1895pnae.proj.1671

KG
11366
v.667

Variable Stars.

Computations.

May 15. 1901.

At. $8^h\ 33^m$ Zercidina fols. c.s. $1^m\ 42^s.9$ 4'.0 north of it.
" 11 2 " " " " 1 43.4 4.5 " " "

At $8^h\ 15^m$ " on meridian. Dec. −2°.3

$\frac{11\quad 2}{+2\quad 47^m}$ Alt. 31.5

May 16. 1901.

At $8^h\ 40^m$ Zercidina fols. c.s. $1^m\ 50^s.9$ 7'.8 north of it.
" 11 0 " " " " 1 51.4 8.3 " " "

At 8 19 " on meridian Dec. −2.3

$\frac{11\quad 0}{+2\quad 41^m}$ Alt. 32°.3

May ~~12. 13. 14.~~ 14. 15. 16. Torcidmia.

May. 14.	8^h 22^m to 8^h 44^m		+2.00
	9 6	" 9 23	+2.04
	9 30	" 9 46	+1.99
	9 59	" 10 31	+1.99
May 15.	8 46	" 8 56	+2.22
	9 0	" 9 16	+2.23
	9 23	" 9 40	+2.28
	10 10	" 10 28	+2.26
	10 36	" 10 50	+2.26
May 16.	8 51	" 9 2	+2.13
	9 8	" 9 23	+2.21
	9 33	" 9 50	+2.27
	10 2	" 10 14	+2.39
	10 30	" 10 49	+2.42

ed

May 16. 1901.

$8^h\ 40^m$ Tercidina fols. −2° 3459 (9.3) 49.5 secs. and is 5.'3 north of it.

11 00. Tercidina fols. −2° 3459 (9.3) by 50.0 secs. and is 5.'8 north of it.

Comp. Star = −3° 3231 (9.5)

At $8^h\ 40^m$ Tercidina fols. comp. star $1^m\ 50^s.9$ 7.'8 north

" 11 0 " " " " 1 51.4 8.3 "

May 14. 1901.

8h 10m ± Tercidina fols. BD −2° 3459 9.3 by 35 secs. and is 3.′9 south of it.

10 50 Tercidina now fols. same star by 35.6 secs. and is 3.′4 south of it.

(7 50) H. A. at beginning −0h 20m Dec. −2.°3
Comp. Star = BD −2° 3462 (9.5)

May 15. 1901.

8h 33m Tercidina fols. −2° 3459 (9.3) by 41.5 and is 1.′5 north of it.

11 02 Tercidina fols. −2° 3459 (9.3) by 42 secs. and is 2.′0 north of it.

8 20 ± Tercidina was 0h 5m west Dec. −2.°3

Comp. Star = BD −3° 3231 (9.5)
At. 8h 33m Tercidina fols. comp. star 1m 42.s9 4.′0 north of it.
" 11 02 " " " " 1 43.4 4.5 " " "

−2° 3459 (9.3) = 11^h 58^m 31.5^s −2° 57.9′
−3° 3231 (9.5) = 11 57 30.1 −3 0.4 (C.5.)
−1 1.4 −2.5

Expts. with Phot. ~~I.~~ R p. 20.
" " " R " 24.

Accurate minimum of β Lyrae computed p. 102.
" " " δ Cephei " " 100.

Computations on Z Herculis. p. 42.
Discussion of Z Herculis p. 75.
Comp. of Times of min. from Hartwig's Eph. } p. 112.
Ephemeris of β Lyrae. p. 108.
" " U Ophiuchi. for dates of obs. } " 153.

Eclipse of Moon. Mar. 10-11. 1895.

S.M.T.	Moon's (1895) R.A.	Dec.		Moon's (1895) R.A.	Dec.	
14ʰ	11ʰ 21ᵐ 5ˢ.	+4° 26.9'		11ʰ 19ᵐ 1ˢ.	+4° 40.1'	
	2 13.		17.9			17.9
15	11 23 18.	+4 9.0		11 21 14.	+4 22.2	
	2 12.		17.9			17.9
16	11 25 30.	+3 51.1		11 23 26.	+4 4.3	
	2 13		18.0			18.0
17	11 27 43.	+3 33.1		11 25 39.	+3 46.3	

Totality (S.M.T.)

Begins.	Middle	Ends.
14ʰ 51.5ᵐ	15ʰ 39.3ᵐ	16 27.0

11ʰ 22ᵐ 20ˢ. Moon's mean R.A.

```
23 12 28.8   S.T. m. n.
   15 27.7
-----------
23 27.9 ~~56.5~~
10 39.3 ~~0.0~~
-----------
11 11.4      = sid. time mid. Ecl
11 22.3      = Moon's R.A.
-----------
   -10.9     =  "   H.A.
```

+4°.2 = Moon's Dec. at mid. Ecl.

51°.9 = Moon's Alt.

38°.1 = " Z.D.

Precession.

```
+3.09      -19.8
   40         40
------     ------
123.60     792.0

+2ᵐ 4ˢ     -13' 12"
```

Augmented Semidiameter.

$$s' = s(1 + \sin \pi \cos Z)$$

$\pi = 60'\ 53.2'' = 3653.2'' = 1°\ 0'\ 53.2''$

```
Log sin (1° 0' 53.2") = 8.24790
 "  cos Z (38°.1)     = 9.89594
                        8.14384
                        0.01393
                        1.
                        1.01393
16' 34.7" = 994.7)   Log do. = 0.00601
                       "  s  = 2.99769
16'.81         = 1008".6     = 3.00370
```

19.
7.13 +.04
6.98 -.11
7.05 -.04
7.21 +.12
7.09 +.16 -.15 ±.08
(8)6.50 +.03
6.50 +.03
6.48 +.01
6.42 -.05
6.47 +.07 -.05 ±.03
32/8.66 -.21
9.01 +.14
8.93 +.06
8.70 -.17
9.07 +.20
8.87 +.40 -.38 ±.16
30/9.22 +.17
9.10 +.05
8.91 -.14
8.98 -.07
9.05 +.22 -.21 ±.11

33
8.93 -.32
9.43 +.18
9.39 +.14
9.26 +.01
9.25 +.33 -.32 ±.16

28
8.65 +.12
8.40 -.13
8.91 +.38
8.27 -.26
8.43 -.10
8.53 +.50 -.49 ±.20

27
9.96 +.12
9.75 -.09
9.76 -.08
9.88 +.04
9.84 +.16 -.17 ±.08

42
9.40 -.19
9.74 +.15
9.61 +.02
9.60 +.01
9.59 +.18 -.19 ±.09

20
9.33 +.49
8.71 -.13
8.62 -.22
8.75 -.09
8.81 -.03
8.84 +.49 -.47 ±.19

5
7.67 -.35
7.87 -.15
8.41 +.39
8.06 +.04
8.01 -.01
8.12 +.10
8.02 +.53 -.51 ±.17

4
7.82 -.11
7.92 -.01
7.66 -.27
8.15 +.22
8.13 +.20
7.97 +.04
7.85 -.08
7.93 +.46 -.47 ±.12
(14)
9.11 -.14
9.47 +.22
9.14 -.11
9.34 +.09
9.21 -.04
9.25 +.31 -.29 ±.12

15
8.77 -.35
8.86 -.26
9.03 -.09
9.60 +.48
9.01 -.11
9.18 +.06
9.36 +.24
9.12 +.78 -.81 ±.23

6
8.74 -.40
9.24 +.10
9.36 +.22
9.23 +.09
9.14 +.41 -.40 ±.16

24
8.78 -.19
9.33 +.36
9.11 +.14
8.78 -.19
8.83 -.14
8.97 +.50 -.52 ±.20

25
9.33 -.28
9.73 +.12
9.72 +.11
9.52 -.09
9.77 +.16
9.61 +.39 -.37

9

9.00 −.02
8.89 −.13
9.21 +.19
8.98 −.04
9.02 +.19 −.19 ±.10

13

8.84 −.08
8.92 .00
9.11 +.19
8.83 −.09
8.92 +.19 −.17 ±.09

23

9.31 −.20
9.22 −.29
9.73 +.22
9.79 +.28
9.51 +.50 −.49 ±.25

8

9.35 −.06
9.37 −.04
9.34 −.07
9.58 +.17
9.41 +.17 −.17 ±.08

17

9.48 −.03
9.46 −.05
9.25 −.26
9.85 +.34
9.51 +.34 −.34 ±.20

16

9.50 −.15
9.74 +.09
9.71 +.06
9.65 +.15 −.15 ±.10

46

9.73 −.28
10.23 +.22
10.08 +.07
10.01 +.29 −.28 ±.19

10

9.38 −.32
9.71 +.01
9.76 +.06
9.61 −.09
10.06 +.36
9.70 +.43 −.41 ±.17

3

9.00 −.25
9.45 +.20
9.42 +.17
9.43 +.18
8.94 −.31
9.25 +.55 −.56 ±.22

da

9.05 −.20
9.46 +.21
9.27 +.02
9.02 −.23
9.45 +.20
9.25 +.43 −.43 ±.17

db

8.76 +.30
8.27 −.19
8.38 −.08
8.44 +.02
8.46 +.32 −.27 ±.15

22

9.34 −.17
9.57 +.06
9.38 −.13
9.74 +.23
9.51 +.29 −.30 ±.15

36

9.93 −.10
9.90 −.13
10.07 +.04
10.24 +.21
10.03 +.25 −.23 ±.12

2

6.52 +.01
6.52 +.01
6.54 +.03
6.46 −.05
6.51 +.05 −.05 ±.02

43

9.90 −.07
10.04 +.07
9.97 +.07 −.07 ±.07

37

10.23 +.17
9.97 −.09
10.10 +.04
9.95 −.11
10.06 +.21 −.20 ±.10

11

9.44 .00
9.43 −.01
9.53 +.09
9.37 −.07
9.44 +.09 −.08 ±.04

7

8.97 -.22
9.51 +.32
9.02 -.17
9.13 -.06
9.32 +.13
9.19 +.45 -.45 ±.18

35

9.71 +.11
9.56 -.04
9.67 +.07
9.44 -.16
9.60 +.18 -.20 ±.10

21

9.29 -.25
9.53 -.01
9.61 +.07
9.75 +.21
9.54 +.28 -.26 ±.14

44

10.23 +.18
10.00 -.05
9.87 -.18
10.09 +.04
10.05 +.22 -.23 ±.11

12

7.75 -.11
8.03 +.17
7.97 +.11
7.73 -.13
7.82 -.04
7.66 +.28 -.28 ±.11

26

8.87 +.30
8.69 +.12
8.49 -.08
8.28 -.29
8.51 -.06
8.57 +.42 -.43 ±.17

31

7.52 +.11
7.42 +.01
7.28 -.13
7.31 -.10
7.34 -.07
7.60 +.19
7.41 +.31 -.30 ±.15

34

8.08
8.61
9.48
9.26
9.14
9.48
8.64
8.60
8.76
9.29
8.1 - 9.5

29

8.82
8.93
10.04
8.74
9.42
9.35
9.52
10.01
8.7 - 10.0

.08
.03
.16
.11
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.17
.15
.15
.12
.02
.07
.10
.04
.18
.10
.14
.11
.11
.17
.15
40 | 5.44
± .134

Light Curve of o Ceti. No. 1.

Observed with Phot. R. on East Equatorial.

Jul. Day. Obs.	Ord.	Curve.
2760	8.40	8.53
2765		8.61
2770	8.65	8.66
2775		8.69
2780	8.74	8.71
2785		8.71
2790	8.68	8.70
2795		8.68
2800	8.63	8.64
2805		8.59
2810	8.50	8.53
2815		8.46
2820	8.35	8.37
2825		8.27
2830	8.16	8.15
2835	8.04	8.02
2840	7.87	7.87
2845	7.72	7.71
2850	7.53	7.54
2855	7.37	7.36
2860	7.17	7.16
2865	6.84	6.84
2870	6.30	6.30
2875	5.35	5.35
2880	4.55	4.54
2885	3.88	3.93
2890	3.50	3.50
2895	3.19	3.19
2900	2.95	2.98
2905	2.83	2.83
2910	2.73	2.73

Light Curve of o Ceti: No. 2.

Observed with Phot. R on East Equatorial.

Jul. Day. Abs.	Ord.	Curve.		
3100	8.60	8.61	-12	
3105		8.72	-10	1
3110	8.83	8.82	-9	1
3115		8.91	-8	1
3120	8.98	8.99	-7	1
3125		9.06	-5	2
3130	9.11	9.11	-3	2
3135		9.14	-1	2
3140	9.16	9.15	+1	2
3145		9.14	+3	2
3150	9.14	9.11	+5	2
3155		9.06	+7	2
3160	8.95	8.99	+9	2
3165		8.90	+11	2
3170	8.77	8.79	+13	2
3175		8.66	+16	3
3180	8.50	8.50	+20	4
3185		8.30	+25	5
3190	8.06	8.05	+32	7
3195		7.73	+39	7
3200	7.34	7.34	+47	8
3205		6.87	+55	8
3210	6.35	6.32	+62	7
3215		5.70	+62	0
3220	4.97	5.08	+52	-10
3225		4.56	+37	-15
3230	4.22	4.19	+22	-15
3235		3.97	+9	-13
3240	3.88	3.88	+5	-4
3245		3.83	+3	-2
3250	3.80	3.80	+3	
3255		3.77	+2	
3260		3.75	+1	
3265		3.74	+1	
3270		3.73		

Values in magnitudes from Curve No. 2. (1894-5) and resids. from these curve values for the different observers.

Jul. Day	1894-5 Curve.	W. obs.	Cram obs.	Attwill obs.	Waite obs.	Clymer obs.
3217	5.45	+.05	+.10	+.05	+.05	+.15
3218	5.33	+.27	—	—	+.17	—
3219	5.20	+.10	+.40	+.30	+.49	+.40
3221	4.98	—	—	—	+.12	+.12
3223	4.77	-.12	—	—	-.17	—
3230	4.19	+.26	—	—	+.01 +.16	—
3231	4.15	+.35	—	—	—	—
3236	3.95	+.25	+.15	+.05	—	—
3238	3.90	+.20	+.30	+.10	—	—
3240	3.88	+.12	+.32	-.08	—	—
3241	3.88	+.12	+.22	—	—	—
3245	3.83	+.22	+.22	+.07	—	—
3246	3.82	+.23	+.28	—	—	—
3247	3.82	+.18	+.23	+.06	—	—
3248	3.81	+.17	+.19	—	—	—
3251	3.80	—	—	+.10	—	—
		+2.52	+2.41	+.73	+1.00	+.67
		-.12	-.00	-.08	-.17	-.00
		14)2.40	10)+2.41	8)+.65	7)+.83	3)+.67
		+.17	+.24	+.08	+.12	+.22

Relative Estimates of *o* Ceti in 1894-5 by different observers, principally with naked eye. A grade assumed as .01 magn. and results without absorption in black. Final figures (partly in red) indicate final estimates corrected for absorption where necessary.

241	Yr. obs.	Crans obs.	Attwill obs.	Waite obs.	Clymer obs.
3217	5.50	5.55	5.50	5.50	5.60
3218	5.60	—	—	5.50	—
3219	5.30 ~~5.35~~	5.60	5.50	5.60	5.60
3221	—	—	—	5.10 ~~5.15~~	5.10 ~~5.15~~
3223	4.65 ~~4.90~~	—	—	4.60 ~~4.85~~	—
3230	4.45	—	—	4.20 4.35	—
3231	4.50 ~~4.60~~	—	—	—	—
3236	4.20 ~~4.30~~	4.10 ~~4.20~~	4.00 ~~4.10~~	—	—
3238	4.10 ~~4.20~~	4.20 ~~4.30~~	4.00 ~~4.10~~	—	—
3240	4.00 ~~4.10~~	4.20 ~~4.30~~	3.80 ~~3.85~~	—	—
3241	4.00 ~~4.10~~	4.10 ~~4.20~~	—	—	—
3245	4.05 ~~4.20~~	4.05 ~~4.20~~	3.90 ~~4.16~~	—	—
3246	4.05 ~~4.20~~	4.10 ~~4.25~~	—	—	—
3247	4.00 ~~4.15~~	4.05 ~~4.20~~	3.88 ~~4.08~~	—	—
3248	3.98 ~~4.18~~	4.00 ~~4.20~~	—	—	—
3251	—	—	3.90 ~~4.30~~	—	—

U Ophiuchi and Comp. Star (Plat. I)

U Ophiuchi	= 17	9	11.3	+1	22.6	Var.
+1° 3411	= 17	10	17.8	+1	55.0	6.8
		1^m	6.5^s		$32.4'$	

Log. 66.5 = 1.82282
" 15. = 1.17609
" cos δ = 9.99982
= 2.99873
2
994175. = 5.99746

$\frac{32.4}{60}$
Log. 1944.0 = 3.28870
2
3779182. = 6.57740

$\frac{3779182.}{4773357.}$ Log. = 6.67882

2185.″ = 3.33941 = 36′ 25″ = Dist. apart of stars.

Expts. with Phot. T.

Minimum range of Photometer.

~~17.1~~
12.3
11.9
12.2
13.0
12.0

$5\overline{)61.4}$

Log. 12.″28 = 1.08920
15. = 1.17609
cos δ = 9.97173
172.″6 = 2.23702
2′ 52.″6 = ~~Value~~

~~The distances with~~ Therefore two stars must be as much as 2′ 52.″6 apart to be compared with Phot. T. See R. 75 p. 56. for data.

Expts. with Phot. Z. R.
Two images of same star compared.

~~Co~~ Star used: was ε Lyrae.

June 15. 1895.
Settings taken rapidly

Time	Mag.	Av. Dev.
14 22 41	0.70	+.31
<	0.46	+.07
	0.31	−.08
	0.34	−.05
	0.11	−.28
	0.02	−.31
	0.34	−.05
	0.50	+.11
	0.53	+.14
14 23 28	0.49	+.10
<	0.326	+77 −73 ±.150

June 15, 1895
Settings taken slowly

Time	Mag.	Av. Dev.
14 28 51.5	0.39	+.03
<	0.37	−.0~~8~~5
	0.35	−.0~~4~~1
	0.46	+.~~06~~10
	0.41	+.0~~4~~5
	0.33	−.0~~7~~3
	~~+~~0.29	~~+.11~~ −.07
	0.38	+.02
	0.36	~~+.02~~ +.00
14 30 47	0.32	~~+.08~~ −.04
<	.3~~4~~60	−30 +20 ±.050

June 17. 1895
Settings taken more slowly

Time	Mag	Av. Dev.
7 51 37	0.27	+.15
<	0.32	+.20
	0.19	+.07
	0.09	−.03
	0.06	−.18
	0.06	−.06
	0.10	−.02
	0.11	−.01
	0.23	+.11
7 52 33	0.15	+.27
<	+1.16 +.12	−57 +53 ±110

Settings taken more slowly.
June 15. 1895

Time	Mag	Av. Dev.
14 26 21	0.05	−.24
<	0.07	−.22
	0.40	+.11
	0.44	+.15
	0.28	−.01
	0.28	−.01
	0.20	−.09
	0.31	+.02
	0.53	+.24
14 27 19	0.33	+.04
<	0.289	+56 −57 ±113

Settings taken rapidly
June 17, 1895.

Time	Mag.	Av. Dev.
7 49 23	+0.16	+.~~02~~14
<	+0.12	+.~~06~~10
	+0.01	−.~~17~~01
	0.01	−.~~19~~03
	0.13	−.~~31~~15
	0.12	−.~~30~~14
	0.03	−.~~21~~05
	+0.05	+.03
	+0.05	+.03
7 50 28	+0.~~8~~10	~~+.12~~ +.08
	+0.47 −0.29 +0.18 +.02 +.49 −.29 +0.2	+.36 −.38 ±.074 +.48 −.38 ±.086

Settings taken slowest with care
June 17, 1895.

Time	Mag	Av. Dev.
7 54 10	0.15	−.08
<	0.24	+.01
	0.21	−.02
	0.29	+.06
	0.38	+.15
	0.14	−.09
	0.06	−.17
	0.25	+.02
	0.30	+.07
7 56 7	0.27	+.04
	<.229 <.23	+35 −36 ±.071

Star used was ϰ Ophiuchi.

Expts with Phot, XR.

Two ways of same star compared.

June 17, 1895 Settings taken rapidly			June 17, 1895 Settings taken more slowly			June 17, 1895 Settings taken slowly		
Time	Mag	Av Dev	Time	Mag	Av Dev	Time	Mag	Av Dev
8 4 28	+0.13	+.23	8 8 26	+0.08	+.06	8 12 5	0.48	+.28
<	0.11	-.01	<	+0.11	+.09	<	0.29	+.09
	0.27	-.17		0.05	-.07		0.18	-.02
	0.28	-.18		0.11	-.13		0.18	-.02
	0.09	+01		0.02	-.04		0.30	+.10
	0.08	+02		0.03	-.05		0.16	-.04
	0.16	-.06		+0.00	-.00		0.08	-.12
	0.24	-.14		+0.14	+.12		0.22	+.02
	+0.05	+.15		+0.08	+.06		0.19	-.01
8 5 26	+0.08	+.18	8 9 29	-0.03	+.01	8 13 43	0.12	-.08
+0.26 -1.23 -.97	-.97 .097.1	+.59 -.56 ±.115		+0.44 -0.21 +.023	+.34 -.29 ±.063		+.200	-.29 +.49 ±.078

Settings taken more slowly

June 17, 1895.

Same as above

June 17, 1895.

~~Time~~ Mag ~~Av Dev~~ ~~Time~~ ~~Mag~~ ~~Av Dev~~

Time	Mag	Av Dev	Time	Mag	Av Dev	Time	Mag	Av Dev
8 6 8	+0.32	+.33	8 10 15	0.33	+.19			
<	+0.09	+.10	<	0.15	+.01			
	+0.05	+.06		0.09	-.05			
	0.25	-.24		0.20	+.06			
	0.33	-.32		0.15	+.01			
	0.03	-.02		0.~~07~~ 11	-.07			
	0.04	-.03		0.07	-.07			
	0.26	-.25		0.14	+.00			
	+0.23	+.24		0.14	+.00			
8 7 8	+0.15	+.16	8 11 26	0.03	-.11			
	+0.84 -0.91 -0.07 -.007	+.89 -.86 ±.175		81.37 ~~+.14~~ +.137	-.30 +.27 ±.057			

Expts. with Phot. R again.

Star used was α Ophiuchi.

Expts in rapidity of setting. No reversals of images or prism. Right hand image des.

Date.	Rapidly	Av. Dev.	most Slowly	Av. Dev.	Slowly	Av. Dev.
1895. June 17.	−.097	±.115	−.007	±.175	+.200	±.078
" " "			+.023	±.063		
" " "			+.137	±.057		
" June 18.	+.033	±.150	+.412	±.126	+.605	±.039
" June 19.	+.313	±.103	+.280	±.076	+.516	±.100
" June 20.	+.219	±.155	+.385	±.063	+.711	±.061
	+.177	±.101				
Mean Values.	+.129 ✓	±.129 ✓	+.204 ✓	±.153 ✓	+.508 ✓	±.154 ✓
Average Time.	65 secs.		72 secs.		116 secs.	

