

KG
11365
207

H. 53

Equatorial.

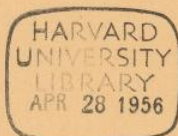
1864 Feb. 19th to
1864 March 21st

Sold by THOMAS GROOM & Co., Stationers, India Building, 82 State Street, Boston.

KG 11365.207



KG 11365.207



Orion - Zones near C Orionis

1864 Feb. 23^d
 7110 obs
 7115 rev

Determination of Zero stars for Zones VIII and IX

See notes at end of this book
Err 34°

Zero 263°12' East of Scale

W. 614	6' 59"	0	56.8	67.8
ζ	9 24	1	32.2	42.3
ε	2 50	2	36.6	
ε'	-0 11	2	43.6	
δ	-4 41	3	59.4	9.3
	-4 18	5	14.3	

wrong star

The capitals L and N of Zone IX

A.				
W 614	6' 58"	5	10.0	19.8
ζ	9 22	7	45.6	55.6
ε	2 48	8	49.8	
ε'	-0 12	9	—	6.8
L	8 38	10	13.8	24.0
N	9 43	10	46.5	56.8

B.				
W 614	6' 57"	5	12 1.8	11.7
ζ	9 19	12	36.8	46.9
ε	2 50	13	41.6	
ε'	-0 13	14	48.5	58.5
L	9 35	5	16 5.3	15.7
N	9 29	5	16 37.8	47.8

2^d wire doubtful.3^d w. doubtful2^d w. recorded badly.

T.				
ζ	-0 31	5	20 26.3	36.4
K	1 19	22	30.9	41.1
L	-0 15	22	54.7	64.8
N	-0 10	23	27.3	37.5
P	9 25	24	37.5	47.3
W 780	2 9	25	52.2	62.0

Δ.				
ζ	-0 32	5	29 17.8	28.2
R	1 18	5	31 23.3	33.1
L	-0 14	31		57.0
N	-0 9	32	19.8	29.5
P	9 27	33	29.6	39.5
W 780	2 11	3	34 44.5	54.3

Star W 660 could not be found in the position 0^m 1.4 following ε" & 1 35 of scale set to zero of Zone VI. Could it be the star H of Zone VI with error in BZ of a wire interval?

The correct reading for ζ Zone VII was probably 1 20 for 0 20. as 1 28 is the correct reading with zero of Zone VI.

Orion (continued)

Observed Differences from π 614 -

$\tau = 0^h 25^m$ $\zeta - 614$				$\tau = 0^h 25^m$ $\epsilon - 614$				$\tau = 0^h 25^m$ $\epsilon' - 614$				$\tau = 0^h 21^m$ $\delta - 614$			
+ 2' 25	+ 0	35.4		- 4 9	+ 1	39.8		- 7 10	+ 1	46.8		+ 2 40	+ 3	3.8	
		34.5			4 10	1 39.8		- 7 10	1 47.0				3 4.2		
2 24		35.4		4 7	1 39.8			- 7 10	1 46.7			2 38	3 3.5		
		35.8							1 46.8				3 4.0		
2 22		35.0													
		35.2													
+ 2 23.7	+ 0	35.22		- 4 8.7	+ 1	39.80		- 7 10.0	+ 1	46.82		+ 2 39.0	+ 3	3.88	
temp - 0.5				+ 0.8				+ 1.5				- 0.5			
ref. + 0.1		0.00		- 0.2		0.00		- 0.2		0.00		+ 0.1		0.00	
ap. eq. + 0.0		0.00		+ 0.1		0.00		+ 0.1		0.00		+ 0.1		0.00	
+ 2 23.3	+ 0	35.22		- 4 8.0	+ 1	39.80		- 7 8.6	+ 1	46.82		+ 2 38.7	+ 3	3.88	
$\tau = 0^h 21^m$ $\delta - 614$				$\tau = 0^h 1^m$ $\zeta - 780$				$\tau = 0^h 1^m$ $\delta - 780$				$\delta - 780$			
+ 2 45	+ 3	36.5		- 2 40	- 5	25.7		- 2 24	- 2	57.5		- 2 19	- 2	24.9	
		37.0				25.5				57.2				24.5	
2 32 ?		36.0		- 2 43		26.7		2 25		57.3		2 20		24.7	
		36.1				26.1								24.8	
	+ 3	36.40		- 2 41.5	- 5	26.05		- 2 24.5	- 2	57.33		- 2 19.5	- 2	24.72	
temp - 0.5				+ 0.6				+ 0.5				+ 0.5			
ref. + 0.1		0.00		- 0.1		0.00		- 0.1		0.00		- 0.1		0.00	
ap. eq. + 0.1		0.00		- 0.2		0.00		- 0.1		0.00		- 0.1		0.00	
2 44.7	+ 3	36.40		- 2 41.2	- 5	26.05		- 2 24.2	- 2	57.33		- 2 19.2	- 2	24.72	
72 38.2	- 3	6.08		+ 77 30.2	+ 2	54.83		+ 77 30.2	+ 2	54.83		+ 77 30.2	+ 2	54.83 (3)	
75 22.9	+ 0	30 32		+ 74 49 0	- 2	31.22		+ 75 06.0	- 0	2.50		+ 75 11.0	+ 0	30.11	

Obs. Differences from π 614 brought down from above

$\zeta - 614$				$\epsilon - 614$				$\epsilon' - 614$				$\delta - 614$			
+ 2 23.3	+ 0	35.22		- 4 8.0	+ 1	39.80		- 7 8.6	+ 1	46.82		+ 2 38.7	+ 3	3.88	
+ 72 38.2	- 3	6.08		+ 72 38.2	- 3	6.08		+ 72 38.2	- 3	6.08		+ 72 38.2	- 3	6.08	
+ 75 1.5	- 2	30.86		+ 68 30.2	- 1	26.28		+ 65 29.6	- 1	19.26		75 16.9	- 0	22.28	

The declinations determined from π 614 are $10''$ north of those by π 780

Orion

1864 Feb 23

4 45 S.R. - Bright Moonlight sky rather hazy
good vision

$$\begin{aligned} \delta'' &> \kappa''' & 1.0 \\ &> \eta'' & 2.0 \end{aligned}$$

$$\zeta'' > \kappa''' \quad 2.5$$

$$'' > \zeta'' \quad 2.0$$

$$'' > \epsilon''' \quad 1.5$$

$$\kappa''' < '' \quad 0.5$$

$$\epsilon''' < \delta''' \quad 0.3$$

$$\kappa''' = \zeta'$$

δ (of Orion minor) is decidedly brighter
than ϵ and ζ (the two n/p δ)
I do not have any doubt of a change since

$$\delta > \epsilon \quad 1.5$$

2u Feb 3 Jan 16

Recollect several weeks ago in warning
 δ being it decidedly $< \epsilon$ when carefully
scrutinized & that I did not find the dif-
ference explained by change of vision, atmo-
sphere - or axis of eye

π 614	$-3^m 6.08$	$72' 39.2''$
780	$+2 \quad 54.83$	$77 \quad 30.2$
	6 00 91	4 52.0

Orion

1864 Feb 25

It is too hazy for good comparisons. Good definition

$$6'' \text{ sid } 3''5'' > M'' 1.5$$

$$3''5'' > M'' 0.3$$

$$2''5'' > D'' 0.5$$

$$E'' < D'' 0.3$$

$$E'' > M'' 0.3$$

$$A'' = Y' \quad F' = M''$$

I a little brighter than 2 or 5.

Stars A and B of Zone VI compared (Vide Memorandum 5) at end of this Book)

Scale

$$A \quad 6.8 \quad 3.51$$

$$B \quad 2.17 \quad 3.51$$

$$3.50.5$$

$$\text{Temp} - 0.77$$

$$\text{ref} + 0.14$$

$$2.15$$

$$0.2$$

$$59.26.0$$

$$65.25.0$$

$$61.41.0$$

$$65.27.0$$

$$A \quad 6.3 \quad 3.50$$

$$B \quad 2.13 \quad 3.50$$

$$\text{Apr. 29} \quad 0.00$$

$$A-B \quad 3.49.87$$

$$B \quad 61.41.0$$

from Zone VI

$$A \quad 65.30.9$$

$$65.35.0$$

from Zone VI

$$65.27.0$$

" VIII

Stars G, H, J, L

$$G \quad 5.10$$

$$H \quad 1.31$$

$$J \quad 0.19$$

$$L \quad 2.42$$

It appears that for the place of A
only $\frac{1}{2}(VI + VIII) - \text{Feb. 25} = +0.1$

Clouded.

The above obs. of H show that it was correctly observed in Zone VI & that the obs. of F of Zone VII = H zone VI. should be probably 1.20 for 0.20

Orion

1864 Feb. 26

7^h 5.0

$\beta^3 > \alpha^3$ 1.0
 $\alpha > \mu$ 0.5
 $\alpha^3 < \gamma^1$ 0.5
 $E^3 = D^3$
 $\gamma^1 > D^3$ 1.0
 $E^3 < D^3$ 0.3
 $\gamma^1 > \mu^3$ 2.5

Clear but definition much disturbed ^{by fine very rapid oscillations} so that none of the
 brighter stars of the Huggenian Region as β & γ 2" were visible at any time. Although
 - what was very striking the very minute
 star in the dark channel offward S. margin
 (between μ^1 & γ^1) was readily seen.
 I was quite as bright as E & D & γ thus
 proving that its recent change has not
 been a consequence of improved atmosphere

Can trace connection of Neb. C obvious with that
 of θ with entire certainty. The pinpoints less
 best pronounced by way of region α and
 a little preceding γ^1 . By moving
 the tel. ^(fixed) in Dec with faintest part of connecting
 nebulosity & then several degrees away in
 R. I could readily recognise in sweeping part
 the region of this connection by the
 nebulous light filling the field

G.P.B.

Both above & the connection recognised
 Feb. 27 were confirmed perfectly March 2
 see drawing on Large Chart. Mar 3 & 9

W 614 6 55 9 10 59.1
 5 9 18 11 34.2

W 614 2 38 9 12 30.0:
 γ^m 6 49 15 9.8
 γ^1 7 38 18 30.9

W 614 3 6 9 20 32.6
 γ^m 7 16 23 12.7
 γ^1 8 6 26 32.9

W 780

W 780 - W 614 = 5.00

Temp - 1.1
 T = 43.51 γ^1 10.4

4 59.3

W 614 4 52.0

Cor. Dec W. 614 - 7.3

sweeping 780 to 2

night

By Zens VI & VII Cor - 9.8

Pion

1864 Feb 27th
G.P.B. obs.
1875 rec.

Magnitude estimates in these zones are always uncertain.

Revision of Zone VI obs'd on 1864 Jan 21.

Assumed times etc
VI beg 5^h 37^m h = c^h 9^m Feb. + 26
end 6 12 0 44

a ₁	17	6.0	4 40
a ₂	13	9.2	9 0
b ₋₁	14	-0.5	2 45
b ₁	13	3.25	6 45
c ₋₂	16	-3.0	7 42
c ₋₁	14	-2.0	8 42
c ₁	14	1.5	8 30
c ₂	16	4.0	10 0
c ₃	17	7.25	5 10
d ₋₁	17	-8.12	7 50
d ₁	16	+1.0	7 40
d ₂	14	+1.75	7 10
d ₃	16	+2.75	7 45
e ₁	15	+3.	6 43
e ₂	11	-3.75	-0 7
f ₀	14	0.0	7 30
f ₂	12.3	1.1	6 22
g ₁	11	0.88	9 18
g ₃	14	6.25	18 48
h ₁₁	15	-7.25	2 30
h ₁₂	12	-5.5	2 12
h ₁₃	13	-4.5	3 20
h ₁₄	16	-2.5	5 35
h ₁₅	17	-0.5	6 5
h ₁₆	14	1.5	5 47
h ₁₇	14	5.0	2 11
h ₁₈	13	12.5	5 52
h ₁₉	12.3	14.5	6 25
i ₋₂	17	-2.5	2 15
i ₋₁	14	-2.0	-0 41
i ₁	13	+4.5	6 24
i ₂	17	4.0	6 40
i ₃	15	7.75	5 25

g is 1^h 6^m N. of F.

Revision of VI cont

scale

z_5	17	9.75	5 10
z_4	17	9.5	4 5
z_3	17	-3.25	2 12
z_2	16	-1.5	2 12
z_1	16.17	-1.25	0 40
z_1	15	2.0	4 35
z_2	15	3.25	3 20
z_1	15	0.85	4 50
m_2	13.14	2.75	5 7
m_3	15	0.5	1 40
m_4	16	8.0	3 22
m_5	13	12.0	6 0
m_6	13.14	4.6	10.5
n_3	16	-7.75	6 45
n_2	17	-7.75	6 55
n_1	14	-5	8 11
n_1	15	+1.85	4 0
n_2	16	3.75	0 32
n_3	14	15.15	6 32
n_4	17	19.5	7 7
o_1	13	0.5	7 22
p_2	15	-9.5	0 58
p_1	16	-5.0	9 30
q_1	16	2.75	0 25
q_0	16	0	-0 30
q_1	15	2.5	10 5
q_2	15	13.5	5 58
q_3	15	15.5	7 45
r_1	15	2.5	4 35
r_2	16	4.5	0 0
r_3	16	14.0	10 15
r_4	15	33	2 58
r_5	15	13.5	8 15
s_1	17	-2.1	6 10
s_2	16	-16.5	1 15
s_3	16	-15.5	5 25
s_4	16	+0.75	8 58

Small stars of 16th or 17th mag. are so numerous near the middle of this zone that a few of the faintest may have been omitted.

Lamm RR

Q Reads 1'37" not 0'37".

