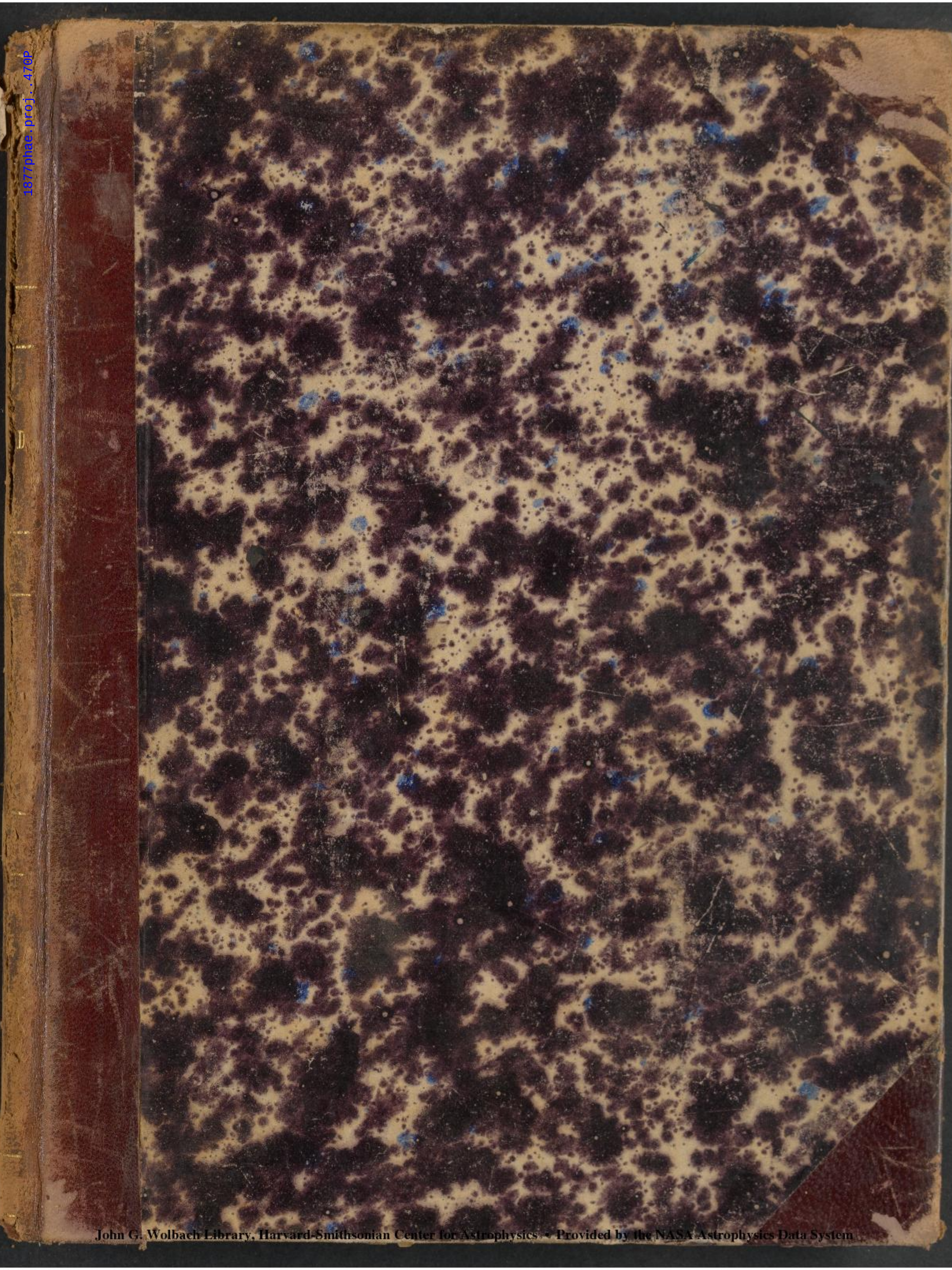

R 26 Kb 1136 S.469

KG 11365.469

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Oct. 6th. 1877. 8 P.m. Errors of Circles of W. Equatorial

Dec. circle correction = + 29° 40′ ±

Oct. 12. 1877. 10. P.M. C.H.M.
Photometric measures on Mars & Saturn
62.1
335.7
336.3

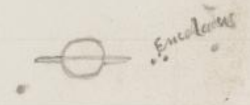
Oct. 13. 1877. 7.15—10. P.M.
Photometric measures on ♂ & ♄

	1st Posn.		
244.3	66.4	280.6	104.2
245.7	64.8	279.5	103.8
246.6	65.8	280.8	100.3
246.2	66.8	281.8	100.2
244.3	67.7	279.9	102.7
5 [1227.1	331.5	1402.6	511.2
245.4	66.3	280.5	102.2
(271)	5	(026)	
245.42	66.30	280.52	102.24

280.52 102.24
35.10 35.94

Akt. 8. P.M.

♄ & Satellites



Filar micrometer
eyepiece No. 2.

Formula ~~for finding the relative brightness of 2 objects~~,

$\sin^2 \frac{1}{2}(x+y) : \sin^2 \frac{1}{2}(x-y) = B : B'$

$\sin^2 347°14'24'' : \sin^2 178°42'0'' = B : B'$ or

$(-0.0209)^2 : (.0227)^2 = .0488 : .0005$

Therefore ♂ : ♄ = 97 : 1

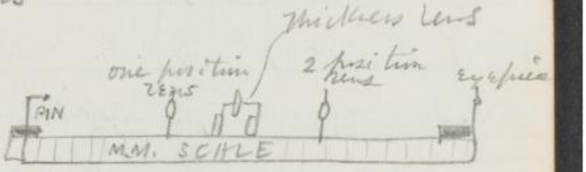
Oct. 15. 1877, 22^h. Focus of object-glass of auxiliary telescope.* by Bessel's Method.

Readings of eyepiece m.m. 75.9

" " object (pin) 913.8

Two positions of object lens

mm.	mm.
638.8	471.8
638.6	472.3
638.1	472.7
637.7	473.0
637.2	473.9
638.~~81~~ 08	472.74



638.08
472.74
165.~~4~~34

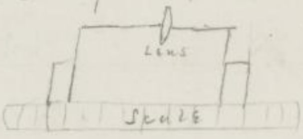
472.74
165.34 } conjugate foci of lens ?
307.40

Formula for finding focal length $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$.

$u + v = 165.34$

$u + v =$

Oct. 16. 1877 - 22^h. Thickness of objective of auxiliary telescope.



mm		
192.1	477.0	284.8
462.8	192.2	270.7
270.7	284.8	14.1 mm. Thickness of Clark objective (photometer A)
470.7	462.8	278.5
192.2	192.2	270.6
278.5	270.6	7.9 mm Thickness of obj. (photometer E)

* for Photometer

Oct 16. 1877 23^h.

Finding α Leonis

R.A. $10^h\ 1^m\ 49^s$ Setting circle δ 12° 34'

δ + 12° 34' 5" δ circle δ 15° 35' 48"

δ circle 15 35 48.

3° 1' 43" = Error δ circle + 3° 2' correction (for sth δs)

S. Time $1^h\ 35^m$

~~Hour circle $11^h\ 37^m$~~

13

S. T. 1 53

R. A. α 10 2

Hour angle $3^h\ \overset{51}{\cancel{33}}{}^m$ α Leonis rejected. River in way to adjust R.A.

Finding ~~Spica~~ Arcturus.

R.A. $14^h\ 10^m\ 3^s$ Setting circle δ 19° 49'.

δ + 19° 49' 27" δ circle δ 16° 35' 36"

Error Circle δ + 3° 2' correction

δ Circle reading 22° 51' 27"

R.A. 14-10-3

S.T. 2-40

$11^h\ 30^m$ Hour angle, determined incorrectly. Star W. of Meridian

Oct 17th 1877 7.15
Comparing Mars and Saturn

7 20 E.C.P. Obs

257.6
266.5
plate fell

8h25m

W.M. Obs. 7:45

339.5
336.0
338.6
7.45

300.6
299.3
interrupted
7:45 P.M.

8.20 pm

320.2	285.5
320.2	283.7
321.3	287.4
319.5	285.0
320.0	284.6
1 2	26 2
320.24	285.24
285.24	
35.00	17.50
605.48	302.74

CHMcA. Mars Saturn

317.3	284.8
317.8	282.4
318.3	281.2
317.6	286.3
30	285.8
	20 5

317.75
284.10
601.85 300.92
33.65 16.82

Saturn & Mars E.C.P. Obs

9.25

28.2	36.9
28.3	36.9
29.6	38.8
28.5	37.4
27.8	36.8
424	368

37.36
28.48
8.88 4.44

65.84 32.92

E. C. P. Obs. Mars + Moon 9.30

47.8 22.5 47.20

45.9 19.2 20.90

47.2 20.0 26.30 13.15

49.9 23.3 68.10 34.05

45.2 19.5

360 45

E. C. P. Obs. Mars + Saturn 9.40

~~28.0~~ ~~37.0~~ ~~Mars and Moon~~ Saturn & Moon

12.4 49.9 28.0 49.54

14.8 48.4 37.0 14.24

13.6 50.3 4.5 35.30 17.65

14.6 49.7 37.5

15.8 49.4 63.78 31.89

21.2 2.7

9.45 C. H. M. obs. Saturn & Moon

~~219.7~~ did not use string

~~208.8~~ ~~26.9~~ ~~270.4~~

218.8 27.8

Coördinates for finding Iris near opposition, 1877. Nov.

	G. M. T. midnt. R.A. 1878	δ
Oct 20	$3^h\ 56^m\ 20^s$	$+26^\circ\ 48'.9$
24	3 55 8	26 36.5
28	3 53 20	26 20.5
Nov 1	3 50 58	26 0.9
5	3 48 8	25 37.8

Mag. 6.8

Difference $1^h = 0^s.75$ RA.
" $3^d\ 15^h = 65^s.2$
RA. Oct. 23. 9^h G.M.T. = 3-55-15
Difference $87^h = 11'.3$ Dec.
Dec. Oct. 23. 9^h G.M.T. = 26-37.6

~~Comparison~~ stars for circle corrections

Name.	R.A.	N.P.D.	Mag.
B.A.C. 1362 κ' Tauri	$4^h\ 16^m\ 25^s.$~~9~~87	$68^\circ\ 3'\ 13''.9$	5½
B.A.C. 1099 ψ Persei			

An. Precession $+3^s.555$
28
$99^s.40$

An. Prec. $-8''.76$
28
-245.28

5

3 25 51.20   42 18 40.7

$4^s.220$
28
$118^s.16$

$-12''.49$
28
$-349''.72$

κ' Tauri 1878.0. R.A. $4^h\ 17^m\ 59^s.41$ N.P.D. 68-7-19.2   δ 21-52-40.8

ψ Persei 1878.0. RA. $3^h\ 27^m\ 49^s.36$ N.P.D. 42-24-30.4   47-35-29.6

R.A. κ' 4 17 60

RA.

Iris R.A. 1850. $3^h\ 53^m\ 29^s$
" Dec. " ~~$21^\circ\ 41'.1$~~

" RA. 1855 3 53 41
" Dec. " $26^\circ\ 41'.7$
Durchmusterung epoch

4.220
5
21.10

3555
4.220
7.775
3.887
5
19.430

$3^h 53^m 29$
19
10

−8.76
−12.49
2 | 21.25
10.62
5
53".10

~~3° 53' 47"~~
100"
21°-40.1
53.
20-47

3.887
23.
11661
7774
89.401

3-55-15
1-29
3-53-46

10.62
23.
3186
2124
$244.26 = 4^h \cdot 4".3$
26 37 36.
26° 41' 40" Position of Iris Oct 23. at 9^h.

Iris RA. Dec.
Oct. 20 3-56-20 +26°48'.9
Oct 24 3-55-8 +26 36.5
Motion $4^d = 1^m 12^s = 72^s$ $4^d = 12'.40$
Motion $1^h = 0^s.75$ of R.A. $1^h = 0'.13$
9^h Oct 24 C.M.T. = $24^d\ 14^h$ G.M.T.
~~14~~ 2 × $0^s.75 = 1^s.5$ 2 × 0'.13 = 0'.26

3-55-8
4 ± 6^s
$3^h 3^m 2\ 6^s$
3-55-2

26-36.5
26° 35'.5

1877 RA ⑦ Oct $24^d\ 12^h$ G.M.T. = 3-55-8 Dec. 26-36.5
" " 28^d " " = 3-53-20 20.5
$4 \,|\, 1\text{-}48 = 108^s$ $4 \,|\, 16.0$
$24^h = 27^s$ $1^d = 4'.0$

RA. Oct 28. 3-53-20 Dec. 26 20.5
Nov. 1 3-50-58 0.9
$3 \,|\, 2^m\text{-}12^s = 132^s$ $3 \,|\, 19.6$
$1^d = 44^s$ $1^d = -6'.5$

Star 5 mag. near Iris. (2 companions)
RA. 1855. $3^h\,57^m\,50^s$
Dec. " $27°\,15'$

Atlas RA 340-4
Dec +23--45

Stars above 9.0 mag. (Arg.) in vicinity of Iris Oct 24. 77.

+26°	D.M. 632	Mag 8.5	D.M. 586	Mag 8.6	+27°
"	D.M. 633	" 7.5	~~D.M. 611~~	" ~~8.3~~	
"	D.M. 636	" 7.3	~~D.M. 616~~	" ~~8.5~~	
"	D.M. 640	" 8.5	~~D.M. 628~~	" ~~7.8~~	
"	D.M. 645	" 8.9	~~D.M. 634~~	" ~~8.5~~	
"	D.M. 648	" 8.3	~~D.M. 635~~	" ~~8.7~~	
"	D.M. 655	" 6.8			
"	D.M. 665	" 8.8			
"	D.M. 669	" 8.8			
"	D.M. 675	" 8.4			
"	D.M. 682	" 8.9			
"	D.M. 684	" 8.5			

Iris. RA. 9h Oct 24. Cm.T. =
$3^h\,55^m\,6.^s5$
Dec. 9h. Oct 24. Cm.T. =
$+26°\,36'.2$
Epoch. 1878.0

Reduced to 1855.0 = $3^h\,53'\,47.^s5$
$\delta = 26°\,40'.3$
Oct 24.

Iris. ⑦. RA. Oct 25 9h Cm.T. = $3^h\,53^m\,20.^s5$
$\delta = +26°\,36'.3$

⑦ RA. Oct 26. 9h = $3^h\,52^m\,53^s$
Dec. " " = $26°\,32'.3$

⑦ RA. Oct 27. 9h = $3^h\,52^m\,9^s$
Dec. " " = $26°\,25'.8$

Stars for identifying Iris. Oct. 1877

D.M.	Mag.	RA. 1878			Dec. 1878	
647	9.5	3h	49m	37s.3	+26°	37'.4
648	8.3		49	41.0	26°	8.9
649	9.5		50	6.5	27°	2.0
650	9.0		50	15.3	26	25.7
651	9.5		50	23.6	26	12.1
652	9.4		50	28.5	26°	39.4
653	9.5		50	32.2	27	0.9
654	9.0		51	1.0	26	23.6
655	6.8		51	47.4	26	50.8
656	9.3		52	20.8	26	13.3
657	9.5		52	44.8	26	44.3
658	9.5		52	51.1	26	43.2
659	9.1		52	51.8	26	38.8
660	9.5		53	8.8	26	27.4
661	9.5		53	34.9	26	7.7
662	9.5		53	39.0	26	42.5
663	9.4		54	2.3	26	27.2
~~664~~	~~9.5~~		~~54~~	~~34.7~~	~~26~~	~~13.7~~
~~665~~	~~8.8~~		~~54~~	~~35.3~~	~~26~~	~~4.2~~
~~666~~	~~9.2~~		~~54~~	~~54.3~~	~~26~~	~~50.1~~
~~667~~	~~9.3~~		~~55~~	~~21.0~~	~~26~~	~~44.9~~
~~668~~	~~9.5~~		~~55~~	~~33.8~~	~~26~~	~~16.7~~
~~669~~	~~8.8~~		~~56~~	~~37.5~~	26	~~8.8~~
~~670~~	~~7.2~~		~~56~~	37.1	~~26~~	~~46.7~~

Discrepancies in Schönfeld's Catalogues

	Dec. Acad. Ausg.	Dec. in "Stars" Cat.
R Delphini.	8°38.8	8° 39.1
R Ophiuchi	-15 54.5 vol II.	-15 54.3

c (R Boötis Comp. Star) RA. 14 40 5.8 in D.M.; 14 40 4 in Sch. (Acad.)

α Cephei. D.M. RA. = $3.^m1$ too great. = 45' of arc.

Positions of Iris at 9. 2m. Oct.-Nov. 1877.

Iris. At Greenwich Mdnt.

Time to be observed

$2^h = 14$ 2^h ~~27~~ ~~27.8~~ 27.8 28.8 28.5 29.8 × 29.8 30.8 31.8 1.8 2.8 3.8 4.8 5.8 6.8 7.8 8.8 9.8 10.8 11.8 12.8 13.8 14.8 15.8 16.8 17.8 18.8 19.8 20.8 21.8 &c

A.	R.A.	Dec.	D in R.A.	D' in R.A.
Oct. 24	3^h 55^m 8^s	+26° 36'.5	^{m} ^{s} +1 – 48	^{m} ^{s}
28	3 53 20	+26 20.5	– 2 – 22	– 0 – 34
Nov 1	3 50 58	+26 0.9	– 2 – 50	– 0 28
5	3 48 8	+25 37.8	– 3 – 11	– 0 21
9	3 44 57	+25 11.6	– 3 – 25	– 0 16
13	3 41 32	+24 42.7	+ 3 – 31	– 0 6
17	3 38 1	+24 11.5	– 3 – 30	+ 0 1
21	3 34 31	+23 38.7	– 3 – 22	+ 0 8
25	3 31 9	+23 5.0	– 3 – 7	+ 0 15
29	3 28 2	+22 31.2	– 2 – 45	+ 0 22
Dec 3	3 25 17	+21 58.1	– 2 – 19	+ 0 27
7	3 22 58	+21 26.5	– 1 – 47	+ 0 32
11	3 21 11	+20 56.7		

Perigee Nov. 15 = 6.8 mag.

