KG
11365
178

H.24

Vol. VI.

Equatorial

Oct. 23d 1857 — Dec. 14th 185~~8~~7

S. Coolidge

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KG 11365.178

Equatorial.

1857phae.proj...178S

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From the 23^{d} to 30th Oct. continual rains and cloudy weather

(Peter ~~—~~ Olcott) Comet

Daily $+66^{s}.5$ $-18'.35''$

9..45..39.5 $-19^{\circ}.18'..25''.4$

1/6 11.1 3 6

R 9..45..50.6 Dec − 19..21 31 of Comet

16.61

HC 19355 57

Star 8th 116 27

83 0 5

9..42 27.26 19..6 36.0 946.77

2 40.17 15..46.8

9..45..07.43 −19..22 22.8 15..46.8

Arg p 307 No 22

7th

9..44..28.70 −19..21..04.4

+19.06 +31.0 37.4

.00 +6.4 23 00 9

prec +19.67 − 1..56.5 23 5

7th 9.. 45.07.43 −19.. 22..23.5

9th − 54.68 +5..52.

9.. 44 12.75 −19.. 16..31.5

+8.87 −11..34.6

8th 9..44 21.62 −19 28 06 1

−13.60 +1 24.6

7/8 9..44 08.02 −19 26 41.5

7/8th 9 44..08.02 −19..26..41.5

9th 9..44..12.75 −19..16..31.5

8th 9 44.21.62 −19..28..06.1

7th 9..45..07.43 −19..22..23.5

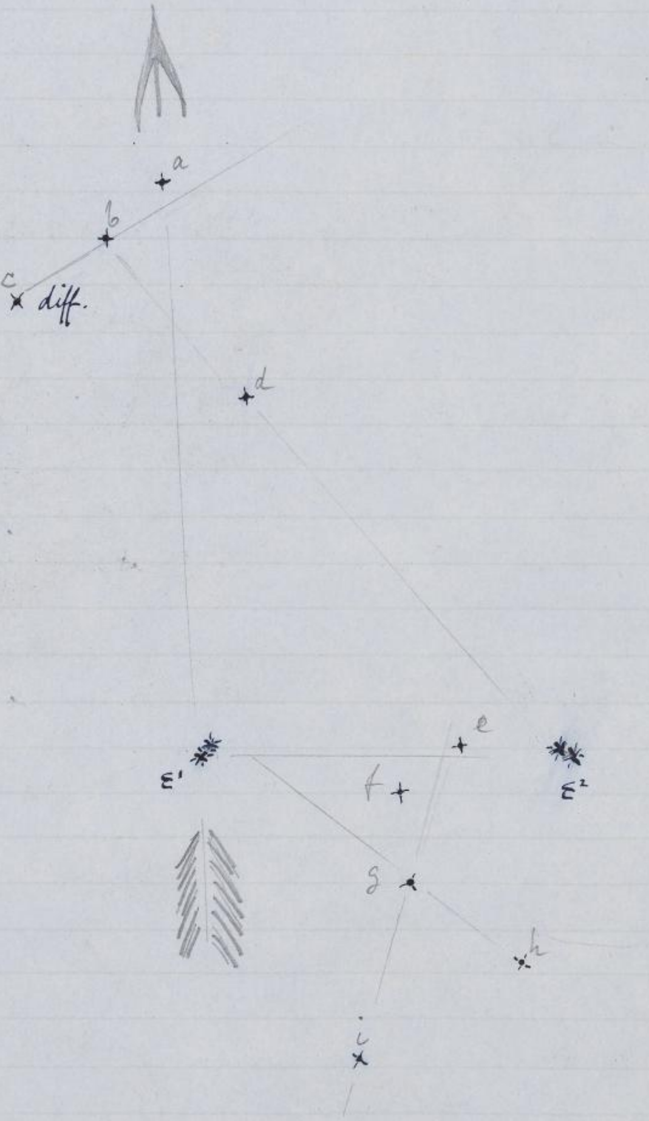
2d November 1857

ε Lyrae and neighbours

8 22^h 50^m. sidereal Time – moonlight very bright

Stars 4 hours & upwards from meridian

c. is a difficult object with moonlight. Moon was full yesterday (?)



S. C

1857 Nov 2nd Ill West. Occultations, obs. by S.C.

Pleiades. Time by E.C. on S Gov

EC fast $30^s.75$

(For mean solar time see 5 pages forward)

a Im. of Electra 2^h .. 29^m .. $03^s.55$

b Im. of Celeno 2 .. 45 .. 06.5

$16^m.2^s.95$

$29^m\ 40^s\ 5$

c Im. of Maja 3^h .. 14^m .. $47^s.0$

$08^m.20^s.5$

d Im. of Merope 3^h .. 23^m .. $07^s.5$ (mean of two observations)

~~$13^m\ 55^s.5$~~

Im 3^h .. 37^m .. $03^s.0$. ? is this a star? ~~17~~ 18 0

~~$3^m\ 23^s.0$~~

b Em. of Celeno 3^h .. 40^m .. $26^s.0$

$2^m\ 14^s\ 0$

a Em. of Electra 3^h .. 42^m .. $40^s.0$

Em. of 3^h .. 45^m .. $52^s.5$? is this a star?

$9^m\ 20^s.7$

d Em. of Merope 3^h .. 52^m .. $00^s.7$ n.s.

$1^m\ 23^s.3$

e Im. of Alcyone. 3^h .. 53^m .. $24^s.0$

$7^m\ 13\ 9$

Em. of No. 7. 4^h .. 00^m .. $37^s.9$

1. 20. 8

Em. of No. 12. 4^h .. 01^m .. $58^s.7$

$12^m\ 2^s2\ 2$

c Em. of Maja. 4^h 14^m .. $20^s.9$

$11^m\ 16\ 9$

Em of No 16. 4^h .. 25^m .. $37^s.8$

9 26. 5

Em of No 18 4^h .. 34^m .. $04^s.3$

9 36. 85

Em. of No 27 4^h .. 43^m .. $41^s.15$

$34^s.25$

e Em of Alcyone 4 .. 44^m .. $15^s.4$

not corrected for rate or error

1857 Nov 2nd Ill West. Occultations. obs. by S.C.

Pleiades Time by E.C. on S. Goo.

44 1 5 4

Em of 26 4^h .. 46^m .. $30^s.7$ 2^m 15^s 3

Em of 20 4^h .. 53^m .. 29.0 6^m 58^s 3

3^m 18^s 3

Em of 56 4^h .. 56^m .. $47^s.3$

not corrected for rate or error

For mean solar time of occultations of Nov 2nd
see 4 pages forward.

Occultations. Nov 2nd 1857. (obs with Small Equatorial)

Pleiades Time by Chron. 424.

Im of Celeno 2^h .. 38^m .. 27^s. H.P.T. .01

29.47

* { Im of Maja 3^h .. 08^m .. 14^s. A.H. 10

8 01 0.5

Im of Merope 3^h .. 16^m .. 15^s. H.P.T. }

17 38

Em of Celeno 3^h .. 33^m .. 53^s H.P.T.

2.22

Em of Electra 3^h . 36^m .. 15^s. H.P.T.

10 35

Im of Alcyone 3^h .. 46^m . 50^s. A.H.

21.04

Ex of Maja 4^h .. 07^m .. 54^s. H.P.T.

29 54

Ex of Alcyone 4^h .. 37^m . 48^s. A.H.

Comparison of 424
with E.C.

Before Observation

E.C. 2 .. 21 .. 00
424. 2 .. 14 .. 32.5
6.27.5

After Observation

E.C. 5 .. 21 .. 00
424 5 .. 14 .. 31
6. 29.0

1.5 3^h. 0.5 p.h.

* The names of these stars have been inter-
changed.

not corrected for rate or error

Saturn.

November 2^d 1857. Very Bad definition (3 AM)

The preceding shadow extends ~~over~~ across ring B but ~~does~~ not on ring A. The southern apex of the ball is seen free from the rings and projected on the sky above them. Curiously enough the north pole was seen with the greatest difficulty and except for a few intervals of steadiness in the planet would have been rather suspected than ~~made out~~

The vision was such that I could not catch a single ~~se~~ sight of the dusky ring. Did not see any shadow to the right, and only momentary glimpse of the division of rings —

0.05
1 0

S. B

Arg p 307 N° 30231

	9 50 26.73		− 20°.. 28'.. 30".3
	+ 38		− 1 20
* 7th R	9.. 51.. 04.73	Dec	− 20.. 29.. 50
	45.31		− 2 36
8th/9th R	9.. 51 50.04	Dec	− 20.. 32.. 26

Comet

R 9.. 50.. 04 Dec − 20.. 34.. 23

Comet precedes * 7th by 1m.. 1s
South of " 4'.. 30"

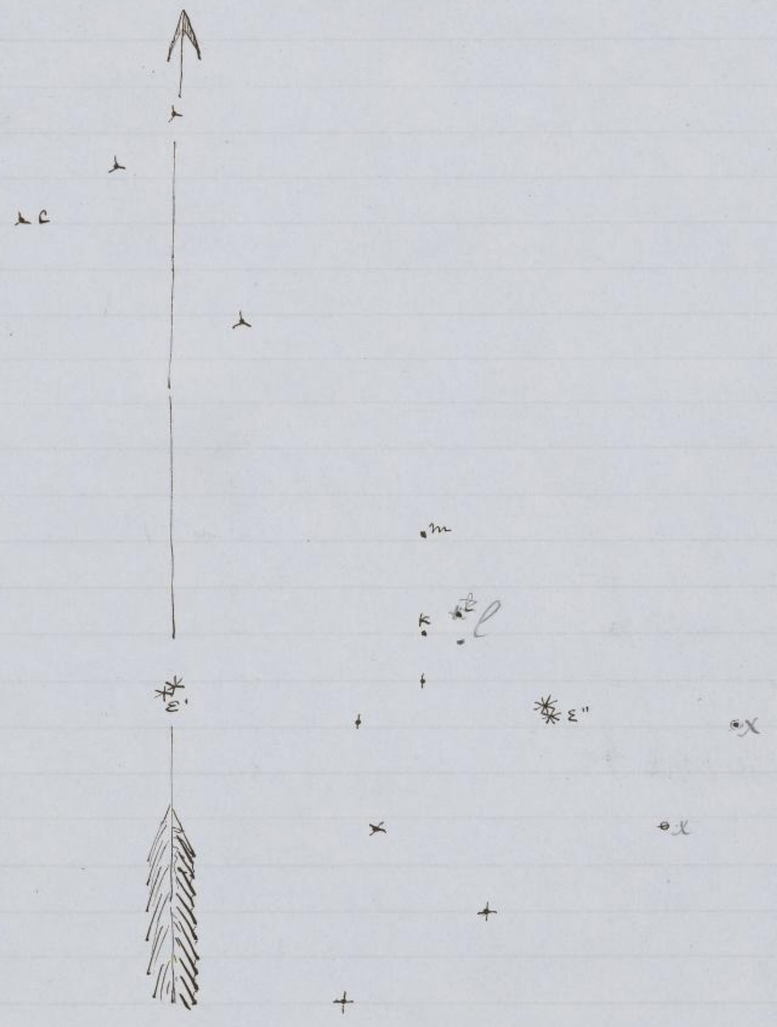
[illegible]	+ 9.10	− 17.. 48
* 9th	9.. 51.. 13.83	− 20.. 47.. 38
	+ 35.88	− 22.. 49
* 8/9	9.. 51.. 40.61	− 20 .. 52.. 39
	1..20.50	
9th	9.. 53.. 01.11	20.. 52 25

Comet 9.. 51.. 05 − 20.. 52

ε Lyrae & neighbours

4th November 1857 22h 50m ± Sid. time

Moon low powers 141. 401. 560



c is a very easy object of the 13th mag. k. l. & m are small & were entirely extinguished by the moon on the 2d Nov. but easily seen now when the 2 ε are not in the field m is the smallest. Somewhere near x there is a small star not mapped at the instrument. They were seen with all the powers used 401 giving the best views. k. l. & m are much more easily seen than the 4 & 5 smallest neighbours of Altair (see 22 Oct 57) C.

Mean Solar Time of Occultations of Nov 2nd 1857.

E.C. fast on Oct. $\frac{29}{30}$ $29^s.92$

E C fast on Nov $\frac{2}{3}$ $\underline{30,86}$

$.94$

Daily rate $+\,,235^s$

Correction for the observed times, (by E.C.), of Occultations $= -\,30^s,75$

Occultations observed by S.C

Pleiades	m. s. t.		
Im of Electra	$11^h\ 39^m\ 01^s.86$		
Im of Celeno	$11^h\ 55^m\ 02^s.18$	$+12^s$	
Im of Maja	$12^h\ 24^m\ 37^s.82$	~~+~~ +5	
Im of Merope	$12^h\ 32^m\ 56^s.95$	+4	
Em of Celeno	$12^h\ 50^m\ 12^s.62$	−5	r×
Em of Electra	$12^h\ 52^m\ 26^s.25$	−3	
Em of Merope	$13^h\ 01^m\ 45^s.42$		×
Im of Alcyone	$13^h\ 03^m\ 08^s.49$	+6	
Em of No 7.	$13^h\ 10^m\ 21^s.21$		
Em of No 12.	$13^h\ 11^m\ 41^s.79$		
Em of Maja	$13^h\ 24^m\ 01^s.96$	−2	

			m. s. t	
	d.l	Em of No 16	13^h .. 35^m .. $17^s.01$	
	d.l	Em of No 18	13^h .. 43^m .. $42^s,13$	
	d.l	Em of No 27.	13^h .. 53^m . $17^s.41$	
	d.l	Em of Alcyone	13^h .. 53^m .. $51^s.56$	← — —$1^s.30$ ×
	d.l	Em of 26	13^h .. 56 .. 06.49	
	d.l	Em of 20	14^h .. 03^m .. $03^s,65$	
	d.l	Em of 56	14^h .. 06^m .. $21^s,42$	

Hourly rate of 424 $-.5^s$

Occultations obs— by H.P.T. and A.H.

			m.s.s.t	
	b.r	Im of Celeno	11^h .. 54^m .. $50^s.32$	H.P.T
	b.r	Im of Maja	12 .. 24 .. 32.74.	A.H.
r×	b.r	Im of Merope	12^h .. 32^m .. $32^s,53$	H.P.T.
	d.l	Em of Celeno	12^h .. 50^m .. $07^s.83$.	H.P.T
×	d.l	Em of Electra	12 .. 52 .. 29.54	H.P.T
	b.r	Im of Alcyone	13^h .. 03^m .. $02^s.81$	A.H.
	d.l	Em of Maja	13^h .. 24^m . 03.56.	H.P.T.
		Em of Alcyone	13^h .. 53^m .. $52^s,76$	A.H.

November 11th 1857
About 4 A.M.

Orion.

G. P. B obs.

Bad seeing during most of the time Calm.

Zone A

Un Ther = + 34°

Angle of position 91°. 48′ of Scale

The Scale reads (from 10 to 20) ~~minutes and seconds~~. north of a (θ of trapezium) The first star being 13m 38s north of a and preceding about 1m. 40s.

① ④ Red. to ③ +0″ Red to θ′ = +29′ 53″ (+20″)

1st D.

11th 3 4.0
12 8 1.2
11 3 3.4
12 1 3.0

lamp went out.

Red to (3) + 17m 20.6s

Red to θ′ = $-7^h\ 7^m\ 29.41^s$

Red. to 1st wire

EC = $7^h .. 05^m .. 5.2^s - 9.4^s$ — $7^h.\ 05^m.\ 5^s.3$
7 .. 05 .. 46.0 − 50.0 — 5. 46.0
7 .. 05 .. 58.5 − 62.7 — 58.6
7 .. 06 .. 27.6 − 31.6 — 6. 27.6

+ End of zone ④

② ⑤ Repeated

B Red. to ③ +1″ Red to θ′ = + 29′ 54″

11th 12 3 3.9
12 8 1.6
11 3 3.3

D. B

12 1. 2.9
10.11 10. 19
10. 11 6. 11
11.12 9. 50 [8..10?]
10 1. 11 n s
10 11 7. 15

Red to (3) + 5m .. 41.7

Red to θ′ = $-7^h\ 19^m\ 08.46^s$

EC = $7^h .. 16^m .. 44.2 - 48.2$ — $7^h.$ 16 44.20
7 .. 17 .. 25.0 − 29.2 — 17 25.10
7 .. 17 .. 37.6 − 41.6 — 37.60

7 .. 18 .. 6.5 − 10.6 — 18 6.55
7 .. 18 .. 25.3 − 29.3 — 25.30
7 .. 18 .. 33.3 − 37.4 — 33.35
7 .. 18 .. 51.7 − 55.8 — 51.75
7 .. 18 .. 57.6 − 61.7 — 57.65
7 .. 19 .. 25.2 − 29.4 — 19 .. 25.30

+ end of ⑤

③ ⑥ 23 Red to ③ 0" Red to θ' = +29' 53"

Long B. D. Repeated

11. 12.	3 40	20ᵐ 25
12. 13	8 12	
11	3. 36	
12	1. 30	
11	10. 20	
10. 11	6. 13 noisy	
10	1. 13	
10 ~~11~~ 10	7. 17	
~~11~~. 11 B	~~10. 9~~	
11	10. 9	
10	6. 00	
12. 13	7. 06 noisy 2ᵈ wire lost	

Red to (3) 0ᵐ. 00ˢ

Red to θ' = −7ʰ 24ᵐ 50ˢ.16

6b = 7ʰ. 22ᵐ. 25ˢ.8 − 30ˢ.0	7ʰ. 22ᵐ.	25ˢ. 90
23. 6.8 − 10.9	23	6. 85
23. 19.2 − 23.2		19. 20
23. 48.2 − 52.4		48. 30
24. 07.1 − 11.0	24	7. 05
24. 15.1 − 19.2		15. 10 5²
24. 39.2 − 43.3		39. 25
25. 07.0 − 11.0	25	7. 00
25. 43.5 − 47.6	~~43~~ 25	43. 55
26. 11.5 − 15.8	26	11. 65
16.4 − ——	× End of ⑥	16. 40

alt: 3 June 1864

④ ⑦ D. B. D Repeated Red to ③ 50" − 2"

Red to θ = +29' 50"

11. 12	3. 44	29ᵐ. 05ˢ
12. 13	8. 15	
11. 12	3. 37	
12. 1	1. 31ᵐ α	
11	10. 20 α	
~~X~~ 10. 11	6. 14 b	
9. 10	1. 16	
10. 11	7. 20	
B for duplicate		
11	10. 11	
11	6. 02	
12. 13	7. 09 noisy	
11. 12	8. 47	33ᵐ. 50

Red to (3) = − 6ᵐ. 40ˢ, 65 Red to θ = − 7ʰ 31ᵐ 30ˢ.83

7ʰ. 29. 6.5 − 10.6	29	6. 55
29. 47.3 − 51.4		47. 35
29. 59.9 − 63.9		59. 90
30. 28.9 − 33.0	30ᵐ	28. 95
30. 47.8 − 51.7		47. 7~~0~~ 5²
30. 55.7 − 59.8		55. 75
31. 20.0 − 24.0	31	20. 00
31. 47.7 − 51.8		47. 75
32. 24.2 − 28.2	32	24. 20
32. 52.3 − 56.2		52. 25 ✓
32. 56.4 − 61.0		56. 90
7ʰ. 33. 53.1 − 57.1	33.	53. 10

× End of ⑦

alt: 3 June 1864

Observations made with some difficulty owing to disturbed state of atmosphere & defective illumination. In parts of the Zone the stars were too numerous to be observed all at once. The following supplementary Zones were then observed to fill vacancies. Taking two or three of the stars previously observed as Zero-stars

The stars were observed first in declination in the order of their right ascensions and then in Right ascension separately in order to give time for the observations of each element.