The star q_4 is probably p.
(- sign set down subsequently in ink but is not to have weight as evidence)

probably r_5

Orion (cont.) *hours from C Orionis*

Revision of VIII

Approved
VIII Reg. 6^h 25 $h = +0^h 57^m$ $T_{hr} + 25^s$
end 8 00 +2 32

	m		
	6, 17	6 50	+1.0
	c, 15	5 18	-1.0
	c, 15	9 20	+3.0
c ₂	16	0 40	7.0
n ₂	17	5 10	-16.5
n ₁	17	6 30	-11.0
f ₆	16	8 20	0.0
f ₁	16	7 29	1.75
g ₁	16	1 18	-1.0
g ₁	17	4 30	+2.0
g ₂	15	2 13	5.0
g ₃	17	7 0	8.5
g ₄	17	9 4	15.35
g ₅	16	8 2	24.5
h ₁	16	7 30	5.5
m ₀	17	10 20	0.0
m ₂	17	6 50	-5.75
m ₁	17	9 20	-3.0
o ₁	15, 16	5 10	-2.0
p ₁	14	9 30	+0.5
p ₂	15	3 48	+4.25
p ₃	16	5 25	+11.75
p ₄	17	6 18	+12.5
p ₅	14	4 18	+18.0
p ₆	14	8 20	+19.5
p ₇	16	7 50	-20.0
q ₂	13	9 40	-2.0
q ₁	16	9 30	-1.5
r ₀	14	1 15	1.0
r ₁	14	4 45	5.0
r ₂	12	7 32	12.5
r ₃	15	7 15	15.0
s ₂	16	3 30	-14.0
s ₁	15	4 0	-7.0
t ₁	16	8 55	+17.75
t ₂	16	4 2	-7.5
t ₃	15	7 58	-12.5
u ₁	16	9 10	-0.85
u ₂	17	7 0	0.5
v ₁	17	5 20	+2.5
v ₂	16	1 40	+9.5
v ₃	17	6 55	+10.0

I follows G 9.75
follows I

follows R

"

Orion (cont) Zones near ϵ Orionis

Re-Revision of End of I

End of I

s_1	14	7 28	5.0
s_2	16	-0 40	7.75
s_3	8	5 58	19.5

Do not accord with 3rd Feb. 29
revision of I
Jan 27.

Apparent time $8^h 10^m 9.4$ -0 44 54.29 $8^h 5.5$

Beginning of II

Re-Revision

a_3	17	2 8	-33.0
a_2	17	6 0	-30.0
a_1	15	2 20	-0.5

Apparent time $8^h 17^m 5.4$

Obs. finished at $8^h 25^m$ Sid. time - quite clear with good vision. Sky dark & favorable though nebula is rather low.

End of V

No stars within limit $2'' 15''$

The obs. on this page are designed to complete the "revision" of zones I to VIII incl. to the limit $2'' 15''$ on either side of the meridian of ϵ in last page of this book.

In order to be secure that the somewhat low altitude of the nebula at the time of above revision of zones I, II - V did not prevent small stars from being seen, I went back to revision of zone VI near ϵ , and found that the small stars then noted were still visible & that their greater frequency is not ~~at all~~ owing to more favorable position of nebula.

Orion

1864 Feb 27

At 8^h 40

Side

 $g''g''' > M''' 1.0$ $" < F''g'' 1.7$ $M''' < E''' 0.5$ $M''' < F' 0.5$ $F' < g'' 0.7$ $E''' < D''' 0.3$ Clear - alt. rather low -
vision pretty good $\delta = \epsilon$

Going to the Telescope at 5^h 30 sid Nebula on Meridian sky clear
& twilight not quite vanished - could very easily connect
the neb. C Orionis with θ Os. Nearly in direction of R
the map tending to the preceding side of meridian of θ .

This nebulosity extends at least 20' north of C and as
much preceding. The limits becoming diffused & blending with
stars -

Orion-Loney

Th

Re-Revision of the end of Zone I.

Apparent time 5^h 30^m Sid.

5₂ 2₂

16^h 9^m 10^s

A small star, in DR between 2₂ and 3₂ of

the revision of Zone I (see Jan 27th).

The star 5₂ was not found, I suppose that it is an error for

5₂ of Feb 27th. The star 5₂ of Feb 27th was in Dec. -0.44 DRK +8.5

Looked at variable stars of nebula but put off comparisons until
after zone 1 then forgot them. No considerable change had occurred
in either of those looked at

It was readily seen & possibly may be brighter

I always look at small stars about trapezium to 9th & 10th but
can recognize no decided changes not accounted for by atmosphere.

Pion - Loney

Assumed

1x Deg. $5^{\circ} 45'$ $h = +0^{\text{h}} 17^{\text{m}}$ Jan +28
 End $6^{\circ} 55'$ $+1^{\text{h}} 27'$

Revision of Loney IX (1864 Jan 21)

No star precedes c within 8° - Limit $2^{\text{m}} 15^{\text{s}}$

Mag	δ	ΔL
d_1	18	8.45 +0.5
d_2	13	6.9 1.38
c_1	15.16	-0.40 4.75
c_2	16.17	3.55 8.0
c_3	17	4.55 8.5
c_4	15	10.12 14.5
c_5	17	6.50 14.5
c_6	16	3.25 19
c_7	17	3.20 21
c_8	17	8.15 24.5
c_9	14	2.10 26
c_{10}	17	5.10 27
c_{11}	17	7.40 30.5
c_{12}	17	6.48 31.5
c_{13}	17	10.10 36
c_{14}	17	7.0 32.25
c_{15}	17	8.17 38.75
c_{16}	16.17	3.10 40.50
c_{17}	17	2.30 46.0
e_{-1}	16	8.12 -0.75
e_{-2}	17	3.28 -0.88
e_{-3}	17	3.12 -0.88
f_1	17	9.15 +3.5
f_2	17	6.5
f_3	17	0.10 +5.5
f_4	17	0.12 +6.5
f_5	15.16	8.45 +6.5
f_6	17	2.15 +8.5
h_0	14	9.4 0.0
h_1	13	1.10 +1.25
h_2	13	10.20 1.
h_3	15	8.45 2.25
h_4	14	-0.55 2.
h_5	17	8.42 2.0
h_6	17	7.5 5.0

The number of small stars gives almost
 a nebulous ground to the field

 $c_7 +$ These stars were determined from c_9 , giving the nos. in

the last column from which those in the last column

but one were derived by the addition of 26.

The diff. AR between c_9 and f_1 was found to equal

$32^{\circ} 25'$
 e_{-1} is nebulous

Although the stars are so numerous
 in this zone I think that few of the six stars
 where noted have passed unrecorded -
 Sky 2 night fine.

{ about same AR.

{ same AR

{ same AR as -0.55

Oliver Jones Revision

Revision of Zone IX (1864 Jan 21)

	Mag	δ	
2-4	17	8 42	-7.75
2-3	14	10 18	-7.75
2-2	16 17	3 15	-3.5
2-1	17	3 15	-2.5
K-1	17	0 0	-4.25
K ₁	17	8 15	+0.25
K ₂	16	-0 50	6.0
K ₃	15	4 55	7.75
K ₄	16	10 0	8.0
K ₅	14	7 18	9.25
K ₆	17	8 10	10.5
K ₇	14	7 45	12.5
K ₈	16	5 17	13.5
K ₉	16 17	5 10	14.5
K ₁₀	16	7 40	20.5
L-1	17	2 30	-0.5
m-2	17	2 25	-5.15
m-1	16	7 50	-1.25
m ₁	17	8 30	+0.75
m ₂	12	10 10	1.0
m ₃	16	6 44	9.5
m ₄	15, 16	-0 20	1.5
n ₂	16	0 40	1.75
n ₃	16	0 50	5.5
n ₄	17	6 50	6.5
n ₅	15	5 53	8.25
n ₆	16	6 0	26.25
n ₇	17	5 50	43.
n ₈	17	5 35	56
o ₂	17	6 50	-2.5
o ₁	15	-0 8	-1.0
o ₁	15	6 4	+0.62
p-10	16	-0 45	-0.75
o ₂	17	5 12	+4.0
o ₃	17	5 20	+1.2
o ₄	17	5 30	+4.75
o ₅	16	8 45	-0.5

The star L₁, 2" or 3" wrong, the declinations here were right by M¹.

follows p.

Orion - Zones Revision

1864 Feb 29

L.P. Bob
J.H. Brai

	mag	δ	$\Delta\alpha$
91	16.17	6 35	+7.5
92	16	6 10	2.25
93	15	6 11	5.50
94	17	8 10	10
95	17	7 55	10.75
26	13	6 42	11.25
97	15	6 40	75
28	15	4 0	+16.5

Revision of Zone IX continued

Ended about 6⁵⁵^m, went to Sirius & then to Zone X.

At end of this revision (IX) I turned upon Zone I & reviewed a few of the small stars. Found the average 16th mag in Zone I & IX not evidently unequal.

I think that examination might show existence of nebulosity in this region.

N.B. That this Zone has had rather an advantage in point of atmosphere & high altitude of nebula. But I think that it has an excess of small stars, actually.

Sirius

Feb 29th
P.B. 6^h
J.W.S. rec.

Atmosphere too much disturbed for satisfactory observations. The companions being invisible for long intervals.

Angle of Position $96^{\circ}37'$
 $94^{\circ}35'$
 Town 141.
 $94^{\circ}5'$
 $95^{\circ}15'$
 $93^{\circ}48'$

Moved away entirely between observations

Companion certainly seen

Zero

$263^{\circ}12'$ $83^{\circ}12'$

$173^{\circ}12' = 0^{\circ}$ Cor.

$78^{\circ}26'$ Angle observed

Mr. Allen kept the March 6th

Distance

$61^{\circ}9\frac{1}{2}'$

61.813

61.883

61.762

61.835

61.841

78.5

78.5

78.1

76

75.5

75

75.5

77

75

From the Clark March 5
 Begun Comp. 10"

Mean 76.41

Higher Power^{applied} The companion cannot be seen.

Zero

$62^{\circ}87'2''$

62.869 2°

62.867 3°

61.841

10.31

10.21

Mean of Zero

62.883

61.841

10.42

21

10.21

Distance $10^{\circ}10'$

* There is a star south following Sirius about $75''$ distance can be seen only by putting Sirius out of field.

Circle Reading

Angle of Position 150°

There is also one $10''$ following and $100''$ distant.

* See remark of Lefell in Monthly Notices April 1864 He finds no other companion nearer than this one

Orion - Zones near ϵ Orionis

1864 Feb 29 (continued)

 JRB obs
JNS rec

 Quite clear - a sky favorable for this work, though nebula is rather too low.
 Revision of Zone X.

	MJD	δ	$\Delta\alpha$
ϵ_1	15	1 15	3.0
g_1	16	8 30	3.25
g_2	17	2 45	9.75
h_1	17	6 25	5.25
z_1	16	6 2	-4.0
i_1	15	8 0	8.5 follows ϵ also
i_2	14	9 30	15. "
i_3	15	6 40	23. "
l_2	13	3 0	-8.5
l_1	16	1 55	-2.0
i_4	17	8 50	+27.0
m_1	18	6 47	+2.5
m_2	15	10 10	+4. "
m_3	14	10 10	+6.75
n_1	14	1 30	+1.0
z_1	15	4 40	+0.5
z_2	14	4 39	+1.0
z_3	15	3 40	+2.75
g_4	15	4 40	+2.5
g_5	17	2 0	+4.0
g_6	15	2 15	+19. "
g_7	16	3 50	21.5
g_8	15	1 40	24.75
g_9	16	5 10	13.25
h_2	16	8 50	-6.0
h_1	17	6 50	-2.5
s_1	14	-0 40	+7.0
r_1	16	7 50	+18.5 follows ϵ also
r_2	16	4 10	+20.5
n_1	16	8 40	+4.5
n_2	17	0 40	+6.75
n_3	16.17	2 0	+8.75
u_1	16	9 30	+6.0
u_2	16	4 27	0.5
u_3	16	3 40	7.5

Appended

 X Beg. 7 30 $h + 2^h 2^m$ Temp. +27°
 End. 8 36 3 8

X E 4 5 47.1

Zms -4 8 5.5

-2 18.4

a'aa +3.0

e, -2 15.4

X W 4 10 13.5

Zms 4 8 5.5

+2 8.0

+7.5

w, +2 15.5

Several other very faint stars near R and in the
 nebulosity
 follows ϵ also

The smaller stars seem
 to aggregate in the nebulous
 masses

 End 8^h 36^m 21^s

Saturn & Satellites

1864 Feb 29th
1865

Order

A. Seven Transits over Two Wires, $20^{\circ} 17' 45''$ $R' 68.388$

Jupiter 1. 2 wires

Saturn I. 1st wire

" III "

Saturn II 2nd wire

" IV "

Titan 1. 2. wire (Dth 1st wire)

B. Differences Declination without Clock

Lamp Below

Lamp N ^o 3	J.	Saturn		C. 6	
				10	2 48
				3	31
	Jupiter	67.147	(DB)	4	38
	Saturn	64.022		5	13
	Jupiter	66.968	11 13	6	53
	Saturn	64.037		7	37
	Jupiter	66.958	11 13	8	57
	Saturn	64.008		9	34
	Jupiter	66.974		11	35
	Saturn	64.023		11	35
	Jupiter	66.980		12	56
	Saturn	64.018		13	29

C. Differences as before

Saturn's Satellites

1864 Feb 29 cont
JHS

Tupetis comp'd with Titan without clock

Leap Below

J.	66.975			16 45
I	61.040	and ray prod		17 32
J.	66.986			18 68
I	60.996	rad.	DS 10 ^h 20 ^m Chm	10 19 38
J	67.032			10 21 11
I	60.928			21 52

Clock in

Saturn	63.914		27 55
Titan	60.884		29 13
Saturn	63.865		30 19
Titan	60.922	DOB	31 24
Saturn	63.946		32 31

C. Diff. AD as before

2nd time Titan omitted?