D' in Dec	D'' in Dec
-16'.0	-3'.6
-19'.6	-3.5
-23.1	-3.1
-26.2	-2.7
-28.9	-2.3
-31.2	-1.6
-32.8	-0.9
-33.7	-0.1
-33.8	+0.7
-33.1	+2.5
-31.6	+1.8
-29.8	

Iris, at 9 P.M., Oct-Nov-Dec. 1878

Epoch	R.A. 1878.	Dec	Epoch	R.A. 1878.	Dec
Oct 27	3h 53m 24s	+ 26° 34'.9	19		
28			20		
29			21		
30	3 51 44	+26° 7'.1	22		
31			23		
Nov 1			24		
2			25		
3	3 49 33	+25° 45'.1	26		
4			27		
5			28		
× 6	3 46 44	+25 26'.3	29		
7			30		
8			Dec 1		
9			2		
10			3		
11			4		
12			5		
13	3 32 42 3 41 28	+25 25,1 A.J. +24 42'.0 Nature	6		
14			7		
15			8		
16			9		
17			10		
18			11		

× all to this point in error,
.8 being taken = 2nd ins. of .08

Interpolation for Iris.

$RA. = \text{Prec.}RA. + n D' + \frac{n(n-1)}{2} D''$ $n = \frac{\text{Epoch-prec.date}}{\text{Fol.d } " \; "}$

Oct. 27.8 $RA = 55^m 8^s + 0.95(-1^m 48^s) + \frac{0.95(-0.05)}{2}(-0^m 34^s)$

$n = \frac{27.8-24}{28-24} = \frac{3.8}{4} = 0.95$

$RA. = 55^m 8^s - 0.95^m 45.6^s + .024(-0^m 34^s)$

$RA. = 55^m 8^s - 57^s 46^s \; 312 \; - 1^s = 55^m 8^s - (1^m 44^s + 3^s)$

$RA = 53^m 24^s \; 43^s$

Oct 27.8 $Dec. = 36'.5 + .095(-16'.0) + .024(-3'.6)$

$n = .095.$

$\delta = 36'.5 - 1'.5 - 0'.08 = 36'.5 - 1'.6 = 34'.9$

Oct. 29.8 $RA. = 53^m 20$

$n = \frac{29.8-28}{32-28} = \frac{1.80}{4} = 0.45$

Oct 30.8 $RA. = 53^m 20^s + .7(-2^m 22^s) + \frac{(.7)(-.3)}{2}(-0^m 28^s)$

$n = \frac{30.8-28.0}{4} = \frac{2.8}{4} = 0.7$

$RA = 53^m 20^s - 1.4^m - 15.4^s + 2^s.08$

$RA. = 53^m 20^s - 1^m 24^s - 15^s + 3^s$

$RA. = 52^m 20^s - 24^s - 15^s + 3^s = 52^m 23^s - 39^s = -16^s$

$RA = 51^m 44^s$

$3^h 45^m 21^s$
$+25° 21'.9$

$+3^s.6$
$23.$
108
72
82.8
$= 1^m 23^s = 4'.18$

$+11.20$
23
3360
2240
257.60
$= 4'.18''$

$Dec. = 20'.5 + .7(-19'.6) + (-.1)(-3'.5)$ $n = 0.7$

$Dec = 20'.5 - 13'.72 + 0'.35,$

$Dec = \begin{array}{r} 20'.50 \\ 00.35 \\ \hline 20.85 \end{array}$ $\begin{array}{r} 20.85 \\ -13.72 \\ \hline +7'.13 \end{array}$ $= 26° 7'.1$

105
3
105
304
$.3195$

Nov. 3.8 $RA. = 50^m 58^s + 0.7(-2^m 50^s) - (.105)(-21^s)$

$n = \frac{3.8-1.0}{5-1.0} = \frac{2.8}{4} = .07$ $\frac{n(n-1)}{2} = \frac{(0.7)(-0.3)}{2} = -\frac{.21}{2} = -.105$

35
$.135$
21.00
8.100

$RA = 50^m 58^s - 1.4^m 3^s.50 + 2^s.205$ $+2^s.2$

$RA = 50^m 58^s - 1^m 24^s 3^s.5 + 2^s.2 = 50^m 58^s - 1^m 27^s.5 + 2^s.2$

$= 50^m 58^s - 1^m 25^s.3 = 49^m 33^s \; 33^s$

$.123$
$16.$
738
123
1968

$Dec = (25°) 60'.9 + 0.7(-23'.1) - .105(-3'.1) = 60'.9 - 16'.17 + 0'.32$

$= 60'.9 - 15'.85 = 45'.1$

Nov 6.8 $RA = 48^m 8^s + .45(-3^m 11^s) - (.123)(-16^s) = 48^m 8^s - 1^m.35^s 4^s.95 + 2^s = 48^m 8^s - 1^m 21^s 5^s + 2^s$
$= 48^m 8^s - 1^m 24^s = 46^m 44^s$

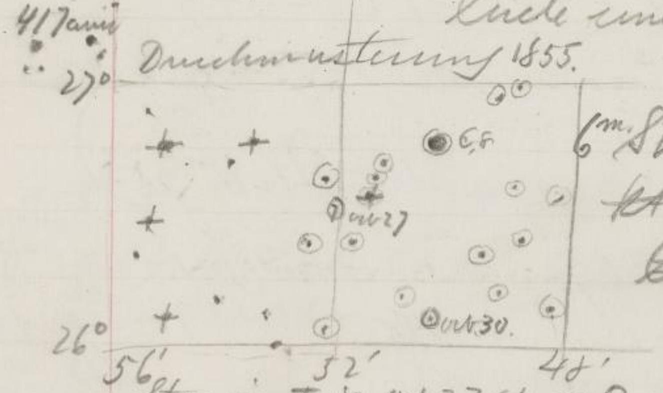
$n = \frac{6.8-5.0}{4} = \frac{1.8}{4} = 0.45$

$n(n-1) = -.2475$

$.45$
$-.55$
225
225
$.2475$

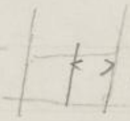
Search for Iris ⑦ 8–10½ p.m. Oct. 27. 1877.

Errors of Circles of W. Equatorial.
1st approximation
η Tauri. True RA. 1878 = $3^h\,40^m\,14^s$
" δ " = 23° 43' 35''.2
Circle reading = −6°
Circle correction = +29° 43' or +30°



Star in Iris' Oct 27 Chart = ⊙

6m. Star 41 Tauri, near ⑦
~~RA.~~ δ 27° 16' Correction +29° 43'
Circle reading = −2° 27'



Time reqd. by star to transit one square = 57^s.

Search for Iris Oct. 30 1877 $7\tfrac{1}{2}^h$
Position of 6.8 mg. star Oe. 655 = $3^h\,51^m\,48^s$ RA.; δ +26° 51'.3
Dec. correction = −29 43
Circle reading = ~~3 22 5~~ −2° 52'
Supposed ⑦ precedes 9.3 mag. star, RA 3 52 24; Dec. 26 13.3 by 58^s; by Ephemeris Iris precedes star 48^s
Correction $+10^s$. South of star $+0.6^s$ = 2.5' sth.

41 Tauri B.A.C. 6 m. No 1262

RA. 1878 = 3h 59m 49s

δ " = 27° 16' 17"

920
2 5
715

33

29 43
27 16
2 27

at
~~= ST.~~

28.
5.02
56
140
140.56 = 2m 20s

149
24
596
298
3576

+14.22
28.
8176
2844
286.16 = 4' 46"

squares
~~2 2/4 at ms. of 1 1/4~~
~~+ 1 sq. ab = 155 ...~~
~~Stand. 3 hrs 2m 5s bef. Ins~~
~~DEC. Ins. read 4 1/3 15 rev. + 1/4 ° incorrect.~~

89 - 54 - 60
62 - 48 - 29
27 - 11 - 31
4 - 46
27 - 15 - 77

E RA. = S.T. + HA.

~~i.e. decn. = 4 2/3 °~~

W RA = S.T. − H.A.

~~Ins. ... 10 1/2 ...~~

29 40
−4 15
25 25

E HA = RA. − S.T.

W HA = S.T. − RA.

H.A. = 3h 48m 10s − 0h 45m 34s = 3h 2m 36s

~~Circle reading of true δ Ins 10 3/4 P.M. = −4° 15'~~

2 10 25 = S.T. now

? Circle reading ~~RA.~~ 9 22 (41 ?) H.a.
5 29 30

RA = 3 53 11

~~C. Stars seen = 6.3 &c~~

~~& comp. 45" ...~~

Star = −4° 0' DEC.

Ins = −4° 16

~~Watch gained 16m. from 9 P.M. Sat. to 9 A.M. Mon~~

Ins. Ann. prec. +3s.547 RA; +10".62 δec.

23.	23.
10641	3186
7094	2124
81s.581	244".26
= 1m 22s	= +4', 4".3
3h 49m 33s	+25° 45'. 6".0
3 48m 11s	25° 41' 1".7
2m 3s	25° 51'
3 46 6	

26.2
.45
1310
1048
11.790

.123
2.7
861
246
.3321

δec. Ins. now 6 c 8

δec = 37'.8 + .45 (−26'.2) − (.123) (−2'.7)

= 37'.8 − 11'.8 + 0'.3

= 37'.8 − 11'.5 = 26'.3

Search for Iris ⑦. 1877. Nov. 3. 8¾–11½ P.M.
W. Equatorial.
Correction of dec. circle reading = +29°40′ ±.
RA. 8.3 mg. star = $3^h 48' 10''$
δ " " " = +26° 0′.
Circle reading δ = −3° 40′ ±.
Iris follows star ~~80~~ s. ~~in RA.~~ | = ~~1¼ squares right~~
+ south of " ~~15′ = 60~~s. | = ~~1 " above.~~

Error of RA. Circle
True RA. Alcyone $3^h 40^m 14^s$ Circle δ = −6° 0′.
RA. (Circle reading)
" " correction − 5

H.A. Alcyone $3^h 2' 36''$ at $0^h 45^m 34^s$.
? H.A. Circle read'g $8^h 32' 6''$
Correction − $5^h 29' 30''$

Iris
⑦ Nov 3, 9 P.M. RA. 3 49 33
S.T. 1 10 0
True H.A. 2 39 33
Correction + 5 29 30
{ Circle H.A. = 8^h – 9^m – 3^s
Circle δ = −3° 40′ }

Stars for ⑦ Iris. 1877 Nov. 6

R.A. 1878.			Dec.		Dm. mag.
$3^{h.}$	$44^{m.}$	$54^{s.}$	+24°	49'.3	7.5
3	45	41	25	1.6	9.0
3	46	17	24	50.0	9.5
3	48	54	25	3.1	9.5
3	44	58	25	51.8	8.1
3	44	50	25	52.0	9.1
3	44	57	25	34.3	9.2
3	45	22	25	16.7	9.2
3	45	24	25	59.9	9.5
3	45	47	25	10.2	8.6
3	46	3	25	16.7	9.2
3	46	8	25	34.1	8.3
3	46	9	25	23.1	8.4
3	46	14	25	18.9	6.6
3	47	21	25	19.3	8.6
3	47	31	25	17.2	9.3
3	48	52	25	24.3	9.4
Iris $3^{h.}$	$46^{m.}$	$44^{s.}$	+ 25°	26'.3	7 mag.

Stars for ⑦. 1877. Nov 13. (Rejected. without limits)

3^{h}	36^{m}	$25^{s}.5$	+ 24	40.9	7.3
3	36	28.4	+ 25	1.4	9.3
〃	36	34.2	+ 24	53.2	9.0
〃	37	2.3	+ 24	28.8	8.9
〃	37	23.1	+ 24	25.9	9.4
〃	37	53.6	+ 24	27.2	6.3
〃	38	2.8	+ 24	32.4	8.9

3^{h}	38^{m}	$5^{s}.9$	+24°	29'.7	9.2
〃	38	22.8	+24°	31.4	9.2
〃	38	38.6	+25	0.7	8.2
〃	38	30.5	+24	39.8	9.3
〃	38	47.3	+24	38.0	9.5
〃	38	47.3	+24	36.0	9.4
〃	38	56.3	+24	51.6	9.5

continued above

3^{h}	39^{m}	$15^{s}.4$	+24°	29'.1	9.4
3	35	22.0	+25°	22.1	9.5
	35	48.1	+25	16.8	7.0
	35	57.5	+25	13.2	9.3
	36	2.2	+25	13.8	9.3
	36	15.8	+25	21.9	8.3
	36	32.3	+25°	20.2	8.3
	36	42.3	+25°	28.8	8.0
	37	21.6	+25°	21.8	9.5
	37	46.0	+25°	9.7	9.5
	38	5.2	+25°	21.6	9.5
	38	12.5	+25°	14.0	8.5
	38	17.8	+25	28.5	9.1
	38	23.4	+25°	13.2	9.5
	38	57.1	+25°	4.5	9.1
	39	11.5	+25°	27.9	8.5
	39	37.2	+25°	15.7	8.9

Search for Iris. 1877. Nov. 6. 9–12 p.m.

R.A φ Nov 6. 9 p.m. $3^h 46^m 44^s$
Dec + 25° 26.'3.

Ephemeris position φ
30^s following 6.6 star | = ½ square right
+ 7.'4 north of " | = ½ " below

R.A. circle Correction $-5^h 29^m 30^s$ for H. Angle
δ " " +29° 40'

Ephemeris δ. Iris. ~~Reading~~ −4° 13.'7

R.A 6.6 star $3^h 46^m 14^s$ 43 35
δ " +25° 18.'9 3.9

H.A. at $9^h 5^m$ p.m.; ($0^h 30^m$ S.T) = $3^h 16^m 14^s$
H.A. correction + 5 29 30
H.A. reading at $0^h 30^m$ S.T. = $8^h 45^m 44^s$
δ " = −4° 21.'1
H.A. " " $1^h 15^m$ S.T. = $2^h 31^m 14$
+ 5 29 30
8 0 44

Error Rt. circle $9^h 27^m$ H.A. reading
1 40
9 27
True H.A = $3^h 40^m$ − 1 40 = $2^h 0^m$
Correction $7^h 27^m$

S.T. $\overset{3}{2}$ $\overset{46}{0}$ 14

H.A. ~~reading~~ 6.6 star at $2^h 0^m$ = $1^h 46^m$
7 24

H.A. reading 6.6 " " " = $9^h 19^m$

Iris ~~follows~~ precedes 6.6 star 35^s and nth. 22′
Another star not on D.M. chart observed near Iris

Search for Iris. Nov 13.

			RA	Dec.
Ephemeris position @ 9. P.M.,	Nature		$3^h 41^m 28^s$	+24° 42′.0
" " "	Ast. Jarb.		3 32 42	+25° 25′.1
	Diff.		$8^m 46^s$ [= 2° arc]	−43′.1
Mean of Nature & A. J. places.			$3^h 37^m 5^s$	+25° 3′.5

46^m 44^s Iris 26'.3
46 14 6.6 star 18'.9
30 7'.4

Iris = 30^s following 6.6 star

S. Watch set 8.45 P.m. ready 6.
gained 10^s at 12:40 a.m.
Thurs. 8.

Iris trans 33^s bef. star.

to Star 4 17 . 1 = 22' on slow = 1'/3575 rdg
−3 53

C. Stars & 1 bd 10.30 on P.m.

Dec reading not reliable

HA = 3^h 46^m 14^s − 2^h 15' = 1^h 31^m

Cor + 7^h 27^m

Ready. 8^h 58^m

− 4° 21.1

29 40,
24 36.5
−5 3.5

10 35

3 36 28
2 30^m ^{s}
1 6 28
7 27^m
8 33

3 40
2 40
1
4 35 = Correction H.A.

Stars for Iris. 1877 Nov. 13. Nautic Eph.