⑤a ⑧ B, D, B Red to ③ = +1″ Red to θ′ = +29″ 51′

Supplementary Zone $A_{(1)}$

12. ~~13~~ 1. 3~~1~~2 (α) 43ᵐ. 58ˢ

11 10. 22 difficult to observe in Dec

12 3. 22 n.s

11 6. 13 n.s

10 1. 17

Red to ③ = −20ᵐ .. 10ˢ.45

Red to θ′ = −7ʰ 45ᵐ 00ˢ.64

Eℓ = 7ʰ .. 43ᵐ .. 58ˢ,8 − 2,8 7ʰ. 43ᵐ 58ˢ. 80

44 .. 17.5 − 21.4 44 17. 45

44 .. 23.4 − 27.4 23. 40

44 .. 25.5 − 29.6 25. 55

44 .. 49.8 − 53.8 49. 80

+ end of ⑧

⑤b ⑨ B. B. D Red to ③ = +1″ Red to θ′ = +29′.. 54″

12. 13 1. 28 55 40±

11 10. 20 Difficult

11 3. ~~19~~18 n.s

10. 11 6. 10 n.s

~~9~~. 10 1. 12 (no sig)

B.

Red to ③ = −26ᵐ .. 54ˢ,7

Red to θ′ = −7ʰ.. 51ᵐ.. 44ˢ.83

50 .. 43.0 − 46.9 50 42. 95

51 .. 01,7 − 05.8 51 1. 75

51 .. 07,6 − 11.6 7. 60

51 .. 09.7 − 13.7 9. 70

7ʰ .. 51 .. 34.0 − 37.9 51 ~~37. 85~~ 2

+ end of ⑨ 33. 95

altered June 1864

Barometer 30, 400 ±

alt th 76

ex th. 38°.5

⑥a ⑩ Red to θ′ = +29′ 51″ Red to ③ = −1″

Supplementary Zone $A_{(2)}$

12 1. 3~~2~~ 8ʰ 10.5

11 10. 2~~0~~ difficult.

12 8. 2~~5~~ 2ᵈ w. lat

12 7. 53 2ᵈ w lat n.s.

12 5 2~~2~~ 2ᵈ w lat n.s

10 1. 1~~7~~ n.s

Red to ③ = −48ᵐ .. 23.20

Red to θ′ = −8ʰ 13ᵐ 13ˢ.30

Eℓ = 8ʰ .. 12ᵐ .. 11ˢ,4 − 15.5 8ʰ. 12ᵐ. 11ˢ. 45

12 .. 30. 2 − 34.5 30 35

12 .. 56,6 − — 56 60

12 .. 59.3 − — 59. 30

13 .. 0.4 − — 13 0. 40

13 .. 2.5 − 6.7 13 2. 60

+ end of ⑩

In each the two first & the last star had been previously observed in Zone A.

long D.

Ⓑ₆ ⑪ Red to θ' = +29' 51"

Supplementary Zone $A_{(2)}$

12
11
12
12
12
10

Same declination as preceding repeatedly repeated in AR.

in the same way

Ⓑc ⑫ Red to θ' = +29' 49"

10 . 13

Red to ③ = − 3."

12	1 33
11	10 23
12	8 27
12	7 55
10	5 20
10	0 16

these last were read in declination after the observations had been made in AR. The nebula is getting too low for observations.

Red to ③ = − 51" 55" 75"

Red to θ' = −8h 16m 45s.86

El = 8h 15m 44s.0 − 48.1	8h 15m 44s.05	
16 " 2.9 − 06.7	16 "	2.80
16 " 29.0 − —		29.00
16 " 31.9 − —		31.90
16 " 32.8 − —		32.80
8h 16 " 35.2 − 39.2 + end of ⑪		35.20

Red to θ' = −8h 19m 19s.02 Red to ③ = −54" 28" 85

8h 18m 17s.0 − 21.2	8h 18m	17s.10
18 " 36.0 − 39.9		35 95
19 " 2.2 − —	19	2.20
19 " 5.2 − —		5.20
19 " 5.9 − —		5.90
19 " 8.0 − 12.1		8.05

end of ⑫

N.B. The magnitudes are only provisional to identify the stars by.

Nov 11th 1857 9h P.M. New Comet by H.P.T.

Comet is rather faint but has a decided concentration of light & can be observed without difficulty.

Comet S.p * 7th/8th = Oeltzen 18894.

Obs. by G.P.B.

236 0 .. 16 .. 40 43".08
0 19 .. 20 42.76
0 .. 21 .. 00 42.58
Mean 0 .. 19 .. 00 42.81
Zero 56.01
13.20

13.20
2.6
129.4 = 2'..09".4

Comet 0 .. 24. 51.5 25 .. 58.0 10.5 41.5
Star 25 .. 22.5 26 .. 28.0 27 .. 39.5 29 10.0
Dif. R 31.0 30.0 29.0 28.5

Comet 0 .. 29 .. 56.5 31 .. 10.5 32 .. 27.0 31.0
Star 30 .. 21.7 35.0 51.0 33 .. 53.3
25.2 24.5 24.0 22.3

54.7 35 32.5
35 .. 15.5 36 .. 52.0
20.8 19.5

Zero
0 .. 42 .. 00 36".92 56.00
44 .. 17 36.29 56.02
46 .. 12 36.05 56.02
0 .. 44 .. 10 36.42 56.01
Zero 56.01
19.59

19.59
3.9
192.0 = 3'..12".0

~~Dif Dec~~ 15 .. 22 .. 15.37
46.73
15 23 05.10

EC. 1 .. 33 .. 00
236 1 .. 32 .. 52
EC 1 .. 35 .. 00
236 1 .. 34 .. 52
8
A.H.

EC fast 30
236 fast 0m .. 22

239 .. 0 .. 30 .. 25.3
236 fast 0 .. 22.0
0 .. 30 03.3
15 .. 23 .. 5 1
9 .. 06 .. 58.2
1 29.6
M.S.T. 9 .. 5 .. 28.6

Comets motion in 1^m in R = $+1^s.0$ in Dec $-2''.5$

There is a star as bright or brighter than comp. star about 6′ or 7′ north of it & preceding it about 3 fields. A 9/10th follows comp. star by 33^s in same dec

Star of Comp.

324 .. 52
270
*1 Dec. 54 .. 52

236   0 .. 54 .. 55
H. west   8 .. 52 .. 50
236 fast   0 .. 22
24 .. 54 .. 33 = Sid time
*1 R   16   01 .. 43

Reading of Dec circle was repeated on 13th & found correct

N. B   1″ of arc is to be added to the observed Dif. Dec. as a correction for setting of wire on comp star which was ~~used at that~~ allowed to transit at that distance north of wire.

Comet prec. Star

236 = 0 .. 24 .. 51   Dif R = 0^m .. $31^s.0$
25 .. 58   30.0
27 .. 10   29.0
28 .. 42   28.5
29 .. 56   25.2
31 .. 11   24.5
32 .. 27   24.0
33 .. 31   22.3
Mean 34 .. 55   20.8
Mean 35 .. 32   19.5
3   2548

Mean 0 .. 30   25.3 $\Delta\alpha = 0^m .. 25^s.48$

Dif Dec

Comet S of Star

236 = 0 .. 19 .. 00   2′ .. 09″.4
0 .. 44 .. 10   3 .. 12.0
63 10   5 21.4
Mean 0 .. 31 .. 35   2 .. 40.7
cor to Δα − 1 10   − 3.0
236 = 0 .. 30 .. 25   Δδ 2′ .. 37″.7
Cor as above   + 1.0
2′ .. 38″.7

The Star of Comparison is in Arg. Zones
Oeltzens Catalogue No 15894.

1842.0 Æ $16^h\,00^m\,46^s.42$ Dec $54°\,41'\,14''.5$
15 × 1.433 +21. 495 9.97×15 = − 2. 29. 50
16. 01. 07. 915 54. 38. 45. 05
Error of Oeltzen vide obs. 14th add 10' 10
$16^h.\,01^m.\,07^s.915$ $54°.\,48'.\,45''.0$
p − * $\Delta\alpha$ = $-25^s.48$ $\Delta\delta$ = $-2'\,38''.7$
Mean Eq 1857.0 nearly 16. 00. 42. 435 +54. 46. 06.3
Star certainly recognised by its attendant 15904

Computation of precession for 1850

+1.143 +9".96

$p = 46''.05910 + 20''.05472 \sin\alpha . \tan\delta$
$p' = 20''.05472 \cos\alpha$

$\sin\alpha = 9.93837\,n$
$\tan\delta = 10.14974$
$\log 20.05472 = 1.30221$
$1.39032\,n = \log. 24.5650\,n$
46.0591
$p = 21''.4941$
$+1^s.433$

$\cos\alpha = 9.69644\,n$
$\log 20.05472 = 1.30221$
$0.99865\,n = \log p'$
$p' = -9.969$

For the reduction of this star to its apparent place for Nov 11th see 16 leaves forward.

6th H.P.T comet of 1857 — discovered Nov 11

November 13th 1857. G. P. B obs.

Chron. 236

Star 9th mag north preceding comet.

* 1^h. 22^m 39^s 0 Star
☄ 22^m. 51^s 9 $^{12.9}$ Comet

* 24 1^s.8 probably 2^s.8
☄ 24 16^s.6 $^{14.8}$

* 24 35.8
☄ 24 50 0 $^{14.2}$

Microm
1^h. 28^m 16^s.3 48^r.60
29^m 25 48.56
30 7.5 48.10

Zero = 56°.01

* 1^h 32^m 25^s.5 33^m 13^s.5
☄ 47 2 $^{21.7}$ 35.6 $^{22.1}$

* 33 52.8
☄ 34 15 5 $^{22.7}$

Reduction of Comet Obs

	Comet	follows * c
236 =	1h.. 22m.. 51.9s	0m.. 12.9s
	1.. 24.. 16.6	13.8
	1.. 24.. 50.0	14.2
Mean	1.. 23.. 59.5	0.. 13.63

236 =	1.. 32.. 47.2	0m.. 21.7
	1.. 33.. 35.6	22.1
	1.. 34.. 15.5	22.7
Mean	1.. 33.. 32.8	0.. 22.17
1st set	1.. 23.. 59.5	0.. 13.63
Mean	1.. 28.. 46.1	Δα 0.. 17.90

Dif Dec

				Zero
	1.. 28.. 16.3	r. 48.60	13th	56.01
	29. 25.0	48.56	11th	56.01
	30. 7.5	48.10		56.01
236	1.. 29.. 16.3	48.42		

Zero 56.01

7 59 Comet S. of Star

1.5

= 74.4 = 1'.. 14.4" = Dif Dec

1.1

Δδ 1.. 13.3 g S of Star

	1.. 29.. 16.3	
cor to Δα	− 30.2	
236 =	1.. 28 46 1	
236 fast	30.0	
	1.. 28.. 16.1	15.. 30.. 11.49
	15.. 30.. 58.2	46.73
	9.. 57.. 17.9	15 30 58.22
	1 37 9	
M.S.T. =	9.. 55 40.0	

Nov. 13th 1857 Comet continued

Stars A. B. C

	AR	D
A	$1^h. 37^m$ $10^s.3-4$	$8'.3''$
B	29.0 ~~29~~.0	$9'.09''$
C	$39^s.1$	$0'.03''$

C is the star of comparison A is of the 9th mag A and B are north of C. B is 8th. No other bright stars near.

App. place of C. $1^h. 41^m, 12^s.0$

AR. circle $8^h. 52^m 50^s$

D. circle $322°. 19'$

Inst cor & ref − 3

322 .. 16

= + 52° .. 16'

236 = 1^h .. 41^m .. 12^s.0

236 fast 24.0

1 .. 40 .. 48.0

h = 8 .. 52 .. 50.0

16 .. 47 .. 58.0

Inst. cor & ref − 35.

16 .. 47 .. 23

Comet continued

3th November 1857.

Ap Place of the comparison star of the 11th November 1857

236 1h. 48m 42s 0

Decl. Circle 324° 52' Cert.

~~R Circle~~

8C 1h 56 00
236 1h 58 58 6 11.4

236 1h 58 0
8C 1h 59 11 3

13th / 14th Nov. 1857.

8C 11h 21m 00s 0
236 11h 20m 59s.8

236 11h 22m 00s
8C 11h 22 00 1
8C fast 30.0
236 .. 30.0

Reduction of Obs Nov 13th 1857

The star of Comparison with Comet on 11th differs in Dec between Tabular place & instrumental place by 10' after correction for refraction in Dec. The inst. place was read again on the 13th & found to be right.

In consequence of this uncertainty I am not certain whether the Star B of the 13th is Oeltzen-Argelander No 16583 or not.

We must observe γ Urs. Maj. at the hour angle $8^h..52^m..50^s$ or thereabouts

* AR	11..46 17
Sid. Time	20..39..07

Reading of Dec Circle = $324^\circ..31',00$
for γ Urs Maj
at Hour angle $8^h,44^m$

Showing that the inst. Declinations are nearly correct.

1857 Nov. 14th Obs'd to identify star of Comp of 11th with Oeltzen 15894 & to prove that the Dec in latter is 10' too ~~far~~ South

Comp star of 11th

15894 16 ,, 00 ,, 46.42 54 ,, 51 ,, 14.5
15936 3 49.15 54 ,, 46 ,, 49.8 9th
3 ,, 02.73 4 ,, 24.7

~~Comp~~ B of 13th

Scale

' " (a) 8th = 15894
8, 26 0 ,, 26, 4, 8
~~8, 1~~

' " (b) = 9/10 = 15904
8.16 0 ,, 26 ,, 37.5 9, 10 mag,

' " (c) = 9th = 15936
4, 01 0 ,, 25 ,, 7.0

(a)
0 ,, 31 ,, 42.8
h = ~~9t~~ 8 ,, 29 25

(a) is the Star of Comp Nov 11th Its place is 10' too far south in Arg. Zones

Both Oeltzen 15894 and 15904 are there given 10' too far South in Dec. as is proved by above obs. & by two different circle readings.

9.91
9.91
9.95
9.92

Comp Star 13^d

No 16583	16..46..51.44	+ 52°..26′..43″.1
16586	47 0.09	51..23..55.5
	8..65	1 2..47.6

B = 9^m
8 9^2

Scale Scale

′ ″ D		′ ″ C = 9 4α/10		
9.44	1 5..8.5	0.35	1..5..18.5	10.0
9.22	..6..19.5	0.14	..6..29.5	10.0

Obsd dδ 9′..08″.5 ref + 1″.2 = 9..09.7 2nd 1″ ~~7..34.2~~
13^d 9..06.0 " + 2.0 = 9..08.0
Mean 9.. cor. 9′..09″.1

13^d 10.0 refs −0.09
10.1 −0.15 h
cor mean 0^m..9.92

1..7 34
236 Inst 25
1..7 09
8..19 3
16 48..06
Inst cor −35

236 = 1^h..7^m 34^s
~~AR~~ 8^h..19^m..3^s

Dec 322°..18′.
Inst cor + m −3
322..15

C is 16..47..31 of Comp on 13^d & B is Oeltzen 16583

B is the brightest of the three by nearly 1 mag. & is besides nearer to the same position which 16583 occupies relatively to 16586

Place of C

Nov 13^d	By circle readings	AR = 16..47..23	Dec = + 52..16
14^d	"	" = 47..31	" = + 52..15
	Mean Eq 1857.0	16..47..27	52..16

Computation of Precession.

$p = 46''.05910 + 20''.05472 \sin\alpha . \tan\delta$
$p' = 20''.05472 \cos\alpha .$

$\log 20''.+ = 1,30221$
$\sin\alpha \quad 9.97760\,n$
$\tan\delta = \underline{10,11415}$
$1\ 39455\,n$
$-24''.806$
$\underline{46''.0591}$
$p = 21''.2531$
$+1^s,4168$

$\cos\alpha = 9.49443\,n$
$\log 20''.+ = \underline{1.30221}$
$0.79664\,n$
$p' = -6,261$

$-6,261 \times 15 = -93,915$

$1^s,4168 \times 15 = 21^s,2520$

Oeltzen's Catalogue. No, 16583

1842.0	AR =	$16^h\,..\,46^m\,..\,51^s.44$	Dec. =	$52^\circ\,..\,26'\,..\,43''.1$
15 × 1,4.168		+21. 25	15 × 6.261	−01 .. 33.9
		16 .. 47 .. 12.69		52 .. 25 .. 09.2
Obsd Dif. (apparent) C − B.		+ 9 92		−9 9.1
	C = AR	16 .. 47 .. 22.61	Dec	52 .. 16 .. 00.1
ꝗ − *		+0 17.90		−1 13.3
	ꝗ AR	16 .. 47 40.5	Dec	+52 14 .. 46 .8

Referred to mean Eq 1857.0 nearly

For reduction of companion star to apparent place
see 12 leaves forward

Tuesday 17th Nov, 1857

Comet. No 6 1857

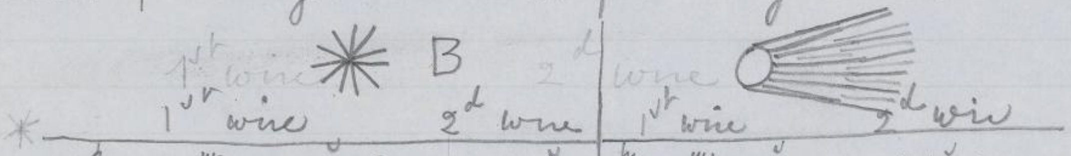
discovered by H.P.T. G. P. B obs.

