

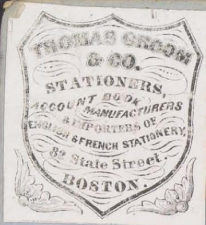
KG  
11365  
179

H. 25

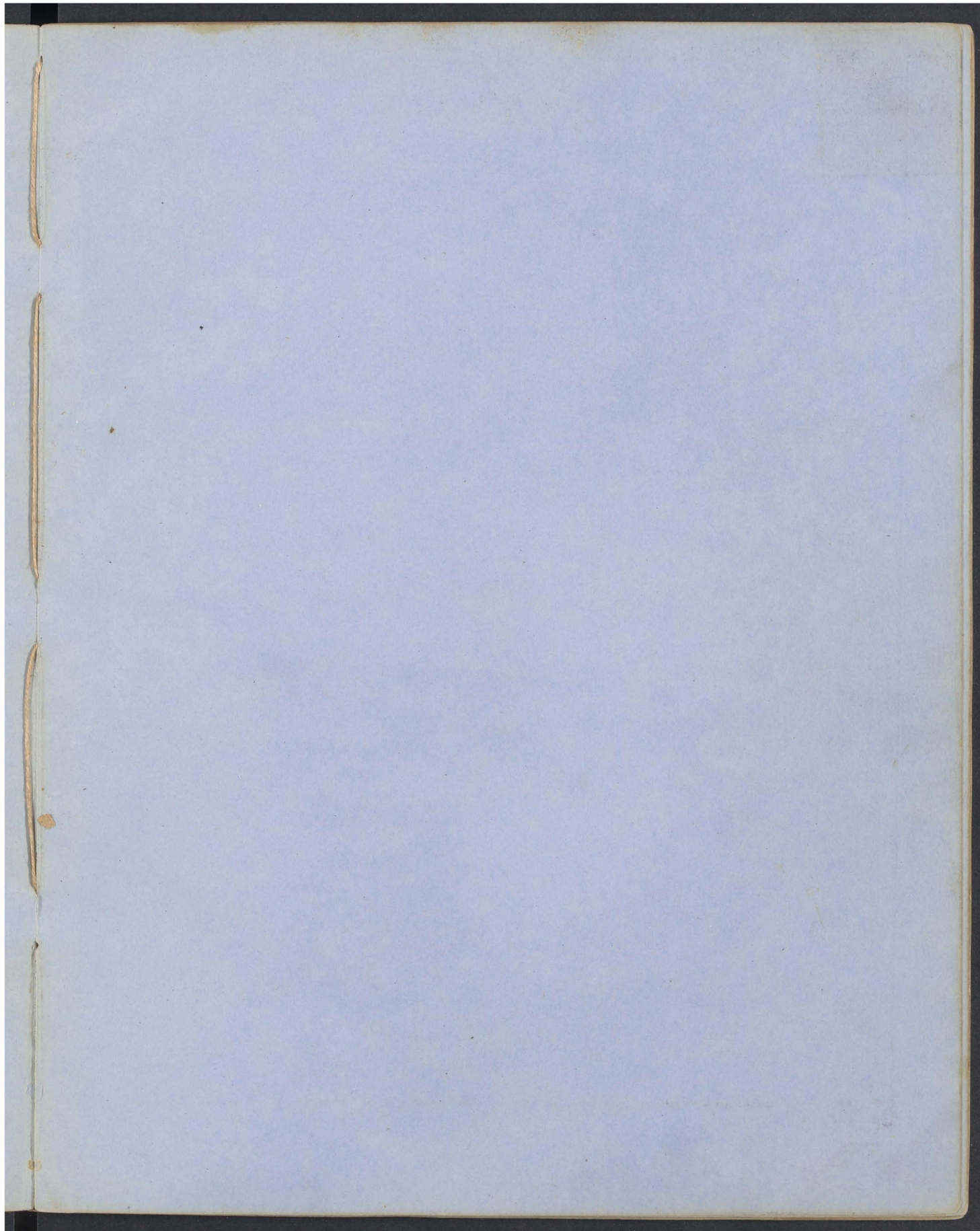
*Equatorial.*  
*Vol. VI.*

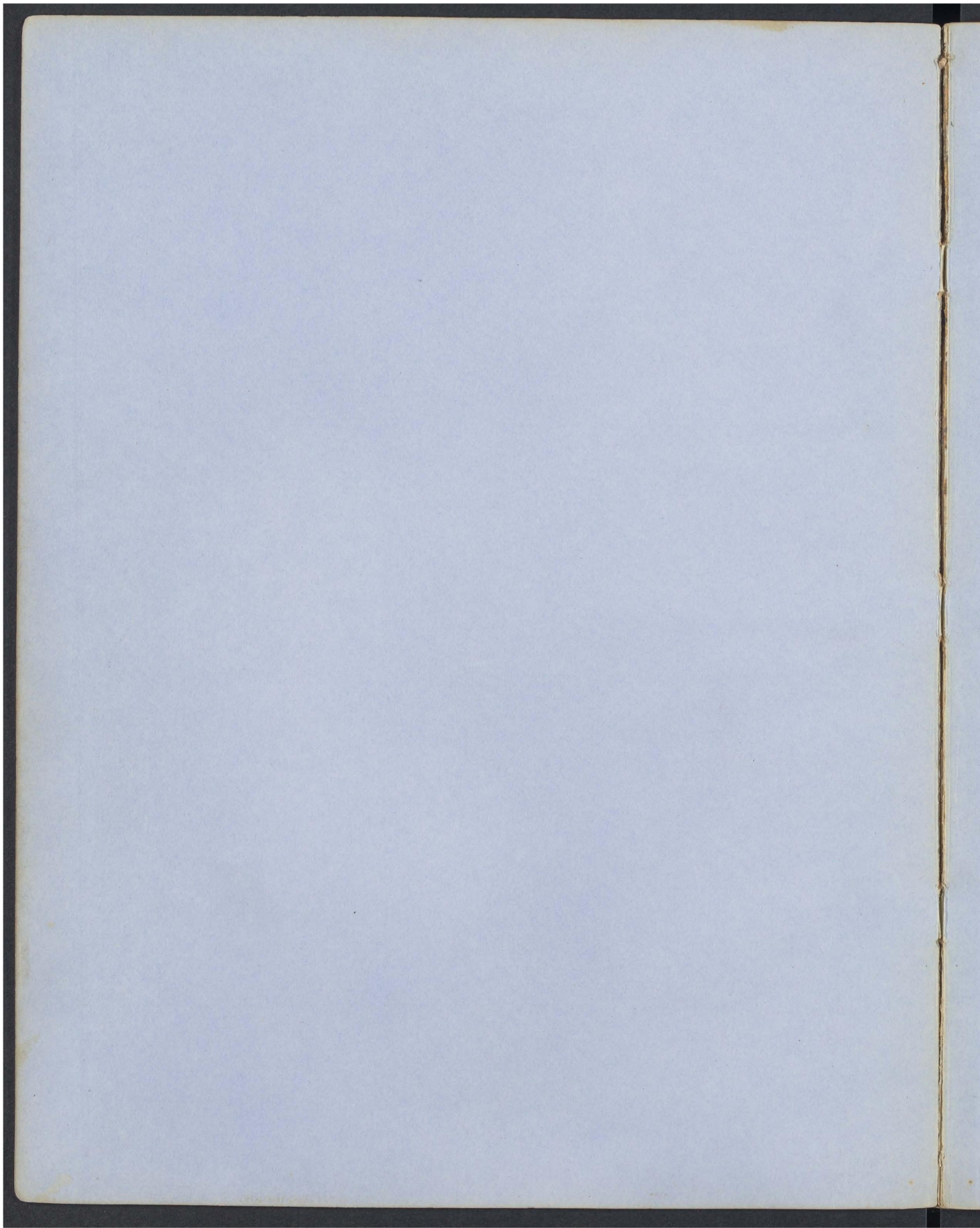
*Dec. 1857 = March 1858.*

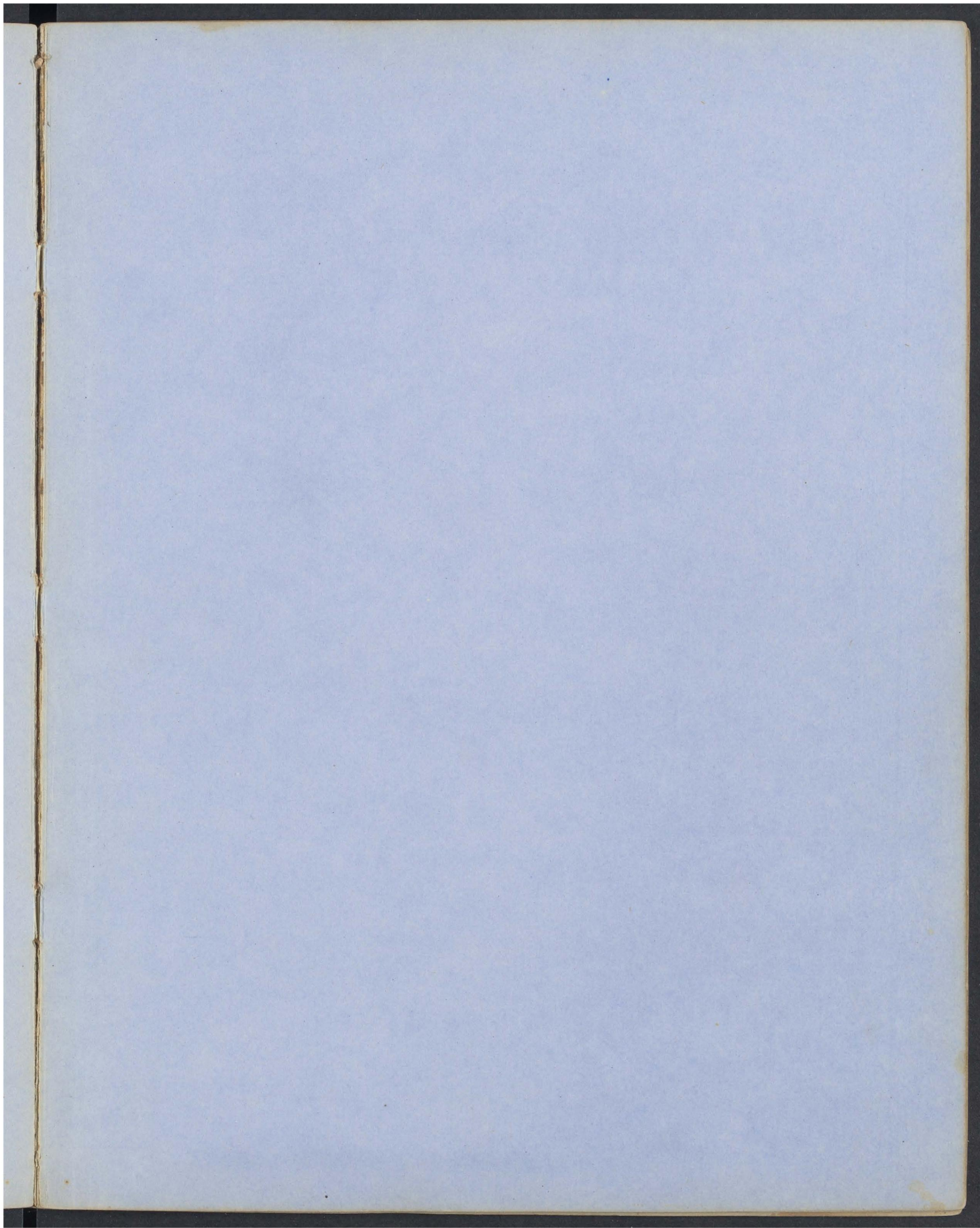
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KG 11365.179







KG11365.179

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Dec 19. 1857. Orion.

Telescope west of pier.

Ex. Ther. 30.0

New determination of <sup>Zero of</sup> angle of position. <sup>G. P. B. obs.</sup> 91°.07Index of  
Catalogue

Observations of the stars F, G, H, and I of Dec 14.

		(Repeated)		Zero
$\delta = F$ north of $G = (2'')$	49.05	63.60	48.99	
	48.93		63.60	56.29
$\varepsilon = G$ north of $E = (2'')$	49.62	62.91	49.62	
			62.91	56.26
$\delta = H$ north of $E = (2'')$	51.45	61.10	51.45	
			61.10	56.28
$\eta = I$ is 2" north of $F$		63.69		56.277

Line joining F and G prolonged passes on the following side of H.

The difference of angle of position of G and H from F is about 7°.

I is the faintest and H is the brightest.

(7)

(5)

Dec 19. 1857.

Orion.

Catalogue  
Notation.

Three S, K, L, and M. measured from C of Dec 14.

 $\alpha'' = K$  south of C. 64.98 $\beta'' = L$  south of C. 70.78 $\gamma'' = M$  south of C. 58.89

Zeros of wires. 56.263

56.290

56.260

on pmi/page

56.271

56.277

56.274

~~Narrow zones~~ observed by placing the moveable wire

K precedes C by 22 beats of 236.

L precedes C by 10.25 beats ..

M .. .. 10.0 ..

Dec 19. 1857.

Orion.

Narrow zones observed by placing the moveable wire on the stars as they pass the centre of the field.

Zero wire placed on  $\alpha$ .

All the stars are north of  $\alpha$   
 Transit over centre?  
 of field in s

13-14	3. 15.5-	58.31 = $\alpha$	This is star $\alpha'$
14	" 39.5-	58.16 = $\beta$	" next to $\beta'$
d of $\gamma$	4. 0.4	58.21	
14	6. 50.6	58.37	
15	7. 18.8	58.43	
d of $\gamma$	" 36.5-	58.39	

There are no <sup>small</sup> stars following Trapezium brighter than 15 mag. within 1' north of it.

$$14. 10.8 = \alpha$$

$$38 = \beta$$

$$53.8 = \alpha$$

$$15. 19.0 = \alpha$$

$$40.8 = \beta$$

$$57.0 = \alpha$$

Zero of wires 56.67. 2u/mic/page

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Dec 19, 1857

Orion

Dec 19, 1857



1857 Dec. 27<sup>th</sup> (Sunday)

Countdown of Pleiades GPRB Mr. A.H. vce

Camb. Sid. Times of Im. & Em. of Stars  
taken from Coast Survey Projection.

Magnit. Index			From C.S. Centre	Sid. time	Chron 236.
15	Im	(1)	4' N	5 <sup>h</sup> 00 <sup>m</sup> 42 <sup>s</sup>	
4-5	"	(2)	6 1/2 S	41 50	5 " 05 " 27.0
	"	(4)	12 N	24 00	" 24 " 24.4
	"	8	4 N	26 36	" 27 " 9.5
	"	10	1 N	28 00	
8-9	"	6	11 1/2 N	32 51	
6	"	11	4 1/2 N	33 36	5 " 34 " 01.3
9	"	7	13 S	37 00	
	"	15	7 S	48 30	48 " 57.0
	"	16	8 S	50 00	50 " 43.6
	"	13	14 N	51 24	51 " 32.0
	"	14	12 N	51 24	51 " 41.0
Im	18	4 S	5 53 12	53 " 24.0	of pair northern *
4-5	Em.	(2)	14 S	6 2 30	double 1.5
Im	9	17 N	6 2 30		
Im	20	9 N	14 18	14 " 32.6	
5	Em	1	5 S	14 40	
Im	33	6 S	25 8	26 " 00.5	
6	Em	4	4 1/2 N	27 4	
Im	29	12 N	30 5		

Aug. 11th

		From C's Centre	Sid.
6	Sun 30	15' N	6. 39. 24
	Em 11	4 S	45. 54
	Sun 37	7 S	47. 3
	" 39	6 S	54. 34
	Sun 44	4 S	7 16 00
	Sun 45	5 1/2 S	19 6
	" 46	15 1/2 S	38 12
	" 50	9 S	38 24
	" 52	2 S	46. 36

Observations were broken off  
on account of dense haze.

Emissions of two rocks observed  
but very uncertain on account of  
haze & clouds.

For obs of Dip. Dec of Aleyone  
& C's limb see next page

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Dec. 27<sup>th</sup>

Σ.C.	41.. 41.. 00
236	41.. 40.. 53.5

ΣC	7 6 00
236	<u>7 5 53.3</u>

Dec 27<sup>th</sup> 1857 R.T.P.

<sup>h</sup>10<sup>m</sup>32<sup>s</sup>40<sup>sec</sup> - 43<sup>sec</sup> - 1<sup>h</sup>12<sup>m</sup> = 10<sup>h</sup>32<sup>m</sup>22<sup>s</sup>8<sup>sec</sup>  
 37 0-34 - 136 - 36 46,4  
 55 46-14 - 56 - 55 40,4  
 58 36-24 - 56 - 58 26,4  
 5 24-22 0,8 11 5 15,2

Clock comparisons  
 10.00 clock (mkt) 151 - 3' 20,5  
 11.30 ————— 3' 20,9

- 135,2 + 2 clock 13,8 +  
 134,6  
 130,6  
 132,8  
 320,6  
 216,8 151 at mid star

Jan 16, 6y 15/ at 10<sup>h</sup>32<sup>m</sup>22<sup>s</sup>8<sup>sec</sup>  
 " 17 ——— 10 36 46,4  
 " 19 ——— 10 55 40,4  
 " star unknown, 10 58 26,4 about 6<sup>1</sup>/<sub>2</sub> mag  
 " 20 ——— 11 5 15,2

The unknown star was the smallest say 6<sup>1</sup>/<sub>2</sub>  
 mag - all the observations were very fair, D's  
 limb very steady, but the cold made my  
 heart very irritable

(Mint is 8 1/2 mag)

Dec 27. 1857.

As S limb & Aleyone } readings from?  
Dif Dec of Moon and Aleyone. Mica Seal.