For the material from which the above summary is made, see p.p. 21. 24. 25 of this book.

No reversals made. Right hand image des.

Expts. with Phot R. Star used was α Ophiuchi:

of Two ways of same star compared

June 18, 1895. Settings taken rapidly			June 18, 1895. Settings taken slowly			June 19, 1895. Settings taken more slowly		
Time	Mag	Av Dev	Time	Mag	Av Dev	Time	Mag	Av Dev
8 18 49	0.63	+.30	8 22 36	0.64	+.04	8 15 23	0.19	-.09
	0.33	+.00		0.57	-.03		0.24	-.04
	0.11	-.22		~~0.61~~ .57	+.01		0.31	+.03
	0.24	-.09		0.65	+.05		0.14	-.14
	0.24	-09		0.65	+.05		0.26	-.02
	0.38	+.05		0.65	+.05		0.35	+.07
	0.63	+.30		0.62	+.02		0.32	+.04
	0.42	+.09		0.54	-.06		0.21	-.07
	0.14	-19		0.54	-.06		0.36	+.12
8 19 49	0.16	-17	8 24 48	0.58	-.02	8 16 38	0.42	+.14
	.328	-.76 +.74		.60 5	-17		2.80	-36
				.605	+22		.280	+40
	.033	±150			±039			±076

Settings taken more slowly June 18, 1895.			Settings taken rapidly June 19, 1895.			Settings taken slowly June 19, 1895.		
Time	Mag	Av Dev	Time	Mag	Av Dev	Time	Mag	Av Dev
8 20 20	0.64	+.19				8 17 17	0.36	-.16
	0.57	+.12	8 13 17	0.51	+.20		0.30	-.22
	0.35	-.10		0.49	+.18		0.52	+.00
	0.23	-.22		0.30	-.01		0.68	+.16
	0.21	-.24		0.14	-.17		0.64	+.12
	0.42	-.03		0.25	-.06		0.48	-.04
	0.67	+.22		0.35	+.04		0.42	-.10
	0.51	+.06		0.42	+.11		0.54	+.02
	0.42	-.03		0.28	-.03		0.61	+.09
8 21 50	0.50	+.05		0.09	-.22	8 19 8	0.61	+.09
	.452	-.62	8 14 19	0.30	-.01		5.16	-52
	+.452	+.64		3.13	-.50		.52	+48
		±126		.313	+.53		.516	±100
					±103			

No reversals made. Right hand image disappears.

Expts. with Phot. R. Two ways of same star compared

Star used was α Ophiuchi

June 20, 1895 | June 20, 1895.

Settings taken rapidly | Settings taken more slowly

Time	Mag	Av Dev	Time	Mag	Av Dev	Time	Mag	Av Dev
8 17 3	0.68	+.46	8 21 14	0.61	+.23			
	0.42	+.20		0.42	+.04			
	0.03	-.19		0.30	-.08			
	0.05	-.17		0.44	+.06			
	0.18	-.04		0.37	-.01			
	0.38	+.16		0.38	+.00			
	0.28	+.06		0.30	-.08			
	0.02	-.20		0.30	-.08			
	0.15	-.07		0.42	+.04			
8 18 23	0.00	+.00	8 22 27	0.37	-.01			
	2.19	-67		.381	-.26			
	.22	+88			+.37			
	.219	±155			±.063			

Settings taken rapidly again | Settings taken still more slowly.

June 20, 1895. | June 20, 1895.

Time	Mag	Av Dev	Time	Mag	Av Dev	Time	Mag	Av Dev
8 19 21	0.50	+.32	8 23 16	0.65	-.06			
	0.15	-.03		0.58	-.13			
	0.19	+.01		0.65	-.06			
	0.33	+.15		0.77	+.05			
	0.19	+.01		0.77	+.05			
	0.08	-.10		0.75	+.04			
	0.06	-.12		0.79	+.08			
	0.01	-.19		0.67	-.04			
	0.14	-.04		0.69	-.02			
8 20 25	0.14	-.04	8 25 21	0.79	+08			
	+1.77	-52		.711	-31			
	+.18	+49			+30			
	.177	±101			±061			

Right hand image always made to disappear.

Expts. with Phot. R. again.

Expts. in rapidity of setting. on ε Aquilae. 6 sets of four settings taken under each condition, and prism (and so, images) reversed every two settings.

July 10. 1895. Settings taken rapidly. Magn.			July 12. 95. Settings rapidly.			July 15. 95. Settings rapidly.		
Time.	Magn.	Av. Dev.	Time.	Magn.	Av. Dev.	Time.	Magn.	Av. Dev.
8h 8m 17s.	0.30	.08	8h 16m 44s.	0.30	.08	7h 58m 3s.	0.16	.00
	0.32	.10		0.16	.06		0.07	.09
	0.08	.14		0.15	.07		0.42	.26
	0.10	.12		0.22	.00		0.32	.16
	0.28	.06		0.07	.15		-0.19	.35
8 11 21.	0.21	.01	8 20 8.	0.40	.18	8 0 58	0.18	.02
	0.215	±0.085		0.217	±.090		0.160	±.147

July 10. 1895. Settings more slowly. Magn.			July 12. 95. Settings more slowly			July 15. 95. Settings more slowly.		
Time.	Magn.	Av. Dev.	Time.	Magn.	Av. Dev.	Time.	Magn.	Av. Dev.
8 12 6	0.19	.09	8 22 27	0.20	.12	8 1 50.	0.30	.04
	0.16	.12		0.44	.12		0.30	.04
	0.28	.00		0.41	.09		0.46	.12
	0.35	.07		0.35	.03		0.39	.05
	0.31	.03		0.22	.10		0.25	.09
8 15 33	0.39	.11	8 26 56	0.31	.01	8 5 45.	0.32	.02
	0.280	±070		0.322	±.078		0.337	±.060

July 10. 1895. Settings slowly.			July 12. 95. Settings slowly.			July 15. 95. Settings. slowly.		
Time.	Magn.	Av. Dev.	Time.	Magn.	Av. Dev.	Time.	Magn.	Av. Dev.
8 16 35	0.25	.08	8 29 8.	0.22	.13	8 7 33.	0.35	.03
	0.30	.03		0.40	.05		0.34	.04
	0.28	.05		0.57	.22		0.36	.02
	0.35	.02		0.23	.12		0.35	.03
	0.42	.09		0.35	.00		0.42	.04
8 22 31	0.40	.07	8 35 0	0.32	.03	8 15 0.	0.45	.07
	0.333	±.057		0.348	±.092		0.37	±0.038

Expts. with Phot. R.

Expts. in rapidity of setting on ε Aquilae &c.

Summary

Date.	Settings rapidly.	Av. Dev.	More Slowly	Av. Dev.	Slowly	Av. Dev.
95. July 10.	.215	± .045	.240	± .070	.333	± .057
" July 12.	.217	± .090	.322	± .074	.344	± .092
" July 15.	.160	± .147	.337	± .060	.374	± .034
Mean Value	.197	± .025	.313	± .022	.353	± .017
		.105		.069		.062
Average Time.	184 secs.	$7.^s8$	237 secs.	$9.^s9$	345 secs.	$6.^s0$
" "	$3^m\ 4^s$		$3^m\ 57^s$		$6^m\ 25^s$	

Measts of Faint Comp. Stars for Variables with Phot. I. Obs. corrected for absorption

S Cassiop.

1895. Feb. 26. / Mar. 16.

Desig.	Pr. l.	Pr. r	Mean.	P. l.	Pr. r	Mean.
q	12.82 ~~12.45~~	12.71 ~~12.34~~	12.76 ~~12.40~~	12.51 ~~12.22~~	12.86 ~~12.57~~	12.68 ~~12.40~~
r	14.30 ~~13.93~~	13.87 ~~13.50~~	14.08 ~~13.22~~	12.86 ~~12.57~~	13.02 ~~12.73~~	12.94 ~~12.65~~
s	13.55 ~~13.18~~	13.34 ~~12.97~~	13.44 ~~13.08~~	13.16 ~~12.67~~	13.29 ~~13.00~~	13.22 ~~12.94~~
t	14.14 ~~13.77~~	13.85 ~~13.48~~	14.00 ~~13.62~~	14.02 ~~13.73~~	14.02 ~~13.73~~	14.02 ~~13.73~~
u	14.43 ~~14.06~~	14.22 ~~13.85~~	14.32 ~~13.96~~	13.99 ~~13.70~~	13.88 ~~13.59~~	13.94 ~~13.64~~
w	14.66 ~~14.29~~	14.66 ~~14.29~~	14.66 ~~14.29~~	14.75 ~~14.46~~	14.65 ~~14.36~~	14.70 ~~14.41~~
x	14.93 ~~14.50~~	15.15 ~~14.78~~	15.04 ~~14.69~~	14.88 ~~14.59~~	14.92 ~~14.63~~	14.90 ~~14.61~~
y	15.44 ~~15.07~~	15.83 ~~15.46~~	15.64 ~~15.26~~	15.07 ~~14.78~~	15.69 ~~15.40~~	15.38 ~~15.09~~

Mar. 30.

Desig.	Pr. l.	Pr. r.	Mean.
q	12.81 ~~12.29~~	12.64 ~~12.12~~	12.72 ~~12.20~~
r	13.02 ~~12.50~~	13.13 ~~12.61~~	13.08 ~~12.56~~
s	13.13 ~~12.61~~	13.34 ~~12.82~~	13.24 ~~12.72~~
t	14.06 ~~13.54~~	13.81 ~~13.29~~	13.94 ~~13.42~~
u	14.20 ~~13.68~~	13.83 ~~13.31~~	14.02 ~~13.50~~
w	14.69 ~~14.17~~	14.44 ~~13.92~~	14.56 ~~14.04~~
x	14.91 ~~14.39~~	14.75 ~~14.23~~	14.83 ~~14.31~~
y	15.19 ~~14.67~~	15.26 ~~14.74~~	15.22 ~~14.70~~

~~q~~	~~12.40~~	~~12.40~~	~~12.20~~
~~r~~	~~13.22~~	~~12.65~~	~~12.56~~
~~s~~	~~13.08~~	~~12.94~~	~~12.72~~
~~t~~	~~13.62~~	~~13.73~~	~~13.42~~
~~u~~	~~13.96~~	~~13.64~~	~~13.50~~
~~w~~	~~14.29~~	~~14.41~~	~~14.04~~
~~x~~	~~14.67~~	~~14.61~~	~~14.31~~
~~y~~	~~15.26~~	~~15.09~~	~~14.70~~

Final Values.

	Feb. 26.	Mar. 16.	Mar. 30.	Final Mean.	Resids.
q	12.76	12.68	12.72	12.72	1 0 0
r	14.08	12.94	13.08	13.37	7 5 3
s	13.44	13.22	13.24	13.~~29~~ 30	1 1 1
t	14.00	14.02	13.94	13.99	0 0 1
u	14.32	13.94	14.02	14.09	2 3 1
w	14.66	14.70	14.56	14.64	1 1 0
x	15.04	14.90	14.83	14.92	1 0 1
y	15.64	15.38	15.22	15.41	2 0 2

Measts. of Faint Comp. Stars for Variable with Phot. I. Corr. for Absorption.

S Cephei:

1895. ^
Feb. 11.

	Pr. l.	Pr. r.	Mean.
k	11.87	11.96	11.92
l	11.58	11.97	11.78
m	13.06	14.02	13.54
n	13.21	13.66	13.44
o	14.06	14.16	14.11
p	13.80	14.76	14.28
q	14.16	14.95	14.56
r	—	—	—
s	—	—	—
t	—	—	—

1895 ^
Feb. 13.

Pr. l.	Pr. r.	Mean.
11.37	11.23	11.30
11.12	11.52	11.32
12.90	12.85	12.88
12.83	12.89	12.86
13.58	13.75	13.66
13.92	13.69	13.80
13.57	13.35	13.46
—	—	—
—	—	—
—	—	—

1895
Feb. 16. ^

	Pr. l.	Pr. r.	Mean.
k	11.05	11.43	11.24
l	11.20	11.72	11.46
m	12.25	12.53	12.39
n	12.59	13.31	12.95
o	13.29	13.72	13.50
p	13.38	13.37	13.38
q	13.22	13.66	13.44
r	14.57	15.05	14.81
s	14.95	15.10	15.02
t	15.27	15.23	15.25

1895
Feb. 20. ^

Pr. l.	Pr. r.	Mean.
11.20	11.43	11.32
11.28	11.38	11.33
13.61	12.85	13.23
12.58	12.88	12.73
13.17	13.40	13.28
13.43	13.24	13.34
13.69	14.02	13.86
14.57	14.88	14.72
15.09	15.14	15.12
15.37	15.43	15.40

Cont. on next page.

Con. from previous page.

Meass. of Faint Comp. Stars for Variables with Phot. I. Corr. for Absorption.

S Cephei. con.

	1895 Feb. 21			1895 Feb. 23.		
	Pr. l.	Pr. r.	mean.	Pr. l.	Pr. r.	mean.
k	11.23	11.41	11.32	11.36	11.42	11.39
l	11.17	11.44	11.30	11.45	11.36	11.40
m	12.24	12.37	12.30	11.99	12.61	12.30
n	12.70	12.76	12.73	12.79	12.80	12.80
o	13.58	13.62	13.58	13.43	13.13	13.28
p	13.29	13.38	13.34	13.37	13.69	13.53
q	13.63	14.00	13.82	13.73	13.75	13.74
r	14.56	15.23	14.90	14.84	14.78	14.81
s	14.78	15.33	15.06	14.95	15.12	15.04
t	14.93	15.64	15.28	15.12	15.29	15.20

/	Feb. 11.	Feb. 13.	Feb. 16.	Feb. 20.	Feb. 21.	Feb. 23.	First mean Values.
k	11.92	11.30	11.24	11.32	11.32	11.39	
l	11.78	11.32	11.46	11.33	11.30	11.40	
m	13.54	12.88	12.39	13.23	12.30	12.30	
n	13.44	12.86	12.95	12.73	12.73	12.80	
o	14.11	13.66	13.50	13.28	13.58	13.28	
p	14.28	13.80	13.38	13.34	13.34	13.53	
q	14.56	13.46	13.44	13.86	13.82	13.74	
r	—	—	14.81	14.72	14.90	14.81	
s	—	—	15.02	15.12	15.06	15.04	
t	—	—	15.25	15.40	15.28	15.20	

Measts. of Faint Comp. Stars for Variables with Phot. I. Corr. for Absorption.

R Urs. maj.

1895.
Jan. 24.

	Pr. l.	Pr. R.	Mean.
r	12.03	13.01	12.52
s	12.39	12.98	12.68
t	13.24	13.03	13.14
u	13.50	13.87	13.68
w	14.28	14.73	14.50
x	14.27	14.99	14.63
y	14.65	15.06	14.85
z	14.86	15.45	15.15
a	15.37	15.73	15.55

Meast. of Faint Comp. Stars for Variables with Phot. I. Corr. for Absorption.

R Urs. Mini.

1895. Feb. 16.

	Pr. l.	Pr. r.	Mean.
l	12.18	11.96	12.07
m	12.30	12.43	12.36
n	12.41	13.17	12.79
o	13.18	12.21	12.70

1895. Feb. 20.

	Pr. l.	Pr. r.	Mean.
l	12.03	12.15	12.09
m	12.46	12.54	12.50
n	12.71	13.01	12.86
o	12.88	13.25	13.06

1895 Feb. 23.

	Pr. l.	Pr. r.	Mean.
l	11.82	12.07	11.94
m	12.17	12.04	12.10
n	12.52	12.84	12.68
o	13.01	13.06	13.04

	Feb. 16.	Feb. 20.	Feb. 23.	Final mean Values.
l	12.07	12.09	11.94	12.03
m	12.36	12.50	12.10	12.32
n	12.79	12.86	12.68	12.78
o	12.70	13.06	13.04	12.93

Meast. of Faint Comp. Stars for Variables with Phot. I. Corr. for Absorption.

R Draconis.

1895. ^

Jan. 24.

	Pr. l.	Pr. r	mean.
q	12.92	12.99	12.96
r	13.30	13.59	13.44
s	13.43	13.87	13.65
t	13.86	14.24	14.05
u	13.93	14.00	13.96
w	14.25	14.71	14.48
x	14.97	15.22	15.10

Comparison Stars for Circumpolar Variables.
Sent Mr. Peek.

Desig.	T Cassiop.	S Cassiop.	S Persei.	R Aurigae.	R Lyncis.	R Urs. maj.
a	5.8	6.2	7.9	6.2	6.6	5.8
b	6.4	6.8	8.0	6.6	7.0	6.3
c	6.9	7.3	8.4	7.2	7.5	6.5
d	7.3	7.7	8.6	7.7	8.1	6.8
e	7.8	8.1	9.0	8.1	8.6	7.2
f	8.1	8.5	9.2	8.8	9.0	7.6
g	8.5	8.8	9.4	9.2	9.4	7.9
h	8.9	9.2	9.7	9.7	9.7	8.3
k	9.2	9.5	10.0	10.5	10.3	8.7
l	9.8	9.7	10.3	10.9	10.7 ✓	9.0
m	10.1	9.9	10.4	11.3	11.0	9.4
n			10.7	11.8	11.6	9.6
o			10.9			10.0
p			11.1			10.5
q						11.0
r						11.4
s						11.9

Computations on Z Herculis.

See Astro-Phys. Journal Vol. 1. p. 288.

Dunér's period for even minima is $3^{d}.99201 \frac{E}{2} =$
$= 1^{d}.99600 = 1^{d}\ 23^{h}\ 54^{m}\ 15^{s}.5$

(Even Epoch) Time of min. from Dunér = June $18^{d}\ 19^{h}\ 15^{m}$.
= June $18^{d}.80209$

$$
\begin{array}{lrl}
2\,\text{per.} = & & 3^{d}.99201 \\
& & \underline{\qquad\quad 6} \\
& & 23.95206 \\
& \text{June} & \underline{24.80209} \\
& & 48.75415 \\
& & \underline{30.\qquad\ \ } \\
& \text{June} & 18.75415
\end{array}
$$

June 18.75415 = June $18^{d}\ 5^{m}\ 59^{s}$ = Theoret. Time of min.

Computation of Times of Minima on Z Herculis. (See Astro. Phys. Journal Vol 1, p. $2\overset{55}{88}$)

Principal Minima.

Time of Prim. Min. = 1895. June 24d 19h 15m = 24.d802084 = June 24d 19h 15m.

	1.996005				
June	26.798089 =	"	26	19	9.
	1.996005				
"	28.794094 =	"	28	19	4.
	1.996005				
"	30.790099 =	"	28	18	58.
	1.996005				
July	2.786104 =	July	2	18	52.
	1.996005				
"	4.782109 =	"	4	18	46.
	1.996005				
"	6.778114 =	"	6	18	40
	1.996005				
"	8.774119 =	"	8	18	34
	1.996005				
"	10.770124 =	"	10	18	28
	1.996005				
"	12.766129 =	"	12	18	23
	1.996005				
"	14.762134 =	"	14	18	17
	1.996005				
"	16.758139 =	"	16	18	11
	1.996005				
"	18.754144 =	"	18	18	✓ 6
	1.996005				
"	20.750149 =	"	20	18	0
	1.996005				
"	22.746154 =	"	22	17	54
	1.996005				
"	24.742159 =	"	24	17	48
	1.996005				
"	26.738164 =	"	26	17	43
	1.996005				
"	28.734169 =	"	28	17	36
	1.996005				
"	30.730174 =	"	30	17	31
	1.996005				
Aug.	1.726179 =	Aug.	1	17	26

Computation of Times of Minima. on Z Herculis. (See Astro-Phys. Journal Vol. 1. p. 288.) A.F.

	1895.		d.	hrs	m s
Time of Prin. Mini. =	Aug. 1.726179 =	Aug.	1	17	25:41
	1.996005				
"	3.722184 =	"	3	17	19:55
	1.996005				
"	5.718189 =	"	5	17	14:9
	1.996005				
"	7.714194 =	"	7	17	8:25
	1.996005				
"	9.710199 =	"	9	17	2:41
	1.996005				
"	11.706204 =	"	11	16	56:55
	1.996005				
"	13.702209 =	"	13	16	51:10
	1.996005				
"	15.698214 =	"	15	16	45:25
	1.996005				
"	17.694219 =	"	17	16	40:40
	1.996005				
"	19.690224 =	"	19	16	33:55
	1.996005				
"	21.686229 =	"	21	16	28:10
	1.996005				
"	23.682234 =	"	23	16	22:25
	1.996005				
"	25.678239 =	"	25	16	16:39
	1.996005				
"	27.674244 =	"	27	16	10:54
	1.996005				
"	29.670249 =	"	29	16	5:9
	1.996005				
→ "	31.666254 =	"	31	15	59:24
	1.996005				
	Sept. 2.662259	Sept.	2	15	53:39

Computation of Times of Minima on Z Herculis &c.

	1895			d	hrs	m	
Time of Prim. min. =	Sept. 2^d.662259	=	Sept	2	15	53	39
	1.996005						
—	4.658264	=	"	4	15	47	54
	1.996005						
	6.654269	=	"	6	15	42	8
	1.996005						
—	8.650274	=	"	8	15	36	23
	1.996005						
	10.646279	=	"	10	15	30	38
	1.996005						
—	12.642284	=	"	12	15	24	53
	1.996005						
	14.638289	=	"	14	15	18	8
	1.996005						
—	16.634294	=	"	16	15	13	23
	1.996005						
	18.630299	=	"	18	15	7	37
	1.996005						
—	20.626304	=	"	20	15	1	52
	1.996005						
	22.622309	=	"	22	14	56	7
	1.996005						
—	24.618314	=	"	24	14	50	22
	1.996005						
	26.614319	=	"	26	14	44	37
	1.996005						
—	28.610324	=	"	28	14	38	52
	1.996005						
	30.606329	=	"	30	14	33	6
	1.996005						
— Oct	2.602334	=	Oct	2	14	27	21

Computation of times of Minima.
on Z. Herculis.

1895 Gr. m. T.

			d.	hrs.	m.	s.
Times of Prim Min =	Oct. 2.602334 =	Oct.	2	14	27	21.
	1.996005					
			d.	hrs.	m.	s.
	4.598339< =	"	4	14	21	36.
	1.996005					
	– 6.594344< =	"	6	14	15	51.
	1.996005					
	8.590349< =	"	8	14	10	6.
	1.996005					
	– 10.586354< =	"	10	14	4	21.
	1.996005					
	12.582359< =	"	12	13	58	36.
	1.996005					
	– 14.578364< =	"	14	13	52	50.
	1.996005					
	16.574369< =	"	16	13	47	4.
	1.996005					
	– 18.570374< =	"	18	13	41	20.
	1.996005					
	20.566379< =	"	20	13	35	35.
	1.996005					
	– 22.562384< =	"	22	13	29	50.
	1.996005					
	24.558389< =	"	24	13	24	4.5
	1.996005					
	– 26.554394 =	"	26	13	18	19.
	1.996005					
	28.550399 =	"	28	13	12	51.
	1.996005					
	– 30.546404 =	"	30	13	6	49.
	1996005					
Nov.	1.542409 =	"	1	13	1	4.