8h	39m	43s.3	+24°	8'.6	7.5
	39	46.0	+	26.3	8.4
	39	47.1	+	15.5	9.5
	39	52.8	+	55.6	9.2
	40	7.3	+	12.4	8.0
	40	9.1	+	16.9	8.6
	40	27.4	+25°	0.5	8.4
	40	33.7	+24	45.3	9.4
	40	44.1	+24	58.5	9.5
	40	48.9	+24	36.6	7.0
	41	3.8	+	57.3	9.1
	41	54.2	+	15.6	9.4
	42	16.4	+	15.3	9.2
	42	58.1	+	17.1	9.0
	43	11.5	+	7.5	7.7
	44	6.6	+	48.1	7.7

A. J. Eph.

3	29	49.3	+25°	35.6	8.0	3h 35m 48s.1 +25° 16'.8 7.0
	30	56.6	+25°	21.2	9.2	
	31	39.3	+	40.2	9.4	
	31	58.9	+	9.2	9.4	
	32	8.7	+	44.6	8.9	
	32	42.4	+	24.6	9.5	
	32	50.2	+	14.0	9.5	
	33	34.1	+	55.8	9.2	
	33	34.4	+	13.2	9.1	
	33	34.7	+	28.9	9.0	
	33	47.6	+	35.8	9.1	
	34	12.5	+	14.0	9.5	
	35	22.0	+	22.1	9.5	

1877 Dec 1 Zöllner photometer in Liby
Color circle at 43. String tied to one handle of setting circle. Readings positive when handle is toward the observer

ε Pegasi. Altitude. 22°.0 too low
Time 9 40

170.5

α Pegasi Alt. 36.8 Too bright.
9.50

59.9
126.7

μ Pegasi 37.6 Too far north
10.5

−131.0 ~~184.4~~
53.4
156.1
−90.6

31.1
16.40

−139.6
51.0
152.1
−78.0

τ Orionis 38.0 Rejected
11.15

−34.8
−99.7
38.9
11.30
−31.1
160.9
−146.3
35.7
40.0
35.7 11.45
−26.8
153.8
−147.7
36.1

1877 Dec 13. Comparison stars for λ Tauri
measured with Zöllner photometer in W. Dome
Pinhole not taken. (Illuminated by Student lamp.)

o Tauri
Altitude 42°.0
Time 8h 0m

54.9 101.3
156.2
208.2
−151.8 = [illegible]
178.1
2
326.3

44.2
8.5-

48.7 114.6
169.3

209.0 124.8
333.8

42.2
8.30

49.8 105.6
155.4

210.4 108.8
319.2

48.9
8.45-

44.1 115.6
159.7

211.3 114.5
325.8

ξ Tauri

50.7
9.0

48.1

o Tauri 53.9

9 37 42.6 101.6
144.2

234.8 94.4
329.2

750.8 196.0
187.70 49.00

ξ Tauri 55.2

9 46 44.0 105.8

149.8 ~~92.0~~

237.8 97.0

334.8

766.4 202.8

191.60 50.70

ν Tauri 49.5 ~~I?~~

9 55 45.0 106.3

151.3

220.8 116.4

337.2

754.3 222.7

188.57 55.67

γ Tauri 57.4

10 4 44.0 109.2

153.2

225.8 109.6

335.4

758.4 218.8

189.60 54.70

ε Tauri 60.3

10 11 46.6 100.7

147.3

228.3 105.3

333.6

755.8 206.0

188.95 51.50

ε Tauri 61.1

10 18 45.7 102.1

147.8

231.0 96.8

327.8

752.3 198.9

188.07 49.72

V Sanni 59.9

10 26 42.6 104.8

147.4

229.7 106.1

335.8

755.5 210.9

188.87 52.72

V Sanni 52.4 ~~(?)~~

10 38 38.4 112.2

150.6

222.1 114.4

336.5

747.6 226.6

ξ Sanni 56.8

186.90 56.65

10 60 41.1 109.5

150.6

220.4 115.4

335.8

747.9 224.9

186.97 56.22

0 Sanni 55.6

11 1 44.5 105.7

150.2

225.2 107.7

11 6 332.9

752.8 213.4

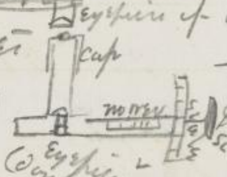
188.20 53.35

18:
9

1877 Dec 5 4 P.M.

Measuring mag. power of diagonal eyepiece of variation transit ~~with dynameter~~ Dollond

Diam. of image of objective formed by eyepiece measured with dynameter



50.2
49.5 47.8 No. of turns not taken
47.3 44.6 Screw opposite objective
45.0 46.4
44.7 45.8
265 246
8.4662 11.4615

8.467 11.463 11.4655 Screw at right of eyepiece
8.456 11.477 8.4672
8.463 11.457 2.9983 1 division of dynam. scale =
8.483 11.465 abt. 1/50 inch (?) See p. 42
269 262
8.4672 11.4655

8.486 11.465 11.4667
8.477 11.478 8.4832
8.487 11.450 2.9835
8.483 11.474 2.9983
333 267 5.9818
8.4832 11.4667 2.9909

9 P.M.

Diam. of objective meas. with Coast Survey micrometer

42.664, 98.270 85.268 40.664 98.270 98.270 98.270
98.270 44.665 39.665 40.664

The above figures should read, in terms of no. of revs. of screw

66.42	27.96	26.85 - Rejected	66.40	27.98	27.93	27.98	mean
27.96		66.42	27.93	66.44	66.39	66.43	38.46
38.46		39.57	38.47	38.46	38.46	38.45	

1877 Dec. 6. 3 P.m.

Measuring pitch of dynameter screw with C. S. micrometer.

101.087 101.098 Pitch of C.S. screw = 1/24 inch
97.711 97.719
24)3.376 3.379 Length of 14 divisions of pitch scale
0.1407 0.1408
0.1407
0.14075 inches = " " " " " "
0.01005 " = pitch of dynam. screw

2.9909 diameter of objective image
0.02991 inches = " " " "

24)38.46 diameter of objective in C.S. screw revns.
1.602 inches " " "

0.03)1.602
53.4 = simple mag. Power of Eyepiece

~~The pitch of the dyn. screw above employed should be doubled in computing the mag. power, owing to the opposite motions of the two images. Hence 26.7 = mag. Power.~~

4 hr
35 mm

1877 Dec. 8. 3½ P.M.

Measuring mag. power of diag. eyepiece of ~~S~~ Variation transit by Valz method.

Dist. image from eyepiece 145 mm.
Diameter image 67 mm
½ " " 33.5 mm.

$\frac{145}{33.5}$ = .23103 = tn 0°13′. Mag. power = $\frac{d}{2 D \text{ tn} \frac{1}{2} w}$

= $\frac{67}{2 . 145 . (.0046)}$ = 50.3. Less than dynamometer result by 3.1

1877 Dec 8. 9 P.M. Measures of ε Aurigae Comparison Stars with Zöllner photometer in W. Dome.

Pinhole 1
Color circle 208.
Student lamp used.

9 5 β Trianguli 82.5
37.7 120.1
157.8
219.6 119.1
338.7
753.8 239.2
188.45 59.80

9 18 ε Persei 76.0
45.4 104.8
150.2
223.3 113.8
337.1
756.0 218.6
189.00 54.65

9 30 ζ 64.6

30.0 134.3
164.3
213.7 131.4
345.1

753.1 265.7
188.27 66.4~~7~~2

9 41 η 65.8

41.7 116.0
157.7
210.3 128.7
339.0

748.7 244.7
187.17 61.17
37.8

9 48 η 67.2

37.8 121.2
159.0
209.8 124.4
334.2

740.8 245.6
185.20 61.40

10 9 ζ 71.6

34.4 127.9
162.3
209.3 138.5
347.8

753.8 266.4
188.45 66.60

23252

10 27 ε 86.1
44.4 105.3
149.7
224.4 113.2
337.6
756.1 218.5
189.02 54.62

10 47 β 67.4
42.3 115.5
157.8
~~149.1~~
218.6 114.9
333.5
752.2 230.4
188.05 57.60

Comparison Stars for ζ Geminorum
Hole illuminated by Student lamp
Pinhole 1. Color circle 208.

11 6 ν 55.4 (Shutter ?)
32.3 131.3
163.6
210.9 131.1
342.0
748.8 262.4
187.20 65.60

11 18 ξ 49.1
46.2 107.7
153.9
224.7 114.5
338.2
764.0 222.2
191.00 55.55

11 28 λ 43.4
41.2 114.7
155.9
218.3 117.8
336.1

751.5 232.5
187.87 58.12

11 37 δ 53.2
40.4 110.2
150.6
222.8 112.3
335.1

~~742.9~~ 222.5
748.9
187.22 55.62

11 49? υ 55.8
31.6 130.6
162.2
212.0 132.2
344.2

750.0 262.8
187.50 65.70

11 54 υ 54.7
32.4 131.7
164.1
212.7 131.4
344.1

753.3 263.1
188.32 65.77
Clouds interfered

9

12 10 δ 58.9

39.1 113.9
153.0
220.0 118.4
338.4

750.5 232.3
187.62 58.07

12 16 λ 58.8

37.3 120.4
157.7
218.8 115.2
334.0

747.8 235.6
186.95 58.90

12 29 ξ 57.7

39.4 110.6
150.0
221.7 114.5
336.2

747.3 225.1
186.82 56.27

12 36 ν 66.6

29.4 128.0
157.4
210.2 135.6
345.8

742.8 263.6
185.70 65.90

1877 Dec 12. 3½ P.M.
Fruitless attempt to measure mag. power of direct-vision eyepiece of var. transit by Gauss's method. The smallness of the field rendered the method inapplicable owing to the coincidence of the circle readings of the theodolite. Also, focus of ~~theodolite~~ objective ~~objective of~~ ~~transit~~ not coincident with cross hairs.

1877 Dec. 13.
3 P.M.
Measuring mag. power of eyepieces of Zöllner photometer etc. by direct method. Power = abt. 8 See Page 50
Gauss's method failed on account of reversal of telescope.
Power of var. transit direct-vision eyepiece = abt. 30.

Comparison Stars for ε Aurigae with Zöllner phot. in W Dome. Pinhole 1. Color circle 208. (Student lamp)
Lamp blown out

7 20 β Trianguli 71.8
49.0 Lamp went out

7 34 β Trianguli 74.0
64.8 70.4
135.2
242.6 74.7
317.3

7 36 ε Persei 58.5+
57.8

Lamp changed to brighten the images.

8 7 β Trianguli 79.1
57.2 80.7
137.9
234.4 88.0
322.4

8 17 ε Persei 64.7
56.7 78.0
134.7
237.4 83.2
320.6

8 35 ζ 56.3
33.8 144.6
153.4
224.4 106.0
330.4

Clouds hindered obsn.

Screw loose which holds the altitude index, occasioning a possible error of °5 in the readings. On this account, altitude readings will be hereafter omitted, and the true altitudes computed subsequently.

1.588
.0434
432) .0154.0 (.35~~7~~
1296
2440
2160
~~3600~~
2592

1 1401357

85254
30
2557620

7.308825
25576
2.33440 | 298 9590

99653
30

249 7 58.4 ×

51.1 82.6
133.7

Clouds hindered

Light extinguished and all obsns lost

1877 Dec. 14

3 P.M. Measuring mag. power of diagonal eyepiece of Z. photometer by Gauss's method. Variation transit substituted for theodolite.

Readings for 1st point	For 2nd point
123° 38	123° 23'
123° 38'	123° 23'
123 38	123 23

0° 15' = appt. angular distance of points seen through objective of Z. telescope

Readings for points measured directly with the transit

219° 27' (57)	219° 29' (59)
216° 38'	216° 37'
2° 49'	2° 52

2° 50' = angular distance of points measured directly.

Mag. power given by formula $G = \frac{\tan \frac{1}{2} A}{\tan \frac{1}{2} a}$ where
$A = 2°50'$; $a = 15'$

log tan ½ A = 8.3932
" " ½ a = 7.3344
" ~~A~~ G = 1.0588 whence Mag. Power 10.01

Comp Stars for ε Aurigae P.6

8 5 β Camelopardali 80.7 Zenith 6

37.2 120.2
157.4
214.7 129.3
344.0

Slight haze (B)

ε Persei Zenith 1.

Time + alt. not taken

38.4 117.4
155.8
221.2 114.3
335.5

Scattering clouds cover the sky. ~~[illegible]~~

1877 Dec. 17. Photometer Z. (W. Sime.)

7 48 V Ursae Minoris Gas burner used.

25.4 144.3
169.7
203.5 147.0
350.5

Clouds

1877 Dec 20. Photometer Z. in W. Dome.
Companion Stars for ε Aurigae.
Pinhole 1. Color circle 208

8 0 β Trianguli

38.5 ~~120.1~~
158.6 62.6
221.2 ~~7~~
335.3 63.2
753.6 125.8
188.40 31.45

Images with gas burner being too large and dim, Student lamp was replaced. Images bright and well-defined, without sensible disks,— almost like a fixed star.

8 9 ε Pisci

45.6
149.8 73.4
223.2
326.9 78.7
745.5 152.1
186.37 38.02

8 18 ζ

93.8
160.1 56.8
216.9
336.9 56.9
747.7 113.7
186.92 28.42

8 24 η

39.8
154.1 65.9
220.0
333.4 66.4
747.3 132.3
186.82 33.07

8 32 η

29.7
155.5 64.8
220.3
333.3 56.4

738.8 121.2
184.70 30.30

11-

8 41 ζ

36.7
156.7 57.5
214.2
337.2 59.5

744.8 117.0
186.20 29.25

8 49 ε Persei

46.3
149.5 74.3
223.8
327.4 78.9

747.0 153.2
186.75 38.30

8 58 β Trianguli

426
152.2 68.6
220.8
328.8 73.8

744.4 142.4
186.10 35.60

λ Tauri Comp. Stars

9 7 o
24.6
166.4 42.9
209.3
350.1 34.5
750.4 77.4
187.60 19.35

ξ
9 14 25.7
165.6 42.8
208.8
350.0 35.7
750.1 78.5
187.52 19.62

9 22 ν
242
167.8 38.8
206.6
351.7 32.5
750.3 71.3
187.57 17.82

γ
9 33 29.4
163.4 46.6
210.0
348.9 40.5
751.7 87.1
187.92 21.77

9 41 E

29.2
163.1 47.4
210.5
349.3 39.9

752.1 87.3
188.02 21.82

E

25.8
165.3 41.9
207.2
349.0 36.8

747.3 78.7
186.82 19.67

9 55^3 V

25.0
165.4 42.8
208.2
349.1 35.9

747.7 78.7
186.92 19.67

10 2 V

22.3
169.7 35.0
204.7
352.2 30.1

748.9 65.1
187.22 16.27

10 11 ξ

22.5
167.9 38.5
206.4
351.6 30.9

748.4 69.4
187.10 17.35

10 17 θ

25.0
165.6 41.0
206.6
351.8 33.2

749.0 74.2
187.25 18.55

ζ Geminorum Comp. Stars

Stars in Gemini near the Full Moon.

10 29 ν

20.3
170.7 32.9
203.6
352.6 27.7

747.2 60.6
186.80 15.15

34 ξ

26.5
165.6 42.7
208.3
348.8 37.7

749.2 80.4
187.30 20.10

Λ

10 41 24.4
163.7 47.8
211.5
349.9 34.5
749.5 82.3
187.37 20.57

41 δ
27.6
165.0 43.2
208.2
350.0 37.6
750.8 80.8
187.70 20.20

54 υ — Clouds passing, but sky clear.
22.4
170.1 34.8
204.9
352.4 30.0
749.8 64.8
187.45 16.20

11 0 υ
22.5
166.0 41.4
207.4
351.4 31.1
747.3 72.5
186.82 18.12

Clouds passing

δ

11 15³ 36.5 cloud ?

168.5

35.1

203.6

These four readings rejected.

320.4 76.1 Falling off of 30 in the last reading, due

729.0 111.2 probably to exhaustion of oil, as no haze

182.25 27.80 ~~could be~~ was perceptible

Sudden decrease of brightness of images checked by noticing that the images were invisible for $\lambda = 24$, and $\nu = 20$

Uncertainties in formation of Double Stars from H. and Σ catalogues.

0.) P. G. Cat. VII., Vol. XXXVIII. Sweep 121. R.A., Dec., mags. and No. omitted.

1.) Cat. VII. p. 6. Is Σ 464 the same star as ζ Persei.

2.) " " p. 15. Σ 2726 is marked κ, but in Vol. III., is marked K.

3.) " " p. 14. ~~St~~ Do the mags 9, 12, (preceding Σ 2521) belong to the star Σ 2494, Vol. III., or do they correspond to 9, 13 opposite Σ 2494, Cat. VII

4.) The following stars from Cat. VII have no mags. assigned their components, or have some of the mags. left out; and are arranged in order of R.A.

H. 5450

LL. 717

H. 5452

Σ 84

26 Ceti (Sweep 112)

Σ. 133, (C. & D omitted, but have been written from Vol III.)

Σ 201

Following star (sweep 106)

Σ 310

ζ Persei (sweep 106). See note (1.)

Σ 609

Σ 614

Σ 653 (14 Aurigae). Fainter comps. omitted but found in Vol. III.

Σ 738 (λ Orionis).

Σ 751

Σ 762 (σ Orionis)

H. 5465. B omitted. "An excessively minute comp. suspected. Position by diagram much defaced. LL. 10989."

H. 5466. B omitted. "Seen double but not verified. (i.e., by magnifying.)"

Σ 861. Very close.

Star foll. Σ 950. also, R.A., D., &c. omitted.

Σ 1037

Σ 1074. "Not seen double with either power."

Σ 1110 (Castor)

Next star.

π Geminorum.

H. 5471, 5472 "Two pretty close doub. stars in same field, and nearly in same parallel."

Star following Σ 1196.

Σ 1356. (ω Leonis)

Next star. "A suspected elongation with 6 in. aperture."

Hh. 333. (31, τ Hydrae).

Σ 1659

Σ 1670. (γ Virginis). The small companion

Σ 1692. (Cor Caroli)

Next star.

H. 232. (ι Boötis)

Σ 1938. (μ² Boötis C.D)

Star foll. β Serpentis.

ρ Herculis

Second star after 70 Ophiuchi

H. 5497.

Σ 2492. (23 Aq.) B omitted.

H. 5512. B omitted. "Strongly suspected to be double; high ~~B~~ power & long attention."

H. 5513.

18 Aquarii. "A most minute point strongly suspected."

Σ 2802.

δ Capricorni. (A.)

H. 5525 (20 Cygni)

H. 5529 (κ Aquarii) "An exc. minute pt. strongly susp."

Σ 2945.

H. 311.

Zero Time and mer. Circle.

~~ε Aurigae~~

393
ν 305.8
22.5
283.3

299.4 δ
Tauri 298.7 ε
298.5 α

17.12
299.4
316.52
18.94
298.7
317.64
16.12
298.5
314.7

316.6
317.6
314.7
948.9
316.3
2.2
314.1

316.6
33.
283.3
316.3
43.6
359.9
272.7

ε Aur. 272.2
43.6
315.8 = ε.p.

β Aur. 321.9
5.2
316.7 ε.p
45.8
270.9

267.2
45.8
313.0 = ε.p.
316.0
28.5
287.6
9.7
306.3

β Tauri

5 44

306.0
2.4
313.4

Z. Micrometer

9.5 λ

~~θ~~

17.4

170.7 33.4

204.1

356.8 20.6

9.7 δ

32.3

122.9 155.2 62.1

2.7

129.6 217.3

346.9 45.4

Readings rejected owing to inaccuracy.

