

1869phase prod. 2000

KG  
11365  
299

N 16

E. Equatorial  
1869 April 28  
to 1869 Oct 18  
Vol. 16

Sold by T. Groom & Co., Stationers, India Building, 82 State St., Boston.



KG-11365.299

Dec R.X.

W	H	$\lambda$
1045	1100	577.53
1184	1314.5	553.37
1147	1255.5	558.29

s.d.  
2.3

Aurora 1225 Huggins

First estimates of  
H values

brightest 1280  
1400  
1550  
1680

near  $\gamma$   
2640near  $\eta$ 

1090

1045	1100	577.53	-16	8	11	40.5
1184	1314.5	553.37	-10	14	11	41.5
1147	1255.5	558.29	-13	15	11	48
			+7	29	11	49
			-18	33	11	53
			-17	6	11	54
			-18	9	11	55
			25	48	11	59
			+3	26	12	1
			+10	16	12	1
			+11	6	12	1.5
			+2	1	12	6
			+7	8	12	9
			+8	11	12	10
			+7	55	12	10.5
			+4	21	12	10.5
			+6	47	12	13
			+5	36	12	13
			+13	31	12	13





\* 611365.299

Web. & Spect<sup>20</sup> 1-3-6-10-12-14-17-18-22-24-25-27-30-33-41-48-49

Occult 3-45

Minnekes 6-8-11-13-15-20-24-25-27-29-43

Photographs 12-13-19

Aurora 22-31-41-50

Moon 28

Double 30-39-86

h 32-39

Stopwatch 33-34

I Sagittarii 36

Antenoid 46-51-52-53-54-55-56-71-72-74-78 et seq - - -













1869 Apr 28

Regulus

By frame it over  
middle of field  
Chron. Am. 1424  
is10<sup>5</sup> slow~~10<sup>5</sup> 30m sid. t~~

Neb. L 2038 v.B.S.R. vm B.M.N.  
Spectrum ~~cf.~~ <sup>cf.</sup> cont.  
No doubt about  
spectrum because  
T.W. can move  
it out & comes  
on to it again  
Extends from  
about 900  
to

Neb. L 2041 v.B.S.R. vm B.M.N.  
red \* 7-8 mag. foll.  
Spectrum (ac-  
cording to C.S.P. &  
P.W.) was ~~that~~ <sup>the</sup> con-  
tinuous with  
band beyond. Both  
thought they saw  
a line in the con-  
tinuous part -

Neb. L 2386 <sup>little</sup> B.S. v/E gEBM  
Blueish - a little  
like a planetary  
Spectr. (C.S.P.)  
continuous v/f -  
Line suspected  
about 1400 -



1869

Apr 28 continued

Neb L 2276 vB. vS. R. vmbMN  
 Very B contin. spec-  
 trum. C.S.P.  
 obs -

Neb L 2805 cF. vS. E. LBM  
 No visible spec-  
 trum - C.S.P. obs -

Neb L 2857 B. vS. mE smbMN  
 Spectrum cont.  
 Doubtful C.S.P.

Neb L 2853 F. S. R. glbM

Neb L 5070 cF. S. R. pscbM

Neb L



Thursday Apr 29 1869

Chron.

Apr. 454

Slow  
Equatorial time

14<sup>5</sup>.0

Neb L 2038

Continuous  
spectrum. One  
place in it  
brighter than  
the rest - T.W.  
v.B. R. p.S. s.v.m.b.MN  
C.S.P.

Neb L 2041

v.B. p.S. R. v.s.v.m.b.MN  
Smaller & less  
Bright than 2038  
Has a v. W.  
companion neb  
or part of same  
sp. - 20" ± 9  
Suspected this  
last night. C.S.  
Puzzling. Ap-  
pears to be  
continuous  
spectrum T.W.

Neb L 2386

B. S. E. p. g. b. h. b.  
C. S. P.  
Some light in  
sp. T.W.

Neb L 2341

B. p. S. E. n. p. a. f.  
p. s. m. b. M. C. S. P.  
No spectrum  
seen by T.W.  
The contin sp. is  
faint

Cambridge

Sid. on. t.

M. H. Petlee, Obs.

14	23	44.6	Im. 15 Sagitt.
14	27	56.4	Em. 13 Sagitt.
15	26	12.5	Em. 15 Sagitt.

(? Clouds  
passing  
over)

1869  
Apr 29 Occultations

1880, Dec. 14. Omitted in present reduction  
on account of absence of information  
respecting the time-piece used. Probably  
it was some chronometer the error  
of which was allowed for in writing  
down the time; but this does not seem  
to be certain.

Thursday Apr 29 1869

Chron.

Apr. 454

Slow  
Equatorial time

14<sup>s</sup>.0

Neb L 2038 Continuous  
Spectrum. One  
place in it  
brighter than  
the rest - T.W.  
vB, R, pS, svmbMN  
C.S.P.

Neb L 2041 vB, pS, R, vsymbMN  
Smaller & less  
Bright than 2038  
Has a v. W.  
Companion neb  
or part of same  
sp. - 20" ± 9  
Suspected this  
last night. C.S.P.  
Puzzling, ap-  
pears to be  
continuous  
Spectrum T.W.

Neb L 2386 LB, S.E. p g b l b  
C.S.P.  
Some light in  
sp. T.W.

Neb L 2341 B, pS, E n p a o f  
p s m b M c s p  
No spectrum  
seen by T.W.  
The contin sp. T.W.

M. H. Petlee, Obs.

15 Sagitt.

13 Sagitt.

15 Sagitt.


(? Clouds  
passing  
over)

Occultations

mitted in present reduction  
of absence of information  
time-piece used. Probably  
chronometer the error  
is allowed for in writing  
me; but this does not seem



1869 Apr 29 Continued

Number of Neb.	Description C. S. P. obs.	Spectrum T.M. obs.
Neb L 2276	vB. S. R. vmbMN <del>C.S.P.</del>	After long looking Sun good deal of light Pretty bright cont. sp.
Neb L 2878	vB. vL. R. vobhMN Nucleus not in middle A little resolution ble - looking - Texture like Andromeda - Smooth shiny	Cont sp - Suspected line C. S. P. Bar. cont. sp. without lines T.M.
Neb L 3132	vB. vL. eeE vsvmbMN E p & f C. S. P. Black band in neb. seen also in spectrum T.M. Seen also plainly by C. S. P.	OB cont sp -
Neb. L 3170	Not found	
<del>Neb L 3193</del> Neb L 3108	B. VI. Double head both heads psch. M  Very extraordinary discrepancy from dis. of h.	7. cont. sp. 7. mottled sp



1869 April 29.

Neb. 3199 V plain much B cont sp.  
 Neb. h 3105 brighter than  
 3193

VS. ER. vsrmbM  
 C.S.P.

VB. S. CE. vsrmbM  
 Y. W.

D'Arest may  
 not have distin-  
 guished this  
 from a star.

h of Neb taken  
 for h 3193

Chron't

Corr

R. X

R. A of h 3108

Note Oct. 14, 1880. The remark  
 "D'Arest may not have  
 distinguished this from a star"  
 is not applicable to the nebula  
 actually observed; see note of June  
 11, 1880, below. The R. A. below is  
 nearer that of G.C. 3108 than that  
 of G.C. 3105; but as the S of G.C. 3105  
 agrees better than that of G.C. 3108  
 with that of G.C. 3199 (the object  
 proposed for observation), it may  
 be concluded that the identification  
 in the left hand margin (G.C. 3105)  
 is correct, especially as the description  
 agrees fairly with that of G.C. 3105, but  
 not with that of G.C. 3108, which  
 was, moreover, observed previously the same  
 evening.

1	2	24
13	32	10
		7 14
12	29	30
12	29	26

Neb. h 3193 VB. S. CE.

No spectrum seen  
 by C. S. P.

Another sf B S XME

8 ft. cont. sp.

Note June 11, 1880.  
 G.C. 3199 was not found  
 by D'Arest (see his catalogue  
 for 1861, p. 257). Herschel's  
 S for this nebula may  
 consequently be supposed  
 erroneous. If 3199 is of  
 3193 instead of nf as  
 Herschel had it, it may  
 be the nebula observed  
 here; but Herschel calls  
 it round, Peire elongated.

Note Oct. 15, 1880.  
 Possibly the nebula of G.C. 3193  
 may be G.C. 3225.



1869 Apr 30 Friday

Name neb.	Descrip or Remarks	Spectrum or Observation	R. & time	Declin.
Minnecke's Comet	Found by J.W.			126° 39' 5" C.S.P. 126 39.0

RA 10<sup>h</sup> 00<sup>m</sup> 14<sup>s</sup>

~~RA at~~  
At 11 9 2  
Corr 16  
h 1 9 12  
RA 10 00 6

At star  
5-6 mag  
21 Leo Min

λ Urs. Maj.

9	59	44	250° 33' 44"
Pre 209	1	10	- 5 35
IPSO 9	58	34	35 59 18
BAC 9	58	34	54 0 44

At 11 22 6	16	183° 34' 4"
11 22 22		542
h 1 13 10	for 43	39 46
10 9 12	NPD 46	20 14
11 1	BAC 46	20 19

T. Wob.  
for 1850 10 8 1  
BAC 10 8 2

Neb L 2102 O w B. p S. R. psmbd. 4 lines a con-  
tinuous spectrum  
J.W.

Positively sure of  
4<sup>th</sup> line J.W.

4<sup>th</sup> line about double  
between most distant  
plates 3

At 14 53 56 Alt. Dec  
h 1 37 20 S.P.D. 73° 32' 28"  
10 38 38 Dec - 16 27 32  
10 18 34 SPD 72° 3' 31"  
17° 56' 24"

11	58	44
7	46	
12	6	30
1	46	56



1869 Apr 30 cont

Comp. of  
Chron.

C.S.P. obs

T.W. obs

To reduce  
C.S.P. obs

C.S.P. obs

To reduce Bond 286 to Apr 424 add  $+7^m 30^s$  ~~from I.  $15^0 10' 12''$~~ 

Neb L 2838. C.F.v.L.R. geb.M Faint contin RA  $12^h 18^m 2^s$   $15^0 10' 12''$   
 small star f. on Spectr. mottled  
 the edge -  
 Y.W. sees spiral

Neb L 3831\* p.F.v.L.m.E. vgeb.M Faint Contin. RA  $12 12 31$  Dec.  $48^0 2' 48''$   
 Nucleus Bright Spectrum -

Neb L 3321 p.B.v.L.E. N V.fh. contin RA  $12^h 50^m 17^s$  Dec  $22^0 20' 24''$   
 very peculiar Y.W.  
 dark place near V. bright contin C.S.P.  
 nucleus. Perhaps  
 a ring.