3rd Saturn clock I II III 1st 2nd
III IV 2nd

$21' = 353^{\circ} 45' \text{ or } 66.325$

Jan 62.953

62.782 868

62.905

62.804 854

62.929

62.795

862

861

Low of Portm

by H. J. 29

by $\frac{948}{15100}$

9.8165

by Klein

2620 0'	between 10 ^h 46 ^m and 11 ^h 0 ^m about		
64.480	20 ^s	8.0672	262 42
64.107			
64.480	18 ^s	8.1654	262 50
64.078			
64.450	17 ^s	8.1112	262 44
64.115			

264 0			
64.112	15 ^s	8.1589	263 10
64.442			
64.058	13.5	8.1967	263 6
64.382			

262 54.4 This is not very reliable

being worked and work

Saturn

1863 Feb 29th
M. Lab.

Readings from sheets

Lamp on East Side
to: night throughoutw.
183° 4' 5"

					Δ R-13	J-32	T-52
Jupiter	9	46	43.6	47.2	45.40	-31.341	
Saturn I		47	14.2	—	17.228 + 0.02		
" II		—	18.4	17.2013			
" III		16.0	—				
" IV		—	20.45				
Titan		23.35	26.90	25.12			+7.91
J.	9	47	39.7	43.2	41.45	-32.00	
II I		48	10.3	—	13.50 - 0.10		
" II		—	14.6	13.40			
" III		12.2	—				
" IV		—	16.7				
T		—	23.0	21.20			+7.75
J.	9	48	38.0	41.6	39.60	-32.05	
II I		49	8.7	—	11.85 0.00		
" II		—	13.05	11.85			
" III		10.65	—				
" IV		—	15.0				
T		17.7	21.5	19.60			+7.75
J.	9	49	47.2	50.95	49.04	-31.39	
II I		50	17.7	—	20.95 - 0.03		
" II		—	22.1	20.98			
" III		19.85	—				
" IV		—	24.2				
T		27.1	30.6	28.75			+7.79
J.		49.1	52.8	50.95		-31.78	
II I	51	19.55	—	22.72 0.00			
" II		—	23.85	22.72			
" III		21.6	—				
" IV		—	25.9				
T		28.8	32.35	30.58			+7.86

					R-B	Δ	T-H	T-H	N'
J	9	51	46.95	48.5	46.72	-0.05	-31.95		213 ⁰ 6'5"
H I		52	15.4	—	18.65				
II			—	19.85	18.70				
III			17.55	—					
IV			—	21.9					
T			24.7	28.25	26.48			+7.80	
J			44.7	48.3	46.50	-0.02	-31.89		
H I			15.1	—	18.38				
II			—	19.55	18.40				
III			17.25	—					
IV			—	21.65					
I			24.45	27.95	26.20			+7.81	

After Declination

10	38	15.55	17.8	16.68	+0.15	-31.95			
		46.3	—	48.70					
		—	49.1	48.55					
		48.0	—						
		51.1	51.1						
		55.2	57.45	56.32				+7.70	
39	10.8	12.9	11.85	-0.02	-31.96				
	41.25	—	43.80						
	—	44.45	43.82						
	42.4	—							
	—	46.35							
	50.2	52.6	51.40					+7.59	
40	56.5	7.7	6.68	+0.05	-32.05				
	36.2	—	38.72						
	37.0	—	38.18						
	38.2	40.35							
	—	41.25							
	45.2	47.4	46.30					+7.60	

10	41	2.6	4.8	3.70	-32.08
		33.2	—	35.75	+0.05
		—	36.4	35.80	
		35.2	—		
		—	36.3		
	12.3	44.6	43.45		+7.67
		52.6	54.9	52.75	-32.08
		23.25	—	25.78	-0.10
		—	26.45	25.88	
		25.30	—		
		—	28.3		
		38.25	34.6	33.42	+7.59

Orion

1863 March 2

Comparisons made between clouds - Later for Lons it was
a fine clear night. Vision not very good

236	S"5" > N"V"	3
5 ^h 30 ^m	" > M"	1.5
	" < F"7"	2
	F"7" > E"	2.5
	" > D"	2
	E" < "	0.3
	M" > F'	0.3

 $\delta = 2$

Clouded Afterwards very clear & fine dark sky

It appears that W 628 has a right-
ascension 1° too small in W. by error in
reduction from P.Z. 216. Also that
W. 609 is too large by 14.5 about -
Probably by reducing for wire interval
for IV. instead of for V. See sketch of
Orion reductions

W 628	5	49	21.8	- 10 hrs
661		50	48.0	
		1	26.2	

See end of Book
Mem. (7)

W 609	54	45.5
629	55	18.6

At 6^h10^m under a very fine & clear sky
with good definition explored and
Drew on Chart portion of
Nebula about C Orion's. using power
146.

W 609	958	6	0	35.0	45.3
	-013		1	8.2	17.9
10 ^m	-012				38.4
	958		2		1.6
9	273			34.3	44.1
10	109				51.4

A double connection with θ Or. was
clearly made out one on the preceding
side of T' towards F'. The other
running in a direction n.p. to the
n side of 'Cam'

The drawing of light in approaching
the great nebula is sensible very much
outside (north) of the engraving. Light
shades very gradually & ^{on it} superimposed
as it were the 'Cam' & other features

8.9	956	3		40.9	—
9	-013	4		13.6	—
10	249			34.0	—
9	957			57.3	—
11	83	5		26.7	—
9	273			39.7	—
9.10	110			42.0	—

Orion New nebulous star

Mar. 2 (cont)

A star of 7 mag 34' S of ϵ Orion and $\frac{1}{2}(393) = 196.5$ (about)
following it Doubtful

Revision of Orion Zones

by March 2
at 10:00
Moon

Revision of Zone XII

c	12 ^m	10 10	-18.5
h	17	9 00	-4.75
d	16	5 0	-2.95
e	16	10 10	-9.5
e	16	8 15	-1.0
f	15	9 40	-2.5
f	17	8 20	+1.0
g	16	9 40	+9.5
g	17	8 0	+13.5
g	17	-0 10	0.0
h	17	4 0	+4.5
h	16	10 20	+8.5
m	17	2 40	+1.25
n	17	9 40	-3.0
n	16.17	7 28	+4.75
o	15	2 10	-3.25

Sky very clear & fine although nebula is somewhat low. On the 3rd I found that at a high alt. & remarkably pure sky the 16th & 17th mag. stars of this revision had been safely estimated on the 2nd.

It is the 13th mag.

There is a memorandum in one of our Equatorial books to the effect that 15' prec. & Orionis there is a large area with comparatively few stars.

Appended

XII Star c-1 8^h 40 h + 3^h 12^m Thr. + 23
o-1 9 00 + 3 32

Left incomplete because Orion is too low
Revision completed March 3.

Part of Zone X of Jan 25th

A	4 50
B	0 50
D	5 31
E	5 16
F	9 10 4 18
G	9 10 3 54

For the D of Zones I and II

X is right XI is wrong.

See end of this Book

Part of Zone XVI

A	9 0
B	9 15
F	3 17
G	2 33

From XVI

F

New Zero XVI

$$A = -61' 6'' - 5 43 + 1.3 = -66 47.7 + 2.4 = -66 45.3$$

$$C = -60 51 + 5 58 + 1.3 = -66 47.7 + 2.4 = -66 45.3$$

The one of them that precedes is north
G

$$A = -61 6 - 6 27 + 1.5 = -67 31.5 + 2.4 = -67 29.1$$

$$C = -60 51 - 6 42 + 1.5 = -67 31.5 + 2.4 = -67 29.1$$

XII C	4	25	35.2	0	4	27	55.9
Sum	-4	28	42.1		-4	28	42.1
	-3	6.9			-0	46.2	
		-4.7				<u>-3.2</u>	
C ₁	-3	2.2		Q ₁	-0	49.4	

For Angle of Position

864 Msh 2
H Sob.

Japetus.

Begin at 9^h 50^mW¹ 261° 59' 5"W¹ 264° 0'68.608
68.046 20.568.160
68.702 23.568.750
68.091 24.568.119 26.5
68.67668.688 23.5
67.97268.120 23.5
68.52068.672 27.5
67.920

Ended at 10 4

Satellites of Saturn

$W' = 263^{\circ}10'$ Lamp West

Jupiter - Saturn $R' = 68^{\circ}52'$

1.2. Ring on 1st wire IX
 Ball " 2^d " II III
 3456 Ring on 2^d
 Ball on 3rd
 48 Ring on 1st
 Ball on 2^d

Titan: Saturn $R' = 70^{\circ}55'$

5 Transits of inner Ring (5 wires)
 10 wires of Titan and following ansae
 5 Transits (wires) of inner Ring ¹³⁵¹³
 (5 Transits (or 6) 2 wires each Titan and Ball
 5 Transits (2 wires) Jupiter and Titan

$263^{\circ}10'$
 10 56 52 $57^{\circ}48'$

11 6 4 5

The seeing has grown much worse. It is quite foggy
 so that I shall not attempt differences of declination.

Salinities of Salton.

~~65th 29~~ Mich 2,
1875

				A.	B.	$\frac{1}{10}$ Mid. Nine	T-5 (=K-8)	Lamp on West side
<i>Salton</i>	10	8	27.15	31.0		29.075	-34.55	Drain of River
$\frac{1}{2}$ I		9	0.4	~~3.~~				
IV			3.3	—	1.85			2.9
II		9	—	4.8				
III		—	6.0		3.40	3.625		1.2
<i>Salton</i>	9	20.4	24.0			22.20	-34.44	
$\frac{1}{2}$ I		53.25	—	54.72				
IV		56.2	—					2.95
II		—	58.0	58.55	56.64			
III		—	59.1					1.1
<i>Salton</i>	10	16.4	19.95			18.175	-34.55	
$\frac{1}{2}$ I		49.4	—	50.85		52.725		
IV		52.3	—					2.9
II		—	54.0	54.60				
III		—	55.2					1.2
<i>Salton</i>	11	15.0	18.8			16.90	-34.54	
$\frac{1}{2}$ I		~~49.~~ 49.0	—	49.60	51.44			
IV		—	50.2					
II		51.85	—	53.28				
III		54.7	—					2.85 1.2
<i>Salton</i>	12	12.6	16.4			14.50	-34.64	
$\frac{1}{2}$ I		1	46.7		47.28	49.14		
IV			47.85					
II		49.6	—	51.0				
III		52.4	—					2.8 1.15
<i>Salton</i>	13	8.75	12.65			10.60	-34.51	
$\frac{1}{2}$ I			42.65		43.28	45.11		
IV			43.9					
II		45.5	—	46.95				
III		48.4	—					2.9 1.25

10	14	0.9	41.65		46.45	2.775	-34.55		
			34.9		37.325				
			36.0					1.1	
		37.8		39.20					
		40.6						2.9	
14	57.55	1.2			59.38	-34.62			
15	34.7	—	32.15		31.00				
	33.6	—						2.9	
	—	35.3		35.85					
	—	36.4						1.1	
15	49.25	52.9			51.08	-34.56			
16	22.4	—	23.80		25.64				
	25.2	—						2.8	
	—	26.85		27.48					
	—	28.1						1.25	
Mean - interval			3.705					2.87	1.17
						-34.551			
R'			68.520						
2nd (last) year			62.864						
			5.656 =						
			$\frac{113}{55.64}$						
R-13 x int			55.64 = 3.709						
			+ 0.195						
			- 0.125						
			- 0.065						
			- 0.025						
			+ 0.015						
			- 0.035						
			+ 0.045						
			+ 0.005						
			+ 0.025						
Mean			- 0.002						

Saturn's Satellites

64 March 2.

	Th	I	II	Titan - h IV	Titan - h Ring
h I	11 21	58.9	58.9		
IV	11.0	58.9		3.0	
h I	22	20.0	25.1	2.9	
IV		22.9	28.0	2.9	
h I		40.8	45.8	3.05	
IV		43.85	48.8	3.0	
Titan	23	2.1	7.2	3.3	-3.25 -1.798
h IV		5.4	10.4		
Titan		21.2	26.2	3.225	1.773
h IV		24.4	29.45		
Titan		39.0	44.0	3.275	1.773
h IV		42.25	47.2		
Titan		57.5	62.55	3.225	1.773
h IV	24	0.7	5.8		
Titan		18.4	23.5	3.200	1.748
h IV		21.7	26.6		
Titan		36.95	42.0	3.175	1.723
h IV		40.2	45.1		
h I	25	10.45		2.85	-1.778
IV		13.3			
h I		23.8	28.95	2.85	
IV		26.65	31.7	2.85	
h I		43.75	48.65	2.80	
IV		46.55	51.8	3.15	
				2.935	

Sum of Ring
 $\frac{2.867 + 2.935}{2} = 2.901$
 9.06
 10

					$\Sigma \text{tan-}$ return	Diam. of Ball
Σtan	11	29	0.95	5.75	3.30	-1.79
$\Sigma \text{ II}$			2.05	6.9	5.09	
$\Sigma \text{ III}$			3.2	8.2		+1.22
Σ			22.6	27.65	25.12	-1.78
$\Sigma \text{ II}$			23.8	28.8	26.90	
$\Sigma \text{ III}$			25.0	30.0		1.20
Σ			40.2	45.3	42.75	-1.85
$\Sigma \text{ II}$			41.5	46.45	44.60	
$\Sigma \text{ III}$			42.75	47.7		1.25
Σ	30		2.15	7.15	4.65	-1.79
$\Sigma \text{ II}$			3.4	8.35	6.44	
$\Sigma \text{ III}$			4.5	9.5		1.12
Σ			19.3	24.25	21.78	-1.77
$\Sigma \text{ II}$			20.35	25.55	23.55	
$\Sigma \text{ III}$			21.6	26.7		1.20
Σ			37.75	42.7	40.22	-1.79
$\Sigma \text{ II}$			38.95	43.95	42.01	
$\Sigma \text{ III}$			40.05	45.1		1.12
					-1.795	+1.188
						1.172 (9)
						1.188 (12)
						1.187
						Diam. of Ball

