340	100
d	290	100
ε Lyrae	330	210
e	290	80

From ζ Lyrae

			Magn.
Princ. comp.	140°	30″	
	160	60	15
	165	70	13
	180	60	13
	190	110	13
	60	115	12
	230	50	
	260	80	
	80	100	15

Nov. 30 1877

6.25 Japetus ECP Obs

130.7
95.5 reject

Japetus Saturn partly concealed. AS Obs

1.288 1.2710
1.174
6.35 1.252
1.342
1.299
1355

Japetus W. U. obs. Saturn in full view.

6 40 1.148 1.0300
1.226
0.891
0.985
0.900
5150

Rhea AS Obs

6.55 1.310 1.1682
1392
1.072
1.085
0982
841

Titan

7.00 1.469 1.5220
1.280
1.397
1.659 bright
1.805
7610

Nov. 30, 1877

7.09 Rhea W.U. obs

0,876 1,0148
.958
1,099
1,068
1,073
5074

Titan W.U. obs

7.24 1.64 Abandoned poor seeing.

Stars near α Delphini

	α Delphini				ECP
13^m ~~α Delphini~~	118	105	(1)		a
14^m	160	60	(2)		b
14	290	60	(3)		c
15	315	70	(4)		d

α and (1) (1) = a of the above list

2,33 2,402
2,55
7.45 2.20
2,42
2.51
201 α and (2) (2) = b of the above list
1.85 1.73
1.61
4 — light cut off by telescope

~~Clouded~~

α and (3) Nov. 30, 1877

2.42
2.68
2.42 2.462
2.55
2.24
~~8~~.55 2.31 α and 4
7 1.30 1.28
1.26
2.52 Eyes tired

W.U. obs

a	118°	105''
b	150	60
c	270	50
d	300	70

8 15 α Delphini & a W.U. obs.
2.61 2.290
3.13
2.51
3.20
11 45 Clouds interrupted measure

10 Set on Neptune and looked for satellite without success. E.C.P & W.U.
Closed at 10 35

Dec. 1, 1877

Dec 1st 1877, 20.40 Sid. time

Phot. G. Saturn A 28.750

Zero point:

20.40 0.0

99.5 99.90

0.1

~~0.3 × light~~

99.7

0.2

4 5

Constant apart 5"

20.43 1.771 ~~1.7448~~

.671 1.7468

.711

.783

.798

2~~2~~4

3

Dec. 1, 1877

Japetus A G

1.27 Saturn in field.

645 0.97 1.058

1.02

1.18

0.85

5.29 Titan

650 2.51 2.412

2.52

2.07

2.55

2.41

20 6 Faint just following ring ~~(Rhea)~~ Either Tethys or Enceladus; only 3 satellites besides Titan were seen, so it was probably Tethys.

655 1.38

1.82 1.696

1.99

1.51

1.78

34 8

7.26 Japetus W. U. dx Phot G

1.22 1.130

.08

.19

.15

.01

65

Dec. 1, 1877

Titan 7.33
200 ? 1.00
1.16 faint ? Rhea

Rhea

1.17 1.352
7.45 1.30
1.35
1.33
1.61
1.76

7.50 Japetus ECP

1.015 1.158
1.13
1.12
1.13
1.26
79

Rhea

7.56 2.24 ~~1.820~~
1.75 ~~1.800~~
1.850
1.84
1.68
1.76
1.83
6)1110
185

Dec. 1, 1877

Companion to β Delphini

ECP

Mag. Pos. Ang. Dist.

15m 120° 25"

8.20 2.96 2.426

2.40

2.45

2.10

2.22

21 3

12th magn. companion too bright

a.s. 15m 20" 120°

γ Equulei & compr E. C. P. obs

8 40 2.34 faint & distant star

2.81 glimpsed when γ is made

2.53 equal to the companion

2.56 * . artif star

3.26 2.700

350

a.s.

6.78

5.27

better night much better

4.46 5.016

4.62

4.79

5.19

6.07

25.08

Dec. 1 1877

ε Pegasi 9 10 A.S. Obs.

14 mag.

1.37 1571

1.27 1.250

1.63

0.98

1.00

125

ε. El. P. obs.

9 27 1.32 1.352

1.47

1.40

1.44

1.13

176

α Aquarii D) ~~[illegible]~~ companion (13th. magn.). El. P. obs.

9 40 1.60

1.95 2.006

2.05

2.10

2.33

03

Same A S Ob.

~~2.34~~ ~~turned~~ turned screw [illegible] A

2.25 2.280

2.52

2.71

160

2.32 rather higher

140

Dec. 2, 1877.

Photometer C with ~~string for~~ moving double image prism, on East Equatorial, ε Lyrae (the northern of the two pairs). Components compared. E. C. P. obs.

6 32 33.8
105.3 71.5
216.8
272.6 55.8
628.5
314.25
157.12
127.3
31.82

6 34 23.2
89.8 66.6
204.8 67.4
272.2
590.0
295.0
147.50
134.0
33.50

ε Lyrae A. S. obs angle fixed at 0°+8

6 43 296.4 58.3
354.7
120.2 69.8
190.0
961.3
480.65
240.33
128.1
32.02

6.46 113.2 66.9
180.1
295.2 69.5
364.7
953.2
476.6
238.30
136.4
34.10

Dec. 2, 1877

δ Cygni n. prec. of ang 100° [illegible]

6.56 10.8 1036

114.4

188.7 5 pres. fr. dis. 0° dis.

296.3 107.4

610.4

305.2 211.0

152.60 52.75

Photometer G on E. Equatorial. α Cygni & companion. E. C. P. obs

8 18 0.77 .834

0.78

0.88

0.83

0.91

4.17 0.303 limit of visibility for the reflected image

A. S. obs.

8 30 0.84 .838

0.84

0.92

0.78

0.81

19 0.371 limit of visibility for the reflected image.

Dec. 2, 1877

9.20 ε Pegasi 14m a.S. do

0.77 .986

1.12

1.00

.92

1.12

.93

ε. C. P. obs.

1.05 1.046

1.06

1.03

1.01

9 30 1.08

23

Much fainter companion, pos. angle 20° less than 14th magn. companion, distance 50".

0.63 .652

0.58

0.62

0.76

9 38 0.67 setting poor.

326

ξ Pegasi & 15th magn. companion.

9 45 2.412 too faint to continue

a.S. 4.29 light partly cut off from prism
too faint to continue.

Dec. 2, 1877

β Pegasi & comp. E. C. P. obs.

10 2	1.08		
	0.95	1.040	
	1.14		
	1.06		
	0.97		
	520		
10 8	1.03	1.052	A. S. obs.
	.98		
	.99		
	1.16		
	1.10		
	526		

Shelter 18°

Dec. 3, 1877

Dec. 3d. 1877. Cont'd Phot. G

~~201.0~~

4 48 1.879 1.9048
1.972
1.891
1.947
1.835
9524
1.9048

4 47 a S. do.
2.11. 2.138
.08
.16
.21
.13
.69
2.138

Σ degrees. a little beyond angular range of inst. Phot. H

27.6 61.3
88.9
211.6 58.0
269.6
597.7 119.3
149.42 29.8

5 20 30.2 58.6
88.8
209.6 57.8
267.4
596.0 116.4
149.00 29.1

Dec. 3, 1877

ζ Cygni. A.S. obs

5.28 31.3
89.2 57.9
212.0
270.9 58.9
~~59~~3.4 116.8
60
~~148.85~~ 29.2
150.85

Dec ζ 37°28
" 39 Drac. 58 44
21 16
nally 220 35
241 51

39 Draconis
° "

T 22 32
α 18 22
h 4 10

5 45 39 Draconis, Photometer H. E.C.P. obs.

138.2 10.7 −3.5
165.4 27.2 16.5 +2.3
311.2 17.7 +3.5
340.7 29.5 11.8 −2.4
955.5 56.7 11.7
238.87 14.17 2.92
477.75
238.87

Dec. 3, 1877

5 45 39 Draconis. A. S. obs

135.0			13.8	−2.9
165.8	30.8		17.0	+3
309.3			19.5	2.8
345.2	35.9 61.7		16.4	~~+~~3
955.3				6.3
238.82	16.67			1.57

59 15
44
31

6 4 o Draconis E. C. P. obs.

133.5
160.6 27.1
318.4 24.2
342.6
955.1 51.3
238.77 12.82

6 8 A. S. obs.

136.9 30.1
167.0
311.2 31.9
343.1
958.2 62.0
239.55 15.5

6 12 W. A. obs.

137.2 23.2
160.4
319.5 22.4
341.9
959.0 45.6
239.75 11.4

Dec. 3 1877

Stars near α Aquilae

P. Ang	Dist	
70	80	14^m
250	70	15
280	115	15
285	130	14
343	130	15

Photometer G.

α Aquilae & Smyth's Comp. Wells

6.42 1.865
2.100
2.010
1.870
1.920
9.765
1.9530

γ Aquilae ECP

A comp Pos 255 & dist 50 in addition to Smyth's

Smyth's Comp and γ Aquilae
ECP

7.12 1.244
1.532
1.555
1.652
1.565
7.548
1.5096

Same W.C.C. Dec. 3, 1877

7.25 1.705
1.858
1.522
1.300
1.384
7.769
1.5.538

O2 Cygni l. α Cygni
0 470
8.00 0.405
0.430
0.375
0.400
2.080
0.4160

8.05 W.C.obs. la
.52
.59
.60
.57
.61
2.89
.578

8 39 Companion of ζ Pegasi compared with α Pegasi.
W.C. obs.
0.907
0.883
0.912
0.857
0.878
4437
0.8874

Same AH, Dec. 3, 1877

8.54 0.732
.654
.810
.719
.803
3.718
0.7436 Comp P.A. 120° D 15" to ξ Peg. A α Peg, AH

9.12 1.010
0.668
0.815
0.500
0.665
3.658
0.7316

H. H. obs.

9 28 0.788
0.820 After this measure the reflected image was brought closer to the star
1.830
1.360
1.079
5.877
1.1754

Reading of decl. circle for α Arietis
205° 58'
11 14
194 44

I 2 50
α 2 14
36

Searched for satellite of Neptune without success

Dec. 4-5, 1877.

Constant of photometer G determined in room over library. Object-glass from telescope of Troughton & Simms spectroscope used for direct image. Prism drawn out a little to get clear of the bar which would otherwise have cut off light. Star formed by lantern shining on quartz sphere. Only one image seen. Diaphragm used, cap of No. 1 filar micrometer eye-piece.

E. C. P. As.

23 33 3.23 3.266
3.16
3.54
3.30
3.10
133

unfocussed images

23 42 4.29 dec A. S. As.
3.66 inc 3.99^{8}
4.00 dec
3.78 incr
4.26 dec
4.99

Diaphragm changed

Images refocussed

Dec. 4–5, 1877

A. S. obs.

	dec.	inc
23 34	3.63	3.21
	3.60	3.39
	4.03	3.87
	4.12	4.20
	4.09	4.01
	3.894	3.736

inc & dec alternately

E. C. P. obs.

	Incr.	Decr.
0 7	3.36	3.64
	3.24	3.17
	3.49	3.12
	3.68	4.02
	3.97	4.11
	274	3.06
	3.548	3.612

Wick of lantern lowered. Images refocussed.
A. S. obs. (right eye, as before).

	Incr.	Decr.
1 4	3.05	3.74
	3.38	3.29
	3.22	3.63
	3.52	3.45
	3.05	3.31
	3.244	3.484

After these, the diaphragm fell off, and had to be replaced & the images refocussed.

Dec. 5, 1877

	Incr.	Decreasing	A. S. obs. (left eye)
1 26	3.15	3.06	
	3.16	3.44	
	3.60	3.57	
	3.22	3.84	
	3.15	3.92	
	128	283	
	3.256	3.566	

Both images seemed to be growing brighter; probably the lantern burned a little higher. Wick again reduced. Images now very small but distinct.

	Incr.	Decr.	A. S. obs. (right eye)
1 42	3.16	3.48	
	3.42	3.41	
	3.58	3.41	
	2.88	3.76	
	3.09	3.53	
	1~~8~~1,3	259	
	~~3.286~~ 3.226	3.518	

	Incr.	Decr.	A-S. obs. (left eye)
2 4	3.17	3.80	
	3.29	4.09	
	4.51*		
2.15		3.36	
	3.20	3.57	
	3.19	3.19	
	3.18	3.35	
	3.33	3.41	
		144	
	3.57 14] 3294	3.376	

* Probably out of focus. Images getting very faint. Refocussed. Reject the measures made before refocussing.

Stars both very faint.

Incr. & decr. do not apply to the final adjustment before reading, but only signify that the deflected image was at first too faint or too bright.