\* Note Oct. 5, 1880. The nebula called L 3831 above is perhaps G.C. 2834; it may be that the intention of the observers was to observe G.C. 2831, and that it was accidentally written 3831. The  $\alpha$  and  $\delta$  taken from the circles as above, when compared with the G.C. places brought forward to 1869, give the following results.

G.C. No.	$\alpha$ 1869 G.C.	$\Delta \alpha$	$\delta$ 1869 G.C.	$\Delta \delta$
2102	$10^h 18^m 29^s$	$+65$	$10^h 19^m 34^s$	$+2$
2838	$12 12 9$	$+53$	$12 13 2$	$+1$
{ 2831	$12 10 55$		$+38 32$	
{ 2834	$12 11 16$	$+75$	$12 12 31$	$-5'$
{ 3831	$14 11 11$		$+40 12$	
3321	$12 50 19$	$-2$	$12 50 17$	$-4'$

Before observing 3321, the chronometer may have been put back; or a correction of  $1^m$  may have been applied in the computation of  $\alpha$ .



May 6 1869

Winnecke's  
CometAt 13<sup>h</sup> 45<sup>m</sup> 5<sup>s</sup>  
sid. time~~7<sup>h</sup>~~

Chron. A 124

Time

13 45 23.3

Hour angle

3 53 20.

R.A.

9 52 3.3

Decl.

126° 52' 16"

Vernier No. 4

12 1

Chron. A. 124

13 50 49.2

Hour angle

3 57 44

9 53 5.2

Chron. A. 124

13 52 49.2

3 59 44

9 53 5.2

Vernier No. 4

126° 53' 4"

13 56 55.8

4 3 52.

9 53 3.8

126° 52' 32"

May 6 1869 continued

Star  
21 Leo. Min.

$$\begin{array}{r} 14 \ 2 \ 39. \\ 4 \ 2 \ 56 \\ \hline 9 \ 59 \ 43 \end{array}$$

125° 53' 42"

$$\begin{array}{r} 4 \ 9 \ 40 \\ 14 \ 9 \ 24 \\ 9 \ 59 \ 44 \end{array}$$

125° 53' 48"

Comet observed without illumination; coarse wires -  
and without micrometer; Diagonal eye piece  
Circles read with clock on -

v. L. & B. R. gpm b. M. N.



May 7 1869.

Winncke's  
Comet

Looked for but not found - Sky hazy

Aurora  
Borealis  
Obs. J. W.

Examined with Spectroscope  
Saw one bright line about 13.7

May 10 1869

Weynecke's  
CometTime from  
Chron. N. 424

$$\begin{array}{r}
 \text{I} \quad 11 \quad 55 \quad 12 \\
 \text{Hour angle} \quad 2 \quad 5 \quad 10 \\
 \hline
 9 \quad 50 \quad 2 \\
 \\
 11 \quad 55 \quad 44 \\
 2 \quad 5 \quad 25 \\
 \hline
 9 \quad 50 \quad 19 \\
 \\
 126^\circ 56' 26''
 \end{array}$$

$$\begin{array}{r}
 11 \quad 58 \quad 52 \\
 2 \quad 8 \quad 44 \\
 \hline
 9 \quad 50 \quad 8 \\
 \\
 126^\circ 56' 36''
 \end{array}$$

$$\begin{array}{r}
 12 \quad 0 \quad 26 \\
 2 \quad 10 \quad 20 \\
 \hline
 9 \quad 50 \quad 6 \\
 \\
 126^\circ 56' 36''
 \end{array}$$

$$\begin{array}{r}
 12 \quad 2 \quad 7\frac{1}{2} \\
 2 \quad 12 \quad 0 \\
 \hline
 9 \quad 50 \quad 7\frac{1}{2} \\
 \\
 126^\circ 56' 34''
 \end{array}$$

21 Leon Min

$$\begin{array}{r}
 12 \quad 9 \quad 39.37 \\
 2 \quad 9 \quad 36. \\
 \hline
 10 \quad 10 \quad 3.3
 \end{array}$$

$$125^\circ 53' 32''$$

$$\begin{array}{r}
 12 \quad 10 \quad 57.2 \\
 2 \quad 11 \quad 4 \\
 \hline
 9 \quad 59 \quad 53.2 \\
 \\
 125^\circ 53' 30''
 \end{array}$$



May 10 1869 continued

2 Photographs of Sun taken this day one with finder  
another with equatorial between 5 & 6 mean time


1 Leon Min.

R.A.  
8 Dec.

$$\begin{array}{r}
 12 \quad 12 \quad 42.0 \\
 2 \quad 12 \quad 48.0 \\
 \hline
 9 \quad 59 \quad 54. \\
 125^\circ 53' 32''
 \end{array}$$

Winnecke's Comet

Obs. J. W. Spectrum in the field at 11.91


 somewhat this appearance  
between 13 & 15 on the scale

Aurora

with the battery

little to

13.86

Aurora line

9.70

8.71

8.81

air line

Aurora

10.22

5-13 86

approximately

very much, coincides with the  
air line 10.40

May 11 1869

Photographs of Sun taken at  
2<sup>h</sup> 35<sup>m</sup> 2<sup>h</sup> 45<sup>m</sup> 2<sup>h</sup> 50<sup>m</sup> 3<sup>h</sup> 2<sup>m</sup> mean time3<sup>h</sup> 13<sup>m</sup> mean time with large telescopeWith finder 3<sup>h</sup> 43<sup>m</sup> 3<sup>h</sup> 53<sup>m</sup> 4<sup>h</sup> 1<sup>m</sup>

Winckles

time 449	11	48	47	?
W	1	59	20	
R.A.	9	49	27	?

time 442	11	49	29
W	2	00	00
R.A.	9	49	29

126° 57' 4"

another setting

11	53	29.5
2	4	00
9	49	29.5

11	54	29.5
2	4	40
9	49	29.5

126° 57' 00"

another setting

11	57	68.5
2	8	40
9	49	28.5

11	58	48
2	9	20
9	49	28

126° 57' 02"

Star 21 Leonis Min.

12	7	57.7
2	8	
9	59	57.7
12	8	57.5
2	8	40

125° 53' 20"



May 11. 1869

~~Vincke's~~ *Another setting*  
 21 Leonis Minoris

12	11	57.3
2	12	00
<hr/>		
9	59	57.3
12	12	38.5
2	12	40
<hr/>		
9	59	58.5

125° 53' 20"



Ursae Majoris

12	20	8
2	5	20
<hr/>		
10	14	48

12	21	20
2	6	40
<hr/>		
10	14	46

Note Oct. 11, 1880.  
 Place of  $\mu$  Ursae Majoris for 1869  
 from B. A. C.

10<sup>h</sup> 14<sup>m</sup> 31.<sup>s</sup>2 +42° 9' 26"

Corrections to circle readings  
 -15<sup>s</sup> -14"

132° 9' 20"

Another setting

12	26	1	Poor
2	11	20	Poor
<hr/>			
10	14	41	

12	28	7.5	Pa
2	13	20	Good
<hr/>			
10	14	47.5	

Note Oct. 11, 1880.  
 Applying Corrections -15<sup>s</sup> and  
 -19" to circle readings of  
 the 3 nebulae below, we find  
 12<sup>h</sup> 21<sup>m</sup> 48<sup>s</sup> +44° 48' 39"  
 12 24 3 +42 21 53  
 13 9 50 +42 42 53  
 Corresponding corrections to G. C.  
 +4<sup>s</sup>, -13"; -32"; -44' 18"; -6<sup>s</sup>, 0; -3' 30";  
 the setting of the telescope on the nebulae  
 was probably not precise.

132° 10' 00"

C. S. P. obs

Obs J W

C S P

C S P

Neb. L 3002 vB. E. I. ch M distinct continuous  
 or rather at p end spectrum. Mid-  
 dle of it about  
 1600.

13	6	43
0	44	40
<hr/>		
12	22	3

134° 48' 58"

Neb L 3042 B. v I. E. v g m b (W?) No spectrum  
 seen  
 7<sup>th</sup> light in  
 patches perhaps  
 seen

13	26	18
1	2	00
<hr/>		
12	24	18

132° 22' 11"

Neb L 3474 Seeing too poor Continuous  
 for description Spectrum

13	24	25
0	34	20
<hr/>		
13	10	5

132° 43' 12"



May 12 1869

Minnecke's T. W. Obs

Chron. A. 424  
~~1st~~  
 1<sup>st</sup> setting {  $\begin{array}{r} 11 \ 56 \ 52 \\ 2 \ 7 \ 21. \\ \hline 9 \ 48 \ 44.2 \\ \hline 136^\circ \ 56' \ 50'' \end{array}$

15.  
 2<sup>nd</sup> setting {  $\begin{array}{r} 11 \ 58 \ 15.4 \\ 2 \ 9 \ 32. \\ \hline 9 \ 48 \ 43.4 \\ \hline 136^\circ \ 56' \ 56'' \end{array}$

3<sup>rd</sup> setting {  $\begin{array}{r} 12 \ 0 \ 23.0 \\ 2 \ 11 \ 40.0 \\ \hline 9 \ 48 \ 43.0 \\ \hline 136^\circ \ 56' \ 44'' \end{array}$

4<sup>th</sup> {  $\begin{array}{r} 12 \ 2 \ 54.2 \\ 2 \ 14 \ 8. \\ \hline 9 \ 48 \ 43.2 \\ \hline 136^\circ \ 56' \ 52'' \end{array}$

$\begin{array}{r} 12 \ 4 \ 42.0 \\ 2 \ 16 \ 0.0 \\ \hline 9 \ 48 \ 44.0 \\ \hline 136^\circ \ 56' \ 56'' \end{array}$



May 12 1869 continued

Winnecke's D

~~|    |    |      |
|----|----|------|
| 12 | 7  | 26.8 |
| 2  | 18 | 40.0 |
| 9  | 45 | 46.8 |~~
136° 56' 42"  $\frac{1}{2}$  yr -

6 settings

12	10	28.0
2	21	43.5
9	48	44.5

  
136° 56' 50"
Diameter S'  
Single Nucleus

21 Leon. Min.

12	14	2.0
2	14	4.0
9	59	58.0

  
125° 52' 57"

20 57.6

12	16	13.6
2	16	16.
9	59	57.6

  
125° 52' 54"

12	18	52.4
2	18	56.
9	59	56.4

125° 52' 52"

May 12 1869 continued

21 Leon. Min.

12	49	58.4
2	20	0
9	59	58.4

Pro. circles 9 59 57.6  
 Com. to circles -15.7  
 125° 52' 58"

Note Oct. 19, 1880. Place of  
 21 Leon. Min. from p. 14  
 9<sup>h</sup> 59<sup>m</sup> 41.9 +35° 52' 56"  
 9 59 57.6 +35 52 55"  
 -15.7 +1"

Neb L 3258 Could not be found by C.S.P.