Moon	27 .. 33	6.64	} $\Delta D = 0..7''$
Al	<del>28</del> .. 43	5.57	
M	29 .. 40	5.26	} = 0..22
Al		5.04	
M	31 .. 32 ..	3.23	35 0-75
Al		2.48	
M	33 08	2.49	48
Al		2.01	
Moon	34 .. 37 ..	4.34	57
Al		3.37	
Moon	36 41 ..	6.50	72
Al		3.38	

C, N limb  $\alpha \times 7/8^2$  ? (Bepel No 3 = Flamsteed No 18m  
 $\times 8$  may 23 .. 9.22  $\times n$  p moon's north limb

Moon	44 09 ..	1.12	
$\times$	46 .. 25 ..	9.33	north limb of not perfectly illuminated
Moon	<u>48</u> .. 20 ..	1.51	

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## Reduction of Dip. Dec. of C. S. Limb &amp; Helyone

236 =	6 <sup>h</sup>	27 <sup>m</sup>	33 <sup>s</sup>	0.07"
		29	40	0.22
		31	32	0.35
		33	08	0.48
		34	37	0.57
		36	41	0.72
		15	11	32.41
	6	32	11.8	0.40.2

6	32	11.8
46	14.5	
14	07.7	
2	3	
12	5	32.3
12	19	32.7

236 fast 13.5

6	31	58.3
18	24	26.8
12	07	31.5
1		59.2

Dec 27<sup>th</sup> M.S.F. 12 5 32.3

C. S. Limb North of Helyone 0.40.2  
 computed distance 0.38.3  
 1.9

236	6	44	9.0	8' 10"
	6	48	20.0	7 42
	6	46	14.5	7 56.0
236 fast			13.5	

6	46	01.0
18	24	26.8
12	21	34.2
2		1.5

Dec. 27<sup>th</sup> M.S.F. 12.19 32.7

C. S. Limb South of Bessel No 3 7' 56.0  
 Bessel No 3 = Flamsteed No 18m  
 computed distance 7 54.2  
 1.8

Occultations of 19, 20, 21. (R. T. P.'s nos) of Pleiades.  
observed by H. P. J. - recorded on Spring Yr. with Comet Seeker

Dec 27. 1857.

E. C. fast 29.09

Im of " 19. 5<sup>h</sup> 24<sup>m</sup> 31.4  
" " 20. 5 " 34 " 08.2  
" " 21. 5 " 51 " 47.2

Im of 17. 10<sup>h</sup> 36<sup>m</sup> 54.0 by chron. 1678. H. P. J.

comparison before observations M. C. 10 " 23 " 00

1678 10 " 19 " 47.7 3 12.3

after " M. C. 12 " 51 " 00

1678 12 " 47 " 43.7 3 16.3

Im of 17. 10<sup>h</sup> 39<sup>m</sup> 07.3 M. S. J.

" " 19 10 " 57 " 56.44

" " 20 11 " 07 " 31.66

" " 21 11 " 25 " 07.77

5 24 31.4

20.09

5 24 11.31

18 24 26.79

10 59 44.52

1 48.08

10 57 56.44

## Occultation of Pleiades, Dec 27. 1857.

obs. by R. T. Paine, Chron. 151. with 5 ft. Equatorial

$$\text{Im of } 16. - 10^h . 32^m . 40^s - 43^{\text{heto}} - 17.2 = 10^h . 32^m . 22.8$$

$$" \quad " \quad 17 - 10 . 37 . 00 - 34 - 13.6 = 10 . 36 . 46.4$$

$$" \quad " \quad 19 - 10 . 55 . 46 - 14 - 05.6 = 10 . 55 . 40.4$$

$$" \quad " \quad 10 . 58 . 36 - 24 - 9.6 = 10 . 58 . 26.4$$

$$" \quad " \quad 20 - 11 . 5 . 24 - 22 - 8.8 = 11 . 5 . 15.2$$

Clock comparison.

$$10^h . 00^m . \text{M.C. fast of } 151 \quad 3^m . 20.5$$

$$11 . 30 \quad " \quad " \quad " \quad 3 . 20.9$$

$$\text{M.C. fast } 1^m . 05.91$$

$$151. \text{ slow at } 10^h . 00 - 2^m . 14.59$$

$$" \quad " \quad 11 . 30 - 2 . 14.99$$

$$\text{Im of } 16. - 10^h . 34^m . 37.79 \text{ M.S.T.}$$

$$\text{Im of } 16. \quad 10^h . 34^m . 37.52 \text{ M.S.T. By R. T. Paine}$$

$$" \quad " \quad 17. \quad 10 . 39 . 01.14 \quad " \quad " \quad "$$

$$" \quad " \quad 19. \quad 10 . 57 . 55.25 \quad " \quad " \quad "$$

$$" \quad " \quad 10 . 00 . 41.25 \quad " \quad " \quad "$$

$$" \quad " \quad 20 \quad 11 . 07 . 30.10 \quad " \quad " \quad "$$

## Occultation of Pleiades. Dec 27. 1857.

G. P. B. obs. A. H. rec. Chron 236. with 23 ft Refractor  
Comparison.Elc fast. 20<sup>h</sup>.09

Elc. 4 .. 41 .. 00

236 4 .. 40 .. 53.5  
6.5236 fast 13<sup>h</sup>.59 before obs  
" " 13.39 after "

Elc 7 .. 6 .. 00

236 7 .. 5 .. 53.8

Sid Time at G. M. N.

18 .. 23 .. 40.05

46.74

18 .. 24 .. 26.79

	obs Time.	236 +	Sid. Time.	M. S. T.
In of No. 2	5 .. 05 .. 27.0	13.56	5 .. 05 .. 13.44	10 .. 39 .. 01.68
" " " 4	24 .. 24.4	13.53	" 24 .. 10.87	10 .. 57 .. 56.00
" " " 8	27 .. 09.5	13.52	26 .. 55.98	11 .. 00 .. 40.66
" " " 11	5 .. 34 .. 01.3	13.50	5 .. 33 .. 47.80	11 .. 07 .. 31.35
" " " 15	48 .. 57.0	13.48	48 .. 43.52	11 .. 22 .. 24.63
" " " 16	50 .. 45.6	13.48	50 .. 32.12	11 .. 24 .. 12.91
" " " 13	5 .. 51 .. 32.0	13.47	5 .. 51 .. 18.53	11 .. 24 .. 59.22
" " " 14	51 .. 41.0	13.47	51 .. 27.53	11 .. 25 .. 08.19
" " " 18	53 .. 24.0	13.47	53 .. 10.53	11 .. 26 .. 50.91
" " " 20	6 .. 14 .. 32.6	13.42	6 .. 14 .. 19.18	11 .. 47 .. 56.10
" " " 33	" 26 .. 00.5	13.40	6 .. 25 .. 47.10	11 .. 59 .. 22.31

5	5	13.44
18	24	26.79
10	40	46.65
	1	44.97
10	39	01.68

5 Notation of Stars (continued from following  
 page) In case a <sup>higher</sup> star is met with  
 in the beginning of a zone preceding  
 the A star of that zone it must have  
 the notation  $a_{-1}^A$  dc.

## Nebula in Orion. 1857-58

A preliminary reduction gives the Catalogues on the next pages. The following notation will be adopted to indicate the stars. The whole region is to be divided into 4 Zones each 11' broad. (overlapping 0'.30" on each other) <sup>preliminary</sup> For each Zone a Catalogue will be made of all the stars accurately observed. They will be lettered in the order of Right Ascension -

1<sup>st</sup> For the most Northern Zone A, B, C ..... through the alphabet. When the letters have been exhausted the next stars following ~~B~~ Z will be AA, BB, CC ..... Any supplementary stars which may afterwards be inserted. if accurately observed will be lettered like the star next preceding but with the numerals 1 or 2 or .... subscribed. Thus 2 such stars following C (a preceding D) would be C<sub>1</sub> and C<sub>2</sub>. For the zones south accent all the letters one accent for 1<sup>st</sup> Zone South, 2 for 2<sup>nd</sup> &c.

Faint stars afterwards filled in approximately will be lettered with the small letters corresponding to the capital letter designating the Catalogue Star next preceding it

~~x~~ ~~Numbers 12, 13<sub>a</sub>, 13<sub>b</sub>, 13<sub>c</sub>, 14<sub>a</sub> and 14<sub>b</sub> were overlooked~~  
~~a not included in above Catalogue. They contain in all~~  
~~about 6 or 8 new stars. They have since been~~  
~~inserted, & indicated by Capitals with sub. numbers.~~

# Catalogue of Stars from 10' to 20' North of $\theta$

*I have inserted in the red ink columns below the final number  $\xi$  and  $\eta$  from the sheets "Orion. Principal Stars near  $\theta$  Orion. Final Results from Zone of 1857. 1.2." 315. 1864 Dec. 29.*

	Mag.	Dec	R		$\xi$	$\eta$
A-2	11	33' 32"	- 2	24.28	-2 24.26	+33' 32.2"
A-1	12	38 04	1	43.35	1 43.36	38 3.1
A	10-11	33 27	1	30.87	1 30.87	33 26.6
B	12-13	32 53	1	8.37	1 8.38	32 51.8
C	11-12	31 23	1	1.88	1 1.88	31 21.9
D	11	40 13	0	43.11	0 43.11	40 10.7
E	12	33 11	0	37.21	0 37.22	33 10.8
F	10-11	36 4	0	35.07	0 35.06	36 3.4
G	11-12	38 16	0	16.77	0 16.77	38 15.8
H	12	37 44	0	13.91	0 14.01	37 42.5
I	11	35 10	0	13.09	0 13.07	35 9.4
K	9-10	31 07	-0	10.88	-0 10.87	31 6.0
L	10-11	39 33	+0	00.72	+0 00.69	39 32.2
M	11-12	34 10	0	04.03	0 4.03	34 8.9
N	12	31 12	0	04.28	0 4.28	31 12.2
O	13-14	34 47	0	9.14	0 9.08	34 46.3
P = S	12-13	30 11	0	9.79	0 9.81	30 11.2
Q	10-11	37 9	0	16.94	0 16.90	37 8.4
R	12	31 6	0	18.65	0 18.50	31 6.1
S = V	12-13	29 48	0	26.00	0 26.00	29 48.0
T	13-14	33 1	0	30.66	0 30.65	33 0.1
U	14	35 23	0	34.54	0 34.53	35 22.2
V	13	38 29	0	35.30	0 35.29	38 27.2
W	10-11	40 1	0	53.40	0 53.42	39 59.6
X	13	31 56	1	0.08	1 0.08	31 54.9
Y	10	35 51	1	21.49	1 21.49	35 51.0
Z	11-12	38 38	1	22.31	1 22.31	38 35.9
Z	12-13	36 59	1	26.18	1 26.16	36 56.9
Z	12	33 9	+1	52.07	1 52.01	33 8.9
Z	11-12	38 38	2	22.31	1 22.31	38 35.9

*There was a star of 11<sup>th</sup> mag. Obsd twice on Oct 11/12 in same R with D [but 1' south of it. ?] D is certainly right*

*There was a star of 11<sup>th</sup> mag. Obsd twice on Oct 11/12 in same R with D [but 1' south of it. ?] D is certainly right*

*Found night Jan 4<sup>th</sup> 1858*

*in one zone only (Also in Zone 3)*

*only Zone only*

*See below*

*only*

*Also in Zone 3*

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Working

Orion

Catalogue of Stars from 0' to 10' N of  $\theta'$ 

	Mag.	Dec	R	
A <sub>3</sub>	11-12	27' 37" - 2	27.15	-2 27.22 + 27.34.6
A <sub>2</sub>	12	28 33	2	19.95 - 2 28.04 + 28.31.3
A <sub>1</sub>	10	22 32	2	9.10 - 2 9.13 + 22.30.9
A'	12	21 47	1	52.00 - 1 51.98 + 21.46.6
B'	12	26 33	1	22.95 - 1 22.03 + 26.31.8
C' = C''	11	20 13	1	5.25 - 1 5.28 + 20.13.9
D'	12	21 6	0	51.46 - 51.49 + 21 6.3
E'	11-12	24 51	0	33.00 - 32.03 + 24.50.3
F'	11-12	24 32	0	26.70 - 26.69
G' = 0"	12	20 04	0	20.40
H'	12	28 31	0	11.65
I'	12	20 13	0	0.67
K'	8	20 8	0	0.63
L' = u"	10	20 16	- 0	0.30 Dg. mag.
M'	6	20 00 + 0	0.00	$\theta'$
N'	12	19 58	0	0.30
O'	12	21 37	0	0.55
P'	7	20 6	0	0.83
Q'	11	21 38	0	4.20
R'	13	28 13	0	9.58
S' = P	12-13	30 11	0	9.81
T'	8	27 24	0	14.50
U'	12	23 14	0	24.95
V' = S	12	29 48	0	26.05
W'	9/10 in March 1859	21 00	0	42.10
X' = M' M''	12	19 52	1	15.85
Y'	11	23 48	1	22.83

Long 31 to 36

11

12

11

All derived from previous  
 Feb 1858 by comparison  
 to one with the stars themselves

## Onions

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Catalogue from 0' to 10' South of  $\theta$ 

	Mag	Dec	AR	
11 A <sup>1</sup>	11	14.. 45 <sup>00</sup>	-1.. 54. 38	
12 A <sup>1</sup>	12.12	16 8	1.. 38. 88	In one zone only
11 B <sup>1</sup> = B <sup>11</sup>	11-12	10 16	1.. 26. 52	
C <sup>1</sup> = C <sup>11</sup>	11	20.. 13	1.. 5. 27	
D <sup>1</sup>	13	14.. 52	1.. 1. 58	
E <sup>1</sup>	12	15.. 59	0.. 56. 82	
F <sup>1</sup>	14	18.. 48	0.. 48. 87	In one zone only
G <sup>1</sup>	13	11.. 14	0.. 48. 33	In one zone only
H <sup>1</sup>	13	19.. 14	0.. 46. 80	In one zone only
I <sup>1</sup>	11.12	15.. 46	0.. 45. 86	
K <sup>1</sup>	12	18.. 47	0.. 36. 43	
L <sup>1</sup>	13	18.. 11	0.. 30. 95	
M <sup>1</sup> = M <sup>11</sup>	10-11	10.. 06	0.. 23. 74	
N <sup>1</sup>	10-11	12.. 53	0.. 20. 72	
O <sup>1</sup> = O <sup>11</sup>	12	20.. 04	0.. 20. 37	In one zone only
P <sup>1</sup>	10-11	18.. 03	0.. 16. 12	
Q <sup>1</sup>	12	18.. 00	0.. 10. 60	12-13 2nd 8
R <sup>1</sup>	10-11	15.. 25	0.. 06. 38	9-10 2nd 8
S <sup>1</sup>	12	20.. 13	0.. 00. 67	
T <sup>1</sup>	8	20.. 08	0.. 00. 63	
U <sup>1</sup>	10	20.. 16	-0.. 00. 35	
V <sup>1</sup>	6	20.. 00	+0.. 00. 0	
W <sup>1</sup>	12	19.. 58	0.. 00. 30	
X <sup>1</sup>	7	20.. 6	0.. 00. 83	
Y <sup>1</sup>	6	18.. 26	0.. 6. 33	In one zone only
Z <sup>1</sup>	13	12.. 36	0.. 7. 87	In one zone only
A <sup>1</sup> A <sup>1</sup>	12-13	15.. 45	0.. 10. 06	13 2nd 8
B <sup>1</sup> B <sup>1</sup>	8	18.. 22	0.. 10. 08	In one zone only
C <sup>1</sup> C <sup>1</sup>	11	17.. 03	0.. 12. 19	
D <sup>1</sup> D <sup>1</sup>	13	10.. 28	+0.. 13. 94	In one zone only

404

# Unions

## 0' to 10' South (continued)

	Mag	Dec	R A	
$\Sigma \Sigma$	10-11	18. 08" + 0. 15. 03		
$\Sigma \Sigma = 2$	12	10. 14	0. 15. 56	In one zone only
$\Sigma \Sigma$	13	12. 13	0. 16. 47	In one zone only
<del><math>\Sigma \Sigma</math></del>	<del>12</del>	<del>10. 12</del>	<del>0. 16. 53</del>	<del>In one zone only</del> Mistake
$\Sigma \Sigma$	12-13	15. 13	0. 25. 87	In one zone only
$\Sigma \Sigma$	11	14. 57	0. 34. 32	
$\Sigma \Sigma$	13	15. 40	0. 53. 42	
$\Sigma \Sigma$	10	19. 6	1. 10. 84	
$\Sigma \Sigma = 2$	12	19. 54	1. 15. 72	In one zone only
$\Sigma \Sigma$	12	15. 03	1. 22. 00	
<del><math>\Sigma \Sigma</math></del>	<del>12</del>	<del>14. 42</del>	<del>1. 22. 15</del>	<del>In one zone only</del> Mistake
$\Sigma \Sigma$	12	14. 40	1. 32. 20	In one zone only
$\Sigma \Sigma$	12-13	11. 25 + 2. 04. 12		In one zone only.