Dec. 5, 1877

2 50	inc.	dec.	W.U. obs.
	3,46~~8~~		refit refocussed
	3.64	3,68	
	.46	3.94	refocussed.
	3.34	3.49	
	3.11	3,52	
	3.34.	3.43	
		304	
	189	3.608	
	3.378		ECP
	2.94	3.61	
3.00	4.64	3.76	
	3,71	3,96	Images too bright
	3,65	3.49	Reflected image out of
	4.08	3,69	focus
	19.02	351	
	3.804	3.702	Wick lowered-
3.10	Dec	Inc.	Star fainter E.C.P. obs
	359.	3,30	
	3,13	3.72	
	3.48	3.64	focus changes by micrometer slipping
	120	126	
	3.40	3.42	

Dec. 5 1877

Dec 5th 1877 E. C. P. obs. Same diaphragm used in the last measures of yesterday
Star moderately bright.

		dec	inc	
		3.18	4.07	
		3.78	3.48	
		3.58	3.34	
21	55	3.44	3.55	
		3.14	3.19	
		11 2	263	
22	0	3.424	3.526	Star fainter, but easily seen. } A. S. obs.
		inc.	dec.	
		3.28	3.55	
		3.42	3.86	
		3.62	3.68	
		3.36	3.57	
		3.72	3.99	
		240	365	
		3.480	3.730	
22	20	Incr.	Decr.	E. C. P. obs.
		3.64	3.63	
		3.97	3.46	
		3.53	3.95	
		3.54	3.68	
		3.69	3.52	
		337	324	
		3.674	3.648	

Dec. 5 1877

Diameter of aperture used. C. S. [illegible]

69.643
63.800
× 5.843
6.843

70.743
63.905
6.838

63.966
70.831
6.865

70.771
63.911
6.860

dia A 6.8405
6.8625
Mean. 6.8515 tubes

1 = $\frac{25.4}{24}$ = $\frac{127}{12}$ = $10\frac{7}{12}$

116

127

477605/82
3.9967
68.515
7.25117
116

7.263
7.240
7.251 [illegible]

Dec. 7th, 1877. Phot. H.
S obs.

I Pegasi. ↓

5.45 67.0 12.8
79.8
245.1 11.9
257.0
648.9 24.7
162.22
.6.17
5 48 6 P obs
68.7 8.5
77.2
244.9 10.5
255.4
646.2 19.0
161.55
4.75
5 50 67.1 11.5
78.6
245.6
13.5
259.1
656.4
162.60 25.0
6.25
5 55 64.4 S obs. (Refocussed).
76.2 11.8
247.2
256.4 9.2
644.2
161.05 21.0
5.25

Dec. 9, 1877
↓ Index

η Lyræ

δ obs

6.20 149.8 11.3 +1
171.5 21.7 10.4 −8
330.0 11.1 −1
353.2 23.2 12.1 +9
1004.5 44.9 19
251.12 11.22 .47

~~169.2~~ U obs.

6 30 150.7 106 +5
170.2 19.5 8.9 −1.2
331.7 9.6 −5
352.7 21.0 11.4 +1.3
1005.3 40.5 35
251.32 10.12 .87

6 35 150.5 U. obs. 11.0 0
171.4 20.9 9.9 −1.1
330.5 11.0 −0.0
353.5 23.0 2.0 +1.0
1005.9 43.9 21
251.47 10.97 .52

6 38 147.9 δ 14.1 ~~+2.2~~ +2.0
173.8 25.9 11.8 ~~−.1~~ −.3
331.9 Somewhat hazy 10.1 −1.8 −2.0
X 354.6 22.7 12.6 +.7 +.5
1008.2 4~~7~~8.6 48.6 4.8
252.05 ~~11.90~~ 12.15 12.15 4.80

Examined δ Cygni − could not separate it with Photometer H, ~~(H. should be G.)~~

Dec. 7, 1877

52 Cygni S obs

7.7 242.0
258.9 16.9
64.4
78.9 14.5
644.2 31.4
161.05 7.85

7.12 244.8 U obs.
257.0 12.2
65.2
78.2 13.0
645.2 25.2
161.30 6.30

7.18 242.8
256.5 13.7
499.3
249.65
Clouds
.82

f' Cygni (perhaps not the star, as the pos. angle is not over 300; but distance nearly right & no other double star near; so that the change of pos. angle may be real.

8.07 67.0
79.7 12.7
242.9
255.4 12.5
645.0 25.2
161.25 6.30

8 14 66.0
79.2 13.2 Clouds
145.2
72.6 6.6

f' Cygni Dec. 7 1888

A.S. obs. Images dim & unsteady

9 49	65.2		
	77.6	12.4	
	244.9	13.3	
	258.2		
	645.9	25.7	
	161.47	6.42	P. obs.
9 55	63.4	14.8	
	78.2		
	245.6	13.7	
	259.3		
	646.5	28.5	
	161.62	7.12	
	~~63.0~~ Same A.S. obs		
	63.0	14.7	
	77.7		
	245.5	13.7	
10 0	259.2		
	645.4	28.4	
	161.35	7.10	
10 1	63.2		P obs.
	77.5	14.3	
	244.9	14.1	
	259.0		
	644.6	28.4	
	161.15	7.10	

Dec. 8, 1877.

β Cygni. color marked; bright star orange; comp. blue

S obs.

6.10 141.3 20.5 −2
181.3 40.0 19.5 −1.2
320.8 43.0 21.0 +3
3.8 22.0 +13
647.2 83.0 3.0
161.80 20.75 P. obs. .75

6 15 136.8 24.3 +1.6
181.3 44.5 20.7 +2.5
320.1 21.0 +1.7
6.4 46.3 Thin clouds 25.3 −2.6
644.6 90.8 84
161.15 22.70 210

6 20 322.0 a.S. obs
4.8 42.8 22.0 +2
142.4 20.8 −10
186.8 44.4 21.6 +2
656.0 87.2 22.8 +10
164.00 21.80 7.2 24
.60

6 27 327.2 U. obs. 17.6 −1.4
4.8 37.6 20.0 +1.0
X 144.4 0.4 +1.4
182.8 38.4 ~~38.4~~ 80 −1.0
659.2 ~~74.0~~ 76.0 ~~76.0~~ 48
164.80 ~~18.50~~ ~~19.00~~ 1.20
324.4 19.00 Seeing much worse 20.9 +6
6.5 42.1 656.6 81.4 18.4 −1.9
143.2 164.15 20.35 19.7 −.6
182.5 39.3 22.4 +2.1
52
1.30

Dec. 8 1877

6 33 140.1 P obs 2.7 -1.0

186.8 46.7 4.0 +3

318.0 48 +1.1

6.2 48.2 3.4 -3

651.1 94.9 2.7

162.77 23.72 .67

6 40 γ Delphini P obs.

38.3

108.6 70.3

220.5

287.9 67.4

655.3 137.7

163.82 34.42

6 42 Sam G. S. obs

103.9 120.3

224.2

284.5 118.4

=402.9

42.9

655.5 238.7

163.87 59.67

6 47 43.4 62.3 P. obs.

105.7

221.6 62.9

284.5

655.2 125.2

163.80 31.30

6 50 44.4 S obs

60.9

105.3 658.2 119.2

225.1 58.3 164.55 29.80

283.4

Dec. 8, 1877

β Delphini 8 obs.

7 0	72.8	
	78.2	5.4
	250.4	
	255.8	5.4
	657.2	10.8
	164.30	2.70

Looked for occultation of Venus. Clouds.

7.47 ζ Aquarii fainter? 320°

7.47	21.7 fainter dis	~~100.9~~ 101.1	
	122.8		
	201.6	103.8	
	305.4		
	651.5	~~204.7~~	204.9
	162.87	~~51.17~~	51.22
7 52	21.6	100.9	
	122.5		
	203.4	96.5	
	299.9		
	647.4	197.4	
	161.85	49.35	12 obs
7 58	23.5	92.6	
	116.1		
	210.8	85.8	
	296.6		
	647.0	178.4	
	161.75	44.60	

Dec. 8, 1877
u Pb

802 23.1
1182 95.1
205.3
88.8
294.1
640.7 183.9
160.17 45.97

8.10 μ Cygni P
38.1
63.0
101.1
226.9
49.8
276.7
642.8 ~~648.8~~ 112.8
160.70 ~~162.20~~ 28.20

8.14 46.2 50.5 u
96.7
225.2
51.8
277.0
645.1 102.3
161.27 25.57 refocussed

8 17 46.0 49.3 u
95.3
225.0
54.3
279.3
645.6 103.6
161.40 25.90

8.23 42.1 P
58.2
100.3
222.6
55.0
277.6
642.6 113.2
160.65 28.30

Dec. 8, 1877

8.26 47.3
100.2 52.9
223.3
276.2 52.9
647.0 105.8
161.75 26.45

Examined δ Cygni with photometer and also with Achr. 400; could not divide it

ψ Cygni P

8.38 49.2
89.6 40.4
230.5
275.6 45.1
644.9 85.5
161.22 21.37

8.42 50.4 S
87.1 36.7
233.7
269.3 35.7
640.5 72.4
160.12 18.10

25.4 }
116.8 } wrong images observed. U obs. 91.4
22.85

8 54 53.6
86.9 33.3
237.0
268.8 31.8
646.3 65.1
161.57 16.27

Dec. 8 1877

ψ Cygni U. obs.

8 59 53.8
87.8 34.0
234.8
268.6 33.8
645.0 67.8
161.25 16.95

9 03 ~~52.4~~ ψ Cygni S
52.4
87.7 35.3
237.9
266.2 28.3
644.2 63.6
161.05 15.90

P obs.

9 08 48.6
90.6 42.0
232.9
270.5 37.6
642.6 79.6
160.65 19.90

Dec 9th 1877 Opened at 4 45

adjusted Slit Cal [illegible]

6.38 ~~γ~~ β Aquilae cap. cut with α.

0.84 .774
.80
.78
.73
.72
37

Looked for Winnecke's Comet & Vega not seen.

ε Cygni a cap with α Cygni

7 27 1.38 1.112
1.03.
1.24
1.00
.91
556

7 31 16 .264
.26
.26
.25
.32
.23
.32

Dec. 9, 1877

b

7.35 .32 .306

.31

.28

.25

.37

3

2

7 37 .84 .790 .828

.88 retaining .60 rejecting .60 4.14

.81 .69

.60 too faint .828

.83

.78

4.74

.790 Dome cuts off. reject really one half

.87 .956

1.03

.96

.90

1.02

478

Cap α Cygni

7 51 108 1.012

108

100

98

92

6

Dec. 9 1877

802 ζ Lyrae

~~109~~		
19.3		35.7
132.5	113.2	29.1
191.6	119.5	28.0
311.1		32.5
654.5	232.7	
163.62	58.17	
12.6	123.6	
135.2		
188.7	125.7	
314.4	249.3	
651.9	62.32	
162.97		

Reading poor. too low.

o₂ Cygni with α Cygni

8.19 0.66 0.566
.57
.54
.48
.58
2.83
.566

Dec. 9, 1877

8 30 α Cygni a with α Cygni

.80 0.808

.86

.90

.60

.88

4.04

Comp b angle 90° greatest dist 150"

.38 0.404

.40

.38

.44

.42

8 42 2.02

9 30 ε Cygni.

1.57 1.500

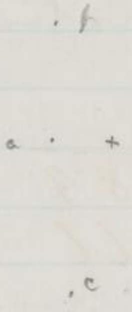
1.38

1.50

1.43

1.62

2.50



two addit components

to 250" 100"

b & C faint

Dec. 9, 1877

9h 8 μ Cygni. Phot H

36.6
105.6 69.0
221.7 ~~58.9~~ 59.1
280.8

644.7 ~~127.9~~ 128.1
161.17 ~~31.97~~ 32.02
44.1 54.6
98.7
227.1 50.2
277.3

647.2 164.8
0 161.80 26.20

Dec 9th 1877. 22h Screw A of Phot. G found at 29.408 This makes zero point 9.81 about.

Seeing pretty good; air clear, but images unsteady.

Dec. 10 1877

Dec 10th 1877 1.45

angular deviation of double image prism

187°6
185.2
2.4

182 22
184 51
2 29

pencilled cross hairs

185° 11
187 43
2 32

2°.5

Dec 10th, 21.20 1877 Angular deviation of prism

181° 27'
180 1.5
182 41

1 12
1 14

73'

425 | 326
326 130.4
990
978
1200

1090 133.4
978
1120
978
1420

23.5
282

33 : 282 = 40" = 330"
33 / 1044
99
54

6'.5

380 | 326
326 1.165
540
326
2140
1956
1840

784 | 326
2608 88.3
2720
2608
1120

73' ± 6.5 = 80' to 65'

Stars near β Pollucis on Dm maps

20° = 39.1 cms. 1° = 19.55 mms. 1' = 0.326

β to ρ = 42.5 = 130.4

π 43.5 = 133.4

ω 28.8 = 88.3

Dec. 10, 1877

Stars near β Lyrae.