Neb. L 3474 Found by C.S.P.  
 Very bright  
 long continuous spectrum  
 rB, rL, mE, rgy, mB, MN

13	46	48.4
0	36	40.0
12	10	8.4
13		

132° 42' 52" poor reading

Note Oct. 19, 1880. Place with corrected circle readings

13<sup>h</sup> 9<sup>m</sup> 52.7 +42° 42' 53"  
 13 9 56.2 +42 43 24

No actual corrections to G.C. are thus indicated.

Neb L 3572 Very fine obvious spiral - will not describe it tonight

Spectrum of central portion  
 r.b. continuous  
 No spectrum got of ring or spiral part

Neb L 3574 Part of last

Spectrum bright continuous



May 21 1869

Solar Spectrum	Mer. line	28	29
		28	29
H line		31	43
		32	24
b		14	R8
D		9	64

Experimented in the evening with 3 spectroscopes  
upon Levan & Geissler tubes. 2<sup>nd</sup> Spectrum of Hydrogen.

14.18

St

28.25

$$\begin{array}{r} 14.00 \\ 14.14 \\ \hline 14.09 \end{array}$$

28.17

11

4430 Huggins

4420 - 4450 Huggins

$$\begin{array}{r} 32.00 \\ 32.11 \end{array}$$

New Bright Solar Line

Found 1869 May 21

= 4420 - 4430 Huggins's Scale

G line was seen Jan 14.

May 27 1869

Photograph of Sun taken at  $2^h 39^m$   
mean time with large telescope:  
camera arranged with wooden  
slide to admit the light only for a  
small fraction of a second.  
Aperture too large (5 inches); photograph unsuccessful.

Another taken at about  $2^h 57^m$  with  
large telescope: smallest aperture ( $\frac{3}{4}$  inch).  
Better: slide shook some dust upon the plate.  
Slide cleaned.

Another at  $3^h 8^m$ ; smallest aperture ( $\frac{3}{4}$  inch).  
Pretty good, but image too far to one side.

Another at  $3^h 21^m$  ( $\frac{3}{4}$  inch aperture)  
Good:

Another at  $3^h 32^m$  ( $\frac{3}{4}$  inch aperture)

Another at  $3^h 44^m$  ( $\frac{3}{4}$  inch aperture)

Another at  $4^h 1\frac{1}{2}^m$



June 3 1869

Winnick's  
C.S.P. obs.

Time	1		
Chiron: A. 424	13	56	58.7
Hour angle	4	25	52.
	9	31	6.7

Poor

Another reading	13	57	12.4
	4	26	24.
	9	30	48.4

Spectrum ac-  
cording to P.M.  
is 2 bands sharp  
at red end of spec.

June 4 opened dome and set for Comet  
at 8<sup>h</sup> 10 ~~etc~~  
Clouded suddenly

June 4 1869

Winnickel's

Clouded  
up as soon  
as telescope  
was pointed

171	15
9	29
4	46



June 6 1869

Aurora Bor.

JW obs.  
SpectroscopeArch.  
with little  
appearance  
of streamers  
at 10<sup>h</sup> 15<sup>m</sup>  
mean time

Line at 1117	{	field illumination
Same line		unsatisfactory
better measured 1125		{
Same line 1124		

No other measures could be got.

~~Some opened again at 11~~

At 11 20 Aurora much more brilliant, streamers extending to zenith. Tried the great refractor again on a bright spot but found only one line, that measured above - the same line was equally as bright with the 15" mirror direct vision Spectroscope held in the hand without telescope. And then appeared in this several broad faint bands in addition to the green line and a little more perceptible. The dark cloud below the Aurora shows the same green line with the hand Spectroscope.

Air line bright 10 45-

The next line at all distinct 11.84  
but there is intermediate between these  
barely with a faint line about 11.47

Aurora line seen distinctly by both J.W. & C.S.P.  
not to coincide with the fr. bright Nitrogen line. Not  
to be near it.

1125 obviously does not correspond with any of  
these lines C.S.P. & J.W.

C.S.P. makes aurora 1123 & 1123 field ill. good.

June 6, 1869.

With Horsford's single ~~specimen~~ <sup>specimen</sup> chemical spectrocope  
a b c d e  
|| || || || || four lines <sup>besides the bright</sup> (two or 3 possibly bands)  
seen by C. S. P.

7.10. read brightest at 31 another at 50  
probably 2<sup>nd</sup> or 4<sup>th</sup>

C. S. P. makes	~	31
	b	36
	d	50
	e	70

~~Platinum~~  
~~Magnesium~~ electrodes air lining Horsford's spec.

Brightest about	42
next ..	52
bright one	27
"	60
"	69

2 20. renewed activity of aurora, streamers extending to and beyond the zenith.

2 30. Aurora cast to the South - Green line of aurora visible to S.E. 30° beyond the point at which the aurora apparently ceased



Wednesday June 9 1869

Minuchas comet

obs. L. W.

The character of the Spectrum  
could not be well made out  
with the Simms Spectroscope  
with the Browning star and  
hand Spectroscope combined  
it had the appearance of three  
lines with continuous spectrum  
the least refrangible line was the sharpest  
the middle one the brightest  
In the Simms Spectroscope on every  
occasion in which it has been seen  
the lines appeared well defined on  
the least refrangible side and continuous  
on the other this was not clearly so  
with the two Spectroscopes combined

June 11

Comet observations prevented by clouds  
in short clear interval after 10 the character  
of spectrum was determined with Browning Spectroscope  
without the slit. The experiment was successful  
but interrupted by clouds

June 12 1869

Winnick's  
Obs. J. W.  
Spectroscope  
Browning's  
star & hand  
spectroscopes combined

Weather calm  
sky rather bright  
with a few  
passing clouds.

Large  
spectroscope

Bright line  
in the  
neighborhood  
of 1490

Comet examined with these spectroscopes,  
Browning - tandem - & Simms.

Saw the three lines distinct on the  
least refrangible side, shading off on  
the more refrangible side, similar to Huggins'  
spectra of carbon

with cylindrical lens axis parallel to slit the reading  
on the focus scale on telescope for Browning's spectroscope  
was 19

Monday June 14. 1869

Dome opened at 8 P.M. for observations on the moon  
clouds came up very rapidly.



June 14 1869

Door opened but clouds prevented observation

June 15

Same

June 16 1869

Winnick's Spectrum  
 seen by C. D.  
 3 bands  
 shaded toward  
 more refrangible  
 middle brightest  
 most refrangible  
 the faintest

Mean of middle

9.45<sup>m</sup>

Least refrangible

Brightest Bi line (H 1675)

Another Bi line (H 1759)

Bright one

1352  
 1343  
 1360  
 1358

Wash

1038  
 1053

1363  
 66  
 65

1424  
 23

2341



June 17 1869

Moon

Mr. Shaler  
pointed out  
that Webb's  
"Common Objects" (p. 103)

says the straight  
wall E of Thibet  
to me appears  
brownish. It  
begins at a small  
crater & ends  
at a branching  
mountain. Mr.  
S. says it seems  
a "fault" with  
a downthrow on  
the E side. The  
N end is quite  
distinct from  
the crater.

also that the  
central mass in the  
crater Aristillus is  
not three parallel ridges  
as seen by Webb, L.C. 87  
but several indistinct  
craters arranged as in  
diagram



June 19 1869 *Coincidence*  
(h) 77.520

Minneke  
Dec.

126° 33' 52"

T.W.  
Obs.  
Chrom 424  
& hour angle  
Chrom

14 59 59.7  
6 20 88  
2 39 52

14 59 34.5  
6 20 36  
2 38 52

13 1 15  
6 22 16  
2 34 59

13 3 4.5  
6 24 8  
2 32 56

13 3 24  
6 24 30  
2 32 54

126° 33' 56"

*α* Lyncis \*

124° 58' 0"

Chrom

13 11 2  
5 58 30  
9 12 32

Chrom.

13 11 22.5  
5 58 48  
9 12 34.5

~~15~~ 15<sup>h</sup> 18<sup>m</sup> 8<sup>s</sup>  
~~20~~ 20 56  
2<sup>m</sup> 48<sup>s</sup>

58.76

Good pos. 254° 1

Bond 238

good obs. 15<sup>h</sup> 23<sup>m</sup> 13.4  
24.9  
83.3 } Correct

20 4.8  
14.1  
24.9  
9.6  
20.4 10.8



1869 Saturday June 19 continued

$\Delta 8$   $15^h 29^m 11^s$  Bond 236 57.39

~~3444st~~  
 $\Delta \alpha$  (3444°, Pos. Leno)

12.1	15	35	48.4	} comet	38	43.1	11.7
8.1		36	0.5			54.8	8.2
			8.6			39	3.0

11.5	37	18.9	} a star a little N	
8.5		30.4		one of again $\approx 10^m$ or $11^m$ mag
		38.9		

$\Delta 8$   $15^h 41^m 38^s$   
 56.21

Comet S of Star & preceded it

Comet. ~~78.26~~  
 77.46  
 77.57  
 51  
 54  
 77.520

Observed also

on  
 a star of Mr. Clark's near  $14^h$  Bootis No such star  $20^s$  p &  $\frac{1}{2}^s$  S  
 Antares. Comp not seen. Seeing bad  
 Saturn Looks very poor  
 Antares Spectrum Borrowing sp. on finder. Poor.

Tuesday June 29 1869

Obs. J. W. Brilliant aurora about 9<sup>h</sup>.  
The usual streamers in the north  
— also an arch beyond them extending  
from the East to the West point.  
This arch was very white and was  
the brightest part of the aurora.