E C. $23^h.51^m\ 00^s.0$ $23^h.52^m\ 00^s.0$

236 $23^h\ 51^m.\ 10^s\ 0$ $23^h\ 51^m.\ 50^s\ 0$

Angle of position 90° 50′

Star B 9th mag. south preceding comet



$0^h_{''}\ 17^m_{''}\ 20^s.3$ — $37^s.0$ 16.7 $0^h_{''}\ 20^m_{''}\ 27^s.0$ — $44^s.9$ 17.9

Star on zero wire 8 = $0^h.26^m.18^s0$ Micr. 48r.66

Zero 55.88

$0^h_{''}\ 30^m\ 7^s.8$ — $25^s\ 4$
17.6

$0^h_{''}\ 33^m.\ 23^s.5$ — $40^s.7$
17. 2

Star on zero wire

7th Nov. 1857 Comet continued

		1st w	2d w	3d wire	Scale
Star A	0^h	$36^m\ 52^s.7$ —	$37^m\ 10.4$ —	$37^m\ 45.0$	4' 59"
Star B	0^h	$39\ 37^s.5$	$39^m\ 55.2$ —	$40\ 29\ 8$	5' 35"
		17.7			

$0^h\ 42^m.\ 58^s.8$ — $43^m\ 17^s.0$ —

18 2

* B $0^h.\ 45^m\ 24^s.9$ in centre of field

$H = 6^h\ 45^m.\ 50^s.$ $D = 314^\circ.45'$

270

44.. 45'

Zero = $55^r\ 88$

ε C $0^h\ 58^m\ 00^s$

α 36 $0^h\ 58^m\ 10^s$

εC fast 29.5

236 .. 39.5

0.. 45.. 24.9

236 fast 39.5

0.. 44 45 4

h 6 45 50.

17.. 58.. 55

Inst Corr ref − 28

17.. 58.. 27

17 56.4
3.6
57
.12
1.94
57
11.64
1
24.8
45
17
315
455
765
29
45
145
116
1335

Red of * 9th Mag. B.Z. 478. = Star A probably

Identity a little doubtful as the 9/10 mag * preceded at 40^s & 2' S of it.

	h m s	° ' "
	17.. 56.. 23.31	44.. 44.. 43.2
	+ 52.91	− 24.8
	+ .13	+ 0.8
1825.0	17. 57 16.35	44. 44.19.2
prec 32 yrs	54.4	− 7.8
	17. 58 10.7	44.. 44.11 4
☄ − *	+ 3 10.8	+ 1 10 8

Dec next half

Mean Eq Jan 1 1857

1.70
32
340
510
5440

− 0.18
32
36
54
7.76

Computation of Obs of Nov. 17th

Dif. Æ. g-* (Star B)

236 = $0^h\ 20^m\ 27^s$ +3^m.. $6^s.7$

" = 0.. 20 44.9 + 3.. 7.9

" = 0.. 33.. 23.5 + 3.. 15.7

" = 0.. 33.. 40.7 + 3.. 15.3

Mean = 0.. 27.. 04.0 + 3.. 11.40

$$\begin{array}{r} 2.6 \\ 23 \\ 2 \\ 4\overline{)456} \\ 11.40 \end{array}$$

0.. 27.. 04.0 + 3^m.. $11^s.4$
cor 245 – 0 46.0 cor – 0.6
0.. 26 18.0

Dif Dec, * South of [illegible] B.

55.88
48.66
7.22
98
72.20
1.44
70.76 = 1'.. 10".76

236 = 0.. 26.. 18.0

236 = 0.. 26.. 18.0

$\Delta\alpha$ = + 3^m.. $10^s.78$

$\Delta\delta$ = + 1'.. 10".76

0.. 26.. 18.0
236 fast 39.5
0.. 25 38.5
15.. 46.. 44.5
8.. 38 54 0
– 1 25.0
S.T. 8.. 37.. 29.0

15.. 45.. 57.71
46.74
15 46 44.45

Nov 17th Computation of Precession.

$\alpha = 17^h \,..\, 57^m \,..\, 43^s \qquad \delta = 44^\circ \,..\, 44' \,..\, 15''$

$p = 46.05910 + 20.05472 \sin\alpha . \tan\delta$

$p' = 20.05472 \cos\alpha .$

log 20.+ = 1.30221
$\sin\alpha$ = 9.99998 n
$\tan\delta$ = 9.99602
1.29821 n $\qquad -19''.871$

46.05910
19.871
15) 26.18810
$1^s.746$
32
3.492
5238
55.872

log 20.+ = 1.30221
$\cos\alpha$ = 7.99785 n
9.30006 n $\qquad$ -.1996
32
3992
5988
-6.3872

$32 \times p = 55^s.872$
$32 \times p' = -6''.387$

17 .. 57 .. 16.35 $\qquad$ 44 .. 44 .. 19.2
55.87 $\qquad$ -6 39
17 .. 58 .. 12.22 $\qquad$ 44 .. 44 .. 12.81
☄ – * $\qquad$ +3 . 10.78 $\qquad$ +1 .. 10.76
$18^h \,..\, 01^m \,..\, 23^s.00 \qquad 44^\circ \,..\, 45' \,..\, 23''.57$ $\qquad$ Mean Eq 1857.0 nearly.

For reduction of comp star to apparent place see 9 leaves forward

Nov 20th 1857 Comet VI.

Dec. ☄ ☄ South following * A.

236 = 23 „ 07 „ 25

$18^{r}.00$

AR
* A ☄

236 = 23 „ 10 „ 15 1st wire 23 „ 11 „ 19.5 1.04.5
10 . 42 2d wire „ 11 46.8 1.04.8

* B is 2' south of ☄. there are other brighter stars
12 „ 07.5 . 2d wire in the vicinity, but none near
B. A?

* A. 7 mag ☄
236 = 23 „ 13 „ 7 23 „ 14 „ 13. 1 06

* A in centre of field.
236 = 23 „ 15 „ 44.5

Ht = 4^{h} „ 35^{m} „ 40^{s} D = 218° „ 25"

Zero $55^{r}.96$

23 „ 15 „ 44.5 * A is in Lalande, 34900
48.0

---

23 „ 14 „ 56.5 *
4 „ 35 . 40

---

18 „ 39 „ 16.5

Reduction of comet observations of Nov 20th

Dec. AR.

236. $23^h .. 15^m .. 44^s.5$ *A ☄

	236. 23 .. 10 .. 15	23 .. 11 .. 19.5
55.96	.. .. 10 .. 42	11 .. 46.8
18.00	13 .. 07	14 .. 13.0
37.96	34 .. 04	37 .. 19.3
98	Mean 23 .. 11 .. 21.33	23 .. 12 .. 26.43
3796		
7.592		
372".01		

Dif = $1^m .. 05^s.1$
~~1.66~~
$1^m .. 06.76$

23 .. 15 .. 44.5
23 .. 12 .. 26.43
$3^m .. 18^s.07$

236. ~~23^h~~ .. 15^m .. ~~$44^s.5$~~

~~23 .. 15 .. 44.5~~
~~236 fem 49.14~~
~~23 .. 14 .. 55.36~~

$\Delta\alpha = +$ ~~$1^m .. 06^s.76$~~
$\Delta\delta = -6 .. 12''.01$

~~15 .. 57 .. 47.38~~
~~46.74~~
~~15 .. 58 .. 34.12~~
~~23 .. 14 .. 55.36~~
~~7 .. 16 .. 21.24~~
~~1 .. 11.48~~
~~7 .. 15 .. 09.76~~

*A. Lalande 34900.

AR. 1800.0 $18^h .. 37^m .. 19^s.33$
Dec $38^\circ .. 20' .. 08''$.

Computation of Precession.

in AR	in Dec		
$+2^s.026$	$+3''.253$	3.253	
57	57	73	$18^h .. 37^m .. 19^s.33$
14182	22771	3.326	01 .. 55.48
10130	16265	57	18 .. 39 .. 14.81
115.482	185".421	23282	
$1^m .. 55^s.482$	3' .. 05".421	16630	
		189582	38 .. 20 .. 08.0
		3'.9".6	3 .. 09 6
			$38^\circ .. 23' .. 17'' 6$

*1857.0 $18^h .. 39^m .. 14^s.81$ 1857.0 $38^\circ .. 23' .. 17''.6$
☄ − * + 1 .. 06.76 ☄ − * − 06 .. 12.01
☄.0 AR = $18^h .. 40^m .. 21^s.57$ ☄.0 Dec = ~~38 .. 17 .. 00.99~~

Nov $20^d .. 7^h .. 15^m .. 09^s.76$. Mean Solar Time.

Computation of Obs 20th

β − ★

236 23h = 7 .. 25

Δδ = −6′ .. 12″.0

23 .. 11 19
11 47
14 13
79
23 .. 12 .. 26
Cor − 5 . 1
23 .. 7 .. 25
236 + 49
23 6 .. 36
15 58 34
7 08 .. 02
1 10
M.S.T. 7 .. 6 .. 52

Δα + 1m 4s.5
4.8
6.0
15.3
1 .. 5.10
− 2.75
+1 .. 2.35

15 .. 57 . 47 . 38
46 . 74
58 341

18.00
55.96
37 96
76
37 20
6′ .. 12.0

294)39m (13.2
294
960
882
780

m daily
2.4
25s

Daily mo 13m.22s
+ 25s
13
60
780
12
24)792 (33s
72
72

My mo +33s
12)33 (2.75
24
90
84
6

Bessel Zone 481 7th mag

α 18 .. 37 .. 16.65
+ 53.26
+ 05
1825.0 18 .. 38 09 96
prec 1 4 83
1857.0 18 39 14.79
14.81
18 .. 39 .. 14.80
= Adopted place of Stn
β − ★ + 1 2 35
18 .. 40 .. 17.15
Mean Eq 1857.0 nearly

Sep 341

3

+38 .. 22 .. 18.8
− 51.2
+ 0.4
38 21 28.0
1 47.9
38 .. 23 15.9
23 17.6
+38 .. 23 .. 16.5
− 6 12.0
38 17 04 5

δ 38 .. 22
D 38 .. 00
δ − D + 22

24
22
48
48
528
1
22
36
36
396

Lalande 2.026
sec m 000
2.026
57
14182
10130
115482
1m .. 55.48
2.026
32
4052
6078
64832 = 1m .. 04.83

3.373
32
6746
10119
107936
1′ .. 47″.9

+3″.253
+ 120
+3.373

293
41
293
1172
12013

Nov 20th Leucothea
place corrected

at 8h 23m   ℛ 0h 13m 42s
Dec + 5° 32' 24"

Daily mo ~~+~~ 11s in ℛ   0.5s.
− 48" in Dec   2" ~~[illegible]~~

prec in ℛ + 3.08
57
21 56
15 40
175.56

in Dec + 20.01
57
6) 1140"
19'00"

prec in 57 years 2m 55.6s

Lalande 343   8th

0 9 48.8
2 55.6
0 12 44.4

84 49 4
− 19 0
84 30 0
+ 5 30 00"

* 8th ℛ 0h 12m 44.4s
Dec + 5° 30' 00"

Leucothea follows star, 0m 48s
& is North of it 2' 24"

Proved not to be the planet

Nov. 20th 1857 Leucothea G. P. B obs.

236 0 „ 13 „ 56.5 * = paper meridian obsd

Scale for * a, 2, 29
4 31 2, 3

0 „ 20 „ 36
Scale 4.31 Leucothea
21 „ 23.8 47.8

Scale 3. 12 * a 2, 2
22 „ 14

Same 5.14 Leucothea
„ 23 „ 02.5 48.5

Scale 3.06 *
24 „ 44.0
Scale 5.09 2, 3
25 „ 42.5 58 5

Scale * 2.48
0 „ 26 „ 25.8
Scale 4.50 2, 4
0 „ 27 „ 14.5 48.7

Leucothea* is of the 13-14 mg. but is easily observed through the mica scale

AR's got on S. ping Gov

	Scale.
* a	2,46
O	4, 39
	B
* a	2, 02
O	4, 05
* a	3, 44
O	5, 07

* Was not the Planet

2[illegible]th Nov. 1857 **Leucothea continued**

very bad vision
high wind

< > Scale.

Star	4'. 25'' —	$2^h\,18^m\,59.9$
planet	6. 29 —	$2^h\,19^m\,48.2$
Δ	2. 4	0.48^s3

star	4'. 47''	$2^h\,21^m\,21^s.6$
planet	6. 21	2 22 9.9
Δ	2. 4	48.3

star	2'. 48''	$2^h\,22^m\,48^s.8$
planet	4. 52	2 23 37.3
Δ	2' 4	48 5

star	3'.08''	$2^h\,25^m\,4^s.8$	
planet	5. 11	25 52.8	?
	2. 3	48 0	

A star of 16th follows L. by 33 beats
& is 30''? S of it

9236 $3^h\,21^m\,20^s$
LC $3^h\,21^m\,00$

Nov. 27th. 1857

Orion.

G. P. B obs.

Barometer 30. 443 } 11 o'clock 20m + Ure Thr. = 33°
att th. 61

Angle of position 91°. 53′

Spring governor set off at 4h. 1m 0s
4h. 2m 0s

Red to θ′ = + 29′ 55″ Red to θ′ = − 4h 19m 50s.05

⑦ ⑬ Red to ⑧ = + 2″ Red to ⑧ = + 06m. 07s,40

Red to 1st wire

11.	3 . 35	α	4h.		
Probably Tel. reset in R					
11.	3 . 37		(424) 4h. 16m.	4 . 17 . 25.8 − 29.8	4 .. 17 .. 25.80
12	8 . 08			18 .. 6.9 − 10.8	18 .. 06,85
10−11	3 . 32	xx		18 .. 19.1 − 23.1	18 .. 19.10
	S.				
11.12 ✓	1 . 26 ✓			4 . 18 .. 48.1 − 52.2	4 .. 18 .. 48.15
12	10 . 17			19 .. 6.8 − 10.9	19 . 06.85
10	6 . 10			19 14.9 18.9	19 .. 14.90
	B				
9	1 . 11	γ = ε of Zone B		4 .. 19 .. 39.1 − 43.2	19 .. 39.15
11	9 . 39			19 .. 50.7 − 54.7	19 .. 50.70
11	7 . 13	δ		20 .. 6.9 − 11.0	20 .. 06.95
10.11	10 . 5			20 .. 43.3 − 47.4	20 .. 43.35
10	5 . 56			21 .. 11.6 − 15.4	21 .. 11.50

end of ⑬

=

⑧ ⑭ Red to ⑧ = 00″
Red to θ′ = + 29′.. 53″

Red to θ′ = −4h 25m 57s.41 Red to ⑧ = 00s
Red to 1st wire.

11.	3 . 39 α	4 .. 23 .. 33.1 − 37.0	4h .. 23m .. 33.05
12.	8 . 11	24 .. 14.1 − 18.0	24 .. 14.05
12.11	3 . 34	24 .. 26.6 − 30.6	24 .. 26.60
	D B	[illegible] 59.6	
11.12 .	1 . 29	24 .. 55.5 − 59.6	24 .. 55.55
12	3 . 18 β wire	25 . 20.2 − 24.2	25 .. 20.20
11	6 . 11 n.s β	25 .. 22.4 − 26.3	25 .. 22.35
12	7 . 50	25 .. 43.5 − 47.4	25 .. 43.45
	B		
10	9 . 40 wire	4 .. 25 .. 58.2 − 62.1	4 .. 25 .. 58.15
10-11	7 . 16 δ	26 .. 14.4 − 18.4	26 .. 14.40
10	10 . 07 m	26 .. 50.9 − 54.8	26 .. 50.85
10	5 . 57 m	27 .. 18.9 − 22.9	27 .. 18.90

B . D Red to θ′ = 29′.. 54″

Red to θ′ = −4h 38m 56s.70 end of ⑭ Red to ⑧ = −12m .. 59.40

⑨ ⑮ Red to ⑧ = 0″

11	6 .. 11 β	4 38 .. 21.7 − 25.8	4 .. 38 .. 21.75
11.12	8 .. 21	38 .. 39.9 − 43.9	38 .. 39.90
9 12	5 .. 16 nsty	38 .. 45.8 − 49.8 transpose	38 .. 45.80 tr
12 9	1 .. 13 ns	− − − 47.6	38 .. 43.60
11	B 1 .. 19	39 .. 0.9 − 05.0	39 .. 00.95
12.13	0 .. 18 ns	39 .. 6.4 − 10.5	39 .. 06.45
	1 .. 13	39 .. 15.4 − 19.4	39 .. 15.40

D B D Red to θ′ = +29′ 52″

Red to θ = −4h 47m 29s.36 end of ⑮
Red to ⑧ = −21m .. 31s.90

⑩ ⑯ Red to ⑧ = −2″

~~12~~ 11	6 .. 13	4 .. 46 .. 54.2 − 58.3	4 .. 46 .. 54.25
12	8 . 23 2d w. lost	47 .. 12.7 − —	47 .. 12.70
12	5 .. 18	47 .. 16.3 − 20.2	47 .. 16.25
9	1 . 135 ns	47 .. 18.4 − 22.4	47 .. 18.40
12	1 . 22	47 .. 33.6 − 37.6	47 .. 33.60
12.13	0 .. 18 ns	47 .. 39.1 − 43.1	47 .. 39.10
11.12	1 . 14	47 .. 48.0 − 52.0	4 .. 47 .. 48.00

B . D . B

end of ⑯

Continuation 17 pages ahead

Nov 21. Leucothea.

S. P. B obs.

236. Transits.

~~20.3~~
23.. 24.. 36.5
.. 25.. 25.3

23.. 49.. 24.8
.. 50.. 12.8

51.. 06.5
51.. 36.8

52.. 16.3
46.8

53.. 03.2
53.. 37.6

b afterwards proved to have been Leucothea. its discovery was in some sort accidental. It was so much fainter than described by Bruns (16^m instead of 13^m mag) that it would not have been observed had it not been near the star b & convenient for recognition.

10.5 beats a to b
22.5 " c " d

b is 1".20" south star 8½–9m Lalande (This was Leucothea)
b is possibly the planet. Its distance one hour after was 9 beats.

a 23h 56m .. 18 57.. 16.8 57.5 | 11.8 | 12.0 | 12.0
c .. 29.8 28.8 58.. 09.5 | 11.2 | 11.0 | 10.7
d .. 41.0 39.6 20.2

a 0h.. 02.. 23.8
} 39.7
b 3.. 03.5
c 19.7

~~24.8~~
d 51.5 39.7
e 4.. 31.2

f 47.5
g 58.0

g = 14 mag
f 12 same dec
e 14 20" south

d 13m same as b c 15 mag
a 14 mag a and c in same Dec
b 16 mag b 20" north of a
15?

Leucothea continued

236.