β to γ 38.0 mm = 116.5

Angle of Position B
181° 26 1° 19'
182 45 1° 17' 76'
180 9

ζ to ε 39.8 122.1
ζ to η 39.8 122.1
α to ζ 37.9 116.3
α to ε 33.0 101.2

39.8/326
326 122.1
720
652
680
652
280

379 116.3
326
530
326
2040
1956
840

330 | 326
326 1012
400
326
740

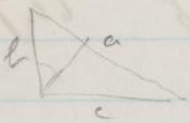
Angle position A = 73' can be used between 79.5 and 66.5
B . 76 82.5 69.5

β Persei to	ρ	130.4
"	π	133.4
"	ω	88.3
β Lyrae	γ	116.5
ζ "	ε	122.1
" "	η	122.1
α "	ζ	116.3
" "	ε	101.2

Dec. 12 1877.

Looked for Mercury from 4^h 45^m to 5^h 15^m, but clouds in the west concealed it.

9 30 Tried achrom. prism in front of comet seeker images excellent.



$a^2 = b^2 + c^2 + 2bc \cos A$

$a = 2b \sin \frac{1}{2}A$

Dec. 13, 1877; 4^h 50^m to 5^h 15^m; looked out for Mercury; sky partly clear, but no view of Mercury; Jupiter only seen at times.

Dec. 13, 1877

7.07 ε Lyrae ρ obs Photometer H.

22.1
84.2 62.1
204.4
264.7 60.3
575.4 122.4
143.85 30.60

7.10 ~~22.6~~ Index Shifted Seeing so poor that observation on this star abandoned.

ζ Lyrae

7.15 25.7 134.7. Seeing very poor.
160.4
214.2 124.9
339.1
739.4 259.6
184.85 64.90
31.2 186.22
126.1
157.3 62.72
215.8 124.6
340.6
744.9 250.9

Dec. 12, 1877

7 21	U dr.	ζ Sagittae
	35.1	122.4
	157.5	
	216.0	120.4
	336.4	
	745.0	242.8
	186.25	60.70
	31.8	127.5
	159.3	
	216.4	121.6
	338.0	
	745.6	249.1
	186.37	62.27

Circle reading 220 42

7.48	μ Cygni	U ds
	26.5	
	160.3	133.8
	207.2	
	345.2	138.0
	739.2	271.8
	184.80	67.95
	26.2	
	159.8	133.6
	206.5	
	342.7	136.2
	735.2	269.8
	183.80	67.45

High wind

ξ Cephei U. obs. Dec. 12 1877

8 12 71.8
116.5 44.7
255.2
299.2 44.0
742.7 88.7
185.67 22.17

8 14 70.5
118.9 48.4
252.3
299.4 47.1
741.1 95.5
185.27 23.87

S obs

8.18 71.1
113.0 41.~~8~~9
250.9 48.6
299.5
734.5 90.~~4~~5
183.62 22.6~~1~~2

73.0
115.8 42.8
251.5
296.2 4~~6~~4.7
736.5 ~~89.5~~ 875
184.12 ~~22.37~~ 21.87

β Cephei

8.27 89.8 16.4
106.2
269.0
283.2 14.2
748.2 30.6
187.05 7.65

β Cephei S obs. Dec. 12, 1877

8.32 86.2
16.5
102.7
268.3
286.0 17.7
743.2 34.2
185.80 8.55

8 37 88.7 U. obs.
104.0 15.3
268.2
282.0 13.8
742.9 29.1
185.72 7.27

8 40 88.3
102.5 14.2
269.0
282.0 13.0
741.8 27.2
185.45 6.80 Clouds passing

δ Cephei U. obs.

8 55 27.2
167.2
205.0 37.8
345.5
744.9 41.7
79.5
186.22 19.87

8 58 30.5
165.8
207.2 41.4
345.9
749.4 44.6
86.0
187.35 21.5

β 66 Dec. 12 1877

9 0 28.2
168.5
31.5
200.0
348.0
40.2
744.7 71.7
186.17 17.92

9 5 25.5
170.1
32.7
202.8
348.0 37.5
746.4 70.2
186.60 17.55

R. Cephei

9.20 16.0
176.7
24.7
201.4
356.3 19.7
~~26.3~~
750.4 ~~51.0~~ 444
187.60 ~~12.75~~ 11.10

17.1
174.9
23.9
148.8
354.2
22.9
745.0 46.8
186.22 11.70

u. obs.

9 32 16.2
174.8
197.2 22.4
355.5
20.7
743.7 43.1
185.92 10.77

Dec. 12, 1877

κ Cephei U. obs. Clouds passing after 1st setting.

9 35 16.1
176.2
197.5 21.3
355.4
20.7
745.2 42.0
186.30 10.50

η Cassiop. U obs.

9 47 14.5
176.0
192.3 16.3
357.4
17.1
740.2 33.4
185.05 8.35

9 50 13.5
176.5
194.0 17.5
356.8
16.7
740.8 34.2
185.20 8.55

9 55 S obs.
14.0
176.2
194.0 17.8
354.8
19.2
739.0 37.0
184.75 9.25

10 0 13.8
177.0
194.9 17.9
355.2
18.6
740.9 36.5
185.22 9.12

Seeing decidedly bad.

Dec 14th 1877 Opened Dome at 4 30
tested for [illegible].

5 0 Mercury seen between streaks of clouds, but not plainly enough to bear the photometer.

Photometer H. η Lyrae. P. obs.

5 15 15.1 161.7 9.0 -3
17 6.8 9.3 0
19 5.8 161.1 9.7 +4
35 6.9 9.2 -1
744.6 322.8 8
186.15 80.70 .20

9.30
5 18 15.8 159.2 Ram. A. S. obs. 10.3 +.6
17 5.0 10.5 +.8
19 4.6 162.0 9.1 -.6
35 6.6 8.9 -.8
742.0 321.2 28
185.50 80.30 .70

9.70
5 20 14.3 161.6 P. obs 8.8 1.5
17 5.9 9.6 .7
19 7.3 157.3 11.8 1.5
35 4.6 10.9 .6
742.1 318.9 43
185.52 79.72 10.27 1.07

221 43 38 40

241 43 58 44

Dec. 14, 1877

5 22 S obs lamp

152 162.5 8.8 -3
177.7 8.7 -4
195.8 161.2 79.4 +3
357.0 79.4 +3
745.7 323.7 13
186.42 80.92 9.08 .32

0 Diac. S obs.

5 41 79.9
111.8 31.9
260.0
285
288.5
740.2 60.4
185.05 15.10

80.7 Left eye
109.0 28.3
261.0
29.0
290.0
740.7 57.3
185.17 14.32

5 51 87.0 P. obs.
106.4 19.4
263.8
23.6
287.4
744.6 43.6
186.15 10.75

5 54 86.4
105.5 19.1
265.6
20.7
286.3
743.8 39.8
185.95 9.95

Dec. 14, 1877

o Drac. Alvan G. Clark obs.

~~326.0~~ wrong images

5 59 157.0 77.9

78.5 mean 79.1 repetition of last setting

~~105.1~~ 78.5 26.6

258.9 25.2

284.1 Mr. Clark says this was 84.1 (the first setting again)

726.6 51.8

181.65 12.95

ε Drac. U. obs. too bad seeing.

f' Cygni P. obs.

6 26 82.1

98.6 16.5

261.6

278.3 16.7

720.6 33.2

180.15 8.30

83.5 S. obs.

99.5 16.0

260.0

276.1 16.1

719.1 32.1

~~184.77~~ 179.77 8.02

86.4 left eye

100.8 14.4

263.6

6 36 278.0 14.4

728.8 28.8

182.20 7.20

Dec. 14, 1877

f' Cygni U. obs.

6 39 82.5
98.2 15.7.
260.8
279.2 18.4
720.7 34.1
180.17 8.52

6 42 82.2 Seeing growing worse; now very bad
97.8 15.6
258.0
278.8 20.8
716.8 36.4
179.20 9.10

197 38 reading of decl. circle for
8 15 γ Pegasi
189 23 reading for 51 Pisc.

14 30
6 15
8 15

51 Piscium 5 obs

373.8
7 5 13.8
170.0
194.0 24.0
349.3 24.5
727.1 48.5
181.77 12.12
13.2 left eye
171.9
193.1 21.2
349.1 24.1
727.3 45.3
181.82 11.32

Dec. 14, 1877

7.12. U. U. Ms.

10.2
169.5 24.2
193.7 22.8
347.4

720.8 47.0
180.20 11.75

7 16

9.3 21.4
171.4 ~~26.5~~
347.9 21.4
192.8

721.4 42.8
180.35 10.70

ζ Pegasi
55 "
ψ "
φ

Owing to dark bar in the field, probably due to the Nicol prism being inclined ~~out of adjustment~~, the instrument here taken apart and new prism ~~readjusted.~~ inserted

7.30

13.7
174.7 20.0
194.7
355.6 18.1

738.7 38.1
184.67 9.52

14.4
173.6 19.0
192.6
354.4 20.0

735.0 39.0
183.75 9.75

Dec. 14, 1877

ζ Piscium Pds.

7 39 37.3
149.7 65.6
215.3
335.4 61.9
737.7 127.5
184.42 31.87

35.8
152.1
218.6 66.5
332.2 63.6
738.7 130.1
184.67 32.52

7 42 35.1 u ds
150.5
218.2 67.7
328.4 66.7
732.2 134.4
183.05 33.60

190° 2' 6 55
13 50 20 45
203 52 13 50.

35.5
150.5 72.5
223.0
329.7 65.8
738.7 138.3
184.67 34.57

7 52 ψ Piscium
46.7 Pob
140.4 ← *160° disappears
225.2 84.8
325.2 81.5
737.5 166.3
184.37 41.57

Dec. 14, 1877

45.5

142.2

223.3 81.1

321.6 83.9

732.6 165.0

183.15 41.25

w. obs.

7 57 42.3 160° dis.

141.5 79.1

220.6

324.6 77.7

729.0 156.8

182.25 39.20

44.5

137.5

221.2 83.7

324.4 80.1

727.6 163.8

181.90 40.95

55 Piscium P. obs. left eye. Companion bluish.

8 10 16.8

170.2

195.1 24.9

351.2 25.6

733.3 50.5

183.32 12.62 right eye

8 13 16.3

173.6

192.6 19.0

350.9 25.4

733.4 44.4

183.35 11.10

Dec. 14, 1877

8 15 A S lame.

15.8

173.2

20.8

194.0

352.0

23.8

735.0 44.6

183.75 11.15 l. eye A. S obs.

15.9

173.0

27.1

194.1

351.3

24.6

734.3 45.7

183.57 11.42

8 23 18.2 U. obs.

172.0

194.5 22.5

349.6

28.6

734.3 51.1

183.57 12.77

8 26 16.5

172.0

194.5 22.5

350.4

26.1

733.4 48.6

183.35 12.15

φ Piscium U. obs.

8 43 10.7

178.4

188.5 10.1

359.1

736.7 11.6

184.17 21.7

5.42

Dec. 14, 1877

φ Piscium U. obs. continued. (Partly under a cloud but well seen; cloud gone after second setting.

8 47 10.0
177.5
10.8
188.3
360.9 9.1
736.7 19.9 S obs
184.17 4.97
8 50 1.0
clouds
9.8
8 57 10.8
177.0 11.0
188.0
376.8 20.8
94.20 5.20
9.0 1.4 left eye
11.7 10.3
177.6 8.6
186.2
376.9 18.9
94.22 4.72

9 5 358.4 P. obs.
10.1 11.7
177.8
188.6 10.8
734.9 22.5
183.72 5.62
9 7 357.3
11.2 13.9
179.1
189.2 10.1
736.8 24.0
184.20 6.00

Dec. 14, 1877

γ Arietis P. obs.

9.12
47.2
136.3 89.1 ∠180 disappears
226.3
317.5 91.2
727.3 180.3
181.82 45.07

9.15
44.5
137.2 92.7 ∠0 ~~disappear~~
224.9
321.1 96.2
727.7 188.9
181.92 47.22

9 18
52.1 U. obs.
134.0 81.9 ∠270 disappears
234.3
314.9 80.6 — Focus changed after this set
735.3 ~~166.5~~ 1625
183.82 ~~41.62~~ 40.62

49.38 complement

9 23
52.4
[131.5] ~~79.1~~ reject this; on looking again, observer dissatisfied.
135.5 83.1
230.5
315.7 85.2
734.1 168.3
183.52 42.07 — 47.93 complement

S obs
270 (& 180) disappear

9 28
50.0
134.2 84.2
230.0 91.0
321.0
735.2 175.2
183.80 43.80
46.20 complement

Seeing bad

The differences should be taken where the southern star disappears, since that is the brighter according to Struve.

It seems from the notes on the third and fifth sets that the pair of images observed in the last four sets was that of the other diagonal from the pair observed in the first two. Hence the southern star disappears between the first two settings of sets 1 & 2, and between the second & third of sets 3 — 6 inclusive.