The chemical spectroscope showed  
the green line as usual in the  
streamers, but the arch gave a  
continuous spectrum. The arch  
moved slowly to the South, and  
later, streamers appeared in the South.

Chronometer A. 424 compared with  
South Clock and found to be two minutes slow.  
At 16<sup>h</sup> 28<sup>m</sup> sid. time by this chronometer  
2 Aquilae was in the middle of the arch.  
At 16<sup>h</sup> 31<sup>m</sup> Arcturus was in the middle of the arch.



Wednesday June 30 1869

Saturn examined  
Seeing not good. Main division  
of the ring not seen steadily.

1869 July 25

{ Note June 28, 1877. The record below means  
that distant fireworks were observed for  
practice in the use of hand spectroscopes. }

Practice for shooting-stars with spectroscopes by

T.M.

C.S.P.

Prof. Rence

& Prof. T.M. Rence

Strontium, Sodium, Barium & well made out.

Afterwards interval of 2 runs measured with stop  
watch by C.S.P.

times 0.0

5.8

11.6

17.2

22.8

28.7

34.5

40.8

46.2

52.0

57.8

Declination  $12^{\circ} 30' N$

Micrometer 68.79  
77.45

Dist by microm 84.9  
" stop watch 85.0



1869 July 6

Experiments with stop-watch by CSP  
Star over two wires

0.0	
1.6	1.6
2.8	1.2
4.9	Bad 1.9
6.4	1.7
7.9	1.5
9.8	1.9
11.6	1.8
13.3	1.7
15.0	1.7
16.7	1.7
18.4	1.7
-18.4	1.5
19.9	1.9
21.8	1.5
23.3	1.8
25.1	2.1
27.2	Bad 1.6
28.8	1.8
30.6	1.8
32.2	1.4
-33.6	1.5
35.1	1.7
-36.8	1.5
38.3	1.8
40.1	1.6
41.7	1.1
42.8	1.4
44.2	1.4
45.6	1.5
47.1	1.4
48.5	Bad 1.5
50.0	1.9
51.9	1.7
53.6	1.6
55.2	

$$\begin{array}{r} 18.4 \\ 1.2 \\ \hline 17.2 \end{array}$$

$$\begin{array}{r} 36.8 \\ 18.4 \\ \hline 18.4 \\ 2.1 \\ \hline 16.3 \end{array}$$

$$\begin{array}{r} 53.6 \\ 36.8 \\ \hline 16.8 \\ 1.4 \\ \hline 18.4 \end{array}$$

2

inelli 2



1869 Aug 22 Sunday

Coincidence  
(h) 77.403, 3<sup>rd</sup> power  
77.399, 6<sup>th</sup> "  
77.406, 8<sup>th</sup> "  
Mean 77.403

Saturn Seeing poor.

See finder

ζ Sagittarii Winkels close double. Separated by T.W. & CSP but not fit to measure.

Σ 2396

CSP obs.

3d power

x = 56

Pos.

instead

hazy

mag 8 &amp; 11

a is orange

b blue

observer out

of practice

glass out of

order somewhat

40.3 reject

38.3

38.3

38.6

37.6 (poor, 1/2 wt.)

37.8

38.8

41.8

83.6

7.6

11) 91.2

38.29

Very difficult  
to bisect the  
small star

Dist.

1/2 wt (Poor) 75.62

1/2 wt (Poor) 75.53

75.55

75.59

2 wt (Better) 75.57

75.572

Come.

77.415

.390

.405

.405

.400

.403

1869 Aug. 22 Sunday continued.

Zero of pos.

75.8  
75.9  
75.9  
75.87

$\Sigma 2737$

E Equulei  
C.S.P. obs.  
3<sup>rd</sup> P.  
4<sup>th</sup> P.

Close pair  
separated  
well.  
Separated  
easily: but  
seeing rather  
poor.

5<sup>th</sup> P.

$\times = 56$

Quite widely  
separated.  
Double image  
very marked:  
but star would  
seldom be so  
well separated.  
Double image  
growing worse.

Pos.

59.6  
59.7  
59.6  
58.2  
61.0  
59.65<sup>r</sup>

Dist.

(thought to be very good) 77.45 (a little close)  
.46  
.47  
.47  
.47  
77.464

Stars occasionally  
come out very  
sharp & fine

6<sup>th</sup> P.

Stars look  
very sharp.

Dist

Coinc.

77.475  
.480  
.470  
77.475  
77.395  
.390  
.400  
.400  
.410  
77.399



1869 Aug. 22 Sunday continued

ε Equulei  
C.S.P. obs.  
8<sup>th</sup> Power

Stars very  
sharp  
indeed.  
Measure good.

Dist.

77.50  
77.48  
.48  
.47  
146  
77.478

9<sup>th</sup> Power

Focus cannot  
be adjusted  
for wires

8<sup>th</sup> Power

Both micrometer  
wires cannot be  
in focus at once  
or the measures  
would agree better

Dist.

(best yet) 77.47

Coinc. (~~reject first~~) 77.40.3

37 Pegasi

Could not be separated

41.7  
.20.5  
.409  
1406  
.409  
77.4064

Monday Aug 23 1869

Saturn examined by C. S. P.

Found dusky  
ring visible up  
to planet at  
point where  
ring crosses  
over planet  
though there  
may remain  
some slight  
doubt of this.

Also it seemed  
that inner bright  
ring was sharply  
defined on in-  
ner edge & not  
shaded toward  
the inside.

A sort of a  
faint ring possibly  
outside the outer  
ring on sides  
seems the width  
of outer ring in  
the middle wider

Close double  $1\frac{1}{2}''$  about 10 & 10 mag  
found by C. S. P.

Transit

18	55	59.8
1	48	15.5
17	7	44.3

Another

18	57	14.0
1	49	29.0
17	7	45.0

Decl.

$4^{\circ} 38' 20''$



1869 Aug 23 Monday Continued

1869phae.proj...299P  
 v Draconis  
 Probable  
 B. Phincho

Transit

19 12 0.2  
 1 34 40.0

17 37 20.2

Another

19 12 44.0

01 35 25.0

17 37 19.0

Decl.

40° 40' 40"





1869 Aug. 24

sub of doors so that <sup>the band</sup> ~~this~~ was on a circle of declination all the way. (7W & C & P)

Mr. Langley got place of band by stars as follows:—

At 8<sup>h</sup> 20. (Amob) the band covered  $\delta$  &  $\mu$  Mercuris, and its middle line was inclined so as to be about  $30'$  South of  $\mu$  while it crossed  $\delta$ . The other extremity touched the moon. Band  $\frac{1}{2}$  in wide, and as moving Southward. (keeping nearly parallel to its first place) at the rate of  $3\frac{1}{2}'$  a minute.

At 8. 23. band was growing fainter and appeared about  $4^\circ$  South of  $\mu$  (There estimate of its motion and again)

At 8 34 it was South of  $\alpha$  Ophiuchi very diffuse. From this it returned to a position between  $\alpha$  Her. &  $\alpha$  Oph where it remained till it disappeared. E.H.

<sup>turned</sup>  
or another south of it

Bands crossed this band, obliquely pointing toward the zenith. They moved slowly from E to W continuing to point to the Zenith.

1869, Aug 26

Seeing too bad to be usefully used.

Minutest  found by  
J.M.

Zero off

254.5

~~254.5~~ $\Delta \delta$ 

65.61

 $\Delta \alpha$ 

4.2

stop watch

4.2  
4.3

Best 2 wh.

Coinc

~~52~~

52.64

Comet not seen

3 stars together  
Call them  $\alpha \beta \gamma$  $(\Delta) \alpha \beta$ 

13.3

stop watch

14.0

hour

13.0

 $\gamma$  may be  
W.III. 741 $(\Delta) \alpha \gamma$ 

24.2

stop watch

24.8

(Comp star)  $\alpha$ 

time

hour angle

2h	00	28.5
22	21	16
3	39	12.4

No - 5° 42' 14"

2	3	9.5
22	23	06.5
3	39	13.0

over



1869 Aug. 26.

4 bright star

Double  $\alpha$  Ar

32 Eridani

$$\begin{array}{r} 2 \quad 12 \quad 1 \\ 22 \quad 24 \quad 3 \\ \hline 3 \quad 47 \quad 58 \end{array}$$

$$\begin{array}{r} 2 \quad 13 \quad 86 \\ 22 \quad 25 \quad 36 \\ \hline 3 \quad 48 \quad 0 \end{array}$$

Dec

$$-3^{\circ} 18' 00''$$



Ar

$$\begin{array}{r} L \\ 2 \quad 28.5^m \quad 40 \quad 3.0^s \quad \text{stop watch} \\ 29.5^m \quad 3.6 \\ 3.4 \end{array}$$

2h 38<sup>m</sup>

64.33

In 120<sup>s</sup> stop watch went 119.2

Find up circle

$$-5^{\circ} 48'$$

Aug 27 1869.

Occultations Obs. by C. S. P. with Chronograph  
Moon on the Wane

Star	Phenom.	Predicted time	Chronograph read	Remarks
Runk 1197	Imm.	Sid. t. 22 <sup>h</sup> 42 <sup>m</sup>		not visible Star too faint & sky too light
75 Tauri	Imm.	22 45	22 <sup>h</sup> 44 <sup>m</sup> 58 <sup>s</sup> .1	D's limb flowing greatly 0.4 too early.
Runk 1197	Em	23 32	23 <sup>h</sup> 33 <sup>m</sup> 1 <sup>s</sup> .2	0.2 Late
75 Tauri	Em	23 39	23 <sup>h</sup> 41 <sup>m</sup> 25 <sup>s</sup> .6	0.1 Late
Runk 1232	Em	1 45	<del>23</del> 1 <sup>h</sup> 46 <sup>m</sup> 56 <sup>s</sup> .1	0.5 Late another chron sheet

These corr's are  
not applied in pre-  
ceding column.

Em of Sal. 8610 & 8613 lost. Too light

Long search for Penneker's ~~Star~~ Not seen

C. S. P. sat up till sunrise

Note Dec. 14, 1880. By look 107, the clock was fast  
60<sup>s</sup>.34 at 18<sup>h</sup><sup>3</sup>/<sub>4</sub> sid. time, and gaining 0<sup>s</sup>.69 a day (0<sup>s</sup>.03 an hour). Hence  
at 23<sup>h</sup> it was fast 60<sup>s</sup>.5, at 1<sup>h</sup><sup>3</sup>/<sub>4</sub> also 60<sup>s</sup>.5.