	0^h	
a	36.. 32.5	
b	~~[illegible]~~	12.0
c	44.5	.01.5
d	56.0	39.6
e	36.. 35.6	16.2
f	51.8	10.5
g	37.. 2.3	

a	42.. 2.5	11.7
c	14.2	11.3
d	25.5	39.7
e	43.. 5.2	16.1
f	21.3	10.7
g	32.0	

236

a	0^h	55.. 49.8	
c		56.. 01.5	11.7
d		13.0	11.5
e		52.8	39.8
f		08.8	16.0
g		18.8	10.0

a	0^h	58.. 26.8	11.7
c		38.5	11.9
d		50.4	39.4
e		29.8	16.2
f		46.0	10.0
g		56.8	

a	1^h.. 11.. 53.8	11.7
c	5.5	11.7
d	17.2	39.6
e	56.8	16.2
f	13.0	10.1
g	23.1	

b which afterwards proved to be the planet

was at 0^h.. 50^m and say — $4^s.7$ following ✱ a — Nov 21
18" north of "

$4^s.4$ preceding ✱ a — Nov 22
10" South "

By comp. with ✱ 8^h.. 9^h it moved South in dec. 23" between 21^{st} & 22^{nd} Mean of two stars = 25"

Nov 22nd

Recognised b as Leucothea having moved 30" South in Dec & and about 9s in R diminishing

Observed on next page b = L

Lalande No. 343 8th may

0h.. 9m 48s.80   + 3s.075   84° 49' 4".2   − 20.041
2 55.39   .002   − 19 01.8   + .010
0.. 12 44.19   3.077   84 30..02.4   20.031
57   + 5..29..57.6   57
21539   140217
15385   1001557
175.389 = 2m.. 55.39   ~~1.942~~   114.1,767
0.006   0.037
19'.. 01".8

Weisse H 0 No 310 8th may

0h 11m 5s.84   3.076   + 5°.. 19'.. 11".8   + 20.031
1 38.46   1   + 10 40.8   5
0.. 12 ..44.30   3.077   + 5.. 29 .. 52.6   20.026
32   32
6154   40.052
9231   60078
98464   640832
1..38.46   10'..40".8

	R 1857.0	Dec 1857.0
By Lalande	0h..12m..44s.19	+ 5°.. 29'.. 57".6
Give wt of 2 to Bessel — Bessel	0.. 12.. 44.30	+ 5.. 29.. 52.6
Mean	0 ..12..44.26	5.. 29.. 54.3
L − *	+ 0 20.48	− 1 .. 43.5
	0.. 13 04.74	+ 5.. 28 .10.8

Nov 22nd 1857 Sunday fair but haze

x is Lalande 343. 8th mag.

L South of * x 66.65 Revolutions rev at 0^h, 11^m, 30^s by Nº236

Zero 55.95

55.94

66.36 rev at 0^h 13^m, 45^s, by Nº236

66.39 0^h, 15^m, 15^{sec}

1056
2.1
103.5 =
= 1'..43".5

66.59
1 19 9
66 50
Zero 55 . 94
10 .. 56

4) 0^h, 17^m, 00^{sec}
17 .. 30
0 .. 14 .. 23 = 0 .. 14 .. 23
236 + 54
L. 0 .. 13 .. 29
AR 0 .. 19 .. 17
5 .. 48

x	L (faint & somewhat difficult)	
s	sec	
0,18 34.9	0 .. 18 . 55.4	20.5
19 11.7	19 . 32.0	20.3
19 49.0	20 . 10.0	21.0
20 28.3	20 . 48.8	20.5
21 8.3	21 . 28.7	20.1
	54.9	2.4
	0 .. 20 .. 11.0	20.48

16 5 40.5
46.7
16 .. 6 .. 27.2

236 fast. Error 54.0
0 .. 19 . 17.0
16 6 27.2
~~Camb m s t~~ 8 .. 12 .. 49.8 ~~Obs in AR~~
1 20 7
Camb m s t 8 .. 11 . 29 . 1 Obs in AR L follows * 8th by 0^m.. 20^s.48
5 49 4
.. 8 .. 5 . 42.0 .. Dec. L South of .. 1'.. 43".5

For Star See prec. page.

On Dec 10th found that L had disappeared.

Nov 22?   Leucothea

~~H~~ ~~A~~ ~~C~~

L 37.5

A 55.0   a .25.0
12.0 (5 above 0)   11.5
B 07.0   b 36.5
D 18.0   d 48.3
39.8
E' 34.34   e 280
~~F~~ E 57.8   f 44.0
F 7 14.0   g 54.3
G 24.5

From
H to A
48.0   13.0
25.0
27.2   52.7
25.5

At about 1^h sid.

L to A
422   46.8
02.6
15.5   20.0
4.5
43.7   48.0
4.3
11.0   15.3
4.3

The planet is not brighter than the 15th mag.
On a fine clear night it could be observed with precision. But there was a thin haze & some moonlight which made the observations difficult.

Dec 10th Examined the region where De was seen carefully, It had certainly disappeared.

Reduction of companion stars of the observations of Comett VI. to their apparent places.

For Nov 11. Star 15894, Oeltzens Catalogue.

$$\alpha' - \alpha = f + \tau\mu + g \sin(G+\alpha).\tan\delta + h.\sin(H+\alpha).\sec\delta.$$

$$\delta' - \delta = i\cos\delta + \tau\mu' + g\cos(G+\alpha) + h.\cos(H+\alpha)\sin\delta.$$

$f = +40''.03.$ $\log g = 1.2924.$ $\log h = 1.2958.$ $\log i = 0.7197$

$G = 332°.42'.$ $H = 37°.46'.36''$

$\alpha = 240°.16'.59''$ $\delta = +54°.48'.45''.0$

$G+\alpha = 212°.58'.59''$ $H+\alpha = 278°.03'.35''$

α in time $= 16^h.01^m.07^s.915$

$f = \quad +40''.03$

$g = 1.29240$

$\sin(G+\alpha) = 9.73590n$

$\tan\delta = \underline{10.15175}$

$1.18005n \quad -15''.139$

$h = 1.29580$

$\sin(H+\alpha) = 9.99569n$

$\sec\delta = \underline{10.23939}$

$1.53088n \quad -\underline{33''.953}$

in arc $\alpha' - \alpha = -9''.062$

in time $\alpha' - \alpha = -0^s.604$

$g = 1.29240$

$\cos(G+\alpha) = \underline{9.92368}n$

$1.21608n \quad -16''.45$

$h = 1.29580$

$\cos(H+\alpha) = 9.14673$

$\sin\delta = \underline{9.91237}$

$0.35490 \quad +2''.264$

$i = 0.71970$

$\cos\delta = \underline{9.76061}$

$0.48031 \quad +\underline{3''.022}$

$\delta' - \delta = \quad -11''.164$

$16^h.01^m.07^s.915$

$\underline{-.604}$

$\alpha' = 16.01.07.311$

$54°.48'.45''$

-11.164

$\delta' = 54°.48'.33''.876$

Nov 11.1857.

Comet VI. 1857.

For Nov 13. Star 16583. Oeltzen's Catalogue.

$f = 40''.33.$ $\log g = 1.29460$ $\log h = 1.29700$ $\log i = 0.70080$

$G = 332^\circ.58'$ $H = 35^\circ.48'$

$\alpha = 251^\circ.50'.35''$ $\delta = +52.16.00.1$ $\alpha = 16^h.47^m.22^s.61$

$G+\alpha = 224^\circ.48'.35$ $H+\alpha = 287^\circ.38'.35''$

$f =$ $+40''.33$

$g = 1.29460$

$\sin(G+\alpha) = 9.84804\,n$

$\tan\delta = \underline{10.11136}$

$1.25400\,n$ $-17''.95$

$h = 1.29700$

$\sin(H+\alpha) = 9.97908\,n$

$\sec\delta = \underline{10.21326}$

$1.48934\,n$ $-\underline{30''.86}$

in $\alpha'-\alpha$ $= -8''.48$

in time $\alpha'-\alpha$ $= -0^s.565$

$g = 1.29460$

$\cos(G+\alpha) = \underline{9.85093}\,n$

$1.14553\,n$ $-13''.98$

$h = 1.29700$

$\cos(H+\alpha) = 9.48156$

$\sin\delta = \underline{9.89810}$

$0.\underline{67666}$ $+4''.75$

$i = 0.70080$

$\cos\delta = \underline{9.78674}$

0.48754 $+\underline{3''.073}$

$\delta'-\delta$ $= -6.157$

$$\begin{array}{r} 16\,.\,47\,.\,22.61 \\ -\underline{0.565} \\ \alpha' = 16^h\,.\,47^m\,.\,22^s.045 \end{array} \qquad \begin{array}{r} 52\,.\,16\,.\,00.1 \\ \underline{-6.157} \\ \delta' = 52\,.\,15'\,.\,53''.943 \end{array}$$

Nov 13. 1857.

Comet VI. 1857.

For Nov 17. Star 478 B. Z.

$\alpha = 270°.20'.45''$ $\delta = 44°.45'.23''.57$

α in time $= 18^h.01^m.23^s.0$

$f = +40''.94$ log $g = 1.29910$ log $h = 1.29940$. log $i = 0.6597$.

$G = 333°.32'$ $H = 31°.53'$

$G + \alpha = 243°.52'.45''$ $H + \alpha = 302°.13'.45''$

f $+40''.94$

$g = 1.29910$

$\sin(G+\alpha) = 9.95322\,n$

$\tan\delta = \underline{9.99631}$

$1.24863\,n$ $-17''.727$

$h = 1.29940$

$\sin(H+\alpha) = 9.92733\,n$

$\sec\delta = \underline{10.14868}$

$1.37541\,n$ $\underline{-23''.736}$

in arc $\alpha' - \alpha$ $= -0''.523$

in time $\alpha' - \alpha$ $= -0^s.035$

$g = 1.29910$

$\cos(G+\alpha) = \underline{9.64372}\,n$

$0.94282\,n$ $-8''.766$

$h = 1.29940$

$\cos(H+\alpha) = 9.72698$

$\sin\delta = \underline{9.84763}$

0.87401 $+7''.482$

$i = 0.65970$

$\cos\delta = \underline{9.85132}$

0.51102 $+\underline{3''.244}$

$\delta' - \delta = +1''.960$

~~18.01.23.0~~
~~$\underline{-00.035}$~~
~~$18^h.01^m.22.965$~~

~~44.45.23.57~~
~~$\underline{+1.96}$~~
~~$44°.45'.25''.53$~~

Nov 17. 1857.

17.58.12.22
$\underline{-00.035}$
17.58.12.185

44.44.12.81
$\underline{+1.96}$
44.44.14.77

Comet VI. 1857.

For Nov. 20. star 34900 Lalande.

$\alpha = 18^h . 39^m . 14^s.81$ $\delta = +38° . 23' . 13''$

α in arc $= 279° . 48' . 38''$.

$f = +41''.26$. $\log g = 1.30140$ $\log h = 1.30050$

$\log i = 0.62230$

$G = 333°.48'$ $H = 28°.58'$

$G + \alpha = 253° . 36' . 38''$ $H + \alpha = 308° . 46' . 38''$

$f = +41''.26$

$g = 1.30140$

$\sin(G+\alpha) = 9.98198\,n$

$\tan\delta = \underline{9.89885}$

$1.18223\,n$ $-15''.213$

$h = 1.30050$

$\sin(H+\alpha) = 9.89187\,n$

$\sec\delta = \underline{10.10577}$

$1.29814\,n$ $\underline{-19''.867}$

in arc $\alpha' - \alpha = +6.18$

in time $\alpha' - \alpha = +0^s.412$

$g = 1.30140$

$\cos(G+\alpha) = \underline{9.45050}\,n$

$0.75190\,n$ $-5''.648$

$h = 1.30050$

$\cos(H+\alpha) = 9.79678$

$\sin\delta = \underline{9.79307}$

0.89035 $+7''.769$

$i = 0.62230$

$\cos\delta = \underline{9.89423}$

0.51653 $+\underline{3''.285}$

$\delta' - \delta = +5.406$

$18 . 39 . 14.80$

$\underline{+0.412}$

$18 . 39 . 15.212$

$38 . 23 . 16.5$

$\underline{+5.406}$

$38 . 23 . 28.906$

Nov 20. 1857.

Comet VI. 1857.

Apparent place of comparison stars. & Comet

Cambridge Mean Solar Time.

Nov 11^d 9^h .. 05^m .. 28^s.6. ✳ δ + 54° .. 48′ .. 33″.876. α = 16^h .. 01^m .. 07^s.31
☄ − ✳ − 2 .. 38.7 − 25.48
☄'s apparent δ = + 54° .. 45′ .. 55″.176 α = 16 .. 00 .. 41.83

Nov 13^d .. 9^h .. 55^m .. 40^s.0 ✳ δ +52° .. 15′ .. 53″.94 α = 16^h .. 47^m .. 22^s.04
☄ − ✳ − 1 .. 13.3 + 17.90
☄ apparent δ +52 .. 14 .. 40.64 α = 16 .. 47 .. 39.94

~~Nov 17^d .. 8^h .. 37^m .. 29^s.0 ✳ δ +44° .. 45′ .. 25″.53~~ α = ~~18^h .. 01^m .. 22^s.965~~
~~☄ − ✳ +1 .. 10.76~~ ~~+3 .. 10.78~~
~~☄ apparent δ = +44 .. 46 .. 36.29~~ ~~18 .. 4 .. 33.745~~

Nov 17^d . 8 .. 37 .. 29.0 ✳ δ + 44° .. 44′ .. 14″.77 α = 17^h . 58^m .. 12^s.185
☄ − ✳ + 1 .. 10.76 + 3 . 10.78
☄'s apparent δ = +44 .. 45 .. 25.53 α = 18 .. 01 .. 22.965

Nov 20^d .. 7^h .. 8^m . 52^s : ✳ δ = +38° .. 23′ .. ~~18″.406~~ 21.9 α = 18^h .. 39^m .. 15^s.272
☄ − ✳ ~~− 6 .. 12.010~~ + 1 .. 02.35
☄ apparent δ = +38° .. ~~17′ .. 06″.396~~ α = 18 .. 40 .. ~~17.62~~
38 .. 17 .. 09.9 18 .. 40 17 56

Commenced 19 pages back

Nov. 27th 1857

Orion Cont.

(17) (11)

	Red to ⑧ = − 2" **Red to θ' = 29' 52"**	**Red to θ' = 4h 50m 15s.47**	Red to ⑧ = −24m.18s.05 Red to 1st wire
11.	6.11	4h 49m 40s.4 − 44s.4	4h .. 49 .. 40.40
	8.24 2d w. lost.	" 58.7 − —	49 . 58.70
	5.18	50m 2.4 − 6.4	50 . 02.40
	1.15 ns.	4.6 − 8.6	50 .. 04.60
	1.22	19 6 − 23.7	50 .. 19.65
	0.18 ns.	25 2 − 29.3	50 .. 25.25
	1.14	50 34 1 − 38.2	50 .. 34.15

end of (17)

D. B. D. B

These stars repeated in AR but not read off ~~the~~ another time in declination

Red to θ' = 29' 55" **Red to θ' = − 5h 2m 48s.63**

(12) (18)

	Red to ⑧ = 0"	= + 2"		Red to ⑧ = −36 .. 51 .. 28
9	1 .. 13 γ	1 .. 11	5h 2m 37s.8 − 41s.8	5h .. 02m .. 37s.80
12-12	4 .. 17	4 .. 15	52.7 − 56.7	2 .. 52.70
10.11	7 .. 18	7 .. 15	3 .. 5.6 − 9.5	3 .. 05.55
13.14	3 .. 08	3 .. 06	19.3 − 23.2	3 . 19.20
13 3	8 .. 36	8 .. 34 1st w. lost	3 .. — − 27.9	3 . 23.90

× end of (18)

this set was observed twice in declination before being observed in AR

B. D. B. D (19)

× repetition of last series in AR & not in declination a noisy [illegible]

(13a) **Red to θ' = −5h 4m 34s.02** Red to ⑧ = −38 .. 36 .. 63

5 .. 4m 23s.1 − 27s.2	5h .. 04 . 23.15
38.0 − 42.1	04 .. 38.05
50.9 − 55.0	4 .. 50.95
5m 4.8 − 8.8	5 .. 04.80
9.4 − 13.4	5 .. 09.40

end of (19)

(13b) (20) **Red to θ' = + 29' 55"** **Red to θ' = −5 12m 0s.98** Red to ⑧ = −46 .. 03 .. 58

	Red to ⑧ = 0"			
9.	1 .. 13	1 .. 09	5 .. 11 .. 50.1 − 54.1	5 .. 11 .. 50.10
11.12	4 .. 16	4 .. 13	12 .. 5.1 − 9.1	12 .. 05.10
13-14	4 .. 54 ns	4 .. 50 ns	10.2 − 14.1	12 .. 10.15
14	5 .. 30	5 .. 26	35.5 − 39.5	12 .. 35.50
14	6 .. 30	6 .. 26 ns	48.2 − 52.2	12 .. 48.20

end of (20)

obs. twice in D then twice in AR the series being separated by

D. (13c) (21) **Red to θ' = +29' 58"** Red to ⑧ = −47 .. 54 .. 38 **Red to θ' = −5h 13m 51s.97**

repetition of last series

9. 1 .. 09	5h 13m 41s.1 − 45s.1	5 .. 13 . 41.10
11.12. 4 .. 13	55.9 − 59.9	13 . 55.90
13.14. 4 .. 50	14m 0.9 − 5.0	14 .. 00.95
14 5 .. 26	26.5 − 30.5	14 .. 26.50
14 6 .. 26	14m 39s.1 − —	14 .. 39.10

2d wire lost

end of (21)

Nov. 27th 1857

Orion continued

Red to θ′ =+29′ 56″

(14)a (22) Red to (8) = +1″

long Br.

11 7 „ 13 d

13 8 „ 32

10.11 10 „ 06 m

10 5 „ 56 n

12 7 „ 00 ns

12 3. 13

(14)b (23) repetition of last series

11 7. 08 d Red to (8) =+8″

13 8 26

D. **Red to θ′ =+30′ 01″**

10.11 9 „ 59

10 5 „ 50

12 6 „ 56 ns

12 3 „ 07

Here

Red to θ′ = − 5^h 25^m $27^s.68$

Red to (8) = − 59^m „ $30^s.35$

Red to 1st min

$5^h.25^m$„ $44^s.6$ − $48^s.7$ — 5^h .. 25^m .. 44.65

26^m„ $2^s.9$ − $7^s.0$ — 26 .. 02.95

$21^s.2$ − $25^s.2$ — 26 .. 21.20

49.3 − 53.3 — 26 .. 49.30

54.0 − 58.0 — 26 .. 54.00

27^m„ ~~23~~ 19.8 − 23.9 — 27 .. 19.85

end of (22)

Red to (8) = − 1^h „ ~~02~~ 0^m „ $09^s.70$

28^m. 24.0 − 28.0 — 28 .. 24.00

42.4 − 46.5 — 28 .. 42.45

Red to θ′ = 5^h 28^m $07^s.11$

29^m. $0^s.5$ − $4^s.6$ — 29 .. 00.55

28.6 − 32.6 — 29 .. 28.60

33.2 − 37.2 — 29 .. 33.20

5^h„ 29^m„ $59^s.1$ − $63^s.1$ — 5 .. 29 .. 59.10

End of (23)

Zone. B.