Computation of times of Minima on Z. Herculis.

1895 Gr. M. T.

Times of Prime Min. = Nov. 1.542409 = $1^{d.}\ 13^{hr.}\ 1^{m.}\ 4^{s.}$

1.996005

— 3.538414 = <3 ^{d} 12 ^{h} 55 ^{m} 19 ^{s} <

1.996005

5.534419 = <5

1.996005

— 7.530424 = <7 ^{d} 12 ^{h} 44 ^{m} ~~43~~ ~~48~~ 5 ^{s} <

1.996005

9.526429 = <9

1.996005

— 11.522434 = <11 12 32 18 ^{s} <

1.996005

13.518439 = <13

1.996005

— 15.514444 = <15 12 20 48 ^{s} <

1.996005

17.510449 = 47

1.996005

— 19.506454 = 19 12 9 ~~34~~ 17 <

1.996005

21.502459 = 21

1.996005

— 23.498464 = 23 11 57 47 <

1.996005

25.494469 = 25

1.996005

— 27.490474 = 27 11 46 17 <

1.996005

29.486479 = 29

1.996005

— Dec. 1.482484 = 1 11 34 46 <

1 996005

3.478489 = 3

Computation of Times of Minima on Z Herculis (See Astro Phys. Journals Vol. Vol. 1. p. 289 ff)

Secondary Minima.

1895

Secondary Min. = May 17^d 19^h 51^m

Period 3^d 23^h 48^m 30^s

		Gr.	M.	Time
	d	h	m	
= 17.827084 =	May 17	19	50	
1.996005				
May 19.823089c =	May 19	19	45	14
1.996005				
21.819094c =	" 21	19	39	38
1.996005				
23.815099c =	" 23	19	33	44
1.996005				
25.811104c =	" 25	19	27	59
1.996005				
27.807109c =	" 27	19	22	14
1.996005				
29.803114c =	" 29	19	16	29
1.996005				
31.799119c =	" 31	19	10	43
1.996005				
June 2.795124c =	June 2	19	4	58
1.996005				
4.791129c =	" 4	18	59	13
1.996005				
6.787134c =	" 6	18	53	28
1.996005				
8.783139c =	" 8	18	47	43
1.996005				
10.779144c =	" 10	18	41	58
1.996005				
12.775149c =	" 12	18	36	12
1.996005				
14.771154c =	" 14	18	30	27
1.996005				
16.767159c =	" 16	18	24	42
1.996005				
18.763164c =	" 18	18	18	57
1.996005				
20.759169c =	" 20	18	13	12
1.996005				
June 22.755174c =	June 22	18	7	27

Computation of Times of Minima on Z Herculis

Secondary Minima

Gr. M. Time.

=1895

			d	hrs	m	s
Secondary Min = June	22.755174	= June	22	18	7	27
	1.996005					
	24.751179	= "	24	18	1	41
	1.996005					
	26.747184	= "	26	17	55	56
	1.996005					
	28.743189	= "	28	17	50	11
	1.996005					
	30.739194	= "	30	17	44	26
	1.996005					
July	2.735199	= July	2	17	38	41
	1996005					
	4.731204	= "	4	17	32	56
	1.996005					
	6.727209	= "	6	17	27	10
	1.996005					
	8.723214	= "	8	17	21	25
	1.996005 27					
	10.719219	= "	10	17	15	40
	1.996005					
	12.715224	= "	12	17	9	55
	1.996005					
	14.711229	= "	14	17	4	10
	1.996005					
	16.707234	= "	16	16	58	25
	1996005					
	18.703239	= "	18	16	52	39
	1.996005					
	20.699244	= "	20	16	46	46
	1.996005					
	22.695249	= "	22	16	41	9
	1.996005					
	24.691254	= "	24	16	35	24
	1.996005					
	26.687259	= "	26	16	29	39
	1.996005					
	28.683264	= "	28	16	23	54
	1.996005					
July	30.679269	= "	30	16	18	8

Computation of Times of Minima on Z Herculis

1895.

			G. M. Time d	Secondary Minima hrs	m	s
Secondary Min = August	1.675274 <	= August	1	16	12	23 <
	1.996005 <					
	3.671279 <	= "	3	16	6	38 <
	1.996005 <					
	5.667284 <	= "	5	16	0	53 <
	1.996005 <					
	7.663289 <	= "	7	15	40	44 <
	1.996005 <					
	9.659294 <	= "	9	15	49	23 <
	1.996005 <					
	11.655~~300~~ 299 <	= "	11	15	43	37 <
	1.996005 <					
	13.651304 <	= "	13	15	37	52 <
	1.996005 <					
	15.647309 <	= "	15	15	32	6 <
	1.996005 <					
	17.643314 <	= "	17	15	26	22 <
	1.996005 <					
	19.639319 <	= "	19	15	20	37 <
	1.996005 <					
	21.635324 <	= "	21	15	14	52 <
	1.996005 <					
	23.631329 <	= "	23	15	9	6 <
	1.996005 <					
	25.627334 <	= "	25	15	3	21 <
	1.996005 <					
	27.623339 <	= "	27	14	57	36 <
	1.996005 <					
	29.619344 <	= "	29	14	51	50 <
	1.996005 <					
	31.615349 <	= "	31	14	46	6 <
	1.996005 <					
Sept –	2.611354 <	= Sept.	2	14	40	21 <
	1.996005 <					
	4.607359 <	= "	4	14	34	35 <
	1.996005 <					
–	6.603364 <	= "	6	14	28	50 <

Computation of Times of Minima on
Z Herculis

Secondary Minima

1895

			Gr. M. Time d	hrs	m	s	
Secondary Min = Sept.	6.603364 =	Sept.	6	14	28	50	
	1.996005						
	8.599369 =	"	8	14	23	5	
	1.996005						
–	10.595374 =	"	10	14	17	20	
	1.996005						
	12.591379 =	"	12	14	11	34	
	1.996005						
–	14,587384 =	"	14	14	5	50	✓
	1.996005						
	16,583389 =	"	16	14	0	4	
	1.996005						
–	18.579394 =	"	18	13	54	19	
	1.996005						
	20.575399 =	"	20	13	48	25	
	1.996005						
–	22571404 =	"	22	13	42	49	
	1.996005						
	24.567409 =	"	24	13	37	4	
	1.996005						
–	26,563414 =	"	26	13	31	19	
	1.996005						
	28,559419 =	"	28	13	25	33	
	1.996005						
–	30.555424 =	"	30	13	19	48	
	1.996005 18						
Oct.	2.551429 =	Oct.	2	13	14	3	
	1.996005						
–	4,547434 =	"	4	13	8	18	
	1.996005 20						
	6,543439 =	"	6	13	2	33	
	1.996005						
–	8,539444 =	"	8	12	56	48	
	1.996005						
	10,535449 =	"	10	12	51	2	
	1.996005						
–	12.531454 =	"	12	12	45	19	
	1.996005						
	14.527459 =	"	14.	12	39	32	

Computation of Times of Minima. on Z Herculis.

Secondary Minima

1895

			Time		
		d	h	m	s
Secondary Min = October 14.527459< =	October	14	12	39	32<
1.996005<					
– 16.523464< =	"	16	12	33	47<
1.996005<					
18.519469< =	"	18	12	28	2<
1.996005<					
– 20.515474< =	"	20	12	22	17<
1.996005<					
22.511479< =	"	22	12	16	31<
1.996005<					
– 24.507484< =	"	24	12	10	46<
1.996005<					
26.503489< =	"	26	12	5	1<
1.996005<					
– 28.499494< =	"	28	11	59	16<
1.996005<					
30.495499< =	"	30	11	53	31<
1.996005<					
November 1.491504< =	November	1	11	47	46<

Computation of Times of Minima of R Can. Maj: Eastern Time.

Nov. 0^d 7^h 52.6
1 3 15.8
Nov. 1 11 8.4

0 7 52.6
2 6 31.5
2 14 24.1

0 7 52.6
3 9 47.3
3 17 39.9

0 7 52.6
4 13 3.1
4 20 55.7

0 7 52.6
5 16 18.8
6 0 11.4

0 7 52.6
6 19 34.6
7 3 27.2

0 7 52.6
7 22 50.4
8 6 43.0

0 7 52.6
9 2 6.1
9 9 58.7

0 7 52.6
10 5 21.9
10 13 14.5

0 7 52.6
11 8 37.7
11 16 30.3

0 7 52.6
12 11 53.4
12 19 46.0

0 7 52.6
13 15 9.2
13 23 1.8

0 7 52.6
14 18 25.0

0 7 52.6
15 21 40.7
16 5 33.3

0 7 52.6
17 0 56.5
17 8 49.1

0 7 52.6
18 4 12.3
18 12 4.9

0 7 52.6
19 7 28.0
19 15 20.6

0 7 52.6
20 10 43.8
20 18 36.4

0 7 52.6
21 13 59.6
21 21 52.2

0 7 52.6
22 17 15.3
23 1 7.9

0 7 52.6
23 20 31.1
24 4 23.7

0 7 52.6
24 23 46.9
25 7 39.5

0 7 52.6
26 3 2.6
26 10 55.2

0 7 52.6
27 6 18.4
27 14 11.0

0 7 52.6
28 9 34.2
28 17 26.8

0 7 52.6
29 12 49.9
29 20 42.5

Times of minima of U Ophiuchi.

Gr. M. T.

		d	h	m
Time of min. = 1895.	June	0	5	29.5
		0	20	7.7
	June	1	1	37.2
	June	1	21	44.9
	June	2	17	52.6
	June	3	14	0.3
	June	4	10	8.0
	June	5	6	15.8
	June	6	2	23.5
	June	6	22	31.2
	June	7	18	38.9
	June	8	14	46.6
	June	9	10	54.3
	June	10	7	2.0
	June	11	2	9.7
	June	11	23	17.4
	June	13	5	25.1
	June	13	15	32.8
	June	14	11	40.6
	June	15	7	48.3
	June	16	3	56.0
	June	17	0	3.7
	June	17	20	11.4
	June	18	16	19.1
	June	19	12	26.8
	June	20	8	34.5
	June	21	4	42.2
	June	22	0	49.9
	June	22	20	57.7
	June	23	17	5.4
	June	24	13	13.1

Times of Minima of U. Ophiuchi.

Gr. M. Time.

			d	hrs	m
Time of Min =	1895.	June	25	9	20.8
	"	June	26	5	28.5
	"	June	27	1	36.2
	"	June	27	21	43.9
	"	June	28	17	51.6
	"	June	29	13	59.3
	"	June	30	10	7.0
	1895	July	1	6	14.8
	"	July	2	22	30.2
	"	July	3	18	37.9
	"	July	4	14	45.6
	"	July	5	10	53.4
	"	July	6	7	1.1
	"	July	7	3	8.8
	"	July	7	23	16.1
	"	July	8	19	24.2
	"	July	9	15	31.9
	"	July	10	11	39.6
	"	July	11	7	47.3
	"	July	12	3	55.0
	"	July	13	0	2.7
	"	July	13	20	10.4
	"	July	14	16	18.2
	"	July	15	12	25.9
	"	July	16	8	33.6
	"	July	17	4	41.3
	"	July	18	0	49.0
	"	July	18	20	56.7
	"	July	19	17	4.4
	"	July	20	13	12.1

Times of Minima on U Ophiuchi.

		Gr. M. T.	d	hrs	m
Time of Min =	1895	July	21	9	19.8
	"	"	22	5	27.5
	"	"	23	1	35.3
	"	"	23	21	43.0
	"	"	24	17	50.7
	"	"	25	13	58.4
	"	"	26	10	6.1
	"	"	27	6	13.8
	"	"	28	2	21.5
	"	"	28	22	29.2
	"	"	29	18	36.9
	"	"	30	14	44.6
	"	"	31	10	52.3
	"	August	1	7	0.2
	"	"	2	3	7.9
	"	"	2	23	15.6
	"	"	3	19	23.8
	"	"	4	15	31.0
	"	"	5	11	38.8
	"	"	6	7	46.5
	"	"	7	3	54.2
	"	"	8	0	1.9
	"	"	8	20	9.6
	"	"	9	16	17.3
	"	"	10	12	25.0
	"	"	11	8	32.7
	"	"	12	4	40.4
	"	"	13	0	48.1
	"	"	13	20	55.8
	"	"	14	17	3.6

Times of Minima on U Ophiuchi.

		Gr. M. T.	d	hrs	m
Time of Min =	1895.	August	15	13	11.3
	"	"	16	9	19.0
	"	"	17	5	26.7
	"	"	18	1	34.4
	"	"	18	21	42.1
	"	"	19	17	49.8
	"	"	20	13	57.0
	"	"	21	10	5.2
	"	"	22	6	12.9
	"	"	23	2	20.7
	"	"	23	22	28.4
	"	"	24	18	36.1
	"	"	25	14	43.4
	"	"	26	10	57.5
	"	"	27	6	59.2
	"	"	28	3	6.9
	"	"	28	23	14.6
	"	"	29	19	22.3
	"	"	30	15	30.0
	"	"	31	11	37.7
	"	September	1	7	45.6 ✓
	"	"	2	3	53.3 ✓
	"	"	3	0	1.0 ✓
	"	"	3	20	8.7 ✓
	"	"	4	16	16.4 ✓
	"	"	5	12	24.2 ✓
	"	"	6	8	31.9 ✓
	"	"	7	4	39.6 ✓
	"	"	8	0	47.3 ✓
	"	"	8	20	55.0 ✓

Times of Minima of U Ophiuchi.

Gr. M. T.

		d	hrs	m
Time of Min =	1895. September,	9	17	2.7
"	"	10	13	10.4
"	"	11	9	18.1
"	"	12	5	25.8
"	"	13	1	33.5
"	"	13	21	41.2
"	"	14	17	49.0
"	"	15	13	56.7
"	"	16	10	4.4
"	"	17	6	12.1
"	"	18	2	19.8
"	"	18	22	27.5
"	"	19	18	35.2
"	"	20	14	42.9
"	"	21	10	50.6
"	"	22	6	58.3
"	"	23	3	6.1
"	"	23	23	13.8
"	"	24	19	21.5
"	"	25	15	29.2
"	"	26	11	36.9
"	"	27	7	44.6
"	"	28	3	52.3
"	"	29	0	0.0
"	"	29	20	7.7
"	"	30	16	15.4
"	October	1	12	23.3
"	"	2	8	31.0
"	"	3	4	38.7
"	"	4	0	46.4

Times of Minima of U Ophiuchi.

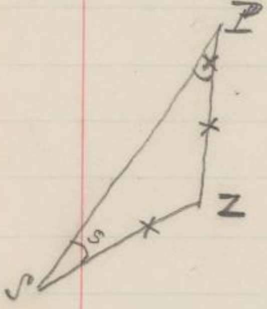
G. M. T.

		d	hrs	m
Time of Min = 1895.	October	4	20	54.1
"	"	5	17	1.9
"	"	6	13	9.6
"	"	7	9	17.3
"	"	8	5	25.0
"	"	9	1	32.7
"	"	9	21	40.4
"	"	10	17	48.1
"	"	11	13	55.8
"	"	12	10	3.5
"	"	13	6	11.2
"	"	14	2	18.9
"	"	14	22	26.7
"	"	15	18	34.4
"	"	16	14	42.1
"	"	17	10	49.8
"	"	18	6	57.5
"	"	19	3	5.2
"	"	19	23	12.9
"	"	20	19	20.6
"	"	21	15	28.3
"	"	22	11	36.0
"	"	23	7	43.8
"	"	24	3	51.5
"	"	24	23	59.2
"	"	25	20	6.9
"	"	26	16	14.6
"	"	27	12	22.3
"	"	28	8	30.0
"	"	29	4	37.7

Times of minima of U Ophiuchi.

Time of min. = 1895, October 30. 0h 45m.4
" 30. 20 53.1
" 31. 17 0.8

Computation of Differential Absorption on Z Herculis for different Hour Angles and corresponding altitudes.



$\varphi = 42° 23'$

Log sin φ =
" cos δ =

Altitude of Z Herculis for 2h H.A. = 52.5
" " " " " " 4h " = 32.1
" " " " " " 6h " = 10.2

For H.A. 2h.

For H.A. = 2h {
PZ = 47° 37'
∠P = 30°
ZS = 37° 30'

(30°) Log sin P = 9.69897
(47° 37') " " PZ = 9.86844
Sum logs = 9.56741
(37° 30') Log sin ZS = 9.78445
(37° 21') " " S = 9.78296

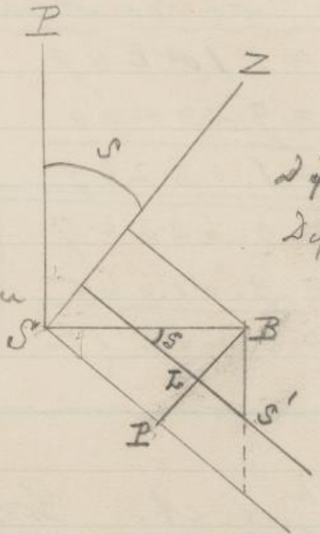
For. H. A. 4h

60° Log sin P = 9.93753
" " PZ = 9.86844
Sum logs = 9.80597
(57° 54') Log sin ZS = 9.92795
49° 2' " " S = 9.87802

Con. from p. 62.

For H. A. 6^h

(90°) Log sin P = 0.00000
" " PZ = 9.86844
Sum logs = 9.86844
79° 58' Log sin Zs = 9.99308
(48 38) " " s = 9.87536



Diff. R.A. = S'B = α
Diff. Z.D. = BP − BL = LP
Diff. dec. = BS' = δ

Diff. Z.D. = $\alpha \sin s - \delta \cos s$
(α being the diff. in R. A. between the two stars in minutes of arc, and

Diff. of R. A. between Z Herculis and comp. star is $1^m\ 3^s.5$
" " dec. " " " " " " " $4'.3$

(Z Herc. has smaller R. A. but greater dec. than comp. star)

Log. 63.5 = 1.80277
" cos. 15° = 9.98494
" 15. = 1.17609
60)920." = 2.96380
15.3

Con. from p. 62.

2^h H. A. West.

.017 = Δ path for 1°

(15.3) Log. x = 1.18469
(37° 21') " sin s = 9.78296
9.28 = 0.96765
(4.3) Log. d = 0.63347
(37° 21') " cos. s = 9.90034
3.42 = 0.53381
(Z∂ = 37° 30')

9.28
3.42
5.86

Log. .017 = 8.23045
" 5.86 = 0.76790
8.99835
" 60. = 1.77815
Δ Path = .0017 .26 = = 7.22020

4^h H. A. West.

.053 = Δ path for 1°

Log x = 1.18469
(49° 2') Log sin s = 9.87800
11.55 = 1.06269
(4.3) Log. d = 0.63347
" cos s = 9.81665
2.82 = 0.45012
(Z∂ = 57° 54')

11.55
2.82
8.73

Log. .053 = 8.72428
" 8.73 = 0.94101
9.66529
" 60. = 1.77815
Δ Path = .0077 = 7.88714

6^h H. A. West.

.460 = Δ path for 1°.

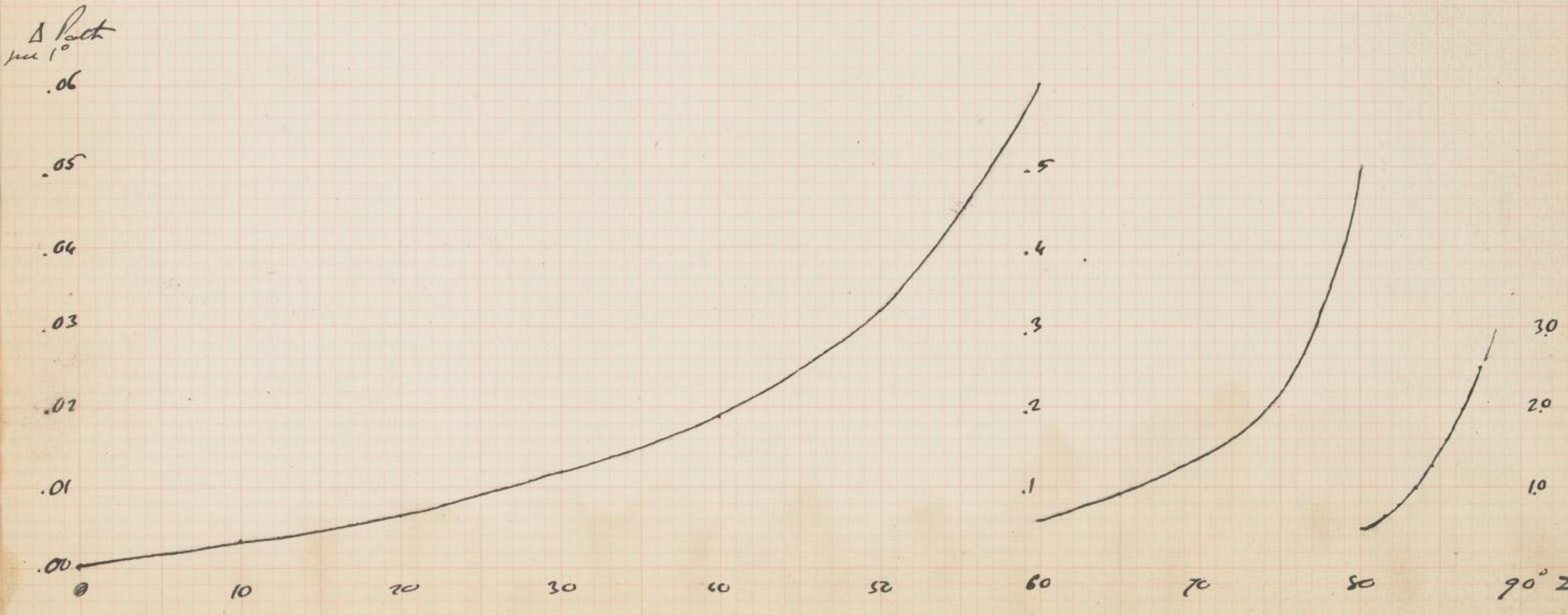
Log x = 1.18469
48° 38' Log sin s = 9.87536
11.48 = 1.06005
Log. d = 0.63347
48 38 " cos s = 9.82012
2.84 = 0.45359
(Z∂ = 79° 48')

11.48
2.84
8.64

Log. .460 = 9.66276
" 8.64 = 0.93651
0.59927
" 60. = 1.77815
Δ Path = .0662 = 8.82112

Con. on p. 66.

Relation of Δ Path to Zenith Distance.