1878 Jan 19. Photometer Z. (in warm room, with
7 24 δ Urs. min. Screen arrangement). Pinhole, 2. Col. circle 208.
Seeing very fine but hazy near horizon.

157.2 59.0
216.2
334.7 60.4
395.1
1103.2 119.4
275.80 29.85

7 31 λ Urs. minoris
174.7 24.2
198.9
356.8 19.8
376.6
1107.0 44.0
276.75 11.00

7 40 λ Ursae minoris. (Readings repeated.
175.4 22.4
197.8
356.2 19.8
376.0
1105.4 42.2
276.35 10.55

7 52 (344) DM. 86°
173.4 27.1
200.5
353.3 26.8
380.1
1107.3 53.9
276.82 13.47

8 0 16 Thm. 86°

176.5 21.0
197.5

~~44~~
356.5 20.7
377.2

1107.7 41.7
276.94 10.42

8 7 19 Thm. 85°

164.8 44.0
208.8

344.6 47.9
389.5

1104.7 91.9
276.17 22.97

8 15 19 Thm. 82°

174.3 25.5
199.8

355.2 23.2
378.4

1107.7 48.7
276.92 12.17

8 21 26 Thm. 83°

180.0 13.4
193.4

360.7 13.1
373.8

1107.9 26.5
276.97 6.62

8 28 13 om. 81°
179.5 16.1
195.6
359.5 15.4
374.9
1109.5 31.5
277.37 7.87

8 37 742 om. 82°
180.0 13.7
193.7
360.4 13.5
373.9
1108.0 27.2
8 277.00 6.80

8 46 640 om 83°
170.4 34.4
204.8
350.4 34.9
385.3
1110.9 69.3
277.72 17.32

8 52 376 ? 516 om. 84°
174.2 25.0
199.2
352.3 26.1
378.4
1104.1 51.1
276.02 12.77

9 0 383 Dm. 85°

172.3
32.7
205.0

351.6
32.7
384.3

1113.2 65.4
278.30 16.35

9 16 δ Urs. min. Dm. 86°.269

164.8
45.2.
210.0

340.1
47.8
387.9

1102.8 93.0
275.70 23.25

9 23 λ Urs. min. Dm 88°

177.4
20.3
197.7

357.6
20.6
378.2

1110.9 40.9
277.72 10.22

9 32 51 Dm 86°

172.6
29.5
202.1

354.6
25.3
379.9

1109.2 54.8
277.30 13.70

9 38 63 D.M. 85.°

176.8
20.5
197.3

357.7
20.1
377.8
1109.6 40.6
277.40 10.15

9 44 69 3.59 D.M 84°
162.4 Lamp went down

10 1 λ
175.5
22.4
197.9
358.0 18.6
376.6
1108.0 41.0
277.00 10.25

10 6 δ

162.2
51.2
213.4 Lamp turned ~~down~~ causing alteration in readings
352.2 26.9
379.1
1106.9 78.1
276.72 19.52
10 16 λ
156.4
69.2
225.6
336.4 59.2 Lamp?
395.6 128.4
1114.0 Lamp so erratic that no more readings could
278.50 32.10 be taken

1878 June 24. Observations of Circumpolar Stars with Photometer Z. in W. Entry.
Pinhole 2. Color circle 208. Student lamp.

8 40 88. λ Urs. min. 8 56 λ

173.5 25.5 170.6 29.1
199.0 199.7
348.9 36.0 ? image bad, 354.0 27.4
384.9 381.4
This setting rejected. Unsatisfactory.
1106.3 61.5 1105.7 56.5
276.57 15.37 276.42 14.12

9 6 86. δ Urs. min.

149.1 70.2
219.3
330.3 ? 67.6
397.9
1096.6 137.8
274.15 34.45

0 m.
9 15 86°.16

173.2 28.7
201.9
352.2 33.1
385.3
1112.6 61.8
278.15 15.45

9 27 85°.19

146.8

85.0

231.8

328.1

72.1

400.2

1106.9 157.1

276.72 39.27

9 38 83.20

174.8 23.6

198.4

350.6 30.7

381.3

1105.1 54.3

276.27 13.57

9 47 82.19

169.0 41.7

210.7

343.3

44.5

387.8

1110.8 86.2

277.70 21.55

9 54 81.13

176.0 22.6

198.6

356.7 20.5

377.2

1108.5 43.1

277.12 10.77

$I^{h.}$

10 2 87.12 Difficult.

177.6 17.8

195.4

358.5 16.3

374.8

1106.3 34.1

276.57 8.52

10 10 85.41 difficult.

178.6

17.8

196.4

358.4

17.9

376.3

1109.7 82.51 not taken, being difficult to find.

277.42 35.7

23 h. 8.92

10 23 ~~86~~.344

165.8 39.9

205.7

348.0 38.2

386.2

1105.7 78.1

276.42 19.52

10 31 85.409

177.9 17.9

195.8

356.4 21.2

377.6

1107.7 39.1

276.92 9.77

10	38	85.401	
		180.7	14.0
		194.7	
		359.0	16.7
		375.7	
		1110.1	30.7
		277.52	7.67
10	45	85.399	
		179.8	14.6
		194.4	
		359.7	14.7
		374.4	
		1108.3	29.3
		277.07	7.32
10	54	86.. ~~443~~ λ	
		178.2	18.4
		196.6	
		357.7	22.9
		380.6	
		1113.1	41.3
		278.27	10.32
11	2	88.. ~~400~~ δ	
		164.8	48.5
		213.3	
		343.0	48.5
		391.5	
		1112.6	97.0
		278.15	24.25

9 85.403
1764 Haze came on

1878 Jan 30. Phot. Z.

8 8 λ Ur Min. P.H. 2 8 44 λ Ur min P.H. 1

169.3	35.6	381.0	
264.9		165.4	37.4
353.2	30.4	202.8	
383.6		350.5	30.5

δ U.M. P.H. 2 δ P.H. 1.

117.9	103.2	8 35	149.6	64.9
221.1			214.5	
332.8	84.4		340.4	61.2
417.2			401.6	

Tried first Tubule 1, but found image too small for δ. P.A. 1 Measures not considered reliable enough to record in Journal.

I h,
8 53 82.51
381.1
175.3 24.6
199.9
355.1 26.0

Lamp flared up and had to give up

1877. Feb. 2. [illegible] Circumpolar Stars with Phot. Z.

Pinhole, 1; outer circle, 208; lard-oil lamp.

8 5 λ Ursae min.

Watch readings 3m. fast.

170.2 32.5
202.7
348.9 37.6
386.5
1108.3 70.1
8 277.07 17.~~77~~52

δ Ursae min.

8 11 132.0 92.2
224.2
326.9 73.9
400.8
1083.9 166.1
270.97 41.52

Focussed

17? δ ~~Ursae~~ min.

145.3 74.6
219.8
329.6 79.6
409.2
1103.9 154.1
275.97 38.52

Focussed

28 82.51
175.13 27.0
202.1
356.0 26.2
382.2
1116.4 53.2
278.85 13.30

8 34 85.403
178.7 17.8
196.5
357.4 20.8
378.2
1110.8 38.6
277.70 9.65

8 40 85.400
175.8 21.3
197.1
358.3 20.9
379.2
1110.4 42.2
277.60 10.55

8 50 82.742
175.1 24.6
199.7
354.8 25.8
380.6
1110.2 50.4
277.55 12.60

8 55 82.748
173.3 29.0
202.3
355.4 23.4
378.8
1109.8 52.4
277.45 13.10

90-88 9th-0 inc
80°-90°; 7-0 inc.
85-90 8-0 inc.
} D.M. Circump. Catalogue
for R. 21

86. 335
9 6 ~~205~~
166.2 29.6
195.8
359.9 16.8
376.7
1098.6 46.4
274.65 11.60
87.205
9 ~~15~~ ~~33~~179.2 16.6
195.8
358.2 18.8
377.0
1110.2 35.4
277.55 8.85

9 23 85°.384
175.9 25.7
201.6
354.2 27.6
381.8
1113.5 53.3
278.37 13.32

9 32 85.383
156.4 63.5
219.9
345.4 49.5
394.9
1116.6 113.0
279.15 28.25

9 43 84.516
389.5
162.4
208.4 46.0
344.7 44.8
1105.0 90.8
276.25 22.70

9 49 85.383 ref.
162.3 51.2
213.5
339.1 56.4
395.5
1110.4 107.6
277.60 26.90

9 54 λ
168.3 37.5
205.8
348.5 34.8
383.3
1105.9 72.3
276.47 18.07

10 1 δ
157.7 65.5
223.2
332.4 61.8
394.2
1107.5 127.3
276.87 31.82

10 10
~~9 1~~ 83.630
178.2 20.3
198.5
357.3 20.5
377.8
1111.8 40.8
277.95 10.20

10 17 83.640
174.1 Lamp turned up
221.6 47.5
322.3 82.5
404.8
1122.8 130.0
280.70 32.50

10 24 83.640
429.1
135.7 Lamp smoked and
232.3 96.6 turned down
334.8
~~401~~ 94.3
1131.9 190.9
282.97 47.72

10 35 82.703
129.5 96.7
226.2
335.3 65.7
461.0
1092.0 162.4
273.00 40.60

10 42 82.703
150.1 72.4
222.5
337.5 61.7
399.2
1109.3 134.1
277.32 33.52

10 47 81.775
170.5 28.3
198.8
354.1 23.1
377.2
1100.6 61.4
275.15 1.285

10 55 86.308
179.2 17.5
196.7
359.0 14.9
373.9
1108.8 32.4
277.20 8.10

11 2 86.309
177.4 22.1
199.5
356.7 22.7
379.4
1113.0 44.8
278.25 11.20

Catalogue in R.21.

11 9 87.186

177.7
20.5
198.12

356.9
18.7
375.6

1108.4 39.2
277.10 9.80

11 22 85.347

179.2
16.1
195.3

359.2
14.7
373.9

1107.6 30.8
276.90 7.70

11 34 85.340

177.4
19.0
196.4

358.1
19.4
377.5

1109.4 38.4
277.35 9.60

11 35 85.354 ~~+05~~
[?]
Pub. 18.38

175.9
23.9
199.8

357.3
20.2
377.5

1110.5 44.1
277.62 11.02

11 41 λ

169.2
38.6
207.8

351.4
44.2
395.6

1124.0 82.8
281.00 20.70

11 47 δ

139.5
91.1
230.6

328.1
84.4
412.5

1110.7 175.5
277.67 43.87

1878 Feb. 4. Obs. Circumpolar Stars with Unit 2.; Color circle, 208; pitblende .1; lard-oil lamp.

7 37	λ	Polaris at ~~#~~41° altitude			83.588	
	175.3			8 8	176.4	
		26.3				21.9
	201.6				198.3	
	357.5	21.1			357.0	21.7
	378.6				378.7	
	1113.0	47.4			1110.4	43.6
	278.25	11.85			277.60	10.90
46	δ			8 15	82.617	
	168.9	42.2			178.1	19.1
	211.1				197.2	
	342.2	50.2			358.1	19.2
	392.4				377.3	
	1114.6	92.4			1110.7	38.3
	278.65	23.10			277.67	9.57
7 55	84.451			8 21	81.717	
	178.7	18.7			174.6	31.4
	197.4				206.0	
	357.4	22.1			353.6	29.7
	379.5				383.3	
	1113.2	40.8	278.30		1117.5	61.1
8 1	84.462	10.20			279.37	15.27
	178.3			8 29	λ	
		19.0			179.7	15.7
	197.3				195.4	
	360.6				357.4	17.8
		15.6			375.2	
	376.2					
	1112.4	34.6			1107.7	33.5
	278.10	8.65			276.92	8.37

8 37 87.181 Too faint for vy. accurate meast.		9 4 83.547	
182.6		176.9	
	10.7		21.5
193.3		198.4	
362.8	10.2	357.7	19.0
373.0		376.7	
1111.7	20.9	1109.7	40.6
277.92	5.21	277.42	10.12
8 43 87.180		9 12 δ	
182.4		170.4	37.6
	11.4		
193.8		208.0	
361.5	13.4	348.8	42.3
374.9		391.1	
1112.6	24.8	1118.3	79.9
278.15	6.20	279.57	19.97
8 48 86.282		9 23 83.552	
176.4		178.9	
	22.0		19.8
198.4		198.7	
356.5	21.0	357.5	21.6
377.5		379.1	
1108.8	43.0	1114.2	41.4
277.20	10.75	278.55	10.35
what does D signify?			
8 56 85.D (x nearest δ)		9 29 82.572	
Faint but easy			
181.6	12.5	178.3	16.5
194.1		194.8	
361.1	13.0	359.0	16.3
374.1		375.3	
1110.9	25.5	1107.4	32.8
277.75	6.37	276.85	8.20

86.272
9 36 173.6 26.8
200.4
352.8 27.8
380.6
1107.4 54.6
276.85 13.65

9 41 85.294
180.6 14.8
195.4
361.7 13.9
375.6
1113.3 28.7
278.32 7.17
9 47 83.536
172.9 28.7
201.6
351.9 31.5
383.4
1109.8 60.2
277.45 15.05
9 53 λ
174.8 23.3
198.1
355.6 20.6
376.2
1104.7 43.9
276.17 10.97

10 7 82.498 (ε)
160.7 51. Perhaps unsafe
211.8 to include this
335.3 59.5 star owing to
394.4 subsequent smoking
1102.2 110.2 of lamp
275.55 27.55
The discordance in diffs. probably
due to lamp.
Lamp smoked
85.269 Turned down and
recommenced set

10 18 λ
177.6 17.6 Lamp flickering
195.2
357.3
Light turned down a little
376.9 19.6
37.2
9.30
1107.0 Lamp kept on
276.75 smoking, flickering,
&c.

Oil thrown over and ignited on sides of tube.
Lamp considered unsafe by Prof. Pickering and obsns. ended.

abt. 560 obsns. up to this time.

1878 Feb. 6. Photometer 2. Pinhole 1; [illegible], 108;
[illegible] lamp no. 2.

9 11 λ Ursæ Min.
178.8
196.4 17.6
359.7
375.8 16.1
1110.7 33.7
277.67 8.42

9 17 δ
171.3
204.1 32.8
349.9
386.8 36.9
1112.1 69.7
278.02 17.42

9 23 82.498
170.4
208.2 37.8
349.6
387.9 38.3
1116.1 76.1
279.02 19.02

9 31 85.269
180.6
196.5 15.9
359.4
375.8 16.4
1182.3 32.3
278.07 8.07

9 38 87.143
180.7
193.6 12.9
361.7
374.8 13.1
1110.8 26.0
277.70 6.50

9 42 87.146
183.3
192.4 9.1
362.7
372.2 9.5
1110.6 18.6
277.65 4.65

9 49 85.249
182.4
193.3 10.9
362.3
372.3 10.0
1110.3 20.9
277.57 5.21

9 56 λ
178.8
200.3 21.5
337.4
378.3 20.9
1114.8 42.4
~~276.20~~ 278.70 10.60

10 3 85°.213
179.9 12.9
192.8
357.6 17.6
375.2
1105.5 30.5
276.37 7.62

10 9 83.430
175.3 24.4
199.7
354.0 26.8
380.8
1109.8 51.2
277.45 12.80

10 20 81.516
180.9 13.4
194.3
359.0 20.6
379.6
1113.8 34.0
278.45 8.50

10 27 80.470 Double
180.2 Difficult owing to duplicity
194.8 14.6 & unsatisfactory
354.2 22.3 Brighter comp. measured.
376.5
1105.7 36.9
276.42 9.21

Settings somewhat inaccurate after the 10 20, eyes being tired.

10 42 86.201
178.6 Unsatisfactory 14.8
193.4 Lamp image dim
350.7 24.0
384.7
1107.4 38.8
276.85 9.70

10 51 δ
174.1 28.1
202.2
330.3 81.3
411.6 109.4
1118.2 27.35
Lamp Image dim, which accounts
279.55 for above discordance.

δ 1878 Feb 16
7 09 138.1 88.6
226.6
312.1 97.7
409.8

α Polaris. Artif star not bright enough for α
Haze too thick for measuring anything fainter than δ.
Star near Polaris barely seen. Could not find 81°.344 and did not attempt any more measurements.

1878 Feb. 19. Obst. 2. Ph. 1. ; C.C. 208 ; [illegible]
Circumpolar stars.

art. image focus at 22.4

7 0 λ   7 40 λ   8 44 λ   80.486
198.6   ~~16.0~~   171.4 38.7   166.5 43.9   8 17 361.1   13.2
354.6   18.1   210.1 Reject   210.4 Reject   374.3   Retain
382.7   355.8 22.1   355.7 23.1   194.8   ~~15.6~~
176.3 22.3   377.9   378.8   179.2

Difficult to identify & ~~[illegible]~~ measure small stars. Therefore commenced on bright stars. Moon also rises shortly ~~[illegible]~~ after 8.

8 49 δ

7 4 δ   7 12 δ   149.1
172.3 39.4   165.1 45.7   224.3 75.2   8 42 81.302
211.7 Rej.   210.8 Rej ?   334.1 65.1   174.2   27.5
340.8 53.5   337.7 68.7   395.2   201.7   Retain
394.8   406.4   8 54 δ   354.3   25.5
Lamp smelled and re-began as above   391.9 153.8 215.8 340.0   64.0 51.9   379.8

8 7 81.516   84.289
173.3   27.1   ~~Clos~~ Double Dist 20"
200.4   Did not measure
356.6   21.0   8 66 82.356 Reject 8 56 82.356
377.6   388.0
8 12 80.480   219.3 39.4 Eyes too tired to go on.
171.7   29.6   348.6   Reject
200.3   Retain   114.4   104.9
356.7   23.0   Flickering of light be-
379.7   gan at 8¾. Time 2h.

These measurements all to be rejected, ~~[illegible]~~ having no accurate measures of λ and δ to which to refer them.

Double Stars observed at H.C.O.