(15)

To make this zone the telescope was moved south 5 minutes of arc towards the trapezium

Red to θ′ = + 24′ 57″

(24) Red to (16) = +5″

the 1st star of this zone is the 1st one of zone A. put down to right as

11 8 „ 31 α

12.13 7 „ 56

12 6 „ 26 ns

12.13 − 0. 07

12? − 0 23 ns

9 6. 10 ε

B, D

Red to θ′ = − 5° 38′ 33″.39

Red to (16) = + 3^m „ $50^s.55$

5^h„ 37^m„ $2^s.6$ − $6^s.6$ — 5^h .. 37 .. 02.60

$24^s.9$ − $29^s.0$ — 37 .. 24.95

$31^s.4$ − $35^s.6$ — 37 .. 31.50

38 „ $0^s.3$ − $4^s.2$ — 38 .. 00.25

$6^s.7$ − $10^s.7$ — 38 .. 06.70

5^h„ 38^m„ $22^s.5$ − $26^s.5$ — 5 . 38 . 22.50

			Red to 1st wire
8	2′, 27″	5h, 38m, 47.9-51.9	5h . 38 . 47.90
13	7.00 2d w. lost	39m 33.3 — —	39 . 33.30

end of (24)

Repetition of last series

(16) (25) Red to θ′ = +24′ 52″ Red to θ′ = −5h 42m 23s.95

11.	8, 36 α	40m, 53.1 − 57.1	5 . 40 . 53.10
12.13	8, 01	41m, 15.6 − 19.6	41 . 15.60
12	6, 31 ns	22.1 − 26.1	41 . 22.10
12	−0, 02	50.9 − 54.9	41 . 50.90
11.12	−0, 20 ns	57.2 − 61.2	41 . 57.20
9	6, 15	42m, 13.0 − 17.0	42 . 13.00
11.12	9, 18	28.0 − 32.0	42 . 28.00
8	2, 32	38.5 − 42.5	42 . 38.50
13.14	7 : 03 difficult to observe	43m, 24.2 − 28.1	43 . 24.15

end of (25)

Repetition of series Red to θ′ = −5h 46m 29s.97

(17) (26) Red to (16) = + 3″ Red to θ′ = +24′ 55″ Red to (16) = −4m, 06s.00

11.	8, 33 α	5 43 37	44m, 59.1 − 63.1	5 . 44 . 59.10
	1, 36 ns		45m 7.0 − 11.0	45 . 07.00
12	6, 28		28.1 − 32.1	45 . 28.10
	−0, 04		57.0 − 61.0	45 . 57.00
	no declin ns		46m, ~~45m~~ 3.3 − 7.2	46 . 03.25
9	6, 12		19.1 − 23.1	46 . 19.10
8	2, 28		44.5 − 48.5	46 . 44.50
12	8, 15 sure	(read off right)	48m, 21.9 − 2[illegible]	48 . 21.95

end of (26)

D. B ~~D~~. Red to θ′ = +24′ 54″ Red to θ′ = −5h 55m 32s.40

(18) (27) B Red to (16) = + 2″ Red to (16) = −13m . 08s.40

11.	8, 33 α		8, 35″	5h, 54m, 01.6 − 05.5	5 . 54 . 01.55
12.13	1, 38		1, 40 ns	09.2 − 13.4	54 . 09.30
12	7, 59	12.13	8, 00	24.0 − 28.1	54 . 24.05
12	6, 29		6, 30 ns	30.5 − 34.5	54 . 30.50
12	8, 16		8, 18	55.2 − 59.2 (rightly read off)	54 . 55.20
12	6, 20	12.13	6, 20	55m, 36.8 − 40.7	55 . 36.75
13	5, 18		5, 18 ns	42.2 − 46.2	55 . 42.20

B, D, B. Immediately after this signal spring pinion run down end of (27)

Observed first in declination & then in D & R at the same time

Nov. 27th 1857 Orion continued

12, 13	3"36		3"40	
9	6"11	ε ns	6"15	nosig
13	3"18		3"21	
8	2"29	ns	2"32	no
12, 13	4"52		4"56	

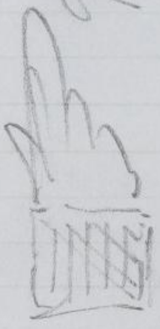
Observed twice in Declination & then twice in AR.
D. D.

9	6' 10"	ε
12	6"16	
8	2"27	
14	1"35	
13	7"00	

Long d Dots
Reps of last series

9	6', 12"	2d w. lost
12 13	6"19	
8	2"29	
14	lost	
14	7"00	

~~Zone B~~ Zone B ends here



This page of observations lost by Spring governor running down

Part of Zone B was lost by Spr. Gov. running down.

Nov. 27th 1857 Trapezium. in Orion

The 6th star is plainly visible [and is no more in centre of trapezium than Secchi is himself, but at its old place near θ] It seems to have a slight reddish tinge.

1st December 1857

Orion.

Moon very bright
Clear and calm

G. P. B obs

Angle of position 271°.50!
Barometer 30.104 }
att Ther. 59.3 } 10h 55m
ex Ther. 37.8 }
m Ther = 38

Spring governor 3h 40m.0
8h 41m.0

(19) Part of Zone B reobserved on account of Spring governor running down on the 27th Nov. 1857

Red to θ' = +24' 58" Red to θ' = −3h 48m 45s.75

(28)a Red to (20) = +1" Red to (20) = +04m. 16s.35 Red to (20) = ±0.3m. 01s.35 Red. to pr wire

12.13	3"34	(No 424) 3h 47m 18s.5	Red to pr wire 47.. 19.00	3h 47m 19.0 − 23.0	48m 34.0 − 38.0	3h 48 34.00
9	6"09 no α (ε?)		47.. 19.85	19.8 − 23.9	34.9 − 38.9	48. 34.~~86~~.90
13	3"16		3.. 47.. 40.40	40.4 − 44.4	55.2 − 59.2	48. 53.20
8 (n)	2"28 ns		43.30	45.4 − 49.2	49m 02 − 4.3	49. 0.25
12.13	4"50		56.80	56.8 − 60.8	11.7 − 15.8	49. 11.75

end of (28)

First observed in declination then twice in R separated

(20)
by (29) D. after which
B Red to θ = +24".58" Red to θ' = −3h 51m 47s.09

9	6'.10" α (ε?)		3h 51m 36.2 − 40.2	3h 51. 36.20
12	6.18		51.4 − 55.4	51. 51.40
8 (n)	2.28		52m 01.6 − 05.6	52. 01.60
14	not obs			
13	7.00	badly observed in R	46.9 − 51.2	52.. 47.05

end of (29)

(21) (30) D B Red to (20) = +8" Red to (20) = −2m. 43s.65
Repetition of last ser Red to θ = +25".06 Red to θ' = −3h 54m 30s.77

9	6.04	54m 19.9 − 23.9	54.. 19.90
12	6.10	35.0 − 39.0	54.. 35.00
8	2.20	3h 54m 45.2 − 49.3	54.. 45.25

1st December 1857

14 not observed
13 6. 51
B. D

Orion continued

3h 55m 30.9 – 34.9 end of (30) 3. 55. 30.90

Zone C

To form this zone the telescope was pushed south 5' so as to bring θ on ~~to~~ the

Red to θ' = + 20' 00"

Red to θ' = – 4h 6m 45s.97

(22) Red to (22) = 00"
(31)

Red to 1st wire

4. 04. 18.8 – 22.9 | 04. 18.85
~~54. 19.9 – 23.9~~ | ~~54. 19.90~~
4. 36.9 – 40.9 | 04. 36.90
~~35.0 – 39.0~~ | ~~35.00~~

11.12 7' 35" A 7' 37" 4h 4m 4h 4m 54.0 – 57.9 .. 53.95
10.11 2 32 5m 23.0 – 27.0 05. 23.00
12 1 47 40.6 – 44.7 .. 40.65 ×
12 6 33 54.4 – 58.5 05 54.45
11 Declin. lost 6m 12.9 – 16.9 06. 12.90
12 1. 06. 19.2 – 23.3 .. 19.25
11.12 Decl. lost 34.4 – 38.4 .. 34.40 26.75
11.12 (m) 4. 32 = 1 trapezium 46.0 – 50.0 .. 46.00
Decl. lost 7m 00.5 – 04.5 07. 00.50
0. 00 ~~A bright star in trapezium~~ 28.0 – 32.1 07. 28.05
8 (m) 7. 23 8m 8.8 – 12.9 08. 8.85
11 1. 01
12 (r) 3. 48

end of (31)

(23) D. B. D
(32)

Red to (22) = – 1"
Red to θ' = + 19' 58"

11.12 7' 37"
12.13 2 32"
12.13 1 47
& lost
& lost
lost
4 52
4. 32
0. 02 A
8 7. 27
11 1. 02
12 3 49

not observed in R

end of (32)

1st Dec, 1857 Orion continued

Red to θ' = + 19' 59"

(33) Supp. Zone C(1).

(24) Red to (22) = − 1"

D

11.12 7 " 38 β
9.10 2 " 33
12,12 0 " ~~36~~ 16?
12 1. 07
12 4 " 52
11, 12 4 " 34 ns

B ~~Red to θ' = +~~

6 0 " 02 A
8 7 " 26

(25) (34) ~~D~~ B reobservation of last series

Red to (22) = − 8"

Red to θ' = + 19' 53"

11 7 " 43 β
9.10 2 " 38
11 0 " 21 γ
11-12 1 " 14
11-12 4 " 58
11 ~~12~~ 4 " 40 ns

A.

6 0 " 07
8 7 " 32
10-11 4 " 07

B D

12 3 . 56

B half minute

(26) (35) = S. Z. C(2)

D

Red to (22) = − 8"

11-12 7 45 β Red to θ' = + 19' 52"
12 8 41 ns
9 2 40
12 1 55
12.13 6 42

observed first in declination then in AR

D B D Red to θ' = + 19' 53"

Red to θ' = − 4^h 16^m $39^s.40$

Red to (22) = − 9^m .. $53^s.45$

Red to 1st wire

4^h 14^m 12.2 − 16.3	4^h .. 14 .. 12.25	18.00
~~11^m 56.0 − 60.0~~ 30.3 − 34.2	14 .. 30.25	63.90
~~12 03.8 − 07.7~~		
15^m 34.1 − 38.2	15 .. 34.15	13.85
48.0 − 52.0	15 .. 48.00	18.40
16^m 6.4 − 10.4	16 .. 06.40	
12.8 − 16.8	16 .. 12.80	

Red to θ' = −

16^m 39.5 − 43.4	16 .. 39.45	
53.9 − 58.0	16 .. 53.95	

end of (33)

Red to (22) = − 15' .. 52.30 Red to θ = 4^h 22^m 38^s 20

20^m 11.0 − 15.1	20 .. 11.05	18.05
29.1 − 33.1	20 .. 29.10	63.90
21^m 33.0 − 37.0	21 .. 33.00 ×	13.80
46.8 − 50.8	21 .. 46.80 ✓	18.55
22^m 05.4 − 09.3	22 .. 05.35 −	
11.5 − 15.6	22 .. 11.55 = (m)	
38.3 − 42.3	22 .. 38.30 −	
52.9 − 56.8	22 .. 52.85	
23^m 20.3 − 24.3 ...	23 .. 20.30	
4^h 24^m 2.0 − 6.1 1.0? 5.1?	4^h 24 .. 02.05 1.05?	

(34)

Red to θ' = − 4^h 39^m $40^s.10$

Red to (22) = − 32' .. 54.20

37^m 12.9 − 17.0	37 .. 12.95
20.2 − 24.2	37 .. 20.20
31.2 − 35.2	37 .. 31.20
48.3 − 52.3	37 .. 48.30
38^m 17.2 − 21.2	38 .. 17.20

(35)

Red to θ' = − 4^h 40^m $27^s.05$

Repetition of last series. Observed first in AR then in Declination

(27) (36)

7 Red to (22) = − 9"

11-12 7 . 44

Red to (22) = − 34' .. 41" . 05

4^h .. 38^m 59.9 − 64.9 4^h .. 38^m 59.90

1st December 1857 Orion continued

Red to 1st wire

12 8 " 42 ns 4^h 38^m 07.1 – 11.1 4 " ~~38~~ 39 " 07.10

9 2 " 41 Error of 1m 39^m 18.0 – 21.9 39 " 17.95

12 1 " 57 35.2 – 39.1 39 " 35.15

12 - 13 6 " 41 40^m 04.1 – 08.1 40 " 04.10

= S. Z. $\mathcal{C}_{(3)}$ Red to θ' = + 19' " 48" end of (36) Red to θ' = – 5^h 49^m $20^s.70$

(28) (37) Red to (22) = – 11" Red to (22) = – 42' " 34".80

11 . 0 " 24 γ 48^m 15.5 – 19.4 48 " 15.45

12 . 1 " 17 29.2 – 33.3 48 " 29.25

11 . 12 5 " 01 47.7 – 51.8 48 " 47.75

11 4 " 42 ns 54.0 – 58.1 48 " 54.05

12 0 " 17 ns 49^m 00.2 – 04.3 49 " 00.25

12 8 " 42 9.1 – 13.1 49 " 09.10

8 7 " 35 (n) 35.2 – 39.2 49 " 35.20

repeated in Decl. as below thin obs. twice in R end of (37) Red to (22) = – 44' " 29" . 45

(29) (38) Red to θ = 4^h 51^m $15^s.33$

11 0 . 24 γ Red to (22) = – 11" 50^m 10.0 – 14.0 50 " 10.00

12 1 " 16 Red to θ' = + 19' " 49" 23.9 – 27.9 50 " 23.90

11 . 12 5 " 02 42.3 – 46.3 50 " 42.30

11 4 " 4~~4~~4 ns 48.7 – 52.7 50 " 48.70

12 0 " 17 ns 54.9 – 59.0 50 " 54.95

12 8 " 42 51^m 03.8 – 07.7 51 " 03.75

8 7 " 36 (n) 29.9 – 33.8 4^h " 51 " 29.85

B . D . 13 Red to θ' = + 19' " 51" end of (38) Red to θ' = – 5^h 5^m $39^s.15$

(30) (39) = S. Z. $\mathcal{C}_{(4)}$ Red to (22) = – 8" Red to (22) = 5' 8" . 53.20

12 8 " 40 5^h 5^m 27.5 – 31.5 5^h . 05^m . 27.50

12 10 " 21 2d w. lost. 49.0 – – 5 " 49.00

8 7 " 32 ns 1st w. lost. (n) — – 57.6 5 " 53.60

12 9 " 57 6^m 05.0 – 9.0 6 " 05.00

end of (39)

(31) (40) Red to (22) = – 6" Red to (22) = – 1^h . 00^m . 16^s.95

12 8 " ~~87~~ 37 Red to θ' = + 19' " 54" Red to θ = – 5^h 7^m 2^s.88

51.2 – 55.2 6 " 51.20

12 10 . 17 7^m 12.8 – 16.8 7 " 12.80

8 7 . 30 ns 1st w. lost (n) [illegible] – 21.4 7 . 17.40

12 9 . 53 + 5^h 28.9 – 32.9 5^h 7 " 28.90

end of (40)

Dec 1st 1857 Orion continued

Red to θ′ = 19′ 51″

Red to θ′ = $5^h\ 8^m\ 23^s.17$

Red to (22) = $-1^h\ 01^m\ 37^s.25$

(32) (41) Red to (22) = − 8″

Red to 1st wire

12	8 " 4.0		5^h " 8^m " $11^s.84$ − $15^s.6$	5^h " 08^m " 11.50
12	10 " 22	2d w. lost	$33^s.0$ − $37^s.0$	8 " 33.00
8	7 " 32	ns 1st w. lost	$37^s.8$ − $41^s.7$	8 " 37.75
12	9 " 58		49.2 − 53.1	8 " 49.15

End of (41)

S. Z. C(3)

Red to (22) = -1^h " 32^m " 17.50

These 4 stars observed 3 times in declination first then 3 times in AR

(33) (42) Red to (22) = ~~0″~~ = − 9″

no ~~declination~~ to a star observed in AR

Red to θ′ = + 19′ " 57″

Red to θ′ = $-5^h\ 39^m\ 3^s.51$

12	0 . 11	ns	5^h 38^m $36^s.8$ − $40^s.9$	5 " 38 " 36.85
12	1 . 47	~~st~~ 2d wire lost	$43^s.2$ − $47^s.1$	38 " 43.15
11	1 . 48	ns	39^m $4^s.0$ − ~~7.8~~	39 " 04.00
12	3 . 23		$7^s.8$ − $11^s.7$	39 . 7.75
10	1 . 07		$28^s.4$ − $32^s.5$	39 . 28.45
12	0 . 00		$45^s.7$ − $49^s.6$	39 " 45.65
11	3 . 57 ⓡ		40^m $19^s.4$ − $23^s.3$	40 " 19.35
			$26^s.3$ − $30^s.3$	40 " 26.30

End of (42)

(34) (43) . #

Repetition of series Red to (22) = − 10″

Red to (22) = -1^h " 34^m " $40^s.60$

Red to θ′ = + 19′ " 50″

Red to θ′ = $-5^h\ 41^m\ 26^s.55$

11	4 " 42	observed before ⓜ	40^m 59.9 − 64.0	5^h . 40 " 59.95
12	0 " 14	ns	41^m 6.1 − 10.2	41 " 06.15
12	1 " 46	~~1st wire~~	27.1 − 31.1	41 " 27.10
11	1 " 49	ns 1st wire lost	− 34.9	41 " 30.90
12	3 " 25		51.4 − 55.6	41 " 51.50
9	1 " 09		42^m 8.7 − 12.7	42 " 08.70
12	0 " 02		42.3 − 46.3	42 . 42.30
11	3 " 58 ⓡ		5^h 42^m . 49.4 − 53.4	42 " 49.40

(43)

Observed twice in Declin then 2ce in AR

(35) (44) = Red to θ′ = 20′ . 03″

Beginning of Zone C reobserved in Declination only

Red to (22) = + 2″

11.12	7 . 33
10	2 " 28
12	1 " 45
12	6 " 30
11	0 " 12
12	1 " 04

End of (44)

1st Dec 1857 Orion continued

(45) S. Z. C (6)
(36) Trapezium

Northernmost star of trapezium called D = d compared with 3 other ~~sta~~ stars

Red to θ' = + 18' 58"

Red to θ' = −5' 53" 12".60

Red t (22) = −1'.03"   (m) of Zone

12.12 5" 34" =
10 1" 18 D = d
8 8" 27 (m)
9-10 2" 03

Red to (22) = −1h. 46m. 26s.60
Red to 1st wire

5h 52m 46.0 − 49.9   5h. 52. 45.95
53m 12.2 − 16.3   53. 12.25
27.0 − 31.0   53. 27.00
54.7 − 58.7   53. 34.70

end of (45)

the same of B (close to star observation observed by Mr Hall with transit)

(37) (46) Red to (22) = −1'. 16" Red to θ' = + 18' 46"

Here follows the same observed in Declination

11.12 5" 48" (m)
10 1" 31 D = d
8 8" 39 (m)
9.10 2" 14

~~57m 25.0 − 29.0~~
~~51.2 − 55.3~~
~~58 06.2 − 10.2~~
~~33.9 − 37.9~~

end of (46)

(38) Red to (22) = − .56"

a Repetition in R & D

(47) Red to θ' = +19'.05"

11.12 5" 27 (m)
10 1" 10 D = d
8 8" 21 (m)
9.10 1" 56

B. B. B.

Red to θ' = 5h 57m 51s.60
Red to (22) = −1h. 50m. 05s.70

~~57m 25.0 29.~~
57m 25.0 29.0   5h. 57. 25.00
51.2 55.3   57. 51.25
58 06.2 10.2   58. 06.20   8
33.9 37.9   58. 33.90   8

end of (47)

(39) (48) = Red to θ' = + 18' 34"

Red to (22) = −2'.27"

11.12 5" 59 (m)
10 1" 42 D = d
8 8" 50 (m)
9-10 2" 24

Red to θ' = −6h 00m 2s.05

Red to (22) = −1h. 53m. 16s.10

5h 59m 35.3 − 39.4   5h. 59. 35.35
6h 0m 01.9 − 5.8   6h. 00. 01.85
16.6 − 20.6   00. 16.60
6h 0m 44.2 − 48.1   6. 00. 44.15

end of (48)

4th December 1857

Orion.