Con from p. 64.

2h H. A. East.

9.28
3.42
Log. 12.70 = 1.10380
" .017 = 8.23045
9.33425
" 60. = 1.77815
Δ Path = .0036 = 7.55610

4h H. A. East.

11.55
2.82
Log. 14.37 = 1.15746
" .053 = 8.72428
9.88174
" 60. = 1.77815
Δ Path = .0127 = 8.10359

6h H. A. East.

11.48
2.84
Log. 14.32 = 1.15594
" .460 = 9.66276
0.81870
" 60. = 1.77815
Δ Path = .1098 = 9.04055

Con. from p. 66.

(93.°) Log sin P. = 9.99940
(47° 37') " " P.Z = 9.86844
9.86784
(82° 0') " " Z S = 9.99575
48° 9' " " S = 9.87209

(96°) Log sin P. = 9.99761
(47° 37') " " PZ = 9.86844
9.86605
(84° 6') " " ZS = 9.99769
(47° 37') " " S = 9.86839

(15.3) Log a = 1.18469
(48° 9') " sin s = 9.87209
11.40 = 1.05678

(4.3) Log d = 0.63347
(48° 9') " cos s = 9.82424
2.87 = 0.45771

West.	East.
11.40	11.40
2.87	2.87
8.53	14.27

15.3 Log a = 1.18469
(47° 37') " sin s = 9.86839
11.30 = 1.05308

(4.3) Log d = 0.63347
" cos s = 9.82872
2.90 = 0.46219

West.	East.
11.30	11.30
2.90	2.90
8.40	14.20

Con. from p. 67.

Z Herculis.

Δ Path for 1° at 82° 0′ Z.D. = 0.70

6.2

West.	East.
Log. 0.70 = 9.84510	Log. 0.70 = 9.84510
" 8.53 = 0.93095	" 14.27 = 1.25442
0.77605	1.09952
" 60. = 1.77815	" 60. = 1.77815
Actual Δ Path = 0.0995+ = 8.99790	= 0.2096 = 9.32137

Δ Path for 1° at 84° 6′ ZD = 1.19

West.	East.
Log. 1.19 = 0.07555	Log. 1.19 = 0.07555
" 8.40 = 0.92428	" 14.20 = 1.15229
0.99983	1.22784
" 60. = 1.77815	" 60. = 1.77815
Actual Δ Path = 0.1666 = 9.22168	= 0.2816 = 9.44969

Lat. of Cambridge 42° 22′ 48″
90
47 37 12
+15 8 54
Elevation of Var. = 62 46 6.

Z.D. of Var. = 27° 13′ 54″
" " Comp. ★ = 27 18 12.
4′ 18″

62 46 6.
−4 18.
Elevation of C.S. = 62 41 48.

Log 0.010 = 8.00000
" 4.3 = 0.63347
8.63347
" 60. = 1.77815
0.0007 = 6.85532

Con. from p. 67.

(Col. 1) H. A.	(Col. 2.) Δ Path.	Differential Absorption = Col. 2 × 0.26
$-6.^h4$	0.282	0.073
-6.2	.210	.055
-6.0	.110	.029
-4.0	.013	.003
-2.0	.004	.001
0.0	.0007	.000
$+2.0$	.002	.001
$+4.0$	.008	.002
$+6.0$	.066	.017
$+6.2$	.100	.026
$+6.4$	.167	.043
$+6.5$	.204	.053

These results tabulated on cross section paper on next page.

From diagram on next page, when Z Herculis is west of meridian, correction for differential absorbtion is 0.005 magn. at $5.^h00$ H.A., 0.015 at $5^h\ 55^m$ H.A., 0.025 at $6^h\ 10^m$ H.A., 0.035 at $6^h\ 20^m$ H.A.

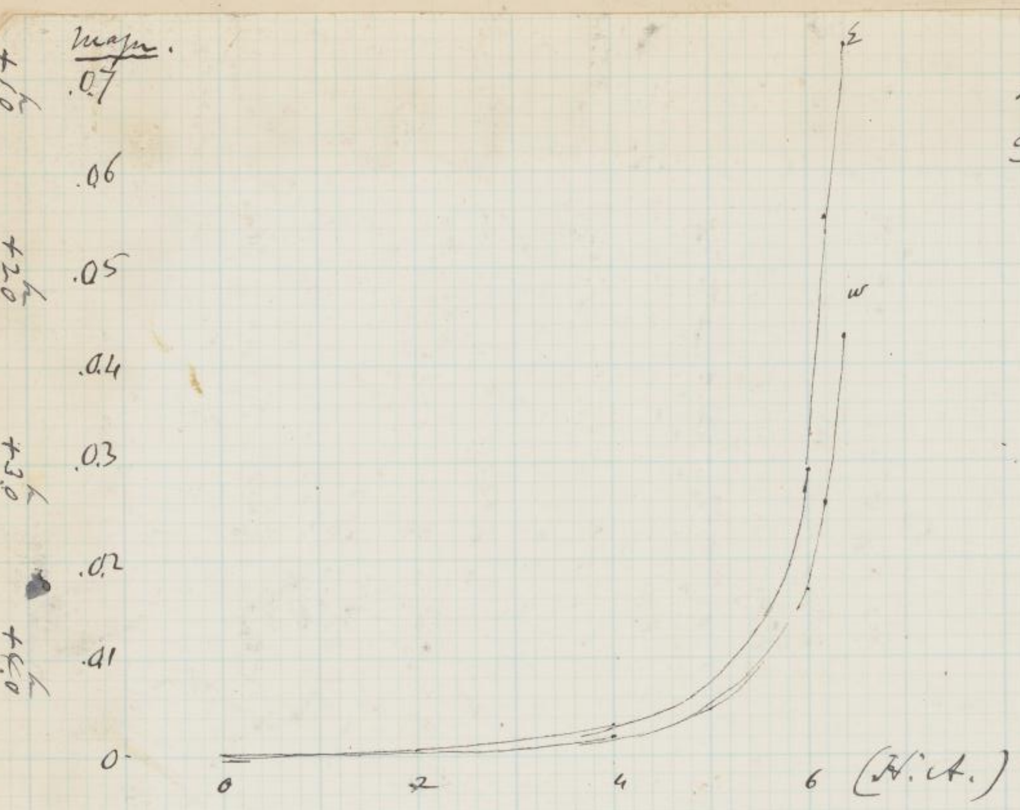
Z Herculis is always brtr. than comp. star.

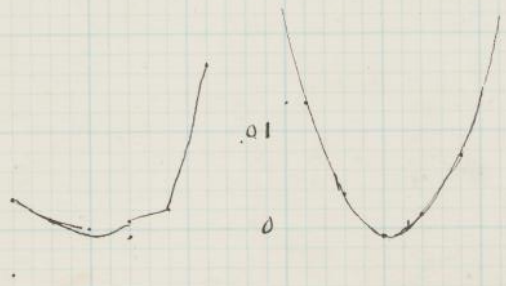
To correct, for var. west, add diff. abs. numerically to diff. magn.

.00 from $0.^h00$ to $5.^h00$ H.A.
.01 " $5.^h00$ " $5^h\ 55^m$
.02 " $5^h\ 55^m$ " $6^h\ 10^m$
.03 " $6^h\ 10^m$ " $6^h\ 20^m$

Z is always lower on west side of meridian, so that the correction for diff. absorb. (west) will always be numerically additive to Diff. magn. (For diagram, see next page.)

Differential Absorption on Z Herculis.





See previous page.

For H. A. 6^h 30^m West. (Z S = 85° 3′)

97° 30′ Log. sin P = +9.99627 ✓
" " PZ = +9.86844
+9.86471 ✓

85° 3′ " " Z S = +9.99838 ✓
47° 19′ " " s = +9.86633

15′.3 Log t = +1.18469 ✓
(47° 19′) " sin s = +9.86633 ✓
11′.25 = +1.05102 ✓

4′.3 Log. δ = +0.63347 ✓
47° 19′ " cos s = +9.83120 ✓
2′.92 = +0.46467

11.25
2.92
8′.33

Δ path = .2041

1.47 = Δ path for 10.
Log 1.47 = 0.16732 ✓
" 8.33 = 0.92065
1.08797
" 60. = 1.77815
= 9.30982

Y Cygni. Even Epochs.

Computation of Times of Minimum.

Eastern Time.

Time of min. =	Oct.	28.	10h	28.8m
		2	23	54.9
	Oct.	31	10	23.7
		2	23	54.9
	Nov.	3	10	18.6
		2	23	54.9
	Nov.	8	10	13.5
		2	23	54.9
	Nov.	11	10	8.4
		2	23	54.9
	Nov.	14	10	3.3
		2	23	54.9
	Nov.	17	9	58.2
		2	23	54.9
	Nov.	20	9	53.1
		2	23	54.9
	Nov.	23	9	48.0
		2	23	54.9
	Nov.	26	9	42.9
		2	23	54.9
	Nov.	29	9	37.8

Y Cygni. Uneven Epochs.

Computation of Times of Minima.

			Eastern Time.	
Time of min. =	Oct.	26^d	13^h	54.9^m
		2	23	54.5
	Oct.	29	13	49.4
		2	23	54.5
	Nov.	1	13	43.9
		2	23	54.5
	Nov.	4	13	38.4
		2	23	54.5
	Nov.	7	13	32.9
		2	23	54.5
	Nov.	10	13	27.4
		2	23	54.5
	Nov.	13	13	21.9
		2	23	54.5
	Nov.	16	13	16.4
		2	23	54.5
	Nov.	19	13	10.9
		2	23	54.5
	Nov.	22	13	5.4
		2	23	54.5
	Nov.	25	12	59.9
		2	23	54.5
	Nov.	28	12	54.4

R Can. Majoris.

Computation of Times of Minimum.

Nov.	0^d	7^h	52^m.6	Eastern Time.
	1	3	15.8	
Nov.	1	11	8.4	
	1	3	15.8	
Nov.	2	14	24.2	
	1	3	15.8	
Nov.	3	17	40.0	
	1	3	15.8	
Nov.	4	20	55.8	
	1	3	15.8	
Nov.	6	0	11.6	
	1	3	15.8	
Nov.	7	3	27.4	
	1	3	15.8	
Nov.	8	6	43.2	
	1	3	15.8	
Nov.	9	9	59.0	
	1	3	15.8	
Nov.	10	13	14.8	
	1	3	15.8	
Nov.	11	16	30.6	
	1	3	15.8	
Nov.	12	19	46.4	
	1	3	15.8	
Nov.	13	23	2.2	
	1	3	15.8	
Nov.	15	2	18.0	
	1	3	15.8	
Nov.	16	5	33.8	

R Can. majoris.

Con. from previous page.

Nov. 16^d 5^h 33.8^m Eastern Time.

1 3 15.8

Nov. 17 8 49.6

1 3 15.8

Nov. 18 12 5.4

1 3 15.8

Nov. 19 15 21.2

1 3 15.8

Nov. 20 18 37.0

1 3 15.8

Nov. 21 21 52.8

1 3 15.8

Nov. 23 1 8.6

1 3 15.8

Nov. 24 4 24.4

1 3 15.8

Nov. 25 7 40.2

1 3 15.8

Nov. 26 10 56.0

1 3 15.8

Nov. 27 14 11.8

1 3 15.8

Nov. 28 17 27.6

1 3 15.8

Nov. 29 20 43.4

1 3 15.8

Nov. 30 23 59.2

Times in parentheses in red, are with respect to Hartwig's times of min.

Z Herculis. ~~Computations in connection~~

Discussion of Results. Principal min.

1895. July 18.

Gr. M. T.		Diff. magn.
(−2h	38.2)	
~~11~~ 16h	42.0	2.51
~~11~~ 16	49.6	2.38
~~11~~ 16	55.5	2.40
~~12~~ 17	14.0	2.34
~~12~~ 17	18.7	2.32
5/59	59.8	5/11.95
~~12~~ 17	0.0	2.39
−1	6.0	
~~12~~ 17	30.4	2.23
~~12~~ 17	38.7	2.21
~~12~~ 17	49.2	2.18
~~12~~ 17	54.5	2.18
~~13~~ 18	1.1	2.08
~~12~~ 17	46.8	2.18
−0	19.2	
(−1	51.4)	
~~13~~ 18	6.1	2.02
~~13~~ 18	15.2	1.98
~~13~~ 18	21.8	1.94
~~13~~ 18	27.9	1.90
~~13~~ 18	35.8	2.03
~~13~~ 18	21.4	1.97
+0	15.4	
(−1	16.8)	
~~13~~ 18	46.2	1.88
~~13~~ 18	54.3	1.92 (33.0)
~~14~~ 19	6.1	1.94
~~14~~ 19	14.9	1.90
~~14~~ 19	22.0	1.98 (−0)
~~14~~ 19	4.7	1.92
+0		

1895. July 18.

Gr. M. T.		Diff. magn.
(+0	11.9)	
~~14~~ 19h	35.9	1.91
~~14~~ 19	53.1	1.97
~~15~~ 20	1.2	2.02
~~14~~ 19	50.1	1.97
+1	44.1	

Gr. Time of Min. 1895 = Dunér

	d	hrs	m
July	18	18	6.0
"	26	17	43.0
Sept	12	15	24.9
"	24	14	50.4
Oct	2	14	27.4
"	10	14	4.4
"	14	13	52.8
"	30	13	6.8

Gr. Time of Min. 1895 Hartwig

	d		
July	18	19	38.16
"	26	19	17.24
September	12	17	12.08
"	24	16	40.70
October	2	16	19.00
"	10	15	58.08
"	14	15	47.62
"	30	15	5.78

1895. July 26.

Gr. M. T.		Diff. magn.
(−5	27.1)	
13h	33.3	2.68
13	40.4	2.60
13	49.7	2.56
13	57.1	2.65
14	10.2	2.65
13h	50.1	2.63
−~~4~~3	52.9	
14	23.1	2.64
14	33.1	2.70
14	44.0 (32.3)	2.77
14	55.2	2.70
15	9.2 (−4	2.70
14	44.9	2.70
−2	58.1	
15	24.0	2.66
15	35.6	2.63
15	43.9	2.53
16	0.6	2.44
16	11.1	2.51
15	47.0	2.55
−1	56.0	
(−3	30.2)	
16	23.7	2.36
16	38.5 (27.2)	2.36
16	51.5	2.30
16	59.2	2.29
17	12.2 (−2	2.20
16	50.0	2.30

Z Herculis.

Discussion of results. Prin. min.

1895. July 26.		~~1895. Sept. 10.~~		1895. Sept. 24.	
Gr. M. T.	Diff. magn.	~~Gr. M. T.~~	~~Diff. magn.~~	Gr. M. T.	Diff. magn.
17h 24.5m	2.14	~~13h 4.6m~~	~~2.76~~	14h 18.4m	2.49 ✓
17 38.1	2.0~~3~~ 8	~~13 12.3~~	~~2.78~~	14 22.9	2.52 ✓
17 48.1	2.05	~~13 20.4~~	~~2.72~~	14 27.5	2.48 ✓
17 56.4	2.01	~~13 30.6~~	~~2.75~~	14 39.7	2.38 ✓
18 16.9	1.95	~~13 36.9~~	~~2.73~~	14 45.2	2.36 ✓
17 48.8	2.05			14 30.7 ✓	2.45 ✓
+0 5.8				14 50.4 −0 19.7 ✓	
(−1 28.4)				(−2 10.0)	
18 23.9	1.96	~~13 54.7~~	~~2.76~~	14 51.2	2.32 ✓
18 34.2	1.85	~~13 58.8~~	~~2.83~~	15 9.0	2.2~~4~~ 7 ✓
18 40.7	1.89	~~14 18.6~~	~~2.74~~	15 14.8	2.18 ✓
18 50.9	1.89	~~14 23.8~~	~~2.76~~	15 28.0	2.15 ✓
18 57.7	1.88	~~14 35.9~~	~~2.67~~	15 34.2	2.13 ✓
18 41.5	1.89			15 15.4 ✓	2.21 ✓
+0 58.5				+0 25.0 ✓	
(−0 35.7)				(−1 25.3)	
19 9.7	1.82	~~15 24.4~~	~~2.66~~	15 48.8	2.09 ✓
19 15.9	1.91	~~15 29.3~~	~~2.62~~	15 53.9	2.09 ✓
19 26.6	1.90	~~15 41.8~~	~~2.61~~	16 1.9	2.12 ✓
19 34.8	1.96	~~15 4[illegible].0~~	~~2.6[illegible]~~	16 6.9	2.08 ✓
19 47.8	2.04	~~15 56.3~~	~~2.6[illegible]~~	16 22.6	2.14 ✓
19 27.0	1.93			16 2.8 ✓	2.10 ✓
+1 44.0				+1 12.4 ✓	
(+0 9.8)				(−0 37.9)	
				16 29.7	2.08 ✓
				16 46.7	2.06 ✓
				16 53.1	2.14 ✓
				16 43.2 ✓	2.09 ✓
				14 50.4 +1 52.8 ✓	
				(+0 2.0)	

Z Herculis.

Discussion of Results. Prim. Min.

1895. Sept. 12.			
Gr. m. T.			Diff. magn.
12^h	41.9		2.76
12	46.8	(14.0)	2.76
12	59.7		2.68
13	4.8	(1 4)	2.74
13	17.4		2.76
13 12	58.15		2.74<
−2	26.8<		
14	2.3		2.59
14	8.7	(54.8)	2.57
14	12.6		2.53
14	26.8	(1 2)	2.51
14	36.0		2.44
14	17.3<		2.53<
−1	7.6		
14	40.7		2.37
14	56.8	(11.1)	2.31
15	1.4		2.31
15	10.8	(1 2)	2.25
15	15.1		2.24
15	1.0<		2.30<
−0	23.9		
15	32.9		2.05
15	37.9	(18.3)	1.98
15	57.1		2.06
16	2.2	(1 1)	2.04
16	19.6		2.06
15	53.8<		2.04<
+0	28.8		

1895. Sept. 12.			
Gr. m. T.			Diff. magn.
16^h	24.9		2.02
16	34.6	(37.8)	2.03
16	43.4		2.01
16	34.3<	(1 0)	2.02<
+1	9.4<		

1895 Oct. 2.			
Gr. m. T.			Diff. magn.
1.4 (−2	27.3 29.6)		
13^h	30.5		2.56
13	36.2		2.52
13	50.8		2.52
13	56.3		2.44
14	13.2		2.37
14 13	27.4 49.4<		2.48<
−0	38.0		
14	18.7		2.36
14	37.8	(24.8)	2.27
14	43.5		2.28
14	58.0	(1)	2.21
15	2.9		2.20
14	44.2<		2.27<
+0	16.8<		
15	16.0	(50.3)	2.14
15	20.9		2.11
15	33.5	(1 0)	2.13
15	44.4		2.03
15 1,4	28.7< 27.4		2.10<
+1	1.3		

Z Herculis.

Discussion of Results. Provisional.

1895. Oct. 10.

Gr. m. T.	Diff. magn.	
11h 26.6 <	2.66 <	(12.7
11 35.0 <	2.70 <	
11 44.3 <	2.63 <	
11 51.1 <	2.60 <	(−4
12 10.0 <	2.60 <	
11 45.4 <<	2.64 <<	
−2 21.0		
2 19.0		
12 15.7 <	2.60 <	
12 29.3 <	2.59 <	(20.4
12 33.4 <	2.61 <	
12 52.7 <	2.50 <	(−3
12 58.0 <	2.54 <	
12 37.7 <	2.57 <<	
−1 26.7 <		
13 15.3 <	2.39 <	(20.2
13 20.7 <	2.38 <	
13 41.2 <	2.31 <	(−2
13 48.2 <	2.34 <	
14 4.2 <	2.23 <	
13 37.9 <	2.33 <	
−0 26.5 <		
14 9.5 <	2.17 <	(26.2
14 24.7	2.11 <	
14 30.1 <	2.13 <	
14 45.2 <	2.14 <	(−1
14 50.0 <	2.06 <	
14 31.9 <	2.12 <	
+0		

1895. Oct. 10.

Gr. m. T.	Diff. magn.
14h 56.7 <	2.03 <<
15 2.4 <	1.95 <<
14 59.2 <<	1.99 <
+0 54.8 <	
(−0 58.9)	

1895. Oct. 14.

Gr. m. T.	Diff. magn.	
11h 41.7	2.64	
11 46.6	2.68	(57.2
11 58.0	2.62	
12 2.6	2.62	(−3
12 13.0	2.63	
11 56.4 <	2.65 <	
−1 56.4		
12 17.8	2.56	
12 32.9	2.48	(9.1
12 37.3	2.47	
12 49.6	2.47	(−3
12 55.0	2.44	
12 38.5 <	2.48 <	
−1 14.53 <		
13 4.4	2.41	
13 8.8	2.39	(26.4
13 22.9	2.32	
13 28.2	2.31	(−2
13 41.8	2.27	
13 21.2 <	2.34 <	
−0 31.6		
13 47.1	2.22	
14 2.0	2.16	(38.9
14 7.1	2.14	
14 21.3	2.06	(−1
14 26.0	2.09	
14 8.7 <	2.13 <	

Z Herculis.

Discussion of Results. Prim. Min.

1895, Oct. 14.		1895. Oct. 30.		1895. Oct. 30.	
Gr. M. T.	Diff. Magn.	Gr. M. T.	Diff. Magn.	Gr. M. T.	Diff. Magn.
14h 35.9	2.00	10h 45.5	2.74		
14 41.1 (10 59.8)	2.03	10 47.7 (14 7.1)	2.72		
14 49.0	2.02	10 59.7	2.71		
14 54.0	1.95	11 5.1	2.68		
14 58.8	1.96	11 20.5	2.68		
14 47.8<	1.99<	10 58.7<	2.71<		
+0 55.0		−2 8.1			
15 2.9	1.92	11 25.6	2.67		
+1 10.1		11 39.1 (13 19.0)	2.62		
(−0 44.7)		11 44.8	2.59		
		11 ~~5?.9~~ 59.0	2.55		
		12 5.4	2.53		
		11 46.8<	2.59<		
		−1 20.0			
		12 18.7	2.47		
		12 23.3 (2 31.1)	2.38		
		12 35.6	2.39		
		12 42.1	2.34		
		12 54.0	2.34		
		12 34.7<	2.39<		
		−0 32.1			
		12 59.8	2.22		
		13 11.8 (1 42.0)	2.26		
		13 17.8	2.19		
		13 29.4	2.15		
		13 35.3	2.04		
		13 49.0	2.08		
		13 23.8<	2.16<		

U Pegasi.

3514.5244

3514.457 = Epoch. at +0.7 magn. on ascending side.
+ 0.d18739 = Period
+ 0.d0674 = Ivy to red. from 0.7 point to summit of curve.

75 × 0.18739 = 14.05425
3747 " " = 702.15033
3806 " " = 713.20634
4125 " " = 772.98375
4126 " " = 773.17114
4136 " " = 775.04504

Gr. T. when Var. is 0.7 magn. ftr. than comp. star.