1869 Aug 31.

Coincidence (h) Aug. 22 77.403  
 Interval 9h Jan. 22 25.018 52.385  
 Coincidence (g) Sept. 11 52.403  
 Perhaps use 52.400 for this date if required.

(5) Astraea

Comp with

W. XXIII 68

EPd obs.

Stop watch

 $\Delta\infty$   
 planet p \*
No 506 (EPd  
noting)No 627 (CIP  
noting)

Arnold 424

10 <sup>h</sup> 10 <sup>m</sup> 5 <sup>s</sup>	1 <sup>m</sup> 10.3
	10.6
	11.6
	11.0
	10.88
Cor of rate	+0.06
	10.94

1 <sup>m</sup> 9.8
9.6
10.5
9.8
10.0
9.94
+0.83
10.77

10 <sup>h</sup> 10 <sup>m</sup> 4 <sup>s</sup>
12.8
14.2
16.7
18.4

Rating of watches

No 506 started

22 <sup>h</sup> 21 <sup>m</sup> 00 <sup>s</sup>
22 37 40
0 16 40

No 627 started

22 21 30
22 38 10
0 16 40

16<sup>m</sup> 39.2

16 28.3

10.9

Note Dec. 27, 1880.  
 It may perhaps be assumed that the chronometer A. 424, which was often felt forward or back, was on this occasion set nearly to Cambridge sideral time before the observations.

Line of Pos - 254° 2

Δ8

Arnold 424

Micron

22<sup>h</sup> 25.1

22 26.9

29.9

18.9

40.5

42.8

45.1

47.3

58.98 (back-back)

58.643

57.97

50.025

50.090

58.90

58.865

Reject

3<sup>1</sup>/<sub>2</sub> Power

"

"

"

No 506 By EPA

No 627 By CIP

Arn. 424

1<sup>m</sup> 12.41<sup>m</sup> 10.8

22 51.4

12.0

11.2

53.1

11.4 two short

11.0

55.1

11.8

11.0

57.1

11.6

11.0

58.9

1 11.84

1 11.00

06

1.84

1 11.90

1 11.84

1869 Sep. 3.

No coincidences. Measures all of double distances.

Hercules 457

$\Sigma 2289$

5<sup>th</sup> P.

Disk by George B. Clark  
other side

— .335  
— .520  
— .185  
.09

By E.P.A.

.37  
.475  
— .105  
.05

C.S.P.

.53  
.30  
— .23  
.11

E.P.A.

.36  
.52  
— .16  
.08

6<sup>th</sup> P.

C.S.P.

.52  
.32  
— .20  
.10

G.B.C.

.565  
.324  
— .241  
.12

E.P.A.

.37  
.52  
— .15  
.15



1869 Sept. 3

7<sup>th</sup> P

68 p

Dist

$$\begin{array}{r} 52 \\ 32 \\ \hline \end{array}$$

Pers

100

star perf to eyes

Position

114°

115.1

114.0

$$\begin{array}{r} 114.0 \\ \hline 114.4 \end{array}$$

End

113.8

115.6

113.8

$$\begin{array}{r} 113.8 \\ \hline 114.4 \end{array}$$

Aurora

Continuation Spectrum with Chemical Spectroscope - CSP obs

Note Jan. 11, 1882. See p. 50.

Σ 2437

Dist By GBC

.56

.41

.15

.095

485

5<sup>th</sup> P

EPA

.38

.585

.205

.10

482

F. B. Blake

.58

.390

.18

.09

485

CSP

.56

.38

.18

.09

470

Sept 3 1869

E Pct

40.2	492
58.2	
18.0	
.09	
58	
38	
20	
10	

Position 71  
 E Pct 79  
 \* = to Eyes 80

Aurora one bright line E Pct also  
 One bright line now but not before E P  
 much brighter C P Note Jan. 11, 1882. See p. 50.

± 2437

Position  
C S D

278.2
280.6
277.2
278.0
280.0
278.8

Poor

5<sup>th</sup> power being not  
 6<sup>th</sup> " so good.

± 2825

elongated C P r S fol

E P A. Pos. 345.0

237.2
236.8
240.4

C S P Pos

55.6
60.4
56.4
58.6
57.3
57.7

pretty good  
 not so good

Distance

51-
39
12
06



1869 Sept. 3

$\pm 29.12$  C S P stars moving violently  
 = 37 Pegasi elongation only seen at intervals

P10	35.0
	80.3
	32.0
	<u>32.4</u>

at 22<sup>h</sup> auroral arch, extending from eastern horizon to western between  $\alpha$  Androm and  $\gamma$  Pegasi over  $\beta$  Pegasi &  $\beta$  Cygni and go on to western horizon drifting away to Southward but a continuous spectrum with some signs of the bright line E.P.A

This arch showed continuous spectrum with the auroral line faintly but decided C.S.P.

Note Jan. 11, 1882. The record on this page of the aurora seems meant to include the results of the observations on the last two pages.

1869 Sep 5

Gravimence (g) Sept. 11 52.403  
 Intervals Jan. 22 { 24.790  
 Hence f 27.413 g 77.421

L. Aquilae Set chronometer  
 by

Obs by EPN

Zero of No

256.5

~~257.0~~

256.5

256.6

Stop watch 506 S. Watch 627 EPN

$\Delta \alpha$

6<sup>m</sup> 24.7

b 23.3

b 19.6

23.2

18.7?

22.4

23.4

20.0

33  
 21<sup>h</sup> 40<sup>n</sup>  
 47

$\Delta \delta$

10.0

10.0

16.0

23.7

32.9

32.47

34.00

33.71

34.63

35.65



1869 Sep 6

See p. 51 for data for  
coincidence.Diana  
x W XXII 228

EPd obs

 $\Delta$ 

Planet sf \*

time	Stop W 506 CSP	Stop W 627
22 <sup>h</sup> 13.6	49.0	49.0
15.0	49.0	48.7
16.7	48.9	49.0
18.1	50.0	48.6
19.5	49.9	48.5
	49.36	48.76
	<sup>0.4</sup>	<sup>0.7</sup>
true interval	49.40	49.33

time	$\Delta$	
22 30.8	61.30	
43.3	68.48	changed 180°
55.8	68.47	

23 <sup>h</sup> 1.0	49.0	48.7
2.4	49.3	48.7

This is not the planet.

1869 Sept 11

Coincidence 52,403

ERA  
Obs

Zero of Pos. 256.7  
 256.1  
 256.5  
 256.2  
 256.4  


---

 256.38

Asia  
x as starObs by  
E.P.A by diagonal wires with Chronograph

Pos. of Moreable wire

64.84

Comp \* } Comp \*  
 $\alpha$  W<sub>XXI</sub> 1260 } n.f. $\Delta S$ 98.245  
115

Coincidence 52.42

37  
 38  
 39.5  
 45  


---

 52.403

Asia  $\alpha$   
Comp \*

22<sup>h</sup> 01.0<sup>m</sup>  
 2.5  
 3.6

Asia n.f.

56.685  
 .545  
 .700  
 .620

over



1869. Sep 11 continued 1869 Sept. 13.

Coincidence  
Sept. 11 52.403  
Sept. 13 52.474

Stop No	506	627	627
22	8.8		Corr.
	40.4	41.0	41.5
	41.3	40.0	40.5
	40.8	40.2	40.7
	40.6	40.7	41.2
	41.3	40.0	40.5
	<u>40.88</u>	<u>40.38</u>	
		50	
		40.88	

Sept 13 1869

 $\leq 2847$   
 $5^{th}$  power  $\times = 00$   
 Pos

C S P

 $46.4$   
 $(52.8)$  reg Dist  
 $46.4$   
 $47.2$   
 $46.6$   
 $45.4$   
 $46.4$ 
 $52.58$   
 $57$   
 $58$   
 $58$   
 $57$   
 $52.576$ 

Dist

 $52.59$   
 $60$ 

not so good

 $59$   
 $56.5$   
 $57$   
 $52.583$ 

Coincid

 $52.552$  reg  
 $476$   
 $470$   
 $476$   
 $476$   
 $472$   
 $52.474$

1869 Sep 12

Coincidence Sept. 11 52.403 1.53  
" " 13 52.474 1.54  
Use mean for Sept. 12, 52.438

Stopwatch 506	627	627 Corr.	Actual time
W. XXI 1260	1 <sup>m</sup> 18.3	1 <sup>m</sup> 19.2	
Asia (67)	18.8	19.7	
	19.2	19.6	
Asia n.f.*	18.7	19.3	
	19.0	19.5	
Σ P & Obs	19.18	18.56	19 <sup>h</sup> 20.0 <sup>m</sup>
	80		
	19.36		

Δ8

47.48  
39  
385  
54  
65  
73

19<sup>h</sup> 34.3<sup>m</sup>  
33.2  
32.0  
30.8  
29.9

Rate of Stopwatch 627

at 19<sup>h</sup> 21<sup>m</sup> 30.5<sup>s</sup>  
25 46  
4 10  
= 250

0<sup>m</sup> 0.5<sup>s</sup>  
4 7.8  
247.8  
2.2  
4  
8.8

19 27 45  
31 53

0 0.0  
4 7.6  
247.6  
2.4  
9.6

9.8  
9.8  
3.9  
6.1  
9.4  
13.6  
14.0

19 33 5  
34 15

0 0.0  
4 7.2  
247.2  
2.8  
4  
11.2  
3

Note Dec. 27, 1880. The observations of Asia (67) M. 53-56, can apparently be used, assuming the chronometer correct, and the stopwatches as compared; No. 506 seems to be assumed correct.



Sept. 14 1869

Asteroid  
E.P.A. Obs.  
(78)

(69)

Intervals in R.A. between (69) & Weiss's \* 751  
Stopwatches E.P.A. & A.S.  
Started by chron. Intervals

A. 424

23<sup>h</sup> 36<sup>m</sup> 23.023<sup>h</sup> 38<sup>m</sup> 35.31<sup>m</sup> 10.7

1 10.3

1<sup>m</sup> 10.5

1 10.3

Position angle  
345.8  
Should have  
been 346.4  
unless the  
micrometer has been  
taken off.