R.A's and Decs. for 1875, corrected for Precession & Proper Motion and taken from the B.A.C.

	B.A.C.	RA 75 h	m	s	Dec 75 °	'	"	Peirce.	British N.A.
×94 Aquarii	8117	23h	12m	32s	−14°	9'	10"	7	
×Sirius	2213	6	39	38	−16	32	43	7	7 −16° 32 46
×Regulus	3459	10	1	43	+12	41	10		7 +12° 34.6
× ζ¹ Lyrae	6392	18	40	28	+37	28	36	7	
× ζ Sagitt.	6989	18	54	40	−30	3	27	7	
×B.A.C. 6631	6631	19	17	11	−29	32	26	P.M. Corr. omitted in B.A.C.	
× β Aquilae	6833	19	49	10	+6	6	8		7 +6° 5.8
× α2 Cap.	6974	20	11	7	−12	55	52	7	
× π "	7031	20	20	10	−18	37	9	7	
×98 Aquarii	8144	23	16	24	−20	46	55	7	
× τ Orionis	1638	5	11	32	−6	58	53	7	
×42 "	1759	5	29	13	−4	55	20	7	
not found Antares	5498	16	21	45	−26	9	10	7	
×35 Piscium	36	0	8	32	+8	17	35	a. a. 7	
×51 "	129	0	25	57	−6	15	59	a. a. 7	
					(+2) 3 dim Echt.				
×65 "	229	0	43	43.1 10	+27	1	49	7	
× ζ "	368	1	7	12	+6	54	50.	a 54.9 7	
× η Cass.	218	0 0	41 41	26.3 33	57 +57	9 9	10 8	29s 9.3 ?	
×42 Ceti	400	1	13	25	−1	9	55	a a 7	
× α Piscium	625	1 1	55 55	35 35	2 +2	9 9	33 35	7 53m 29s 9.22	
× γ And.	628	1 1	56 55	14 54	+41 +41	43 43	36 46	53m 45s 43.36 ?	
× ι 6 Trianguli	675	2 2	5 5	7.5 7	+29 +29	43 42	1 59	2m 47s 42.16 7	
×66 Ceti	685	2 2	6 6	24 25	−2 −2°	58 58	31 42	m?s? 4 21 9.23 ?	

R.A.'s & Decs. in cases of discordance between B.A.C. Computed & Peirce positions From Σ's Cat. Generalis

	R.A. 1830.						R.A. Reduced to 1875 h	m	s	Dec.		
η Cass.	0	38	52.03	+56	54	40.6	~~0~~	~~41~~ 57 9	~~26.29~~ 9.8	~~+56~~ 25	~~39~~ 9	~~51.4~~ 29.8
							1	55	34.77	+2°	9'	32.9
α Piscium	1	53	15.59	+ 1	56	20.5	~~1~~	~~35~~	~~34.77~~	~~+1~~	~~48~~	8.1
γ And	1	53	29.93	+41.	30	34.4	1	56	13.7	+41	43	46
ι Triang	2	2	31.81	+29	30	7.0	2	5	7.5	+29	43	1
66 Ceti	2	4	7.04	−3	11	32.6	2	6	23.54	−2	58	31.3

~~Values to be adopted.~~

Struve. Cat. Generalis.

94 Aquarii

ζ' Lyrae

ζ Sagitt.

π Cap.

98 aquarii

τ Orionis

42 "

35 Piscium
38
51 "
49 "
65

ζ "

η Cass.

42 Ceti

η Puppis

δ Sextantis

36 And

Ceti 160

γ And.

No. Σ	& Cass.	Price	1875 Price	1830 Pos. med	1830 Pos. med.	1875 Comp.	1875 Comp
295	84 Ceti	2^{h} 32 45	−1° 14.11				
299	γ "	2 34 44	+2 42.1				
311	π Arietis	2 40 4	+16 56.14				
333	ρ Arietis	2 49 45	+2 40.30				
412	7 Tauri	3 24 39	+24° 2.18				
470	32 Eridani	3 45 59	−3 19.45				
516	39 "	4 6 31	−10 34.1				
554	80 Tauri	4 20 42	+15 21.34 [all Σ nos rather far this pt]				
570		4 27 21	−10 0.29				
583		4 32 24	+0 42.39				
622	P. IV.258	4 49 31	+1 28.24				
651		5 2 2	−7 13.47				
686		5 10 50	+23 54 31				
742	Tauri 380	5 26 29	+21 54.44				
748	θ Orionis	5 27 8	−5 28.30				
762	σ " (AB)	5 30 26	−2 41.9				
774	ζ "	5 32 25	−2 1.13				
836		5 54 12	−2 21.59				
844		5 58 54	+14 0.42				
848		5 59 6	+13 59.12				

Constant correction of $\overset{\text{abt.}}{+2.^{m}}$ must be applied to the Price R.A.'s of Stars to obtain the R.A.s for 1875. Decs. also incorrect.

μ Cephei. Position according to different authorities

	R.A.		Dec.	
Σ (Dun Echt)	21 50.6	(1875)	+56° 1'	(1875)
B.A.C.	21 39.7	Red. 50 to (1875)	+58 12	Red. 50 to (1875)
Σ Cat. Gen.	21 50.5	Red. to 1875 (~~Red. 75~~)	+56 2 ~~+55° 49'~~	Red. to 1875. (~~Red 75~~)
Heis	21 39.8		+58 14	(Heis Red. to 1875)
H.C.O. Ref. Rogers	21 50.7		+56° 1'	(1875)

Var

1877

21 50 35.11
6
41

21 50.7 56 1.2

+56 0 20 51"

an var 2.010
3
6.030

+16".94
3
+50.82

56 1 11

5.050
21 50.81

Dun Echt. Red. to 1850.

$21^h\ 49.8^m$ +56° 1'

B.A.C. μ 13 Ceph. 21 50.7 +56° 1'

The μ Cephei with R.A. $21^h\ 40^m$ is variable.

" 13 " " " " 21 51 " double.

μ Cephei of 6 mag = XXI. 285. P. = "Double, Variable, Red" (Piazzi's notes)

1878 Mar 5.

Value of division of variation transit level at Buff + Berger's

1st Set.

Readings. 1st position		2nd Position	
Right end	Left end	R	L
+10.6	−0.6	+0.6	−10.4
+10.6	−0.5	+0.7	−10.4
+10.6	−0.5	+0.7	−10.3
+10.6	−0.5	+0.7	−10.3
+10.6	−0.5	+0.6	−10.4
	−2.60	0.33	−51.8
+10.60	−0.52	+0.66	−10.36

Distance moved over by screw = 45.8 divns. or nearly 1 semi-revolution. 21 parts of screw = 40" of arc. 1 part = 1".90

21)40(1.90
21
190
189
10

10.60
0.66
~~10.5 9~~
9.94 = no. divns. level corresponding to 45 screw division deduced from Right End readings

−10.36
−0.52
9.84 = no. divns. found by Left End

9.89 mean value (1st set) of 45 parts of screw

2nd Set.

1st Position $\boxed{\frac{3}{7}}$		2nd Position $\binom{0}{0}$	
R	L	R	L
+2.4	−8.3	+9.2	−1.5
+2.6	−8.0	+9.2	−1.5
+2.7	−8.0	+9.3	−1.5
+2.7	−7.9	+9.2	−1.4
+2.7	−7.9	+9.2	−1.4
13.1	40.1	46.1	7.3
+2.62	−8.02	+9.22	−1.46

Right	Left
9.22	8.02
2.62	1.46
6.60.	6.56
6.56	

6.58 = Mean value of 30 parts screw obtained from 2nd set.
(9.84 = " " " 45 " ")
∴ 6.56 = " " " 30 " " " " 1st "
6.57 = Final adopted value of 30 parts of screw
$1''.9$ angular mag. 1 division of scale
30
57.0 " " 30 " " "

6.57) 57.00 ($8''.68$ = one division of level = $0^{s}.579$
5256
4440
3942
4980
5256
276

15.) 8.68 (.579
75
118
105
130
135

Naked eye estimates of magnitudes of first-mag stars compared with Mars.

1878
March $8^{d}.3$ ♂ 1 Castor; β Geminorum 2 ♂.

1878 ~~1878 Mar 16. 5¼ a.m.~~

March 16. 5.2   F. 3424 $2^{m}\ 37^{s}$ slow of F. 3451

" 19 3   "   "   14 16.0   "   "   "   "

" 19 8   "   "   ast 11 X 30   "   "   Bond 394

~~[illegible]~~

1878 Mar. 22

E. Mer. Circle level. 5 a.m.

W	E			
70.4	90.3		70.4	64.3
64.3	95.6		90.3	95.6
134.7	185.9		160.7	159.9

134.7
185.9

4)51.2

bd = 12.80 for ~~wort~~ (

+ ~~14.6~~

70.4	90.3
95.6	64.3
166.0	154.6
154.6	

$11^{d}.4$

$14^{d}.6$ S.W.

4) 11.4
~~+2.8~~

~~$3^{d}.2$~~ by
$2^{d}.85$ (c w)

3.65 by S. W. (ce)

∴ the west end is too high $3^{d}.65$ S. W. (ce)

" " " " " " 2.85 (cw.)

♄ 1898 Mar. 23

Set on α Leonis Minoris at 7.30. to find equator point correction. Correction found insensible.

Equatorial intervals of wires
26 Lyncis δ +47 53.5 205 hunts R.a. 1678.

Comparison of I.R.A. 1678 with Bond 394

1678, 9h 19m 56.7s = 394, 19m 0.0s — 3.3s
25 57.0 = 26 0.0
27 57.1 = 28 0.0
27 57.1 = 30 0.0
30 57.1 = 31 0.0
10 13 56.8 = 14 0.0

Object	31 Lyncis	1 Ursae Maj.	38 Lyncis	Gr 1586	ζ Leonis	Bo 1508 ~~3 H. 3~~
Circle reading	268° 47'	263 51	275 3	238 54	288 20	233 56.
I.	8 ~~8~~ 1. 83.2	8 44 2 82.2	9 4 5 81.2	9 44 5 121.7	10 3 3 65.5	10 41
II.		~~4~~				43
III.	8 9 1 14.2	45 2 30.7	5 5 5.5	46 50 26		44
IV.						45
V.	8 9 4 21.5	46 0 18.7	6 1 29.2	48 0 61.5	10 4 4 19.2	46

1878 Mar. 26. Time Obs.

	δ Cancri 293° 46′				κ Ursae Maj. 264° 44′				Gr. 1564 242 34				μ Leonis 285 47			
I	8	20	0	65.2	8	36	5	139.2	9	12	1	219.5	9	27	3	119.5
III	8	20	2	27.5		37	3	26.5		14	3	39.5		28	3	35.7
V	8	21	1	4.5		38	5	38.7		15	1	111.5		29	0	25.5

Limit for 3 wires, +20°.

	λ Ursae Maj. 268 50				9 H. Draconis 236 1			
I.	9	51	1	131.2	10	4	4	181
III		52	3	37.5		7	1	59
V.		52	5	43.2		8	4	83

P.R.A. 1678				Bond 394			
9	38	7.9	=	9	38	0.0	+ 7.9 s
9	40	8.0	=	9	40	0.	+8.0
9	41	8.0	=	9	41	0	+8.0
9	42	7.9	=	9	42	0	+7.9
9	43	8.0	=	9	43	0	+8.0
9	44	7.9	=	9	44	0	+7.9
9	45	7.9	=	9	45	0	+7.9

P.R.A. 1678
= 7.s9 fast
of Bond
394

Level. Mar. 27 5.45

W	E
68.6	87.4
92.3	62.5
160.9	149.9
149.9	
4 | 11.0^{d}	

Value 1^{d}. Emc. level = 1″ = 0^{s}.07

b = + 2.75 (cw) ∴ the west end is too high 2^{d}.75 = 2.75 × ^{s}.067 = ~~0^{s}.1925~~ 0^{s}.18 = + 0^{s}.2

Reduction of Obsns. of Mar. 23

Date 1878 Mar 23. Instrument, E.M.C. Observer C.H.M.

Timepiece P.R.A. 1678 Recorder C.H.M.

Object Declination Circle	C.W. 31 Lyncis + 43° 35′ 268° 47′	C.W. ι Ursae maj. + 48 31 263 51	C.W. 38 Lyncis + 37 19 275 3	C.W. Gr. 1586 + 73 28 238 54	C.W. ζ Leonis + 24 2 288 20	C.W. Gr. 1508 + 78 26 233 56
Wire I	8 8 43.3	8 44 52.9	9 5 22.5	9 45 38.7	10 3 56.2	10 42 36.4
II						43 35.2
III	9 15.7	8 45 32.3	5 52.2	9 47 0.4	Lost	44 34.6
IV						45 32.8
V	9 48.6	46 7.5	6 21.7	9 48 24.6	10 4 47.7	46 31.6
Sum	107.6 35.87	92.7	96.4	63.7 30.23 30	103.9 51.95 30	170.6 34.15 ~~56.84~~
Mean	8 9 15.87	8 45 30.90	9 5 52.13	9 47 1.23	10 4 [illegible]1.95	10 44 34.15
Sid. int. mean trans.	8 14 44.67	8 51 4.66	9 11 30.23	9 52 46.09	10 10 9.66	10 50 28.46
Bb	+ .26	+ .29	+ .24	+ .57	+ .20	+ .77
Aa	+ .12	+ .66	− .44	+ 7.20	− 1.39	+ 11.70
Cc	Neglected					
Corrd. transit sid. t.	8 14 45.05	8 51 6.61	9 11 30.93	9 52 53.86	10 10 9.47	10 50 40.93
Corrd Transit	8 9 16.25	8 45 31.85 ~~40.4~~	9 5 51.93	9 47 9.00	10 4 20.76	10 44 46.62
R.A.	8 14 27.23	8 50 49.78	9 11 13.75	9 47 27.69	10 9 53.30	10 50 14.09
Error of timepiece	− 17^{s}.82	− 16^{s}.83	− 16^{s}.28 1−	− 5. 26.14 Reject.	− 15.17	− 26.84 Reject

$h = 2^{d}.85 \ \boxed{\text{cor. Mar. 22}} = +0^{s}.1909 = +0.2$

~~8 9 15.87~~
10 44 34.15 (Gr. 1508)
9 5 52.13 (38 Lyncis)
t′−t = 1 38 32.02 mean time
+ 16.18
t′−t 1 38 48.20 sid. int.

10 50 14.09
9 11 13.75
α′−α = 1 39 0.34

1 39 0.34
1 38 48.20
+0 12.14

A′ = −2.94
A = +0.11
−3.05

$\therefore a = \frac{+12^{s}.14}{-3.05} = -3^{s}.98$

~~Eqn~~ $-17^{s}.82$
−16.83
−16.28
−15.17
−16.10
−16.52

$-16^{s}.52$
+15.50 ±
$-1^{s}.0$ = error of A.R.A. 1678
+3.0 = diff. bet Bond 394, and 1678
$+2^{s}.0$ = error of Bond 394, Mar. 22.4

Reduction of Time Observations Mar. 26
Instrument E.M.C.
Timepiece P.R.A. 1678

Object		δ Cancri				κ Ursae Maj.				Gr. 1564			
Declination		+ 18° 36′				+ 47 36				+ 69 48			
Wire	I.	8	20	26.1		8	37	45.7		9	13	37.8	$1^m\ 8.0^s$
	III.			31.0	4.9 Rejected 40.8			40.6	− 5.1, Rejected 24.9		14	45.8	
	V.		21	11.8			39	5.5			15	54.6	1 8.8

Sum	9	42	138.2
			46.07
Mean.	9	14	46.07
Mean reduced to C.S.T.	9	32	15.31
Bb			+ 0.49
Aa			+ 0.89
Collimation neglected. Corrected transit sid. time	9	32	16.69
R.A. Mar. 26.	9	31	52.31
Error P.R.A. 1678			− 24.38 ~~35.62~~

μ Leonis		λ Ursae Maj.		9 H. Draconis	
+26 35		+43 32		+76 21	
9 28 17.8	26.5	9 52 2.5	42.5	10 5 52.4	m s 1 41.2
44.3		52 45.0	Rejected	7 33.6	
29 10.2	25.9	53 7.3	223	9 13.2	1 39.6
72.3				99.2	
24.10				33.07	
9 28 44.10				10 7 33.07	
9 46 15.63				10 25 10.97	
+ 0.21				+ 0.67	
− 0.21				+ 1.59	
9 46 15.63				10 25 13.23	
9 46 15.84				10 25 11.64	
+0.21				−1.59	

10 25 11.64 9 H. Drac.
9 46 15.84 μ Leonis
$t' - t = 38\ 55.80$

10 24 49.65
9 45 52.08
$\alpha' - \alpha = 38\ 57.57$
$t' - t = 38\ 55.80$
$+0^m\ 1^s.77$

$A' = -2.37$
A = ~~+0~~ +0.31 ~~25~~ 11.64
$A' - A = -2.68$

~~24.~~

$$\therefore\ a = \frac{+\ 1^s.77}{-2.68} = -\ 0^s.67$$

Satellites of Saturn.

Computation of longitudes from tables in No. 90, Ast. Nach., for R 14.

Rhea.

Oct. 17 8.8
4.7
" " 13.5
" 17.563

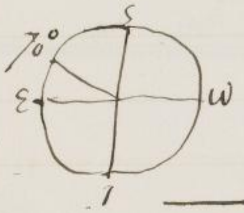
Diff. 5^d 398°.63
" 1^d 79°.726

Long. at 17.0 = 25°.13
45.02

Long 17.563 = 70.15
Dist from E.E = −20°

0.563 × 79°.7 = 44.8711
0.563 × .26 = .144
45°.0175

.542
.021
.563



.478
.765
1.243

163.750
262
425

Enceladus.