G. P B obs

clear and calm

Angle of position
Barom 30.165
att th 56.
ex th 23.5
} 11 PM
m th 23

Spring governor $3^h 52^m 0^s$
$8^h 53^m 0^s$

Zone D.

no Star over 14th mag in zone, preceding the first one observed tonight

Red to $\theta' = +15' 00''$ Red to $\theta = -3^h 10^m 55^s.62$

Star θ of Trapezium put on 5'.00" before beginning observations

㊵ ㊾ Red to ㊸ = −3" Red to ㊸ = +1h .. 05 .. 16.50 Red to 1st wire.

11.13	5'13" α		C÷C'	3h .. 9 .. 50.3 − 54.4	3 .. 09 .. 50.35
12	6.03		D'	10 .. 4.1 − 8.2	10 .. 04.15
12	0.45 ns		g''	10 .. 9.8 − 14.0	10 .. 09.90
11	9.32		F'	10 .. 29.0 − 33.0	10 .. 29.00
9	0.23		R''	10 .. 49.3 − 53.3	10 .. 49.30
	5.13 ns	northermost star of trapezium		10 .. 55.3 − 59.3	10 .. 55.30
12	−0.09		g''g''	11 .. 30.0 − 34.0	11 .. 30.00
11	5.59		n'	11 .. 37.8 − 41.8	11 .. 37.80
9.10	4.06		2''2''	12 .. 06.5 − 10.6	12 .. 06.55
~~12~~	~~4.51~~ not obs			3 12 .. 18.5 − 22.5	3 .. 12 .. 18.50
11.12	8..46?		y'		

end of ㊾ Red to $\theta' = -3^h 15' 10''.77$

㊶ ㊿ D. Red to ㊸ = −4" Red to $\theta' = +15' 00''$ Red to ㊸ = +1 .. 01 .. 01.35

11.13	5 14 α	C−C'	3 . 14 .. 5.5 − 9.6	3 . 14 .. 05.55
12	6.07	D'	14 19.3 − 23.4	14 . 19.35
11	9.32	F'	14 44.0 48.1	14 .. 44.05

4th Dec. 1857 Orion continued

9 θ. =	50'.26"			3 15m 4.4 – 8.3	3h . 15m . 04.35
	5.16	northernmost star of trap.		10.3 – 14.5	15 . 10.40
12	– 0.07		g'''g''	45.0 – 49.0	15 . 45.00
10	6.00			52.8 – 56.8	15 . 52.80
10	4.05			16 ~~33~~ 21.7 – 25.8	16 . 21.75
	8.46			3h . 16m . 33.6 – 37.6	3 . 16 . 33.60

B

end of (50)

Clouded up then cleared up

Red to θ' = + 14' 59"

Red to θ' = – 4h 12m 34s.02

(42) (51) Red. to (43) = – 6"

Red to (43) = + 03m . 38s.20

11	5' . 15"	α	e = C'	4h . 11m . 28.8 – 32.7	4 . 11 . 28.75
11.12	6 . 08		D'	42.3 – 46.4	11 . 42.35
11.12	0 . 48	ns	y''	48.1 – 52.1	11 . 48.10
11	9 . 33		7'	12m 7.3 – 11.2	12 . 07.25
9	0 . 27			27.8 – 31.8	12 . 27.80
9 10	5 . 17	ns in Trap		~~28~~ 33.8 – 37.6	12 . 33.70
10	3 . 11		E''E''	49.0 – 53.0	12 . 49.00
12	– 0 . 05		g''g''	13m 8.2 – 12.2	13 . 08.20
10	6 . 01		π'	15.9 – 20.0	13 . 15.95
9.10	4 . 07			44.8 – 48.8	13 . 44.80
11.12	8 . 50		y'	56.9 – 60.9	13 . 56.90

end of (51)

(43) DB. (52) Red to θ' = + 15' 05"

Red to θ' = 4h 16m 12s,17

11	5.09"	α	e = C'	15 . 06.9 – 10.9	4 . 15 . 06.90
11.12	6.03		D'	20.6 – 24.8	15 . 20.70
11.12	0.41	ns	g''	26.3 – 30.3	15 . 26.30
11	9.29		7'	45.6 – 49.6	15 . 45.60
9	0.21		R''	16 . 5.9 – 9.6	16 . 05.75
9.10	6.10	ns	u''	11.8 – 15.9	16 . 11.85
10	3.04		E''E''	27.2 – 31.2	16 . 27.20
12	– 0.12		g''g''	46.5 – 50.6	16 . 46.55
10	5.5 ~~6~~ 5		π'	54.1 – 58.2	16 . 54.15
10	4.0 ~~0~~ 1		2'2''	17m . 23.0 – 27.0	17 . 23.00
12	8.42		y'	4 . 17 35.0 – 39.0	4 . 17 . 35.00

BD

end of (52)

4th December 1857 Orion continued —

(53) Red to θ' = $+15'\,02''$

㊹ Red to ㊸ = $-3''$

observed first in Declin. then in R

11	5" 12	α
12	0" 58	
11-12	6" 04	ns
11-12	0" 43	ns
12	3" 47	
10-11	3" 01	
12	2" 58	ns

㊺ D B. D Red to ㊸ = $-4''$

Rep. of last series observed first in R then in Decl Red to θ = $+15'\,01''$

(54)

11	5" 12	α
12	0" 59	ns
11-12	6" 05	ns
11-12	0" 46	ns
12	3" 47	
10-11	3" 02	
12	2" 59	ns

㊻ B D B Red to θ' = $+15'\,00''$

(55) Red to ㊸ = $-4''$

11	5' 13"	α
13	4' 14"	observed in declin first then in R
13-14	3' 18"	
10-11	3' 03"	

Reps of last series. observed first in R then in Decl ㊼ Red to ㊸ = $-7''$

(56) Red to θ' = $+14'\,57''$

11	5" 16	α
13	4" 17	
13-14	3" 14	
10-11	3' 06"	

D B D B

═

Red to θ = $-4^h\,26^m\,12^s.92$

Red to 43 = $-10^m\,00^s.70$ Red to 1st wire.

$4^h\,25^m\,07^s.7 - 11^s.7$	$4^h\,25^m\,07.70$
$16^s.1 - 20^s.1$	25 . 16.10
$21^s.3 - 25^s.4$	25 . 21.35
27.0 – 31.0	25 . 27.00
36.4 – 40.4	25 . 36.40
56.8 – 60.8	25 . 56.80
26^m 2.2 – 6.2	26 . 02.20

End of (53)

Red to θ' = $-4^h\,28^m\,23^s.92$

Red to ㊸ = $-12^m\,11^s.70$

$4^h\,27^m\,18^s.6 - 22.7$	4 . 27 . 18.65
$27^s.2 - 31^s.1$	27 . 27.15
$32^s.3 - 36^s.4$	27 . 32.35
$38^s.0 - 42^s.0$	27 . 38.00
47.3 – 51.4	27 . 47.35
28^m 07.8 – 11.8	28 . 07.80
13.2 – 17.2	28 . 13.20

End of (54)

Red to θ' = $4^h\,35^m\,29^s.65$

Red to ㊸ = $-19^m\,17^s.50$

$4^h\,34^m\,24^s.4 - 28.4$	4^h . 34 . 24.40
$42^s.8 - 46^s.9$	. 42.85
$58^s.8 - 62^s.7$	. 58.75
$35^m\,13^s.6 - 17^s.6$	35 . 13.60

End of (55)

Red to ㊸ = $-20^m\,44^s.40$

Red to θ = $-4^h\,36'\,36.57$

$35^m\,51^s.3 - 55^s.3$	35 . 51.30
36^m 09.7 – 13.8	36 . 09.75
25.8 – 29.9	36 . 25.85
$4^h\,36^m\,40^s.5 - 44^s.5$	4 . 36 . 40.50

End of (56)

4th December 1857 — Orion continued —

(57)

(48) Red to (43) = $-6''$ **Red to $\theta' = +14'\,58''$** **Red to $\theta' = -4^h\,43^m\,22^s.66$**

obs. first in D, then in R | Red to (43) = $-27^m\,.\,10^s.40$ Red to 1st wire.

11	$5'\,15''$ α	$4^h\,42^m\,17^s.3 - 21^s.3$	4^h .. 42 .. 17.30
14	$3'\,50''$	$33^s.9 - 37^s.9$	42 . 33.90
12	$3'\,49''$	$46.2 - 50.2$	42 . 46.20
12	$5'\,07''$	$43\,.\,2^s.3 - 6^s.3$	43 . 02.30
10-11	$5'\,17''$ d of Trapezium	$22^s.3 - 26^s.6$	4^h .. 43 .. 22.45

end of (57)

(49) Rep. of last series obs first in R then in D **Red to $\theta' = +15'\,01''$** **Red to $\theta' = -4^h\,45^m\,38^s.22$**

(58) | Red to (43) = $-29^m\,.\,26^s.10$

11	$5'\,12''$ Red to (43) = $-3''$	$4^h\,44^m\,33^s.0 - 37^s.0$	4 . 44 . 33.00
14	$3'\,47''$ diff to obs.	$49.4 - 53.4$	44 . 49.40
12	$3'\,46''$	$01.9 - 06.0$	45 . 01.95
12	$5'\,03''$	$45^m\,18.0 - 22.0$	45 . 18.00
10-11	$5'\,14''$ d of Trapezium	$38.0 - 42.0$	45 . 38.00

B. D. B. D

end of (58)

Red to $\theta' = -5^h\,00^m\,6^s.54$

(50) Red to (43) = $-1''$ **Red to $\theta' = +15'\,03''$** an ~~then~~ obs. here to be cancelled Red to (43) = $-43^m\,.\,54^s.65$

(59)

11	$5'\,10''$ α ~~ℓ0~~	C - C′	$4^h\,59^m\,01^s.4 - 05^s.3$	4 . 59 . 01.35
12, 13	$-0'\,12$ ns first wire lost	D″	$-09^s.1$	59 . 05.10
12	$0'\,43$	g″	$4^h\,59^m\,21^s.0 - 24^s.9$	59 .. 20.95
9	$0'\,22$	R″	$5^h\,0^m\,0^s.4 - 04^s.4$	5 . 00 . 00.40
12	$0'\,41$	A″A″	$16^s.9 - 20^s.8$	00 . 16.85
11	$2'\,00$ ns	C″C″	$19^s.0 - 22^s.9$	00 . 18.95
11	$-0'\,10$	g″g″	$41^s.0 - 45.0$	5 . 00 . 41.00

end of (59)

first obs in D then in R.

D **Red to $\theta' = +15'\,01''$** **Red to $\theta' = -5^h\,2^m\,52^s.07$**

rep. of last series in

4 (51) Red to (43) = $-3''$ | Red to (43) = $-46^m\,.\,39^s.90$

(60)

11	$5'\,12$	C - C′	$5^h\,1^m\,46^s.8 - 50^s.8$	5 . 01^m .. 46.80
12, 13	-0.10 ns 1st wire lost	D″	-54.6	1 .. 50.60
12	$0, 46$	g″	$2^m\,6^s.2 - 10^s.1$	2 . 06.15
13-14	$1, 30$ new star ns	k_1''	$16^s.1 - 20^s.2$	2 . 16.15
9	$0, 25$	R″	$45^s.9 - 49^s.9$	2 . 45.90
12	$0, 44$	A″A″	$3^m\,02^s.2 - 06^s.2$	3 . 02.20
11	$2, 02$ ns	C″C″	$04^s.3 - 08^s.2$	3 . 04.25
11	-0.08	g″g″	$26^s.5 - 30^s.36$	3 .. 26.55

end of (60)

Break

th Dec. 1857 Orion

Red to θ = + 15' 00"

(61)

(52) Red to (43) = – 4"

11 5' 13" α

12 1' 00"

9 0' 25"

9.10 5' 16" ns d of trapezium

10 3' 07"

10.12 0 03

11–12 –0 19

(53) (62) D, 13 Red to (43) = –5"

Red to θ = +14' 59"

11. 5' 14" α

12 1' 00" not observed

9 0" 26" ~~ns~~ 1st wire lost

9.10 5 17 nsd of Trapezium

10 3 09

11.12 0 03

11.12 –0 17

Red to θ = +15' 01"

(54) (63) long dot Red to (43) = –2"

11 5' 11"

12-~~13~~ 3' 46

12-13 3' 09 ns

12 6 36

11 6 37 ~~ns~~ 1st wire lost

10 4 03

12 8 47+ lost

13

The stars to be filled in on them from 20" preceding to 20" following the trapezium and south of it

Spring governor $2^h\,32^m\,0^s$

5?

Red to θ = $-5^h\,9^m\,59.^s11$

Red to (43) = – $53^m\,47.^s00$

	Red to 1st wire.
$5^h\,8^m\,53.^s8 - 57.^s9$	5^h 08 53.85
$9^m\,02.^s2 - 06.^s3$	9 02.25
$52.^s8 - 56.^s8$	9 52.80
$58.^s8 - 62.^s9$	9 58.85
$10^m\,14.^s0 - 18.^s0$	10 14.00
$11^m\,21.^s1 - 25.^s2$	11 21.15
$31.^s2 - 35.^s2$	11 31.20

end of (61)

Red to (43) = – 57 07.25

$12^m\,14.^s1 - 18.^s2$	12 14.15
13^m ~~13.0~~ – $17.^s0$	13 13.00
$19.^s0 - 23.^s1$	13 19.05
$34.^s3 - 38.^s5$	13 34.40
$14^m\,41.^s3 - 45.^s3$	14 41.30
$51.^s6 - 55.^s6$	14 51.60

Red to θ' = $-5^h\,13^m\,19.^s40$

end of (62)

Red to θ = $-5^h\,22^m\,14.^s13$

Red to (43) = – $1^h\,06^m\,02.^s00$

$5^h\,21^m\,08.^s9 - 12.^s9$	5^h 21 08.90
$37.^s7 - 41.^s8$	21 37.75
$43.^s0 - 46.^s9$	21 42.95
$22^m\,14.^s8 - 18.^s6$	22 14.70
$- 22.^s2$	22 18.20
$23^m\,24.^s9 - 28.^s9$	23 24.90
$36.^s9 - 40.^s9$	23 36.90

end of (63)

7th December 1857

Orion.

G. P. B obs.

Un. ther. = +40°

Calm & good vision

angle of position 91°..51'.

N.B. The sid. time of zero of Shut has been lost. We have taken 3h..30m for time of 1st obs.

Continuation of zone D

Red to θ' = + 15' 00" Red to θ' = - 3 37 1.32

(55) (64)

Red to (56) = +1" Red to (56) = + 1m..10.10

Red to 1st wire

11m	3'.03"		3h 36m – 45s.2	49s.2	3..36..45.20
12	3.01 ns		50.9	55.0	36..50.95
	5.15	D of trapezium	37 1.0	5.0	37.01.00
12	2.03		13.8	17.7	37..13.75
11	3.10 ns		16.6	20.6	37..16.60

end of (64)

(56) (65) Red to θ' = + 14' 59" Red to θ' = - 3h 38m 11s.45

11	3..04		37 – 55.4	59.3	37..55.35
12	3..02 ns		38.. 1.0	4.9	38..00.95
	5..16	D of trapezium	11.2	15.1	38..11.15
11	2..04		23.7	27.7	38..23.70
10.11 10:	3..09		26.7	30.7	38..26.70

end of 65

(57) (66) Red to θ' = - 3h 39m 7.35 Red to (56) = ~~- 55.90~~

11		38.. 51.2	55.3	38..51.25
12		56.9	60.9	38..56.90
D of trapezium		39 07.0	11.1	39..07.05
11	2d wire lost	19.7	----	39..19.70
10-11		22.4	26.6	39..22.50

This series was observed first twice in Decl. then three times in AR

end of (66)

(58)a (67) D Red to θ = + 14' 58" Red to θ = - 3h 44m 10s.39

10,11	0,29	α	3 44 4.0	8.0	3..44..04.00
6	3.27		16.9	21.0	44..16.95
8	3.23	ns	20.4	24.3	44..20.35
10	6.02		52.4	56.3	44..52.35

end of (67)

7th December 1857

Orion continued.

Red to θ' = + 15' 04"　　　Red to θ' = − 3h 45m 20,66s

(58)b (68)

						Red to 1st wire
10.11	0'.22"	α	3h 45m.. 14.3s		18.2	3 .. 45 .. 14.25
6	3'.21"			27.0	31.0	45 .. 27.00
8	3'.18" ns			30.8	34.7	45 .. 30.75
	B					
10	5'.57"		46	2.8	6.7	46 .. 02.75

observed twice in Declination then twice in R　end of (68)

B

(59) (69) Red to θ' = + 10' 04"

10　2,,49
10-11　5,,20 this star is the α R" of tonight
13　5,,40　A"A"
12.13　5,,07　H"H"
11,12　4,,46　G"G"
13　5,36　K"K"　end of (69)

(60) (70) Red to θ' = + 10' 04"

10,11　2,48
10,11　5,20　This is α　R"
13　5,41　A"A"
12,13　5,07　H"H"
12　4,47　G"G"
13　5,35　end of (70)　K"K"

The R for this group will be found under Dec 10th:

Clouded up →

Clouds put a Stop to observations.