Saturn's Satellites

J
I

10 30 58.5 63.4 -32.85
31 31.3 36.3

31 46.35 49.3 -32.78
32 17.1 22.1

32 26.9 41.8 -32.80
33 9.65 14.65

34 8.0 12.8 -32.75
40.6 45.7

34 57.4 62.3 -32.70
35 30.0 35.1

-32.746

Orion

1864 March 3

very Clear tolerably good vision - afterwards improved & sky
 5^h 30 3.1' became remarkably pure

$$\delta''\delta'' < \gamma''\gamma'' \quad 1.7$$

$$> \nu''\nu'' \quad 3$$

$$'' < \zeta' \quad 2$$

$$> \mu''' \quad 1.3$$

$$'' > \epsilon''' \quad 0.5$$

$$> \delta''' \quad 0.5$$

$$\mu''' > \gamma' \quad 0.7$$

$$\gamma''\gamma'' > \epsilon''' \quad 2$$

$$\epsilon''' < \delta''' \quad 0.3$$

 $\delta''\delta''$ looks brighter

$$\delta > \epsilon \quad 1.9''$$

 μ''' looks somewhat brighter than of late μ''' is decidedly brighterZone VIII Star γ I. See end of Book mem. 5)

$$D=\epsilon \quad 258 \quad 5 \quad 47 \quad 3.8$$

$$\epsilon=\epsilon' \quad -0.6 \quad 16.7$$

$$\gamma \quad -0.58 \quad 32.0$$

$$\mu \quad 0.19 \quad 57.2$$

$$\nu \quad 5.48 \quad 46 \quad 12.5$$

$$2.55 \quad 49 \quad 34.6$$

$$-0.6 \quad 41.5$$

$$-0.57 \quad 50 \quad 2.7$$

$$D=\epsilon \quad 255 \quad 51 \quad 12.9$$

$$\epsilon=\epsilon' \quad -0.7 \quad 19.9$$

$$\gamma \quad -0.57 \quad 40.8$$

$$\mu \quad +0.18 \quad 52 \quad 2.2$$

$$\text{From Zone VII } \epsilon \quad -1 \quad 26.36 \quad 68' 20''.1$$

$$\text{VIII} \quad 26.33 \quad 19.5$$

$$-1 \quad 26.34 \quad 68' 19.8$$

$$28.05 \quad 3 \quad 52 \quad -0''.8$$

$$\text{From Zone VIII } \gamma \quad -0 \quad 58.29 \quad 64 \quad 28.6$$

$$\text{VII } \epsilon' \quad -1 \quad 19.46 \quad 65 \quad 20.8$$

$$\text{VIII} \quad 19.43 \quad 19.3$$

$$-1 \quad 19.45 \quad 65 \quad 20.0$$

$$21.10 \quad 51.0 \quad -0.2$$

$$\text{Zone VIII } \gamma \quad -0 \quad 58.35 \quad 64 \quad 29.2$$

Orion. Zones near ϵ Orionis

1864ph
In Mich 3
J. P. B. obs
J. H. S. in j-2

$236 = 5 \frac{1}{2} \times 58$
about.

Revision of Zone 811 continued from March 2nd -

Feb 29th about

Remarkably clear sky. 2 fine nights.
Nebula high.

Appointed Beg. 5^h 58^m $h = +0^h 30^m$ Temp 29
 " end 6 40 $= +1^h 12$

Sign of Δa for S_1 , probably - as t is near S_2 [following it]

XII P	4 28 11.6	CC	4 30 49.6
Low	-4 28 42.1	-	4 28 42.1
-	0 30.5		+2 7.5
	-5.2		+1.8
-	0 35.7		+2 9.3

past BVB BB in 8th

Removed Micrometer & put on
Low Power (90x) to draw nebulae.

Orion Micrometer taken off-

1864 March 3

Atmosphere of perfect transparency & every condition favorable. vision quite good as to definition also.

- 1) Power 90 Light may be discerned 448 beats
 $= 224^s$ preceding & Orions in same parallel & a full
 field 3 & 5/10. & shading insensibly
 field $= \frac{1}{2}(488 - 165) = \frac{1}{2}(323) = 161^s$ about (See below field = 34.3)

- 2) Mopimung Branch sweeps finely to point say
 8' n. p. 20. Connecting strongly with nebulosity sweeping
 over from D^m encircling dark area of which centre
 is in R of E^m and say 8' S of it The sweep of nebulosity on both sides
 clearly defining this dark area & blending away insensibly to S. & S.pr. is one of the grandest features
 of the nebula
 Field = 1.1 : Field = 34.3 not very exact $\pm 2'$ Shall use field = 36'
 8-6 By obs March 9th Field = 36'

- 3) Can discern light 1 field prec. & in parallel of E^m
 and 8' fol. (S^m = V^m) (2nd of Pinnisi stars) v. faint

- 4) A pretty strong body of light ^{in breadth =} $\frac{2}{3}$ ^{$\frac{2}{3} 7' = 4\frac{2}{3}'$} extreme length of Cam, extends
 $\frac{1}{2}$ field in parallel of T['] (of Cam) following it ^{in dir. sp. n.f.)}

- 5) Light extends strongly 1 field prec. & ^{& in parallel of T['] & thence suddenly fainter.} 2 v faint say
 $\frac{2}{3}$ field following

- 6) Faintly to 1 field prec. (30" north of) F['] 1 field = 2'

- 7) I think a faint nebulous ground is still discernible
 as far as $1\frac{1}{2}$ fields prec C' Or. & in parallel & with
 entire certainty $\frac{8}{10}$ field following

- 8) Quite decided light to $1\frac{1}{4}$ field n 45° fol. C' - ^{Faint} $\frac{8}{10}$ of field
 due north of C' & $1\frac{1}{4}$ field in dir. prec. 45° north (See 11)
 In obs Feb 27 nebulosity at least 20' n of C' and as much preceding. but both
 sky & power than used were less favorable.

Orion (cont) (Low power)

1864 March 3

Calm. very fine clear sky Power 90

- 9) The association of nebulosity about stars near C Orion is very remarkable. There are 4 striking examples including C' not reckoning C². The most remarkable is in Dec + 39° 5' α-d - 4' rough Double star 7th mag
- 10) Revised drawing of C' Orion made last night & with a few corrections made it entirely satisfactory
- 11) The coarse cluster straggling round a centre in +60' Dec - 10th α-d. gives so much light that I cannot decide whether it is enveloped in nebulosity from C'

Notes which follow were written out ~~from~~ on the 4th using rough memoranda put down on 3rd

- (1) Power - on 4th measured apparent field of view = 55°

$$\text{Power} = \frac{2 \sin \frac{1}{2} 55}{\text{field}} = 90$$

 Minimum eye strain Power 90 (roughly)
 [March 7 power = 91 by another method]

- (2) The grand sweep of nebulosity from D''' on one side, & Meisnerian branch on the other, bright & well defined on the boundary of the dark region enclosed by it south of E''' is a fine feature brought out with far greater distinctness tonight with the low power than I had before seen it. To the southward & s.p. side light shades off insensibly without decided feature excepting the nebulosity about & or a some of the neighbouring stars. The light to s.p. side of D''' associates itself so decidedly with that it should be classed among examples of that feature.

The whole of the nebulous wreaths from one side of the Trapezium Region is admirably displayed. rising like smoke of grass or weeds in a bonfire in filaments as it were & ascending past D''' bending round to a little n of & or.

Orion

Low power

which however it envelopes in its fainter southerly expansion

The dark area S of E''' is remarkable did not record its diameter but it must have been 8' or 10'

(5) A great diffusion of light n.p. & diminishing rather suddenly but continuing faintly as indicated by (6)

(7) I found it very difficult to fix the limit of light on *prec* side of C Orionis beyond about a field from that star. About Dec. +34' and R -30 to 35 is a region of comparatively few small stars. I always suspected diffuse faint light in approaching this region.

The connection of C Or. with great nebula is perhaps most decided with the low power in the diffused light extending S.p. from C. Though with the higher power Mar by way of Cam may be easiest discerned

Evidently the map of light from sub. C Orionis sweeps off southerly & especially S.p.

9) The association of nebulosity with stars R +1' Dec +33' = C Or. R -5' Dec +39' (very strongly) R 0' Dec +42' and R +2' Dec +38' is here referred to All these stars are coarsely double.

10) On revision was well satisfied with last night's sketch. made some additions & continued light S.p. C to its connection with great nebula about R -20' Dec +14'

It seems that the immediate neighbourhood of the Great nebula - especially the following side - & that of C Orionis have considerable areas comparatively clear of small stars. while at greater distances - as for instance far north of C Orionis - the ground of the sky assumes the aspect of the milky way - It is as though there had been a process of absorption into the nebula.

Orion

1864 March 3 (continued)

Purity of Sky throughout unexceptionable & definition quite good

Had made arrangements for drawing nebula to night
 & put the low power eyepiece (that given by Mr. Shimmer) and the
 object glass in condition for observing with least obstruction of light

Fortunately the night was one of the finest we ever
 experienced for the object particularly required - To trace the ut-
 most limits of the nebula - and the connection of ϵ & C Orionis
 with θ Orionis -

I do not know that I ever saw the best en-semble
of the nebula to such advantage.

To ascertain the limits of faint light, the telescope was
 moved rather quickly from a distance of several fields until
 the dimming of the light could be discerned. The operation being
 often repeated three or four times until the limit was definitely deter-
 mined on. I think that in most cases there was perceptible though
 barely visible faint light outside of the point taken.

G. P. B.

Zodiacal Light

1864 March 3

After finishing observations upon Orion the night being so clear I looked for zodiacal light to East of meridian. It could easily be traced ^{its axis passing} through Praesepe (near Meridian) - between γ Leonis & Regulus say 3° north of latter - to 3° north of Spica (Saturn) I am quite as certain of a decided trace of light - say 7° broad - in the region indicated as I could be of the milky way itself. It was in fact seen without any special attention & could be traced I think within an error of $\pm 3^\circ$ the whole way from meridian eastward to an altitude of 20° or 30° & less certainly much below.

I have many times before seen this trace of light but rarely if ever so perfectly. I have noticed as now - that it does not appear quite exactly in a great circle or uniformly broad - but slightly irregular wavering a little on one side or the other. I also that it is not so uniform in ^{the diffusion of} its light as the Zodiacal light & the sun is. In fact it has more the aspect of a very faint & narrow milky way.

That the Zodiacal light has so often been limited to about the region of the Pleiades - is plainly enough owing to the presence of the overpowering light of the milky way - just beyond that group - which arrests any attempt at further prolongation by entirely confusing the vision it is only at a considerable distance on the opposite side of this obstacle - & by ~~having~~ screening the eye from its light - as for instance by taking a station on the East side of a building that one can recover its continuity - If the phenomenon described be not the continuation of the ^{zodiacal} milky way light then it must arise from presence of stars as in milky way.

G. P. B.

Orion & Orionis

1864 March 7

Cleared up about 3^h a.m. time. Attempted to draw parts of the nebula north of ϵ Orionis & near D''' & E''' but was baffled by clouds & low altitude of the nebula. Though sky clear at times the contrast with the aspect of this part of the nebula on the fine night of 2nd & 3rd very striking.

$33'' < 7'' 0.7$. Thought $7'' 0.7$ fainter than usual companion uncertain being made with low power.

Field of view = 1.15 of Diff. θ & ϵ Orionis Shimmer eye piece
 Estimated Diff. $7.2''$ with this power subtended same apparent angle that $12''$ would with power 141 - actual diff. being $18.4''$ The power of this eye piece will be roughly

$$\frac{12}{18.4} \cdot 141 = 91$$

Orion

Micrometer put on.

1864 March 9th
G.P.B. obs.
J.H.S. rec.

Zone XVI See note 8 end of Book & March 12
by 1' 38"
by 2 13

by 2 45 The northern one precedes
by 3 22

Diff 36" by 3^d obs.
35" 1st "
37" 2^d "
36" By another obs 37" Mean 36.3 See charts of Reductions Zone XVI

Second of this Book

Note 19) No star in the place

Star of 5th 9th following N 6.5 and South 6.55"

End of Book

Note 17 No star in place of which 716; none in that decl.
within a field

End of Book

Note 5 Star I of Zone VIII

2 22 17.3
21 29.5
I 46.0

2 23 9.9
21 16.8
I 36.4

Orion

1864 March 9th

A fine clear night - Completed drawing of nebula about ϵ Orionis under very favorable circumstances. The sky being clear, dark & tolerably quiet - using "Shrimmin" eye piece power 90. It has been most fortunate that I should have secured these such fine opportunities as the 2nd, 3rd, and 9th of March at the very moment when most needed. The chart of stars near ϵ & ζ Orionis having been completed just in season to take advantage of them not one hour to spare.

The fine curve from S''' to region preceding D''' is composed of quite bright nebulosity contrasting strongly with the dark gulf or bay enclosed by it having its center about H''' and I''' . With this low power & large field - combined with the Mepician branch whence it issues at S''' and with the bright masses in $AR - 14'$ Dec $-4'$ (from θ') it forms decidedly the grandest feature of the nebula.

To the south of this feature [with the exception of the nebulous star ϵ - itself only a brighter very diffuse nebulosity surrounding the star - and the strongly nebulous coarsely double star δ p δ & ϵ Or. in $AR - 3'$ Dec $-37'$,] can trace no features but is a diffuse nebulosity shading off by insensible gradations.

There is a good deal of complication to δ & δ p (especially) of S''' the latter itself belonging decidedly to the class of stars having nebulous appendages the connection of nebulosity being perfectly decisive.

but certainly recognizable

A rather faint & irregular bridge of light traverses the dark bay passing the neighborhood of H''' I''' to S''' . It does not much affect the general darkness of this bay.