# Crion

## Catalogue 10' to 20' South

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	Mag	Dec	AR	
A <sup>'''</sup>	11	8.. 15"	- 2.. 10. 66	
B <sup>'''</sup> = B <sup>'''</sup>	11. 12	10.. 16	1.. 26. 54	
C <sup>'''</sup>	8-9	6.. 43	1.. 20. 50	
D <sup>'''</sup>	10-11	4.. 12	1.. 20. 20	
E <sup>'''</sup>	11	6.. 12	1.. 1. 41	
F <sup>'''</sup>	12	6.. 20	0.. 59. 11	In one zone only
G <sup>'''</sup>	12	4.. 10	0.. 55. 50	In one zone only
H <sup>'''</sup>	10	0.. 16	0.. 41. 75	
I <sup>'''</sup>	10	1.. 34	0.. 40. 42	
K <sup>'''</sup>	13	3.. 32?	0.. 35. 09	In one zone only Vide obs. March 18. 1858
		3.. 02		
L <sup>'''</sup>	8	8.. 56	0.. 28. 73	
M <sup>'''</sup> = M <sup>'''</sup>	10-11	10.. 06	0.. 23. 72	
N <sup>'''</sup>	13	3.. 41	- 0.. 2. 39	In one zone only
O <sup>'''</sup>	12	4.. 03	+ 0.. 0. 76	
P <sup>'''</sup> = P <sup>'''</sup> = P <sup>'''</sup>	13	10.. 28	0.. 13. 94	In one zone only
Q <sup>'''</sup> = Q <sup>'''</sup> = Q <sup>'''</sup>	12	10.. 14	0.. 15. 56	
	<del>12</del>	<del>10.. 12</del>	<del>0.. 19. 59</del>	1 obs. In one zone only. (Mistake)
R <sup>'''</sup>	12	2.. 57	0.. 34. 50	
S <sup>'''</sup>	7	5.. 44	0.. 38. 60	In one zone only
T <sup>'''</sup>	11	3.. 27	+ 0.. 43. 65	In one zone only
U <sup>'''</sup>	11	1.. 28	0.. 57. 15	1 obs. In one zone only
V <sup>'''</sup>	7	4.. 38	0.. 59. 52	
W <sup>'''</sup>	11	0.. 30	1.. 15. 60	1 obs. In one zone only
X <sup>'''</sup>	12. 13	7.. 12	1.. 46. 70	In one zone only
Y <sup>'''</sup>	11. 12	3.. 15	+ 1.. 58. 27	

121 stars

All revised in  
Aug & Dec.

P. V. 163.

406

407

1,08

Jan 4<sup>th</sup> 1858.

Orion.

Chron. 236.

$M =$				$K = -0 \ 10.88$		$A = -1 \ 30.87$	
		Beats.	Dec.				$+4.50$
$\times a_1$	$\times 15 \text{ mag.}$	$A + 9$	39.30	$+3.00$	$a_1$	$1 \ 26.37$	$+11.00$
$\times a_2$	$\times 17$	$A + 22$	36.10	$k_1 = -0 \ 7.88$	$a_2$	$1 \ 19.87$	
$\times a_3$	$\times 15$	$B - 2\frac{1}{2}$	31.30				
					$B = -1 \ 8.37$		
$\times c_1$	$\times 13$	$C + 6.2$	38.27		$-1.25$		
					$a_3 = \cdot 1 \ 9.62$		
$\times f_1$	$\times 15$	$F + 0.5$	30.50				
$\times f_2$	$\times 16$	$F + 21.0$	39.50		$b = -1 \ 1.88$		
$\times f_3$	$\times 14$	$F + 30.0$	31.45		$+3.10$		
$\times k_1$	$\times 16.17$	$K + 6.0$	36.30		$c_1 = -58.78$		
					$F = -0 \ 35.07$		
					$+0.25$		
					$f_1 = -0 \ 34.82$		
					$+10.50$		
					$f_2 = -0 \ 24.57$		
					$+15.00$		
					$f_3 = -0 \ 20.07$		

7

The above are small stars compared with stars in Catalogue. By using the reading of Scale as nearly as practicable or otherwise by estimation and as taking two or more passages in  $R$  by beats of the Chronometer. The notation has been described on a preceding page.

The zero of Scale is always set so as to give to the Catalogue stars their true readings.



400

Orion.

## Order of Magnitudes. Jan 4, 1858.

Better estimates

A  $\mathcal{H} = 10-11$  $\mathcal{H}$  & much the brightestB  $\mathcal{H} = 12$ ~~D. H. G.~~  $\mathcal{Z}, D, A$   
~~L. H. A.~~  $\mathcal{H}, G, I$   
~~F. I~~  $C, E$ C  $\mathcal{H} = 11$ ~~H~~

B

C,  $\mathcal{H} = 12-13$ ~~f~~

c,

D  $\mathcal{H} = 10 = \mathcal{H}^A \mathcal{H}^B?$ ~~H~~b<sub>3</sub>E  $\mathcal{H} = 11$ The rest are smaller than the  
above  $a_2$  is perhaps the faintestF  $\mathcal{H} = 10 > \mathcal{H}^D$ The above letters <sup>order</sup> representG  $\mathcal{H} = 11-12$ 

the order of brightness viz

H  $\mathcal{H} = 11$ 

K, F, D, A, H, G &amp;c

I  $\mathcal{H} = 11 < \mathcal{H}^H < \mathcal{H}^G?$ Those nearly equal being  
placed on the same line.K  $\mathcal{H} = 9$ 

The 16<sup>th</sup>-17<sup>th</sup> mag stars are the smallest  
that can be estimated with the scale near Orion.

The  $R_1$  are best for the faint stars (ie better than declinations)

New Comet discovered by H. P. Tuttle Jan 4, 1858

At 7<sup>h</sup> 30<sup>m</sup> m. s. t.

Chron 236

at 3<sup>h</sup> Chron. 236.

about -  $\delta - x$   $\ast = 11^{\circ} = m$  in same dec with Comet  
 $\delta$  4<sup>h</sup> 12<sup>m</sup> 28.2 18.3  
 $\ast$  46.5  
 $\delta$  6.7 18.1  
 $\ast$  24.8  
 $\delta$  41.8 18.2  
 $\ast$  60.0

At 5<sup>h</sup> 5<sup>m</sup> the Comet preceded m by 9<sup>s</sup> 0 and was 2' 15" South of it

Compared with  $\ast$  of 9.10 mag  
 Dif Dec  
 $\delta$  S. P.  $\ast$

207 = change in Dec in one minute

4<sup>h</sup> 24<sup>m</sup> 7.0 24<sup>m</sup> 35

25<sup>m</sup> 14.8 24<sup>m</sup> 08

4<sup>h</sup> 24<sup>m</sup> 40.9 24<sup>m</sup> 205 =

5.407

Sum 55.99

207

31.79

11.19249

556.4

237.21

311.5 = 5<sup>m</sup> 11.5

11.19

226.02

AR Beats  
 $\delta - x$  4<sup>h</sup> 28<sup>m</sup> 10 15.0  
 " 28<sup>m</sup> 30 13.5  
 " 29<sup>m</sup> 18 13.0  
 " 29<sup>m</sup> 52 13.0  
 " 30<sup>m</sup> 17 14.0  
 " 30<sup>m</sup> 46 13.0  
 " 31<sup>m</sup> 30 14.0  
 4<sup>h</sup> 32<sup>m</sup> 00 12.0

36<sup>m</sup> 00<sup>m</sup> 43 107.5 beats

4<sup>h</sup> 30<sup>m</sup> 05.37, 13.44 = -6.72 =  $\Delta\alpha$ .  $\Delta\delta = -226.02$

$\Delta\alpha$ , Comet -  $\ast = -0^{\circ} 6.72$   
 $\Delta\delta$  " = -5' 22.7

412

Jan 4. Comet I 1858.

Chron 236.

Diff Dec.

E.C. Fast 17.9  
 236. part of E.C. 18.5  
 236 + 33.4

4 " 34" 11.8 22" 23

35" 26.0 21.90

4 " 34" 48.9 22, 065

Line 55.991

33.93

31.79

572

32.86

6.57

322.03

33 93

6.8

33 25 = 5" 32.5 at 4" 34.48.9

5 11.5

Moved in Dec 21.0 in 10.080

10.5

5" 22.0 = 5" 22.0 at 4" 29.44.9

(b) in 21" = 0.7

5" 22.7

4" 30.5

There is a star of the same mag with the  
 comparison star next following Diff Dec 34.64

x of com = a

a " 38" 21.0

b " 38" 38.0

x of 7 mag = c

x is of 9-10 mag

Scale "

c 4" 44" 19.0 44" 37.5 45" 9.4

x 49" 36.4 49" 54.8 50" 27.0

a " 52" 28.3 52" 46.4 53" 18.2

a-c + 8 9.3 = + 8.08.9 = + 8.08.8

a-c = + 3" 04

Not good observations of a &amp; c

236 Fast 0 36.6

236 4" 55" 49.5

h 5 12 00

4" 55 13.1 + 39" 5.0 15"

R \* a

23" 43" 13.1

Less of wires 56.00

55.98

56.00

In center of field with  
 eyepiece in center of Microm.

$c = 46436$  Lalande,  $c$  is also in Bessels Zone No 381. (See next page)

$$\text{Sec var in AR} = +0.0200$$

$$\text{" " " Dec} = +0.060$$

$$.0002$$

$$.0006$$

$$\underline{29}$$

$$\underline{29}$$

$$.0058$$

$$.0174$$

AR of  $c$  in 1800

$$23^h \ 31^m \ 38.12$$

Dec of  $c$  in 1800

$$39^\circ \ 27' \ 01.1$$

$$\text{Ann Prec 1800} = +2.934$$

$$\underline{0.06}$$

$$\text{" " 1829} = +2.940$$

$$\underline{58}$$

$$23.520$$

$$\underline{147.00}$$

$$60) 170.520$$

$$2^m \ 50^s \ 52$$

$$23 \ 31 \ 38.12$$

$$\text{AR of } c \text{ 1858} = 23^h \ 34^m \ 28.64, \text{ Dec} = 39.46.16.63$$

$$+19.906$$

$$\underline{.017}$$

$$+19.923$$

$$\underline{58}$$

$$159384$$

$$\underline{99615}$$

$$60) 1155534$$

$$19.15.53$$

$$39.27.01.10$$

Lalande 46436

414

AR of c from Bessel's Zones,  
 $t = 23^{\circ} 32' 51.26''$

Dec of c.  
 $\delta = +39^{\circ} 36' 41.9''$

$$AR = t + k + k' \cdot \frac{\delta - D}{100}$$

$$Dec = \delta + d + d' \cdot \frac{\delta - D}{100}$$

$$k = +.728$$

$$k' = -.038$$

$$-13.981$$

$$-0.38$$

$$111848$$

$$41943$$

$$= +531278$$

$$k' \cdot \frac{\delta - D}{100}$$

$$t = 23^{\circ} 32' 51.26''$$

$$k = +.728$$

$$k' \cdot \frac{\delta - D}{100} = +.531$$

$$AR = 23^{\circ} 32' 52.52''$$

$$D = 40^{\circ} 00' 00''$$

$$39^{\circ} 36' 41.9''$$

$$\delta - D = -23^{\circ} 18.1''$$

$$\delta - D = -23.3$$

$$1380$$

$$18$$

$$\delta - D = -1398.1 = -23.3$$

$$\frac{\delta - D}{100} = -13.981$$

$$d' = +1.88$$

$$\log d' = 0.27416$$

$$\log \frac{\delta - D}{100} = 1.14553$$

$$1.41969$$

$$d' \cdot \frac{\delta - D}{100} = -26.284$$

$$d = -82.54$$

$$-108.82$$

$$\delta = 39^{\circ} 36' 41.9''$$

$$-1^{\circ} 48.82''$$

$$Dec = 39^{\circ} 34' 53.08''$$

$$AR \text{ in } 1825 = 23^{\circ} 32' 52.52'', Dec + 39^{\circ} 34' 53.1''$$

Place of  $\alpha$  of Jan. 4.

415

Procession in AR = +2.934  
 see variation for 41 years = +.008

2.942  
 33

8826  
 8826  
 97,086

in Dec = + 19.906  
 = + .025

19.931  
 33

59793  
 59793  
 657723

23 " 32 " 52.52

1 " 37.09

AR 1858 23 " 34 " 29.61

39 " 34 " 53.1

10 " 57.7

39 " 45 " 50.8

$\delta - \delta = -233$   
 100 -038  
 1864  
 699  
 ,008854

23 " 32 " 51.26

k = +77

+01

23 " 32 " 51.98

1 " 37.09

1858.0  $\alpha = 23$  " 34 " 28.98 - Bx 3818 wt=2

23 " 34 " 28.64 Laland 46436

C  $\alpha = 23$  " 34 " 28.87

AR in 1858 23 " 34 " 28.87

Cor to ap. 23

-0.85

23 " 34 " 28.02

By 100 a-c

+8900

a-c

App place of  $\alpha + \alpha = 23$  " 42 " 37.02

Comet - \*4

-06.72

Comet - \*4

Comet AR 23 " 42 " 30.30

Comet

$\delta = +39$

Dec +39 " 46 " 16.6

+11.2

+39 46 " 27.8

+3 41.0

$\delta + 39$  " 49 " 31.8

-5 22.7

Comet

$\delta = +39$

44 " 09.1

Ap. 23.

At Jan 4 " 9 " 31 " 55.8 m. s. t.

416

## Apparent place of c. Jan 4. 1858

$$f = +3.45, g = +8.69, S = 279.57, H = 346.43, i = -2.03$$

$$\alpha = 353.37$$

$$353.37$$

$$S + \alpha = 273.34, H + \alpha = 340.20, h = +20.33$$

f

$$= +3.45$$

$$\log g = 0.93902$$

-

-

$$0.93902$$

$$\sin(S + \alpha) = 9.99916n$$

-

-

$$\cos 8.79386$$

$$\tan S = 9.92029$$

-

-

$$9.73288 + 0.54$$

$$0.85847n - 7.22$$

$$\log h = 1.30814$$

-

-

$$1.30814$$

$$\sin(H + \alpha) = 9.92705n$$

-

-

$$\cos 9.97390$$

$$\sec S = 10.11430$$

-

-

$$\sin 9.80599$$

$$0.94949n - 18.90$$

$$1.08803 + 12.25$$

$$\Delta \alpha = -12.67$$

$$= -0.84$$

$$i = 0.30750n$$

$$\cos S = 9.88570$$

$$0.19320n - 1.56$$

$$\Delta \delta = +11.23$$

$$23^h 34^m 28.87$$

$$- 0.84$$

$$AR = 23^h 34^m 28.03$$

$$39^{\circ} 46' 16.6$$

$$+ 11.2$$

$$Dec = +39^{\circ} 46' 27.8$$

$$a - c = +8.09.80$$

$$+ 3.04.0$$

$$23^h 42^m 37.82 = AR \text{ of } \alpha$$

$$+ 39^{\circ} 49' 31.8 = Dec \text{ of } \alpha$$

$$- 6.72$$

$$- 3.46.0$$

V-x

$$V. \alpha 23^h 42^m 30.86$$

$$V. \delta = +39^{\circ} 45' 45.8$$

$$39^{\circ} 44' 09.1$$

Ap. 29 1858

$$\text{at } 4^h 30^m 05.37, \text{ by chron } 236. \quad \text{66. feet } 17.86$$

$$36.36$$

$$236 \quad 18.50$$

$$4^h 29^m 29.01$$

$$36.36$$

$$18^h 55^m 59.27$$

$$18^h 55^m 12.33$$

$$9^h 33^m 29.74$$

$$46.74$$

$$1^h 33.95$$

$$18^h 55^m 59.27$$

$$9^h 31^m 55.79 \text{ M.S.T.}$$

Revised

Apparent place of Comet I of 1858.

1858 Jan 4  $9^h 31^m 55^s.8$  Comb in 1  
 ||| Compt. R  $23^h 42^m 30^s.30$  Ref. to ap. 29- |||  
 "  $+39^\circ 44' 9".1$   
 Referred to the ap. Equinox.

Depending on a star (a) of 9<sup>th</sup>/10<sup>th</sup> mag which was  
 compared (rather hastily with (c) of 7<sup>th</sup> mag  
 in B. 2. 381 & Lalande 46436

b in B. 2. 381 is 4<sup>m</sup> following c. and 7' south.

$$\begin{array}{r} 23 \text{ " } 34 \\ \hline 26 \\ \hline 1 \text{ " } 50 \\ \hline 2 \text{ " } 16 \end{array}$$

Jan. 7. 1858. Comet I, 1858.

Chron 236.

Chron 236.  
Zero of angle of position of scale  $91.48$   $h+2^{h}_{10}^{\sim}$

3, 16 ~~1, 19~~ 6, 20  
2, 5, 10, 5 - 16, 0 = c, 2, 13, 19, 5 - 24, 3 = a

Comet compared with a star such as  $\alpha$

\*  $a' = 8 - 9$  may

$$\begin{array}{r} 236 = \\ *2, 23, 37, 8. \\ 540. \end{array} \quad \begin{array}{r} \Delta a, \rho - * \\ + 16.2 \end{array}$$

\* 24.15.0 + 16.8  
31.8

\* 24, 50.2 + 17.3  
0 07.5

$$\begin{array}{r} * \quad 25.30.3 \\ \quad \quad 42.6 \\ \hline \end{array} \quad + 17.3$$

98.20.9 67.6

2, 24, 35, 22 + 16.9

$$\underline{2,36,04.40} \quad \underline{19.3}$$

11, 29, 18      2, 4

5 44.6

2 20 105- - - - -

2 31 00.4

In 40.6 motor

$$\text{Ar } 236 = 2^4 \cdot 31^2 \cdot 100.4$$

ΔJ      9 - \*

2.28 54.0      52.52

30 27.5 52.66

2 29 40.75 52 59

200 5579

320

2 32 200 2.73

2. 21 22 23

2. 31, 00, 58 2. 9. 1

$$\begin{array}{r} 250 \quad 19.80 \\ \hline 1.00 \quad 1.00 \end{array}$$

$$40.5 - 0 = 40.5$$

Motiv in  $R$  in  $1^{\text{ste}} = +0,21$

$$Aa = 0.1810$$

45 + 0' 29"

$$+ 0.15$$

$+0.18, 24$

$p - * = +0.29.1$

$$0 - * =$$

23 .. 42 .. 30  
 12 .. 00  
 23 .. 54 .. 30

39 .. 44  
 2 .. 30  
 37 .. 14

Diff. Dec. Comet N. of \* a'  
 2 .. 28.54.0      52, 52  
 . 30, 27.5      52, 66

Double Dis.      Diff. Dec.      8 north of \*

236 = 2 .. 31 .. 40  
 33 .. 00  
 2 .. 32 .. 20

50 .. 13  
 50 .. 52  
 50 .. 32  
 55 .. 79  
 5 .. 47  
 2 .. 73

236 = AR       $\Delta \alpha$  of \* a'  
 \* 2 .. 34 .. 46.8      +19.0  
 35 .. 5.8

\* 35 .. 22.8      18.7  
 35 .. 41.5

\* 35 .. 54.0      19.8  
 36 .. 13.8

\* 36 .. 56.8      19.7  
 37 .. 16.5

144 .. 17.6      77.2  
 2 .. 36 .. 04.40      +19.3

420

Jan 7. 1858.