Dec. 14, 1877

S obs. left eye

9.35 50.7 86.5
137.2
231.5
322.0 90.5
741.4 177.0
185.35 44.2~~2~~5 45.75 complement

trianguli S obs.

9 45 65.0 54.0
119.0
249.5 51.5
301.0
734.5 105.5
183.62 26.37

69.0 46.0 left eye
115.0
255.0
300.0 45.0
739.0 91.0
184.75 22.75

9 49 u obs.

68.3 53.0
121.3
248.9
299.5 50.6
738.0 103.6
184.50 25.90

71.0 47.3
118.3
251.0 46.7
297.7
738.0 94.0
184.50 23.50

Dec. 14, 1877

ι Trianguli P. obs.

10 1 68.7
119.4 50.7
250.6
299.9 49.3
738.6 100.0
184.65 25.00

10 3 67.9 Seeing poor.
121.3 53.4
249.9
301.8 51.9
740.9 105.3
185.22 26.32

Dec. 15, 1877

5h 10m Mercury and Jupiter both visible with the naked eye; but nothing could be seen of Mercury and very little of Jupiter with the photometer. Both planets in and among streaks of cloud.

Hazy and Cloudy lately.

Changed Photometers to Prof. Young.

Latitude Princeton 40°20'50"

Dec 16th, 1877. clear.
Looked for Mercury. At 5h 10m it was plainly visible to the naked eye at the same altitude with Jupiter, but could not be seen with the photometer.
ζ Lyrae 130° angle. Seeing bad.

Photometer H.

	ζ Lyrae	P obs.
50.8	53.2	
	181.6	
	233.6	52.0
	358.3	56.9
	828.7	108.9
	207.17	27.22
5 14	57.0	
	180.2	53.7
	233.9	
	358.6	58.4
	829.7	112.1
	207.42	28.02
5 17	5 obs. both sets right eye.	
	54.0	
	182.8	50.2
	233.0	
	360.0	54.0
	829.8	104.2
	207.45	26.05
5 20	52.6	
	185.7	48.7
	234.4	
	361.3	51.3
	834.0	100.0
	208.50	25.0

η Lyrae P. obs. Dec. 16, 1877

5 26	18.1			8.8	+2
	35.6	17.5		8.7	+1
	198.0			8.3	-3
	215.4	16.8		8.5	-1
	467.7	34.3			7
	116.92	8.57			.17
5 28	18.3				
	35.6	17.3			
	197.9			8.7	-2
		18.2		8.6	-3
	216.1			9.1	+2
	467.9	35.5		9.1	+2
	116.97	8.87			9 .22

Disk of bright star when reduced larger than that of companion.

S obs. red.

5 37						Arc
	15.2			11.0	1.3	222° 2'
	35.1	19.9		8.9	.8	19 47
	197.9	18.8		8.3	1.4	241 49
	216.7	38.7		10.5	.8	
	464.9	9.67			4.3	
	116.22				1.07	
						38 57
						4 5

left eye

5 38	17.6	17.3 ~~16.7~~		9.1	+3
	34.9			8.2	-6
				8.5	- x3
	198.2	17.8		9.3	+5
	216.0	~~34.5~~	35.1		~~1.5~~ 7
	466.7	~~8.62~~	8.77		~~.37~~ .7 42
	116.67				

3 Draconis P. obs

5 42	102.2	29.8 ~~31.8~~		14.5	+.5
	132.0			15.3	+1.3
	283.2			13.5	-.5
	309.6	26.4 ~~58.2~~	56.2	12.9	-1.1
	827.0	14.55	14.05		34 85
	206.75				

39 Draconis Pobs. continued Dec. 16, 1877

5 44 100.7 32.5 5.8 0.0
133.2 6.7 +.9
280.7 30.7 5.8 0.0
311.4 4.9 -.9
826.0 63.2 18
206.50 15.80 .45

5 54 Sd da. nad.
100.1 6.2 -.9
133.0 32.7 6.7 -.4
278.3 35.5 8.0 +9
313.8 7.5 +4
825.2 68.4 2.6
206.30 17.10 .65

5 57 100.0 39.0 left eye; it was in the case of this star I think, that the reduced image seemed more involved in the rays of the image not reduced, when the left eye was used than in the preceding measures made with the right eye.
139.0
274.8
317.3 42.5
831.1 81.5 17.8 -2.6
207.77 20.37 21.2 +.8
o Drac. P. obs. 23.0 +2.6
6 6 104.6 19.5 -.9
127.3 22.7 6.9
286.8 1.72
307.5 20.7
826.2 43.4
206.55 10.85

6 8 106.6 20.8 828.5 40.7
127.4 207.12 10.17
287.3
307.2 19.9

Dec. 16, 1877

6 12 Σ. o Draconis

6 12	102.9	24.7
	127.6	
	283.6	
	308.0	24.4
	822.1	49.1
	205.52	12.27

left eye

6 17	102.6	26.5
	129.1	
	285.0	
	311.8	26.8
	828.5	53.3
	207.12	13.32

ε Lyrae P.obs,

6 25	88.2	
	146.4	58.2
	265.3	
	326.8	61.5
	826.7	119.7
	206.67	29.92

6 27	83.2	
	145.8	62.6
	263.6	
	326.6	63.0
	819.2	125.6
	204.80	31.40

Dec. 16, 1877

6 32 ε Lyrae S Δs index shifted.

84.2 65.9
150.1
263.5 66.1
329.6 132.0
827.4 33.00
206.85

S Δs left eye.

6 42 80.0
151.1 71.1
261.2
333.6 72.4
20 825.9 143.5
206.47 35.87

5 Lyrae S

6 45 {Disappearance of n.f. stars occurs when photometer circle reads 104° * at ~~180~~ 0°}
ditto at 104

f Cyg.
μ Cyg.

66.8
165.3 98.5
249.6
347.9 98.3
829.6 196.8
207.40 49.20

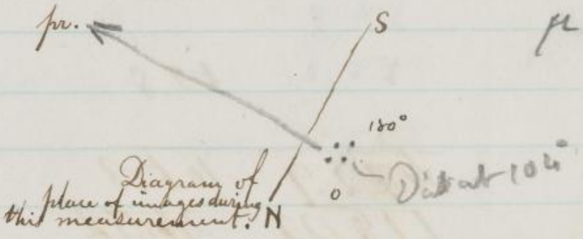
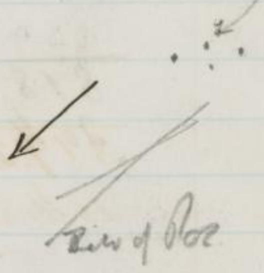


Diagram of place of images during this measurement.

6 56 67.5 P obs. * at 150 disappears
168.9 101.4
244.8
346.8 102.0
828.0 203.4
207.00 50.85



Dec. 16, 1877

f' Cygni. Pds

7.53 108.5 1~~8~~.6
4
123.1

291.8 13.6
305.4

828.8 ~~30.2~~ 282
207.20 ~~7.55~~ 7.05

7.5 Pds meas. a + b 2d Comp.

109.9 13.2
123.1
291.6 14.0
305.6

830.2 27.2
207.55 6.80

μ Cygni. P. ds.

8.05 3.2 51.5
54.7
180.6 53.8
234.4

472.9 105.3
118.22 26.32

357.1 ~~65~~ 59.5
56.6 ~~118.0~~
174.6 56.0
230.6

818.9 115.5
204.72 28.87

Dec. 16, 1877

Photometer J
μ Cygni & Burnham's ft. companion
P. obs.

8 27 2.57
2.70 2.832
3.20
2.75
2.94
4.16
2.832

A. S. obs.

8 36 2.50
2.82 2.912
3.50
3.26
2.89
4.56

Sc. A = 28750 before and after [illegible] have the
Saturn Jupiter images [illegible]

8 53 1.32 ~~1.346~~
1.56 1,366
1.27 1.17 I think most likely. In that case
1.36 the first computation is right. (S.)
1.32
~~1.73~~
183

Dec. 16, 1877

Photometer H. P obs. & Rosin

9 30 85.2
148.9 63.7
266.2
328.4 62.2
828.7 125.9
207.17 31.47

9 35 87.2 Sobs.
147.8 60.6
268.5
330.1 61.6
833.6 122.2
208.40 30.55

P obs. readjust. interchanged comps

9 38 83.5
148.2 64.7
262.3
331.8 69.5
825.8 134.2
206.45 33.55

9 41 84.0 64.5 S obs. left eye
148.5
265.2
329.8 64.6
827.5 129.1
206.87 32.27

51 Piscium P obs. Bright star below ang 150°

9 52 107.6 831.9 37.5
126.6 19.0 207.97 9.37
289.6
308.1 18.5

Dec. 16, 1877

9 54 S obs.
106.1
127.8 21.7
288.9 20.0
308.9
831.7 41.7
207.92 10.42

9 57 104.4 P. obs Bright star above; angle 300
127.6 23.2
287.3 24.1
311.4
830.7 47.3
207.67 11.82

9 59 105.2 S obs left eye
130.1 24.9
286.7 22.8
309.5
831.5 47.7
207.87 11.92

Dec. 17, 1877

Dec 17th 1877 Opened dome at 5.20

5.41 α β Capricorni

814
1534 72.0
262.1
338.5 76.5
8355 ~~866.4~~ 146.5
208.87 ~~216.6~~ 36.62

The last reading has been assumed to be 338.6

799 68.4
1483
254.9 83.8
342.7
829.8 152.2
207.45 38.05

5.53 β 106.6
131.3 24.7
283.9 26.0
309.9
831.7 50.7
207.92 12.67

105.3
130.2 24.9
281.3
309.6 28.3
826.4 53.2
206.60 13.30

Dec. 17, 1877

7.42 I Pegasi **1**

154.7 9.9
164.6

335.4 10.3
345.7

1000.4 20.2
250.10 5.05

153.5 10.9
164.4

335.6 10.8
346.4

999.9 21.7
249.97 5.42

7 53 μ Cygni

41.9 56.0
97.9

220.4 55.1
275.5

635.7 111.1
158.92 27.77

38.4 57.1 630.6 113.6
95.5 157.65 28.40

220.1 56.5
276.6

8 34 α Piscium

9.2 2
121.4
192.5 71.1
300.4 68.8

623.5 139.9
155.87 34.97

17 & 18
Dec. 18, 1877

8 36 α Piscium

11.4	
123.2	
186.6	63.4
305.2	66.2
626.4	129.6
156.60	32.40

8 41 C H Mr Rann clouds
closed at 9 10

Dec 18th 1877 Dome opened about 4 30.

4.50 5 [illegible]
28.0
Seeing too poor.

5 05 ε

	P
13.4	
130.3	
189.4	59.1
300.7 73	72.7
633.8	131.8
158.45	32.95 P

5.10

16.1	
123.1	
189.6	66.5
301.5	74.6
630.3	141.1
157.57	35.27

5 14 5 Lyrae P Dec. 18, 1877

24.2 88.5 330° Di. 330 br.

112.7

202.0

292.3 90.3

631.2 178.8

157.80 44.70

S. obs.

290 80.9 300 D

109.9

210.3

291.2 80.9

640.4 161.8

160.10 40.45

58.44 222 35

330 br. 39.27 19 1.5

241 50

5 42 G.S. 39 Draconis

142.1 5.9 -.2

31.0

173.1 5.1 -1.0

321.7 6.3 +.2

355.2 33.5 7.2 1.1

992.1 64.5 25

248.02 16.12 .62

P obs

5 45 137.6 19.9 +2.0

175.2 37.6 17.8 -.1

321.5 34.1 16.0 -1.9

355.6 18.2 +.3

4.3 1.07

989.9 71.7

Reversed images

247.47 17.92

S obs

5 50 146.6 16.7 +.2

32.0

172.6 15.3 -1.2

321.8 15.5 -1.0

356.0 34.2 18.7 +1.2

991.0 66.2 4.6

247.75 16.55 1.15

39 Drac. P. obs. Dec. 18, 1877

5 53 141.6 14.9 -.9
170.0 28.4 13.5 -2.3
319.9 34.7 16.6 +.8
354.6 18.1 +2.3
986.1 63.1 6.3
246.52 15.77 1.57

8 β Cygni P. obs. Colors strongly marked,
5 59 48.8 400 19.9 -3 -2
88.8 20.1 -0 0
228.3 40.6 20.4 +3 +3
268.9 20.2 +1 +1
634.8 80.6 6
158.70 20.15 .15

6 03 49.8 S 18.5 -3 -4
87.1 37.3 18.8 0 -2
229.0 38.2 19.3 +5 +4
267.2 37.8 18.9 +1 -0
X 633.1 75.1 75.5 9
37.75
~~19.0~~
158.27 18.77 18.8 .22
Reversed images

6 7 49.1 P. obs. 20.3 +2.6
88.1 39.0 18.7 +1.0
234.2 15.2 -2.5
266.2 32.0 16.8 -.9
637.6 ~~71.0~~ ~~17.75~~ 71.0 7.0
159.40 17.75 1.75

X 6 11 49.8 ~~37.9~~ 38.1 S obs. 19.1 -1.0
87.9 19.0 -1.1
227.8 21.1 +1.0
270.0 42.2 ~~80.3~~ 21.1 +1.0
20.07 4.1
635.5 ~~80.1~~ 1.02
158.87 ~~20.02~~
P. set at 234.2; found images unequal; equal at 229

Interfered blue glass Dec. 18. 1877
P. obs.