3528.~~5112~~ .5786 = 1895. Dec. 0d 12h 16m
4216.~~6073~~ .6747 = 1897. Oct. 18 14 35.
4227.~~6633~~ .7307 = " Oct. 29. 15 55
4287.~~4408~~ .5082 = " Dec. 28. 10 35
4287.~~6281~~ .6955 = " Dec. 28. 15 4
4289.~~5020~~ .5694 = " Dec. 30. 12 3

Times ~~of max.~~ below referred to summit.
G. M. T.

Gr. M. T. of maximum.

75	3528.5786	= 1895 Dec. 0. 13 53
3747	4216.6747	= 1897 Oct. 18. 16 12
3806	4227.7307	= " " 29. 17 32
4125	4287.5082	= " Dec. 28. 12 12
4126	4287.6955	= " " " 16 42
4136	4289.5694	= " " 30 13 40
4146	4291.4433	= 1898 Jan. 1. 10 38
4147	4291.6307	= " " " 15 8
4157	4293.5046	= " " 3. 12 7

−7 15

4 52

Corr. for Lt. Eq.
to nearest minute.

11 34 — 3746
16 4 — 3747
12 55 — 3805
17 25 — 3806
7 42 — 4124
12 12 — 4125
16 42 — 4126
13 40 — 4136
10 38 — 4146
15 8 — 4147
12 8 — 4157

U Pegasi.

Period now assumed to be $0.^d18739 \times 2 = 0.^d37478$ ✓

3514.457 ✓ = Epoch when diff. magn. is +0.7 magn.
$+.0674$ = Corr. to reduce to summit of curve.
3514.5244
$-.0937$ = Corr. to reduce from summit to minimum,
3514.4307 referred to minimum.

$0.^d37478 \times 2078 = 778.79284$
3514.4307
4293.22354

Epoch 2078 = 2414293.22354 = 1898 Jan. 3. $5^h\ 22^m$

0.37478 × 37.0	= 13.86686 ✓	+ 3514.4307	= 3528.29756 ✓
" × 1873.0	= 701.96294 ✓	" "	= 4216.39364 ✓
" × 1903.0	= 713.20634 ✓	" "	= 4227.63704 ✓
" × 2062.0	= 772.79636 ✓	" "	= 4287.22706 ✓
" × 2063.0	= 773.17114 ✓	" "	= 4287.60184 ✓
" × 2068.0	= 775.04504 ✓	" "	= 4289.47574 ✓
" × 2073.0 " × 2073.5	= 776.91894 ✓ "	" "	= 4291.34964 ✓ "
" × 2078.0	= 778.79284 ✓	" "	= 4293.22354 ✓

37	3528.29756	3528.48506 ✓
1873	4216.39364	4216.58114 ✓
1903	4227.63704	4227.82454 ✓
2062	4287.22706	4287.41456 ✓
2063	4287.60184	4287.78934 ✓
2068	4289.47574	4289.66324 ✓
2073	4291.34964	4291.53714 ✓
2078	4293.22354	4293.41104 ✓

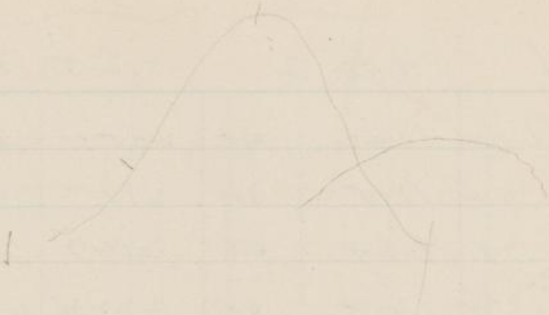
Gr. M. T. Prim. min. uncorrected for Light Equation.			Do. corr. for Light Equation. to nearest minute.		
7	9	✓			1895. Jan. 0.
9	27	✓	9h	19m	1897 Oct. 18.
15	17	✓	15	10	" " 29.
5	27	✓	5	27	" Dec. 28.
14	27	✓	14	27	" " "
11	25	✓	11	25	" " 30
8	23	✓	8	23	1898 Jan. 1.
8	23	✓	8	23	" " "
5	22		5	23	" " 3

U Pegasi.

Period now assumed to be $0.^{d}18739 \times 2 = 0.^{d}37478$

3514.4570 = Epoch when diff. magn. is 0.7
+.0674 = Corr. to reduce to summit of curve.
3514.5244
−.0937 = " " " from summit to minimum.
3514.4307 = referred to secondary minimum.
.1875 = Corr. to reduce to primary min.
3514.6182 = Epoch of primary min.
−.0025 = Correction
3514.6157 = Final value of epoch.

		Gr. M. T. minimum.		Gr. Time. Prim. min. uncor. for ~~Light Eq.~~ L.	Light Eq. Same corr. for Light
Epoch.	37.	3528. ~~48506~~ .4826 ✓	= 1895. Dec. 0.	= ~~11 39~~ 11 35.0	11 31.4 ✓
	1873.	4216. ~~58114~~ .5786 ✓	= 1897. Oct. 18	= ~~13 57~~ 13 53.1	~~13 49~~ 13 45.6 ✓
	1903	4227. ~~82454~~ .8220 ✓	= " " 29	= ~~19 47~~ 19 43.7	~~19 40~~ 19 36.8 ✓
	2062	4287. ~~41456~~ .4121 ✓	= " Dec. 28	= ~~9 57~~ 9 53.4	~~9 57~~ 9 53.6 ✓
	2063	4287. ~~78934~~ .7868 ✓	= " " "	= ~~18 57~~ 18 53.0	~~18 57~~ 18 53.2 ✓
	2068	4289. ~~66324~~ .6607 ✓	= " " 30	= ~~15 55~~ 15 51.4	~~15 55~~ 15 51.9 ✓
	2073	4291. ~~53714~~ .5346 ✓	= 1898. Jan. 1.	= ~~12 53~~ 12 49.9	~~12 53~~ 12 50.7 ✓
	2078	4293. ~~41104~~ .4085 ✓	= " " 3.	= ~~9 52~~ 9 48.3	~~9 53~~ 9 49.3 ✓
	2083	4295. ~~28494~~ .2824 ✓	= " " 5.	= ~~6 50~~ 6 46.7	~~6 51~~ 6 48.0 ✓
	2088	4297. ~~15884~~ .1563 ✓	= " " 7	= ~~3 49~~ 3 45.0	~~(3 51)~~ 3 46.6 ✓
	2089	4297. ~~53362~~ .5311 ✓	= " " "	= ~~12 48~~ 12 44.7	~~(12 50)~~ 12 46.3 ✓
Epoch	0	3514. ~~61820~~ .6157 ✓	= 1895 Nov. 16	~~14 50~~ 14 46.6	~~14 45~~ 14 41.3 ✓
"	269	3615. ~~43402~~ 4.315 ✓	= 1896 Feb. 25	~~10 25~~ 10 21.3	~~10 32~~ 10 28.3 ✓



Corr. for
Light Eq.
to be applied
to Ephemeris.

-3^m	38^s	✓	.4802'
−7	32	✓	.5733'
−6	52	✓	.8173'
+0	11	✓	.4122'
+0	11	✓	.7869'
+0	28	✓	.6610'
+0	45	✓	.5352'
+1	2	✓	.4092'
+1	19	✓	.2833'
+1	35	✓	.1573'
+1	35	✓	.5321'
−5	16	✓	.6120'
+6	57	✓	.4363'

U Pegasi. Plat. I.
Tabulation of Phase and Diff. magn.

.0 to .1		.1 to .2		.2 to .3		.3 to .4		.4 to .5	
.0005	1.02	.1046	.40	.2051	.66	.3235	.58		
.0134	.94	.1115	.38	.2111	.66	.3323	.66		
.0197	.71	.1169	.46	.2167	.58	.3386	.68		
.0263	.72	.1269	.48	.2224	.58	3457	.78		
.0336	.59	.1332	.48	.2303	.50	.3525	.84		
.0445	.56	.1415	.50	.2359	.44	.3606	.93		
.0533	.46	.1501	.61			.3719	.98		
.0605	.48	.1557	.64						
.0715	.38	.1608	.70						
.0803	.34	.1660	.74						
.0873	.33	.1705	.77						
.0949	.46	1750	.82						
		.1799	.80						
		.1270	.44						
		.1354	.44						
		.1410	.53						
		.1467	.56						
		.1529	.57						
		.1585	.70						
		.1650	.73						
		.1710	.85						
		.1770	.82						
		.1831	.79						
		.1887	.80						
		.1968	.78						

.5 to .6	.6 to .7	.7 to .8	.8 to .9	.9 to .10

U Pegasi. Phot. I.

Tabulations of Phase and Diff. magn.

Tabulation of individual groups of 16 settings

.00 to .05		.05 to .10		.10 to .15		.15 to .20		.20 to .25	
~~.0055~~	~~1.02~~	~~.0533~~	~~.46~~	~~.1046~~	~~.40~~	~~.1501~~	~~.61~~	~~.2051~~	~~.66~~
~~.0134~~	~~.94~~	~~.0605~~	~~.48~~	~~.1145~~	~~.38~~	~~.1557~~	~~.64~~	~~.2111~~	~~.66~~
~~.0199~~	~~.71~~	~~.0715~~	~~.38~~	~~.1169~~	~~.46~~	~~.1608~~	~~.70~~	~~.2167~~	~~.58~~
~~.0263~~	~~.72~~	~~.0803~~	~~.34~~	~~.1269~~	~~.48~~	~~.1660~~	~~.74~~	~~.2224~~	~~.58~~
~~.0336~~	~~.59~~	~~.0873~~	~~.33~~	~~.1332~~	~~.48~~	~~.1705~~	~~.77~~	~~.2303~~	~~.50~~
~~.0445~~	~~.56~~	~~.0949~~	~~.46~~	~~.1415~~	~~.50~~	~~.1750~~	~~.82~~	~~.2359~~	~~.44~~
~~.0231~~	~~.73~~	~~.0548~~	~~.46~~	~~.1270~~	~~.44~~	~~.1799~~	~~.80~~	~~.2417~~	~~.43~~
~~.0282~~	~~.66~~	~~.0679~~	~~.42~~	~~.1354~~	~~.44~~	~~.1529~~	~~.57~~	~~.2010~~	~~.85~~
~~.0337~~	~~.62~~	~~.0739~~	~~.43~~	~~.1420~~	~~.53~~	~~.1585~~	~~.70~~	~~.2059~~	~~.75~~
~~.0429~~	~~.58~~	~~.0799~~	~~.40~~	~~.1467~~	~~.56~~	~~.1650~~	~~.73~~	~~.2177~~	~~.66~~
~~.0494~~	~~.53~~	~~.0846~~	~~.37~~	~~.1058~~	~~.40~~	~~.1710~~	~~.85~~	~~.2232~~	~~.58~~
~~.0015~~	~~1.04~~	~~.0557~~	~~.50~~	~~.1110~~	~~.38~~	~~.1770~~	~~.82~~	~~.2274~~	~~.52~~
~~.0074~~	~~.98~~	~~.0628~~	~~.45~~	~~.1164~~	~~.42~~	~~.1831~~	~~.79~~	~~.2315~~	~~.52~~
~~.0013~~	~~.96~~	~~.0674~~	~~.40~~	~~.1233~~	~~.46~~	~~.1887~~	~~.80~~	~~.2358~~	~~.52~~
~~.0082~~	~~.90~~	~~.0860~~	~~.36~~	~~.1416~~	~~.53~~	~~.1968~~	~~.78~~	~~.2102~~	~~.72~~
~~.0156~~	~~.81~~	~~.0906~~	~~.39~~	~~.1483~~	~~.56~~	~~.1545~~	~~.66~~	~~.2152~~	~~.67~~
~~.0223~~	~~.70~~	~~.0948~~	~~.42~~	~~.1065~~	~~.40~~	~~.1633~~	~~.70~~	~~.2199~~	~~.62~~
~~.0355~~	~~.56~~	~~.0509~~	~~.54~~	~~.1123~~	~~.40~~	~~.1701~~	~~.77~~	~~.2242~~	~~.60~~
~~.0397~~	~~.52~~	~~.0582~~	~~.45~~	~~.1182~~	~~.40~~	~~.1833~~	~~.88~~	~~.2289~~	~~.54~~
~~.0450~~	~~.54~~	~~.0657~~	~~.45~~	~~.1232~~	~~.36~~	~~.1882~~	~~.87~~	~~.2336~~	~~.52~~
~~.0498~~	~~.48~~	~~.0748~~	~~.46~~	~~.1401~~	~~.52~~	~~.1947~~	~~.85~~	~~.2488~~	~~.40~~
~~.0063~~	~~.95~~	~~.0812~~	~~.46~~	~~.1462~~	~~.53~~	~~.1527~~	~~.58~~	~~.2420~~	~~.48~~
~~.0144~~	~~.86~~	~~.0887~~	~~.48~~	~~.1009~~	~~.43~~	~~.1651~~	~~.73~~	~~.2477~~	~~.44~~
~~.0255~~	~~.74~~	~~.0940~~	~~.46~~			~~.1705~~	~~.77~~	~~.253~~	
~~.0355~~	~~.62~~					~~.1754~~	~~.84~~		
~~.0425~~	~~.58~~					~~.1825~~	~~.87~~		
						~~.1876~~	~~.84~~		
						~~.1922~~	~~.88~~		

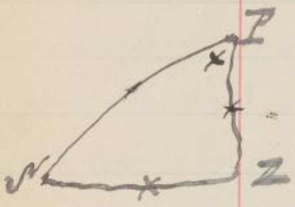
preparatory to groups of 80 settings for plotting in Book 15. pp. 2 & 3. In this grouping, the dates 1897 Oct. 18. + 29, Dec. 28. + 30, and 1898. Jan. 1. 3. 5 + 7 are included.
(See Book 15. pp. 2 & 3.)

.25 to .30		.30 to .35		.35 to .40	
~~.2523~~	~~.44~~	~~.3235~~	~~.58~~	~~.3535~~	~~.84~~
~~.2566~~	~~.47~~	~~.3323~~	~~.66~~	~~.3606~~	~~.93~~
~~.2637~~	~~.45~~	~~.3386~~	~~.68~~	~~.3719~~	~~.98~~
~~.2692~~	~~.48~~	~~.3457~~	~~.78~~	~~.3587~~	~~.94~~
~~.2750~~	~~.44~~	~~.3212~~	~~.52~~	~~.3688~~	~~.98~~
~~.2558~~	~~.48~~	~~.3264~~	~~.55~~	~~.3701~~	~~1.02~~
~~.2615~~	~~.38~~	~~.3320~~	~~.58~~	~~.3530~~	~~.80~~
~~.2539~~	~~.45~~	~~.3424~~	~~.68~~	~~.3592~~	~~.94~~
~~.2595~~	~~.46~~	~~.3488~~	~~.72~~	~~.3659~~	~~.92~~
~~.2660~~	~~.44~~	~~.3019~~	~~.44~~	~~.3556~~	~~.84~~
~~.2811~~	~~.40~~	~~.3200~~	~~.53~~	~~.3655~~	~~.93~~
~~.2865~~	~~.42~~	~~.3258~~	~~.50~~		
~~.2921~~	~~.44~~	~~.3306~~	~~.56~~		
~~.2977~~	~~.43~~	~~.3350~~	~~.60~~		
~~.2853~~	~~.43~~	~~.3047~~	~~.40~~		
~~.2930~~	~~.43~~	~~.3124~~	~~.44~~		
~~.2997~~	~~.39~~	~~.3185~~	~~.50~~		
		~~.3277~~	~~.54~~		
		~~.3330~~	~~.58~~		
		~~.3375~~	~~.60~~		
		~~.3431~~	~~.67~~		
		~~.3499~~	~~.75~~		

U Pegasi. Dec.(1900) = +15°.4

Computation of Parallactic Angles.

PZ = 47° 37'



For 1h hour angle. Zσ = 29°.9

sin Zσ : sin 15° = sin PZ : < σ

Log sin 15° = 9.41300
" " PZ = 9.86844
9.28144
" " Zσ = 9.69765
p = 22° 33' = 9.58379

For 2h Hour Angle. Zσ = 37°.3

Log sin 30° = 9.69897
" " PZ = 9.86844
9.56741
" " Zσ = 9.78246
p = 37° 33' = 9.78495

For 3h Hour Angle. Zσ = 47°.0

Log sin 45° = 9.84949
" " PZ = 9.86844
9.71793
" " Zσ = 9.86413
p = 45° 34' = 9.85380

For 4h Hour Angle. Zσ = 57°.7

Log sin 60° = 9.93753
" " PZ = 9.86844
= 9.80597
" " Zσ = 9.92699
p = 49° 11' = 9.87898

U Pegasi.

For 1° Hour Angle.

ZS = 27°.0

Log sin 1° = 8.24186
" " PZ = 9.86844
8.11030
" " ZS = 9.65705
∴ p = 1° 38′ = 8.45325

U Pegasi: Comparison with Yendell's

Obs. assuming period of .37478

Oct. 18, 1894. 12h 55m = 3120.5382 ✓
Ephem. time corr. for Lt. Eq = 3120.3419
.1963 = +4h 43m　　+4h 28m

1895. Sept. 13d 13h 1m = 3450.5424
Ephem. Time corr. for Lt. Eq. = 3450.5228
.0196 = +0h 28m　　+0 13

1895. Sept. 24. 14h 8m = 3461.5889
Eph. Time corr. for Lt. Eq. = 3461.3913　　(Wt. 5)
+.1976 = +4h 45m　　+4 30

1895. Oct. 14. 15h 9m = 3481.6312 ✓
~~Eph. Time corr. for Lt. Eq. = 3514.6103~~　　(Wt. 5)
~~−32.9791~~
Eph. Time corr. for Lt. Eq. = 3481.6297 ✓
+ .0015 = +0h 2m ✓　　−0 13

1895. Nov. 5. 12h 59.5m = 3503.5414
Eph. Time corr. for Lt. Eq. 3503.7427
.2013 = +4h 10m　　−0 20m
(Wt. 1)

1895. Oct. 23. 14h 39.5m = 3490.6108
Eph. Time corr. for Lt. Eq = 3490.6194
.0086 =　　−0 12m
(Wt. 5)

1895phae.proj.167I

δ Cephei.

Max. (Gr. m. T.) = 1840 Sept. $26^d\ 10^h\ 50^m$ = 2393375.4513889
1st term period = $5^d\ 8^h\ 47^m\ 39^s.3$ = 5.3664271

Time of my first meast. = 1895. Apr. 4.4027314 (East. Time.) = 2413288.4027314

2413288.4027314
2393375.4513889
Log. 19912.9513425 = 4.2991356
" 5.3664271 = 0.7296852
3710.64 = 3.5694504

Log. 5.3664271 = 0.7296852
" 3710. = 3.5693739
19909.4429224 = 4.2990591
494
97
− 0.2160879
19909.2268345
2393375.4513889
2413284.6782234
2413284. = Apr. 0.
0.6782234
∴ Time max = 1895 Apr. 0.6782234 =
= Apr. $0^d\ 16^h\ 16^m\ 39^s$. G. m. T.
= Apr. $0^d\ 11^h\ 16^m\ 39^s$. East. Time.

Log. $0^s.0008$ = 6.9030900
" $(3710.)^2$ = 7.1387478
$11010.^s$ 4.0418378

" $0^s.000000015$ = 3.1760913
" $(3710.)$ = 10.7081217
7659.7214^s = 3.8842130
11010.
$18670.^s$ = $0^d\ 5^h\ 11^m\ 10^s$ =
= 0.2160879

First Term = $5^d.3664271$ ——
Second " = $0^s.0008$
Third " = $0^s.000000015$

δ Cephei: Computation of times of maxima.

See p. 108.

~~Gr. Time of max. = 1895. Apr. $0.^{d}6782234$ = Gr. M. T. of maximum.~~

~~+32.1697302~~

~~32.8479536~~

~~Apr. 30.0~~

~~May 2.8479536 = " " " " "~~

~~Apr. 0.6782234~~

Gr. Time of max. = 1895. Apr. $0.^{d}6782234$ = Gr. M. T. of maximum.

+32.1985626

32.8767860

30.0

May 2.8767860 = " " " " "

Apr. $0.^{d}6782234$

59.0306981

59.7089215

30.0

May 29.7089215 = " " " " "

Apr. $0.^{d}6782234$

$5.3664271 \times 17 = 91.2292607$

91.9074841

$0.^{d}0008 \times (17)^2 =$

$0.00000015 (17)^3 =$

91.9074841

61.

June 30.9074841 = " " " " "

Con. on p. 108.

β Lyrae.

Gr. m. T.

Minimum = 1855 Jan. $6^d\ 14^h\ 28^m.7$ = 2398590.6032638

1st term period = $12^d\ 21^h\ 46^m\ 58^s.3$ = 12.9076192

2d " " = $+0.^s4217\ E^2$

3d " " = $-0.^s00007\ E^3$

Time of 1st meast. = Apr. $4^d\ 15^h\ 15^m\ 7^s$ Gr. m. T. = 2413288.6354977 Gr. m. T.

Apr. 4 = 2413288.6
2398590.6
Lg. 14698.0 = 4.1672582
" 12.90762 = 1.1108462
" 1138.7 = 3.0564120

Lg. 12.9076192 = 1.1108462
" 1138. = 3.0561423
8706496
14688.8745763 = 4.1669885
+5.1268171
14694.0013934
2398590.6032638
2413284.6046572 =

Apr. 0.6046572 G. m. T.
= 1895 Apr. $0^d\ 14^h\ 30^m\ 42^s$. Gr. m. T.

Lg. $0.^s4217$ = 9.6250036
" $(1138)^2$ = 6.1122846
+546120.^{s} = 5.7372882

Lg. $0.^s0007$ = 5.8450980
" $(1138)^3$ = 9.1684269
−103163.^{s} = 5.0135249
+546120.^{s}
+442957.^{s} = $5^d\ 3^h\ 2^m\ 37^s$.
= $+5.^d1268171$

Computations on β Lyrae.

~~1895 Nov. 4.619 = 2413502.619 =~~

5

Lg. 12.9076192 = 1.1108462 ✓
" 1200. = 3.0791812 ✓
.1430400 ✓
15489.1428571 = 4.1900274 ✓
5.6283334
15494.7711905

Lg. 0.4217 = 9.6250036 ✓
" $(1200.)^2$ = 6.1583624 ✓
+607248.^{s} 5.7833660

" $(1200)^3$ = 9.2375436 ✓
" .00007 = $\bar{5}$.8450980 ✓
−120960.^{s} = 5.0826416
+607248.
+486288 = +5^d 15^h 4^m $48.^s$
= 5.6283334

2398590.6032638
15494.7711905
2414085.3744543 =

= 1897. June 9^d 8^h 59^m $13.^s$ = Gr. M. T. of minimum for Epoch 1200. since the fundamental time of minimum in 1855. on preceding page.