Comet. I. 1858.

\*,  $A = 7$  mag.

Scale,

3..58

10..00

6..17"

4..58

$A$   $B$   $a'$   $C$   
 2..43..23.5 - 24.5 43.59.0, 4.0, 2..46..26.0 21.0 2..52..51.2 - 56.7  
 $B$  59.0, 4.0  
 $B$  10.00  
 $Aa$   $As$

scale  
 $A$  1.27 - 2..54..35.0 - 40.5  
 8-9  $A'$  5.08 35.30.5 - 35.5  
 8..  $B$  7.26 36..10.3 - 15.3  
 $a'$  3.48 37..37.0 - 42.3  
 $a' - A = +3..2.50 +2' 19''$   
 $3..2.05 \quad 2..21$   
 Mean  $+3..2.28 +2..20.0$

Derivatives  
 55..77  
 55.80

$D'$  in center of field

236 3..3..39.5

h. angle 3..9.0

236 feet 44.0

3..12..33.5

AR = 23..55..46.5

Dec +  $37^\circ$  .. 3..55"

E.D. 5..16..00

236 5..16..26.8

66 + 17.2

236 + 44.0

$\alpha'$ ,  $A$ , and  $B$  are in B. 2. 387.

$$\left. \begin{array}{l} AR \text{ of } \alpha' = 23^h 53^m 42.43 \quad Dec + 36^\circ 53' 18.3 \\ \text{of } A = 23^h 50^m 40.12 \quad \quad \quad + 36^\circ 51' 2.1 \\ \text{of } B = 23^h 52^m 30.66 \quad \quad \quad + 36^\circ 57' 21.0 \end{array} \right\} \begin{array}{l} \text{catalogue} \\ \text{places.} \end{array}$$

$$\alpha' \left\{ \begin{array}{l} AR = t + k + k' \cdot \frac{\delta - \delta'}{100} \quad \delta = +36^\circ 53' 18.3 \quad \frac{\delta - \delta'}{100} = -.667 \\ Dec = \delta + d + d' \cdot \frac{\delta - \delta'}{100} \quad \delta - \delta' = -1^\circ 06' 42 \end{array} \right.$$

$$\begin{array}{rcl} k = +5''.098 & k' = -0''.048 & t = 23^h 53^m 42.43 \\ & \underline{-.667} & +5.098 \\ & .336 & +.032 \\ 288 & AR = 23^h 53^m 47.55 & \\ \underline{288} & & \\ +.032016 & & \end{array}$$

$$\begin{array}{rcl} d = -87.64 & \delta = 36^\circ 53' 18.3 \\ d' = +1.81 & \quad \quad \quad -1^\circ 28.8 \\ \underline{-76.62} & Dec = 36^\circ 51' 49.5 \\ 12.67 & \\ 108.6 & \\ \underline{108.6} & \\ -1207.27 & \\ \underline{87.64} & \\ -88.85 & \end{array}$$

By similar methods the places of  $A$  and  $B$  are found.

$$\left. \begin{array}{l} AR \text{ of } \alpha' = 23^h 53^m 47.55 \quad Dec + 36^\circ 51' 49.5 \quad \text{tested} \\ \text{of } A = 23^h 50^m 45.29 \quad \quad \quad + 36^\circ 49' 33.1 \\ \text{of } B = 23^h 52^m 35.79 \quad \quad \quad + 36^\circ 55' 28.8 \end{array} \right\} 1825$$

422

Revised

Computation of Precession, for  $a'$ 

$$\begin{array}{r}
 m = 46''.0282 + 91 \times 0.0031 \\
 n = 20.0644 - 91 \times 0.00097 \\
 \quad \underline{0088} \quad \quad \quad \underline{91} \\
 n = +20''.0556 \quad \quad \quad 000097 \\
 \quad \quad \quad \underline{873} \quad \quad \quad \underline{02821} \\
 m = +46''.0564 \quad \quad \quad 008827 \quad \quad \quad 46.0282 \\
 \quad \quad \quad \quad \quad \quad \quad \quad \quad \underline{46.0564}
 \end{array}$$

$$\Delta \alpha = m + n \sin \alpha \tan \delta$$

$$\Delta \delta = n \cos \alpha$$

$$\alpha = 358^\circ 35'$$

$$\delta = +37^\circ 3' \text{ nearly}$$

$$\sin \alpha = 8.39310 n$$

$$\tan \delta = 9.87790$$

$$\log n = 1.30223$$

$$9.57323 n$$

$$- .3743$$

$$\underline{46.0564}$$

$$\Delta \alpha = +45''.6821$$

$$+3''.0453$$

$$\underline{33}$$

$$9.135$$

$$\underline{9.135}$$

$$10.0485$$

$$+1'' 40''.48 + 0.03$$

$$\cos \alpha = 9.99987$$

$$\log n = 1.30223$$

$$\underline{1.30210}$$

$$\Delta \delta = +20.050$$

$$\underline{33}$$

$$6.015$$

$$\underline{6.015}$$

$$6.6165$$

$$+11'' 01''.65$$

$$23^\circ 57' 47''.55$$

$$+1'' 40''.54$$

$$AR \text{ of } a' = 23^\circ 55' 28''.06$$

$$36^\circ 51' 49''.5$$

$$\underline{11'' 01''.6}$$

$$Dec = +37^\circ 02' 51''.1$$

$$23^\circ 50' 45''.29$$

$$+1'' 40''.48 - 0.38$$

$$AR \text{ of } A = 23^\circ 52' 25''.77$$

$$.39$$

$$36^\circ 49' 33''.1$$

$$\underline{11'' 01''.6}$$

$$+37^\circ 00' 34''.7$$

$$1858.$$

$$23^\circ 52' 35''.79$$

$$\underline{1'' 40''.48}$$

$$23^\circ 54' 16''.27$$

$$36^\circ 53' 28''.8$$

$$\underline{11'' 01''.6}$$

$$+37^\circ 07' 30''.4$$

Reduction 3 pages further on

change of  $\mu$  in  $\mu R$   
for  $+1^\circ$  in  $\delta$  =  $+0.0016$

Orion. Jan 7. 1858. Vision Bad-

$\delta$  is found to be right as given in the catalogue

$\kappa$  is of the 8 mag. It is much brighter than any other star in the zone

$\rho$  is nearly as bright as  $\mu$ . or of the 10-11 mag

$\delta$  found correct.

$\nu$  8.28

Chron 236.

$\nu$  is right in the catalogue.

may  $\kappa$  <sup>Dr</sup> 36.30 <sup>AP. beats</sup>  $I + 9.10$ .

There seems to be one or two faint stars in the vicinity of  $\kappa$ , but vision is very bad-

16-17  $\mu$  36.15 <sup>beats</sup>  $M + 1.5$

16  $\mu_2$  34.13  $M + 2.3$

14-15  $\mu_{35}$  33.40  $M + 9.5$

~~16~~  $\rho$  32.15  ~~$M + 1.2$~~  =  $P - 0.1$

17  $\mu_3$  32.20 <sup>beats</sup>  $N + 4$

The small stars cannot be put <sup>correctly</sup> in on account of bad definition.

Obliged to stop measurements on account  
of Bad definition

424

Jan 7, 1850

Orion

Magnitudes.

K 7-8  
 L 9  
 M 10  
 N 11-12  
 O 12  
 P 11-12 < K  
 Q 9  
 R 9-10  
 S 11-12  
 T and U 12-13  
 V 12 > J

K much the brightest  
 L > R  
 M nearly as bright as R  
 S, N  
 V, P, and O  
 T, U

The above is order of  
 brightness but put in with  
 fingers cooled to  $+10^{\circ}$   
 interpret thus.

K much the brightest  
 L  
 L, R      L > R  
 M = R nearly  
 S, N  
 V, P, O  
 T, U

Apparent place of stars of Jan 7. For  $\alpha'$

$$\begin{array}{rclclcl} f = +3''.97 & g = +8''.76 & G = 281.24 & h = +20''.29 & Gb = 343.53 \\ l = -2''.46 & & d = 358.35 & & 358.35 \\ \delta = +37.03 & & G + \alpha = 279.59 & & Gb + \alpha = 342.28 \end{array}$$

$$\begin{array}{rclcl} f = & +3''.97 & & & \\ \log g = 0.94250 & & & & 0.94250 \\ \sin(G + \alpha) = 9.99337n & & & & \cos 9.23895 \\ \tan \delta = 9.87790 & & & & 0.18245 \\ & & & & +1''.58 \\ & 0.81077n & -6''.51 & & \end{array}$$

$$\begin{array}{rclcl} \log h = 1.30728 & & & & 1.30728 \\ \sin(Gb + \alpha) = 9.47894n & & & & \cos 9.97934 \\ \sec \delta = 10.09794 & & & & \sin 9.77997 \\ & 0.88416n & -7''.66 & & 1.06659 \\ & \Delta \alpha = -10''.20 & & & +11.66 \\ Revised = & -0''.68 & & & \end{array}$$

$$\begin{array}{rcl} l = 0.39094n & & \\ \cos \delta 9.90206 & & \\ 0.29300n & -1''.96 & \\ \Delta \delta = +11''.23 & Revised & \end{array}$$

$$\begin{array}{rcl} AR \text{ of } A \text{ } 1858.0 = 23.52.25.39 & Dec = +37.00.34.7 & \\ Cor to app place = & -0.68 & \Delta = Cor to app. = +11.2 \end{array}$$

$$\begin{array}{rcl} a' - A & = & +3.228 \\ App AR \text{ of } a' \text{ from } A. & = & 23.55.26.99 \\ " a' \text{ from } B.2387 & = & 23.55.27.38 \\ Adopted app. AR of a' & = & 23.55.27.18 \\ " B - a' & = & +0.18.25 \end{array}$$

$$\begin{array}{rcl} App. place of Comet AR & 23.55.45.43 & Dec +37.03.05.9 \\ & & 37.03.22.3 \\ & & 37.03.40.1 \\ & & +0.29.1 \end{array}$$

$$236 = 2.31.00.38$$

$$236 \text{ from } 44.05$$

$$2.30.16.33$$

$$19.07.48.95$$

$$7.22.27.38$$

$$1.12.48$$

$$\text{At Jan } 7^{\text{th}} 7^{\text{h}} 21^{\text{m}} 14^{\text{s}}.90 \text{ m.s.t.}$$

$$19.07.02.21$$

$$46.74$$

$$19.07.48.95$$

Revised.

426

## Reduction of obs on

next page

2 16

A 3 beats

$$At 236 = 2 \ 32 \ 8.4$$

$$p - x a'' = +5 \ 52.1 = \Delta \delta$$

$$At \Sigma C = 2 \ 25 \ 14.5$$

$$p - x = -0 \ 50.98 = \Delta \alpha$$

236 fast of 2C =

30.3

$$236 = 2 \ 25 \ 44.8$$

Int to  $\Delta \delta$ 

$$+ 6 \ 23.16$$

$$\text{cor. for motion in } R \quad +1.18$$

$$At 236 = 2 \ 32 \ 8.4$$

$$p - x = -0 \ 49.80$$

$$236 + \quad \quad \quad 47.3$$

$$Ap \ R \ of \ \Delta'' \quad 0 \ 1 \ 6 \ 38$$

$$2nd. \text{ line} \quad 2 \ 31 \ 21.1$$

$$Ap \ R \ of \ A \quad 0 \ 0 \ 16 \ 58$$

$$19 \ 10 \ 54.77 \quad 19 \ 11 \ 45.5$$

$$Ap \ \text{Dir} \ of \ 4'' + 36 \ 00 \ 54.9$$

$$46.74 \quad 7 \ 19 \ 35.6$$

$$p - x = +5 \ 52.1$$

$$19 \ 11 \ 45.51 \quad -1 \ 12 \ 0$$

$$\Delta \alpha_R = +36 \ 6' \ 47.0$$

$$1858.0 \text{ Jan. } 8^{\text{th}} \quad 7 \ 18 \ 23.6 \text{ dist}$$

$$||| \quad A \ \text{ap} \ R \quad 0 \ 4 \ 00 \ 16.58$$

$$||| \quad \quad \quad +36 \ 6' \ 47.0$$

For Comet Obs.

Computed Cor to ap. Eq

R

Dir

$$\text{Jan } 4 \quad -0.85 \quad +11.2$$

$$7 \quad -0.68 \quad +11.2$$

$$8 \quad -0.55 \quad +11.6$$

Jan 8<sup>th</sup> 1858 Comet G.P.B. orb

427

375

272

$$\frac{312.7}{0.9} = 541$$

$$23 \ 55 \ 46$$

$$37-03$$

$$23 \ 42 \ 30$$

$$54$$

$$A \text{ Daily mo. in } R = + 4^m 25^s \text{ by } H.0 \ 31 \ 13 \ 14$$

$$36-09$$

$$" \text{ Dec } = - 0^m 54^s - 2^s$$

$$4 \ 25$$

$$\text{mo in } R \text{ in } 1^m = + 0.184$$

$$0 \ 00 \ 09$$

$$" \text{ Dec } = - 2^m 3^s$$

By daily motion

$$\text{Computed Comets } \alpha \ 0^h 00^m 10^s$$

$$\delta \ + 36^m 09^s$$

\* of 12 mag. South, following

$$* = \alpha''$$

Dif. R Comet precedes \*  $\alpha'' = 12^{\text{th}}$  mag.

Micrometer Wires

$$236-2..12$$

Spring Gov. 2

1<sup>st</sup> wire

2<sup>nd</sup>

Dec = Comet prec \*

Dots.

1<sup>st</sup> wire

2<sup>nd</sup> wire

$$E.C. = 2..23..46.8$$

$$55.7$$

$$p-x \ -0..51.4$$

$$-0..51.4$$

$$* \quad \quad \quad 24..38.2$$

$$47.1$$

B

$$236-2..25$$

Middle obs was taken at 2..25 nearly

$$E.C. = 2..25..6.8$$

$$15.9$$

$$-0..51.2$$

$$-0..51.1$$

$$* \quad \quad \quad 25..58.0$$

$$67.0$$

D. B. D.

$$2..26..39.0$$

$$48.0$$

$$-0..50.4$$

$$-0..50.4$$

$$* \quad \quad \quad 27..29.4$$

$$38.4$$

$$153.0$$

$$152.9$$

$$125.6$$

$$152.5$$

$$p-x \ = -51.00$$

$$-50.97$$

$$E.C. \ 2..25..10^s$$

$$19.3$$

$$.50.97$$

is Motion in one 1<sup>st</sup> = .35

$$.35 \times 6.12 = 2.14$$

$$\text{Dec } -0..50.98$$

Dif. Dec Comet n. of \*  $\alpha''$

Zero

$$236 = 2..30-55.2$$

$$19.45$$

$$55.78$$

$$33..21.6$$

$$20.28$$

$$79$$

$$2..32..08.4$$

$$19.86$$

$$2..26..18.7$$

$$55.79$$

$$6..26.33$$

$$35.93$$

$$7.19$$

$$p-x \ = +352.11 \quad = +5..52.1$$

428

Jan 8. 1858

Comet I, 1858

 $a''$  compared with  $A''$  of 4 mag (or 5<sup>th</sup>) $A''$  is about 52" south of  $a''$ 

Spring Gov.

B. B. Lerts

 $A''$  follows  $a''$  about 10"

Scale  
 $a'' = 6''.09$   
 $A'' = 5''.18$

$A'' = 58. B. A. 6$  or 25 Anchiometer  
 $= 283. Salade.$

L. G. 2<sup>h</sup> 56<sup>m</sup> 00<sup>s</sup>  $A''$  in center of field.

b. b. 3 01 00

236. 3 01 30.3  
 30.3

236 " 2 " 52 " 01.3

20. A. 2 " 40 " 00

236 for 48

2 " 51 " 13

 $A'' AR = 0 " 17 " 13$ 

Dec +36. 01 " 00  
 N.P.D = 53 " 59 " 00

EC + 17.0  
 47.3

Dy. Dec.

Observed on Spr. Gov.

Dy. R

Scale  
 12<sup>h</sup>  $a'' = 6''.09$   
 4<sup>h</sup>  $A'' = 5''.18$   
 $a'' - A'' = 0''.51$

1<sup>st</sup> Trim 2<sup>nd</sup> Trim  
 $2C = 2''.39 " 22.3$   
 $" = 2''.49 " 10.8$

27.4  
 15.7  
 Mean

1<sup>st</sup> 2<sup>nd</sup>  
 $a'' - A'' = -9''.48.5, -9''.48.3$   
 $a'' - A'' = -9''.48.40$

$A'' 281, \alpha 283, \text{Lelande.}$

$0 \text{ } ^h 7 \text{ } ^m 54.75$	$54 \text{ } ^h 19 \text{ } ^m 27.5$	$20.041$
$+ 3 \text{ } ^m 00.38$	$- 19 \text{ } ^m 22.4$	$58$
$0 \text{ } ^h 10 \text{ } ^m 55.13$	$54 \text{ } ^h 00 \text{ } ^m 05.1$	$160328$
$24880$	$35 \text{ } ^h 59 \text{ } ^m 54.9$	$160205$
$15550$		$1162378$
$180380$		$19 \text{ } ^h 22.378$

Same as BAC No 58

$0 \text{ } ^h 10 \text{ } ^m 30.41$	$3.115$	$54 \text{ } ^h 2 \text{ } ^m 47.9$	$20.03$
$24.92$	$8$	$240.2$	$8$
$R A'' = 0 \text{ } ^h 10 \text{ } ^m 55.33$	$24.92$	$54 \text{ } ^h 0 \text{ } ^m 7.7$	$16024$
		$Dec A'' = +35 \text{ } ^h 59 \text{ } ^m 52.3$	$2 \text{ } ^h 40.2$

Adopted

Reduction of  $A''$  to apparent place.