6 16
46.2
91.5 45.3
228.3
269.6 41.3
635.6 86.6
158.90 21.65

6 18 S
45.2 48.4
93.6
226.9
273.6 46.7
639.3 95.1
159.82 ~~28.77~~ 23.77

6 23 50.8 P. obs. through red glass
87.7 36.9
234.6 30.0
264.6
637.7 66.9
159.42 16.72

S do.

6 25 50.8 39.2
90.0
232.6 32.3
264.9
638.3 71.5
159.57 17.87

Dec 20th. 1877 Opened Dome at 4.30

n prec. ~~315°~~ ~~30~~
* Dis at 350° is s.foll. ~~135°~~

5 Layrse S. obs.

5.37		
	23.1	
	118.8	95.7
	206.0	
	303.1	97.1
	651.0	192.8
	162.75	48.20
5 45	26.0	P. obs.
	118.4	92.4
	203.6	
	302.7	99.1
	650.7	191.5
	162.67	47.87
5 48	26.8)	S. obs.
	120.7)	93.4
	205.8	
	302.0	96.2
	654.8	189.6
	163.70	47.40
6 1	26.2	P. obs.
	119.8	93.6
	203.3	
	300.4	97.1
	649.7	190.7
	162.42	47.67

Star at 150° disappears between 1st two of this set.

Reversed images:

s foll. ~~210~~ (120°) disappears.
235°

Dec. 20, 1877

P. & S. looked at δ Cygni.
Not separable or at all events not measurable.

6.30 S obs ψ Cygni
0.8
143.0
175.2 32.2
327.6
33.2
646.6 65.4
161.65 16.35

6 36 0.5 P. obs.
145.7
182.0 36.3
323.3
37.2
651.5 73.5
162.87 18.37 Reversed images

6 37 2.0 S obs.
143.0
180.5 37.5
326.0
36.0
651.5 73.5
162.87 18.37

6 45 0.8 P. obs.
147.6
180.0 32.4
328.6
32.2
657.0 64.6
164.25 16.15

Dec. 29, 1877

26 Cygni P. obs.

θ

649 358.4
152.3 20.3
172.6
334.7 23.7
1018.0 44.0
254.50 P 11.00 Reversed images

6 51 153.7 18.7
172.4
334.1 17.4
351.5
1011.7 36.1
252.92 9.02

S obs.

6 55 155.5 16.0
171.5
332.0
350.9 18.9
1009.9 34.9
252.47 P 8.72 Reversed images. probe S.

6 58 153.2 20.8
174.0
331.6 23.8
355.4
1014.2 44.6
253.55 11.15

ε Drac. S. obs.

8 30 60.7 1.8 +4
82.9 22.2 0.4 -1.0
241.5 1.0 -.4
264.9 23.4 2.4 +1.0
650.0 45.6 2.8
162.50 11.40 .70
S

Reversed images. The reduced image of the chief star was then lost in the rays of the other, and the images had to be separated farther. The reduced image was then farther than the companion from the brightest point of the bright star, but no farther from the borders of the image.

8 40 61.2
1.4 -.5 83.6 22.4
1.0 -9
240.2
2.4 +.5
30 +11 265.6 25.4
7.8 30 .75 650.6 47.8
162.65 11.95

ο Ceti looked at. Too distant to measure.

ν Ceti. Companion seen with some difficulty.

9 40 154.2
169.6 15.4
337.0
350.5 13.5
1011.3 28.9
252.82 7.22
S

Reversed images.

9 45 159.5
172.3 12.8
333.0
347.8 14.8
1012.6 27.6
253.15 6.90

Dec. 20, 1877

γ Ceti.

10 1 53.5
92.4 38.9
235.8
271.1 35.3
652.8 74.2
163.20 18.55

Reversed images. The two images of the chief star then seemed a little too far apart, but no change was made.

10 6 60.0
89.9 29.9
236.6
267.0 30.4
653.5 60.3
163.37 15.07

Seeing good, by glimpses only, in the north; almost constantly very bad in the south; perhaps too bad, for the difficult objects observed, which required much time to be spent in examination before they could be measured at all satisfactorily.

Dec 21st 1877 ~~E. S.~~ Inserted diaphragm to limit field

α Lyrae 5 23 P. obs.
165.5
165.6
166.2

S. obs.

Looked at ε Lyrae. Too faint in clouds for observation

Stars mostly invisible to naked eye.

Reading of decl. circle for α Aquilae 191° 40′

Decl. + 8 33

House circle 4 18 40
Star leaves field at 0 4 30 by B. 236
α 19 44 50
h 4 19 40

Error of circle & chronometer 1^m

Delphinus in thick clouds.

ζ Aquar. decl. −0° 40′

South of α Aquilae 9° 13′

Reading of decl. circle 182 27

Set on ζ Aquarii. Star invisible to naked eye but seen once in finder; immediately afterwards lost in clouds.

Dec 22d 1877. Opened Dome at 5 50

β Cygni
5 58 7.0
146.6 40.3 20.1 -1
186.9 20.2
326.4 40.6 20.3 +1
666.9 809 20.3 +1
166.72 20.22 .3
.07

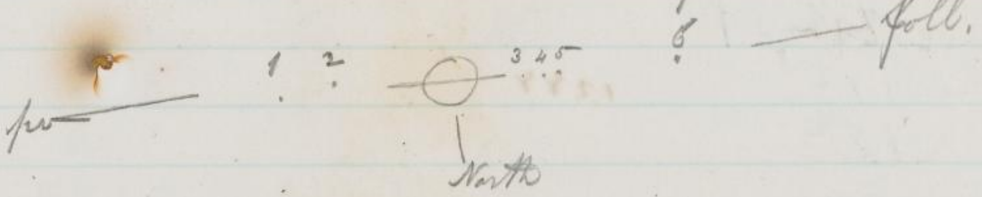
601 4.4
147.4 41.2 18.4 -2.2
188.6 22.8 +2.2
41.4 22.8 +2.2
323.0 826 18.6 -20
663.4 20.65 ~~26~~ 86
166.85 2.15

609 5 Lyrae String broke
315
126.3 330 2.0 94.8
210.3
304.1 93.8
672.2 188.6
168.05 ~~47.4~~
47.15

612 29.6
128.0 98.4
208.9
301.2 92.3
667.7 190.7 358
166.92 47.67

Dec. 22, 1877,

Saturn at 7¼



No. 3, although on the following side, is suspected to be Mimas which should be west by Marth's ephemeris. No faint object seen preceding Saturn. No. 4 is supposed to be Enceladus. Both are faint, No. 3 being very faint. Photometer I. Saturn (reflected) and No. 3 (Mimas?) Screw A set at 28.75.

E. C. P. obs. No. 3 given up for the present.

7 3. Saturn (reflected) and No. 5 (~~probably~~ Tethys)

1.53 1.350
1.34
1.28
1.27
1.33
.75

7 43 Japetus

149 0.644 1.444
145
153
154
121
122

Dec. 22, 1877

Tethys

7.49 1.12 1.288
1.52
1.29
1.31
1.20
144

Jap.

7.52 1.26 1.2.8
1.36
1.17
1.36
1.09
124

Seeing much worse. Consid. diff. minus from Saturn (reflected) and Iapetus. S. obs.

8 17 1.26
1.52 1336
1.33
1.32
1.25
168

Tethys

8.25 104
122 1.076
0.96
093
123
538

Photometer H. Dec. 22 1877

ψ' Aquarii P. obs.

8 31 51.6 12.5
64.1
231.5 12.8
244.3
591.5 25.3
147.87 6.32

8 35 S obs.
50.8 14.2
65.0
230.0 15.5
245.5
591.3 29.7
147.82 7.42

8 39 P. obs. Bright image out of field.
50.6 13.5
64.1
231.4 12.9
244.3
590.4 26.4 6.60
147.60

8 43 S. obs.
52.3 11.9
64.2
233.2 11.8
245.0
594.7 23.7
148.67 5.92

λ Arietis P. obs. Dec. 22, 1877

8 52 129.6
168.7 39.1
308.6
34.5
343.1

950.0 73.6
18.40
237.50

8 54 130.2 S obs.
166.2 36.0
308.9 36.6
345.5

960.8 72.6
18.15
237.70

8 58 39.7 P. obs. Other diagonal
72.2 32.5
219.6
257.6 38.0

589.1 70.5
17.62
147.27

38.0 S. obs.
76.0 38.0
221.1
256.8 35.7

591.9 73.7
18.42
147.97

γ Arietis P. obs.

9 3 14.7 83.6 star at 180 disappears
98.3
190.7
281.6 90.9

585.3 174.5
43.62
146.32

Dec. 22, 1877

[illegible] *
9 5 S obs. left eye
11.1 *180° disappears
102.3 91.2
193.1 91.6
284.7
591.2 182.8
147.80 45.70

P. obs. Other diagonal.
9 11 9.0
98.8 89.8
193.6 85.6
279.2
580.6 175.4
145.15 43.85

left eye
9 14 13.7 S obs x Dome cut off $\frac{3}{4}$ of object-glass; last set must have been taken with half the glass.

9 17 7.3 *0 disappears
103.0 95.7
189.2
281.0 91.8
580.5 187.5
145.12 46.87

π Arietis P. obs. Another companion seen about 20" distant, somewhat fainter, about 10° less than Struve's companion in position angle.
9 28 132.4
160.3 27.9
312.6
30.6
343.2
948.5 58.5
237.12 14.62

Dec. 22, 1877

9 30 Sds.
1325 ~~index loose~~
tube loose

9 37 1332 29.8
1630
314.6 27.4
342.0
952.8 57.2
238.20 14.30

9 41 45.1 28.9 P. obs. Other diagonal.
74.0
224.3 24.5
248.8
592.2 534
148.05 13.35

9 46 43.0 31.8 Sds.
74.8
224.3
251.2 26.9
593.3 58.7
148.32 14.67

π Arietis; chief star compared with 2d companion
above mentioned. P. obs.

9 52 54.3 8.8
63.1
233.6 9.0
242.6
593.6 17.8
148.40 4.45

Dec. 23) 1877

9 55 Cloud at 10 05

Dec 23d 1877

— ψ Cygni
— 26 "
— ε Draconis
α Lyrae
β Delphini
δ Equulei
κ Pegasi

Photometer H

26 Cygni P. obs.

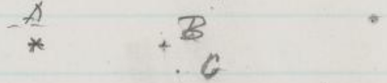
5 13 140.0
160.4 20.4
323.3 16.9
340.2
963.9 37.3
240.97 9.32

5 18 141.5 16.7 S. obs
158.2
323.0 18.9
341.9
964.6 35.6
241.15 8.90

5 21 141.9 18.2 P. obs. Reversed images.
160.1
321.0 21.6
342.6
965.6 39.8
241.40 9.95

S Dec. 2~~2~~3, 18~~77~~

26 Cygni
Three components seen by P.
Third barely suspected by S.



C much fainter than B
Angle ABC about 120°
Pos. angle of B from A 130°
" " " C " B 75°
Distance of C from B 1/6 that of B from A.

5 23 142.0 1~~7~~8.5
160.5
323.2 17.1
340.3
966.0 ~~34.6~~ 35.6
241.50 8.~~65~~ 8.90

ψ Cygni

5 33 135.4 P. obs. 29.1
164.5
316.2 28.1
344.3
960.4 57.2
240.10 14.30

5 35 S
133.0 39.5
172.5
313.0 33.8
346.8
965.3 73.3
241.32 18.32

5 43 130.6 P. obs. Reversed images
168.9 ~~37.7~~ 38.3
312.3 36.0
348.3
960.1 ~~73.7~~ 74.3
240.02 ~~18.42~~ 18.57

Dec. 2$\overset{3}{\cancel{d}}$ 1877

132.0 3$\overset{5}{4}$.4
167.4
313.5
350.2 36.7
963 1 ~~71.1~~ 721
240.77 ~~1777~~ 18,02

Looked for Mimas at 5.50
faint point seen (by P. only) near where ⊖.
was last night. Very faint.
Photometer I.
Iapetus and (reflected) Saturn. P. obs.