=

Note　The 6th star in trapezium was distinctly seen

1857. Dec. 10th. Meteoric Shower. obsd by H.P. Tuttle.

Commenced at 6.30 P.M.

westward - meteors in great number, not counted - generally of small apparent magnitude.

at 10. a meteor exploded with a bright flash -— generally

Many were seen croſsing the field of view of the comet seeker - as many as thirty - some times two or more in the field at the same time.

three were seen at the same instant in the field of the comet seeker - looking at a nebula near Capella. three meteors were seen to form as it were in the field of the telescope. paſsing out at the right hand, when line of sight directed to the Zenith -

The meteors were not observed to radiate from any particular point of the heavens -

See Note at end of Orion Zones Dec. 10th.

Dec 10th There was, at $0^h.40$ Sid. a star of 16th mag prec a of Nov. 21st by 13.3 beats of 424 = 13.3 × 0.4 = $5^s.3$ and about $40''$? South of it

There was certainly no star in the place of the object observed for Leucothea on Nov. 22nd

Dec 10^{th} 1857. Orion

Zero position. 91°.54'   G. P. B. obs.

Ure Thr = + 34°

4 .. 30 .. 00
4 .. 31 .. 00 Spring Gov.

Red to θ' = − 4^h 46^m 53^s.10
Red to θ = + 10' 06"   Zone B.? Zone D. Red to θ = − 4^h 44^m 27^s.88

Observed in AR. Dec's are given Dec 7th   add 2^m.25^s.20

	(61) (71) b		Red to 1st min	repetition.
R''	10	5 .. 19	4 .. 46 .. 46.75	4^h .. 46 .. 46.7 − 50.8
H''H'' A''A''	13	5 .. 39	47 .. 03.00	47 .. 03.0 − 07.0
	13 − 12	5 . 07	47 .. 18.90	" . 18.9 − 22.9
g''g''	1− 12	4 . 46	47 .. 27.35	" 27.4 − 31.3
K''K''	13	5 . 34	47 .. 46.50	" 46.5 − 50.5
N''N''	11 − 12	4 . 58	48 .. 15.15	48 . 15.2 − 19.1
O''O''	11 − 12	4 . 34	48 .. 25.25	" 25.2 − 29.3

(71) a	Red to 1st min
~~5~~ 4^h .. 44^m .. 21^s.5 − 25.5	4^h .. 44 . 21.50
" 37.9 − 41.9	44 . 37.90
" 53.7 − 57.7	44 . 53.70
45 .. 02.1 − 06.1	45 . 02.10
" 21.2 − 25.2	45 . 21.20
" 49.8 − 53.8	45 . 49.80
59.9 − 63.9	45 . 59.90

End of (71)

D. Red to θ' = + 10' .. 6"

same repeated in AR.

Red to (64) = − 6"   Zone E.   Red to θ' = − 4^h 55^m 13^s.78

(62) (72)   θ of Trapezium reads 10' .. 00.   Red to (64) = + 11^m .. 12^s.00

	B.	D. ~~Red to~~				Red to 1st min.
A''	11	4 . 40	= g		4^h . 53 .. 19.4 − 23.4	4^h .. 53 .. 19.40
A''	12	6 . 03			" . 34.9 − 38.9	53 .. 34.90
B''	12	0 . 10	= β		47.2 − 51.3	53 .. 47.25
F''	12	5 . 54			54 .. 17.0 − 21.0	54 . 17.00
g''	12	5 . 40			" . 27.9 − 31.9	" .. 27.90
	B	D				
	11	0 . 07		N'''	4^h .. 54 .. 50.0 − 54.0	4 .. 54 .. 50.00
	(10 − 11	~~5~~	n. s)	A''	" .. 53.2 − 57.2	54 .. 53.20
	60	5 . 20		R''	55 .. 7.3 − 11.3	55 .. 07.30
	12	0 . 09		7''7'' = 2''	" . 29.2 − 33.3	55 .. 29.25
	12	4 . 46		g''g''	" 48.0 − 52.1	55 .. 48.05
	10	9 . 00		L''L''	56 . 24.7 − 28.7	56 .. 24.70
	12	4 . 34		O''O''	" 46.0 − 50.0	56 .. 46.00
	12 − 13	1 . 19		P''P''	57 .. 17.9 − 21.9	57 . 17.90
	B.	B				

~~4^h . 46 .. 46.7 − 50.8~~
~~47 .. 03.0 − 07.0~~
~~" 18.9 − 22.9~~
~~" 27.4 − 31.3~~
~~" 46.5 − 50.5~~
~~4^h .. 48 .. 15.2 − 19.1~~
~~" . 25.2 − 29.3~~

End of (72)

D.10 Orion con-

Red to θ' = + 10' 06"

Red to θ = – 5h 00m 52s 58

(73)

Zone E. repeated.

(63) Red to (64) = –4"

A''-1 11 .. 4,39 = q

A'' 12 .. 6.01

B''' 12 .. 0.10 = β

E'' 12 .. 5,52

g'' 12 5.40

D B

M''' 10-11 –~~2, XX~~ ?. .01 = γ Dec? ~~by Zones~~ Dec?

N'' 10 ~~2, XX~~

R'' 12 ~~5. 28~~ 18

F''F'' 12 0. 07

g''g'' N.B. ? ~~10~~ 12 4, 43=

L''L'' ~~12~~ 10 8, 58

O''O'' 12 4.32

P''P'' 12-13 1,18

(64) (74)

above repeated Red to θ' = + 10' 12"

g''-1 11 . 4,34 = q

A'' 12 .. 5,57

B''' 12 .. 0.07 = β

E'' 12 .. 5, 48

g'' 12 .. 5.35

M''' 10-11 – 0, .06 = γ

N'' 10-11 2, 42

R'' 12 5, 14

F''F'' 12 0, 03

g''g'' 12 4,40

L''L'' 10 8. 54

O''O'' 12 4, 28

P''P'' 12-13 1, 13

D. B D.

Red to (64) = + 5m .. 33s.00 Red to 1st min

4h .. 58 .. 58.2 – 62.2	4h .. 58 .. 58.20
59 .. 13.9 – 17.9	59 .. 13.90
" . 26.0 – 30.0	59 .. 26.00
" 55.9 – 59.8	59 .. 55.85
60 .. 06.8 – 10.8	60 .. 06.80
5h .. 00 .. 28.9 – 32.8	5h .. 00 .. 28.85
" 32.0 – 36.0	00 .. 32.00
" 46.2 – 50.2	00 .. 46.20
1 .. 08.1 – 12.2	1 .. 08.15
1 .. 26.9 – 30.9	1 .. 26.90
2 .. 3.5 – 7.4	2 .. 03.45
" 24.9 – 28.9	2 .. 24.90
" 56.9 – 60.8	2 .. 56.85

end of (73)

Red to θ' = – 5h 6m 25s.88

5h .. 04 . 31.4 – 35.4	5h .. 04 .. 31.40
" .. 46.9 – 50.9	04 .. 46.90
" 59.2 – 63.3	04 .. 59.25
5 .. 29.0 – 33.0	05 .. 29.00
" " 40.0 – 44.0	05 .. 40.00
6 .. 2.1 – 6.0	6 .. 02.05
" .. 5.2 – 9.2	6 .. 05.20
" 19.6 – 23.4	6 .. 19.50
" 41.3 – 45.4	6 .. 41.35
7 .. 00.2 – 4.1	7 .. 00.15
" .. 36.7 – 40.8	7 .. 36.75
" .. 58.2 – 62.2	7 .. 58.20
8 .. 30.0 – 34.2	8 .. 30.10

end of (74)

Ɗ 10 Orion cont=

Red to $\theta = +10' 06''$ Red to $\theta = -5^h\ 22^m\ 6^s.45$

(75) Supplementary Zone. E,

(65) Red to (64) = −4″ Red to (64) = $-15^m.40.7$ Red to first in

11	0,11 = β	5^h .. 20 .. 39.9 − 44.0	5^h .. 20 .. 39.95
13	4.46 = 4.46	21 .. 04.9 − 8.8	21 . 04.85
13	1.10	" " 18.1 − 22.1	21 .. 18.10
13	2,30	22 . 14.4 − 18.3	22 . 14.35
13	2.07	" 23.0 − 27.0	22 . 23.00
10	9.02	23 . 17.3 − 21.3	23 . 17.30
12	9.47 ns	" 22.1 − 26.2	23 . 22.15

D.D. end of (75)

repeated above Red to $\theta = +10' 06''$ Red to $\theta = -5^h\ 26^m\ 20^s.92$

(76) (66) Red to (64) = −5″ Red to (64) = $19^m.55^s.20$

11	0,12 = β	5^h .. 24 .. 54.3 − 58.6	5^h . 24 .. 54.45
13	4,46	25 .. 19.5 − 23.5	25 . 19.50
13	1.07 ns	" " 32.7 − 36.8	25 . 32.75
13	2.30	26 . 28.9 − 33.0	26 . 28.95
13	2.06	" " 37.6 − 41.4	26 . 37.50
10	9.02	27 . 31.8 − 35.8	27 . 31.80
12	9.48	27? .. 36.8 − 40.8	27 . 36.80

B.D. Red to $\theta = +10' 15''$ Red to $\theta = -5^h.\ 32^m.\ 39^s.72$ end of (76)

(67) (77) Red to (64) = +3″ E_2 Red to (64) = $-26^m.13^s.85$

11	−0,09 = γ	5^h .. 32 .. 16.0 − 20.0	5 .. 32 . 16.00
10	2.38 n.s	" " 19.0 − 23.0	32 . 19.00
	10.02 d of Trapezium	" " 39.5 − 43.4	32 .. 39.45
13	0,11	" " 53.8 − 57.8	32 . 53.80
12	−0.02	" . 55.1 − 59.2	32 . 55.15
13	5.25	33 . 33.2 − 37.1	33 .. 33.15

Red to $\theta = +10' 16''$ end of (77)

(68) (78) repeated Red to (64) = +4″ Red to $\theta = -5^h.\ 34^m.\ 47^s.47$ Red to (64) = $-28^m.21^s.62$

11	−0.10 = γ	34 .. 23.8 − 27.7	34 . 23.75
10	2.37 ns	" .. 26.8 − 30.8	34 . 26.80
	10.00 d of T.	" . 47.1 − 51.0	34 . 47.05
13	0.11	35 .. 01.5 − 5.5	35 . 01.50
12	−0.02 ns	" " 3.0 − 7.0	35 . 03.00
13	5.24	" " 40.8 − 45.0	35 . 40.90

B. B. B On account of bad definition there are many 13 mag stars in Zone E which could not be observed tonight. end of (78)

Dec. 10 Orion contin –

Zone F.

Zero of zone F is 15' south of θ of Trapezium

Red to δ' = + 5' 0"6 Red to θ = −5h 51m 31s.13 Red to (70) + 5m.. 31s.30

(79) Second star of F is the same as the first star of E

(69) Red to (70) = Red to Trm

	11	3.07 = Δ	5h . 49 .	20.2 – 24.6	5h . 49 . 20.40
	11	9.40 (9?)	"	36.9 – 41.0	49. 36.95
	12 – 11	5.09	50 ..	4.7 – 8.8	(50.. 04.75
	9	1.36 ns	"	10.8 – 14.7	50 . 10.75
E'''	11 – 10	1.04	"	29.8 – 33.8	50 . 29.80
F'''	12	1.13 ns	"	32.0 – 36.0	50 . 32.00
	8	3.52	51 ..	02.4 – 6.4	51 . 02.40
M'''	17	4.59	" ..	7.3 – 11.4	51 . 07.35
55" = P'''	13	5.21	"	45.1 – 49.0	51 .. 45.05
(S'') 77''	12	5.07	"	46.8 – 50.8	51 . 46.80
	7	0.37	52	9.7 – 13.7	52 . 09.70
	6 – 7	−0.27	"	30.7 – 34.8	52 .. 30.75
	12	9.56	"	53.1 – 57.1	52 . 53.10
	12	9.33	53	3.2 – 7.3	(53 . 03.26
	12 – 13	6.19		35.1 – 39.2	53 .. 35.15

(70) D. D. 13 (80) Red to θ' = + 5' 05" Red to θ = −5h 57m 2s,46 end of (79)

	11	3.08 = Δ	54 ..	51.8 – 55.8	54 . 51.80
	11	9.40	55 "	8.1 – 12.1	55 , 08.10
	(11 – ~~12~~)	5.09	" "	35.9 – 40.0	55 .. 35.95
	9	1.36 ns	" "	41.9 – 45.9	55 . 41.90
E'''	10 – 11	1.06	56 .	1.0 – 5.0	56 .. 01.00
F'''	12	1.14 ns	"	3.4 – 7.5	56 .. 03.45
		3.53	"	33.7 – 37.8	56 . 33.75
M'''	11	4.59 ns	"	38.6 – 42.8	56 .. 38.70
	13	5.22	57 "	16.3 – 20.4	57 . 16.35
77''	12	5.07	" "	18.0 – 22.0	57 . 18.00
	7 – 8	(0.36) 6	"	41.0 – 45.0	57 . 41.00
	~~6~~ 7	−0.27	58 ..	2.0 – 6.0	58 . 02.00
	12	9.57	"	24.5 – 28.6	58 . 24.55
	12	9.34	"	34.7 – 38.8	58 . 34.75
	12 – 13	6.20	59	6.6 – 10.6	5h. 59 . 06.60

D end of (80)

Dec. 10 Orion continued

On account of bad definition many small stars in zone F are omitted.

Red to θ' = + 0' 8" Red to θ' = $-6^h\,10^m\,28^s.41$ Red to (72) = 6^m 04.75

(81) Zero of zone G is 20' south of θ of Trapezium

(71) Red = +1"

						Red to 1st min
11	8.07	= Δ	6^h	8	17.8 - 21.7	6^h 08 .. 17.75
8	6.36	see w last		9	7.9 - ~~12.1~~	9 .. 07.90
10-11	4.06	n s first w last		..	~~37~~ 12.1	9 .. 08.10
12	4.01			9	32.9 - 36.8	9 .. 32.85
10	0.07			..	46.6 - 50.6	9 .. 46.60
10	1.24	n. s		..	47.8 - 51.9	9 .. 47.85
12	3.57			10	29.1 - 33.2	10 .. 29.15
12 - 11	2.49			11	2.9 - 6.9	11 .. 02.90
11	3.19			..	12.0 - 16.0	11 .. 12.00
11	1.20	n. s		..	19.5 - 23.5	11 .. 19.50
12	0.21			..	43.9 - 48.0	11 .. 43.95
12	3.06			12	26.8 - 30.7	6^h .. 12 .. 26.75

end of (81)

Song B

(72) Red = -1" (82) Red to θ' = + 0' 7" Red to θ' = $-6^h\,16^m\,33^s.07$

11	8.09	= Δ	6	14	22.3 - 26.4	6 .. 14 .. 22.35
8	6.37	see w last		15	12.6 - —	15 .. 12.60
10	4.05	first w last		..	~~0.0~~ - 16.9	15 .. 12.90
12	4.03	see w last		..	37.6 - —	15 .. 37.60
10	0.07			..	51.3 - 55.3	15 .. 51.30
10	1.26			..	52.6 - 56.7	15 .. 52.65
12	3.38			16	33.9 - 37.9	16 .. 33.90
11 - 12	2.49			17	7.6 - 11.6	17 .. 07.60
11	3.20			..	16.8 - 20.7	6 .. 17 .. 16.75

B. D.

end of (82)

Dec 10 Orion con-

(83) Zone G, Red to (72) = −06m 53s, 65

(73) Red = − 3" Red to θ' = +0' 5" Red to θ'h = −6h 23m 26s.66 Red to 1st h

	11	8.11 = Δ		6 .. 21 . 16.0 – 20.0	6.21.16.00
	11	10.11		22 .. 0.1 – 4.2	22 .. 00.15
	8	6.38	n s	" 6.2 – 10.3	22 . 06.25
E'''	12	6.07		" 25.3 – 29.4	22 . 25.35
	8	8.55		" 58.0 – 62.0	22 – 58.00
M'''	10 – 11	10.01	n s	23 3.0 – 7.0	23 .. 03.00
F''F''	12	10.09		" 42.4 – 46.4	23 . 42.40
	7	5.39		24 . 5.2 – 9.3	24 .. 05.25
	7	4.33	(wind shakes telescope)	" 26.2 – (30.2)	h 24 .. 26.20
	11 – 12	3.09		25 24.8 – 28.9	6.25 .. 24.85

D. D. B Red to θ' = +0' 4" Red to θ' = −6h 28m 34s.78 end of (83)

(74) (84) Red = − 4" Red to (72) = −12m 01s.65

	11	8.12 = Δ		6 .. 26 . 24.0 – 28.1	h 6 .. 26 . 24.05
	11	10.12		27 .. 8.2 – 12.1	27 . 08.15
	8	6.40	n s	" 14.2 – 18.2	27 . 14.20
E'''	11 – 12	6.08		" 33.3 – 37.3	27 . 33.30
	8	8.56		28 6.0 – 10.0	28 .. 06.00
M'''	10 – 11	10.02	n s	" 11.0 – 15.1	28 .. 11.05
F''F''	~~12~~	10.11		" 50.2 – 54.3	28 .. 50.25
	~~6~~ 7	5.40		29 13.3 – 17.3	29 .. 13.30
	6 – 7	4.35		" 34.3 – 38.3	h 29 .. 34.30
	11 – 12	3.11		30 .. 33.0 – 37.1	6 . 30 .. 33.05

D D B end of (84)

Spir Gov 6 .. 40 . 00

Ex Ther 33.7

An unusual number of shooting stars were noticed this evening (Dec 10).

Dec 11th A R 20^{h} .. 53^{m} .. 5 at 7^{h} .. 15^{m}
Dec + 4 .. 16 .. 17

Could not find the Comet. Swept several fields on all sides of above place
(orbit wrong.)

Dec 12 Orion.

New determination of zero position. 91.54
Use for Scale cor θ = 24°
Spring Gov. 4. 20. 00
4. 21. 00

Ex ther 22.8

Red to θ' = +10' 14" Red to θ = -4h 30m 58s.74

(85) d is the northernmost star of Trapezium Red to (76) = +1m 47s.13

(75) Red to (76) = +6" Red to (76) = Red to 1st wire.