Oct 13 10.3
4.7
" " 15.0
" 13.6249

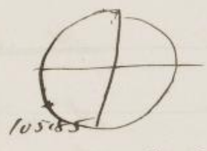
Diff 5^d 1313.820
" 1^d 262.765

Long. at 12 = 38.86
66.99

Long 13.6 = 105.85

λ 105°.85 = E.E. +16°. (Should be +49°)

1.625 × 262. = 425.750
1.625 × .765 = 1.243
426°.993
360.
67°



Check. Oct. 13. 10.5 E.E. = +90° long.

1.44 × 263 = 378°.7 = ~~49°~~ 18.7
38.9
57°.6 = long. at E.E.

.4166
.0208
.4374

Disagreement accounted for by error in table P.291

Tethys.

190 790 298.3
.950 .008 .95
950 299.25

.542
.033
.575

Oct 13 9.1
4.7
" " 13.8
" 13.575

Diff 5^d 953.67
1^d 190.73
Long oct 12 = 127.61

λ = 68°.01 = −22°

1.575 × 190 = 299.25
1.575 × 0.73 = 1.15
300°.40
127.61
428.01

Longitude of Titan, from P. 50 Vol IX Act. Math

~~Sept 24. 1877 $7^h\,25^m = 24^d\,17^h\,9^m$. 264°~~

~~344 33 34.6~~
~~86 12 47.8~~
~~270 55 26.8~~

~~344.7~~
~~86.2~~
~~249.7~~
~~181.8~~
~~11.3~~
~~0.1~~
~~624°.1~~
~~360.~~
~~264.1~~

7 25
4 44
11 69
12 9

~~Sept 24th $9^h\,0$. 265°. 264.1~~
~~7 25 1.4~~
~~1 35 265.5~~

~~0.9~~
~~0.5~~
~~1.4~~

~~Sept 26th 9.30 311°~~

~~9 30~~
~~4 44~~
~~14 14~~

~~344.7~~
~~86.2~~
~~227.0~~
~~13.2~~
~~0.2~~
~~671.3~~
~~360~~
~~311.3~~

These figures wrong.

Paris ins. of Greenwich time should be used.

+ 5 17 33.02
0 23 41.54
4 53 51.48
4 76 93.02
4 77 33.02
5 17 33.02
7 25
4 54
11 79
4 67 12 29
72.39
23 41.54
4 44 30.85
5 58
5 4 45 9^m

9 7
4 54
13 61

6.9
4.9
11.8

Long. Paris East of Cambr = 4 53 51.48 = $4^h\,53^m.9$

Sept 24. 1877 $7^h\,25^m = 24^d\,12^h\,29^m$ = 264°

344° 34′
86 13
181 51
11 17
0. 18
622° 133′
624° 13
624.2
360
264.2

Oct. 17. $9^h\,7^m = 17^d\,14^h\,1^m$ = 65°

344 34
86 13
344 34
43 31
23 49
13 10
0 1
423 125
425 5
360
65° 5′

Dec. $1^d\,6^h\,9^m = 1^d\,11^h.8$ ~~[illegible]~~ [illegible] = 359°
$1^d\,11^h\,48^m$

344 34
340 43
22 35
10 21
0 45
716 178
718 58
360
358° 58

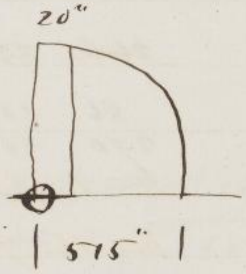
D.m. Titan (Newcomb) = 22°.577

H.m. Titan " = 0°.9407

Cal H.m. 0°.941 till Jan. 28.

Japetus on Oct 17th 9h 53m in conjunct. with foll. ansae R 24.120

∴ Long. of Jap. on Oct 17d 10h Camb. M.T. = 4°



Nov 6th Jap = 90°
" 270°
Nov. 25th " = 180°
Dec. 16th " = 270°

~~.000~~.22036
36. (10)
132216
66108
$0^d.0793\,2960$
$79^d.329$

4.538
60
.008
.048

.292
.038
79.330

Time of revn. of Japetus = $79^d.329$

nov 6
oct 17

nov 37
oct 17
20

31
nov 25
oct 17
56
17
39

31
30
16
oct 77
17
60

77
6
71

~~4.53~~ × 20
0.008
nov 6th 4.54 × 20 = 90°.8 + 4 = 95°
nov 25 177°.1 + 4 = 181°
dec 16 272.4 + 4 = 276°

nov 19 9.2 = oct 50 9.2
31 17 10.
50 $33^d\ 0^h$ × 4.54 = 149.8 = 150° + 4 = 154°

nov 19 9.5 . 154°

nov. 20 6.5 oct 51 6.5
oct 50 30.5
17 10.
33 20.5 × 4.54 = 153 + 4 = 157°

nov 30. 6.6. = oct 60 30.6
" 17 10.
43 21 × 4.54 = 199 + 4 = 203°

nov 30. 6.7 = 203°

24) 220 (698
81 2 / 180 / 400
24) 220 (92
216 / 216 / 40

Dec. 1. 6.8 = oct 62 6.8
= " 61 30.8
" 17 10.
44 21 × 4.54 = 204° + 4 = 208°

Dec 1. 7.5 = oct 62 ~~6.8~~ 7.5 = 204 + 4 = 208°
61 ~~30.8~~ 31.5
17 10 10
44 21 21.5

Dec 1. 7.9 = 204 + 4 = 208°

Dec 16. 9.0 = oct 77 9.0
" 17 10
60 0 × 4.54 = 272 + 4 = 276°

Dec 22 7.8 = oct 83 7.8
= " 82 31.8
17 10
65 22 × 4.54 = 299 + 4 = 303°

Dec 22. 7.9 = = 303°

" " 8.3 = oct 82 32
17 10
65 22 = 303°

" 23 6.2 = oct 84 6.2
= " 83 30
17 10
66 20 = 303 + 4 = 307°

" 23 6.3 = = 307°

" 28 8.2 = oct 89 8.2
" 88 32.
" 17 10
" 71 22 = 326 + 4 = 330°

Jan 5. 6.7 = oct 97 6.7
= " 98 30.7
" 17 10.
" 81 21 × 4.54 = 372, + 4 = (16°) 376°

" " 6.8 = = (16°) 376°

Jan? 16. 6.2 = oct 108 6.2
= oct 107 30.2
" 17 10
" 90 20 × 4.54 = 412, + 4 = (56°) 416

" " 6.4 = oct 107 30.4 = (56°) 416

45 | 38
53.8
54.0

Longitudes of Japetus Sept 11 – Nov. 19, 1877.

Long. Oct 17d 10h, Camb M.T., = 4°

Oct 17 10h = Sept. 47.d 10h   4° = 364°

Anomaly.

47 10
Sept. 11d 7h 45m = Sept 11 7.7 ---- 200°
36 2 = 36.1 × 454 = 164 (364)
= 200°   ~~210~~

47 10.0
" 24 7 25 = Sept 24 7.4   259
23 2.6 = 23.1 × 4.54 = 105 (364)
259°

47 10.
" " 9 15 = Sept 24 9.2   260
23 0 = 23.0 × 4.54 = 104 (364)
260

" " 9 25 =   260

Oct 5th. (time?)

Oct.

17 10.
Oct 7 10 15 = Oct 7 10.2   319
10 0 = 10 × 4.54 = 45 (364)
319

" " " 20 =   319

17 10.
Oct 17 8 50 = Oct 17 8.8   4
0 1.2 = .05 × 4.54 = 0.2 (4)
4

" " 9 45 =   4

" 18 9 30 = Oct 18 9.5
17 10.
1 0 × 4.54 = 5, +4 =   9

" 22 6 24 = Oct 22 6.4 = Oct 21 30.4   26
17 10   17 10
4 20 = 4.8 × 4.54 = 22 + 4 = 26

Nov 7 8 = Oct 38 8   99
17 10
20 22 = 20.9 × 4.54 = 95, +4 = 99

Nov 7 8 41 = ~~Oct~~ 38 8.7   99°
= " 37 32.7
17 10.
20 23 = 21.0 × 4.54 = 95, +4 = 99

Nov 16 9 15 = Oct 47 9.2   140°
" 17 10.
30 0 = 30 × 4.54 = 136, +4 = 140

Nov 19 8 50 = Oct 50 8.8   154°
" 17 10.
33 0 = 33.0 × 4.54 = 150, +4 = 154

Hyperion. Compn. of Apparent Anomalies. Oct. Nov 77.

31 8.6
29 5.4
2 3.2

35 7.7
29 5.4
6 2.3
146.3

~~49 8.9~~ 50 8.9 = ~~49 32.9~~
20 12.9 = ~~29 12.9~~
~~29~~ 20.0
24
116
58

1645 1175
165675
±166°

235
1505
1175
1645
17.625

7047
2351
35235
21141
14094
16356045

38 8.5 = 37 32.5
20 12.8
17 19.6
24
17
168
24
408
19.4
49.6

29 31.9
20 12.9
9 19.0
216
19.
235

18 32.9
10 20.4
8 12.5
192
12.5
204.5

0°.705

24) 16.914 (0.7048
168
114
96
180
178
2

7047

Date in Prec. Peri-Tz column considered Camb. time.

Com'pn. Peri-Tz (vid. P.78)

M.D.M. Hyp. = 16°.914 Multiplied by eccentricity & written
M.H.M. " = 0°.705. in Last column, P.78 R.14

M.D.M. Titan = 22.577
" H." " = 0.941

~~Computation of Titan~~

Anomaly of Titan
[illegible] of Mars.
Venus
Jupiter
Saturn

Longitude of Titan Sept. Jan. 1877–8. (R 14 P. 76.)

1.6 × 0°.941 = 1°.5056 — 264. / 2 — 266°

50.1 × " = 47°.1 — 47 / 311 — 311°

~~2.7~~ 2.6 × .941 = ~~25.4~~ 24.46

13. × 22.58 = 293.8 / 296.3 — 24.4 / 293.8 / 318.2 — 2.4 / 293.8 / 296.2 — 296 / 264 / 560 / 360 / 200 — 200

1.7 × .941 = 1.6.0

506. / 13.3 / 579.3

2~~2~~3 × 22.58 = ~~497.2~~ 519.3 / 498.8 — 519.3 / 1.6 / 520.9 — 499 / 264 / 763 / 720 / 43 — 5 — 521 / 264 / 785 / 720 / 65 — 65 / ~~43~~

2.5 × .941 = 23.5 — 2.3 / 519.3 / 521.6 — 522 / 264 / 786

2~~2~~3 × 22.58 = ~~497.2~~ 519.3 / 499.5 — 66 / ~~43~~

23.0 × .941 = 21.6 — 632 / 264 / 896 / 720 / 176

27 × 22.58 = 610.2 / 631.8 — 176

52 6 24
51 30 24
51 29 84
47 9 52
4 20 32

2.5 × 0.941 = 23.

~~56 ×~~ Began again by sub. each date from the following date. &c.

24 9 0
24 7 25
1 35 = 1.h6.

26 9 30
24 9 0
2 0 30 = 48.5

37 10 0
26 9 30
11 0 30 = 11d 0h.5

47 9 7
37 10 0
9 23 7
9d 23h.1

47 9 52
47 9 7
0 0 45 = 0h.7

52 6 24
47 9 52
4 20 32
= 4 20h.5

80 9 54
52 6 24
28 3 30
28d 3h.5

80 10 0
80 9 54
0 6 = 0h.1

91 6 54
80 10 0
10 20 54
= 10d 20h.9

92 6 54
91 6 54
1d 0h.0

150 8 24
92 6 54
58 1 30
= 58d 1h.5

62 / 60 / 122 / 28 / 150

Sept 24 d 7 h 25 m

				264° Ast. Nach. value	264° Values by [illegible]
24 9 0	1.6 × 0.°941 =	1.°505	~~264° + 2 = 266~~ 264.2 + 1.5 265.7 265.7 + 45.6 = 311.3		266°
26 9 30	48.5 × 0.941 =	45.64			311°
Oct 7 10 10	11 × ~~243~~ 22.58 =	248.38	311.3 +248.8 =560.1 200.1		200°
	0.5 × .941 =	0.47 248.85			
17 9 7	9 × 22.58 =	203.19	200.1 224.9 425.0 360 65.0	65°	65°
~~" 9 52~~	23.1 × .941 =	21.74 224.93			
" 9 52	0.7 × .941 =	.66	65.0 .7 65.7		66°
22 6 24	4 × 22.58 =	90.32	65.7 109.6 175.3		175°
	20.5 × .941 =	19.29 109.61			
Nov 19 9.9	28 × 22.58 =	632.16	175.3 635.4 810.7 720.0 90.7 .1 90.8		91°
	3.5 × .941 =	3.29 635.45			
" 10.0	0.1 × .941 =	0.09			91°
30 ~~30~~ 6.9	10 × 22.58 =	225.77	90.8 245.4 336.2		336°
	20.9 × .941 =	19.67 245.44			~~3~~
Dec 1 6.9	1 × 22.58 =	22.58	336.2 22.6 358.8	359°	359°
Jan 28 8.4	58 × ~~22~~ 22.58 =	1309.47	358.8 1310.9 1669.7 1440 229.7	2 720 1440	230°
	1.5 × .941 =	1.41 1310.88			

1877 Dec 9 6 ~~44~~ 45 G.M.T. meridian transit of Titan. (Observ. No. 9. (P. 288)

" Nov 7 8 12 " " " " " " No. 8 (P. 256)

" Dec ~~9 11 29 C.M. 9~~

" Nov ~~7 12 56~~

9 2.0
Dec 1 6.9
7 19.1

1877 Dec 9 d 2 h 1 m C.M.T. Long = 174.°8

" Nov 7 3 28 " " " " = 173.°8

= longitudes of Titan at these times computed by Bessel's Tables. These longitudes are 6° less than those derived from the modern ~~[illegible]~~ observations

22.58
7.
158.06
17.97
176.03

358.8
176.0
534.8
36
174.8

19. 9.9
7 3.5
12 6.4

22.58
45.16

22.58
225.77
45.16
270.93
6.02
276.95

360
91
451

450.7
276.9
173.8

Venus & Jupiter Oct 28, Nov 7, 17, 27.

	~~Log. phase ♀~~	Log. diam ♀	Log diam ♃
Oct 28	0.679	11.8	16.2
Nov 7	0.643	18.0	15.9
" 17		19.6	15.6
" 27		21.4	15.4

~~Oct~~ 0.724
Nov 15 0.618
Oct 11 0.726
30|0.1080
0.0036
13.
108
36
.0468
0.726
.047
0.679
30|.1000
.0033
.0033
2
.0066
.0036
23.
108
72
.0828
0.726
0.083
0.643
Nov 6 1074

1745/3490

Venus

Dat.	Oct 28	Nov 7	Nov 17	Nov 27
phase	.683	.650	.612	.568
A log phase	9.6688	9.6258	9.5436	9.5086
B log diam	1.2253 2	1.2553 2	1.2923 2	1.3304 2
C "	2.4506	2.5106	2.5846	2.6608
	2.1194	2.1364	2.1582	2.1694
log dist ☉	9.8622 2	9.8618 2	9.8613 2	9.8606 2
D = 2 " "	9.7244	9.7236	9.7226	9.7212
~~A + B + C = E~~	~~2.3964~~	~~2.4128~~	~~2.4356~~	~~2.4482~~ 2
D − E				
A + B + C = E	2.1194	2.1364	2.1582	2.1694
D − E	7.6050	7.5872	7.5644	7.5518

Jupiter

Coeff. eccentricity ~~phase~~	0.0165	0.0165	0.0165	0.0165
A log phase	~~0.0061~~	~~0.0061~~	~~0.0061~~	~~0.0061~~
B " diam	1.2095	1.2014	1.1931	1.1875
C " "	1.2095	1.2014	1.1931	1.1875
~~a + B +~~ log dist ☉	0.7164	0.7164	0.7161	0.7158
D = 2 " " "	1.4328	1.4328	1.4322	1.4316
a + B + C = E	2.4355	2.4193	2.4027	2.3915
D − E	8.9979 .6021	9.0135 .6021	9.0295 .6021	9.0401 .6021
	8.3958	8.4114	8.4274	8.4380

43 010
.6000

Semidiameters used
♂

Aug 19 8.92
17.84

1.6178
.6021
2.2199

~~Mars~~

Saturn

Diam.	Aug. 18 18.4	Sept. 7 18.8	Sept. 27 19.0	Oct. 17 18.7	Nov. 6 18.4	Nov. 26 17.7
B log diam	1.2648	1.2742	1.2788	1.2718	1.2648	1.2480
log dist ☉ ~~E. 2 log diam~~	0.9848	0.9845	0.9843	0.9840	0.9837	0.9835
2 " " "	1.9696	1.9690	1.9686	1.9680	1.9674	1.9670
(a=0) + 2B = E	2.5296	2.5484	2.5576	2.5436	2.5296	2.4960
D − E	9.4400	9.4206	9.4110	9.4244	9.4398	9.4710

Mars.

(diameter interpolation from p. 387, am. ephy, on next page.—)

Diam	12.87	13.35	12.00	9.91	7.94	6.44
A ~~log diam~~	~~2.2192~~	~~2.2510~~	~~84~~			
B log diam	1.1096	1.1255	1.0792	0.9961	0.8998	0.8089
B + C	2.2192	2.2510	2.1584	1.9922	1.7996	1.6178
" " " (Corrected)	2.8213	2.8531	2.7605	2.5943	2.4017	2.2199
log dist ☉	0.1404	0.1410	0.1434	0.1474	0.1527 2.4017	0.1591
D	0.2808	0.2820	0.2868	0.2948	0.3054	0.3182

A = log phase
B = log diam. 1.4094 1.4265
C " 1.4094

.098
0.98465
2
1.96930

1.4654
2
2.9308
1.4654

14.6
2
29.2

B + C	2.8213	2.8531	2.7605	2.5943	2.4017	2.2199
A	9.9899	0.0000	9.9890	9.9703	9.9542	9.9450
D	0.2808	0.2820	0.2868	0.2948	0.3054	0.3182
E = (a + B + C)	2.8112	2.8531	2.7495	2.5646	2.3559	2.1649
D − E	7.4696	7.4289	7.5373	7.7302	7.9495	8.1533

Mars. Aug. 28th. Saturn. Aug. 28th.