6 9 1.64
1.34 1.366
1.39
1.13
1.33
1.83

6 12 Same S
1.44 1.198
1.20
1.23
1.00 not perceptibly too faint.
1.12
99

Dec. 23, 1877

Transits of stars in region of Mars on Oct 2d

				Decl.
74 Aquarii	0h	38m	34.6s	16.
			55.2	24
		39m	4.0	23.5
74 Aquarii		41	46.8	
		42	7.5	
			16.0	

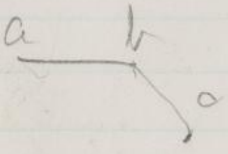
Photometer I. Saturn (reflected) and the third of the above stars. P. obs. Screw Sat 28.75

6 40 0.56
0.54 .562 b
0.58
0.59
0.54
n

Saturn & 2d of above stars. a

6 42 0.67 .635
0.60

fainter star c

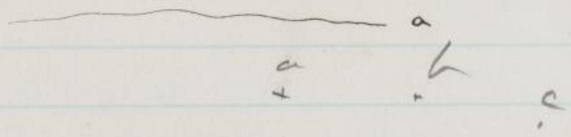


abc = 120°
bc = ab.

6.50 S obs star b   Dec. 23, 1877

0.43   .516   b
.52
.49
.60
.54
258

7.00 .71 star a
   .58   .645



S rus c dist bc = (1⅓ & 1¼) ab
abc = 170°

7.54 Search for star mistaken for satellite by Hall on August 17

2. 16 20 14 Declination of first star 3′. Time $0^{m}.0^{s}$.   2 22
22 30 " " Second star 7 " 2.22   * 52
2 0 24 30 Third star 10. " 4.14.

Interval between first & second by stop watch 2^{m} ~~16^{s}~~
" " second & third 1.58.

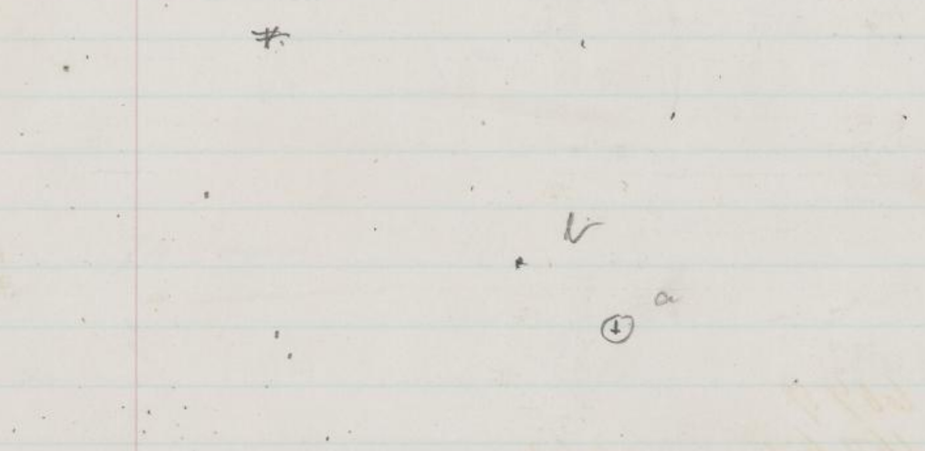
* 463   23 24 30   10 50
25 37   10 39
1m 7.0   .11 S

Obs interval 1m 6.50

Setting of declination circle for star 463. 42°.20m

Dec. 23, 1877

Sketch of * foll. 463



a called in Journal +

b called g to distinguish from those on page 137.

a Pole

.88
.72
.63
.77
.76 .752

a 6

b Pole

1.23
1.02 1.125

Index found at .65

.84
.76 .750
.78
.70
.67

8 55 3.75 Moon has risen

Dec. 23, 1877

Last set strongly accordant, but satisfactory

907 ζ Piscium

4.6	64.6
118.1	
~~100.6~~	69.1
300.0	
187.2	
609.9	133.7
152.47	33.42
7.8	
118.7	69.4
185.2	67.0
298.4	
609.6	136.4
152.40	34.10

9.25 57 Piscium

139.0	20.6
159.6	
341.8	22.2
319.6	
~~960.0~~ 960.0	42.8
~~239.60~~ 240.09	107.0
160.0	21.8
138.3	
319.3	28.0
341.3	43.8
958.8	109.5
239.70	

Dec. 23, 1877

947 30 Tauri

	140.2	
	158.3	179
	320.1	172
	337.3	
955.9	~~945.9~~	35.1
238.97	~~236.47~~	8.77
	141.2	164
	157.6	
	320.5	178
	338.3	
	957.6	34.2
	239.40	8.55

Looked for Burnhams Comp to α Tauri without success. Closed at 10 10

Dec 24th 1877 Dome opened at 4.30

ff

ε Draconis ~~β Del.~~

– γ Delphini ~~α Lyrae~~

~~δ Equu~~

ζ Aquarii κ Pegasi

I Peg.

52 Cygg.

ζ Aquarii

ψ Aquarii

β Lyrae.

Stars are at about 140°–150°

Dobs

5 14 14.2 87.3) 320° dis.

101.5

198.5

281.3 82.8

595.5 ~~586.5~~ 170.1

42.52

148.87 ~~146.37~~ Pobs

α Lyrae

5 32 60.6

60.6

60.5

60 and 61 too bright

β Delphini ? 2 Dec. 24, 1877

5 49

151.6
151.7
149.1
148.7
] too faint

151.65
148.9
2.75
0 55
150.27

601.1
150.27 β Delphini

147.8
151.5 3.7

329.2
333.6 4.4

6.0

962.1 8.1
240.52 2.02

6.05 γ Delphini

4.4
117.6 62.0
179.6
297.3
598.9 67.1
149.72 129.1
32.27

64.55
32.27

27.0
93.9 67.9
207.4 64.1
271.5
599.8 132.0
33.0
149.95

Dec. 24, 1877

6.23 δ Equulei

53.3			
62.9	7.6		
237.6			
245.4	7.8		
6012	15.4		
150.30	3.85		
147.5	8.2		
155.7			
325.1	8.2		
333.3			
961.6	16.4		
240.40	4.10		

7.11 ζ Aquarii

100.6			
197.1	86.6	330° dis	330° ln.
283.7			
14.9	85.7		
596.3	172.3		
149.07	43.07 — 46.93		
20.3	81.2	) 150 dis.	1[illegible] ln
101.5			
195.7	84.5		
280.2			
597.7	165.7		
149.42	41.42		

Dec. 24, 1877

7.22 φ Aquarii

53.2
67.1 13.9
233.2
247.5 14.3
601.0 28.2
150.25 7.05

i.

144.2
158.0 13.8
322.6
336.6 14.0
961.4 27.8
240.35 6.95

F. 23

7.51 32 Erid. com. bl., larg. yel.

35.4 55.2
90.6
210.7 61.4
272.1
608.8 116.6
152.20 29.15

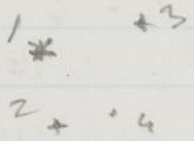
F. 32

120.3
174.6 54.4
304.6
353.2 48.6
7.59 952.6 103.0
238.15 25.75

F. 12

Dec. 24, 1877

θ Orionis S. obs.



8 30 1 - 2

0.6
121.6
177.0 55.4
300.7
599.9 59.9
149.97 115.3
28.82

8 34 24.9 1 - 3
95.9 71.0
210.0
267.7 57.7
598.5 128.7
149.62 32.17

8 37 132.5 1 .4
165.6 33.1
313.1
344.7 31.6
955.9 64.7
238.97 16.17

8 43 15.9 91.0) 2 dis. 2 - 3
96.9
200.2
280.9 80.7
593.9 161.7
148.47 40.42

Dec. 24, 1877

8 49 2 - 4

25.6
92.7 67.1
206.5
271.0 64.5
595.8 131.6
148.95 ~~[illegible]~~
32.90

3 - 4

123.8
180.0 56.2
303.0
355.8 52,8
962.6 109.0
240.65 27.25

P. obs. 1 - 2

8 58 123,4
175.7 52.3
304.6
354.8 50.2
958.5 102.5
239.62 25.62

9 1 124.8 1 - 3
177.5 52.7
302.7
354.4 51.7
959.4 104.4
239.85 26.10

9. 3 132.6 1 — 4 Dec. 24, 1877
166.9 34.3
314.4
344.6 30.2
958.5 64.5
239.62 16.12

9 8 123.0 2 — 3 1 & 2 by mistake reject
2 disappears

9 10 16.2 2 and 3
105.0 88.2 3 disappears
196.1
286.9 90.8
604.2 179.0
151.05 44.75

9 13 5.2 2 and 4
116.2
179.9 63.7
296.7
598.0 68.5
149.50 132.2
33.05

9 15 0.2 3 and 4
120.4
178.5 58.1
298.9
598.0 61.3
149.50 119.4
29.85

9 22 a.S repeats 1 – 3. Dec. 24, 1877

30.9 54.7
85.6

210.8 59.8
270.6

597.9 114.5
149.47 28.62

9 27 ι Orionis

53.5
128
66.3

231.0
15.1
246.1

596.9 27.9
6.97
149.22

9 36 51.8 P. obs.
13.9
65.7

231.6
13.7
245.3

594.4 27.6
69.0
148.60

9 39 141.1
15.3 Other diagonal
156.4

323.6
13.3
336.9

958.0 28.6
7.15
239.50

9 42 141.0
14.8
155.8

323.6
13.7
337.3

957.7 28.5
239.42 7.12

Dec. 24th 1877
& Dec. 25

α Canis Majoris P. obs.

9 52 331.3
331.4
330.6
331.4
330.5 reduced image too bright
330.6

331.37
330.57
80
.4

looked again with eyepiece of Phot. I and neither S or P could be companion.
Closed at 10. 14.
Seeing became worse later.

Dec 25th 1877 Opened dome at 4 30

5.02 α Ursae Min.

24.0	4.9	2.3	-2
28.9		2.6	+1
23.6	5.2	2.7	+2 106
28.8		2.5	265
204.3	5.7	30	.12 0
210.0		27	-3
204.4	6 2	2.9	-1
210.6		33	+3
8293	11 9		7.7
207.32	2.97		

11.6
2.85

2.8 +2
2.6 -5
2.5 -1
3.2 +6
14
.35

52.9
414.3
467.2
118.80

52.4
415.0
467.4
118.85

~~6.8~~

3.2 +.4
2.0 -.8
2.4 -.4
3.8 +1.0
26
.65

1053
5265
26.32

10.1
505
2.52

113.9	6.4	2.9	-1
120.3		34	+4
293.8	5.6	30	
299.4		26	-4
			7
827.4	12.0		
206.85	3.0		

Probably 294.6 Dec. 2~~4~~5, 1877

5 12	113.8	5.6	+0.7	-21	3.2	+.4
	119.4		4.9	21	2.4	-.4
	284.6	5.8	-.1	-29	2.4	-.6
	300.4		5.9	3.1	3.4	+6
	~~818.2~~	11.4		102		16
	~~204.55~~	2.85		255		.45
	207.05					

5 34 κ Cephei

106.4	19.4	
125.8		
287.3	17.7	
305.0	37.1	
824.5	9.27	
206.12		br. md.
15.6		
195.1	20.0	
215.1		
17.2		
~~36.8~~	20.4	
164		
46~~3~~8.4	40.4	
116.85	10.10	

5 57 β Cephei

33.2	
199.4	12.6
212.9	13.5
20.6	
466.1	26.1
116.52	6.52

Dec. 2~~4~~ 5 1897

108.9
123.2 14.3
289.3
303.9 14.6
825.3 289
206.32 7.22

6.01 ξ Cephei
93.1
137.8 44.7
274.6
321.3 46.7
8268 91.4
206.70 22.85
6.6
49.4 42.8
182.1
225.6 43.5
463.7 86.3
116.92 21.57

δ Cephei
13.5
40.0 26.5
193.3
220.4 27.1
467.2 53.6
116.80 13.40

Dec. $\overset{5}{24}$, 1877

6.15

99.7 300
129.7
281.2 334
6.18 314.6 [illegible]
825.2 634
206.30 15.85

7 28 β D [illegible] [illegible]

7 54 φ' [illegible] 180° [illegible]
79.1
158.9 79.8
255.7) 180° [illegible] 84.3
340.0
8[illegible]3.7 164.1
41.02
~~19092~~
208.42
79.6) 180 dis
165.6 84.0
249.6
343.9 86.7
829.7 170.7
207.42 42.67

55 Piscium Dec. 2~~4~~5, 1877

14.2
42.1 27.9
192.5
221.6 29.1
470.4 57.0
117.60 14.25

105.4
132.0 26.6
283.6
312.6 29.0
833.6 55.6
13.90
208.40

14.6
39.9 25.3
197.1
8.15 220.8 23.7
472.4 49.0
12.25
118.10

8.19 φ Piscium
24.2
35.6 11.4
201.6
212.6 11.0
474.0 22.4
5.60
118.50

111.6
121.6 10.0
294.2
305.0 10.8
8.25 832.4 20.8
5.20
208.10

829 γ Arietis Dec. 2~~4~~5, 1877

71.1

166.6) 180 dis 91.7

258.3

347.7 83.4

843.7 1751

43.77

210.92

70.5

163.3 92.8

253.1) 180 dis. 82.2

335.3

175.0

822.2 43.75

205.55

90 δ Orionis ζ dist

117.8

3.5

121.3

297.4

3.0

300.4

6.5

836.9 1.62

209.22

286

3.4

320

206.3

3.3

209.6

6.7

476.5 1.67

119.12

8.51.