For plotting the observations, assume a uniform period for β Lyrae of $12.^d916$ This value can be carried forward by starting with ~~assuming~~ the initial value on preceding page which is Apr. 0.6046572 Gr. M. T. = 1895 Apr. 0^d 14^h 30^m $42.^s$ G. M. T. = 2413284.6046572 G. M. T.

$x = ae + be^2 - ce^3$

$dx = a \cdot de + 2be \cdot de - 3ce^2 \cdot de$

$\frac{dx}{de} = a + 2be - 3ce^2$

$\frac{d^2x}{de^2} = +2b - 6ce = +0.8434 - 0.00042e$

Ephemeris of β Lyrae, assuming approximate value of period = $12^d.916$

G.M.T.

No. Ep.					
1138	2,41 3,284.~~605~~ 609	1895: apr. 0^d 14^h 32^m		2,41 3,646.~~253~~ 257	1896: Mar. 27^d 6^h 4^m
	3,297.~~521~~ 525	" apr. 13^d 12^h 30^m		3,659.~~169~~ 173	apr. 9^d 4^h 3^m
1140	3,310.~~437~~ 441	" apr. 26^d 10^h 29^m		3,672.~~085~~ 089	apr. 22^d 2^h 3^m
	3,323.~~353~~ 357	" May 9^d 8^h 29^m		3,685.~~001~~ 005	May 5^d 0^h 1^m
	3,336.~~269~~ 273	" May 22^d 6^h 27^m	1170	3,697.~~917~~ 921	May 17^d 22^h 0^m
	3,349.~~185~~ 189	" June 4^d 4^h 26^m		3,710.~~833~~ 837	May 30^d 20^h 0^m
	3,362.~~101~~ 105	" June 17^d 2^h 26^m		3,723.~~749~~ 753	June 12^d 17^h 59^m
1145	3,375.~~017~~ 021	" July 0^d 0^h 24^m		3,736.~~665~~ 669	June 25^d 15^h 58^m
	3,387.~~933~~ 937	" July 12^d 22^h 23^m		3,749.~~581~~ 585	July 8^d 13^h 56^m
	3,400.~~849~~ 853	" July 25^d 20^h 23^m	1175	3,762.~~497~~ 501	July 21^d 11^h 56^m
	3,413.~~765~~ 769	" Aug. 7^d 18^h 22^m		3,775.~~413~~ 417	Aug 3^d 9^h 55^m
	3,426.~~681~~ 685	" Aug. 20^d 16^h 20^m		3,788.~~329~~ 333	Aug. 16^d 7^h 53^m
1150	3,439.~~597~~ 601	" Sept. 2^d 14^h 20^m		3,801.~~245~~ 249	Aug. 29^d 5^h 53^m
	3,452.~~513~~ 517	" Sept. 15^d 12^h 19^m		3,814.~~161~~ 165	Sept. 11^d 3^h 52^m
	3,465.~~429~~ 433	" Sept 28^d 10^h 17^m	1180	3,827.~~077~~ 081	Sept. 24^d 1^h 50^m
	3,478.~~345~~ 349	" Oct. 11^d 8^h 17^m		3,839.~~993~~ 997	Oct. 6^d 23^h 50^m
	3,491.~~261~~ 265	" Oct. 24^d 6^h 16^m		3,852.~~909~~ 913	Oct. 19^d 21^h 49^m
1155	3,504.~~177~~ 181	" Nov. 6^d 4^h 14^m		3,865.~~825~~ 829	Nov. 1^d 19^h 48^m
	3,517.~~093~~ 097	" Nov. 19^d 2^h 14^m		3,878.~~741~~ 745	Nov. 14^d 17^h 48^m
	3,530.~~009~~ 013	" Dec. 2^d 0^h 13^m	1185	3,891.~~657~~ 661	Nov. 27^d 15^h 46^m
	3,542.~~925~~ 929	" Dec. 14^d 22^h 12^m		3,904.~~573~~ 577	Dec. 10^d 13^h 45^m
	3,555.~~841~~ 845	" Dec. 27^d 20^h 12^m		3,917.~~489~~ 493	Dec. 23^d 11^h 45^m
1160	3,568.~~757~~ 761	1896 Jan. 9^d 18^h 10^m		3,930.~~405~~ 409	1897: Jan. 5^d 9^h 43^m
	3,581.~~673~~ 677	Jan. 22^d 16^h 9^m		3,943.~~321~~ 325	Jan. 18^d 7^h 42^m
	3,594.~~589~~ 593	Feb. 4^d 14^h 9^m	1190	3,956.~~237~~ 241	Feb. 0^d 5^h 42^m
	3,607.~~505~~ 509	Feb. 17^d 12^h 7^m		3,969.~~153~~ 157	Feb. 13^d 3^h 40^m
	3,620.~~421~~ 425	Mar. 1^d 10^h 6^m		3,982.~~069~~ 073	Feb. 26^d 1^h 39^m
1165	3,633.~~337~~ 341	Mar. 14^d 8^h 6^m		3,994.~~985~~ 989	Mar. 10^d 23^h 39^m
	3,646.~~253~~ 257	Mar. 27^d 6^h 4^m		4,007.~~901~~ 905	Mar. 23^d 21^h 38^m

This ephemeris was based on Chandler's elements in his 2^{d} Catalogue.

	2,414,007.~~901~~ 905	1897:	Mar 23$^{d.}$	21$^{h.}$	38$^{m.}$
1195	4,020.~~817~~ 821		Apr. 5$^{d.}$	19$^{h.}$	36$^{m.}$
	4,033.~~733~~ 737		Apr. 18$^{d.}$	17^{h}	36$^{m.}$
	4,046.~~649~~ 653		May 1$^{d.}$	15$^{h.}$	35$^{m.}$
	4,059.~~565~~ 569		May 14^{d}	13$^{h.}$	33$^{m.}$
	4,072.~~481~~ 485		May 27$^{d.}$	11$^{h.}$	33$^{m.}$
1200	4,085.~~397~~ 401		June 9$^{d.}$	9$^{h.}$	32$^{m.}$
	4,098.~~313~~ 317		June 22$^{d.}$	7$^{h.}$	30$^{m.}$
	4,111.~~229~~ 233		July 5$^{d.}$	5$^{h.}$	30$^{m.}$
	4,124.~~145~~ 149		July 18$^{d.}$	3$^{h.}$	29$^{m.}$
	4,137.~~061~~ 065		Aug. 0$^{d.}$	1$^{h.}$	27$^{m.}$
1205	4,149.~~977~~ 981		Aug. 12$^{d.}$	23$^{h.}$	27$^{m.}$
	4,162.~~893~~ 897		Aug. 25$^{d.}$	21$^{h.}$	26$^{m.}$
	4,175.~~809~~ 813		Sept. 7$^{d.}$	19$^{h.}$	24$^{m.}$
	4,188.~~725~~ 729		Sept. 20$^{d.}$	17$^{h.}$	24$^{m.}$
	4,201.~~641~~ 645		Oct. 3$^{d.}$	15$^{h.}$	23^{m}
1210	4,214.~~557~~ 561		Oct. 16$^{d.}$	13$^{h.}$	22$^{m.}$
	4,227.~~473~~ 477		Oct. 29$^{d.}$	11$^{h.}$	22^{m}
	4,240.~~389~~ 393		Nov. 11$^{d.}$	9$^{h.}$	20$^{m.}$
	4,253.~~305~~ 309		Nov. 24$^{d.}$	7$^{h.}$	19$^{m.}$
	4,266.~~221~~ 225		Dec. 7$^{d.}$	5$^{h.}$	19$^{m.}$
1215	4,279.~~137~~ 141		Dec. 20$^{d.}$	3$^{h.}$	17$^{m.}$
	4,292.~~053~~ 057	1898	Jan. 2^{d}	1^{h}	16$^{m.}$

β Lyrae.
Elements from Chandler's Third Cat.

Min. = 1855 Jan. 6^d 15^h.0 = 2398590.625000

1st term = 12^d 21^h 47^m 23^s.72 = 12.9079135

2^d " " = +0^s.315938 E^2

3^d " " = −0^s.0000121 E^3

12.9079135
1170
9035539450
129079135
129079135
151022587950
2398590.625000
4.7811575
2413697.6649525

Log 1170. = 3.0681859
2
6.1363718
Log .315938 = 9.4996019
+432488. = 5.6359737

Log 1170. = 3.0681859
3
9.2045577
Log 0.0000121 = 5.0831441
−19396. = 4.2877018
+432488.
+413092^s = 4^d 18^h 44^m 52^s =
+4^d.7811575

12.9079135
1180
10326330800
129079135
129079135
15231.3379300
+4.8612847
2398590.625000
2413826.8242147

Log 1180. = 3.0718820
2
6.1437640
Log .315938 = 9.4996019
+439912.^{s} = 5.6433659

Log. 1180 = 3.0718820
3
9.2156460
" 0.0000121 = 5.0831441
−19497. = 4.2987901
+439912.
+420015^s = 4^d 20^h 40^m 15^s =
+4^d.8612847

β Lyrae.

Elements from Chandler's Third Cat.

12.9079135 ✓
1190
11617122150
129079135
129079135
15360.4170650 ✓
4.9420371
2398590.6250000
2413955.9841021 ✓

~~Log. 1190. = 3.0755470~~
~~3~~
~~9.2266410~~
~~Log. .315938 = 9.4996019~~
~~8.7262429~~

Log. 1190. = 3.0755470
2
6.1510940 ✓
Log. .315938 = 9.4996019
+447400. ✓ = 5.6506959 ✓

Log. 1190. = 3.0755470
3
9.2266410 ✓
Log. 0.00001211 = 5.0831441 ✓
−20408. = 4.3097851 ✓
+447400. ✓
+426992 = $4^d\ 22^h\ 36^m\ 32^s$ ✓ =
+4.9420371^d

12.9079135
1200
25815827000
129079135
15489.4962000 ✓
5.0234375 ✓
2398590.6250000 ✓
2414085.1446375 ✓

Log. 1200. = 3.0791812 ✓
2
6.1583624 ✓
Log. .315938 = 9.4996019 ✓
+454951. ✓✓ = 5.6579643

Log. 1200. = 3.0791812 ✓
3
9.2375436
Log. 0.00001211 = 5.0831441
−20926. ✓ = 4.3206877
+454951. ✓
+434025. ✓ = $5^d\ 0^h\ 33^m\ 45^s$ ✓ =
+5.0234375^d ✓

See p. 110.

δ Cephei.

(See p. 101.)

5.3664271
$\times 6$
$+32.1985626$
~~-0.02883240~~
~~$+32.1697302$~~

$0.^{d}0008$
$\times 36$
48
24
$-0.^{d}0288$

$0.^{d}00000015$
$\times 216$
90
15
30
$-0.^{d}00003240$
-0.0288
$-0.^{d}02883240$

5.3664271
$\times 11$
5.3664271
53664271
$+59.0306981$
$-0.^{d}0969996$

$0.^{d}0008$
$\times 121$
08
16
8
-0.0968
-0.0001996
$-0.^{d}0969996$

0.00000015
$\times 1331$
15
45
45
15
$-0.^{d}00019965$

Con. from p. 101.

Gr. M. T. of max. = Apr. 0.6782234
123.4278233
124.1060467
$0.^{d}0008 \times (23)^2 =$
$0.00000015 (23)^3 =$
124.1060467
122.
Aug. 2.1060467 = Gr. M. T. maximum.

Apr. $0.^{d}6782234$
150.2599588
150.9381822
$0.^{d}0008 \times (28)^2 =$
$0.00000015 \times (28)^3 =$
150.9381822
122.0
Aug. 28.9381822 = Gr. M. T. maximum.

1895. Apr. 0.^{d} 6782234 = 2413284.6782234

Date of obs. = " Nov. 4.6617130 = 3502.6617130

217.9834896

Log 5.3664271 = 0.7296852

" 217.9834896 = 2.3384236

~~1169.7925 = 3.0681088~~

40.6 = 1.6087384

Log 5.3664271 = 0.7296852

" 40. = 1.6020600

214.65707925 = 2.3317452

~~2.3317309~~

2413284.6782234

2413499.3353026

498.

Nov. 1.3353026 = $1^d\ 8^{hrs}\ 2^m\ 50^s$

β Lyrae.

Elements from Chandler's Third Cat.

Value of Period assumed to be 12.^d^916

Epoch 1170. = 2413697.6649525

$7.\frac{921}{257}$ +129.1592622

" 1180 = 2413826.8242147 +6252

$7\ \frac{081}{257}$ +129.1598874

" 1190 = 2413955.9841021 +6480

$6.\frac{241}{257}$ +129.1605354

" 1200 = 2414085.1446375

$5.\frac{401}{.257}$

Epoch 1170	2,413,697.664	1896. May 17. 15^h^ 56^m^
1171	3,710.580	30. 13 55
1172	3,723.496	June 12. 11 55
1173	3,736.412	25. 9 53
1174	3,749.328	July. 8. 7 52
1175	3,762.244	21 5 52
1176	3,775.160	Aug 3. 3 50
1177	3,788.076	16. 1 49
1178	3,800.992	28. 23 49
1179	3,813.908	Sept. 10. 21 48
1180	3,826.824	23. 19 46
1181	3,839.740	Oct. 6. 17 46
1182	3,852.656	19. 15 45
1183	3,865.572	Nov. 1. 13 43
1184	3,878.488	14. 11 43
1185	3,891.404	27. 9 42
1186	3,904.320	Dec. 10. 7 40
" 1187	3,917.236	23 5 40

Epoch.	1188	2,413,930.152	1897. Jan. 5.	3h	39m
	1189	3,943.068	18.	1	37
	1190	3,955.984	30.	23	37
	1191	3,968.900	Feb. 12.	21	36
	1192	3,981.816	25.	19	35
	1193	3,994.732	Mar. 10.	17	35
	1194	4,007.648	23.	15	33
	1195	4,020.564	Apr. 5.	13	32
	1196	4,033.480	18.	11	32
	1197	4,046.396	May 1.	9	30
	1198	4,059.312	14.	7	29
	1199	4,072.228	27.	5	29
	1200	4,085.144	June 9.	3	27

Z Herculis (Prin. min.) from Hartwig's Period.

Hartwig's period is $3^d\ 23^h\ 49.^m54$

1895.

Prin. min.	July	2^d	20^h	$20.^m00$	Gr. M. T.
		3	23	49.54	
" "	"	6	20	9.54	
		3	23	49.54	
" "	"	10	19	59.08	
		3	23	49.54	
" "	"	14	19	48.62	
		3	23	49.54	
" "	"	18	19	38.16	
		3	23	49.54	
" "	"	22	19	27.70	
		3	23	49.54	
" "	"	26	19	17.24	
	September	4	17	33.0	
		3	23	49.54	
		8	17	22.54	
		3	23	49.54	
		12	17	1208	
		3	23	49.54	
		16	17	1.62	
		3	23	49.54	
		20	16	51.16	
		3	23	49.54	
		24	16	40.70	
		3	23	49.54	
		28	16	30.24	
		3	23	49.54	
	October	2	16	19.78	

Z Herculis Prim Min
from Hartwig's Period

			1895.	
		d	hrs	m
Prim Min	October	2	16	19.00
		3	23	49.54
" "	"	6	16	8.54
" "	"	3	23	49.54
" "	"	10	15	58.08
" "	"	3	23	49.54
" "	"	14	15	47.62
		3	23	49.54
" "	"	18	15	37.16
		3	23	49.54
" "	"	22	15	26.70
		3	23	49.54
" "	"	26	15	16.24
		3	23	49.54
" "	"	30	15	5.78
		3	23	49.54
" "	November	(3	14	55.32) =
" "	"	(3	14	56.00) in Ephemeris.

Computation of Times of Minima of U Cephei for the early observations.

G.M.T.

Ep. Min. = 1880. June $23^d\ 9^h\ 28.0^m = 2407890.^d3944444$ ✓

$2^d\ 11^h\ 49^m\ 34.25^s = 2.^d4928038$ ✓

$$\begin{array}{r} 40 \\ \hline 99.7121520 \\ 2407890.3944444 \\ \hline 2407990.1065964 \\ -0.0633334 \\ \hline \end{array}$$

1880. Oct. 1.0432630 = 2407990.0432630

$$\begin{array}{r} 0.^\circ 08 \\ 40 \\ \hline 3.^\circ 20 \\ 283. \\ \hline 286.^\circ 2 \end{array}$$

Log sin 286.2 = n 9.98240 ✓

" 95^m = +1.97772 ✓

91.2^m = n 1.96012 ✓ = 0.0633334

1880. Oct. 1.0432630 ✓

2.4928038 ✓

Oct. 3.5360668 ✓

2.4928038 ✓

Oct. 6.0288706 ✓

$$\begin{array}{r} 91. \\ .08 \\ \hline 7.28 \\ 283. \\ \hline 290.^\circ 28 \\ 60 \\ \hline 16.80 \end{array}$$

Log sin 290.28 = n 9.97220 ✓

" 95. = +1.97772 ✓

-89.1^m = n 1.94992 ✓.

$-0.^d0618750$ =

$$\begin{array}{r} 2.4928038 \\ 91 \\ \hline 2\ 4928038 \\ 224\ 352342 \\ \hline 226.8451458 \\ -0.0618750 \\ \hline 226.7832708 \\ 2407890.3944444 \\ \hline 2408117.1777152 \\ 2.4928038 \\ \hline 2408119.6705190 \\ 8112. \\ \hline \end{array}$$

1881 Feb. 7.6705190 ✓

96
.08
7.68
283.
290.68
60
40.80

2.4928038
96
149568228
224352342
239.3091648
2407890.3944444
2408129.7036092
−0.0617245
2408129.6418847 = 1881 Feb. 17.6418847
2.4928038
2.4928038
1881 Feb. 22.6274923

Log sin 290° 40.8′ = n9.97108
" 95. = 1.97772
88^{m} 53^{s} = 88^{m}.88 = n1.94880
= −.0617245

2.4928038
106
149568228
24928038
264.2372028
2407890.3944444
2408154.6316472
−0.0613889
2408154.5702583 = 1881. Mar. 14.5702583

106.
.08
8.48
283.
291.48
60
28.80

Log sin. 291° 28.8′ = n9.96874
" 95. = 1.97772
− 88.40 = n1.94646
− 88^{m} 24^{s} = −0.0613889

2.4928038
111.
2.4928038
24928038
24928038
276.7012218
2407890.3944444
2408167.0956662
−0.0612268
2408167.0344394 = 1881. Mar. 27.0344394

111.
.08
8.88
283.
291.88
60
52.80

Log sin 291° 52.8′ = n9.96753
" 95. = +1.97772
−88^{m}.16 = n1.94525
60
9.60 = −0.0612268

2.4928038
115
124640190
24928038
24928038
286.6724370
2407890.3944444
2408177.0668814
−0.0610834
2408177.0057980 = 1881. Apr. 6.0057980

115
.08
9.20
283.
292.20
60
12.00

Log sin. 292° 12′ = n9.96655
" 95. = +1.97772
− 87^{m}.96 = n1.94427
60
57.60 = −0.0610834

113.

2.4928038
113
74784114
24928038
24928038
2816868294
2407890.3944444
2408172.0812738
-.0611528
2408172.0201210

113
.08
9.04
283.
292°.04
60
2'.40

~~Log sin~~ 292° 2'.4
Log sin do. = n9.96704
" 95.^{m} = +1.97772
-88.06 = n1.94476
60
3'.60

= -.0611528

See p. 114. ff.

Times of minimum of U Cephei, accurately computed from Chandler's last (3^d) catalogue.

No. Epochs.	Gr. M. T.		Gr. M. T.	Light Eq.
40.	1880. Oct. 1.0432630 ✓	=	1880. Oct. 1.^{d} 1^h 2^m 18^s	-1^m 44^s
41.	" Oct. 3.5360668 ✓	=	" Oct. 3. 12 51 56.	-1 51
42.	" Oct. 6.0288706 ✓	=	" Oct. 6. 0 41 34.	-2 1
91.	1881. Feb. 5.1777152	=	1881. Feb. 5. 4 15 55.	-1 36
92.	" Feb. 7.6705190	=	" Feb. 7. 16 5 33.	-1 29
96.	" Feb. 17.6418847	=	" Feb. 17. 15 24 19.	-0 52
98.	" Feb. 22.627~~4923~~5578	=	" Feb. 22. 15 3 ~~35~~ 41 ✓	-0 32
106	" Mar. 14.5702583 ✓	=	" Mar. 14. 13 41 10.	+0 46
111	" Mar. 27.0344394	=	" Mar. 27. 0 49 36.	+1 35
115	" Apr. 6.0057980	=	" Apr. 6. 0 8 21.	+2 9
110	" Mar. 24.5416356	=	" Mar. 24. 12 59 57.	+1 24
114	" Apr. 3.5129896	=	" Apr. 3. 12 18 42.	+1 59
117	" Apr. 10.9914~~000~~815	=	" Apr. 10. 23 47 ~~37~~ 44	+2 22
113	" Apr. 1.0201210	=	" Apr. 1. 0 28 58	+1 52

Corrected for Light Equation.

No. Epochs	
40	~~1880. Oct. 1. 1^h 0^m 34^s.~~
41	~~" Oct. 3. 12 50 5.~~
42	~~" Oct. 6. 0 39 33~~
91	~~1881 Feb. 5. 4 14 19.~~
92	~~" Feb. 7. 16 4 4.~~
96	~~" Feb. 17. 15 23 27.~~
98	~~" Feb. 22. 15 3 9.~~
106	~~" Mar. 14. 13 41 56.~~
111	~~" Mar. 27. 0 51 11.~~
115	~~" Apr. 6. 0 10 30.~~
110	~~" Mar. 24. 13 1 21.~~
114	~~" Apr. 3. 12 20 41.~~
117	~~" Apr. 10. 23 50 6.~~
113	~~" Apr. 1. 0 30 50.~~

Jul. Days.								
2407990.		0^m	0^s			-0^m	0^s	
7992.	−	10^m	$22^s.$	-0^m	$22^s.$			
7995.	−	20	44.	−0	44.			
		528	18					
8117.	−	526	23.	−16	23			
		538						
8119.	−	536	45.	−16	45			
8129.	−	577	59	−17	59			
8134.	−	598	~~44~~ 38	−18	~~44~~ 38			
8154.	−	681	8	−21	8			
8167.	−	732	42	−22	42			
8177.	−	~~774~~	~~57~~	−24	57	−773 57	−23	57
8164.	−	722	21	−22	21			
8174.	−	~~764~~	~~36~~	−24	36	−763 36	−23	36
8181.	−	~~795~~	~~44~~	−25	~~44~~ 34	−794 ~~44~~ 34	−24	~~44~~ 34

U Cephei. Computation of recent Times of minimum from Chandler's last Catalogue.

Min. = 1880. June 23^d 9^h 28^m = 2407890.394444
2^d 11^h 49^m 38.25^s = 2.4928038
2240.