(69) n p of star  
Diff. of Declination by micrometer

23<sup>h</sup> 50<sup>m</sup>  $\frac{1}{2}$ 

41.54

23<sup>h</sup> 52<sup>m</sup>  $\frac{1}{2}$  (reject) 40.2723 56<sup>m</sup>  $\frac{3}{4}$ 

40.60

0<sup>h</sup> 1<sup>m</sup>  $\frac{1}{6}$ 

41.02

Note Dec. 27, 1880. These observations may be used if we assume the chronometer and stopwatches correct; perhaps No. 627 had been regulated since the observations on p. 56.

Sept

15<sup>th</sup> 1869

Coincidence

52.512

52.462

p. 57  
h. 26

p. 59

52.456

Mean

52.477

Mercuris 65 P. observer

3d power  $\ast \approx 06$  comp 8. $\ast$ 's moderately steady rather large  
mag of comp 8.5

Pas

34	5.0
34	6.3
34	6.8
34	6.0
34	6.3
<hr/>	
34	6.08
<del>24</del>	<del>6.4</del>

Dist

54.51	
44	
51	
54	
62	
<hr/>	
53	
61	
54	
48	
43	

Coincid

54.521	
<hr/>	
52.510	
51.3	
51.6	
51.4	
50.8	
<hr/>	
51.2	



1869 Sep 15 continued

 $\leq 2847 \times = 00$ 4<sup>th</sup> power \*'s tremulous pretty small  
totally well separated.

65 D

8 as

44.3 Dist 52.5-5

45.9 5-4

44.9 5-3

44.1 5-2

43.9 5-5

---

44.6 52 528

Coincid 52.46

46.6

46 2

46 3

46 0

---

46 2

Coincid 52.45

Screw turned 48

backward 46

5<sup>th</sup> powertoo close 52.54 ~~5-4~~ reg

5-4

5-3

5-3.5

---

5-3

5-3.5

1869 Sep 18 continued

$\Sigma$  2847  
continued

C. P. A. obs.

X 1100

$\Sigma$  = Power

Dish

~~82.824~~  
52.583  
61  
59  
58<sup>14</sup>  
60  

---

52.590

Coinc. —

52.47  
44.  
462  
465  
445  

---

52.456

Position

~~229.5~~  
226.7  
223.6  
221.0<sup>48</sup>  
223.5<sup>83</sup>  

---

221.66



1869 Sep 16

2455

CSP obs.

3<sup>rd</sup> P

\* 1100

Stars very dim  
m. steady. normal

Pos.

54.0

53.8

52.5

54.4

53.0

---

53.54

Dist.

Clouds prevented further obs.

1869

Sep 18 Saturday

Coincidence  
52.669 $\Sigma 2455$  CIPots

North lens	52.65	3 <sup>rd</sup> P
Screw head	.61	H <sub>2</sub> P
Slip round	59	"
	61	"
	57	"
	<u>52.596</u>	

 $\Sigma 2576$ 
 2 Photos  
 \* 11 00  
 4" Power

Pos	41.8
	40.2
	41.0
	39.7
	40.5
	<u>40.64</u>

Dist	.36
	.27
	.25
	.275
	.27
	<u>.23</u>
	.259

Coincidence

C S P

Coincidence

.69
.672
.675
.685
<u>.665</u>
677
52.660
676
669
660
<u>681</u>
.669



1869 Sept 18 continued

$\leq 2576$ cont	6 S D obs * 11 obs	39.9 39.8 38.6 39.8 38.2 <u>39.26</u>	Dist 53.39 53.05 - wide 01 03 03 03 <u>53.030</u>
---------------------	-----------------------	--	---

$\leq 2834$ = P. XIX 3.9	* T obs 4th power	Pos 28.23 282.6 282.6 283.6 <u>282.9</u> 282.80	Dist 53.34 poor 22 <sup>m</sup> 22 <sup>m</sup> 40 29 bad to close 38 37 34 too close 40 <u>40</u> 39.4
-----------------------------	----------------------	--	---

E P A obs * 4 L obs	281.1 289.5 281.3 282.8 281.5 <u>282.04</u>	53.39 36 28 29 33 <u>330</u>	17 "
------------------------	--	---	---------

$\leq 2760$	6 S D obs * 4 L obs comp pr Mag 7.3-8.3	303.4 303.6 303.1 303.5 303.2 <u>303.36</u>	53.68 two wide 70 68 65 66 close <u>53.664</u>
	C P A obs * 4 L obs	302.3 303.1 302.0 302.3 303.7 <u>302.68</u>	53.59 53 61 wide 60 56 pretty wide <u>53.578</u>

Sept 19<sup>76</sup><sup>34</sup> 1869

Coincidence direct 52.727  
 " " 52.728  
 " " 52.730  
 " by contacts 52.722  
 Mean 52.727

Lerov Pos	ERAB	Posit	77.3
			76.6
			76.7
			77.0
			76.8
			<u>76.88</u>

(69) Could not be found too near the moon

*P. Equulii* comp not seen too much moon

= *Egmonti* A & B not separable  
 \* 0 very large v dim & v tremulous

CS P  
observer

all of CAVB with 6 Pos 63.2 Dist 5-3.18

\* 4 11 20

67.0  
 66.3  
 67.3  
 65.6  
 65.9  
 66.4

Coincidence

52. 727  
727  
723  
728  
732

By contract to

	727	last	727
5-2.	748	700	724
	748	701	724
	753	690	721
	753	688	721
	754	688	721
	<u>751</u>	<u>693</u>	52,722
	722		

52.730  
738  
716  
733  
725  
728

52.727  
740  
730  
731  
728  
730

NASA Astrophysics Data System



Sept 23 1869

Indiculus  $\frac{3}{4}$  power B-G Pos 62.5

\* 1100 A black Liz

$\frac{1}{4}$   $\frac{1100}{n}$  power A +  $\frac{B+C}{2}$  104.7  
B-C 42.2

$\frac{1}{4}$   $\frac{1100}{n}$  power B-G 50.5

A 6 gr  
Abraham Clark Jr

B-G

45.5

45.3

---

45.4

43.5

42.0

47.0 heat

43.0

42.5

---

43.6

E P of  $\frac{1}{4}$   $\frac{1100}{n}$  power B-G

A +  $\frac{B+C}{2}$

107.0

106.2

B-G distance  
estimated 0.5 or less

Coincidence 52.642

Sept 24 1869

EP of  $\beta$  <sup>4th</sup> Power Zero of Pas

78.8
78.5
78.7
78.4
78.2
<u>78.5-2</u>

in Hercules BAC EP Obs -  
X 1100  
4<sup>th</sup> Power  
Elongated not  
separated

Ra 44.0  
43.5  
45.8  
48.8  
47.3 <sup>29.4</sup>

---

45.9  
5.88

B.S. Obs  
scarcely  
elongated from

Das 52.7  
52.6  
60.8  
55.8  
55.5

(slightly elongated very

$\pm 2262.0$  \*'s much blurred  
=  $\tau$  Ophiuch moving much rather  
hazy 6<sup>th</sup> Power  
B.S. Obs \*  $\tau$  SO  
stars can be measured  
well

Das 283.4 Dist 52.76  
283.7 rather small 76 close  
282.4 77 wide  
284.0 78 left  
283.9 775  
283.48 .769

Dist 52.84 Coincid 52.646

80	635
.79	649
.79	639
<u>.795</u>	641
803	<u>6424</u>

34  
17  
765  
782



1869. Sep 24

70 Ophiuchi EP + Obs  
 6<sup>th</sup> Power  
 \* 100  
 5<sup>th</sup> after wards

104.8  
 103.5  
 103.0  
 106.0  
 102.5  
 Sum 19.88  
 103.96

70 Ophiuchi EP + Obs  
 \*<sup>5</sup> 1100

~~67.8~~  
 69.7  
 70.0  
 69.2 173  
 70.8  
~~69.5~~  
 69.84

Dish

53.18  
 16  
 24  
 15  
 full width 14  
 174

6 S P obs  
 \*<sup>5</sup> 1100  
 comp following  
 comp of a  
 red color  
 \* 0 very large

Pos

70.0 53.15  
 70.0 7<sup>th</sup> power 19  
 70.7 175  
 71.9 165  
~~70.4~~ 14  
 71.1 53.162

larger \* suspected  
 to be double  
 appears to be  
 separated with  
 7<sup>th</sup> power  
 comp or

Pos

301. 3d power 16.

1869 Sep Dr<sup>h</sup> = continued

Jupiter

Pro of  
EP 4 obs  
\* 100

Po

9.0  
9.1  
9.6  
10.5  
8.3  

---

9.30

Dr<sup>h</sup>

53.41  
045  
05  
03  
01  
015  

---

53.030

6 S P obs  
x5 1.00  
\* 0 same color  
S one a trifle  
smaller  
\* 0 pale yellow  
motion very bad  
very unsteady  
\* 0 becoming  
more & more unsteady

Pas	12.0	.1	.05	53.00
	11.0	1.0	1.05	.05
	12.0	.1	.01	.035
(rej)	13.5			.01
	11.9	.2	.04	.05
	12.4	.4	.15	53.029
	12.1	± .36	1.22	.305

Shut up on account of clock's breaking  
Very bad seeing



1869 September

25<sup>th</sup>

Mercurii Prof W obs

Pas 209  
 217  
 222  
 224  
 216  


---

 217.6

x<sup>4</sup> 1100following  
fainter.

C S Observer

229.5  
 237  
 247.5  


---

 238.

± 3062

C S O

3d Power x 0 ~~0.1~~ 00

seeing excessively bad  
 double image & moving  
 violently and rather  
 dim  
 Comp Preceded

Pas 249.0

249.7

253.2

249.7

251.1

252.0

255.0

250.8

255.0  
 252.8  
 252.2  
 251.7  
 251.5  


---

 252.6

1/2 wt

1/2 wt

1/2 wt

1/2 wt

1/2 wt

10.2

E P A obs

255.0

252.8

252.2

251.7

251.5

252.6

1869 September

27<sup>th</sup>

Day fine & very bright aurora extended  
to zenith. Clouded up before any work could  
be done —



1869 Sep 28

Coincidence of Sept. 24  
52.622

J Herkules

Dome was  
seeing poor  
Clock much  
out of order  
X not sep.

Along by C.S.P.