$A'', R 1858.0 = 0 \text{ } ^h 10 \text{ } ^m 55.33$

$A'', R 1858.0 = 0 \text{ } ^h 10 \text{ } ^m 55.33$	$Dec +35 \text{ } ^h 59 \text{ } ^m 52.3$
Cor to ap. Eq	$+ 11.6$
Ap. R of $A''$	$36 \text{ } ^h 00 \text{ } ^m 03.9$
$a'' - A'' =$	$+ 0 \text{ } ^m 51.0$
ap R of $a'' =$	$36 \text{ } ^h 00 \text{ } ^m 54.9$
$\mu - a'' =$	$+ 5 \text{ } ^m 52.1$
ap. R of $\mu =$	$ap Dec \mu + 36 \text{ } ^h 06 \text{ } ^m 47.0$

430

G.P.B. obs.

A. Hall Records

Jan 8, 1858

Orion. Definition exceptionally bad  
Ther + 80° to 8°

Order of Magnitudes

K much the brightest  
 L 2 L = 2 L > 2?  
 M. R.  
 N. V. N > V S. V  
 O. D. J  
 U

L and R <sup>is</sup> considerably brighter than M.

L and L are brighter than any preceding stars of this zone. (A. B. C & D). - K excepted, unless it be A, which is nearly as bright as L, but not quite.

A and R are about equal.

R is brighter than I, it is brighter than G or Gb.  
 N is plainly fainter than G, Gb. or I.

N = B nearly. D = M nearly.

W = 10 The original catalogue contains  
 X = 13 - 14 a star called (Z) not to be found tonight  
 Y = 10 but it proved to be 1<sup>st</sup> wrong with R.

~~There is no star whatever in or near the place of (Z) all the other stars are recognized.~~

~~There is a star of 13-14, near following  $\gamma$   $\frac{1}{2}$  hours and reading as Dec 31, '48~~

Jan 8, 1858. Orion. Magnitudes G. P. B.

$\gamma = \eta$  (but  $\gamma$  a little brighter)

$\gamma$  and  $\eta$  are a little brighter than  $\delta$ , or nearly equal to  $\delta$ .

$\epsilon \gg \zeta \gg \eta$

$\theta$  is one of the smallest stars in the Zone-catalogue

~~( $\theta$   $\theta$ )~~  $\approx \theta$ ,  $\epsilon \gg \zeta \gg \eta$

N.B. That in comparing stars for relative brightness I always select two nearly equal which are conveniently near to each other - The latter condition is not always adhered to but the first always is.

The method of filling in the <sup>small</sup> stars by estimation from the Catalogue is a good one but needs the best nights.

The method of Sequences for Magnitudes is very good when there are stars enough to fill all the gaps.

432

Jan 12 1858

 $\alpha = 17^\circ + 32^\circ 36'$  Comp.

Jan 12. 1858

Comet I. 1858.

compared with  $\alpha$  of 12 May  
 $\ast$  north preceding  $\delta$ .  $\ast = \alpha$ .

Alt. got on Spring Gov.

Borek between each set of obs. 2 sets over 2 w.

	1 <sup>st</sup> wire	2 <sup>nd</sup>	1 <sup>st</sup> wire	2 <sup>nd</sup>
$\ast$ E.C. = 2	21.46.8	56.2	$\delta - \ast + 32.9$	+32.7
$\delta$	22.19.7	28.9		

$\ast$	22.49.0	58.2	$\delta - \ast + 33.2$	+32.7
$\delta$	23.22.2	30.9	33.0	32.7

2	22.50.9	59.9	32.7	
---	---------	------	------	--

1<sup>st</sup> Set 2 22.55.4

Mean = +32.9

2<sup>nd</sup> " 2 34.29.1

35.1

E.C. = 2 28.42.3

+34.0

Time for Sijbe EC = 2 28.52.0

.03

9.7

 $\Delta \alpha = +34.03$ Motion in 1<sup>m</sup> = +18.4

At 2 28.52.0 E.C.

9.7 = +.03

Diff Dec.  $\delta - \alpha$ 

236 = 2	27.20.3	51.91	4.43
	28.51.3	51.29	89
2	28.05.8	51.60	

 $\Delta \delta = -43.41 = \delta - \ast$ 

At 2 29.33.7 Chron 236

41.7

At 2 28.52.0 E.C.

2 30.11.5 51.36

31.51.8 51.04

2 31.01.6 51.20

2 28.05.8 51.60

Mean 2 29.33.7 51.40

Zero = 55.82

236 for E.C. 41.7 Zero = 55.83

E.C. 2 28.52.0 4.43

55.86

55.81

55.83

Another set of AR,  $b''$  and  $a''$

	1 <sup>st</sup> wire	2 <sup>d</sup>	1 <sup>st</sup> wire	2 <sup>d</sup>
* $b'' =$	2 " 33 " 20.0	26.1	$b'' - *$	+ 35.3
$b''$	33 " 55.3	61.0		+ 34.9
* $b''$	34 " 18.0	24.0	$b'' - *$	+ 35.1
$b''$	34 " 53.1	59.1		+ 35.2
	2 " 34 " 24.2	34.0	Mean	+ 35.10
Mean	2 " 34 " 29.1			

Scale 367

$A''' = 6-7$  mag

Scale

AR on Spring Gun.

372

$B''' = 7-8$  mag

$b''' = 9-10$  mag

1<sup>st</sup> wire 2<sup>d</sup>

$A'''$  3.58

$b'' = 2$  " 38 " 10.6 - 15.3

$a'' - A''' = + 4$  " 13.8 - 13.7

$B'''$  8.06

38 " 18.7 23.4

$a'' - B''' = + 4$  " 05.7 - 05.6

$B \phi B$

$b'''$  9.49

40 " 53.4 58.0

$a'' - b''' = + 1$  " 31.0 - 31.0

$a'''$  8.16

42 " 24.4 29.0

434  $a''$  = Star of Comp which is n. of  $A'''$  &  $B'''$

Corner I. 1858. Jan 12  
By Spring Governor

Long Brook Scale

$A'''$  1.52 66 = 2 44 " 22.8  
 $B'''$  5.59 44 " 31.0  
 $b'''$  7.43 47 " 5.8  
 $a'''$  6.08 48 " 36.8

$a'' - A''' = + 4 " 16$

$+ 4 " 18$   
Min  $+ 4 " 17$

$a'' - B''' = + 0.09$

$+ 0.10$   
Min  $+ 0.09$

$a'' - b''' = - 1.35$

$- 1.33$   
Min  $- 1.34$

$a'' - A''' = + 4 " 14.0 - 13.9$

$a'' - B''' = + 4 " 05.8 - 05.4$

$a'' - b''' = + 1 " 31.0 - 31.0$

41.2

By MR.  
 $a'' - A''' = + 4 " 13.75$

$13.55$

$+ 4 " 13.85$

$a'' - B''' = + 4 " 05.6$

$05.65$

$+ 4 " 05.63$

$a'' - b''' = + 1 " 31.0$

$31.0$

$+ 1 " 31.00$

$a''$  in centre of field.

236 = 2  $50 " 08$

M.A. = 2  $31.20$   
 $18 " 48$

236 per  $56.84$   
0  $17.51.16$

Dec +  $32 " 12.30$

N.P.D. =  $57 " 47.30$

66 3 " 5 " 00

236 3 " 5 " 41.7

66 per  $15.14$   
 $56.84$

app MR of  $A''' = 0 " 13 " 19.50$   
 $4.13.85$

Dec +  $32 " 07 " 34.6$

$4 " 17.0$

app MR of  $a'' = 0 " 17 " 33.55$

Dec = +  $32 " 11 " 51.4$  Lalonde

app MR of  $B''' = 0 " 13 " 27.69$

Dec = +  $32 " 11 " 47.3$  Lalonde

$4 " 05.63$

$09.0$

app MR of  $a'' = 0 " 17 " 33.32$

Dec = +  $32 " 11 " 56.3$  Lalonde

app MR of  $b''' = 0 " 16 " 02.68$   
 $1 " 31.00$

Dec = +  $32 " 13 " 32.3$

$- 1 " 34.0$

app of  $a'' = 0 " 17 " 33.68$

Dec = +  $32 " 11 " 58.3$  B.D.

$A''' = 367$  Salad. $B''' = 372$  Lalande.

Jan 12.

$$1820, AR \text{ of } A''' = 0 \text{ } 10 \text{ } 19.63 \quad NPD = 58 \text{ } 11 \text{ } 58.1 \quad \text{Recess in } AR = +3.107$$

$$+ 3 \text{ } 00 \text{ } 56 \quad - 19 \text{ } 21 \text{ } 8 \quad \text{in } NPD = -20.039$$

$$1858, AR \text{ of } A''' = 0 \text{ } 13 \text{ } 20.19 \quad 57 \text{ } 52 \text{ } 36.3$$

$$\text{Red to ap. Eq} \quad -49 \text{ } \text{Dec} = +32 \text{ } 07 \text{ } 23.7 \quad \text{Sec var} = +0.0216 = AR$$

$$\text{App } AR \text{ Jan 12} = 0 \text{ } 13 \text{ } 19.70 \quad \text{Dec} = +32 \text{ } 07 \text{ } 34.8$$

$$1800, AR \text{ of } B''' = 0 \text{ } 10 \text{ } 27.57 \quad NPD = 58 \text{ } 07 \text{ } 45.0$$

$$+ 3 \text{ } 00 \text{ } 61 \quad - 19 \text{ } 21 \text{ } 95$$

$$1858, AR = 0 \text{ } 13 \text{ } 28.18 \quad 57 \text{ } 48 \text{ } 23.1$$

$$\text{Red to ap. Eq} = -49 \text{ } \text{Dec} +32 \text{ } 11 \text{ } 36.9$$

$$- \text{Recess } AR = +3.108$$

$$\text{in } NPD = -20.039$$

$$\text{App } AR \text{ Jan 12} = 0 \text{ } 13 \text{ } 27.69 \quad \text{Dec} = +32 \text{ } 11 \text{ } 47.3$$

 $B''' 438 \text{ B.2. } 6''' 438 \text{ B.2.}$ Tabular place of  $B'''$ 

$$AR = 0 \text{ } 12 \text{ } 03.26 \quad \text{Dec} = +32 \text{ } 2 \text{ } 25.5$$

$$k = -17.45 \quad d = -1 \text{ } 53.3$$

$$k \cdot \frac{d-b}{100} = -0.00 \quad d \cdot \frac{d-b}{100} = +00.0$$

$$1825, AR = 0 \text{ } 11 \text{ } 45.81 \quad \text{Dec} = +32 \text{ } 00 \text{ } 32.2$$

$$\text{Dec} + 1 \text{ } 42 \text{ } 83 \quad + 11 \text{ } 01 \text{ } 0$$

$$1838, AR = 0 \text{ } 13 \text{ } 28.64 \quad \text{Dec} = +32 \text{ } 11 \text{ } 33.2$$

Tabular place of  $b'''$ 

$$AR = 0 \text{ } 14 \text{ } 37.57 \quad \text{Dec} = +32 \text{ } 4 \text{ } 13.8$$

$$k = -17.49 \quad d = -1 \text{ } 53.0$$

$$k \cdot \frac{d-b}{100} = -00.00 \quad d \cdot \frac{d-b}{100} = +0 \text{ } 00.1$$

$$1825, AR = 0 \text{ } 14 \text{ } 20.08 \quad \text{Dec} = +32 \text{ } 2 \text{ } 20.9$$

$$+ 1 \text{ } 43 \text{ } 09 \quad 11 \text{ } 01 \text{ } 0$$

$$1858, AR = 0 \text{ } 16 \text{ } 08.17 \quad \text{Dec} = +32 \text{ } 13 \text{ } 21.9$$

$$-49 \quad + 10 \text{ } 4$$

$$\text{App } AR \text{ Jan 12} = 0 \text{ } 16 \text{ } 02.68 \quad \text{Dec} = +32 \text{ } 13 \text{ } 32.3$$

$$\text{App of } B''' \text{ Jan 12} = 0 \text{ } 13 \text{ } 28.15 \quad \text{Dec} = +32 \text{ } 11 \text{ } 43.6$$

$$+ 4 \text{ } 05 \text{ } 63 \quad + 09 \text{ } 0$$

$$\text{app of } a''' = 0 \text{ } 17 \text{ } 33.78 \quad \text{Dec} = +32 \text{ } 11 \text{ } 52.6 \text{ B.2.}$$

$$\text{from Bepols place of } B'''$$

$$\begin{array}{r} 3.107 \\ .006 \\ \hline 3.113 \\ 58 \\ \hline 24904 \\ 15565 \\ \hline 180554 \\ 3 \text{ } 00 \text{ } 55 \end{array}$$

$$\begin{array}{r} 100216 \\ 29 \\ \hline 1944 \\ 432 \\ \hline 0.06264 \\ 3.107 \\ \hline 3.113 \\ 58 \\ \hline 24904 \\ 15565 \\ \hline 180554 = 3 \text{ } 00 \text{ } 56 \end{array}$$

$$\text{Sec var in } NPD = +0.0216 \text{ } 024$$

$$.00047$$

$$\begin{array}{r} 58 \\ .007 \\ 406 \\ \hline 116186 \\ +0.00783 \\ -20.039 \\ -20.035632 \\ \hline 160200 \\ 100125 \\ \hline -1161450 = 19 \text{ } 21 \text{ } 56 \end{array}$$

$$\delta = 32 \text{ } 2 \text{ } 25.5 \text{ } B'''$$

$$\delta = +32 \text{ } 00 \text{ } 00$$

$$\delta - \delta = +2.42 \quad \frac{\delta - \delta}{100} = +02.42$$

$$\delta - \delta = +4.23 \quad \frac{\delta - \delta}{100} = +04.23 \text{ } b'''$$

$$\begin{array}{r} 3.108 \\ 8 \\ \hline 3.116 \\ 58 \\ \hline 9348 \\ 9348 \\ \hline 102828 = 1 \text{ } 42 \text{ } 83 \end{array}$$

$$\begin{array}{r} 20.03 \\ 53 \\ \hline 6009 \\ 6009 \\ \hline 660.99 \end{array}$$

$$\begin{array}{r} 3.124 \\ 33 \\ \hline 9372 \\ 9372 \\ \hline 103092 \end{array}$$

436

Revised

Apparent place of  $\alpha'''$  of Jan 12.

$$\begin{array}{rclclcl}
 f = +4.84 & g = +8.89 & G = +283.32 & h = +20.20 & H = 339.06 \\
 i = -3.12 & & \alpha = 4.20 & & \alpha = 4.20 \\
 & & 287.52 & & 343.26
 \end{array}$$

$$f = +4.84$$

$$\begin{array}{l}
 \log g = 0.94890 \\
 \sin(\delta) = 9.97853n \\
 \tan \delta = 9.79776 \\
 D. 725.19n - 5.31
 \end{array}$$

$$\begin{array}{l}
 0.94890 \\
 \cos 9.48686 \\
 0.43576 + 2.73
 \end{array}$$

$$\begin{array}{l}
 h = 1.30535 \\
 \sin(H\alpha) = 9.45927n \\
 \sec \delta = 10.07213 \\
 0.83675n - 6.87 \\
 15) - 7.34 \\
 - 0.49
 \end{array}$$

$$\begin{array}{l}
 1.30535 \\
 \cos 9.98121 \\
 \sin 9.72562 \\
 1.01218 + 10.28
 \end{array}$$

$$\begin{array}{r}
 23 \\
 21 \\
 4) 273 \\
 59
 \end{array}$$

$$\cos \delta = 9.92787$$

$$i = 0.49413n$$

$$\begin{array}{l}
 0.42202n - 2.64 \\
 + 10.37
 \end{array}$$

Places of  $\alpha'''$  from

Ap. R

Ap. Dr.