The star η p O''' N''' about $AR - 2'$ Dec $-15'$ as I have often before noticed is very strongly nebulous the light connecting with R'' .

Traced very clearly the upward (southerly) sweep of nebulosity in region far prec. (& η p) θ' - Especially a remarkably dark vortex in $AR - 16'$ Dec $+6'$ from θ' & wispy convolutions stretching s.p. over region about $AR - 24'$ Dec $+5'$ forming last of principal light on this side of nebula. Beyond are no

Orion.

details. From this vicinity a strong map of diffuse light connects with C' Orionis.

The S. of sweep of nebulosity throws over region between $1^{\circ}1'$ and $0^{\circ}0'$ well seen. This part of nebula more regular in the curvatures of wisps and N.B. the presence of fewer stars of all grades is it an absence of disturbing clusters of disturbance?

The limit of faint light (not faintest) well pronounced passes $1'$ to n of $N^{\circ}N^{\circ}$ & $0^{\circ}0'$

Recognized the three communications between C Or. & θ' - The middle one is least evident of three

Tried to fix a limit of nebulous light from C Orionis in direction of the coarse cluster n p it. The nebulosity certainly penetrates the S. side of Cluster say to be $+56$ but the number & brightness of stars as the nebulosity grows fainter makes it impossible to follow it through the cluster with certainty - Though it can be traced further on either side of pre. or fol. cluster. [N.B. March 3 traced to $+62'$ with more care & with finest possible sky]

With Comet seeker it appeared that the three star-groups about θ' & C Orionis were projected upon a ground comparatively less mapped with milky-way stars than the more distant regions. At least one might fancy that the three groups were supplied somewhat at the expense of contiguous territory. Thus if we suppose θ' & C grouped as in margin the region surrounding to a distance represented by dotted lines has fewer stars or less of star dust than that outside of it.

The middle star, especially, of belt of Orion has an evident aggregation of stars about it.



Orion

Zodiacal light

1864 March 9 (continued)

Micrometer put on.

Clear

Returned micrometer

- Power 141

8^h s.d. $\gamma''\gamma'' = \gamma''\gamma''$ $\gamma''\gamma''$ v. bright 8th mag. $\gamma''\gamma'' > M'''$

2.5 to 3?

too large for safe comparison

 $\gamma''\gamma'' > M'''$

2.5 "

"

 $\gamma''\gamma'' > D'''$

0.5

 $\gamma''\gamma'' > E'''$

0.7

 $M''' = \gamma'$ $\gamma''\gamma'' < 2' \quad ?$ Region $\gamma''' \pm 0'''$


faintest of the three & strongly nebulous
14th mag? suspect it is fainter than
two weeks or so ago

Zodiacal Light?

Saw again the zodiacal? light east of meridian at 10^h 30^m - not p.m.
through "Praesepe" 2° n. of Regulus thence 2° n. of Saturn - Mr.
Safford at about 9 30 saw it & described its course without hes-
itation within $\pm 2^\circ$ of my estimate.

On West axis passes a little s. of Pleiades say 1° or 2° & thence
is soon lost in Milky way until resumed in neighborhood
of Praesepe

Saturn's satellites

1864 March 9
JHS

Copy of original notes 1864 N^o 4 of detached slips

1. For Test of Position Sideline between $10^h 30^m - 10^h 55^m$
Object: Japetus

W	R	dt
261° 0'	59.906	16 ⁷
	60.326	
2	59.700	21 ⁷
	60.148	
3	59.550	22 ⁵
	59.928	
4	59.500	29 ⁵
	60.068	
263° 1'	60.068	29
	59.272	
6	60.061	22.5
	59.362	
7	60.079	33
	59.025	

2. Transits of J

W = 351° 50' 1. Japetus - Saturn } 3 sets alternately of each
Japetus - Titan }

Pown 141
"

2. Titan Saturn } 2 half sets
Titan Saturn R/B 5 or 4 sets

3. Declinations Japetus - Saturn by scale (4 obs) Pown 141
Japetus - Saturn " " (8 obs) — 206

W = 351° 28' 4. 5 sets of transits Titan - Saturn
by mistake 5. 5 " " Japetus - Titan - Saturn

Japetus appeared nearly of the magnitude of Titan. a star nearly
There was no striking difference between Japetus and the
in the same HR but 5 or 6' south.

Saturn's Satellites

1864 April 9.
H.S.

$H' = 35^{\circ} 50'$

				ϵ	β	ρ true i(R+B)	ρ Saturn - Saturn	Long	Lat	ρ Saturn - Titan
Jupiter	11	0 56.35	62.1			60.22				
Titan	1	00.6	34.25			32.42				-32.20
Jupiter	1	49.3	54.55			51.92	-36.49			
Titan	2	21.5				24.08	-4.33			-32.16
Saturn I		24.3	29.45	28.39						
" II		25.4	30.4	28.42		28.41				
" III		26.41	31.5	28.7						
" IV		27.35	32.45					3.02	1.05	
Jupiter	2	40.0	15.3			12.65				-32.15
Titan	3	12.2	17.4			14.80				
Jupiter	3	33.2	38.35			35.78	-36.50			
Saturn I	4	8.2		970		12.28				
" II		14.2		14.65						
" III		15.5								
" IV		11.2						3.00	1.30	
Jupiter	4	35.9	30.9							-32.08
Titan		57.85	3.1							
Jupiter	5	23.85	28.9			26.39	-36.50			
Saturn I		58.85		0.32		2.88				
" II			4.75	5.42						
" III			6.1							
" IV	6	1.8						2.95	1.35	
Jupiter	7	36.15				-4.38				
Saturn I		11.55		43.02				2.95		
" II		11.5								
Titan	8	8.0				-4.32				
Saturn I		10.8		12.32				3.05		
" IV		13.85								

Saturn's Satellites

1864 March 9

W¹ = 355° 50'

				R	To center line	Teta-Sat.	Dist. of
				R	B	B	R
Titan	11	7	26.0	32.65		29.82	-4.40
Saturn I			27.05	—	30.50	30.14	
II			29.95	37.4	37.95	34.22	1.10
III			31.05	36.5			
IV			32.6	—			
			54.65	62.15		58.40	-4.34
			57.5	—	58.95	2.74	2.9
10			5.9	—	6.52		1.25
			7.15	—			
			2.4	—			
			58.4	65.85		2.12	-4.37
11		1.2	—	2.65	10.32	6.49	2.9
		4.1	9.7	—			1.25
		—	10.95	—			
		4.1	—	—			
11		28.95	36.5	32.72		32.72	-4.34
		31.85	—	33.32		37.06	2.95
		—	40.2	—	40.80		
		—	41.4	—			1.20
		34.8	—	—			
11		55.9	3.5	—		59.70	-4.39
		58.8	—	0.3		4.09	3.00
		—	7.3	—	7.88		1.15
		—	8.45	—			
12		1.8	—	—			

There was some difficulty in locating the numbers read from the sheet in this and the previous set

Saturn's Satellites

1864 Mich 9
7145

Jupiter and Saturn compared at Transit across Solar

Down	141	Scale	El.	7	8	El.
Jupiter	6 46	11	14 2	Jupiter	6 45	11 37 29
h II	4 27.5			h III	4 43:	
J	6 48		15 27	J	6 29.5	38 48
h III	4 48			h II	4 8	
J	7 2		17 2	J	6 59	41 8
h IV	5 31.5			h I	4 46	
J	7 56		18 27?	J	7 50.5	41 21
h II	4 34.5		19 5?	h IV	5 40	
Down 206	(all after this 206)					
J	6 42.5		23 7			
h I	4 29					
J	6 16		25 25*			
h II	3 56.5					
J	6 17		25 50			
h III	4 14.5					
J	7 0		27 17			
h IV	4 49					

* It should perhaps be noted that what Prof. Bond calls 4' 30" for instance I call 2' 30" and so on. Prof. B's readings will have many - signs, mine none; but on the contrary his go beyond about 10' 20" while mine go to 11' 20" with Power 141.

* A time was probably lost between 11 23 7 and 25 50

Saturn's Satellites

1864 March 9
JWS

N ^o = 351° 28' by <i>instrument</i>				R	B	dist. w/ 2(R+B)	dist. to R	Diana of Ring Ball	
Titan		11	44	36.65			-4.15		Half wt. (over)
Saturn I				39.4	40.60			2.8	
IV				42.2					
Titan				56.85	56.85		-4.23		Half wt. (over)
Saturn II				58.55	59.08			1.05	
" III				59.6					
Titan		45	8.7	15.8			-4.19		
Saturn I			11.35	—	12.88		16.94		
II			—	19.4	20.00				
III			—	20.6					
IV			14.14	—				3.05 1.2	
Titan			34.95	41.7	38.32		-4.34		
Saturn I			—	44.7	46.20		42.66		
" II			38.6	—	39.12				
" III			39.65	—					
" IV			—	47.7				3.0 1.05	
Titan		46	4.1	11.1		R	R		
Saturn I			6.7	12.9	12.80		-4.15		
" II			—	—	11.70		11.75		
" III			9.7	16.7					
" IV								2.90	Double right to diam
Titan			30.4	37.5		B	B		
Saturn I							-4.24		
" II			34.2	41.1			38.19		
" III			35.2	42.25				1.08	
" IV									

Saturn's Satellites

Shipboard
7195

W = 251° 28' (by azimuthal method)

				Day	Date	Distance from Saturn (1000)	Latitude - Saturn	Diameter R	Latitudinal - Saturn
Jupiter	41	48 58.7	65.7	1		62.20	-56.36		-32.15
Titan	48	30.8	37.9			31.35	-4.21		
Saturn I	3	40.6	42.05			38.56		2.9	
" II		34.45	—		35.08			1.25	
" III		35.7	—						
" IV		—	43.5						
Jupiter	48	53.0	60.15	5		56.58	-36.32		-32.12
Titan	49	25.1	32.3			28.70	-4.20		
Saturn I	27.9	—	29.55			32.90		2.9	
" II		35.9	36.45					1.10	
" III		37.0							
" IV		30.8	—						
Jupiter	50	1.4	8.5			4.95	-36.39		-32.27
Titan	33.65	40.8				37.22	-4.12		
Saturn I	—	13.4	44.92			41.34		3.05	
" II	37.25	—	37.75					1.00	
" III	38.25	—							
" IV	—	46.45							
Jupiter	46	58.1	65.4			1.75	-36.34		-32.20
Titan	47	30.4	37.5			33.95	-4.14		
Saturn I	33.1	—	34.48			38.09		2.75	
" II	—	41.1	41.70					1.20	
" III	—	42.3							
" IV	55.85	—							

Mean Diam of Ring

 $\frac{5}{1000} \times \frac{\text{Thick of Ring}}{\text{of Ball}}$
 2.953

1.150

by observation

$$d = \frac{\text{amp}}{1000}$$

22 4276

Orion

1864 March 12

6^h 30^m Clear fineI looks fainter $\delta = \epsilon$ δ not $> \epsilon$ (or brightest of ϵ & δ)

This comparison carefully examined

 δ $9''9'' < 11''11''$ 0.5 δ $< 11''11''$ 2.0 δ $< 7''7''$ 2 δ $< 7''$ 0.3 $9''5'' > 0''0''$ 0.5

Diminution of $9''9''$ most remarkable since δ .
 $9''9''$ Much too small to be compared with $7''7''$
 On $9''$ my impression was that $9''9''$ was at its brightest.
 Looking hastily thought $E'' < D''$

W. W. Angle of Position $172^\circ 14'$ Edge of scale

Revision of Zone XIV

Begin at 6^h 47^m L. S. Time

Begin with D

	~~Mg~~	Sec.	$\Delta\alpha$
α_1	~~15~~	2' 55"	0.55
α_{m_1}	15	4 58	1.35
α_{m_2}	16	2 40	2.75
ϵ_1	16	0 59	8.0
ϵ_2	16	10 0	-0.75
ϵ_3	16	-0 20	1.00
ϵ_4	17	4 20	4.0
ϵ_5	15	1 12	7.0
ϵ_6	12	3 43	12.0
ϵ_7	16	6 30	20.0
ϵ_8	16	2 35	23.75
ϵ_9	17	4 30	8.0
ϵ_{10}	17	2 10	-2.0
ϵ_{11}	17	4 15	+0.75
ϵ_{12}	17	7 50	+6.0
δ_1	16-17	7 10	-8.75
m_1	16-17	-1 0	-11.0
m_2	15	3 30	-0.75
m_3	15	8 28	0.
m_4	10	-0 57	+1.
m_5	13-14	8 16	+5.75

D reads 5.59 not 4.59

Assumed

XIV beg. 6 47 $h = +1^h 19^m$ $\theta = +33$
 end 7 23 $+1 55$

XIV D 4 39 38.8 W 4 43 49.2

- 4 41 53.4 - 4 41 53.4

- 2 14.6 + 1 55.8

0.5

+ 20

 d_1 - 2 14.1 w_2 + 2 15.8Follows ϵ which is hard to observe

1864 Aug 12

9.13 obs

2.1.5 rev.

	Mag	δ	Δ
m_1	12	2 48	-0.5
m_2	13	8 45	2.38
9-2	16	-0.50	-5.75
9-1	16.17	3 0	-2.25
3-1	16	9 32	-9.75
m_1	16	7 5	-0.625
m_1	17	6 45	+2.0
m_2	18	-0.52	+20.0

Revision of Zone XIV continuedF is 8th mag comp 10th app. dist 8" Pos. 295° ←

The Stars near $\epsilon \epsilon' 2''$ (Zone VI) were examined to see if ~~Zone VII~~ ^{Zone VII} was ~~affected~~ ^{by moonlight}. One of 7 or 8 was seen with great difficulty, but most of 17th would not have been over looked tonight.