\*<sup>3</sup> ± 00

comp 5

	Residuals
326.7	
331.0	1.42
332.7	.28
332.3	1.2
333.1	.68
333.0	.58
332.42	± .62

3 Sagittae to S P also  
 \* moving very violently  
 very large, shaly  
 slightly elongated  
 3<sup>rd</sup> Power \* ± 00

355.8

Prof Winlock  
 seeing too poor to  
 make anything out

S Equulei

C S P Obs

4<sup>th</sup> Power 0

\* ± 00

Pos 27° rough

44

43.5-

39.2

36.4

44.5-

41.56

31.5-

These readings  
 should no doubt  
 be increased by  
 100. Otherwise the  
 star would not be  
 measured ± to eqs.

Note July 13, 1881.  
 The probability is that the  
 star is  $\delta$  Sagittarii, not  
 $\delta$  Sagittae; for the last  
 letter looks more like  $\epsilon$  than  
 like  $e$ , and  $\delta$  Sagittarii  
 was observed Sept. 29, 1869,  
 (see p. 73) just before  
 $\delta$  Equulei, as here; further,  
 the observation of Sept. 30, 1869,  
 (see p. 74) where the name is  
 again doubtful, answers to the  
 position angle of  $\delta$  Sagittarii;  
 finally, the remark here, only  
 slightly elongated, can hardly  
 apply to  $\delta$  Sagittae, the  
 distance being 8"9."



1869 Sep 28

Mercuria Ast Pr, stop watches  
time 1 2

+3.93

Sal.

69 precedes \*

Ad Transit of 69 22<sup>h</sup> 35<sup>m</sup> 00.0 Arnold 424  
(stop watch) (stop watch)  
506 627

22<sup>h</sup> 35<sup>m</sup> 0

(1) 53.9

2<sup>h</sup> 1.8

22 45.0

2

3.2

5 added

2.0

2

3.6

2.0

22 50.5

2

4.2

2.5

22 53.1

2

4.0

2.1

2

3.75

2

2.18

2

corr. -2.4

2

+2.33

2

3.51

2

3.51

Stop watch 506

Started

22

55<sup>m</sup>

44

0

00.0

23

0

44

5

0.6

23

3

0

0

00.0

8

0

5

0.8

8

30

0

00.0

13

30

5

0.4

Stop watch 627

Started

22

56

50

0

00.0

23

1

50

4

56.8

23

2

20

0

00.0

1

20

4

56.6

9

20

0

00.0

14

00

4

56.6

ΔS

23<sup>h</sup>

1.1

70.025

3.6

69.99

6.5

70.16

9.1

70.43

12.7

70.59

planet soft\*



1869 Sep 28

stop W

stop

627

Residuals

28h

19.7  
23.5  
26.0  
28.7  
31.4

2 5.0  
2 5.0  
2 4.7  
2 4.8  
2 4.8

2 3.0  
2 3.0  
2 3.5  
2 3.4  
2 3.9

.1 .01  
.1 .01  
0  
.1 .01  
.1 .01

2 4.90

2 3.32

.01

Corr

- .24

+ 1.33

.1

2 4.66

2 4.65

Note Dec. 27, 1880. Observations seem available assuming the chronometer correct, and the stopwatches as compared with it.

Sept

29

1869

3 Sagittarii Prof Min obs ~~had~~  
\* 11 00

tried diminishing  
aperture to 5 in 7 in  
without any advan-  
tage

too bad seeing to measure  
though seen double

Equulei

J.W. Obs  
7<sup>th</sup> Power

160

166

168½

} C.S.P. 9<sup>th</sup> Power

J.W. saw it  
as a double star

C.S.P. doubtful  
about elongation

Comp. S.

166

171

170

169

E.P.A. 9<sup>th</sup> Power

J.W. observed  
it with several  
powers 2000

1243 861

\* 608 and

elongated it with  
all

Obs without  
illumination

Extremely  
close C.S.P. estimates ¼"

Stop watch 506 Started 22<sup>h</sup> 22<sup>m</sup> 4<sup>s</sup> 0<sup>m</sup> 00.0  
27 4 5 00.6

Stop watch 507 Started 22 27 00 0 00.0  
32 00 4 57.0

(59)

lost for α not found.



1869 Sept

30 Thursday

No coincidence here, and some doubt as to coincidence of Oct. 1, (see p. 77). Coincidence of Sept. 24 52.642.

Sagittar

Prof Winlock obs  
\* very unsteady  
measures difficult  
wire ill by \*  
4 power

268.2

269.5

271.0

269.6

Note July 13, 1881.

See note of this date on p. 70 with regard to the name of this star; it seems to be *S sagittarius*, and not *S sagittae*.

S Egnorli

630 obs  
no elongation  
made out

E P A

Satto

Aos had seeing A0

(59) compared

with

49.2 + 0°. N 200

(59) S f \*

E P A obs -

St W. 627 (E P)

H W (507 E P)

$\Delta\alpha$	1 <sup>m</sup>	56.1	.22
		55.6	.28
		55.9	.02
		55.8	.00
		56.0	.12
		55.88	.714

1	57.0
	56.8
	56.8 (53 added)
	57.0
	56.9

This is not  
the asteroid  
The following is -

$\Delta\alpha$	22 <sup>h</sup>	28.0	1 <sup>m</sup>	57.8	506	1 <sup>m</sup>	59.8
		31.1	1	57.4		2	00.0
		33.7					59.3
		36.4	1	57.0			59.3
		39.0	1	57.3			59.4
			1	57.42	2)		59.56
			curr	+ 133			
				58.75			

 $\Delta\delta$ 

22	44.2	51.38
	46.8	.26
	49.2	.26
	52.1	50.71
	55.8	41
		51.064

1869 Sept. 30<sup>th</sup>

Stop Watch 627	Started	22 <sup>h</sup> 40 <sup>m</sup> 20 <sup>s</sup>	0 <sup>m</sup> 00 <sup>s</sup> 0	Corr.
	Stopped	45 20	<del>4</del> 58.8	-.64
		45 44	0 00.0	-.67
		51 44	10 52.6	

Continuation  
of obs. of (59)

			<u>627</u>	<u>506</u>
$\Delta L$	23	1 <sup>m</sup> 8 <sup>s</sup>	1 <sup>m</sup> 59.4	2 <sup>m</sup> 3.0
		5.2	59.3	2.0
		10.5	1 59.2	1.6

The above <sup>3 transits</sup> readings were taken with  
micrometer circle at 158° 5' instead of  
168° 5' as it should be. Hence the discrepancy  
with the first set.

$\Delta L$	23 <sup>h</sup>	14 <sup>m</sup> 6 <sup>s</sup>	1 <sup>m</sup> 57.0	1 <sup>m</sup> 58.1
		17.1	1 57.3	1 58.0

Note Dec. 27, 1880. These observations can probably  
be used. Stopwatch 506 does not seem to have been  
compared; it was perhaps assumed to be correct.



October

1st

1869

See p. 77  
for coincidences.

*Egglei* 6 S P Obs 5<sup>th</sup> power as 149.5 rough  
seeing very 6<sup>th</sup> mi. { 147.4 very good measure  
good { 147.6  
148.6  
148.20 mean with 6<sup>th</sup> Power

\* almost separated  
dist small  
diffraction rings  
very plainly seen  
\* moderately steady  
with 7<sup>th</sup> power  
loosely as well as  
better  
very nearly the best  
seeing that may be  
expected

146.9 7<sup>th</sup> P Dist .70 wide  
147.6 .69 mean

147.25

coincided .65

with 9<sup>th</sup> P 9<sup>th</sup> Power  
motion is  
had when  
steady not  
quite separated

144.0 too small  
147.0 better  
148.0  
146.33

The above measures  
of *Egglei* are  
really excellent. C.S.P.  
\* 1.00

E.P.A. Obs.  
9<sup>th</sup> Power

P.W. 9<sup>th</sup> Power  
\* 1.00

EPA 6<sup>th</sup> P.

148.7 162.5  
148.8 159.0  
145.5 158.2 too large  
150.0 159.0  
148.25 157.5  
159.24

157.5  
154.0  
154.0  
155.0  
156.5  
155.4



1869 Oct. 1: Friday

Coincidence (g) 57.698 B.S.P.  
 Mean 57.710 E.P.A.  
 Coincidence (h) 77.584

Fixed wires must have been moved, or possibly 52 should be read instead of 57 in the first measures of coincidence and perhaps of distance.  
 Coincidence Sept. 24 52.642  
 " Oct. 31 52.651

Stop Watch 627 has rate changed

Started 21 <sup>h</sup> 4 <sup>m</sup> 10 <sup>s</sup>	0	00.0	+ .26
14 10	9	57.4	
16 10	0	00.0	
26 10	9	57.7	+ .23
506 Started 21 <sup>h</sup> 5 <sup>m</sup> 30 <sup>s</sup>	0	00.0	+ .04
15 30	9	59.6	

Egnabai  
 cant  
 6 S P also  
 6 power  
 seeing not  
 regu 30 good  
 as before

6<sup>th</sup> Pas 151.5-  
 6<sup>th</sup> power 148.5-  
 148.3  
 149.4  
 7<sup>th</sup> Pas 149.2 one of best  
 better 144.8  
 147.0

2 2999  
 = 20 Pegasi  
 Pegasi 20  
 \* 1100

6 S P also  
 7<sup>th</sup> power

boincid

Pas 214.7 fixed dist  
 214.8 trig good 57.84  
 214.0 case .84  
 214.4 .85-  
 215.6 .86  
 214.7 .84  
 57.846  
 57.698  
 148  
 225.6 (Boquid)

EPs Obs

216.0 57.545  
 219.8 550  
 218.7 525  
 216.7 515  
 215.5 58  
 217.34 57.543  
 57.710  
 1.67

Coincidence EPs Obs

57.710  
 707  
 700  
 723  
 710  
 57.7100



1869 Oct 1st

37 Pegasi 6 S Pobs.

2912

8th power

x 1100

x's separated

but moving violently

measure rough

Comp fol

2 mag different in

mag Dist est  $\frac{2}{3}$ "

\* 4 11.00

236.5

231.4

235.8

230.8

233.9

233.7

238.6

240.8

245.0

241.33

(69) Comp mte

Stop watch

506

627

1 25.3

1 25.0

24.8

25.0

25.2

25.2

24.8

25.2

25.6

25.4

1 25.14

1 25.16

.05

.35

1 25.19

1 25.51

Arg L<sup>2</sup>. N<sup>o</sup> 8623<sup>h</sup> 23.6

\* n p \*

25.8

E.P. A. obs.