Dec. 2~~4~~5, 1877

9 13 9.87 Clear, 34.6
1333
277.2
315.3 38.1
824.6 72.7
206.12 18.17

9 23 35.1 δ Orionis
200.4 15.7
213.4 130
19.4
468.3 28.7
117.07 7.17

109.8
124.0 14.2
289.5 12.9
302.4
825.7 27.1
206.42 6.77

9 34 β Orionis
233 5.3
286
203.6 5.8
209.4
464.9 11.1
116.22 2.77
112.8
~~112.7~~
~~112.4~~ 5.8
118.6
292.9 [illegible]
298.5
822.8 [illegible]
205.70 2.85

Dec. ~~24~~ 25, 1877

9 45 Σ 655 Leporis

20.4
32.7 12.3
201.4
212.6 11.2
23.5
467.1 5.87
116.77

111.2
122.1 10.9

290.9
300.3 9.4
20.3
824.5 5.07
206.12

κ Leporis

9 53 97.3
131.8 34.5

278.0
310.6 32.6
817.7 67.1
204.42 16.77

4.4
42.7 38.3

187.4
220.9 33.5
455.4 71.8
113.85 17.95

Looked at α Can. Maj. companion suspected.
Clouded at about 10.15

Dec 26th 1877. Opened Dome at 4.00

Venus 5.00

Screw A = 2875
B at 200

5.14 B at 150 Disk ½ dia Venus.
V = field.

1 .75 easily seen away from V.
invis near V.
2 .73 seen 1 dia V. covered.

3 1.00 could be full to within circle
4 .50 Venus covered could hardly be noticed.
splendid ti[illegible] by use
5 1.00 V cov. could ~~hardly~~ not be noticed
6 full apt at .55
7 .75 easily seen. within circle

* 3.16 faint
4,55
4,83
4,01
3,91
3,91
5.35 2.417
~~[illegible]~~
4.028

Dec. 26, 1877

Dimly seen at .52 5.37 8

glimpsed at .40 9

5.44 S. at 0.43 could 10 hardly escape detection.

γ D.l.
δ Equu.
ι Peg.
κ Peg.
ζ Aq.
4 "

β Delphini

5 56 S Ao.

228
29.6 6.8
204.0 6.8
210.8
4672 3.40
116.80

6 0 25.6 P. obs.
29.8 4.2
203.9 4.3
208.2
4675 8.5
116.87 2.12

6 3 118.2 Other diagonal
294.1
300.8 6.7
113.3
8264 4.9
206.60 11.6
2.90

Dec. 26, 1877

6 09 S
113.4
109.6 6.2
294.2
299.1 4.9
826.3 111
206.57 27.7

δ Equulei P. obs.

6 13 114.4
121.7 7.3
292.3
299.2 6.9
827.6 14.2
206.90 3.55

6 15 23.4 Other diagonal
30.8 7.4
203.5
210.6 7.1
468.3 14.5
117.07 3.62

6 20 23.9 S. obs.
32.0 8.1
202.9
210.4 7.5
469.2 15.6
117.30 3.90

6 29 112.5 First diagonal
121.8 9.3
293.7
300.8 7.1 16.4
828.8 4.10 207.20

Dec. 26, 1877

γ Delphini 1 obs. Principal (following) star slightly orange; companion white.

6 45 59.9
169.4
242.1 72.7
352.5 67.4
823.9 140.1
205.97 35.02
6 49 82.3 Other diagonal
147.3 65.0
265.8
328.2 62.4
823.6 127.4
205.90 31.85

Showed Prof. S. P. Langley Saturn
Lear - lat Mars &c

Identified S Cancri

Looked unsuccessfully for comp to Sirius

Dec. 26, 1877
24" 100?

9 09 ζ Cancri
85.4
149.3 63.9
263.4
331.1 67.7
8292 131.6
3290
207.30
" 58.0

172.6 68.0
240.6
349.2 68.6
8204 136.8
- 34.20
205.10

β Cephei

9 44 19.3 P. obs
34.6 15.3
198.4
212.7 13.8
4645 29.1
7.27
116.12

9 51 17.3 S. obs.
34.2 16.9
198.5
214.7 16.2
4647 33.1
8.27
116.17

Dec. 26, 1877

9.53 109.2 Other diagonal

124.0 14.8

289.4

303.6 14.2

8262 29.0

206.55 7.25

9 55 109.8 P. obs.

123.0 13.2

288.7

302.4 13.7

8239 26.9

205.97 6.72

E Drac. P. obs.

10 0 99.8

129.1 29.3 15.5 +1.9

283.7 13.8 +2

308.8 25.1 11.6 -20

13.3 -.3

821.4 54.4 44

205.35 13.60 1.10

100.6 30.9 S. do.

131.5 16.0 +11

282.8 14.9 0

311.5 28.7 13.8 -11

14.9

826.4 59.6 22

206.60 14.90 .55

Dec. 26, 1877 & Dec. 27th

Other diagonal. P. obs.

10 6	14.5	24.0	20	
	38.5		2.0	
	194.5			
	218.6	24.1	2.0	
			2.1	
			1	
	466.1	48.1	.02	
		12.02		
	116.52			
				5 obs.
10 11	12.2	25.9	13.9	+.9
	38.1		12.0	-1.0
	194.1	26.1	12.0	+1.0
	220.2		14.1	+1.1
		52.0		4.0
	464.6			1.00
		13.00		
	116.15			

Jan. 11 40

Closed at 10.15

Dec 27th 1877 Opened Dome at 3.00
Hazy & Smoky near horizon

~~a γ Delphini~~
a 52 Cygni.
a κ Pegasi
δ Equulei
I Pegasi
ξ Aquarii
ψ Aquarii

5.0 γ Delphini

62.9	
173.7	64.6
238.3	
354.8	68.1
829.7	132.7
207.42	33.17
87.0	65.0
152.0	
263.2	66.2
329.4	
831.6	131.2
207.90	32.80

Dec. 27, 1877

5 18 α Lyrae P.obs. I Ring
K "

26.9
28.4 1.5

205.0
206.3 1.3

466.6 2.8
116.65 .70

5 21 27.5 S
28.9 1.4

204.8
205.8 1.0

[illegible]7.0 2.4
[illegible]75 .60

5 25 116.8 P.obs. Other diagonal
115.6 1.2

296.6
297.4 0.8

826.4 2.0
206.60 .50

5 29 116.1 1.1
117.2

296.1
297.2 1.1

826.6 2.2
206.65 ~~.50~~ 1.10 .55

Dec. 27 1877

52 Cygni

5 40 110.1 P. obs.

121.6 11.5

289.1 12.8

301.3

822.1 23.7

5.92

205.52

5 43 S obs. left eye

109.4

122.1 12.7

288.0

13.6

301.6

26.3

821.1

6.57

205.27

5 46 19.5 P. obs. Other diagonal

10.9

30.4

200.7 11.1

212.8

22.0

462.4 5.50

115.60

5 48 19.3 11.7 S. obs. left eye

31.0

200.0

11.2

211.2

461.5 22.9

5.72

115.37

Dec. 27, 1877

β Delphini P. obs.

δ Equul.
I Peg.
II "
3 Aq.
4 "

5 56 25.9
29.7 3.8
203.5
207.6 4.1
466.7 7.9
116.67 1.97
25.3 S. obs.
29.5 4.2
203.8
207.7 3.9
466.3 8.1
116.57 2.02
6 5 112.8 P. obs. Other diagonal
117.5 4.7
295.6
299.3 3.7
825.2 8.4
206.30 2.10
6 9 113.1 4.7 S obs.
117.8
294.8
299.4 4.6
825.1 9.3
206.27 2.32

Dec. 27, 1877

δ Equulei P. obs.

6 15 113.5
120.8 7.3
293.2
299.5 6.3
827.0 13.6
206.75 3.40
6 18 119.4 S. obs. left eye
112.2 7.2
301.0 7.5
293.5
14.7
826.1 3.67
206.52
6 23 21.8 P. obs. other diagonal
30.3 8.5
202.2 9.9
212.1
466.4 18.4
4.60
116.60
6 25 S. obs. left eye.
22.2 8.8
31.0
201.8 8.8
210.6
465.6 17.6
4.40
116.40

Dec. 27, 1877

I Pegasi S. obs.

6 30 20.2
31.7 11.5
202.1
213.8 11.7
467.8 23.2
116.95 5.80

6 35 112.7 Other diagonal
122.9 10.2
290.5
301.7 11.2
827.8 21.4
206.95 5.35

κ Pegasi

6 48 111.2 P. obs.
119.1 7.9
292.2
301.4 9.2
823.9 17.1
205.97 4.27

6 52 111.6 S. obs
119.3 7.7
293.1 8.8
301.9
825.9 16.5
206.47 4.12

Dec. 27, 1877

κ Pegasi Other diagonal

6 58 22.4 7.9 P. obs
30.3

202.2 8.4
210.6

~~465.5~~ 163
~~116.37~~ 4.07

7 01 22.0 8.5 S. obs.
30.5

209.1 7.0
202.1

~~463.7~~ 15.5
~~115.92~~ 3.87

7.07 P. obs. I Pegasi
31.6 11.1
205

199.8 11.4
211.2

~~463.1~~ 22.5
~~115.77~~ 5.62

111.8 10.6
122.4

290.4 11.2
301.6

~~826.2~~ 21.8
5.45

26 ~~206.55~~

Dec. 27, 1877

8 05	β Rubi		Zöll	Phot.
		32.4	119.1	
		151.5		
		219.4	122.0	
		341.4		
		744.7	241.1	
		186.17	60.27	29.72
8 08	co			
		23	14.8	
		17.1		
		172.3	16.1	
		198.4		
		390.1	30.9	
		97.62	7.72	~~4.93~~
8 12	β			
		34.2	130.0	
		164.2		
		211.3	134.5	
		345.8		
		755.5	264.5	
		188.87	66.12	23.87
8 16	S. β.			
		~~26.5~~		
8 19		29.4	135.1	
		164.5		
		200.7	149.5	
		350.2		
		744.8	284.6	
		186.20	71.15	18.85

Dec. 27, 1877

ω

8 22 357.8 15.7

13.5

179.7 13.0

192.7

743.7 28.7

185.92 7.17 ~~179~~8

8 28 β

23.5 148.0

171.5

202.9 148.4

351 3

749.2 296.4 74.10

187.30 15.90

ξ Cephei Photometer H, P. obs.

8 40 7.2 410

48.2

185.6

39.9

225.5

466.5 80.9

20.22 ~~50~~

116.62

8 43 5.0 S. obs.

47.9 42.9

181.0

43.9

224.9

458.8 86.8

114.70 2170

Dec. 27, 1877

ξ Cephei; Other diagonal. P. obs

8 46	96.6	39.0	
	135.6		
	276.2		
	317.1	40.9	
	825.5	79.9	
	206.37	19.97	
	93.3	45.6	S. obs
	138.9		
	272.5		
	318.4	45.9	
	823.1	91.5	
	205.77	22.87	

Photometer Z. P. obs.

	β Persei		
8 52	32.2	101.0	
	133.2		
	240.3		
	345.0	104.7	
	750.7	205.7	
	187.67	51.42	
	ω Persei		
8 55	22.0	143.5	
	165.5		
	210.9	145.1	
	356.0		
	754.4	288.6	
	188.60	72.15	
		17.85	

Dec. 27, 1877

	β Persei		
8 59	41.4	94.8	
	136.2		
	248.6	94.9	
	343.5		
	769.7	189.7 47.42	42.59
	192.42		
9 02	350.0	β	S ab
	28.9	83.2	
	112.1		
	229.1	120.9	
	720.1	204.1 51.02	48.99
	180.02		
9 05	359.4	16.4	ω
	15.8		
	167.2	68.9	
	236.1		
	778.5	85.3 21.32	
	194.62		
9 10	41.5	90.2	β
	131.7		
	239.0	103.3	
	342.3		
9 14	754.5	193.5 48.37	41.62
	188.62		

Dec. 27, 1877

δ Cephei Photometer H_2 P. obs.

9 18 98.8 33.6
132.4
280.1 34.9
315.0
826.3 68.5
17.12
206.57

9 20 95.0 S. obs.
42.0
137.0
276.0
39.8
315.8
823.8 81.8
20.45
205.95

9 22 9.2 36.9 P. obs. Other diagonal
45.1
189.9
35.0
224.9
469.1 71.9
17.97
117.27

9 25 8.5 S. obs.
34.7
43.2
188.4 35.1
223.5
463.6 69.8
115.90 17.45

Photometer Z   Dec. 27, 1877

9 33   β Persei   P. obs.