	Mars. Aug. 28th.	Saturn. Aug. 28th.
A	9.9956	
B + C	2.9308	
D	0.2810	1.9693
E = (a + B + C)		
D − E		

Aug. 18
12.94
12.57
.37
4
1.48
12.57
1.48
14.05
.37
.074
4
.296
12.57
12.87

Sept 7
~~6.45~~
~~6.31~~
~~.14~~
~~.028~~
~~4~~
~~.112~~
13.41
13.34
.07
.014
4
.056
13.41
.06
13.34
13.34
.01
13.35
13.34

Sept 27
12.37
11.91
0.46
0.09
12.00

Oct 17
10.35
9.80
0.55
0.110
9.80
9.91

Nov 6
~~14.52~~
~~13.74~~
~~0.78~~
~~0.16~~
~~13.74~~
~~13.90~~
8.30
7.85
0.45
0.09
7.85
7.94
~~13.90~~
7.94

Nov 26
6.70
6.38
0.32
0.06
6.38
6.44
6.44

Phases of Mars.

937	+58	Aug. 18.	.977
995	-23	Sept. 7	1.000
972	-59	Sept. 27	.975
913	-33	Oct. 17	.934
880	-06	Nov 6	.900
874		Nov 26	.881

27	~~0~~	0	787	787
28	~~1~~	1	790	791
Nov 1	~~3~~	2	802	804
3	~~6~~	2	808	810
4	~~8~~	3	811	814
6	~~11~~	4	817	821
7	~~12~~	4	820 + 4	824
9	~~12~~	5	826	831
13	~~6~~	10	838	848
14		13	850	863

Aug. 18		-27	1.9704
27			
28			
30			
Sept 3			
26	1.910	~~-27~~ -28	1.882
Sept: ~~Oct.~~ 30	1.870	~~-23~~ -20	1.850
Oct 1	1.860	~~-22~~ -19	1.841
5	1.820	~~-19~~ -14	1.806
10	1.770	9	1.761
13	1.740	~~-12~~ -7	1.733
17	1.700	~~-10~~ -6	1.694
18	1.690	-6	1.684
22	1.650	-6	1.644
23	1.640	-7	1.633
27	1.600	-8	1.592
28	1.590	-9	1581
29	1.580	-9	1.571
30	1.570	-9	1.561
2	1.540	-10	1.530
4	1.520	-10	1.510
6	1.500	-10	1.4903
7	1.490	-10	1.480
9	1.470	-8	1.462
16	1.400	-1	1.399
18	1.380	+2	1.382

Date.	Venus.	Jupiter	J−V	D'	D²	D'''
Oct. 28	7.6050	8.3958	0.7908			
				+.0334		
Nov 7	7.5872	8.4114	0.8242		+.0054	
				+.0388		−.0210
" 17	7.5644	8.4274	0.8630		−.0156	
				+.0232		
" 27	7.5518	8.4380	0.8862			

	Date	Mars	Saturn	S−M	D'	D''
Aug 18		7.4694	9.4400	1.9704		
					+.0213	
Sept 7	~~Aug. 18~~	7.4289	9.4206	1.9917		−.1393
					−.1180	
" 27	~~Sept. 7~~	7.5373	9.4110	1.8737		−.0615
					−.1795	
Oct. 17	" ~~27~~	7.7302	9.4244	1.6942		−.0244
					−.2039	
Nov. 6	~~Oct. 17~~	7.9495	9.4398	1.4903		+.0313
					−.1726	
" 26	~~Nov. 6~~	8.1533	9.4710	1.3177		
	~~" 26~~	~~8.~~				

Aug 28 7.4308 9.4302 1.9994 R26,167

79	.0008
82	62
85	130
88	62

90	-26
70	-6
50	-10
30	+18

Obsns. of Deimus + Phobus by Prof. Hall; also of Hyperion.

~~Deimus foll. elongation,~~ $p = 71°.8$ ~~1877 Sept 14th 10^h 14^m, Wash~~ m.T.

(From letter of Prof Hall, 1878 May 23.)

Deimus, f.E., $p = 71°.8$, 1877, Sept. 9th 12^h 51^m Wash. m.t.

Phobus " " " $= 72°$ " " 14th 10 14 " " "

Appt. motion retrograde; or p diminishes with time.

m s
−23 41.54
= R.C. East 4th

~~12 51~~
~~23 42~~
~~36 33~~

12 51 10 14
24 24
13 15 10 38

Hyperion, f.E., 1877 Oct 15th, $8^h.2$ W.m.t.

also, " Nov 6th $7^h.5$ " " "

Hall's period $= 21^d.3113$

Periods of ♂'s satellites

Deimus $30^h\ 17^m\ 53^s.86 \pm 0^s.985$ (m.t.)

Phobus 7 39 15.07 ± 1.123 "

λ =

Mean daily motion Hyperion, (Newcomb) 16°.914.

$360° \div 30.298 = 11°.882$ = mean hourly motion, of Deimus

| 30 17.898 | = 30.2983 | (7 39.251 | = 7.6542 |

$360° \div 7.654 = 47°.034 =$ " " " " Phobus

$16°.914 \div 24 = 0°.705 =$ " " " " Hyp. (Newcomb)

$21^d.3113 \times 24 = 511^h.4712$

$360° \div 511.471 = 0.7039 = 0°.704 =$ " " " " " (Hall)

∴ Long. Deimus Sept 9. 12.51 W.m.t. = Sept. 9, $13^h\ 15^m$ G.m.T. = 90° (?)

" Phobus " 14. 10. 14 " " " = " 14, $10^h\ 38^m$ " " " = " (?)

Mars & Saturn. 1877. Aug-Dec.

Interpolation for position to be used in projecting their distances

W. mean noon

W.M.T.	Mars. R.A. h m s	H.D. s	Dec ° ′ ″	H.D. ″	Time W.M.T.	Observed R.A. h m	[illegible] stars	Dec	Observed Dec ° ′
Aug 28.0	23 17 19.6	−2.392	−11° 31′ 27″	−13.0	8.8	23 17.0	5	11	−11 33.3
30.0	23 15 21.7	−2.52	−11 44 45	−12.7	11.8 ~~12.0~~	23 14.9	14	15	−11 44.3
Sept 3.0	23 11 11.1	−2.68	−12 1 23	−11.7	9.4	23 10.8	14	1	−12 3.2
26.0	22 49 56.7	−1.39	−12 42 29	+4.4	10.2 10.3	22 49.7	8	14	−12 41.8 ~~43.2~~
Oct 5.0	22 46 52.9	−0.29	−12 14 3	+11.3	8.0 8.5 8.7	22 46.8	14	4	−12 12.4 ~~15.6~~
					9.4	22 48.0	0	10	31.9
Sept 30.0	22 48 5.8	−0.92	−12 32 57	+7.5	9.5 [illegible]	22.47.9	0		−12 ~~34.1~~
Oct 10	22 46 55.7	+0.34	−11 47 42	+14.9	10.8 11.0	22 47.0	15	15	−11 45.0
" 13	22 47 33.6	+0.71	−11 28 35	+16.9	10.[illegible]	22 47.7	18	8	−11 25.7
					~~8.0~~ 7.9	22 49.2	6	19	−11 57.0
" 17	22 49 4.8	+1.18	−10 59 32	+19.3	9.3	22 49.3	6	19	−11 56.0
" 18	22 49 34.5	+1.30	−10 51 41	+19.9	9.7 9.8	22 49.8	9	16	−10 48.5
" 22	22 51 59.8	+1.72	−10 18 5	+22.0	8.9 9.0	22 52.3	1	5	−10 14.8
					7.8	22 52.9	4	2	−10 6.2
" 23	22 52 42.4	+1.83	−10 9 11	+22.5	9.1 9.2	22 53.0	5	2	−10 5.7
" 27	22 55 56.5	+2.21	−9 31 36	+24.4	9.3 9.9	22 56.3	1	1	−9 28.
" 28	22 56 50.7	+2.30	−9 21 45	+24.8	9.3 9.7	22 57.2	6	6	−9 18.
" 29	22 57 47.1	+2.39	−9 11 44	+25.3	6.8	22 58.1	10	3	−9 8.9
					5.4	22 59.0	15	20	−8 59
" 30	22 58 46.	+2.48	−9 1 32	+25.7	5.8 7.6	22 59.1	15	20	−8 58.4
Nov 2	23 1 54	+2.7	−8 29 57	+27	—				
" 4	23 4 9	+2.9	−8 8 6	+28	5.5	23 4.4	2	2	−8 5.6
					5.3	23 6.8	14	14	−7 43.0
" 6	23 6 32	+3.1	−7 45 37	+28	8.5 8.6	23 7.0	15	14	−7 41.6
" 7	23 7 46	+3.1	−7 34 10	+29	8.1 8.7	23 8.2	1	10	−7 31
" 9	23 10 19	+3.3	−7 10 50	+30	5.8	23 10.6	6	2	−7 7
" 16	23 20 7	+3.7	−5 45 6	+32	8.7 8.8 8.9	23 20.6	3	13	−5 40.4

−18

Saturn

	Wash. mean Noon						Observed Position						
	R.a. h	m	H.D. s	DEC. °	'	H.D. "	Time W.M.T. h	R.a. h	m	1/20 sec	DEC. °	'	1/20 "
1877. Aug 28	23	18.9	−0.7	−6	51.9	−5	8.8	23	18.8	14	−6	52.6	18
30	23	18.3	−0.7	−6	55.6	−5	11.8	23	18.2	11	"	56.6	19
Sept 3	23	17.2	−0.7	−7	3.0	−5	9.4	23	17.1	5	−7	3.8	1
26	23	10.8	−0.7	−7	44.1	−4	10.3	23	10.7	13	"	44.8	15
30	23	9.8	−0.6	−7	50.4	−4	9.6	23	9.7	8	"	51.0	17
Oct 5	23	8.5	−0.6	−7	57.8	−3.5	8.1	23	8.4	2		58.3	19
10	"	7.4	−0.5	−8	4.5	−3	10.9	23	7.3	16	−8	5.0	2
13	"	6.7	−0.5	−8	8.1	−3	10.1		6.6	13		8.6	3
17		6.0	−0.5	−8	12.5	−3	7.9 9.3 }		5.9	9		~~12.9~~ 13.0	4
18		5.8	−0.45	−8	13.5	−2.5	9.5		5.7	8		13.9	5
22		5.1	−0.4	−8	17.2	−2	9.0		5.0	5		17.5	6
23	"	5.0	−0.4	−8	18.1	−2	7.8 9.2 }		4.9	4		18.4	6
27		4.4	−0.3	−8	21.0	−2	9.4 ~~8.8~~		4.4	2		21.3 ~~21.0~~	7
28		4.3	−0.3	−8	21.7	−2	9.5		4.3	1		22.0	7
29		4.2	−0.3	−8	22.3	−1.5	6.8		4.2	1		22.5	7
30		4.0	−0.3	−8	22.9	−1	6.5		4.0	0		23.0	8
Nov 2		3.7	−0.2	−8	24.3	−1	—	—	—	—		—	—
4	"	3.5	−0.2	−8	25.1	−1	5.5		3.5	7		25.2	8
6		3.4	−0.2	−8	25.7	−1	7.0		3.4	7		25.8	9
7		3.3	−0.16	−8	25.9	−0.5	8.4		3.3	6		26.0	9
9		3.2	−0.1	−8	26.3	−0.0	5.8		3.2	6		26.3	9
14	"	3.0	−0.0	−8	26.2	−0.0	8.8		3.0	5		26.2	9

1/0's 20	δ−ξ or ξ−δ. R.a. m	Dec. Diffs.	Diffs. R.a. in 20ths °'s	Diffs. Decs. in 20ths °'s °	20ths	Dec.	R.A.	Dist.
18	1.8	4° 40′.7	9	4	13.6	94	9	4.7°
9	3.3	4 47.7	16	4	15.9	94	16	4.9
1	6.3	4 59.4	31	4	19.8	100	31	5.2
15	21.0	4 57.0	105	4	19.0	99	103	7.2
17	21.7 ~~22.9~~	4 40.9 ~~21.4~~	108 ~~114~~	4	-14	94	106	7.1
19	21.6 ~~20.4~~	4 14.1 ~~33.6~~	108 ~~102~~	4	5 ~~11~~	85	106	6.8
2	20.3 ~~19.3~~	3 40.0	102	3	13	73	102	6.3
3	18.9	3 17.1	94	3	6	64	92	~~5.6~~ 7
4	16.7 ~~18.9~~	3 43.5	82	3	14	74	82	5.5
5	15.9 ~~18.0~~	2 34.6	79	2	12	52	78	4.1
6	12.7 ~~14.8~~	1 57.3	63	1	19	39	62	3.1
6	11.9	1 47.6	59	1	16	36	58	3.4
7	8.1	1 6.7 ~~0 41.5~~	40	1	2	22	40	2.3
7	7.1	0 56.0	35	0	19	19	35	2.0
7	6.1	0 46.4	30	0	15	15	30	~~1.4~~ 7
8	5.0	0 35.7	25	0	12	12	25	~~1.4~~ 4
—	—	~~4~~						
8	0.9	0 19.6	4	0	7	7	4	0.4
9	~~1.4~~ 3.5	0 43.4	17	0	14	14	17	1.1
9	~~4.8~~ 4.9	0 55.0	24	0	18	18	24	1.5
9	~~7.6~~ 7.4	1 19.3	37	1	6	26	37	~~1.3~~ 2.3
7	~~17.6~~ 17.6	2 45.8	88	2	15	55	87	~~4.9~~ 5.1

Deimos & Phobos.

~~Phobos~~. Deimos.

1877 Sept. 9th 12h 51m w.m.t. E.E. λ = 90° = 13h 15m Cmt.

mean H.M. = 11°.882

Phobos.

1877 Sept 14th 10h 14m w.m.t. λ = 90° = 10h 38m Cmt.

m.H.m. = 47°.034.

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20 Dates

Longitude. ~~of~~ Deimos.

Longitude				Reading			
88 ~~92~~	−1°.6	Sept. 4	11.55	4.17	9 12 51 wmt. 9d 13h 15m = 9 12 75 14 11 55 5 1 20	= ~~121.33~~	11.8 × 121 = 1427.8
115	+.25	" 13	10.15	5.54	9 12 75 12 34 15 9 13 .15	= 3 21 0 = 93.0	11.8 × 93 = 1097.4
60 ~~120~~	−30	Sept 4	9.30	7.70	9 12 75 14 9 30 5 3 45	= 123.75 ~~× −1~~	11.8 × 123 = 1451.4
77 ~~103~~	−13	" "	11.0	9.29	9 13 15 14 11 0 5 2 15	= 122.25	11.8 × 122 = 1439.6
79 ~~101~~	−11	"	11.10	9.18	9 13 15 14 11 10 5 2 5	= 122.08	11.8 × 122 = 1439.6
84 ~~94~~	−6	"	11.33	8.40	9 12 75 14 11 33 5 1 42	= 121.70	11.8 × 121 = 1427.8
114 ~~64~~	−334	" 8	9.11	8.55	9 13 15 8 9 11 1. 1 4.4.	= 28.07	11.8 × 28. = 330.40
118 ~~62~~	−332	" "	9.20	9.92	9 12 75 8 9 20 1 3 55	= 27.92	11.8 × 27.9 = 329.22
123 ~~67~~	2 −337	"	9.45	8.52	9 12 75 8 9 45 1 3 30	= 27.50	11.8 × 27.5 = 324.50
125 55 ~~65~~	−325	"	9.55	9.91	9 12 75 8 9 55 1 3 20	= 27.33	11.8 × 27.3 = 322.14
130 ~~70~~	−320	"	10.20	9.38	9 12 75 8 10 20 1 2 55	= 26.92	11.8 × 26.9 = 317.42
132 ~~46~~	−318	"	10 30	10.72	9 12 75 8 10 30 1 2 45	= 26.75	11.8 × 26.7 = 315.06
146 ~~34~~	−304	"	11 40	7.95	9 12 75 8 11 40 1 1 35	= 25.58	11.8 × 25.5 = 300.90
152 ~~28~~	−298	"	12.10	9.91	9 12 75 8 12 10 1 0 65	= 1 1 5 = 25.08	11.8 × 25. = 295.00
183	+93	" 12	9.40	5.83	~~9 12 9 40~~ 11 33 40 9 13 15 2 20 25	= 68.42	11.8 × 68.4 = 807.12
193	+103	"	10.30	5.65	11 33 40 12 10 30 34 30 9 13 15 21 15	= 69.25	11.8 × 69.2 = 816.56
194	+106	"	10.45	8.68	9 12 75 12 10 45		11.8 × 69.50 = 820.10
201	+111	"	11.10	8.86	9 13 15 12 21 30	= 69.50	11.8 × 69.9 = 824.82
99	+9	" 12	8.55	7.33	12 32 55 9 13 15 3 19 40	= 91.67	11.8 × 91.6 = 1080.88
100	+10	" "	9.01	8.61	12 32 60 9 13 15 3 19 45	91.75	91.7 = 1082.06
121	+31	" "	10.44	6.57	12 34 45 9 13 15 3 21 30	93.50	93.50 = 1103.30

~~12 11 10~~ 12 10 70
9 13 15
2 21 55 = 69.92

315.06
2.189
.590
.004
317.843

300.90
2.091
.944
.007
303.942

295.00
2.050
.944
.007
298.001

807.12
5.609
.236
.002
812.967
720
92.9

816.56
5.674
.590
.004
822.828
720
100

820.10
5.699
825.799
720

824.82
5.732
.236
.002
830.790
720
110.7

1080.88
7.511
.826
.006
~~1089.223~~
1089.223
720
1080

1082.06
7.519
.590
.004
1090.173
1080

1103.34
7.667
1110.967
1080

.082 × 121 =	9.922	11.8 × .33	3.894	.082 × .33	.02706
" " 93	7.626	0	0	0	0
123	10.086	.75	8.850	.75	.06150
122	10.004	.25	2.950	.25	.02050
122	10.004	.08	.944	.08	.00656
121	9.922	.70	8.26	.70	.05740
28	2.296	.07	.826	.07	.00574
27.9	2.2878	.02	.236	.02	.00164
27.5	2.2550	0	0	0	0
" " 27.3	2.2386	.03	.354	.03	.00246
26.9	2.2058	.02	.236	.02	.00164
26.7	2.1894	.05	.590	.05	.00410
25.5	2.0910	.08	.944	.08	.00656
26.	2.050	~~.02~~ .08	.944	.08	.00656
68.4	5.6088	.02	.236	.02	.00164
69.2	5.6744	.05	.590	.05	.00410
69.5	5.6990	0	0	0	0
69.9	5.7318	.02	.236	.02	.00164
91.6	7.5112	.07	.826	.07	.00574
91.7	7.5194	.05	.590	.05	.00410
" " 93.50	7.6670	0	0	0	0

360.
720.
1080.
1440.