[Revision of XV beginning with F]

f_1	14	2 48	0.75
f_1	16	0 35	-4.75
g_1	14	2 12	+2.50
g_2	15	0 15	7.5
h_2	16	0 35	-4.75
h_2	16	-0.20	-4.5
h_1	15	1 28	-2.0
i_3	16	6 0	-5.0
i_3	15	9 40	-3.75
i_1	15	6 45	-2.5
i_0	17	2 45	0.
i_1	15	0 3	4
k_2	16	9 5	-1.75
k_1	16	0 50	-4.25
k_1	15	2 45	+1.75
k_2	16	0 25	-3.75
k_3	14	2 15	-10.5
k_4	16.17	2 30	12
m_0	13	8 0	0.

Over.

The ^{faint} magnitudes, as appeared from comparison with stars near $\epsilon \epsilon' \epsilon''$ (Revision of Zone VI ^{Feb 27} when night was clear dark & favorable) are affected by the moon light & perhaps haze, to night, to the amount of about $\frac{3}{4}$ of a magnitude, but as greater effort was made to include the smaller stars I think that the registered magnitudes of tonight for revision of XIV will not need correction - and that a diminution of $\frac{1}{2}$ mag. for stars of 17 16 & 15 & 14 mag will be a sufficient allowance in the Revision of XV

Adopted

XV	beg	7 ^h 33 ^m	$h = +2^{\circ} 5'$	Ther. +33°
	end	8 09	2 41	
XV	δ	5 245.0	M	5 3 44.9
		-5 4 59.7		-5 4 59.7
		-2 14.7		-1 14.8
		0.7		+13.0
		-2 15.4	m_2	-1 01.8

Orion

1864 Dec 12

GPP Bob

JMS

m₁ H₂m₂ H₂16 0.45 13.0⁵

17 2.15 + 7.5

18 0.45 13.0

grew quite cloudy. Had previously looked at sky
 & found it quite clear about Orion - Moon being not far
 distant - The clouds had risen from the West & I
 think came on rather suddenly.

Revision of Zone X not finished. (Sun March 14)

Saturn's Satellites

18th March 1875
J.H.S.

Chronometer 236. [45° 34' of 26]

Lamp below -

Chr. time

N = 261° 49' close going

10 20 49	Saturn	64.176
10 22 10	Titan	68.657
10 23 28	Saturn	65.224
10 24 50	Titan	68.708
10 26 46	Saturn	65.302

65°

An 2nd

Saturn observed by the method of
equal segments of the range if C be minimum
we shall have $\Delta\delta = \text{Titan} - \frac{1}{2}(C + T)$

Lamp above

10 31 38	Saturn	65.720
33 5	Titan	68.888
35 14	Saturn	65.764
36 55	Titan	68.882
38 4	Saturn	65.908

The position of the lamp seems to make a large difference, which will be mostly
eliminated by the reversal

Clock taken out and Japetus obs'd by diagonal Transit. Saturn observed with it
by equality of portion of ring cut off by ~~the~~ ^{min} wire 

N = 263° 1' Lamp above	10 44 8.2	Japetus	57.363
	44 46	Saturn	66.611
	10 46 15	Japetus	57.364
	46 46	Saturn	66.611
	10 48 26	Japetus	57.266
	48 57.5	Saturn	66.611

Coincidence next day same position nearly

66.658	66.611
57.6	
654	66.615
576	
618	66.611
554	

N = 261° 6' Lamp below	10 53 26	Japetus	57.049
	53 6	Saturn	66.611
	10 55 22.5	Japetus	57.102
	55 58	Saturn	66.611
	10 56 52.5	Japetus	57.102
	57 23	Saturn	66.611

The

Satellites of Saturn

1864 March 12th
M.S.

For Low of Position		Δt		I	
Titan		Δt		I	
$21^h = 261^{\circ} 6'$	$10^h 57^m$ 52.240 51.810	20 ^s	8.1485	261° 54'	
	52.300 51.655	30	8.1485	54	
	52.350 51.733	30	8.1294	52	
$21^h = 263^{\circ} 0'$	51.733 52.690	29	8.3346	46	
	51.735 52.604	29	8.2926	52	
	51.735 52.539	27	8.2900	53	
					261° 52' 2"

Satellites of Saturn

1864, Dec 12th

745

Lamp East

				R	13	$\frac{1}{2}(R-B)$ mid Wnd	Satellite - H R	
11	18	47.2	56.6				- 33.75	= W + R
	19	19.5	~~22.45~~	20.98				
		—	29.7		?			
		—	30.65					
		22.45					$\frac{1}{2}(R-B)$	
20		0.45	12.45			6.65 40.39	- 33.74	
		33.1	—	34.58				
		—	45.6		46.20			
		—	46.8					
		36.05	—					
		46.3	56.0			52.15	+ 9.76	
21		23.45	36.15			29.80 3.52	- 33.72	
		—	5.5	9.95	2.45			
		36.5	—	~~57.4~~	57.10			
		57.7	—					
22		~~47~~	11.40					
22		6.7	19.7			13.20	+ 9.68	
22		39.0	57.6			45.30	- 33.75	
23		—	11.2	12.60	12.60	19.05		
		24.9	—	~~25.10~~	25.50			
		26.1	—					
		—	14.0					
		22.25	35.15			28.70	+ 9.65	
23		48.3	61.35			54.82		
24		—	33.65	35.10	~~35.40~~	28.61	- 33.77	
		21.5	—	~~22.12~~	22.12			
		22.75	—					
		—	36.55					
		31.7	44.8			38.25	+ 9.64	
25		3.3	16.3			27.90 43.64	- 33.64	
		35.65	—	37.10				
		—	43.6		50.18			
		38.55	50.15					
		40.55	59.9			53.38	+ 9.74	

2^d wire had the original notes

564 Mark 12

2145

			R	B		
11	27	54.35	67.5		0.92	-33.74
	28	26.7	—	28.20	34.66	
	—	—	40.59	41.12		
	—	—	41.7			
	29.7	—	—			
	36.0	51.0			44.50	+ 9.84
29	3.55	16.45			10.00	-33.78
	~~4~~	48.8	50.25		43.78	
	36.7	—		37.30		
	37.9	—				
	—	51.7				
	47.0	60.0			53.50	+ 9.72
30	26.25	39.45			32.65	
	58.7	—	0.20	12.15	6.68	-33.83
31	—	12.6				
	—	13.7				
	01.7	—				
	9.9	23.0			16.45	+ 9.77
32	6.35	19.3			12.82	-33.84
	38.7	—	40.15		46.66	
	—	52.5		53.18		
	—	52.85				
	41.6	—				
	49.95	62.95			56.45	+ 9.79
33	20.7	33.65	~~27.10~~		27.18	-33.72
	52.9	—	54.38		00.90	
	—	6.9		7.42		
	—	7.95				
	58.85	—				
34	4.2	17.25			10.72	+ 9.82

Orion

1864 March 14

Sky Clear - Definition pretty good.

Sect. 6 "30" $\theta''\theta'' < \theta''\theta''$ 1.0
 " $> \theta''\theta''$ 1.0
 $\theta''\theta'' > \theta''\theta''$ 1.7
 " $< \gamma'$ 0.3
 $\theta''\theta'' < \theta''$ 0.7
 $\theta''\theta'' > \theta''$ 3
 $\theta'' < \gamma'$ 0.3
 $E''' < D'''$ 0.3
 $E''' > \theta''$ 0.5

$\theta''\theta''$ is much too faint for comparison with θ''
 $\theta < \varepsilon$ $\theta < \zeta$ θ has become decidedly fainter.

Too large for comp

ρ is readily seen of usual brightness - $\theta''\theta'' \times \theta''$ as usual. No θ star since Jan 4 though always looked for - No trace of θ'' star near θ''
 θ'' precisely on edge of nebula when there is still some twilight within $\pm 1''$

Revision of XV (continued from March 12)

O of Zone IX is 10th

Moonlight too bright for the small stars.

Partial Revision of Zone IX Moonlight

	θ''	θ''	θ''
θ''	15	1 35	+2.5
θ''	15	8 2	3.5
θ''	15	3 58	4.5
θ''	14	7 20	0.5
θ''	11	-0 7	1.0
θ''	15	3 35	4.5
θ''	16	6 0	-1.0
θ''	15	9 35	-7.0

Note added Apr. 18 1864 - θ'' seemed in first right that "Revision" of XV was incomplete as the last star has $\theta'' = 4''$ but it appears that observations in the vicinity have few small stars between $\theta'' = 4''$ and $\theta'' = 15''$

Adopted

By Star No 7 40 h: +2 12^h Apr 26

End. 7 55 = +2 17

Position circle set at $272^\circ 13'$ XV θ'' 5 4 44.0 W 5 6 11.4

-5 4 59.7

-5 4 59.7

 θ'' -0 -0 15.7

+1 11.7

Zone seems not to have been completed to limit

 θ'' -0 13.7 θ'' +1 4.7

Thr + 36

Mean cor to zone XVI by AC & K = $\frac{6}{4} = +1.5$ θ'' 3 14.0

8 1 45.0

47.7

2 20.7

41.5

55.0

Cor to XVI

+5 3 57.1

+5 4 0.2

33.6

(-12) ?

57.7

+10 5 7.1

Mean cor. to XVI by AC & K

 θ'' 2 36.0 θ'' ind. to XVI 2 42.7 θ'' in XVI 2 41.0

+1.7

Rounded at first. 11

Cor. θ'' in XVIObs. of θ'' & θ'' Zone XVI

A	9 3
C	9 16
θ''	3 14
θ''	8 28
K	1 9

A	8 58
C	9 13
θ''	2 36
θ''	8 42
K	1 1

Zone seems not to have been completed to limit

Orion

1864 March 14

Zone XVI. revision of some stars (continued) G. 2

A	8 56	8 6	29.7	9 in 37" 2.7	Cor. to XVI by A & K	+11.7		
C	9 6		32.6	Cor to XVI for G	+1.7	-7	3	7.9
F	3 2	7	5.7	G.	<u>2.41</u>	7 incl. to XVI	3	18.7
I	8 18		30.3		2.42.7	7 in XVI	3	14.0
K	0 57		40.1		<u>-0.5</u>	Cor of 7 in XVI		+4.2

Star B of XVI = C, XVII

B is 9' 32" north of A
 " 9' 45" " C

Star B is C of Zone XVI
 " " " " " " " " " " " "

Zone XVII

March 14, 1864, Zone XVI.
 -0 29
 27
 0 28
 70 4.2
 -70 32.2

Dec. of C Zone XVI is
 25" too far south

0 27
 9 43

B 0 27

C 9 43

Back to XVI

9 16
 27
 9 43.7
 14.3
 9 41.3
 30 14.1
 -70 32.8
 70 32.2
 -70 32.2

Dec. C Zone XVII March 14

Revision of XVI small stars of 16 & 17 not visible from decaligph.

V of Zone XVII is 8-9

h ₁	~~h_a~~	B=14	4 12	+5.0
h ₂	h _f	14	5 40	+10.0
i ₁	i _b	13	10 10	-13.5
i ₂	i _a	14	8 42	-1.5
	i _n	13	10 12	+0.5
	i _o	12	7 52	+4.5
	i _o	15	1 45	
	i _c	14	4 40	+5.25
	i _d	14	5 48	+6.5
	k _a	11	3 16	+1.25
	m _a	15	8 47	-2.75
	m _a	15	2 37	+13.0
	p _a	14	6 15	+5.0
	m _a	13	6 0	-1.85
	w _a	13	3 20	+1.75
	z _a	14	0 30	+7.25

Adopt.

XVI beg 8 20 h = +2 52 Th 26
 end 8 47 +3 19

XVI H 5 13 17.5 Z 5 17 31.5
 -5 15 26.2 -5 15 26.2
 -2 8.7 +2 5.3
 +8.0 +7.3

h_a = h₁ -2 0.7 +2 12.6

Orion

1864 March 14th (cont.)
clear-

Moon in 1st quarter & being near the nebula its light overpowered the smaller stars and it will be necessary to revise again $\delta\gamma$ (the latter half) and $\chi\psi$

Have used for edge of Great Orion March 9
Zero of pos 172 19

Orion

1864 March 15

Clear - good definition Clouds in West
Moonlight strongSid. time 6^h 40

$$\gamma''\gamma'' > \eta''\eta'' 0.7$$

$$\gamma' = \eta''\eta''$$

$$\gamma''\gamma'' > \rho'' 1.5$$

$$\mu''' < \zeta' 0.3$$

$$\mu''' > \gamma''\gamma'' 2$$

$$o''o'' < \eta''\eta'' 0.7$$

 $\gamma''\gamma''$ evidently brighter than on 14th

$$\mu''' : \zeta''\zeta'' = o''o'' : \gamma''\gamma''$$

$$o''o'' \text{ is } 11-12^{\text{th}} \text{ mag}$$

$$\eta''\eta'' \quad 10 \text{ to } 10-11$$

$$\gamma''\gamma'' \quad 10$$

} Perhaps not to be
frustrated as it clouded
suddenly.

I suppose that $\gamma''\gamma''$ passed a minimum between 12th & 14th of March
& was at max. (maximum?) on 9th. My impression
at the latter date was that $\gamma''\gamma''$ was as bright if not brighter
than I had before seen it. The 13th March was unfor-
tunately cloudy.

Vision quite good

Order of brightness

$$\beta > \gamma_1 \text{ slightly? } \gamma_1 > \rho \text{ not much.}$$

$$\rho \text{ readily seen as usual}$$

$$\sigma \text{ considerably } < \rho$$

$$\xi \pm \pi \text{ not very difficult}$$

 ω (1st star) not visibleOn the whole, with the exception
of ω I can recognise no instance of evident variation in these stars δ is now certainly $< \epsilon$ or ζ under fine definition

Sirius

1864 March 15th

G.P.D. obs.
J.A.S. rec.