Lalande 367	0 17 33.55	+32° 11' 51.1
" 372	33.32	56.3
Bessel 2.438	33.78	52.6
438	33.68	58.3

$$\text{Adopted } \alpha''' = 0. 17. 33.58 + 32. 11. 54.6$$

$$g - \alpha''' = +0. 34.03 - 0. 43.4$$

$$||| \text{Comets } R \text{ } 0^h 18^m 07.61 \text{ } D + 32^\circ 11' 11''.2$$

apparent place

$$\ell b = 2^h 28^m 52.0$$

$$\ell b + 15.14$$

$$\text{Sid Time} = 2^h 28^m 36.86$$

$$19. 27. 31.74$$

$$7. 01. 05.12$$

$$1. 08.97$$

$$\text{Jan } 12^{\text{th}} \text{ } 6^h 59^m 56.1 \text{ min. s.t. } |||$$

$$19. 26. 45.00$$

$$46.74$$

$$19. 27. 31.74$$

# Orion, Jan 12, 1858

beats Dec Chron 236

mag.					
17	$k_1$	=	$I + 10$	36.35	$I = -0 \quad 13.09$
16-17	$m_1$	=	$M + 2$	36.20	$M = +0 \quad 4.03+1.00$
16	$n_2$	=	$M + 2\frac{1}{2}$	34.13	$N = +0 \quad 4.28$
16-17	$n_3$	=	$N + 4\frac{1}{10}$	32.30	$n_3 = +0 \quad 2.35$
16	$n_4$	=	$N + 9$	32.32	$n_4 = +0 \quad 6.63$
14	$n_5$	=	$N + 9\frac{3}{10}$	33.37	$0 = +0 \quad 4.28$
15	$o_1$	=	$O + 1\frac{1}{10}$	32.18	$0 = +0 \quad 9.14$
16	$p_1$	=	$O + 3\frac{2}{10}$	37.20	$p_1 = +0 \quad 2.60$
15	$p_2$	=	$O + 9$	39.12	$p_1 = +0 \quad 11.74$
15	$p_3$	=	$M + 22$	34.02	$R = +0 \quad 18.65$
16-17	$p_4$	=	$M + 25\frac{1}{10}$	39.53	$r_1 = +0 \quad 3.60$
16	$r_1$	=	$R + 7\frac{1}{10}$	34.30	$R = +0 \quad 21.25$
16	$r_2$	=	$S$	31.25	$S = +0 \quad 26.00$
15-16	$r_3$	=	$S$	34.10	$S = +0 \quad 1.75$
16	$r_4$	=	$S$	37.40	$S = +0 \quad 27.70$
14-15	$s_1$	=	$S + 3\frac{1}{2}$	36.13	$y = +0 \quad 30.66$
16-17	$t_1$	=	$T + 6\frac{8}{10}$	36.20	$z_1 = +0 \quad 3.40$
15-16	$v_1$	=	$V + 3$	39.20	$z_1 = +0 \quad 34.06$
15	$v_2$	=	$V + 12$	30.35	$V = +0 \quad 35.30$
16	$v_3$	=	$V + 20\frac{5}{10}$	35.58	$v_1 = +0 \quad 1.50$
13	$v_4$	=	$V + 23\frac{1}{10}$	36.22	$x_1 = +1 \quad 1.08$
17	$v_5$	=	$V + 24$	34.00	$y = +1 \quad 21.45$
16-17	$w_1$	=	$W + 8$	32.25	$y_1 = +1 \quad 2.60$
$v_4$ is as bright as $k_6$ , perhaps brighter.					
15	$x_1$	=	$X + 3$	38.33	$z = +1 \quad 26.18$
14	$y_1$	=	$Y + 5\frac{1}{10}$	31.53	$z = +1 \quad 8.50$
15	$z_1$	=	$Z + 17$	30.13	$z = +1 \quad 34.68$
16	$z_2$	=	$Z + 27$	40.00	$z = +1 \quad 26.18$
15	$z_3$	=	$Z + 46\frac{1}{2}$		$z = +1 \quad 13.50$
					$z = +1 \quad 39.68$
					$z = +1 \quad 26.18$
					$z = +1 \quad 23.25$
					$z = +1 \quad 49.43$

## Orion Jan 12. 1858

The region between K and W contains a greater number of stars of all magnitudes than any other equal area in the zone.

## Order of Mag.

<sup>K</sup>  
 W. <sup>L</sup> (Y is between W and L)  
 Z. <sup>F</sup> D.  
<sup>A</sup> <sup>R</sup>  
 M. <sup>E</sup> <sup>H</sup> <sup>G</sup> <sup>C</sup>  
 L. <sup>B</sup> <sup>N</sup> <sup>V</sup> <sup>S</sup>  
 I U 26 (O and P are between I and U)

The above were not as carefully taken as on the night before.



Jan 14, 1858, Orion.

G' is more than a magnitude smaller than  
 H'.  
 H' = E' and F'. I' = 12-13

H' = 8-9 P' = 8-9 J' = 7-8

W' is 10 or perhaps brighter

U' and V' found correct tonight, and X' also in R & Dec.

R' and S' found correct. in R & Dec.

Examined the Dec of all the stars in this zone,  
 also the magnitudes. ~~All~~ No stars omitted of  
 the 12 mag, or brighter. All the doubtful stars of the  
 Catalogue reexamined in R & Dec. & found correct.

Chron 236

mag		Scale	AR	h <sup>rs</sup>	
13	a'	22.03	B' - 17.3		B' = -1 22.95
15	a'	29.00	B' - 17.3		a' = -1 31.60
17	a'	23.20	B' - 1.0		-1 22.95
16	b'	29.30	B' + 27.8		+13.90
14-15	d'	20.12	D' + 17.0		b' = -1 09.05
15-16	d'	20.30	D' + 32.3		D' = -0 51.46
16-17	g'	27.30	G' - 5.8		+8.50
					d' = -0 42.93
					+16.15
					d' = -0 35.31
					H' = -0 11.65
					g' = -0 2.90
					+14.55

g' looks like a wisp of nebula, but is a star. There seem to be  
 three or four very small stars within one minute of arc of  
 H' but the atmosphere is not good enough to show them  
 distinctly tonight.

14 h' 26.26 H' + 13.0

16 p' 20.50 D' + 1.5

There is another star of 17 mag, p' north, fol p' and  
 10" from it.

Jan 14, 1858

## Orion

The following letters are used to designate several small stars in nearly the same AR as  $\beta$ .

This lettering is only provisional & is to be changed to accord with the systematic notation as soon as their order of right ascension is known.

16	$\varphi = \alpha$	30" north of $\gamma$ of Jupiter	$O' + 2$	Angle of position 10" north of $\alpha$ of $\alpha$ and $\beta$ $142^\circ 20'$
17-18	$\psi = \beta$		$O' + 2.7$	
17	$\delta$	13" north of $O'$ and follows $\psi$	$O' + 6.7$	
13-14	$\delta$	50" north of $O'$	$O' + 4.5$	
15	$\epsilon$	20" north of $\delta$	$O' + 3.0$	$O' = +0$ $0.55$
16	$\zeta$	6" north of $\epsilon$	$O' + 11.5$	$\gamma + 0$ $7.30$
17	$\eta$	2" north of $\zeta$	$O' + 2.7$	
15	$\theta$	26" 50	$O' + 3.0$	$\alpha$ $0.55$ $-0$ $1.35$ $0.80$
16	$\iota$	27" 10	$O' - 2.7$	
16-17	$\kappa$	28" 20		

17	$\epsilon'$	24" 88
18	$\epsilon'_2$	$20 + 10"$

$J'$	+ 0.5
$J'$	+ 9.0

$\gamma' = +0$	14.50
$\gamma'$	+0 0.25
$\gamma'$	+0 14.75
$\gamma'$	4.10
$\gamma'$	0 19.00

Dec of  $\alpha, \beta, \gamma$  etc

Well observed by placing 2 horizontal wires 1' apart. & making three measure even minutes from  $\alpha - 20'$

$\varphi$	$\alpha$	20" 37
$\psi$	$\beta$	20" 47
	$\delta$	21" 48
	$\delta$	49" north of $O'$ $[= 21 37 + 0 49 = 22 26]$
	$\epsilon$	22" 45
	$\zeta$	22" 50
	$\eta$	2" north of $\zeta$
	$\theta$	26" 48
	$\iota$	27" 10
	$\kappa$	28" 22

442

Jan 18, 1858. Occultation. obs. S. P. B.

Im. of 81 Aquarii Chron. 236 =  $2^h 54^m 09.30^s$  $1^m 11.48$ 

C.C. 3 .. 17 .. 00 C.C. fast 13.18

236 3 .. 17 .. 58.3 Sid. Time of Im. =  $2^h 52^m 57.82^s$  $13.18$  $19^m 51^s 11.09$ 236 fast  $1^m 11.48$  $7^m 01^s 46.73$  $1^m 09.10$ 

19 .. 50 .. 24.35

Im. of 81 Aquarii at  $7^m 00^s 37.63$  Camb. m. s. t. $46.74$ 

19 .. 51 .. 11.09

The same by H. P. Tuttle.

 $7^h 1^m 00^s - 37^{\text{beats}}$  by Chron 1678. $14.8$ Chron 1678  $7^m 00^s 45.2$  $8.6$ Im. of 81 Aquarii  $7^m 00^s 36.6$  Camb m. s. t.M.C.  $7^m 10^s 00$ 1678.  $7^m 08^s 49.2$ 1678 slow M.C.  $1^m 10.3$  $1^m 18.9$ 1678 fast  $8.6$  ~~$96^{\text{beats}}$  of 1678 =  $1^m$~~ 

$$\frac{96}{60} = \frac{46}{20} \frac{370}{250} (23.13)$$

$$\frac{20}{250} = \frac{4}{25}$$

$$\frac{4}{25} = \frac{1}{6.25}$$
Final result. 1. beat of 1678 =  $\frac{1}{4}^s$

Orion.

Jan 20. 1858

G. P. B. obs.

66

chron 236

mag		AK	beats	Dec	
16	$v_2'$	$V' + 9$		25.32	$v' = + 0^m \ 26.05$
13	$v_3'$	$V' + 10$		26.31	$v_2' = \ 0 \ 30.55$
17-18	$v_1'$	$U' + 9$	25" south of $U'$		$U' = \ 0 \ 24.95$
17	$v_4'$	$V' + 17.5$	40" north of $U'$	27.00	$v_1' = \ 0 \ 29.45$
14-15	$w_1'$	$W' + 7$		25.58	$v_4' = \ 0 \ 26.05$
15	$w_2'$	$W' + 24.5$		23.48	$w_1' = \ 0 \ 34.40$
16	$y_1'$	$Y' + \frac{2}{3}$		29.40	$w_2' = + 0 \ 42.10$
16-17	$y_2'$	$Y' + 26$		22.30	$y_1' = + 0 \ 45.60$
					$y_2' = + 0 \ 42.10$
					$y_1' = + 0 \ 44.35$
					$y_2' = + 1 \ 22.83$
					$y_1' = \ 1 \ 23.16$

$$\begin{array}{r}
 u' \quad 23' 14'' \\
 \hline
 21'' \\
 \hline
 22' 49''
 \end{array}$$

444

Orion. Jan 20. 1858

Measures of angles of position of stars  
near the Trapezium.

Zero of wires 91.00

Angle of position of  $\alpha$  and  $\beta = 142.20$   
 a point halfway between  $\theta$  of Trap and the preceding star  
 of Trapezium.  $\beta$  is much smaller than  $\alpha$   
 $\alpha$  and  $\beta$  are the stars so lettered on Jan 14.

## Magnitudes.

$A' = 12$  or  $12-13$   
 $B' = 12-13$   
 $C' = 10-11$  or  $11$   
 $D' = 11-12$   $12$   
 $E' = 12$   
 $F' = 10-11$   $11$   
 $G' = 12$   $12-13$   
 $H' = 12$   
 $I' = 12$   
 $J' = 9$   
 $K' = 10$   
 $L' = 6-7$   
 $M' = 12-13$   
 $N' = 12$   
 $O' = 8-9$   
 $P' = 11$   
 $Q' = 12-13$   $13$   
 $R' = 12$   
 $S' = 7-8$   
 $T' = 12$   
 $U' = 12$   
 $V' = 9-10$   
 $W' = 13$  or  $12-13$   
 $X' = 11-12$

1<sup>st</sup> Group.

$\begin{matrix} F \\ A \\ G \end{matrix}$ 
 $\begin{matrix} H \\ D \\ B \end{matrix}$ 
 $\begin{matrix} \text{---} \\ \text{---} \\ \text{---} \end{matrix}$

$$\mathcal{E}' = B \quad (\text{not } B')$$
$$b = b'$$

2<sup>nd</sup> Group.

$M' P' R'$

M' is brightest of whole zone

2' 7' 76' 0' 5' 1' 1'

$\mathcal{L}'$  is  $\frac{1}{2}$  may greater than  $\mathcal{C}$  (not  $\mathcal{C}'$ )

3<sup>rd</sup> Group.

For the brightless

~~It's much~~ <sup>much brighter</sup>  
It also <sup>"</sup> than the other following  
Y' 06' V'S'u' R'

$G'$  is between  $F'$  and  $H'$

$W$  is less than  $L'$

$A'$  and  $R'$  are nearly equal

446

Orion Jan 20

 $O' = \epsilon'$  perhaps  $O' > \epsilon'$  $(\text{not } K')$   $K = \text{or } > L'$  $F' = G$  (not  $G'$ )A in 1<sup>st</sup> quarter



8 17 17

Feb. 6, 1858.

Tuttle Comet.  
G.P.B. obs.

449

\* = a  
 South of \* = \* precedes 8. \* = 8 may.  
 Diff. Sec

236 = 3 51 10 14.65  
 3 52 16.5 14.37  
 53 25.3 13.76  
 51.8 .78  
 3 52 17.27 14.26  
 Diff. AR 55.50  
 41.24

41.24  
 8.25  
 40 4.15 = 6' 44.2"

236 = 3 54 32.0 \* 3.8  
 35.8 8

55 3 \* 3.8  
 6.8 8

14.5  
 21.3 3.8

38.8 \* 3.8  
 2.0 8

15.2  
 12.75  
 18.07  
 11) 46.02  
 4.27

156 = mut in 1<sup>m</sup>  
 4.25  
 780  
 1092  
 624  
 1731 00

4.17  
 3.44 = Δα red. to time of  
 45

3 54 35.8  
 35. 6.8  
 55 21.3  
 56 2.3  
 56 55.0  
 57 15.0  
 57 20.0  
 58 5.0  
 58 20.0  
 58 48.0  
 59 40.0  
 62.7 39.3

3 57 3.60  
 3 52 17.27  
 4 46.33

36 55 8½  
 37 15 8½  
 20 8½

Comet s. of star a

Δα = +3.44 Δδ = -6' 44.2"

38 5 8¾ Alt 3 52 17.27 (by 236)  
 " 20 9 236 pass 2 1.05

58 48 9.2  
 59 40 9.2

3 50 16.22 Dist. Sun  
 21 6 05.66

6 44 10.56  
 1 07.85 6.21 5 18.98  
 46.73

m.s.t. = 6 43 2.71 6.26 2 1 6 5.66

450

Feb 6, 1858

Tuttle Comet

\* (a) in centre of field.

$$236 = 4 \quad 0 \quad 59 \quad H = 2.0.38 \quad Dec + 6.2.01$$

2<sup>m</sup> 15<sup>s</sup> following the x.a. is one of 9<sup>mag</sup>, 1' 58" north of a

$$236 = 4 \quad 12 \quad 2.3 \times = a$$

$$8.5 \quad 8 \quad 6.2$$

$$\text{Differences } 55.49$$

$$55.51$$

$$55.50$$

$$\text{Mean } 55.50$$

$$12 \quad 29.5 \times$$

$$30.8 \quad 6.3$$

$$86 \quad 4 \quad 38 \quad 00$$

$$236 \quad 4 \quad 39 \quad 54.8$$

$$1 \quad 54.8$$

$$86 \text{ feet} \quad 6.25$$

$$236 \text{ feet of sid in } 2^m \quad 1.05$$

Reduction of star (a) to apparent place.

$$f = +8.67 \quad g = +9.80 \quad G = 292.39 \quad h = +19.53 \quad H = 214.28 \quad i = -6.04$$

$$d = +5.5948 \quad \alpha = 29.37 \quad 29.37$$

$$G + \alpha = 322.16$$

$$H + \alpha = 344.05$$

$$\log g = 0.99123$$

$$0.99123$$

$$\sin(G + \alpha) = 9.78674n$$

$$\cos 9.89810$$

$$\text{land } 9.02136$$

$$0.88933$$

$$+ 7.75$$

$$9.79933n - 0.63$$

$$\log h = 1.29070$$

$$1.29070$$

$$\sin(H + \alpha) = 9.43813n$$

$$\cos 9.98302$$

$$\sin d = 0.00239$$

$$\sin 9.01900$$

$$0.73122n - 5.39$$

$$0.29272$$

$$+ 1.96$$

$$- 6.02$$

$$+ 8.67$$

$$\log i = 0.78104n$$

$$+ 9.71$$

$$- 6.01$$

$$\Delta \alpha = 2.65 \quad \cos d = 9.99761 \quad \Delta \rho = 3.70$$

$$+ 0.18$$

$$0.77865n$$

$$\begin{array}{r}
 236 = 4^h 0^m 59.0 \\
 236 \text{ Jan } 2 \quad 1.05 \\
 \hline
 3 \quad 58 \quad 57.95 \\
 HA = 2 \quad 0 \quad 38.00 \\
 AR \text{ of } a = 1 \quad 58 \quad 21.95
 \end{array}$$

$$\begin{array}{l}
 Dec = +6^\circ 2' 00'' \\
 NPD = 83^\circ 58' 00''
 \end{array}$$

$$\begin{array}{r}
 * (a) \text{ Salomon } 3856. \quad P. \\
 1800 \text{ AR } 1 \quad 55 \quad 17.09 \quad +3.134 \\
 NPD \quad 84 \quad 17 \quad 1.5 \quad -17.575
 \end{array}$$

$$\begin{array}{r}
 3.137 \\
 \hline
 25096 \\
 18685 \\
 \hline
 181.946
 \end{array}
 \quad
 \begin{array}{r}
 17.51 \\
 \hline
 58 \\
 140.08 \\
 8755 \\
 \hline
 1015.58
 \end{array}$$

$$\begin{array}{r}
 1 \quad 55 \quad 17.09 \\
 3 \quad 1.95 \\
 \hline
 1 \quad 58 \quad 19.04
 \end{array}
 \quad
 \begin{array}{r}
 84 \quad 17 \quad 1.5 \\
 16 \quad 55.6 \\
 84 \quad 00 \quad 59 \\
 \hline
 5 \quad 59 \quad 55.1
 \end{array}$$

$$\begin{array}{r}
 * (a) W. 1033 \quad P. \quad S. \text{ van} \\
 1825 \text{ AR } 1 \quad 56 \quad 44.52 \quad +3.137 \quad 0.011 \\
 Dec +5 \quad 50 \quad 11.7 \quad +17.51 \quad 0.235 \\
 Salomon 3862 \\
 1 \quad 55 \quad 25.59 \quad 5 \quad 42 \quad 58.4 \\
 3 \quad 1.95 \quad 16 \quad 55.6 \\
 \hline
 1 \quad 58 \quad 27.54 \quad 5 \quad 59 \quad 54.0
 \end{array}$$

$$\begin{array}{r}
 3.139 \\
 \hline
 9417 \\
 9417 \\
 \hline
 103.587
 \end{array}
 \quad
 \begin{array}{r}
 17.47 \\
 \hline
 33 \\
 52.41 \\
 52.41 \\
 \hline
 57.651
 \end{array}$$

$$\begin{array}{r}
 1 \quad 56 \quad 44.52 \\
 1 \quad 43.39 \\
 \hline
 W \quad 1 \quad 58 \quad 28.11
 \end{array}
 \quad
 \begin{array}{r}
 5 \quad 50 \quad 11.7 \\
 9 \quad 36.5 \\
 \hline
 5 \quad 59 \quad 48.2
 \end{array}$$

$$\begin{array}{r}
 k = +8.822 \quad d = -43.82 \\
 A. D. \frac{k}{100} = -0.004 \quad -0.36 \\
 \quad \quad \quad +8.82 \quad -44.18 \\
 1 \quad 56 \quad 35.66 \quad 5 \quad 50 \quad 35.4 \\
 1 \quad 56 \quad 44.48 \quad 5 \quad 50 \quad 11.22 \\
 1 \quad 43.39 \quad 9 \quad 36.5 \\
 \hline
 1 \quad 58 \quad 28.07 \quad 5 \quad 59 \quad 47.7
 \end{array}$$

$$\begin{array}{l}
 1838.0 * (a) W 1033 \text{ AR} = 1^h 58^m 28.11 \quad Dec + 5^\circ 59' 48.2 \\
 " * (a) B 2118 \text{ AR} = 1 \quad 58 \quad 28.07 \quad Dec + 5 \quad 59 \quad 47.7 \\
 " * (a) Salomon 3862 \text{ AR} = 1 \quad 58 \quad 27.54 \quad Dec + 5 \quad 59 \quad 54.0 \\
 " * (a) " 3856 \quad 1 \quad 58 \quad 19.04 \quad + 5 \quad 59 \quad 55.1
 \end{array}$$

$$\begin{array}{r}
 1858.0 * (a) \text{ AR} = 1^h 58^m 28.09 \quad Dec + 5^\circ 59' 48.0 \\
 Red to app place \quad + 0.18 \quad + 3.7 \quad \text{tested} \\
 app place of (a) \quad 1 \quad 58 \quad 28.27 \quad 5 \quad 59 \quad 51.7 \\
 \quad \quad \quad + 3.44 \quad \Delta \delta \quad - 6 \quad 44.2 \\
 K_2 \text{ AR} = 1^h 58^m 31.71 \quad Dec = +5^\circ 53' 7.5
 \end{array}$$

Feb 6.6 - 43 2.7 cont. m.s.t.