99712152 0
4985 6076
4985 6076
5583.8805120
0.0644792 (821)
5583.9449912
2407890.394444
2413474.3394356 (385)
3467.
1895. Oct. 7. 3394356 (385)

√

2240.
0.08
179.20
283.
462.20
360.
Log sin 102.20 = +9.99008
Log. 95. = +1.97772
92.85(4)^m +1.96780
1^h 32^m 51.24^s = .0644792 (8/2 1)

2.4928038
2246
14956822 8
99712152
4985 6076
4985 6076
5598.8373348
0.0643612
5598.9016960
2407890.394444
2413489.2961404
3467.
Oct. 22.2961404
1895. Oct. 22^d

2246.
.08
179.68
283.
462.68
360.
102.68
60
40.80
60
48.0

Log sin. 102° 40′ 48″ = +9.98928
Log 95. = +1.97772
+92.68^m = +1.96700
60
40.80
1^h 32^m 40.8^s = .0643612

U Cephei.
Computation of minima.

For tabulation of same see p. 126.

2.4928038
2200
4985607600
49856076
5484.1683600
2407890.3944444
+0.0651598
2413374.6279642
45.
95. June 29.6279642

2200.
.08
176.00
283.
459.00
360.
99.°0

Log sin. 99.°0 = +9.99462
" 95. = +1.97772
+93.83(0) = +1.97234
60
49.80
+1^h 33^m 49.8(0) = +0.0651598

V

2.4928038
2220
4985607600
49856076
49856076
5534.0244360
2407890.3944444 (53)
+0.0648473
2413424.4837277 (59)
3406.
Aug. 18

2220
.08
177.60
283.
460.60
360.
100°.60
60
36.'00

Log. sin. 100° 36' = +9.99252
" 95. = +1.97772
+93.38 (775) = +1.97024
1^h 33^m 22.8 (.65) = .0648473 (55)

V

2.4928038
2260
1495682280
49856076
49856076
5633.7365880
2407890.3944444 (77)
+0.0640695
2413524.1951019 (01)
3498.
95. Nov. 26.

2260
.08
180.80
283.
463.80
360.
103.°80
60
48.'00

Log sin. 103° 48' = +9.98728
" 95 (575) = +1.97772
92.26 = +1.96500
60
15.60
1^h 32^m 15.6 (45) = +0.0640695 (77)

V

2.4928038
2280
1994243040
49856076
49856076
5683.5926640
2407890.3944444 (32)
0.0636042
2413574.0507126 (16)
3559.
96. Jan. 15.

2280
.08
182.40
283.
465.40
360
105.40
60
24.00

Log sin 105° 24' = +9.98412
Log 95. = +1.97772
91.59 (88) = +1.96184 (32)
1^h 31^m 35.4 (.28) = +0.063 ~~5996~~ 6042

V

U Cephei: Computation of minima.

2.4928038 >
2300
7478411400
49856076
5733.4487400 >
2407890.3944444 >
0.06309037 >
2413623.9062747 >
3619.
1896. Mar. 4.9062747 >

2300
.08
184.00 >
283.
467.
360.
107.° >

Log sin 107.° = +9.98060 >
" 95. = +1.97772 >
= +1.95832 >
+90.850 >
60
51.00 >
1ʰ 30ᵐ 51ˢ = 0.06309037 >

V

2.4928038 >
2320
498560760
74784114
49856076
5783.3048160 >
2407890.3944444 > (49)
0.0625277 >
2413673.7617881 > (53)
3650.
1896. Apr. 23. >

2320
.08
185.60 >
283.
468.60 >
360.
108.°60 >

Log sin 108° 36′ = +9.97670 >
Log 95. (36) = +1.97772 >
+90.04 > = +1.95442 >
1ʰ 30ᵐ 2ˢ.4 > (.16) = 0.0625277 > (49)

V

2.4928038 >
2340
997121520
74784114
49856076
5833.1608920 >
2407890.3944444 > 40
0.0619168 >
2413723.6172532 > (04)
3711
1896. June 12. >

2340 >
.08
187.20 >
283.
470.2
360
110.2 >

Log sin. 110° 12′ = +9.97243 >
Log 95. (56) = +1.97772 >
89.16 > = +1.95015 >
1ʰ 29ᵐ 9ˢ.6 > (.36) = +0.0619168 > (40)

V

2.4928038 >
2360
1495682280
74784114
49856076
5883.0169680 >
2407890.3944444 > (42)
0.0612570 >
2413773.4726694 > (66)
3772.
1896. Aug. 1. >

2360
.08
188.80 >
283.
471.80 >
360.
111.80 >

Log sin 111° 48′ = +9.96778 >
" 95. (06) = +1.97772 >
88.21 > = +1.94550 >
1ʰ 28ᵐ 12ˢ.6 > (.36) = +0.0612570 > (42)

V

U Cephei. Computation of minima.

2.4928038⌝
2380
1994243040
74784114
49856076
59328730440⌝
2407890.3944444⌝ (58)
0.0605486⌝
2413823.3280370⌝ (42)
3803.
96. Sept. 20.⌝

2380
.08
190.40⌝
283.
473.4⌝
360.
113.°4⌝

Log sin. 113° 24' = +9.96273⌝
" 95 (186) = +1.97772⌝
+87.19⌝ = +1.94045⌝
$1^h\ 27^m\ 11.^s4$⌝ = +0.0605486 ✓⌝
(.16) (58)

✓

2.4928038⌝
2400
9971215200
49856076
59827291200⌝
2407890.3944444⌝ (17)
0.0597917⌝ (61)
2413873.1833561⌝
3864.
96. Nov. 9.⌝

2400.
.08
192.00⌝
283.
475.⌝
360.
115.⌝

✓

Log sin 115° = +9.95728⌝
" 95. = +1.97772⌝
86.10⌝ = +1.93500⌝ 4
(17)
$1^h\ 26^m\ 6^s$⌝ = +0.0597917⌝

2.4928038⌝
2420
498560760
99712152
49856076
603258571960⌝
2407890.3944444⌝ (89)
0.0589617⌝
2413923.0386265⌝ (93) ✓
3894.
96. Dec. 29.⌝

2420.
.08
193.60⌝
283.
476.60⌝
360.
116.6⌝

Log sin 116° 36' = +9.95141⌝
" 95. = +1.97772⌝
+84.94(4)⌝ = +1.92913⌝
$1^h\ 24^m\ 56.^s4$⌝ = +0.0589617⌝
(.64) ✓ (89)

✓

(+0.0589889 ✓)

2.4928038 × 2440 = 6082.4412720 ✓

+283°. ✓✓
2440 × .08 ‸ = 478.°20 = 118.°20 ✓✓
Log sin 118.°20 ✓ = +9.94513 ✓✓
" 95. = +1.97772 ✓✓
+83.724 ✓ = +1.92285 ✓✓
83.724 = 0.0581418 ✓✓
6082.4412720 ✓✓
2407890.3944444 ✓✓
2413972.8938582 ✓✓
3956.
1897 Feb. 16. ✓

U Cephei. Accurate minima.

2460
.08
196.80 ✓
283. ✓
479.80 ✓
360
119.80 ✓ = +9.93840 ✓

2.4928038 ✓
2460
1495682280
99712152
49856076
6132.2973480 ✓ Logsin 119.80 = +9.93840 ✓
0.0572473 ✓
2407890.39444444 ✓ Log. 95. = +1.97772 ✓
2414022.7490397 ✓ $82^m.436$ = +1.91612 ✓
4015.
1897. Apr. 7.

$1^h\ 22^m\ 26^s.16$ = 0.0572473 ✓

2.4928038 ✓
2480
1994243040<
99712152<
49856076<
61821534240<
+.0563105 ✓
2407890.39444444
97. May 27. = 2414072.60417895<

2480.
.08
198.40<
283.
481.40<
360.
121°.40< = +9.93123 ✓<
Log. $95.^m$ = +1.97772 ✓
81.087^m< = +1.90895<
+ $1^h\ 21^m\ 5^s.22$< = +.0563105 ✓

2.4928038
2500
124640190 00<
49856076<
6232009500 0<
+.0553285<
2407890.39444444
97. July 16. = 2414122.4592729<

2500.
.08
200.00<
283.
483.
360.<
123.0< = +9.92359<
Log 95. = +1.97772<
79.673^m< = +1.90131<
$1^h\ 19^m\ 40^s.38$ = .0553285<

2.4928038 ✓
2520
498560760
124640190
49856076
6281.8655760
.0543035
2407890.3944444
2414172.3143239 ✓

97. Sept. 4.3143239 ✓

2520
.08
201.60
283.
484.60
360
Log sin. 124.60 = +9.91547 ✓
Log. 95. = +1.97772
= 1.89319
78.197 ✓
$1^h\ 18^m\ 11.82$ = .0543035 ✓

2.4928038
2540
997121520
124640190
49856076
63317216520 ✓
.0532362 ✓
2407890.3944444
2414222.1693326

97. Oct. 24.1693326

2540
.08
203.20
283.
486.20
360.
Log sin 126.20 = +9.90685 ✓
Log. 95. = +1.97772
+76.66 = +1.88457
$1^h\ 16^m\ 39.60$ = +.0532362

2.4928038
2560
1495682280
124640190
49856076
63815777280
+.0521271 ✓
2407890.3944444 ✓
2414272.0242995 ✓

97. Dec. 13.0242995

2560
.08
204.80
283.
487.80
360.
Log sin. 127.80 = +9.89771 ✓
Log 95. = +1.97772
+75.063 = +1.87543
$1^h\ 15^m\ 3.78$ = +.0521271 ✓

U Cephei. Ephemeris of Minima.
Accurately computed.

Accurately Computed Minima.		Corresponding Times.				No. Epochs.
1895. June	29.6279642	1895. June 29ᵈ	15ʰ	4ᵐ	16ˢ	2200
" Aug.	18.4837259	" Aug. 18.	11	36	34.	2220
" Oct.	7.3394385	" Oct. 7.	8	8	47.	2240
" Nov.	26.1951001	" Nov. 26.	4	40	57.	2260
1896. Jan.	15.0507116	1896 Jan. 15.	1	13	01	2280
" Mar.	4.9062747	" Mar. 4.	21	45	02	2300
" Apr.	23.7617853	" Apr. 23.	18	16	58	2320
" June	12.6172504	" June. 12.	14	48	50	2340
" Aug.	1.4726666	" Aug. 1.	11	20	38	2360
" Sept.	20.3280342	" Sept. 20.	7	52	22	2380
" Nov.	9.1833561	" Nov. 9.	4	24	02	2400
" Dec.	29.0386293	" Dec. 29.	0	55	38	2420
1897 Feb.	16.8938582	1897 Feb. 16.	21	27	9.	2440
" Apr.	7.7490397	" Apr. 7.	17	58	37.	2460
" May	27.6041789					2480
" July	16.4592729					2500
" Sept.	4.3143239					2520
" Oct.	24.1693326					2540
97. Dec.	13.0242995					2560

U Cephei. Ephemeris of Minima:

Prin. Term. = 2.^{d}4928038

	1st diff.	2d diff.	3d diff.
2413374.6279642	+49.8557617		
3424.4837259	+49.8557126	−491	
3474.3394385	+49.8556616	−510	−19
3524.1951001	+49.8556115	−501	+09
3574.0507116	+49.8555631	−484	+17
3623.9062747	+49.8555106	−525	−41
3673.7617853	+49.8554651	−455	+70
3723.6172504	+49.8554162	−489	−34
3773.4726666	+49.8553676	−486	+03
3823.3280342	+49.8553219	−457	+29
3873.1833561	+49.8552732	−487	−30
3923.0386293	+49.8552289	−443	+44
3972.8938582	+49.8551815	−474	−31
4022.7490397			

Dates of Obs.	Time of Nearest Min.					
1895. 10. 24.	3491.7889259 =	1895. Oct. 24.^{d}	18^h	56^m	2^s
" 11. 18.	3516.7167543 =	" Nov. 18.	17	12	8.
" 12. 3.	3531.6734447 =	" Dec. 3.	16	9	46.
96. 1. 22.	3581.5290497 =	1896 Jan. 22.	12	41	50.
" 1. 27.	3586.5146077 =	" Jan. 27.	12	21	2.
" 1. 30.	3589.0073864 =	" Jan. 30	0	10	38.
" 2. 11.	3601.4712782 =	" Feb. 11.	11	18	38.
" 2. 21.	3611.4423891 =	" Feb. 21.	10	37	2.
" 3. 7.	3626.3990512 =	" Mar. 7.	9	34	38.
" 3. 17.	3636.3701564 =	" Mar. 17.	8	53	2.
" 5. 26.	3706.1678432 =	" May 26.	4	1	42.
" 5. 27.	3708.6606160 =	" May 28.	15	51	17.
" 6. 23.	3733.5883376 =	" June 22.	14	7	12.
" 10. 26.	3858.2267596 =	" Oct. 25.	5	26	32.
" 10. 27.	3860.7195302 =	" Oct. 27.	17	16	7.
" 11. 16.		" Nov. 16.			

Copy.

No. 339.

Nautical Almanac Office.
Naval Observatory, Georgetown
Heights. D.C. March. 23. 1896.

Dear Sir.

I assume that the argument of the tables mentioned in your inquiry of March 20th. is to be the ordinary date, and not the sun's longitude.

In this case the best year to take will be 1902, because the relative position of the sun and stars will then not vary by 1° for a number of years.

The longitudes for 1902, to single minutes, can be taken with very little work out of my new tables of the sun, neglecting the perturbations, and adding one minute in place of them, which, however, is hardly necessary. The only tables you need to use are Table II. from which you would take M and L. Table III. and Table XVII. The radius vector you could take ~~out~~ either out of Table XXVII, or out of ~~the~~ an Ephemeris for almost any year.

Instead of computing the longitudes, you can equally well take them out of the Nautical Almanac for 1836 or 1840. The dates will correspond up to the end of February; after that time you must enter the Almanac with a date one day earlier than the argument of your table. that being a leap year.

you will thus have the sun's longitudes agreeing with those for 1902, within three or four minutes of arc. The maximum error of the tables thus formed will be about one half a degree, which will occur during leap years. If necessary, a little table to correct this may be made. It is better not to use precessions, because the longitude of the star is not then a constant.

As the value 20."50 will probably be used hereafter for the constant of aberration, I should rather advise taking 499.s as the light equation.

If the Nautical Almanac for 1836 or 1840 is not available, and if your computer cannot get the sun's longitude for 1902, with perfect ease, in the way I suggest, let me know, and I will forward you the data.

Yours very truly.
(Signed) S. Newcomb.

Professor E. C. Pickering.
Cambridge Mass.

δ Cephei. Accurate minima.

Elements = 1840 Sept. 26^d 10^h 50^m + 5^d 8^h 47^m $39.^s3$ E −
− $0.^s0008$ E^2 − 0.000 000 15 E^3

1840 Sept. 26^d 10^h 50^m = 2393375.4513889^d ✓
5^d 8^h 47^m $39.^s3$ = 5.3664271 ✓

5.3664271 × 3600 = 19319.1375600 ✓✓
$-0.^s0008 \times 3600^2$ = −0.1200000 = 2^h 52^m $48.^s0$ ✓✓
$-0.000\,000\,15 \times 3600^3$ = −0.0810000 = 1^h 56^m 38.4 ✓✓
= 19318.9365600 ✓✓
2393375.4513889 ✓✓
'93. Aug. $16.^d$ 9^h 18^m $39.^s$ G.m.t. = 2412694.3879489 ✓✓

5.3664271 × 3700 = 19855.7802700 ✓✓
-0.0008×3700^2 = −0.1267593 ✓✓
$-0.000\,000\,15 \times 3700^3$ = −0.0879392 ✓✓
= 19855.5655715 ✓✓
2393375.4513889 ✓✓
'95. Feb. 6^d 0^h 22^m $51.^s$ = 2413231.0169604 ✓✓

5.3664271 × 3800 = 20392.4229800 ✓✓
-0.0008×3800^2 = −0.1337037 ✓✓
$-0.000\,000\,15 \times 3800^3$ = −0.0952639 ✓✓
20392.1940124 ✓✓
2393375.4513889 ✓✓
'96. July $26.^d$ 15^h 29^m $23.^s$ G.m.t. = 2413767.6454013 ✓✓

$5.3664271 \times 3900 = 20929.0656900$ ✓✓

$-0.0008 \times 3900^2 = -0.1408334$ ✓✓

$-0.000000\,15 \times 3900^3 = -0.1029844$ ✓✓

20928.8218722 ✓✓

2393375.4513889 ✓✓

98. Jan. 14.ᵈ 6ʰ 33ᵐ 30ˢ. $= 2414304.2732611$ ✓✓

$5.3664271 \times 4000 = 21465.7084000$ ✓✓

$-0.0008 \times 4000^2 = -0.1481482$ ✓✓

$-0.000000\,15 \times 4000^3 = -0.1111111$ ✓✓

21465.4491407 ✓✓

2393375.4513889 ✓✓

99. July 4.ᵈ 21ʰ 36ᵐ 46ˢ. 2414840.9005296 ✓✓

$5.3664271 \times 4100 = 22002.3511100$ ✓✓

$-0.0008 \times 4100^2 = -0.1556481$ ✓✓

$-0.000000\,15 \times 4100^3 = -0.1196544$ ✓✓

22002.0758075 ✓✓

2393375.4513889 ✓✓

2415377.5271964 ✓✓

U Cephei.

Accurate minima.

(Computed for every 20 minima.)

2413823.3280342	+49.8553219 ✓		
3873.1833561	+49.8552732 ✓	-487 ✓	
3923.0386293	+49.8552289 ✓	-443 ✓	+44
3972.8938582	+49.8551815 ✓	-474 ✓	-31
4022.7490397	+49.8551392 ✓	-423 ✓	+51
4072.6041789	+49.8550940 ✓	-452 ✓	-29
4122.4592729	+49.8550510 ✓	-430 ✓	+22
4172.3143239	+49.8550087 ✓	-423 ✓	+07
4222.1693326	+49.8549669	-418 ✓	+05
4272.0242995			

96 Sept. 20.
Nov. 9.
Dec. 29. [illegible]
97. Feb. 16.
Apr. 7.
May 27.
July 16.
Sept. 4.
Oct. 24.
Dec. 13.

Computation of Eccentric Anomaly and radius vector for ☄ 1892 III (Holmes) for Feb. 15. Feb. 20. and Mar. 6. 1893.

See Schulhof's Orbit. in A. N. 131. p. 325.

mean Anomaly (Feb. 15. '93.) = 65 days. = 9° 16′ 20″.6 = 9°.272
" " (" 20. ") = 70 " = 9 59 08 = 9.986
" " (Mar. 6. ") = 84 " = 11 58 58.0 = 11.983

log. e = 9.61304 ✓ e = 0.41024 ✓

Feb. 15. '93. E = 15°.590 = 15° 35′ 24″
" 20. " E = 16.769 = 16 46 8.
Mar. 6. " E = 20.036 = 20 2 10.

Log. cos. 15° 35′ 24″ = 9.98372 ✓
" e = 9.61304 ✓
0.39515 ✓ = 9.59676
1.0
Log. 0.60485 = 9.78165 ✓
" a = 0.55962 ✓
Feb. 15. '93. log r = 0.34127 ✓

Log. cos. 16° 46′ 8″ = 9.98113 ✓
Log. e = 9.61304 ✓
0.39280 = 9.59417 ✓
1.0
Log. 0.60720 = 9.78333 ✓
" a = 0.55962 ✓
Feb. 20. '93. log r = 0.34295 ✓

Log. cos. 20° 2′ 10″ = 9.97288 ✓
" e = 9.61304 ✓
0.38541 = 9.58592
1.0
Log. 0.61459 = 9.78858 ✓
" a = 0.55962 ✓
Mar. 6. '93. log. r = 0.34820

Computation of Eccentric Anomaly and radius vector for ☄ 1892 III. (Holmes) for Feb. 15, 20. and Mar. 6. 1893.

T = 1892. June 13. = 165.
412
247

Mean Anomaly 247 days = 35° 14′ 7.″ ✓ = 35°.235
" " 252 " = 35 56 55. ✓ = 35.949
" " 266 " = 37 56 48. ✓ = 37.946

'93. Feb. 15. E. = 54°.329 ✓ = 54° 19′ 44.″ ✓
" 20. E = 55.265 ✓ = 55 15 54.″ ✓
" Mar. 6. E = 57.846 ✓ = 57 50 46.″ ✓

Log. cos. 54° 19′ 44.″ = 9.76577 ✓
" e = 9.61304 ✓
0.23923 ✓ = 9.37881
1.0
Log. 0.76077 = 9.88125 ✓
" a = 0.55962 ✓
Feb. 15. '93. " r = 0.44087 ✓

Log. cos. 55° 15′ 54.″ = 9.75571 ✓
" e = 9.61304 ✓
0.23375 ✓ = 9.36875 ✓
1.0
Log. 0.76625 ✓ = 9.88437 ✓
" a = 0.55962 ✓
Feb. 20 " r = 0.44399 ✓

Log cos. 57° 50′ 46.″ = 9.72607 ✓
" e = 9.61304 ✓
0.21833 ✓ = 9.33911 ✓
1.0
0.78167 ✓ = 9.89302 ✓
Log. a = 0.55962 ✓
Mar. 6. Log. r = 0.45264 ✓

U Cephei.

Min. Oct. 27. 96.

49.8553219
.90
44869789710
+.00000002191
+.00000000073
44.869791974
3823.3280342
3868.1978262

−.04500
−.0000487.
31500
36000
18000
.000002191500

+.01650
+.0000044.
6600
6600
+.000000072600

Min. Nov. 1. 96.

49.8553219
.85
2492766095
3988425752
42377023615
+.000003105
+.0000000108
42.377026828
2413823.3280342
2413865.7050610

−.06375
−.0000487
44625
51000
25500
+.000003104625

+.02444
+.0000044
9776
9776
+.000000107536

Min. Nov. 6. 96.

49.8553219
.95
2492766095
4486978971
47.362555805
+.000001157
+.000000037
2413823.3280342
2413870.6905912

−.02375
−.0000487
16625
19000
9500
.000001156625

+.00831
+.0000044
3324
3324
+.000000036564

(Min. Nov. 11. 96)

49.8552732
.05
2492763660
+.000001052
−.000000048
2413873.1833561
2413875.6761208

+.02375
−.0000443
7125
9500
9500
+.000001052125

+.01544
−.0000031
1544
4632
−.000000047864

(Min. Dec. 1. 96)

49.8552732
.45
2492763660
1994210928
22434872940
+.000005284
2413873.1833561
2413895.618234324

−.12375
−.0000443
37125
49500
49500
+.000005482125
−.0000000198214
+.000005283911

+.06394
−.0000031
6394
19182
−.000000198214

U Cephei.