Companion well seen &

Angles of Position

wins.

$92^{\circ} 23'$

Clouded

There are at least
radius of $11'$ from Sirius.

difficulty within a

180
52
232

Sirius

1864 March 15th

G.P.B. obs.
J.H.S. rec.

Companion well seen before it clouded.

Angles of Position of Stars' companion power 316

Wm.

$92^{\circ} 23'$

Clouded up.

There are at least 50 stars to be seen without difficulty within a radius of $11'$ from Sirius.

Orion

Micrometer

1864 March 16

Cleaned off late

Sid 8° 30

 $\theta''\theta'' > \eta''\eta'' 2.5$ $" < \mu''\mu'' 0.3$ $\mu''\mu'' < \zeta''\zeta'' 2.5$ $\epsilon''\epsilon'' > \delta''\delta'' 0.3$ $" < \zeta''\zeta'' 1.5$

carefully made

 $\delta < \epsilon$ or ζ 1.5 very plainly δ decidedly fainter than it was a week since. It is no doubt variable. $\zeta' = 7/8$ $\beta''\beta'' = \text{Star } \theta^2 = 7/8$ $\epsilon \text{ Lowell } \text{" } \text{near } C'_{\text{Orion}} = 7.8$

$\left\{ \begin{array}{l} \text{Then } \theta \text{ is nearly equal and } = \nu'' \text{ and are less by} \\ \text{full } \frac{1}{2} \text{ mag than fainter of the two bright stars} \\ \text{S of } \epsilon \text{ Orion } = \text{S of } \text{Zone XII.} \end{array} \right.$

N.B. Noticed that there was a relative parallax of wires of Micrometer when the eye was moved as far ^{from axis} as pencil from eyepiece permitted, power 316, amounting to $1''.5$ or $0''.7$ on each side. By estimate not very certain.

Iris (Iris)

1864 March 16th

7145

$\alpha = 352^{\circ} 0'$ $\times$ 3 33.5

Scale 1000 α 9 34

AR and DR

$\times$ 3 15

α 9 16

Declinations about $\times$ 1 34.5

12^h after AR α 7 36

$\times$ 3 55

α 9 55

$\times$ 3 10

α 9 11

$\times$ is *Iris* South preceding α AR of $\times$ 11 34 24 $-6^{\circ} 42' 5''$

α 11 34 ... $-1^{\circ} 36.5'$

α is unknown; not found in the catalogues. About 9th magnitude

Iris

5th March 16

W.A.R.

Planet compared with star A.R. 13448 $P = -6^{\circ} 27' 1''$ for 1461
Planet S. p. star.

Object	Chrom. time		W'	Scale	Ampl.
	I	II			
Star	10 29 33.2	37.2		7 30.5	
Planet	29 04.8	8.5		1 59.0	
Star	11 31 11.3	15.4		7 50	
Planet	30 42.9	46.8		1 59	
Star	10 32 56.4	60.4		7 50.0	
Planet	10 32 29.2	25.1		1 59.5	
Star	10 33 23.4	27.1		7 50.5	
Planet	33 51.9	56.0		2 0.0	
Star				7 49.5	See original Iris obs. comes from film lost by ink failure
Planet	11 37 20.			1 58	

Jan

1864 Dec 16
H. A. R.

566 hand 16th

fris

Saturn's Satellites - Japetus

Orion

New Double star (seen by W. E. B. 14th Dec 1891
Aug 1)

1864 March 17

Fine definition

Power 316 (This is noticed by W. E. B. 14th Dec 1891)

New Double Star $\approx S'''$ Double $1''.25$ comp. 9^{th} S. pos 180° 7th Sec Power 141 " C' Orion " $2''$ " 9 S/p. 225° $1'' > A'' 0.7$

Set wires 2"

 $" < M''' 1.7$ $1''$ seems rather fainter than on 16th $4'' > M''' 2.5$

Two large diff. for good comparison -

 $" > " 3$ $M''' < E''' 0.3$ $D''' = E'''$ S''' prec V''' & is $\frac{1}{2}$ or $\frac{3}{4}$ mag smaller

Notwithstanding bright moonlight the small stars near θ' such as σ , ζ , π
 & ρ & are readily seen ρ is much $> \sigma$ & generally seen with ease.

Owing to uncertainty from passing clouds could not
 make comparisons of magnitudes about C & E Orion as designed.

$h = w$ looked for not seen. Nor 'new star' near $1''$. Then two stars have
 been regularly sought for on every night when atmosphere was not very
 much disturbed.

Sirius

1864 March 17

Definition good-

Power 316

In Dec - 7° H $0^h 40^m$ west

Zero of Pos wires

82 182 3 $90^{\circ} + 82 2$ 90 11

76 57

89° 43'

94 10

95 55

93 57

92 12

98 11

67.737

67.768

67.650

55

67.718

66.635

1088

65.458

65.535

65.483

276

65.492

66.635

1 143

Zero

66.632

1642

631

66.635

Orion

1864 March 18

Rising clouds - but comparisons considered perfectly secure -

Sid 6^h 30 Strong twilight & Moonlight

$$\gamma'' < \alpha'' \alpha'' 0.5$$

$$\alpha'' > \theta'' \theta'' 1.0$$

$$\alpha'' < \theta' 1.0$$

$$\alpha'' < \mu''' 2.5$$

$$\gamma'' \alpha'' > \mu''' 3$$

$$E''' = D'''$$

 δ is brighter and now = θ or α fully

At about 6^h 35^m sid when the small stars near θ' were in sight - even θ & α by putting α Orionis in centre of field only 8 stars including α & its companion could be seen within limits of field power 141 - Looked several times for fear of casual clouds but with same result

Mon - Revision of Magnitudes

1864 March 18

Stars near ϵ Orion compared with magnitudes in Sternverzeichnis
No in Sternverzeichnis.

GPB magn. Dec -1° mag. ^{from Star} Obs. Began at about 7^h Sid. ended at 8^h 15^m

8.9 983 (9.3)

9.8 987 (8.1)

11.1 989 (9.4)

8.9 990 (8.4)

9 991 (9.0)

10.11 993? (9.5)

Reads

3 52.5 7.5

4 38 3

10.9

about 6 1004 (6.2)

5 19.5 8.5

9 1006 (9.3)

10 faint 1011 (9.5)

9.10 1029 (9.5)

9 1040 (8.9)

10.11 1041 (9.5)

8.9 1055-red (9.2)

Zone VI of preceding book near ϵ Orion

Mag

Star

9

B

12

D

11

E

11.12

F

12

G

8.9

H

8

I (as one star)

10

K

8.8

L

9

M

9.8

N

10.11

O

10.11

P

10.11

Q

12

R

10.11

S

Orion Magnitudes

1864phae.proj...207B

1864 March 18 cont.
gpc do

Revision of mag. continued
Stars near 2 Orions

Zone XII

Est. mag	Star
* 10	71
9.10	L
12	M
10	P
9.10	Q
8.9	R
7.8 from	S
7	T
8	U
8 and 7.8	V
5	W
9	X
9.1	Y
12	AA
7.8	BB
10.11	CC
7.8	DD
12	EE

Telescope set back upon stars over-riding near 5 Orions 4° higher alt than nebula

Mag. N. 5 Orions.
gpc -0° mag from any star.

14	8	982	(8.0)
15	9-9.10	991	(9.3)
16	10	995	(9.4)
17	9-9.10	997	(9.1)
18	9.10	998	(9.3)
19	9	1002	(8.9)
20	8	1007	(8.6)
21	10	1010	(9.5)
22	10	1014	(9.5)
23	9	1016	(9.3)
24	8.9	1018	(9.2)
25	9.10	1022	(9.4)

Orion Magnitudes

1864 March 18 (cont)

26	9	1028	^{Mag. from star} (8.9)
27	10	1030	(9.5)
28	9.10	1040	(9.5)
29	9.10	1043	(9.5)
30	9.10	1048	(9.5)
31	9.10	1050	(9.5)
32	10	1053	(9.5)
33	10	1055	Two stars close together
34	10		(9.5)
35	9.10	1066	(9.4)
36	10	1069	(9.5)
37	9.10	1071	(9.5)
38	9.10	1072	(9.5)
39	10	1078	(9.5)

Orion = Zones (from nebula) Old Zones near θ Orionis
mag 1856

40	A	9.10	A	(10.22)
41		12	B	(12)
42		10.11	C	(11)
43		10	D	(10)
44		10	E	(11)
45		9.10-9	F	(10)
46		10	G	(11.12)
47		10	H	(11)
48		10	I	(11.12)
49		8.9	K	(8.8)
50		9.10	L	(9.10)
51		9.10	M	(10)
52		11.12	N	(11.12)
53		13	O	(12)
54	-	12.13	P	True (11.12)

Orion

1864 March 18 (cont.)

Old Orion - Loney
mag. starsMag. estimated by G. P. B.
1858 mag.

55	9	Q	(9.10)
56	9.10	R	(10)
57	12	S	(11.12)
58	12	T	(12)
59	13	U	(12)
60	7.8	F'	(7.8)
61	9	A'	(10)
62	12	A'	(12-12.13)
63	12.13	B'	(12.13)
64	10.11	E'	In 1858 C'(10.11-11) > F', H', C-C' < 2' 1/4 mag
65	10.11	D'	" D(11-12.12)
66	10.11	E'	" E'(12)
67	10	F'	(10.11-11)
68	12	G'	(12-12.13)
69	10.11	H'	In 1858 H'(12)
70	10.11	O'	" O'(12-11) = E'
71	9.10	Q'	2'(11)
72	11	R'	R'(13) and < 12-13 A' = R'
73	7.8	T'	(7.8)
74	14	U'	(12)
75	9	W'	(10)
76	12	X'	(12.13)
77	13-14	F''	(13.14)
78	13	G''	(12.13)
79	12.13	H''	(13)
80	10.11	I''	In 1858 (11.12)
81	11.12	K''	(12) K'' < E''
82	12.13	L''	(13)
83	10	M''	(10.11-11)
84	9	N''	(9.10)
85	10	P''	" (11-12)
86	12	O''	(12.13)
87	8	R''	1858 Mar 11 (9) Feb 12 > E'E a little
88	7	V''	(6)
89	13	Z''	(13.12.13)

Probably lower altitude of nebula & an increasing haze may have gradually affected estimates of magnitudes

Orion

1858 Mag.

90	12.13	A ¹ B ¹	(12.13)
91	8-7.8	B ¹ B ¹	(7.8-8)
92	9.10	C ¹ C ¹	1858 (11)
93	12.13	D ¹ D ¹	(12.13)
94	9.10	F ¹ F ¹	
95	8.9	E ¹ E ¹	(9.10)
96	10	I ¹ I ¹	(11.12)
97	10	N ¹ N ¹	(11.12)
98	11	O ¹ O ¹	(11.12)
99	8.9-9	C ¹	(9)
100	9.10-10	D ¹	(10.11)
101	10	E ¹	(11)
102	12	F ¹	(12)
103	11	G ¹	(12)
104	9	H ¹	(9.10)
105	9	I ¹	(9.10)
106	13-14	K ¹	(13)
107	8.9-8	L ¹	(8.9)
108	10.11	M ¹	(~~10.11~~)(10.11-11)
109	13	N ¹	(13.14)
110	11.12	O ¹	(12)
111	12.13	P ¹	(12.13)
112	11	R ¹	(12)
113	7.8-8	S ¹	(7.8) Sid, 8 ^h 15 ^m
114	11.12	T ¹	(11.12)
115	12	U ¹	(12)
116	7.8	V ¹	(9)
117	13	W ¹	(13)
118		X ¹	

The strong downlight & battery the suspicion of clouds & have diminished confidence in above estimates.

Power used 141. Illuminating lamp on & other circumstances as usual when magnitudes have been observed.

Orion

1864 March 19

Clear - but definition very bad
Strong twilightSet 6 30 $\gamma''\gamma'' = \rho''$ $\gamma''\gamma'' = \eta''\eta''$ $\gamma''\gamma''$ again brighter $\eta''\eta'' > \gamma' 0.3$ $\eta'' = \gamma'$ $\eta''' = \gamma'$ $\eta''' < \gamma''\gamma'' 2.5$ $E''' = D'''$ $\eta''' < E''' 0.7 0.5$

Set on Sirius before sunset hoping to get a first glimpse of the companions before sunset. but the definition proved so bad that it could not have been seen even in a dark sky.

Airneul regions of R. Huggs. proc. θ' is brightest and in very early twilight the bright region is defined so as to extend borders of S. Magner to proc. side of θ' somewhat thus
(not accurately drawn)

Have often remarked this before



Orion

1864 March 21

Clear, with thin cirrus possibly in neighbourhood of Orion at beginning of observations. Definition bad

Of the two v. bright stars γ' & β' of Orionis the n. most is γ' or β' Orionis decidedly say $\frac{1}{3}$ mag. The s. most is β' or γ' but γ' β' by $\frac{1}{2}$ mag.

sid 236 $\delta'' 36''$ $R'' > W'$ by far 2.5 grades
 $W' > L'' L''$ 0.5
 $L' > P''$ 2.5

6 45 $M''' < N. 690$ $\gamma'' \beta''$ of Orionis the s. most of a pair
 dist 15" K & L of Zone IV
 $N. B$ L is marked 11th on Chart and K 8th
 whereas they are now. K & L 1. grade at
 least. L is n. most of the two

M $+10$ $+38'$ called 11th in Zone is = γ . K
 above

7 5 $J > E$ or S 0.7 Definition quite bad.