23.3
173.4   150.1
201.8   148.3
350.1
748.6   298.4
187.15   74.60   15.40

ω Persei

9 36   358.9
15.6   16.7
178.6   15.6
194.2
747.3   32.3
186.82   8.07

9 38   β Persei

23.8   147.4
171.2
198.1   155.6
353.7
746.8   303.0   14.25
186.70   75.75

9 41   δ Ari   β

16.7   156.0
172.7
200.8
351.4   150.6
741.6   306.6
185.40   76.65   18.35

Dec. 29, 1877

9 44 ∞
16.1

Lamp went out

Photometer H.

	κ Cephei	P. obs.	
9 52	104.8		
	127.2	22.4	
	285.8		
	306.6	20.8	
	824.4	43.2 10.80	
	206.10		
9 55	108.1	19.4	S. obs.
	127.5		
	284.4		
	306.9	22.5	
	826.9	41.9 10.47	
	206.72		
10 2	14.7	19.2	P. obs. Other diagonal
	33.9		
	197.7	17.6	
	215.3		
	461.6	36.8	
	115.40	9.20	
10 5	14.9	20.4	
	35.3		
	198.7	20.3	
	218.0		
	465.9	40.7 10.17	
	116.47		

Cloudy at 10 11

Dec. 28, 1877   Opened Dome at 4.50

Photometer H.

5 20   α Lyrae   P. obs.

24.6
25.8   1.2
207.6
208.8   1.2
466.8   2.4
116.70   .60

5 20   24.4   1.7 S
25.1
207.3   1.2
208.5
466.3   2.9   2.9
116.57   .72   1.45
.72

5 27   115.4   1.3   P. obs.   Other diagonal
116.7
232.1
297.2
297.9   .7   Last pair repeated
297.4
296.4   1.0
1188.9
3.0

297.2   28.9
297.9   297.22
297.4
296.4

1.0
.50

594.45

232.1
116.05
297.22
413.27
206.64

116.05
594.45
6)710.50
118.42

116.05
297.21
2)413.26
~~703.31~~
206.63

5 33   116.0   233.5   1.5   S. obs.
117.5
297.0)   .6   clock stopped, between these two;
296.6+)   they were therefore repeated
296.2
297.1   0.9
1187.9   3.0
1.0
.50

116.75
296.97
2)413.72
206.86

Dec. 28, 1877

52 Cygni P. obs.

5 47 109.0 12.1
121.1
290.0
302.9 12.9
823.0 25.0
6.25
205.75

5 50 110.5 S. obs. 172° 20'
13.2
123.7
289.0
302.7 13.7
825.9 26.9
6.72
206.47

5 55 19.7 12.6 Other diagonal. P. obs.
32.3
200.6
213.6 13.0
466.2 25.6
6.40
116.55 S obs.

5 58 19.5 11.3
30.8
201.3 10.5
211.8
463.4 21.8
5.45
115.85

Dec. 28, 1877

κ Pegasi P. obs.

6 9 22.7
31.6 8.9
201.4
208.5 7.1
464.2 16.0
4.00
116.05

6 13 S left eye
23.6
31.5 7.9
202.0 7.2
209.2
466.3 15.1
3.77
116.57

6 21 110.5 Other diagonal, P. obs.
120.2 9.7
292.9 8.1
301.0
824.6 17.8
4.45
206.15

6 24 111.8 8.8
120.6
292.9 9.3
302.2
827.5 18.1
4.52
206.87

Dec. 28, 1877

W 463 23 24 30 10 50

		Δα			Decl.	Magn.
462	Comp. sta	57.2	24 30.	13	10° 50	9
	1	4.0	36.8	3	40	13
		8.5	41.3	2	39	13
		20.1	52.9	2½	39.5	13
		32.1	25 4.9	13	50	12½
		40.4	13.2	12	49	12½
		43.0	15.8	13½	50.5	12½
		43.0	15.8	5½	42.5	12
Star taken for satellite	2	0.2	33 0	3	40	12
		16.9	5,	9		11½
		26.5		½		13
		34.0		2	39	12½

~~[illegible]~~
^{3} 8.3 Δα ~~b~~ between
12th & 2d.

24	30.0	22.1	13		10° 50′
	37.5	29.6	3	12	40
	40.9	33.0	15 ~~2~~ 1.5	12	38.5
	53.7	45.8	15 ~~2~~.5	13	38.5
			1	13.5	38.
			13.	11.5	50
	14.0	6.1	12	11.5	49
	16.7	8.8	5.	10.5	42
	23.8	25.9	3	10.5	40

Dec. 28, 1877

6 56 φ Aquarii . § obs.

109.2 13.8
123.0
291.2 13.7
304.9
828.3 27.5
6.87
207.07

7 06 19.6 14.8
34.4
199.2 15.6
214.8
30.4
468.0 7.60
117.00

7 48 P obs

19.6 14.1
33.7
200.7 13.7
214.4
468.4 27.8
6.95
117.10
110.6 12.7
123.3
290.6 12.1
302.7
827.2 24.8
6.20
206.80

8.41 Japetus Dec. 28, 1877

1,1.6 1,26~~1~~
2

1,31

1,12

1,56

1,16

13~~4~~1

20± Titan

2,916
~~2,5~~

3,19

3,17

2,72

2,71

2,79

~~4~~5 8
14

900 δ Androm.

2,35 2.380

2,86

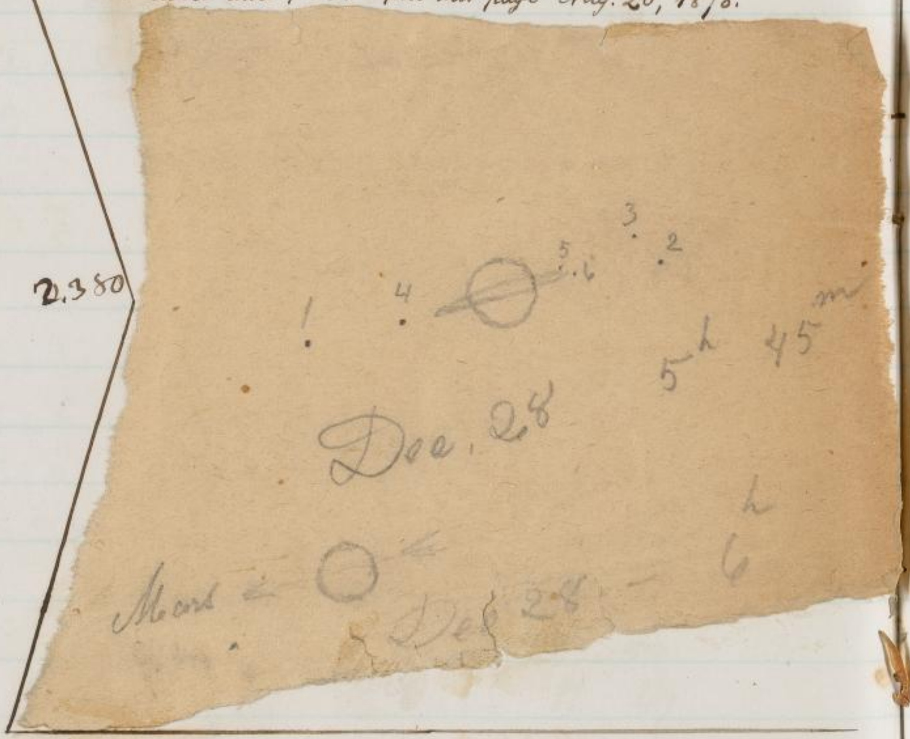
2,20

2,35

2,14

190

Sketch by Mr. Clark of configurations observed by him Dec. 28, 1877.
Received and pasted upon this page Aug. 20, 1878.



9.28 μ Androm

1,71 1.580

1,58

1,45

1,56

1,60

290

Dec. 28. 1877 & Dec. 29

α Arietis
1.64   1.624
1.64
1.62
1.58
1.67
3 1 2

β Delphini saw Burnham's DD ε not B, C. but did not cover star.

Pleiades η has ~~two or~~ three other comp not more distinct than those in DM

Dec 29th 1877 Opened Dome at 4.45

5 15   1   72.9   ~~83.7~~ 150 dis.   ζ Aquarii   ~~ζ Aq.~~
158.6   85.7   150 flat   ~~H Peg.~~
256.0   ~~α Leporis~~
82.0
338.0   ~~Mars Stars~~
826.6   ~~165.7~~ 167.7   ~~Neptune Sat.~~
206.37   ~~41.42~~ 41.92
71.5   330 dis   Other diagonal   Jup
160.2   88.7   150 bott.
251.9
343.6   91.7
827.2   180.4
206.80   45.10   44.90
5 27   68.0   Sch   340 dis.   150 bott.
163.8   95.8
252.9
350.4   97.5
835.1   193.3
48.32   41.68
208.77

Dec. ~~28~~ 29, 1877

S.obs. ζ Aq. First diagonal

77.0	77.3) 160 dis.	150 bitt
154.3		77.3
255.4	87.8 should be ~~88~~ 88.2	
343.6		165.5
830.3	~~165.1~~	41.37
207.57	~~41.27~~	

κ Pegasi P.obs.

5 40	112.7		
	120.2	7.5	
	293.1		
	300.3	7.2	
	826.3	14.7	
	206.57	3.67	
	112.6	8.4	S obs.
	121.0		
	292.9		
	300.2	7.3	
	826.7	15.7	
	206.67	3.92	
5 46	23.8		P.obs. Other diagonal
	32.8	9.0	
	201.8		
	211.4	9.6	
	469.8	18.6	
	117.45	4.65	S obs.
5 49	22.6	8.9	
	31.5		
	203.9		
	211.8	7.9	
	469.8	16.8	
	117.45	~~8.40~~	
		4.20	

α Lyrae P.obs

6 02	27.9	1.3	
	29.2		
	205.0	1.4	
	206.4		
	468.5	2.7	
	117.12	.67	
6 06	28.0	1.0	S obs. left eye
	29.0		
	205.2	1.3	a 2.3
	206.5	2.3	1.15
	468.7	.57	.57
	117.17		
6 10	117.5	0.9	P.obs. Other diagonal
	118.4		
	295.9	1.4	
	297.3		
	829.1	2.3	
	207.27	.57	
6 13	117.1	0.8	
	117.9		
	296.5	1.3	
	297.8		~~1.05~~
	829.3	2.1	.52
	207.32	.52	

Dec. 28, 1877

172.53 · 10 18
2 12 12 30
170 41
175 5 2 12

b to e = 8'
e last

	Mag	Dec		R.A.					
e	11	42.5		b = 22 58 1		12 50			
	12	36.5		c = 23 0 46		12 31			
	12	41.		2 45		19			
	11.5	33.		2 44.0 7.6		2 44.3 7.6			
	12	33.5		2 51.6		2 51.9			
c	b	50.5		32	50.6	37 30.0	58		1
e	11 ~12°	42.5	nr 1	32m	43.0	37 22.4	57 58		54
	13	37.5	nr —		48.8	28.8			
f	14	44.			52.6	32.0		~~20~~	~~20~~ 3
	12	36.5		33m	27.4	34 7.4	58	38	39
	14	45.6			35.3	vf 44.2		46	46
	12	41.		34	5.6	45.3 ?		17	17
	11.5	33.			31.2	11.0	59	42	43
	11.5	33.5	nr.		57.5	37.4	0	8	9
	13.5	40.		35	1.8	41.9		13	14
c		31	c		34.6	110 14.3 36	0	46	46

e to f 96 b to e 7.5
7.7

Dec. 29, 1877

Hour circle reading 0 37 20
7.3451 2 59 46
2 22 26

P. & S. looked at Neptune but saw no satellite.

~~Photometer I.~~ Faint companion of ξ Pegasi ~~ξ Pegasi &~~ seen plainly by P. and occasionally by S at 3h 45m sidereal time.

Photometer I. α Andr. & companion preceding.

P. obs.

9 27 2.32
1.91 2.122
2.45
2.09
1.84
56 1

Same S. obs.

9 35 1.78
1.76 1.844
1.85
1.79
2.04
9 2 2

Looked at ν Ceti. Length estim. of 15 m evidently too faint unless ~~using or~~ estim. has changed, now about 9 m.

Tried measuring o Ceti. Clock stopped.

Dec 31, 1877.

6 28 | μ Cygni, distant comp. Photometer I.

2.05 P. obs.

1.72 1.988

1.91

2.26

2.00 1.45

494

6 32 S obs.

1.45

Seeing very bad & clock could not be made to run.

8 40 ξ Gem. has companions at 85° distance 100" and 350°, distance 110".

Companions of γ Gem.	Pos. angle	Distance
	60°	200"
	340	150"
	30	100"

Watched S Cancri at intervals (near minimum) fainter than either of three neighboring stars.
Looked for Burnham's comp. to β Geminorum and for Comp. to Sirius without success. Observed Neb. in Orion θ Orionis ι Orionis σ Orionis and various others.

1877phae.proj..473O