M''' 12 -0.8 sec wire lost = α_2 4h. 30.. 35.0 — 4. 30.. 35.00

N'' 10-11 2.39 n s " " 38.1 - 42.0 30. 38.05

d of Trap 10.02 " " 58.4 - 62.4 30. 58.40

(77) (86) Red to (76) = +14" R to θ' = +10' 21" Red to θ = -4h 31m 46s.24 end of (85) Red to (76) = +59s.58

M''' 12 -0.15 sec w lost = α_2 4.. 31.. 22.5 — 31.. 22.50

N'' 10-11 2.33 n s " " 25.7 - 29.6 31.. 25.65

d of Trap 9.34 45.9 - 49.9 31. 45.90

(76) (87) B Red to θ' = +10' 08" Red to θ = -4h 32m 45s.87 end of (86)

M''' 12 -0.2 sec w lost = α_2 4.. 32. 22.1 — 32. 22.10

N'' 10-11 2.47 n s " 25.2 - 29.1 32.. 25.15

d of Trap 10.08 45.6 - 49.6 32.. 45.60

(78) 88 d B Red to (76) = +5" Red to θ' = +10' 13" Red to θ = -4h 33m 49s.73 end of (87) Red to (76) = -1m 03s.85

M''' 12 -0.7 = α_2 4. 33.. 26.0 — 33.. 26.00

N'' 10-11 2.41 " " 29.1 - 33.0 33. 29.05

d of Trap 10.3 " " 49.3 - 53.4 4. 33.. 49.35

end of (88)

G_2

Red to θ' = -0' 02" α_2 set so as to read 10.09 making the zero of the new zone 20' south of θ Trapezium Red to θ = -4h 46m 27s.03

(89) (79) Red to (81) = Red to (80) = 0" Red to (80) = +41s.70

H''' 10-11 0.17 α_4 4. 45.. 45.2 - 49.2 4h.. 45.. 45.20

G''' 10-11 1.36 n s α_3 " 46.6 - 50.7 45.. 46.65

M''' 12 10.09 = α_2 46 " 3.3 - 7.4 46. 03.35 end of (89)

(80) (90) Red to θ = -0' 02" Red to θ = -4h 47m 8s.72 Red to (76) = -14m 22s.87

H''' G''' 10-11 0.18 α_4 4.. 46.. 27.0 - 31.0 46.. 27.00

G''' 10-11 1.36 n s α_3 28.3 - 32.3 46. 28.30

M''' 12 10.08 = α_2 45.0 - 49.0 46.. 45.00

(81) (91) B. B. Red to (80) = -5" Red to θ' = -0' 07" Red to θ = -4h 48m 4s.62 end of (90) Red to (80) = -55s.90

10-11 0.23 α_4 4.. 47. 23.0 - 27.0 47.. 23.00

10-11 1.42 n s α_3 " 24.1 - 28.1 47. 24.10

12 10.13 = α_2 " 40.9 - 44.9 4h.. 47. 40.90

d d end of (91)

Dec 12

Orion continued

(92) Red to θ' = – 0'. 03'' Red to θ' = $-4^h\ 49^m\ 8^s.47$

(82) Red to (80) = –1'' Red to (80) = -1^m .. $59^s.7$ Red to 1st wire.

H'''	10-11	0.19	α4	4 . 48 . 26.7 – 30.7	4 .. 48 . 26.70
g'''	10-11	1.38	n.s. α 3	" 28.0 – 31.9	48 .. 27.95
M'''	12	10.09 = α2		" 44.7 – 48.8	48 .. 44.75

Red to θ' = ~~+~~ 0.. 00'' Red to θ' = $-5^h\ 4^m\ 35^s.21$ end of (92)

(83) (93) Red to (80) = +3'' G3 Red to (76) = -31^m .. 49.32

10-11	1.33 α3		5 .. 03 .. 54.7 – 58.8	5 .. 03 .. 54.75
13	3.02	n s	. .. 59.9 – 64.0	03 . 59.95
13	3.43		4 .. 32.8 – 36.9	4 .. 32.85
12	4.06	n s	" 35.9 – 39.9	4 .. 35.90

end of (93)

(84) B (94) B B Red to (80) = + 2'' Red to θ' = 0'. 00'' Red to θ' = $5^h\ 6^m\ 12^s.84$ Red to (76) = – 33 .. 26.97

10-11	1,34 α3		5 .. 5 .. 32.4 – 36.4	5 . 5 .. 32.40
13	3.02	n s.	" 37.8 – 41.8	5 .. 37.80
13	3.43	see n bar	6 .. 10.3 – —	6 .. 10.30
12	4.06	n s	" 13.6 – 17.6	6 .. 13.60

end of (94)

G4

Zero of zone G4 is 20' ~~north~~ south ? of θ of Trap

(85) (95) Red to θ' = + 0'.. 01'' Red to = $-5^h\ 17^m\ 34^s.48$

A'''	11 a	8 (8.13)		5 .. 15 .. 23.9 – 27.9	5 . 15 .. 23.90
D'''	11	4.10		16 .. 14.3 – 18.3	16 .. 14.30
E'''	11	6.10		" " 33.1 – 37.2	16 . 33.15
F'''	12	6.19	n s	" 35.4 – 39.5	16 .. 35.45
L'''	9	8.57		17 .. 5.8 – 9.7	17 .. 05.75
M'''	11.12	10.04	n s = α2	" . 10.8 – 14.8	17 .. 10.80
O'''	12	9.03	4..03? this could not be at all times,	" 35.2 – 39.3	17 .. 35.25
F''F''	12	10.11		" 5~~4~~0.0 – 54.1	17 .. 5~~4~~0.05
R'''	12	2.56		18 .. 8.9 – 13.0	18 .. 08.95
	6-7	4.36		" " 34.0 – 38.0	18 . 34.00
	12-13	7.11	see n bar	19 .. 21.2 – —	19 .. 21.20
	11	3.14		5^h " " 32.6 – 36.7	5^h .. 19 .. 32.65

B B B

end of (95)

In zone G, of Dec 10 the stars read 10'' too small

Red to 0' = 0' 00'' Red to 0' = $-5^h\ 24^m\ 32^s.49$

Dec/12 Comm corr Red to (85) = $-06^m.. 58^s,00$

(85)$_b$ (96) Red to (85)$_a$ = -1''

				Red to 1st wire
A'''	11	8.15	5 .. 22 .. 21.7 – 25.8	5 .. 22 . 21.75
D'''	11	4.12	23 .. 12.3 – 16.3	23 . 12.30
E'''	11	6.12	" 31.0 – 35.0	23 .. 31.00
F'''	12	6.21 ns	" 33.4 – 37.4	23 .. 33.40
L'''	9	8.58	24 .. 3.8 – 7.9	24 .. 03.85
M'''	12	10.65 ns	8.9 – 12.9	24 .. 08.90

~~(86)~~

R''' 12	($\overset{2}{7}$ .58)	25 .. 07.0 – 11.0	25 .. 07.00
6–7	4.37	32.0 – 36.0	25 .. 32.00
12–13	omitted		
11–12	3.13	26 .. 30.6 – 34.7	5^h .. 26 .. 30.65

End of (96)

Spr Gov 5 .. 44 .. 60

Comet VI. 1857.

☄ δ + 1° .. 45' .. 41'' ☄ α $20^h .. 43^m .. 33^s$

Dec 14^d, 7^h .. 15^m nearly. (orbit wrong)

d prec A $0^s.3$
d N of A 16"

Zero derived from obs Dec 14^2

56".264
.292
.282
.291
.255
.276
.278
.283
.279
.282
.284
.320
.287
.295

I have doubts of the stability of the Zero wire since the new wires were put in (about a month since) but there seems to have been no change tonight.

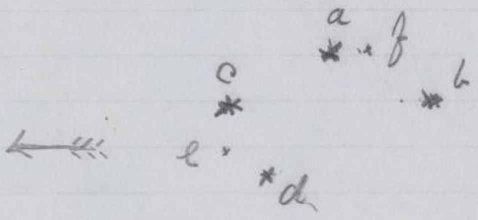
For results of these obs. vide last page of this book - They have been projected with particular care on a sheet of 'Orion reductions' p 44-

1857 Dec 14th Fine Clear night Ext. Thr 31°

Calm & good vision. G.P.B. obs. A. Hall rec.

Orion -

Measures on Trapezium



Power No 4.

236. 5^{h}. 00^{m}.

Telescope east of pier

Angle position for wires. 91, 05

Dis of f. from a. 55^{r}.824 | 56^{r}.680 | 56.673
" " " " 55.886 | 56.666 | 55.855
55.855 | 56.673 | 0.818
0.409
8
4".01

Angle of position. 66°.07'
" " " 60.20
" " " 83.10
63,12

} better observed afterwards on p 382

Angle of position a. c
50°, 50'
50°. 35'
50. 33
50, 39

Dis of a. from c. 54^{r}.962 | 57^{s}.593 | 54.958
" " " " " 54.955 | 57.660 | 57.626
54.958 | 57.626 | 2.668
1.334
27
13".07

Dec 14 Orion

Angle of position of e̊ from c

$11^{\circ}..35'$
10..40
12..00
11..25

Dis e̊ from c

$55^r.856$
55.882
55.869

$56^r.716$
56.674
56.695

56.695
55.869
0,826
0.4,13
83
$4''047$
Zero 56.282

d̊ from c

Angle of position

$149^{\circ}..37'$
148..10
148..53

Dis of d̊ from c

$57^r.205$
57.235
57.220

$55^r.362$
55.364
55.363

57.220
55.363
1.857
0.9285
186
$9''099$
Zero 56.291

d̊ and b.

Angle of position.

$62^{\circ}..12'$
62..06
62..09

Dis of d̊ from b

$58^r.297$
58.243
58.270

$54^r.323$
54.320
54.321

58.270
54.321
3,849
1,9245
385
$18''860$
Zero 56.255

Dec 14.   Orion

= Elsewhere designated as B

Angle of Position of star g of ~~the~~ 15 mag from d.

It is in a line with ~~d.~~ (63)

62°.. 13'

Dis from d   64".85   47".72

64.85

171.3

3.4

2)~~168.9~~   167.9

Dist = 8~~4".4~~   83.95

62°.. 13

Zero   91 05

φ   28.. 52

From d

Δδ = 84".4 sin 28°.. 52'   (g is S of d I suppose as b is)

ΔR = 84.4 cos 28 52 sec δ (g follows d)   (will be S of a & fol)

15 = ~~1.17609~~

84.4 = 1.92634 $\frac{1}{15}$ 8.82391

28 52 sin 9.68374   cos 9.94238   d to g −40".74   d to g +4^s.95

sec δ 0.00198   d to a ~~+~~16.1   d to a + 0.33

8.76827 =   8.768~~2~~7   a to g −~~24.6~~   g to g +~~4.62~~

40".~~74~~ 52 Δδ   1.61008

4.~~95~~ S 923 ΔR.   0 69461

From d

Decr 4 Orion

Dif of Dec of d and bright star which is south following.

x = A

(Assumed hour angle $0^{h}30^{m}$ W.)

The Star is "γ"

$45^{r}.076$
45.100
45,088

$67^{r}.45$
67.48
67.465

67.468
45.088
112.553
56,276
22,377
11.1885
2237
$109''.648$

Dif of Dec of d and B B. is south following A.

(Star elsewhere called "B")

$44^{r}.916$
44904
44,910

67.603
67.750
67.710
67.688

67.688 Zero 56.276
44.910
22.778
11.3893
2277
$111''.616$

Dif Dec of d and b b is south following B.

(Star is "E")

$43^{r},382$
43,453
43,417

69,123
69,156
69.139

69.139
43.417
25.722
12.861
2572
$126'',098$
Zero 56,278

Dif Dec of d and e

56,580
56,590
56.585

55.989
55.976
55.982

56,585
55.982
.603
.301
6
$2''.95$
Zero 56.283

Dif Dec d and c

57.049
57.034
57.041

55,512
55,525
55,518

57.041
55,518
1,523
.7615
152
$7''.463$
Zero 56.279

Dec 14 Orion

Dif Dec of $\mathring{d}$ and $\mathring{b}$

57.273
57.220
57.246

55.298
55.340
55.319

57.246
55.319
112.565
56.282
1.927
0.9635
193
9".442
Zero 56.282

Dif Dec $\mathring{d}$ and a = A of Trap

57.942
57.943
57.942

57.942
54.626
2/3.316
1.658
33
16".25 Zero 56.284

54.652
54.600
54.626

Dif Dec d and f

58.173
58.200
58.186

54.433
54.477
54.455

58.186
54.455
3.731
1.8655
373
18".282
Zero 56.320

Dec 14. Orion

Angle of position of f from a $59^{\circ}.00'$
$60,15$

Definition much better than when first observed

Mean 59 37 wt = 2
Obs on p 63 12 .. = 1
59 37
182 26

Angle of position, ~~f~~ e? from d ‖ Mean 60 . 49

$122^{\circ}.20'$
121, 20
121, 50

Dif Dec d and star of 11 mg north following nearly in same AR
x = D

(Star is 0')

64^{r} . 54
64, 63
64 , 58

47,980
48.000
47.995

64. 58
47.995
16,585
8.2925
1658
$81'',267$

E follows D by 3^{s}. and is in same Dec

Dif Dec d and E

(Star is 2')

64, 79
64, 78
64. 785

47. 798
47. 813
47. 805

Zero 56, 287
64.785
47 805
16.980
8.490
170
$83'',20$
Zero 56. 295

Dec 14 Orion

Dif in AR.

A follows d by 14^{beats} of 236
B " " " 21
C " " " 31
D " " " 2
E " " " 9

F, G, and H, and I are small stars of 13 mag near and north of D and E.

(S)= F precedes E by $4,5^{\text{beats}}$ 236
ε = G " E " 3.5
δ = H " " " 1.5
η = I follows " " 3.0

Angles of position

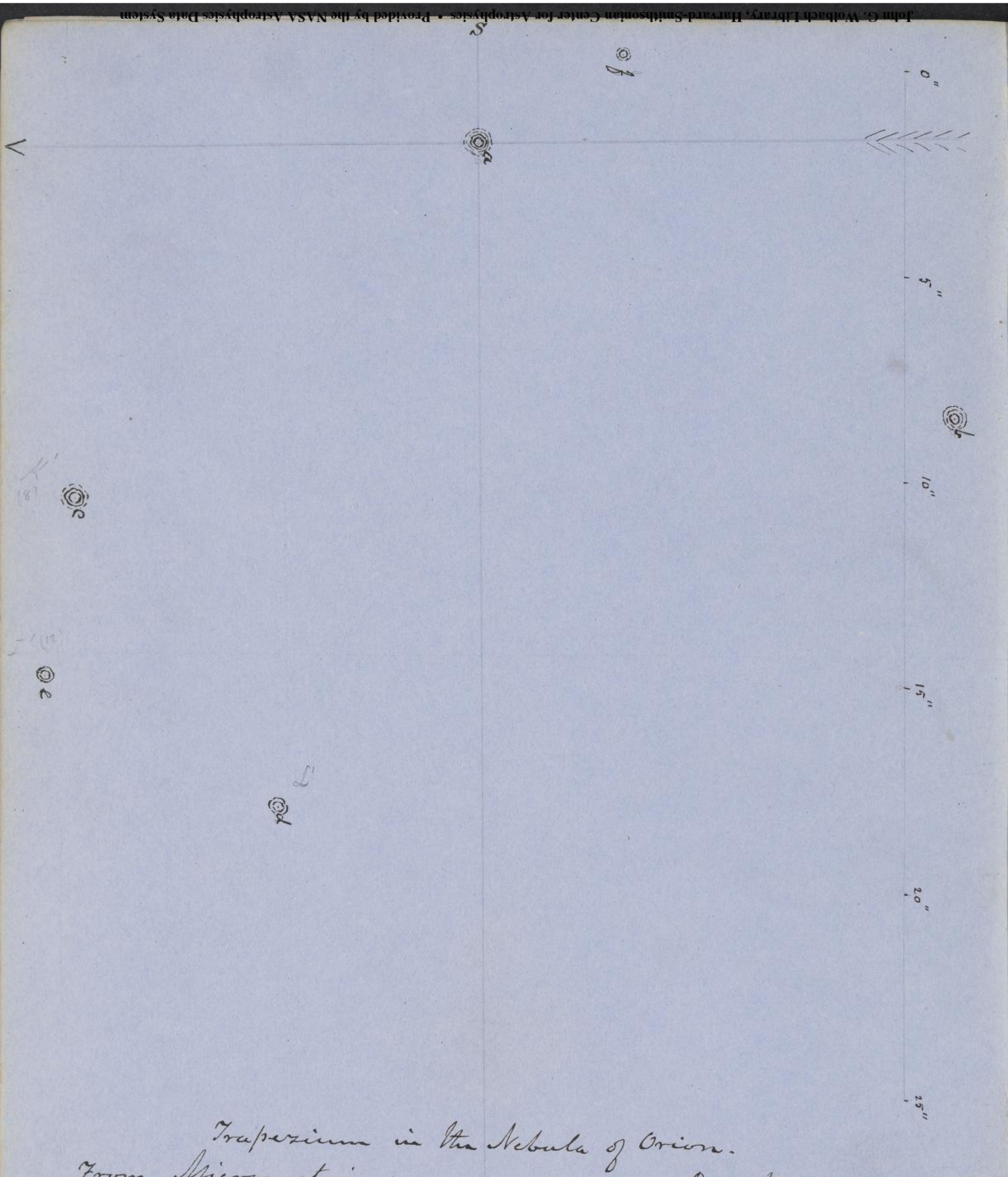
F. from E

Stopped observing on account of Clock stopping - vision deteriorating

N B we never fail of seeing all 6 stars of the Trapezium unless the vision is very bad

Dec 14th

The middle portion of the foregoing work was best done as the vision was then good at first & latterly it was tolerably good but at no time excellent



Trapezium in the Nebula of Orion.
From Micrometric measurements Dec 14th 1857.

Order of brightness a b c d e f see p. 377

Diff Dec 16".06 a to d.

Chacornac's maps

$11^h 20^m$ — $11^h 40^m$ — $+0°$ — $+5°.45'$

$11^h 40^m$ — $12^h.00$ $0°$ — $+$

$23^h 0^m$ — $23^h 20^m$ — $-2°.45$ — $-8°$

$23^h 20^m$ — $23^h 40^m$ — $0°.30'$ — $-05°.40'$

$0^h 40$ — $1^h 00$ — $+0 15'$ — $+5.30$

$0^h 40^m$ — $1^h 00$ — $+5°.30'$ — $+10°.45'$

$+4°.40'$ —

$23^h 27^m \frac{3}{4}$

Olcatt Comet 289/2

ε Lyrae 290

Occ. of pleiades 291