Revised

452

Feb 6 1858, Verification of place of \* a Oct. 21/22

a is the star of corn with 20 Petri's (Olevent) comes

c = 9<sup>m</sup> Argelander same 64 b = 63 ditto,

	Scale	236	13.0 <sup>2</sup>	8a
a	2 13	7.53.85	= 10.5	

b	3 17	43.8	52.0
	3 .. 4		

b 7 52	6.5	11.5
--------	-----	------

a south of b	3' 4"
"	3' 1"
Mean	3' 2.5"

a prec. b	3' 39.25?
"	39.25
Mean	3' 39.25

a	1 52	7.59.11	- 15"
---	------	---------	-------

b	4 53	2.50	- 59.5
		3.01	

c	7 30	3.9	- 13.3
---	------	-----	--------

a prec c	3' 58.20
a south of c	5' 38.5

The focus was not well adjusted so that there was some parallax of images but the error of position this source was not above 1" or 2"

236 Run down Feb 7-8

453

Feb. 8 1858 Orion G P B obs.

There is a discrepancy in the ARs of  $\epsilon''\epsilon''$  and  $\zeta''\zeta''$ . } Right in  
 $\zeta''\zeta''$  does not follow  $\epsilon''\epsilon''$  by more than 1 or 2 tenths of a second Catalogue  
 $\zeta''\zeta''$  is of the 11 mag. + but is not as bright as  $\epsilon''\epsilon''$ .  $\zeta''\zeta''$  brighter than  $\eta''\eta''$

There is certainly no star in the place of  $\delta''\delta''$ . On referring to Sp. G. sheets it  
 was found that  $\delta''\delta''$  was the  
 same as  $\gamma''\gamma''$ .

There is no star in the place of  $\rho''\rho''$ .  $\rho''\rho''$  was erroneously reduced  
 The notation was then changed

After  $\delta''\delta''$  there are only very minute stars of 17 or 18 mag for  
 one minute in AR and a zone of four or five minutes broad in Dec.  
 The center of this zone is 1' N of  $\alpha''\alpha''$

The number of stars from 11 to 17 mag is much greater (in the region) preceding the  
 trapezium than it is in that following, as well as the amount of the  
 nebulosity.

Have examined by diff. Sec all the stars in 3d third catalogue  
 with the above results.

### Magnitudes

$A'' = B$ , or perhaps  $A'' > B$

$B$  is v. little  $> C$

$C''$  is v. v. little  $> B''$  but  $B''$  and  $C$  are nearly equal

$\gamma'' > A''$  and  $< B''$

# Magnitudes in Orion Feb 8, order of Brightness

$A'' = 12^{\text{mag}}$   
 $B'' = 11$   
 $b'' = 11$   
 $D'' = 13$   
 $E'' = 12-13$   
 $F'' = 13-14$   
 $G'' = 12-13$   
 $H'' = 13$   
 $I'' = 12-11$

$b'' B''$   
 $F'' A'' E''$   
 $G'' D'' H''$   
 $H'' F''$

The stars in this group follow in a pretty regular sequence.

The nebulosity in the region <sup>following</sup> between  $E''$  and  $D''$  and ~~between~~ <sup>then</sup> is filled with minute stars.

$J'' = 11-12$   
 $K'' = 12$   
 $L'' = 13$   
 $M'' = 10-11$   
 $N'' = 9-10$   
 $O'' = 12-13$   
 $P'' = 11-12$   
 $Q'' = 13$   
 $R'' = 9$

$R'' A''$   
 $M''$   
 $J'' P''$   
 $K''$   
 $O'' L'' Q''$

$L''$  and  $Q'' = J''$  nearly  $Q'' = H''$  nearly

$K'' D'' < E''$   $P'' < b''$  but  $> J''$

$P'' > B\alpha < b$

In the region also preceding the Trapezium I was struck with the apparent increase of small stars in the parts where the nebulosity was brightest.

I have before observed a similar increase in proper motion in the northern zones of the region preceding the nebula.

456

Orion Feb 12. 6

Order of brightness

$$2'' 2'' 3'' 4'' \quad 2'' = 3'' \text{ nearly}$$

$$M'' M'' P'' \quad N'' = U''$$

$$R'' X''$$

$$Y'' V''$$

$$V'' = 6'' \text{ nearly}$$

Order of Mag.

$$D'' D'' A'' A'' \quad [2'' 4'' = 13, 4'' 4'' = 12]$$

$$G'' G'' = 16'' 16''$$

$$J'' J'' C'' C'' C'' C'' J'' J''$$

$$E'' E''$$

$$B'' B''$$

$$E'' E'' < R'' \text{ a little and } = N''$$

$$J'' J'' < P'' \text{ nearly equal}$$

$$C'' C'' > C'' \text{ (not } C'')$$

$$F'' F'' < A'' \text{ (not } A'')$$

$$E'' E'' > A'' \text{ (not } A'')$$

Order of br.

$$H'' H''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

$$O'' O''$$

$$E'' E''$$

$$C'' C''$$

$$C'' C''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

$$P'' P''$$

$$J'' J''$$

$$M'' M''$$

$$L'' L''$$

Orion Feb 12

 $C'' < C''C''$   $\#C'' = N''$ 

mag.		Scale	AR	fills	16 <sup>th</sup> beats	236
16	$\alpha''$	11 55				
15	$\beta''$	17 05				
17	$\epsilon''$	12 15				
15-16	$\epsilon''$	18 53				
17	$\eta''$	18 12				
15	$\zeta''$	20 20				
14	$\iota''$	14 44				
16	$\iota''$	10 58				
13-14	$\kappa''$	16 33				
16-17	$\ell''$	19 10				

$A''$	$-1$	$38.88$
$B''$	$-1$	$26.62$
$\beta''$	$-1$	$17.75$
$\epsilon''$	$-0$	$56.82$
$\epsilon''$	$-0$	$55.57$
$\eta''$	$-0$	$45.86$
$\iota''$	$-0$	$43.11$
$\iota''$	$-0$	$45.86$
$\iota''$	$-0$	$40.61$
$\kappa''$	$-0$	$30.95$
$\ell''$	$-0$	$25.35$

Caln. seeing tolerably good. but getting hazy.

On account of thin haze we left off observing before reaching the Trapezium. for fear of missing small stars

A.B. On next night to put in the magnitudes from  $R''$  to end of Zone (not

448

## Orion

The zones first observed have been reduced in 4 Catalogues by a preliminary reduction. We have then passed each zone in review to detect errors. We have next taken groups of 6 or 8 & found their sequence of magnitudes & gone through the whole zone in this way in the order of R. Keeping up the connection of the groups by comparing one or two members in each of nearly equal brightness.

We have then put in the very small stars by R passages (quite reliable  $\pm 0.2$ ) and by estimates of Dec. (errors  $\pm 5''$ .)

The 17<sup>th</sup> mag. is the faintest steadily kept in sight in ordinary states of the atmosphere

March 3, 1858 Comet. (Tuttle)

\* (a)  $236^h 54^m 31^s - 35.2$   
 \* (b)  $1830.2 - 34.5$

Sec (Scale)

40.5

20.1

EL = 6 39 00

236 = 6 38 56.4

$\frac{3.5}{2.94}$   
 6.44

236 slow

$\delta$  in centre of field  
 236 = 6 11 14.0

$gl = 2^h 53^m 45^s$

Dec = 165. 4 = -14. 56. 00

A = \* (b-s)  $6. 19. 5. 5$   
 $\frac{6.44}{6.19.11.94}$

$gl = 2^h 48^m 55^s$

Dec = 162 6. 20 = -17 53. 40

6 19 11.94

2 48 55.00

\* AR 3 30 16.94

A in B.A.C. (1115) (20) Eridani

1850 AR = 3 29 27.35

NPB = 107 58 1.6

Ann. Rec in AR + 2.727

Precision +21.82

-1 38.1

8

1858.0 = 3 29 49.17

107 56 23.5

21.816

3 30 16.94

107 53 40.0

NPB - 12.26

27.77

2.43.5

8

Ref

220

98.08

Inst. Corr 0.23.5

$\delta$  236 6 11 17.44

2 53 45

3 17 32.4

-14 56. 00

27.77

2

$\delta$  AR 3 17 05.4

Dec -14 58

From Instrument Reading

46.0

Orion. March 4 1858  
 Estimation Magns, commencing with R <sup>G.P.B. observer</sup>

$$R'' = 10$$

$$S'' = 12-13$$

$$Y'' = 9 \text{ or } 8-9$$

$$U'' = 10$$

$$V'' = 6-7$$

$$W'' = 13$$

$$X'' = 8-9$$

$$Y'' = 6$$

$$Z'' = 13 \text{ or } 12-13$$

$$AA'' = 13$$

$$BB'' = 7-8 \text{ or } 8$$

$$CC'' = 11$$

$$\text{Same as } P'' \quad DD'' = 12-13$$

$$EE'' = 9-10$$

$$\text{Same as } L'' \quad FF'' = 10-11$$

(Called 12<sup>th</sup> in Dec 10 1857)

$$GG'' = 13$$

$$HH'' = 12$$

$$II'' = 11-12$$

$$JJ'' = 13$$

$$KK'' = 9-10 \text{ or } 10$$

$$LL'' = 11-12$$

$$MM'' = 11-12$$

$$NN'' = 11-12$$

$$OO'' = 12-13$$

March 6 1858  
Telescope set on Coma I at  $7^h 45^m$  by G. P. G.'s watch  
and Declination circle read  $163^{\circ} 8'$  & Decl =  $-16^{\circ} 52'$

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h star.

Orion March 10 1858

G. P. B. obs

mag.		Scale			
15	$\sigma_1$	11.32	follows	$N''$ 2.5 beats of 236	$N'' = 0'' 20.72$
15-16, 16	$\sigma_2$	19.30	"	$O''$ 4.0	+1.25
* 15	$\rho_1$	13.17	"	$D''$ 6.25	-0 19.47
17 or 17-18	$\rho_2$	13.25	"	$P''$ 9.75	$P'' = -0 16.12$
15-16	$\rho_1$	13.12	precedes	$R''$ 1.25	+3.12
16	$\tau_2$	17.00	follows	$R''$ 1.0	-0 13.00
17	$\tau_3$	17.20	"	$R''$ 2.5	+4.87
15	$\tau_4$	19.37	"	$R''$ 1.0	$R'' = -0 6.38$
16-17	$\tau_4$	19.39	"	$R''$ 4.5	$g'' = -0 7.00$
					$g'' = -0 5.13$

There is a star of 16 mag preceding  $V''$  (cf of traps) - 1 beat and is  $25''$  south of it.

There are two stars,  $x$  and  $y$  of 17 mag.  $x$  precedes  $V''$  by 2 beats and is  $25''$  north of  $V''$ .  $y = x$  in mag. is one second of arc south of  $x$  and  $7''$  of arc following it. (P.S)  $x = 16-17$ .  $y = 17$

14  $\sigma_3?$  12 23 follows  $R''$  7.5 beats

Following this star ( $\sigma_3$ ) and within  $1'$  north of it there appear to be two or three minute stars.

There is an exceedingly faint star following  $V''$  by one beat and is  $15''$  south of it.

See above  $z'' = 15''$  mag

id of trap  $h'' = 16-17$  mag

$h$  was not visible Feb. 23<sup>rd</sup> 1859 though  $z$  was. definition very good but some haze.

(- 3' 52.5")  
- 0'' 15.5

\* On Feb 22 1859 A star of the  $13/14^k$  mag was seen in  $R$ -on the 17 Dec + 0' 24"

$\gamma''\gamma''$ 

March 10 Orion continued

	A star	Scale	
17	$\gamma''?$	16.35	full R" 21.0 beats
17-18	$\gamma''?$	16.30	" " 23.5 "

$R'' = -0$	6.38
$\gamma''$	+0 4.72
$\gamma''$	+0 5.37

There are two stars  $\beta^{(B)}$  and  $\gamma^{(r)}$ ,  $\beta$  of 15-16 mag,  $\gamma$  of 16-17 mag.  $\beta$  follows  $V''$  9.8 beats and  $\gamma$  follows  $d$  by 11.0 beats. They point at center of Enke's nebula.  $\beta$  is 22" south of  $V''$ .  $\gamma$  is 25" south of  $V''$ .

14  $b''$  follows  $B''B'$  5.1 and is 40" south of  $B''B'$   
 17  $b''_2$  follows  $Z''$  3.25 beats and is 25" north of it

||  $Z''Z''$  is brighter than  $b''b''$  and is fully of 11 mag.  
 • We must begin with  $Z''Z''$  on the next night.

Vision in the early part of the evening good, and at no time bad.

$B''B'$	+0 10.08
	0.10
	+0 10.18
$Z''$	+0 7.87
$b''_2$	+0 1.52
	9.49

L, 64

March 12. 1858 Tuttle's comet.

\* (8-9) mag Arg zone (320) AR = 3.42 Dec - 20.23

AR = 3.42 57 " - 20.21

(a) = 57 Arg zone (320) A = 55 Arg zone 320

A star 30 following and 17' south

one 1<sup>m</sup> 3'"

"

10'

"

E 6 slow 5.70

AR

236 fast of Sid 5. 19.80

1st wire 2 wire

south preceding \* (a)

6 (236) 6.37.5 - 24.5 1st wire - 46.0 sec wire - 46.0

(a) \* 38.2.5 10.5 (a mistake in the star)

6

38.4.5 - 51.5

1st wire

1.55.0

2nd wire

1.54.9

(a) \*

40.38.5 - 46.4

At (236) = 6 38 47.5 Mean = - 1.54.95

6 51 8.5 - 1.54.25

At (236) = 6 44 58.0 Mean = - 1.54.60

south of \*

Dec

51.15

6.85

236 6.43.34.5

67.76

\* 71.49 Diff Dec 3.73

Motion in Dec for  $l^3 = -0.023$   
-0.161

6 46.7.8

72.58

89.42.3

\* 75.85

3.27

At

6 44.51.15

Mean = 3.50

70

34.30

At (236). 6 44 58.0

$\Delta\delta = -34.14$   $\Delta\alpha = -1.54.60$

19.80

6 44 38.20

23 20 8.53

7 24 29.67

1 12.82

bam m.s.t

7 23 16.85

23 19 21.79

46.74

23 20 08.53

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Juttle comes March 12 1858

For AR

$236, 8$  6  $51, 4, 5 - 12, 5$   $51, 50, 1 - 58, 8$   $1^{\text{st}} \text{ wire}$   $2^{\text{d}} \text{ wire}$   
 $(a) *$   $53, 4, 5 - 53, 3$   $53, 4, 5 - 53, 3$   
 $AR$  6  $51, 8, 5$   $\text{Mean} = -1, 54, 25$

$x A$  6  $55, 12, 8 - 22, 5$   $1^{\text{st}} \text{ wire}$   $2^{\text{d}} \text{ wire}$   
 $*(a)$   $56, 17, 5 - 26, 3$   $\text{diff AR} = 1^{\text{st}} 3, 7$   $1^{\text{st}} 3, 8$   $\text{Mean } 1^{\text{st}} 3, 75$

$(a) 2320 \text{ Proj. } 3^h 43^m 38, 47$   $\text{Dec} - 20^{\circ} 34' 26, 0$   $\delta - \beta = -34, 43, 3$   
 $k + 10, 01$   $d + 0, 7$   
 $-0, 02x - 34, 4$   $+ 0, 00$   $- 5, 3$   
 $M \text{ Place } 1850, 3, 43, 48, 49$   $- 20, 34, 34, 4$   
 $\text{Proc} + 21, 24$   $+ 1, 29, 76$   
 $1858, 0, 3, 44, 09, 78$   $- 20, 33, 04, 64$   
 $+ 0, 28$   $- 2, 60$   
 $*(a) \text{ app Place } 3, 44, 10, 01$   $- 20, 33, 04, 24$   
 $\Delta \alpha - 1, 54, 60$   $\Delta \delta - 34, 14$   
 $\delta_s AR = 3, 42, 15, 41$   $\delta_{\text{Dec}} = -20, 33, 38, 48$

March 12<sup>d</sup> 7<sup>h</sup> 23<sup>m</sup> 16, 85

Apparent Place of Comet.