 $\Delta$ 8

23

34.5

36.8

38.7

42.2

44.4

24.32

24.77

.57

.54

.485

from feather wire

The wire  
catch in  
measuring  
cove

Cave.

77.535

57.5

61.3

60.5

59.0

77.584

 $\Delta$ 8

23

54.2

1. 24.8

1 25.3

24.8

25.1

24.8

25.0

25.3

24.9

24.8

25.4

1 24.90

1 25.14

.05

.35

1 24.95

1 25.49

1869 Oct 2

Coincidence not observed, and will  
 used for  $\Delta S$  uncertain. If the observations are  
 reduced, the motion of the asteroid in  $S$  may  
 be assumed, and then by comparison with  
 the observations of Oct. 10 the record can  
 be interpreted.

Coincidence Sept. 24 52.642  
 Oct. 31 52.651

Sagittarii

$\gamma$  Andromedae Not fit for  
 work upon it

(69) comp  
 with  
 Arg 7 + 20 10 86.

S P 10b.

69 Sp \*

506 CSR

627 EPA

 $\Delta x$ 

22<sup>m</sup> 2.0  
 5.2  
 8.9  
 11.8  
 15.0  
 8.58

2 21.3 (3 added)  
 20.3  
 20.7  
 21.7  
 21.3  
 21.06  
 + 1.14  
 21.20

2 20.5  
 21.2  
 20.9  
 20.6 (2 added)  
 21.0  
 20.84  
 + 1.60  
 21.44

$\Delta S$  22<sup>m</sup> 23.0 60.28  
 25.7 65  
 29.0 50  
 32.0 39  
 36.5 54  
 60.512

$\Delta x$   
 22 40.8  
 43.8  
 46.9  
 49.8  
 52.6  
 56.3

2 21.8  
 22.4  
 22.3  
 22.1  
 23.5 wj  
 22.0  
 22.12

2 21.8  
 22.3  
 22.0  
 22.0  
 22.6  
 22.14

rej star not well seen

Note Dec. 27, 1880. See note of this date p. 81



1869 (Obs continued) Saturday.

(59) cont

with

Arg Z + 0° N. 185

23 21.4  
37.0  
38.9  
42.7  
48.2

506 obs

2 2.2  
2.2  
2.0  
2.0  
1.4

2 1.80

627 obs

2 ~~2.2~~ 2.0  
2.0  
1.8  
2.0  
1.5

2 1.82

$\Delta 8$  23<sup>h</sup> 57.0  
0 0.4

(59) sf\*

3.0  
5.7  
8.2

89.00  
1.00  
1.04  
1.06  
1.12  
89.044

Elpis full  
1/2 mag fainter  
than Hesperia

0 12.8  
15.3  
21.4  
24.3  
27.3

2 0.6  
0.3  
0.5  
0.6  
0.0

2 0.40  
corr + 0.14  
2 0.54

2 1.2  
1.2  
0.2  
0.0  
0.5

2 0.69  
corr + 0.60  
1.22

Started 506 } 0 28 20  
31 20  
35 10  
38 10

0 00.0  
2 59.8 .07  
0 00.0  
2 59.7 .40

Started 627 } 0 28 50  
31 50  
34 30  
37 30

0 00.0  
2 59.1 .30  
0 00.0  
2 59.0 .33

Tuesday Oct 5<sup>th</sup> 1869 See note p. 79  
on coincidence.

S. Eggle's m obs seeing too bad to do  
any thing

Started 506	21	2 <sup>m</sup> 40 <sup>s</sup>	0 <sup>m</sup> 00.0	.03
		13 40	10 59.7	

Started 627	21	5 20	0 00.0	.34
		15 20	9 56.6	
			0 00.0	1.27
			5 58.3	
	21	28 00	0 00.0	.29
		43 00	15 55.7	

in mean .30

At Dec 27, 1880. The preceding observations  
can apparently be used. The chronometer employed  
may be assumed to have been set correctly. The  
stopwatches 506 and 627 were compared with it.



1869 Oct 8 continued

Vesperia

Comp with

Ang  $2^{\circ} + 2^{\circ}$  72

(69) mf \*

 $\Delta \alpha$ 21<sup>h</sup> 51<sup>m</sup>

mean

 $\Delta \alpha$ 

21<sup>h</sup> 53.0  
 53.4  
 53.8  
 54.2  
 54.5

 $\Delta \delta$  21<sup>h</sup> 59.2

22 1.7  
 2.5  
 3.2

 $\Delta \alpha$ 

22 6.3

506 PPA

0<sup>m</sup> 2.1

2.5

2.0

1.9

2.0

2.10

5

2.4

1.8

1.8

2.2

2.0

2.04

71.64

.61

.54

.37

.32

1.8

2.1

2.0

1.5

1.9

1.86

627 CSP

2.2

2.2

1.9

1.9

2.05

corr .01  
 2.06

5

2.2

2.1

1.9

2.4

1.9

2.10

corr .01  
 2.11

1.6

2.0

1.6

1.6

1.8

1.72

1869 Oct. 5

Vesperia  
comp with  
Arg 2+2° 75  
(69) sp \*

22 8.8  
9.7  
10.7  
11.5  
12.2

506

23.7  
~~24.7~~  
23.8  
23.9  
24.0  
23.85  
+ .01  
23.86

427

23.7  
24.0  
24.0  
23.6  
23.5  
23.76  
+ .12  
23.88

ΔS

22 17.8

74.85  
88  
91  
83  
95

22 20.6

22 22.7

24.1  
24.4  
24.0  
24.3  
24.5

22 26.1

24.26

Corr.

+ .01  
24.27

23.7

24.7

24.0

23.8

24.2

24.08

+ .12

24.20

Note Dec. 27, 1880. See notes of this date p. 81.





October 7

1869

See note p. 79  
on coincidence.

mean time		506	.627
8 <sup>h</sup> 10 <sup>m</sup>			
19.8		19.8	120.0
20.8		20.8	19.9
19.2		19.2	19.8
19.7		19.7	19.4
19.5		19.5	20.5
19.80		19.80	19.92

21 <sup>h</sup>	Side	85.40	perhaps 84.40
35.6		84.83	
		85.23	
40.2		.35	
41.9		.19	

48.9	627	506
	18.7	12.5
	18.6	18.9
	18.4	17.8
	18.2	19.0
	18.8	19.9
	18.54	19.42

Leysichore swept over the ground and  
 (81) noted positions of stars

Note Dec. 27, 1880. See note p. 81 of this date.



Monday Oct 11 1869

rene (14)  
comp with  
No 830  
(14) or f x

M		m		s	
9	h	6	m	2	52.6
					53.2
					52.6
					51.3
					51.4
				2	52.22
23	3	4.0	0	00	50.6
	14	40	10	58.7	0.12
	16	30			
	30	30	13	59.8	0.01
23	5	00	0	00	627
	16	00	10	57.5	0.23
	17	00			
	31	00	13	56.2	0.27

Note Dec. 27, 1880.  
There were two stopwatches,  
Nos. 506 and 627 (see  
p. 46 of  
this book).  
Two comparisons  
of each of them  
with some chronometer,  
probably B. 236 or 4.424,  
make No. 506 lose on sideral  
time 0.12 and 0.01 in 1m;  
(mean 0.06); and No. 627  
0.23 and 0.27 in 1m  
(mean 0.25).

The  $\Delta$  (?) between rene  
and the stars by No. 506  
seems to have been up in the  
column the mean of which is  $2^m 52.22$   
and by No. 627 as in the column  
the mean of which is  $2^m 51.66$ . The  
columns, respectively, are apparently  
corrected for rate of stopwatch to be applied to the data of these two  
+ 0.2 and + 0.7, which will make the two columns agree well with each other in the mean.

Sunday Oct 17 1869

Looked at a red x with a  
very faint companion near  $\gamma$  Cygni  
probably  $\delta 23 + 38^\circ$  No 4003

Monday Oct 18 1869

see note p. 79  
on coincidences

looked for here (14) not seen acc.  
account of being too near the Moon

	M of C	SM 506	6 57 7	97.35
Urania	8 <sup>n</sup> 38 <sup>m</sup>	9.7	8 49.5	60
(30) comp		8.3		57
wdy +16 250		8.8		64
(30) S P 2 x		8.4		72
		9.1		48
		9.0		38
		9.6		29
		9.1		56
	8 44	9.3	8 57.5	55
		8.8		
		506	627	
	9 2	8.6	8.8	
Urania?		8.8	9.3	
look to		9.1	8.7	
Manaw		9.3	8.8	
	9 4	9.15	9 <sup>h</sup> 7 <sup>m</sup>	8.8
				8.5











June 28, 1877. This book indexed except for double stars.



## 6 Virgines 6 may

Sidit	17 2	17 42
mit.	11 21	12 0
	201	114
	5 0	5 8

Gr m. d.	16 27	17 8
R. d	11 56	11 57
Dec	+ 4 40	+ 4 33
h	5 <sup>h</sup> 6 <sup>m</sup>	5 45

x	+ 6.9	+ 10.9
---	-------	--------

by core d

1.380	1.353
-------	-------

sin d

8.907	8.899
-------	-------

log y

0.287	0.252
-------	-------

y

+ 1.9	+ 1.8
+ 13.1	13.1

+ 15.0	+ 14.9
--------	--------

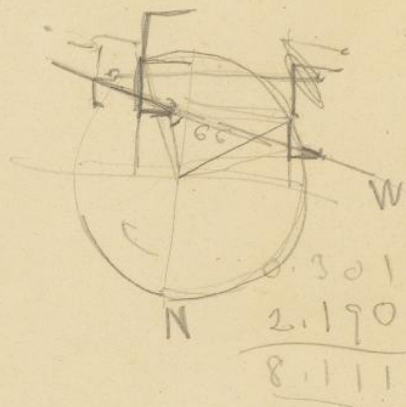
0.839	1.037
-------	-------

1.176	1.173
-------	-------

8.950	9.148
-------	-------

9.287	9.284
-------	-------

0.658
8.241
8.907



Started 19<sup>h</sup> 21<sup>m</sup>  
19 22 1 00.0  
18 50 18.6  
18 31 22 18.6  
18 32 35 56.6



1869phae.proj. 338P