$J'' J'' > A'' W''$ 2.0 J'' Much brighter than on 19th
 $" < M'''$ 0.3
 $F'' F'' > M'''$ 1.3 $F'' F''$ fainter than usual
 $E''' > A''$ 0.3
 $E''' = D''$

Later in Evg. $J'' J'' = M'''$ $F'' F'' = J'' J''$ or even $< J'' J''$ nebula
 very low with bright illumination

Looked at Sirius in early twilight to no purpose

Orion Magnitudes from Str.

1864 March 21st L

38
PB ob Bright Moonlight - quite clear - definition not good. Estimates
JMS rec. made with a good deal of hesitation

Estimated
mag.

ated
mag.
9-10
1007
Mag from
arg. str.

Star hear to (8) Onions

19 + 20 804 (9.0)

9.10 805 (9.3)

11? $8\frac{1}{2}$ (9.3) ^{max} * reads 8' 10" . 2' N.

9/ 804 (9.2)

B. 7 500 red (5.0)

The stars observed were at about the altitude of the nebula.

40 2 7-5 }

910? 295 } 1951

7.10. 195 } (7.10)
B.10. 195 } (B.10)

~~7.10~~ 199 (9.0)
 1911 700 (10.1)

78011 2 7904 (9.2)

10. 1. 9267

~~100~~ } ~~100~~

10 400)

9.10 188 (9.5)

9. 786 (8.8)

9.10 784 (9.5)

10 780 (9.5)

G 774 19.3

14 723 (7.2)

19 772 (9.2)

717

0.9 2.10-9 2 1.01 17.5
2.10-9 2 2.11 18.0

This series from 7^h 20^m to 7^h 37^m Sea time

Orion - Magnitudes

Stars in Nebula
 Stars of old
 Orion Jones.

		1858 Mag.
139	ϵ' 11	(12)
140	ζ' 9.10	(10.11-11)
141	ζ' 9.10	(10.11-11)
142	δ' 10.11	(11.12-12)
143	ζ' 12	(12-12.13)
144	η' 10	(12)
145	θ' 11	(12)
146	ρ' 9.10	(11)
147	ρ' 11.12	(13)
148	ν' 10	(11.12)
149	ν' 11	(11.12)
150	ρ 12	(11.12)
151	μ 9	<u>See later obs.</u> (10)
152	λ 8.9	(9.10)
153	κ 7.8-8.2	(8)
154	ι 10	(11.12)

Then on the rim of the Orion - Jones themselves.

We now go on to Jones about Corcoran

Zone I

μ	8.9
ν	12
ρ	10
ρ	8
ρ	10.11
ρ	10.11
ρ	10

Zone II

μ	9
ν	7.8
ρ	7.8
ρ	7.8
ρ	12
ρ	11
ρ	12

17 ~~12~~ barely visible

Orion

March 21 cont.

Zone IV

K	8.78
L	11
M	8.9
N	9.10
O	9
P	12
Q	11.11
R	13
S	12
T	10.11
U	10.11
V	13.14

Zone V

L	9.10
M	7.8-8
N	7.8
O	13
P	9.10
Q	7.8
R	7.8
S	8

Zone VI

D	11.12
E	11
F	11.12
G	11
H	8.9
I	11.8:7.8
K	10

Orion

1864 March 21 (continued)

Zone VI continued

L 8.9
 M 9
 N 7.8
 O 11
 P 10
 Q 10

Zone VIII

G 12
 H 11.11
 H 11
 K 11
 L not seen
 M 12
 N 11.12
 O 13
 P 13
 Q 10

Zone IX

I 10.11
 K 7.8
 L 13.14
 M 12
 N 13
 O 12
 P 10
 Q 11

End of Zones about Orionis
 Continued in next Book

30

38

3

2

2

3

33

32

31)

30

29

39) To observe the zero of position at different hour angles in Dec of θ Orionis

Probably no small stars beyond $+1^m 5^s$ as other zones near have few

38) By an inadvertence the "revision" of Zone XV was carried only to the limit $+1^m 5^s$

37) To compare tracing of Herschel with nebula.

36) To draw general outline of nebula at low altitude.

1864 March 29 The following Mem. remain to be attended to viz.

5) 11) 14) 15) 21a) 21b) 27) 28) 29) 31) 34)

35) To note error of Herschel's engraving in placing the 'cape' on n.f. side of β magnus ^{ridge of 'cape'} $17''$ n. of β' whereas its s. margin is as much s. of β'

34) To look for small star n. of α' disc. by W.C.B. Feb. 1, 1856 & thought it variable. It is same as Struve's III. Sun April 7 1864

33) Small star ^{17th mag.} ~~Don't~~ in ~~March~~ ^{April} 21 $4^h 3^m 23^s$ ~~24~~ ²⁵ to be examined as to their position Str p 102

32) Look at n.f. side of "Proborae major" & see if line θ^2 through γ' intersects it in right proportion ^{Struve} thinks it has changed

31) To determine magnitude of β & γ' in twilight by comparison with stars outside of nebula

30) O. Struve's chart of θ Orionis θ $4^h 3^m 23^s$ by $\frac{1}{2}$ mag. 1864

29) To mark on a drawing of the Nebula the grades of brightness - Also compare Liapounov's estimates Mem. p. 82. Also the Nebulous maps of Plate II. described on p 74 "Obs. Op. Neb." Margin of Huygh. Region

28) The revision for small stars in the Zones near θ Orionis originally made (including subsequent additions to Jan. Feb. 10 1863 See Chart No. 26) is comprised between the limits

Begin. $-2^m 00^s$ End $+2^m 8^s$

These are to be extended to limit $-2^m 15^s$ on either side using principal stars as follows:-

	Mag.	From θ					
A-2	11	$-2^m 24.3$	$+13' 31''$	AA	12	$+1^m 52.1$	$+13' 9''$
A-1	12	$-1^m 43.4$	$+18' 1''$	BB	11-12	$2^m 22.3$	$+18' 35''$
A'-3	11-12	$-2^m 27.15$	$+7' 35.5''$	M''M'' = X'	12	$+1^m 15.79$	$+10' 6''$
A'-2	12	$-2^m 19.93$	$+8' 33.0''$	Y'	11-12	$+1^m 22.83$	$+3' 47''$
A'-1	10	$-2^m 9.06$	$+2' 32.9''$				
A''-1	11	$-1^m 54.4$	$-5' 13''$	O''O''	12	$+1^m 32.2$	$-5' 18''$
A''	12	$-1^m 38.9$	$-3' 50''$	P''P''	12-13	$+2^m 4.1$	$-8' 32''$
A'''	11	$-2^m 10.7$	$-11' 42''$	X'''	12-13	$+1^m 46.7$	$-12' 45''$
B'''	11-12	$-1^m 26.5$	$-9' 40''$	Y'''	11-12	$+1^m 58.2$	$-16' 41''$

Above were filled up April 8

27) Note time in twilight when comp. of Sirius first comes in sight & find in neighborhood a star equally bright in same twilight & estimate latter in dark sky also.

26) a) Estimate mag. of stars in Sternverzeichniss at near alt. at which the nebula is to be observed but perhaps East of Meridian to avoid twilight as it will be necessary to begin early & to secure a sky as dark as that where neb. will be

b) Estimate mag. Stars say 6 in each Zone - I to XVIII, including old Orion Zones if sky is favorable include also the faint stars listed in revision Zones.

c) Repeat estimate of mag. of stars in "Sternverzeichniss" after above obs. and at alt. corresponding.

25) Select some bright star easily seen in twilight Perhaps Sirius & within a field or two of it, so as to exclude twilight. - watch appearance of group of stars of different magnitudes as twilight diminishes

24) To make some general revision of standard magnitudes in all the zones so as to refer all to one standard

Done March 14

23) B of XVI = C of XVII do not agree in Dec. - which is wrong?

22) Revision Zone XI March 5 ^{should be 3-1 probably March 14} δ_1 should it be δ_2 or is sign of seconds wrong? ^{sign should be - probably March 14}

21) Suppl. to Zone VIII Feb 27 1864 δ_1 should it be δ_2 or sign of seconds + ?

20) To compare β^1 & γ^1 with β & γ stars

19) Magnitudes of [Zone XI] ^{was obsd March 3, 14}, Zone XIV, D & E & K of XV, ^{8-9 March 14} (2 of Zone XVI.) ^{9th March 12}

Done 20) To determine place of companions of ϵ Orionis Zone 12" 21. March 14

Done 19) W. 655 $-1^m 20.5$ $-64' 52''$ not to be seen in Zone XVI in which it would have been $\delta = 5.15$ $\epsilon = 5^h 14^m 5.8$
Looked for not found March 8th

See 5) The following are

All the zones about C & ϵ as well as δ Orionis have been completed to the limits $-2^m 15^s$ to $+2^m 15^s$ from δ in R.

Mem. for continuing Rs. on Orion

1864phae.proj...207B

Feb 29 1864

18) To examine old zones near θ' and those near ϵ Orionis
a full up limits to $2^m 15'$ on either side of meridian of θ'
The following are the present limits of Zones See (28)

Done March 14

8) as examined March 2nd must be looked at again as Meise & Struve
are discordant.

5th mag.

Done 17) W. 716, A star 9th mag = [8] = S Zone XV in Dec. of Meise & following it by 11.3 confirmed by obs.
in an intermediate zone. Is W. 716 wrong in R. or is there another star? There is no other star See March 9

Done 16 Declinations of ~~C=C~~ of Zone of C=C and D=D of Zones X & XI are discrepant 10" *concluded*
that X is right - See obs at end of Revision of X 11 March 2 - D is wrong in XI.

15) To reobserve all the stars of the Trapezium by angles of position & distances.

14) To determine r_i carefully from θ' Done April

Done 13) To construct chart of stars including zones about θ' &
and ϵ Orionis & delineate the nebulae ^{about ϵ & θ'} indicating darker
areas by red & light by pencil with numbers denoting
rel. brightness 1 being brightest - Using power of 60

12) To examine neighbouring region with Comet seeker.

11) To form list of stars with nebularity attached. See Huchel when R. Astr. Soc. p. 495

Mr. B. 10) The revision of end of ~~Zone XVI~~ ²⁹ on Jan 27 does not agree with revision
of same region ²⁹ Feb 27 (end of observations) as for instance the 8th
mag. star

not Done

9) Zone IX extends only to $85'$ north of θ' to be completed to $90'$

(Want to determine at distance See March 14)

Done 8) To see whether F and G of Zone XVI are relatively right G = W 632 and W 633
should follow it by $0^s.12$ and be $0' 42''$ north of it *Stimms' Dec 7*
W 632 is $13.6'$ north of W.

7) In Zone XV III B = W 628 should precede C = W 661 by $1^m 27.4$ by Catalogue
Compare W 628 - $2^m 33.61$ with W 609 (8th) - $3^m 20.27$ } Rel. to θ' Orionis
- $89' 55.7$ - $79' 46.6$

or better compare some stars of Zone XV III with W. 609.

Completed Feb 27/1864

Memoranda for continuing Observations on Zones near ϵ Orionis

1) Compare ~~Zone~~ ^{Done Feb 25} ϵ ϵ' ϵ'' of Zone VIII and L and N of Zone IX with W. 614 9th mag. - Position relative to ϵ Orionis $72' 18''$ n. and $3^m 6.1$ prec. or $2' 30''$ south of Star A = ϵ of Zone VIII and $0^m 36.1$ preceding it.

2) Compare ~~Zone~~ ^{Done Feb 25} A = ϵ . L and N of Zone IX with W. 780. 7-8 mag. Position relative to ϵ Orionis $77' 30.2$ n. and $2^m 54.83$ preceding. or following N by $2^m 24.44$ and $2' 21''$ north of it.

3) In the following Zones complete the supplementary stars as far as full 2^m of R on either side of ϵ Orionis

R rel. to ϵ Or.

Zone II	First star	$-1^m 49.06$	
III	"	"	Same as II repeated.
V	Last star	$+1 48.$	

Done

4) The following are the beginnings & endings of zones near ϵ Orionis

	Begin	End		Begin	End
Zone I	$-2^m 33.9$	$+1^m 59.3$	Zone X = XI	$-3^m 6$	$+2^m 24$
II = III	$-1 49.1$	2 37.5	XIII = XII	$-2 35.9$	$+2 22.9$
IV	$-2 24$	2 13	XIV	$-2 46.5$	$+1 55.8$
V	$-2 23$	1 48	XV	$-2 57.2$	$+2 48.7$
VI = VII	$-2 15$	2 23	XVI	$-2 57.2$	$+2 36.3$
VIII	$-2 30$	2 15	XVII	$-3 13.5$	$+2 38.4$
IX	$-2 31$	$+2 2$	XVIII	$-2 50$	$+2 47.7$

Completed Feb 27, 1964

To see whether the limit 2^m is sufficient N.B. it would require but little to extend all the deficient zones to the limit $2^m 15^s$

5) To examine declinations [Star A, Zone VI] [F. Zone VII] and Right Asc. of Zone VIII

6) To look for star W. 660. 9th mag. $-1^m 7.54 +61' 1.0$ which should have been observed in Zone VI at reading 1 35 Feb 25 and $0^m 1.4$ following ϵ'' Probably H of Z. VI. 1 was wrong in Belief

~~Suppose the angle be W'~~

Suppose the position circle be set at a bearing W' and that the transit of two objects be observed across (diagonally at a very acute angle) be obs'd. Let the diff. this be $\Delta' \alpha$, and the diff. $\Delta \alpha$. Then will $\Delta' \alpha$ be the difference of transit of two objects in the same $\Delta \alpha$; to how much difference of declination does this correspond

Suppose the angle of position ^{of the wire} to be less (slightly, than 90° ; that is $W' - W$ positive



It is obvious that the northernmost object will pass it last

$$\text{Then } \Delta' \alpha = \frac{\Delta \alpha}{\sin W'} \text{ why } \Delta' \alpha = \frac{\Delta \alpha}{\sin W'} \text{ by } (W' - W)$$

$$\Delta' \alpha = t' - t$$

1864phae.proj...207B