$\text{Camb. m. s. t.}$   
 $1858, \text{ March } 12, 7^h 23^m 16, 85$   $\delta_s AR = 3^h 42^m 15, 41$   $\delta_{\text{Dec}} = -20^{\circ} 33' 38, 5$

Zero of position accidentally altered during observations but this remark does not affect the foregoing observations.

### Computation of Precession

$$\mu = 46''.0591 + 20''.05472 \sin \alpha \tan \delta \quad \mu' = 20''.05472 \cos \alpha$$

$$\begin{aligned} \log(20''.05472) &= 1.30222 \\ \sin \alpha &= 9.91832 \\ \tan \delta &= 9.57448n \\ &0.79502n \\ &- 6.2380 \\ &46.0591 \\ 15) 39.8211 \\ \mu &= +2''.6550 \\ &8 \\ &21''.2400 \end{aligned}$$

$$\begin{aligned} 1.30222 \\ \cos &9.74840 \\ &1.05032 \\ \mu' &= +11''.23 \\ \text{Sec var} &= 1 \\ &11''.22 \\ &8 \\ 89''.76 &= 1' . 29''.76 \end{aligned}$$

### Reduction to apparent place of $\alpha$ of March 12

$$\begin{aligned} f &= +12''.60 & g &= +10''.93 & G &= 300''.6 & h &= +18''.79 & H &= 278''.33 & i &= -8''.06 \\ & & & & \alpha &= 56.2 & & & \alpha &= 56.2 \\ & & & & G+\alpha &= 356.8 & & & H+\alpha &= 334''.35 \end{aligned}$$

$$\begin{aligned} \log g &= 1.03862 \\ \sin(G+\alpha) &= 8.82888n \\ \tan \delta &= 9.57389n \\ &9.44139 \quad +0''.28 \\ \log h &= 1.27393 \\ \sin(H+\alpha) &= 9.63266n \\ \sec \delta &= 0.02855 \\ &0.93514n - 8''.62 \\ &- 8.38 \\ &+ 12.60 \\ 15) 4''.28 \\ &+ 0.28 \end{aligned}$$

$$\begin{aligned} 1.03862 \\ \cos &9.99901 \\ &1.03763 \quad + 10.91 \\ 1.27393 \\ \cos &9.95579 \\ \sin &9.54534n \\ &0.77506n - 5''.96 \\ \log i &= 0.90634n \\ \cos \delta &= 9.97145 \\ &0.87779n - 7''.55 \\ &- 13.57 \\ &10.91 \\ &- 2''.60 \end{aligned}$$

Corrected by  $2' 20''$  Eridani

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March 13 1858 Orion. G.P. Bobs.

	Scale	Fine clear night. good definition	
17-18 * m	14.25	follows $\gamma$ "	18.5 beats 236
<del>16</del> -17 * n	14.10	" $\gamma$ "	24.0 "
16 * o	16.45	" $\gamma$ "	29.25 "
15 * p	16.25	" $\gamma$ "	36.0 "
17 * $h_1 h_2$		follows $\gamma$ "	1.0 " and north of it 40.0
13-14 * $h_1 h_2$	11.21	" $\gamma$ "	3.5 "

This is the star ( $h_1 h_2$ ) in the apex of the bow.

16 * $i_1 i_2$		follows $\gamma$ "	3.0 " and south of it 15"
17-18 * $i_1 i_2$	18.00	" $\gamma$ "	11.8 "

There are <sup>2</sup> perhaps ten or more fainter stars between this star and  $\gamma$ "  $\gamma$ ". There ~~are~~ is the region following  $\gamma$ " and north of it a large number of very minute stars too faint to be observed steadily, 6 or 8 within 4' of it. and apparently large numbers at the limit of vision.

17 * $i_1 i_2$	10.20	follows $\gamma$ "	19.5 beats
16-17 * $k_1 k_2$	17.45	" $\gamma$ "	11.0 "
16 * $l_1 l_2$		" $\gamma$ "	8.0 " and 1.30" south of it
17 * $m_1 m_2$	11.15	" $\gamma$ "	16.0
17 * $n_1 n_2$	17.20	" $\gamma$ "	21.0
17 * $o_1 o_2$	12.40	precedes $\gamma$ "	2.5
16-17 * $o_1 o_2$	19.30	follows	22.0
16 * $o_1 o_2$	20.10	"	29.0

10 4 20'  
0' to 10'This finishes review of catalogue from  $\gamma$ " to  $\gamma$ ".

$$\begin{aligned} \gamma &= +1 \quad 10.84 \\ m_1 m_2 &= +1 \quad 21.34 \\ o_1 o_2 &= +1 \quad 32.20 \\ &+1 \quad 37.45 \end{aligned}$$

$$\begin{aligned} \gamma &= +0 \quad 6.33 \\ &+0 \quad 9.25 \\ &+0 \quad 5.68 \\ &14.62 \\ &20.95 \\ \gamma &= +0 \quad 25.87 \\ &+0 \quad 1.75 \\ &+0 \quad 27.62 \\ \gamma &= +0 \quad 34.32 \\ &+0 \quad 5.90 \\ 2 \gamma &= +0 \quad 40.22 \\ &+9.75 \\ &+0 \quad 74.07 \end{aligned}$$

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March 13 1858 Orion.

We have compared the Dec. of all the stars from 0' to 10'.

March, 14/15 - End of Eclipse obs<sup>d</sup> by G. P. Bond  
 C. C. Flow of Camb. - 6.79

EC - 19.. 25.. 06.79	23.. 27.. 14.90
236 - 19.. 25.. 33.80	46.74
236 fast - 27.01	23.. 28.. 01.64
obs <sup>d</sup> 236 - 19.. 15.. 20.52	
Camb. 19 <sup>h</sup> 14.. 53.49	Sid. time of ending of the Eclipse.
233.. 28.. 01.64	
19.. 46.. 51.85	
18.. 56.. 53.24	
45.. 52.46	
50.86	
.85	

Camb. 19.. 43.. 37.41 m.s.t. of end by G. P. Bond.

End of Eclipse by R. T. Paine

Chro - 198 - 19.. 45.. 31.5	MC - 19.. 53.. 00.0
198 fast 1.. 56.65	198 - 1.. 52.65
Camb. m.s.t. - 19.. 43.. 34.85 of ending R.T.P.	19.. 51.. 07.35
	198 - 19.. 53.. 4.00
	1.. 56.65

H. P. Tuttle - 19.. 45.. 33.5  
 1.. 56.65  
 Camb. m.s.t. 19.. 43.. 36.85 of ending H. P. T.

March 14/15 1858

E.C. slow 6.79

EC 18 47 00.0

236 18 47 33.9

Large group of spots

EC = 14 25 00.0

236 = 14 25 33.8

# Eclipse of Sun

## March 14/15 1858

By G.P.B. Finder of G. Ref.  
Screen mixed green & RedEnd at 236 = 19<sup>h</sup> 15<sup>m</sup> 20.5 - 0 beats

1858 2<sup>nd</sup> set 6 35 10" slow of  
 March  $\frac{14}{15}$  largest 6 35  $\frac{3}{4}$  chn - largest spot  
 MC - 18.34.00 MC - 19.53.0  
 198 - 6.34.4.10 198 - 19.53.4.0  
 chn 198

7 50-15 = 7<sup>h</sup> 2<sup>nd</sup> set + motion of 1  
 14 34-11 = 5<sup>h</sup> largest spot  
 45 35-7 3<sup>h</sup> end - p 5  
 45 31, 5 250

7 - 33, 5 M 5.

7 46-53 - 26 $\frac{1}{2}$ 

By R J P - chn 198

45 33 $\frac{1}{2}$ 

Binocular of 2<sup>nd</sup> set for measurement at 6 35 10  
 largest "

6 35 50 } in cut air by  
 } several second, great

" 2<sup>nd</sup> set "  
 largest "

42, 5 } certain motion  
 28, 5 } 2 or 3 seconds

End Eclipse (Good)

45 31, 5

" M 3<sup>rd</sup> set

45 33, 5

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Solar Eclipse of March  $\frac{14}{15}$ W.C.B. Bowditch Comet Sucker - Object glass  $2\frac{1}{2}$  inches

$EC - 18.16.0.0$   
 Lior.  $204 - 18.16.44.7$

Observed ending of the Eclipse - by 204 - 19.15.19.5 - 2 beats

$EC - 19.17.0$   
 $204 - 19.17.44.7$

C.G. How - 6.79

$EC - 19.17.6.79$   
 $204 - 19.17.44.70$   
 $204 \text{ fast sid. } 37.91$   
 $19.15.19.5 - 2$   
 $-1$

obs sid. 19.15.18.50  
 $- 37.91$

Comb. sid. 19.16.40.59  
 $23.28.01.66$   
 $19.46.38.95$   
 $18.56.53.26$   
 $65.52.46$   
 $37.90$   
 $.95$

19.43.24.55 Comb. m.s.t. ending M.C. Bond.

# Solar Eclipse observed at H. C. Observatory.

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1858. March.  $\frac{14}{15}$ . Eclipse began before sun-rise

	3 <sup>in</sup> Aperture	Campb. m. solar. t
R. T. Paine, with State Equatorial - Bisection spot A. imm <sup>n</sup> -		18..33..13.3
" " " " " B. imm <sup>n</sup> -		18..33..53.3
" " " " " A. Emer <sup>n</sup> -		19..05..45.9
" " " " " B. Emer <sup>n</sup> -		19..12..21.9
" " " " " End of the Eclipse -		19..43..34.85
H. P. Tuttle - Fraunhofer - 2 $\frac{1}{2}$ in aperture		19..43..36.85
G. P. Bond - with the Finder of the Gt Equ <sup>e</sup> - 2 $\frac{3}{4}$ in aperture		19..43..37.41
W. C. Bond - with Bowditch Comet seeker - 3 $\frac{3}{4}$ in aperture		19..43..24.55

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2/2

Photography - Solar Eclipse  
 of March 1858 - R. T. Paine's acct - &  
 Rev. Mr. Hills pub. by Smith. Inst.  
 Hansen's Lunar Tables - Peirce's An. Mech.  
 Translation of Gauss. Theor. Mot.

Ellipticity of Peters Comet. Further Comet  
 prop. to Earth's orbit 11 millions of miles at Dec. Node  
 = long 266 - 180 where Earth was on Dec. 18<sup>th</sup>  
 about. Resembles Comet of 1785 & 1790 espe-  
 cially -

Constellation visible in Feb. 1858 and  
 1859 - Jupit Saturn &c in S.E. at evg twilight

Ellipticity of Dr. Peters Comet about weeks  
 longer in Am. than in Europe.

Ellipticity of Tuttle's Comet. Resemblance with 1<sup>st</sup> Comet  
 of 1790 immediately recognised on computation of 1<sup>st</sup>  
 orbit at Camb. Jan 16<sup>th</sup> about. from obs on 4<sup>th</sup> 8<sup>th</sup> & 12<sup>th</sup>.  
 But Dr. Brinkley was misled (vide Astr. Journal) No 110  
 Vide also Astr. Nach. 1124 - 1125.

Year Remarkable for Occultations of Pleiades.

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Elements of 1858<sup>1</sup>/<sub>4</sub>

J Feb 23.3195

$\phi$  55° 6' 31" 2  
 $\pi - \Omega = \omega$  206 48 58.8  
 $\Omega$  269 3 25.4  
 $i$  54 24 17.2

$\mu$  2.415 66.3  
 $\eta$  0.756 22.8

Umlaufzeit 13.625 68 years

Mean Eq. 1858.0

$$x = r (9.765\ 078) \sin(v + 205^{\circ} 11' 47'' 9)$$

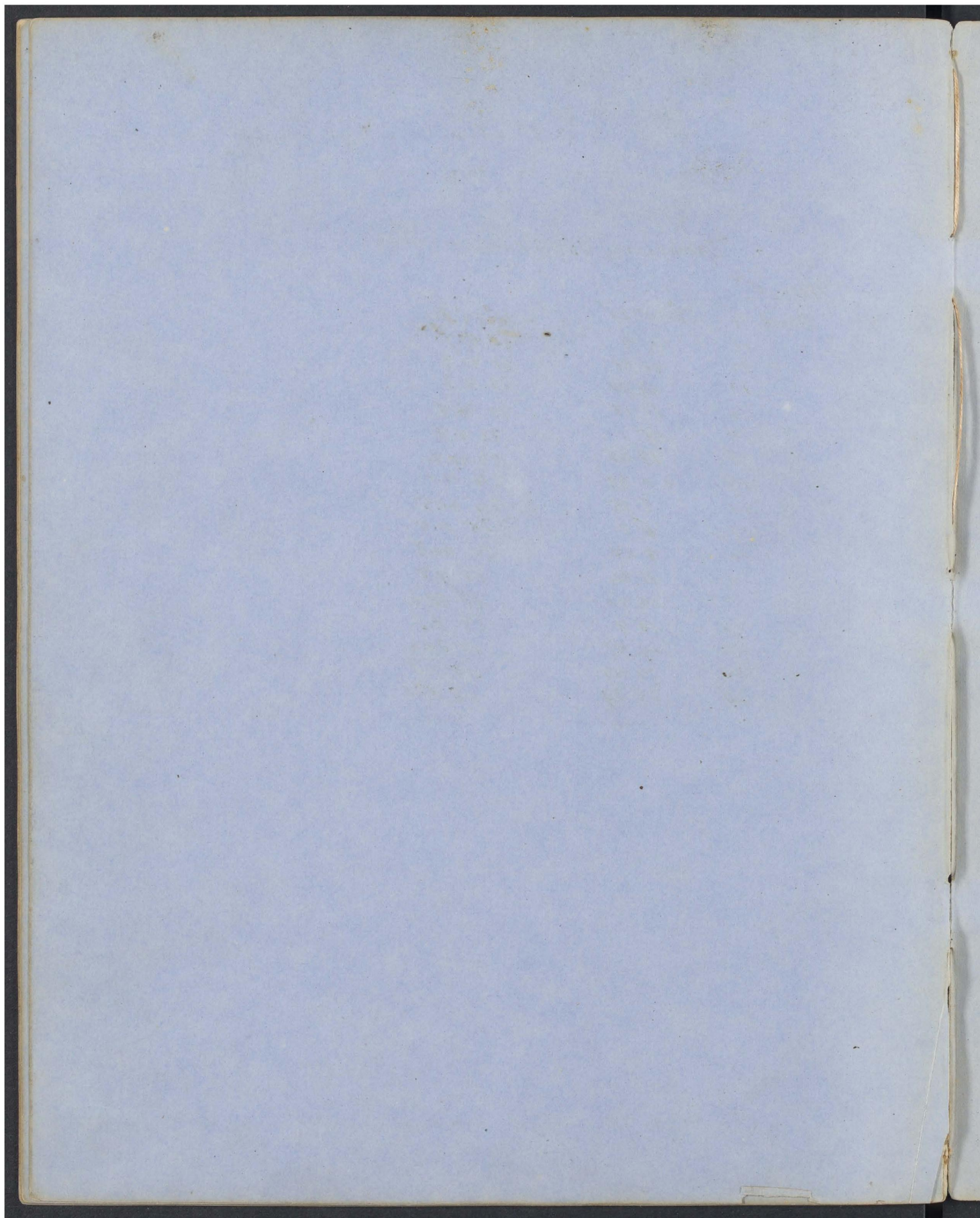
$$y = r (9.989\ 285) \sin(v + 96^{\circ} 53' 30.5)$$

$$z = r (9.425\ 377) \sin(v + 178^{\circ} 36' 39.8)$$

7.715

Extraneous of Leo — from the elements in  
the Berliner Jahrbuch for 1860.

1858	Wash. O.	R.	Dec.	by Δ.
Feb. 9				
Feb. 19	4 39 36		+ 23° 34' 7"	0.3761
24	43 14		48.4	
Mar 1	47 2		24 2.2	0.4035
6	51 18		15.9	
11	56 0		29.4	0.4294
16	5 1 6		42.6	
21	6 34		55.3	0.4535
26	12 22		25 7.4	
✓ 31	18 28		18.8	0.4757
Apr. 5	24 51		29.3	
10	31 28		38.8	0.4960
15	38 19		47.2	
20	45 22		54.4	0.5142
25	52 36		26 0.4	
30	6 0 0		5.2	0.5306.



Eclipse 1858

- Ephemeris

Wash. D. C.

March 19 3 4

11 3 4

12 4 4

13 5 4

14 6 4

15 7 4

16 8 4

17 9 4

18 10 4

19 11 4

20 12 4

21 13 4

22 14 4

23 15 4

24 16 4

25 17 4

26 18 4

- Ephemeris of Tuttle's Comet.

Wash. D<sup>C</sup>

March 10	3 <sup>h</sup> 41 <sup>m</sup> 27 <sup>s</sup>	- 20 <sup>o</sup> 23' 6"
11	44 9	- 20 57.7
12	46 51	21 31.3
13	49 34	22 4.3
14	52 17	22 36.8
15	55 1	23 8.8
16	57 45	23 40.2
17	4 0 30	24 11.1
18	3 15	24 41.5
19	6 1	25 11.4
20	8 47	25 40.8
21	11 34	26 9.7
22	14 21	26 38.2
23	16 9	27 6.3
24	19 57	27 34.0
25	22 45	28 1.3
26	25 34	28 28.1