1427.8
9.922
3.894
.027
1441.643

1097.4
7.626
1105.026

1451.4
10.086
8.850
.061
1470.397

1439.6
10.004
2.950
.020
1452.574

1439.6
10.004
.944
.007
1450.555

1427.8
9.922
8.260
.057
1446.039

330.40
2.296
.826
.006
333.528

329.22
2.288
.236
.002
331.746

324.50
2.255
326.755

322.14
2.239
.354
.002
324.735

317.42
2.206
.236
.002
319.864

Deimos Longitudes (Continued).

Longitude from E. Elong.	Date.	☽ ✱		Interval	Interval h	Log. Interval	Log. Longitude	E. Elong. Longitude
265 + 175°	Sept 16	11 30	35.67	15 35 30 9 13 15 6 22 15	166.25	2.2207617	3.2956512	1975.38
266 + 176		11 35	29.60	15 35 35 9 13 15 6 22 20	166.33	2.2209706	3.2958601	1976.33
269 + 179		11 50	8.96	15 35 50 9 13 15 6 22 35	166.58	2.2216229	3.2965124	1979.30
270 + 180		11 55	3.55	6 22 40	166.67	2.2218574	3.2967469	1980.36
90 + 0	23	10 30	10.14	22 34 30 9 13 15 13 21 15	333.25	2.5227702	3.5976597	3959.68
92 + 2		10 45	14.25	13 21 25	333.42	2.5229916	3.5978811	3961.70
					× 11°.887	+ Constant log 1.0748895		

Phobos Longitudes

Longitude from E. Elong.	Date				Interval	Interval h	Log. Interval	Log. Longitude	E. Elong. Longitude
262 − 188	Sept 11	9 45		14.52	14 9 98 11 19 45 3 0 53	72.88	1.8626084	3.5350203	3427.88
286 − 164	" "	10 15		15.1	14 10 38 11 10 15 3 0 23	72.36	1.8596186	3.5320305	3404.32
299 − 151	" 12	9 30		4.52	14 10 38 12 9 30 2 1 8	49.13	1.6913468	3.3637587 3.3636763	2310.75
240 + 150	" 16	11 45		13.97	14 11 45 12 10 38 2 1 7	49.12	1.6912584	~~3.336703~~	2310.31
	E. Elongation Sept 14	10 38				× 47°.034	+ Constant log 1.6724119		

Latitudes of Mars.

I. Oberon.

Superior conjunctions Feb 6th 18h G.M.T.

Mar 5th 17 "

19 4 "

April 1 15 "

15 2 "

28 14 "

Inferior ☌ Feb 13th 12h

~~II. [illegible]~~

~~Superimposed Feb 9th 9h~~ q.v.

All anomalies checked by C.H.M.

monthly not. R.A.S. June 78 Safford.

Position of λ Ursae Minoris.

		R.A. °	′	″	P.D. ″	Dec. °	′	″
1755	49	319	24	5.34	5374.76	88	30	25.24
1790	44	314	28	52.1	4861.14	88	38	58.86
1800	42	312	52	28.4	4722.59	88	41	17.41
~~1810~~		~~311~~	~~10~~	~~7.2~~	~~4588.30~~	~~88~~	~~43~~	~~31.70~~
1815	40	310	16	36.49	4522.87	88	44	37.13
1835	36	306	26	4.54	4273.79 ~~6073.79~~	88	48	46.21
1855	32	302	7	33.00	4047.70 ~~5847.70~~	88	52	32.30
1875	27	297	19	34.67	3848.65 ~~5648.65~~	88	55	51.35

	1755	1790	1800	1815	1835	1855
log d	3.7303591	3.6867382	3.6741803	3.6554141	3.6308132	3.6072083
log sin α-270	9.8134172	9.853370 ~~9.8455163~~	9.865012	9.882485	9.905545	9.927823
	3.543776	3.540116	3.539192	3.537899	3.536358	3.535031
	3497.65	3468.38	3460.92	3450.63 ~~3450.62~~	3438.41	3427.92

	1755	1790	1800	1815	1835	1855
log cos α-270	9.880407	9.845516	9.832762	9.810556	9.773717	9.725732
	3.610766	3.532254	3.506942 ~~3.499942~~	3.465970	3.404530	3.332940
	4081.00	3406.07	3213.23	2923.95	2538.22	2152.48

~~2.7703591~~

349765			
3468.30	29.35	17.36	
3460.92	7.38	14.76	9'
345053	10.39 3 4/6	13.85	1.73
	12.12	12.12	1.63
3438.41	10.49	10.49	
342792			

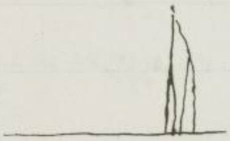
				Comp.		
1875	4081.00	674.93	379.96	4080.89	+.11	+.01
3.5 ~~54~~853085	3406.07	192.84	385.68	3405.92	+.15	+.05
9.948612	3213.23	289.28 96.43	385.74	3213.07	+.16	+.06
3.533920	2923.95	385.73	385.73	2923.8	+.15	+.05
3.419.17	2538.22	385.74	385.74	2538.1	+.12	+.02
	2152.48	385.73	385.74	2152.4 385.7	+.08	−.02
	1766.75			1766.7	+.05	−.05

9.661~~622~~867
3.247176
~~3.514876~~

1766.75

2935 / 434 4 — 1736

7 / 674.93 — 94.99 — 379.96

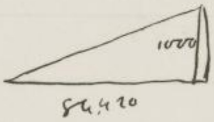


2923.8
192.85
96.425
3213.075
192.85
3405.92
674.77
408089

96.425
7
674.975

	1875	1870	1865	1860	1855
d	3622.3"	3586.3"	3555.0"	3518.3"	3457.9"
log d	3.5589844	3.5545255	3.5508396	3.5463329	3.5388124
α	112° 16′ 39.90"	110 43 37.65	109 9 8.7	107 32 44.00	104 13 9.00
log. sin α	9.966309	9.970940	9.975271	9.979324	.986486
log x	3.525293	3.525465	3.526111	3.525657	3.525298
x	3351.9	3353.3	3358.3	3354.8	3353.7
log cos α	9.578751	9.548905	9.515980	9.479098	9.390284
log d + log cos α = log y	3.137735	3.103430	3.066820	3.025431	2.929096
y	1373.2	1268.9	1166.3	1060.3	849.4

1373.2	1370.	+3.2"	−1.8"
1268.9	1265	+3.9	−1.1
1166.3.	1160	+6.3	+1.3
1060.3	1055	+5.3	+0.3
849.4	845	+4.4	−0.6
746.3	740	+6.3	+1.3
437.4	425.	+12.4	+7.4
24.7	5 420	+19.7	+14.7
387.5	−415 37.5	+27.5	+22.5



$$\begin{array}{r} 23\,60 \\ \hline 1380 \\ 27 \\ \hline 1407\,60 \\ \hline 84420 \end{array} \qquad \begin{array}{r} 1.88 \\ 6 \\ \hline 1128 \end{array} \qquad \begin{array}{r} 137 \\ 6 \\ \hline 822 \end{array}$$

.64 : 1 = 100 : 6"

105
35

$y = -205" + 21" \; (t - 1800)$

1850	1830	1810	1790
3437.4	3390.5	3361.9	3348.7
3.5362301	3.5302637	3.5265848	3.5248762
102 32 19.95	97 24 42.45	90 25 16.95	83 21 21.45
.989576	.996356	.999988	.997073
.525746	3.526620	3.526573	3.521949
3355.4	3362.2	3361.8	3326.2

4 11 3
26
25 2 3
3348.7

9.336664	9.110590	7.869300	9.063340
2.872894	2.640854	1.392885	2.588206
746.3	437.4	24.7	387.5

3357.9	−10.1	−8.1	−11.3	+1.2
3353.3	−8.7	−6.7	9.7	+1.0
3358.3	−3.7	−1.7	8.2	+4.5
3354.8	−7.2	−5.2	6.7	−.5
3352.7	−8.3	−6.3	4.2	−4.1
3355.4	−6.6	−4.6	3.4	−3.2
3362.2	+0.2	+2.2	1.2	+1.4
3361.8	−0.2	−1.8	0	−.2
3326.2	−35.8	−33.6	.9	−34.9

Record of Computation.

1878. Jan. 11. ^continuation of Catalogue of stars including H. + Σ stars in Cat. VII., Vol. XXXVIII., Mem. R.A.S., from 12–20 mags. inclusive; and exclusive H. stars from 15–20. inclusive

Jan. 14. Cat. VII list completed and Cat. IV., Vol IV., list begun.

Jan. ~~26~~ 25 Cat. IV. completed and Cat. VI. started.

1879

Mon. Jan. 13: Copying H. Cat II,

Sat " 20 Copy. Cat. VI & C.G.H. Cat till 3 pm; af. 3, on Mer. Circ. stars.

1st Vol II. P 475.
2nd mem RAS. Vol III. P 52
3d " " " ~~II. P 476~~. P 201.
Cat
4 Mem RAS. Vol IV. P. 331
5 " VI. P. 1
6 " IX " 193
7 " XXVIII " 1 Co

Vol. III Mem. RAS.

~~P. 53. No. 346~~
~~" 63 " 599~~ (-? dec.)
~~" 201 " 634~~
~~" 202 " 666 30 Lami.?~~
~~" 204 " 697 (68?)~~
~~No. 50.~~
~~Cat VII. V. 38. P. 9 Castor mags.~~
~~" " " " 9~~
~~" " " " 11. (N. 5483) 6 Leonis (4, 7 mags)~~
" " " " 13. ~~(mags 6,7 foll. 6,7 sph.)~~ dividing ~~6.7 full [illegible]~~
~~" " " (" 7.8 " 70 ")~~
~~Wrottesley Cat. P. 12. Should 52 Cygni read 92, or k, Cygni.~~
Σ. 2726 ~~(Cat VII. P. 15.) is 92 Cygni.~~
~~Vol IV. Cat. 4. P. 336. No 1030 = No. 4 (Hand)~~ ?
~~4 Piscium = 72 ?~~
~~P 339~~
~~C IV. 1115 = No 29. (ζ Tauri)?~~
~~δ = 44 Cygni.~~ ~~C IV. P. 356. No. 1455 not in cat. (too faint)~~
~~" " " 358. " 1495 = θ² Cygni ?~~
~~" " " 360. " 1554 = Bay? Delphini.~~

(1) (3)

Mer. Circle Stars

$2^h\ 36^m$ Lum.
Bac 2320 ...
... 1865 36?
{ 8 mv 16; 627 — 9.
no Jre. mong
also 631-3 & hour

$12.^h\ 18^m\ 45^s.9$ Pencil

1st 8.6 26 50.1

" 7.3 15 26 .0 or .3

" 7.0 .5 ?

" 6.1 20.7 or 20.1

P32. 2nd 9.2 47.3 or 41.3 dec.

" " Last col. 1st 7.8. (8 or 5)

" 33 3d " 1st 9.4. (8?)

" " 4th " 1s 30 14.4 8.9 or 8.4. Written as 8.9 to clean 8

" 33 1st. " 1st 8.7 (4 or 7)

" 33 2nd " Last 8.6 (= 9 written as such.)

" 33 Last " 1st 8.5 (41.5 or 47.5 dec? Written 41.5.)

" " 4th " 2nd 8.1 written 22.1 in R.A.

Omis. P.34

Insert to cut star & the 3d to last on 12.6 (8.7) to 4. also 12.11 (8.2) to 40.3.

P.34. Last col. last 7.5 Writ. 50.

P35, 1st 9.4 13 44.0 7?

Sub 5; +.7.
Let 6^h + 18^h Pari
~~3 + 15~~
$\frac{27}{8}$ + 20 Pari P.11)
SC: all

(~~Cont.~~ fm p.167.)

~~C. II. P.366. 1581½ = no.226.?~~

(2) 364. 1641½ = no. 229? want for index.

~~(3) mags. not repeated when alike, or written when omitted.~~

(4) 3506 C.G.H. P.176 = no 35 W Tauri?
3982 " " 192 = no 97. K Puppis?
4937½ " " 226 = no 166 39 Oph.? written as such.
4942½ " " " = no. 168 V Oph.? not.

? on no. 111 meth. of averaging.

mags. of no. 141.
(=1 no. 164 + 174

no. 230 Diff mags = 3.0
" 235 avg. of 5, 5+ = 5 written
No own sheets. Ref 141 re-average cases of 3 stars.

C. ~~III~~., P.194: ^{II}Gem. rem'k.

Comp. Cat. Vol. III. 17 cases: H. ^{av}mags. not yet reached.

~~P.191. mags. ζ Persei.~~
~~" 194. [illegible] Gem. mags. 7, 14 (2 flat) not written.~~
~~" 196 [illegible] 4.12. not so written.~~
~~" " l Leonis (114) 4, 4.75 " " "~~
~~" 197 θ Virg. 4.10 " " "~~
~~" 197 ζ Cancri mags 7.8 (2nd cat.) not written.~~
~~" 198 70 Oph. " 6.5, 7.5 not so written.~~
~~" 198 ζ Serpent. 6, 6.5 " " "~~
~~" 199 ζ Aquarii 6.75, 6.75 " " "~~

♃'s Sats.

13^h6 / 5^h8 P.20 Left. P363. (1879 N.a.) mar 16^h to 4^h½ Table Sub. add 5^h
apr 15^h to 2^h½
may 13 - 25.

To m.
while
~~sub.~~?
24^h [illegible]?

add 24^{m}. 0^{s}.0

Isbal [mv. dy. 2 m. | no sat | D | R |

♃'s Satellites (Contd.).

1879 June. 11h–23h. July 9–21 Aug. 7–19
" Sept. 5–17 Oct. 3–15 Nov. 1–13
" Dec. 23h to 11h (i.e. 23 to 35.) Const. diff = 2h.

[illegible] out
~~No [illegible] 6.7.~~

~~[illegible] Hei's Kuffer.~~

Stars in 7 cons. (Cet. & F.)

~~Write Bayer's Rn letters. al. w. [illegible]~~

~~3 a.c. [illegible]~~ 2. ~~Hei's P118 p Er. (φ²) [illegible]~~

~~Sc. [illegible]~~ 3. ~~[illegible] [illegible] (as p³) P118)~~

~~[illegible] of –, –. [illegible]~~ 4. ~~Hei p³ Er., P. 118.~~ ~~5 [illegible]~~

~~[illegible] Sc. in place!~~ 6.

~~[illegible] of [illegible] of Bec. in pt. already written.~~

~~η Ceti. 3 : 3.4.~~

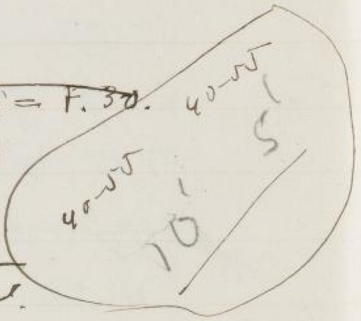
25.4

1h 1.7 & ~~Fl. 6 in Hei's U.N. F. 30 not. ∴ X = F. 30.~~

C.n.c ~~685 Bac. 8415 H. not in Ag (1870.N)~~

~~Place of B. not?~~ ~~Hei's com. all of Ag.~~

~~[illegible] not written in Cetus.~~ (?) P. 82, H. to be included. 2nd [illegible] written. with 791 lines —



Fornax & Sculptor in Uranometria Zone Stars.

~~δ Orionis F 2, A.; Var. H.~~ ~~P. 1251 H. 11530 [illegible] in 6 ch. W.O. written [illegible]~~

~~[illegible] 26 [illegible]~~ ~~Com=?~~ 50+ min 1¼h.

~~Rlef. next 6 in.~~

Heis Constellations

Androm.
Aquarius
Aquila et Antin
Argo Navis
Aries
Auriga
Bootes
~~Camelop.~~
Canes Venat.
X Canis major
" minor
Cancer
Capricornus
Cass
Centaurus

X Cetus
X Columba
X Corvus
X Crater
Cygnus
Delphinus
Equuleus
X Eridanus
Gemini
Hydra
Lacerta
X Lepus
X Leo
Leo minor
X Libra
Lupus
~~Lynx~~
X Monoc.
Ophiuchus

X Orion
Pegasus
Perseus
Piscis Aust
Pisces
Sagitta
Sagittarius
Scorpio
Scutum Sob.
Serpens
X Sextans
X Taurus
~~Tria~~
X Virgo
Vulpec. & Anser.

~~Ist~~

~~835 Urs. maj~~ Heis

366 ~~5 is 36 fm C S~~

~~C S U~~ ~~v A M P 21 aig. P286 = P286 C S.~~

~~(why is δ Sag. p. 110 not on DM)~~

na. 79 P. 459 20 Sept Ec + Oc. Times.