Mini. Dec. 11. 96.

```
    49.8552732             -.11375                +.05119
           .65             -.0000443              -.0000031
    2492763660               34125                  5119
   2991316392               45500                  15357
   32405927580             45500              -.000000158689
   +0.000005039  +.000005039125
   32.405932619
   -.000000159
  +32.405932460
2413873.1833561
2413905.5892886
```

```
(Mini. Dec. 26. 96.)       -.02375                +.00831
    49.8552732             -.0000443              -.0000031
           .95                7125                   831
    2492763660               9500                  2493
   4486974588               9500               -.000000025761
  +47.362509540  +.000001052125
   +0.000001026  -.000000025761
2413873.1833561  +.000001026364
2413920.5458667
```

```
(Mini. Dec. 31. 96.)       -.02375                +.01544
    49.8552289             -.0000474              +.0000051
           .05                9500                  1544
    2492761445              16625                  7720
     .000001204              9500              +.000000078744
2413923.0386293  +.00000112575 0
2413925.5313919  +.000000078744
                 +.000001204494
```

(Mini. Jan. 25. 97.)

```
    49.8552289             -.12375                +.05981
           .55             -.0000474              +.0000051
    2492761445               49500                  5981
   2492761445               86625                 29905
  +27.420375895             49500              +.000000305031
     +000005866  +.000005865750
    +.000000305
2413923.0386293
2413950.459011366
```

U Cephei.

Min. Nov. 16. 1896.

49.8552732
.15
2492763660
498552732
7.478290980
+.000002824
+7.478293804
−.000000122
+7.478293682
2413873.1833561
2413880.6616498

−.06375
−.0000443
19125
25500
25500
+.000002824125

+.03931
−.0000031
3931
11793
−.000000121861

Min. Dec. 17. 1896.

49.8552732
.75
2492763660
3489869124
+37.391454900
+.000004153
37.391459053
−.000000121
+37.391458932
2413873.1833561
2413910.5748150

−.09375
−.0000443
28125
37500
37500
+.000004153125

+.03906
−.0000031
3906
11718
−.000000121086

Min. Dec. 19. 1896.

49.8552732
.80
+39.884218560
+.000003544
+39.884222104
−.000000099
+39.884222005
2413873.1833561
2413913.0675781

−.08000
−.0000443
24000
32000
32000
+.0000035440000

+.03200
−.0000031
3200
9600
−.000000099200

U Cephei: (Accurate minima)

'96. Oct. 27. = 2413868.1978262
" Nov. 1. = 2413865.7050610 = '96. Nov. 1.^{d} 16^h 55^m 17.^{s} ✓
" " 6. = 2413870.6905912 = " " 6. 16 34 27. (35
" " 16 = 2413880.6616498 = " " 16. 15 52 47. ✓
" " 11 = 2413875.6761208 = " " 11. 16 13 37. ✓
" Dec. 1. = 2413895.6182348 = " Dec. 1. 14 50 15. ✓
" " 11. = 2413905.5892886 = " " 11. 14 8 35. ✓
" " 26. = 2413920.5458667 = " " 26. 13 6 3. ✓
" " 31. = 2413925.5313919 = " " 31. 12 45 12. (46
'97. Jan. 25 = 2413950.4590114 = '97. Jan. 25. 11 0 59. ✓
'96. Dec. ~~17~~ 16. = 2413910.5748150 = '96. Dec. 16. 13 47 44. ✓
" " 19 = 2413913.0675781 = " " 19. 1 37 19. (38
'97. Jan. 30 = 2413955.4445337 = '97. Jan. 30. 10 40 8. (41^m
" Feb. 4 2413960.4300556 = " Feb. 4. 10 19 17. (20
" " 9. 2413965.4155770 = " " 9. 9 58 24. 26- (59
" " 19. 2413975.3866182 = " " 19. 9 16 44. ✓
" " 24. 2413980.3721380 = " " 24. 8 55 53 ✓
" Apr. 15. 2414030.2273135 = " Apr. 15. 5 27 20. (28 ✓^{m}
" " 20. 2414035.2128289 = " " 20. 5 6 28 (7^m

U Cephei. Accurate Minima.

97. Jan. 30.

49.8552289
.65
2492761445 ✓
2991313734 ✓
+32.405898785
+.000005392 ✓
+.000000261 ✓
32.405904438 ✓
2413923.0386293
2413955.4445337 ✓

−.11375
−.0000474
45500 ✓
79625 ✓
45500 ✓
+.000005391750 ✓

+.05119
+.0000051
5119 ✓
25595 ✓
+.000000261069 ✓

97. Feb. 4.

49.8552289 ✓
.75
2492761445 ✓
3489866023 ✓
+37.391421675 ✓
.000004444 ✓
.000000199 ✓
2413923.0386293
2413960.430055618 ✓

−.09375 ✓
−.0000474
37500 ✓
65625 ✓
37500 ✓
+.000004443750 ✓

+.03906 ✓
+.0000051
3906 ✓
19530 ✓
+.000000199206 ✓

97. Feb. 9.

49.8552289
.85
2492761445 ✓
3988418312 ✓
+42.376944565 ✓
+.000003022 ✓
+.000000125 ✓
2413923.0386293
2413965.415577012 ✓

−.0000474
−.06375
2370 ✓
3318 ✓
1422 ✓
2844 ✓
+.000003021750 ✓

+.0000051
+.02444
204 ✓
204 ✓
204 ✓
102 ✓
+.000000124644 ✓

U Cephei. (Accurate Minima).

'97. Feb. 19.

49.8551815 ✓
.05
2492759075 <
+.000001005 <
+2.4927600805 <
−.0000000045 <
+2.492760035 <
2413972.8938582
2413975.3866182 <

−.0000423 ✓
−.02375 ✓
2115 <
2961 <
1269 <
846 <
+.00000100462 5

−.0000029 ✓
+.01544
116 <
116 <
145 <
29 <
−.0000000044776

97. Feb. 24.

49.8551815
.15
2492759075
498551815
7.4782772 25
+.000002697
7.478279922
−.000000114
7.478279808
2413972.8938582
2413980.3721380 =

−.0000423 ✓
−.06375
2115
2961
1269
2538
+.0000026966 25

−.0000029
+.03931
29
87
261
87
−.000000113999

49.8551392 ✓
.15 ✓
2492756960 ✓
498551392 ✓
7.478270880 ✓
+0.000002882 ✓
+0.000000086 ✓
2414022.7490397 ✓
2414030.227313548 ✓

−.0000452 ✓
−.06375 ✓
2260 ✓
3164 ✓
1356 ✓
2712 ✓
+.0000028815 00

+.0000022 ✓
+.03931 ✓
22 ✓
66 ✓
198 ✓
66 ✓
+.00000000 86482 ✓

U Cephei. Computation of Time of min. for '97. Feb. 24. by Chandler's new Formula.

1880. June 23^d 9^h 39.6^m G.m.T. = 2407890.402500

$2.^d4927992$) (2443)×($+2^d$ 11^h 49^m $37.^s85$) = 6089.9084456

[(2443 × .06)+300] ([illegible] sin 86° 34.'8 × $130.^m$) = 0.0901180

'97. Feb. $24.^d$ 9^h 37^m $32.^s$ G.m.T. = 2413980.4010636

" " " 8 56

$+41^m$ 32^s.

49.8551392
.255
2492756960
997102784
12.463784800
.000004238
.000000120
4022.7490397
2414035.212828858
'97. Apr. 20.212828858

−.0000452
−.09375
2260
3164
1356
4068
+.000004237500

+.0000022
+05469
198
132
88
110
+.000000120318

U Ophiuchi.

Ep. = 1881 July 17d 14h 45m = 2408279.6145833 ✓
20h 7m 42s.56 = 0.838687034 ✓

0.838687034 ✓
465
4193435170
5032122204
3354748136
389.989470810 ✓
.0273888 ✓
390.0168596 ✓
2408279.6145833 ✓
2408669.6314429 ✓
2408658.
1882. Aug. 11.6314429 ✓
− Lt. Eq. = −0.0025810 ✓
1882. Aug. 11.6288619 ✓✓✓

.0225
465.
1125
1350
900
10°.4625
140°.0
150°.4625
60
27'.7500
60
45".0000

Log sin 150° 27' 45" = 9.69284 ✓
" 80. = 1.90309
= 1.59593
39m.44
60
26s.40

39m = .0270833
.0003009
46
.0273888

0.838687034 ✓
2
1.677374068 ✓
389.989470810 ✓
.0273472 ✓
391.6941921 ✓
2408279.6145833 ✓
2408671.3087754 ✓
8658. ✓
1882 Aug 13.3087754 ✓
−0.0024305 ✓
1882 Aug. 13.3063449 ✓✓✓

.0225
2
.0450 ✓
10.4625 ✓
140.
150°.5075 ✓
60
30'.4500
60
27".0000

Log sin 150° 30' 27" = 9.69224
" 80. = 1.90309
39m.38 ✓ = 1.59533
60
22s.80

39m = .0270833 ✓
22s = .0002546
.80 = .0000093
.0273472

U Ophiuchi.

0.838687034 ✓
4
3.354748136 ✓
389.989470810
.0273125 ✓
2408279.6145833 ✓
2408672.9861147 ✓
- Lt. Eq. = -.0022685 ✓
2408672.9838462 ✓
86758.
1882 Aug. 14.9838462 ✓✓✓

.0225
4
.0900 ✓
10.4625 ✓
140.0
150.5525
60
33.1500
60
9.0000

Log sin 150° 33′ 9″ = 9.69163 ✓
" 80. m = 1.90309 ✓
39.33 = 1.59472
60
19.80.

39^m = .0270833 ✓
19^s = .0002199 ✓
.80 = .0000093 ✓
.0273125 ✓

0.838687034 ✓
9
7.548183306 ✓
389.989470810 ✓
.0272152 ✓
2408279.6145833 ✓
2408677.1794526 ✓
- Lt. Eq. = -.0019329 ✓
2408677.1775197 ✓
86758.
1882 Aug. 19.1775197 ✓✓✓

.0225
9
.2025 ✓
10.4625 ✓
140.0
150.6650 ✓
60
39.9000 ✓
60
54.0000 ✓

Log sin 150° 39′ 54″ = 9.69012 ✓
" 80. = 1.90309 ✓
39.19 = 1.59321 ✓
60
11.40

39^m = .0270833
11^s = .0001273
.4 = .0000046
.0272152 ✓

U Ophiuchi:

0.838687034
12
1.677374068
838687034
10.064244408 ✓
389.989470810 ✓
.0271597 ✓
2408279.6145833 ✓
2408679.6954582 ✓
− Lt. Eq. = −.0017708 + ✓
2408679.6936874 ✓
8658.
✓✓✓"
1882 Aug. 21.6936874

.0225
12
450
225
.2700
10.4625
140.0
150.7325 ✓
60
43.9500
60
57.0000
Log sin 150° 43′ 57″ = 9.68921 ✓
80. = 1.90309 ✓
39.11 ✓ = 1.59230 ✓
60
6.60 ✓
39ᵐ = .0270833 ✓
6ˢ = .0000694 ✓
ˢ.6 = .0000070 ✓
.0271597 ✓

10.064244408 ✓
0.838687034 ✓
10.902931442 ✓
389.989470810 ✓
.0271389 ✓
2408279.6145833 ✓
2408680.5341245 ✓
− Lt. Eq. = −.0016783 +
2408680.5324462 ✓
8658.
1882 Aug. 22.5324462 ✓✓✓

150.7325 ✓
.0225
150.7550
60
45.3000
60
18.0000
Log sin 150° 45′ 18″ = 9.68890 ✓
" 80. = 1.90309 ✓
39.08 ✓ = 1.59199 ✓
60
4.80 ✓
39ᵐ = .0270833 ✓
4ˢ = .0000463 ✓
ˢ.8 = .0000093
.0271389

U Ophiuchi

10.902931442 ✓
1.677374068 ✓
389.989470810 ✓
402.569776320 ✓
.0271042 ✓
2408279.6145833 ✓
2408682.2114638 ✓
− Lt. Eq. = −.0015046 ✓
2408682.2099592 ✓
8658.
1882 Aug. 24.2099592 ✓✓✓

.0225 ✓
.0225 ✓
150.7550 ✓
150°.8000
60
48′.0000

Log sin 150° 48′ = 9.68829 ✓
" 80. = 1.90309
= 1.59138
39.03
60
1.80

39m = .0270833
1s = .0000116
.8 = .0000093
.0271042

402.569776320 ✓
0.838687034 ✓
.0270833 ✓
2408279.6145833 ✓
2408683.0501300 ✓
− Lt. Eq. = −.0014236 ×✓
2408683.0487064 ✓
8658. ✓
1882 Aug. 25.0487064 ✓✓✓

150.8000
.0225
150°.8225
60
49′.3500
60
21″.0000

Log sin 150° 49′ 21″ = 9.68799
" 80. = 1.90309
39.00 = 1.59108

39m = .0270833

0.838687034 ✓
2
1.677374068 ✓
402.569776320 ✓
404.247150388 ✓
.0270625 ✓
2408279.6145833 ✓
2408683.8887962 ✓
− Lt. Eq. = −.0013310 ×✓
2408683.8874652 ✓
8658.
1882 Aug. 25.8874652 ✓✓✓

150.8225
.0225
150°.8450
60
50′.7000
60
42″.0000

Log sin 150° 50′ 42″ = 9.68769
" 80. = 1.90309
38m.97 = 1.59078
60
58s.20
= .0270625

U. Ophiuchi

404.247150388 ✓
2.516061102 ✓
.0270069 ✓
2408279.6145833 ✓
2408686.4048017 ✓
− Lt. Eq. = −.0011574 × ✓
2408686.4036443 ✓
8658.
1882 Aug. 28. 4036443 ✓✓✓

.0225 ✓
3
.0675 ✓
150.8450 ✓
150.°9125 ✓
60
54.′7500
60
45.″0000
Log sin. 150° 54′ 45″ = 9.68677
80. = 1.90309
= 1.58986
38.89
60
53.°40
.0270069 ✓

406.763211490 ✓
0.838687034 ✓
.0269862 ✓
2408279.6145833 ✓
2408687.2434680 ✓
− Lt. Eq. = −.0010648 × ✓
2408687.2424032 ✓
8658.
1882 Aug. 29. 2424032 ✓✓✓

150.9125
.0225
150.°9350
60
56.′1000
60
6.″0000
Log sin. 150° 56′ 6″ = 9.68646
80. = 1.90309
= 1.58955
38.86
60
51.°60
.0269862

407.601898524 ✓
0.838687034 ✓
.0269722 ✓
2408279.6145833 ✓
2408688.0821411 ✓
− Lt. Eq. = −.0009838 × ✓
2408688.0811573 ✓
8658.
1882 Aug. 30. 0811573 ✓✓✓

150.9350 ✓
.0225 ✓
150.°9575 ✓
60
57.′4500
60
27.″0000
Log sin. 150° 57′ 27″ = 9.68615
80. = 1.90309
= 1.58924 ✓
38.84
60
50.°40
.0269722

U Ophiuchi:

408.440585558 ✓
2.516061102 ✓
.0269097 ✓
2408279.6145833 ✓
2408690.5981397 ✓
− Lt. Eq. = −.0007986 × ✓
2408690.5973411 ✓
8689.
1882 Sept. 1.5973411 ✓✓✓

150.9575 ✓
.0675 ✓
151.°0250 ✓
′ 60
1.5000
″ 60
30.″0000

Logsin. 151° 1′ 30″ = 9.68523 ✓
″ 80. = 1.90309 ✓
38.m75 = 1.58832 ✓
60
45.00

.0269097 ✓

410.956646660 ✓
3.354748136 ✓
.0268333 ✓
2408279.6145833 ✓
2408693.9528114 ✓
− Lt. Eq. = −.0004398 × ✓
2408693.9523716 ✓
8689.
1882 Sept. 4.9523716 ✓✓✓

151.0250 ✓
.0900 ✓
151.°1150
′ 60
6.9000
60
54.″0000

Logsin. 151° 6′ 54″ = 9.68399 ✓
″ 80. = 1.90309 ✓
38.m64 = 1.58708
60
38.″40

.0268333 ✓

414.311394796 ✓
2.516061102 ✓
.0267778 ✓
2408279.6145833 ✓
2408696.4688170 ✓
− Lt. Eq. = −.0002662 × ✓
2408696.4685508 ✓
8689.
1882 Sept. 7.4685508 ✓✓✓

151.1150 ✓
.0675 ✓
151.°1825 ✓
′ 60 ✓
10.9500
60
57.0000 ✓

Logsin. 151° 10′ 57″ = 9.68306 ✓
″ 80. = 1.90309 ✓
38.56 = 1.58615
60
33.″60

.0267778 ✓

U Ophiuchi.

416.827455898 ✓
7.548183306 ✓
.0266042 ✓
2408279.6145833 ✓

2408704.0168267 ✓
− Lt. Eq. = +.0004514 ×

2408704.0172781 ✓
8689.

1882. Sept. 15.0172781 ✓✓✓

.0225
9

.2025 ✓
151.1825 ✓

151.°3850 ✓
60

23.′1000
60

6.″0000

Log sin. 151° 23′ 6.″ = 9.68027 ✓
" 80. = 1.90309 ✓

= 1.58336 ✓

38.ᵐ31
60

18.ˢ60

+.0266042 ✓

0.838687034 ✓
4

3.354748136 ✓
424.375639204 ✓

427.730387340 ✓
.0265278 ✓
2408279.6145833 ✓

2408707.3714984 ✓
− Lt. Eq. = +.0007291 × ✓

2408707.3722275 ✓
8689.

1882 Sept. 18.3722275 ✓

.0225
4

.0900 ✓
151.3850

151.°4750 ✓
60

28.′5000
60

30.″0000

Log sin. 151° 28′ 30.″ = 9.67901
" 80. = 1.90309

= 1.58210

38.ᵐ20
60

12.ˢ00

.0265278 ✓

0.838687034 ✓
24

3354748136 ✓
1677374068 ✓

20.128488816 ✓
427.730387340 ✓
.0260694 ✓
2408279.6145833 ✓

2408727.4995289 ✓
1882 Lt. Eq. = +.0024074 ✓

2408729.5019363 ✓
8719.

1882 Oct. 8.5019363 ✓

.0225 ✓
24 ✓

900 ✓
450 ✓

.5400 ✓
151.4750 ✓

152.°0150 ✓
60 ✓

0.′9000 ✓
60 ✓

54.″0000 ✓

Log sin. 152° 0′ 54″ = 9.67139 ✓
" 80. = 1.90309 ✓

37.ᵐ54 = 1.57448 ✓

U Ophiuchi:

Accurately computed ephemeris from Chandler's 3rd Cat. Lt. Eq. also applied to ephemeris with reversed sign.

1882.	Aug.	11.6288619 ✓✓	for	Aug. 11.	465	8669
"	"	13.3063449 ✓✓		13.	467	
"	"	14.9838462 ✓✓		15.	469	
"	"	19.1775197 ✓✓		19.	474 ✓	
"	"	21.6936874 ✓✓		21.	477 ✓	
"	"	22.5324462 ✓✓		22.	478 ✓	
"	"	24.2099592 ✓✓		24.	480 ✓	
"	"	25.0487064 ✓✓		25.	481 ✓	
"	"	25.8874652 ✓✓		26.	482 ✓	
"	"	28.4036443 ✓✓		28.	485 ✓	
"	"	29.2424032 ✓✓		29.	486 ✓	
"	"	30.0811573 ✓✓		30.	487 ✓	
"	Sept.	1.5993411 ✓✓	"	Sept. 1.	490 ✓	
"	"	4.9523716 ✓✓		5.	494 ✓	
"	"	7.4685508 ✓✓		7.	497 ✓	
"	"	15.0172981 ✓✓		15.	506 ✓	
"	"	18.3722275 ✓✓		18.	510 ✓	
"	Oct.	8.5019363 ✓✓	"	Oct. 8.	534 ✓	

Provisional period $= 0^{d}.838687034$ ✓

~~+ Limit = $+^{d}.630$~~

~~− " = $-^{d}.209$~~

+ Limit. = +.589

− " = −.250

0.838687034 ✓
490
7548183306 0 ✓
3354748136 ✓
410.956646660 ✓
.0269097 ✓
2408279.6145833 ✓
2408690.5981397 ✓
− Lt. Eq. = −.0007986 ✓
2408690.5973411 ✓
8689.
1882 Sept. 1.5973411 ✓

.0225
490
20250 ✓
900 ✓
11.0250 ✓
140. ✓
151.0250 ✓
60
1.5000
60
30.0000

Log sin. 151° 1′ 30″ = 9.68523 ✓
" 80. = 1.90309 ✓
= 1.58832 ✓

38.75
60
45.00

.0269097 ✓

0.838687034 ✓
494
3354748136 ✓
7548183306 ✓
3354748136 ✓
414.311394796 ✓
.0268333 ✓
2408279.6145833 ✓
2408693.9528114 ✓
− Lt. Eq. = −.0004398 ✓
2408693.9523716 ✓
8689.
1882 Sept. 4.9523716 ✓

.0225
494
900
2025
900
11.1150
140.
151.1150
60
6.9000
60
54.0000

Log sin. 151° 6′ 54″ = 9.68399 ✓
" 80. = 1.90309 ✓
= 1.58708 ✓

38.64
60
38.40

.0268333 ✓

0.838687034 ✓
510
8386870340 ✓
4193435170 ✓
427.730387340 ✓
.0265278 ✓
2408279.6145833 ✓
2408707.3714984 ✓
+.0007291 ✓
2408707.3722275 ✓
8689.
1882 Sept. 18.3722275 ✓

.0225
510
2250
1125
11.4750
140.
151.4750
60
28.5000
60
30.0000

Log sin. 151° 28′ 30″ = 9.67901 ✓
" 80. = 1.90309 ✓
= 1.58210 ✓

38.20
60
12.00

.0265278 ✓

Computation of approx. longitude of Deimos and Phobos.

1128.8405″ (18°.8140″) = Hourly motion of Phobos.

60
528
480
488
480
84
60
240

285.1632″ (4°.7527″) = Hourly motion of Deimos.

240
451
420
316
300
163
120
430

Log 4.7527 = 0.676940
" 16.2 = 1.209515
76.99 = 1.886455
148.91
225.90

0.676940
16.4 = 1.214844
77.94 = 1.891784
148.91
226.85

0.676940
Log. 39.0 = 1.591065
185°.36 = 2.268005
209.56
394.92
360.
34.92

0.676940
39.5 = 1.596597
187.73 = 2.273537
209.56
397.29
360.
37.29

0.676940
39.6 = 1.597695
188.21 = 2.274635
209.56
397.77
360.
37.77

0.676940
40.9 = 1.611723
194.38 = 2.288663
209.56
403.94
360
43.94

0.676940
41.3 = 1.615950
196.29 = 2.292890
209.56
405.85
360.
45.85

0.676940
131 = 1.117271
~~62.26~~ = 1.794211 = 62.26
181.19
243.45

0.676940
134 = 1.127105
63.69 = 1.804045
181.19
244.88

0.676940
137 = 1.136721
65.11 = 1.813661
181.19
246.30

0.676940
143 = 1.155336
67.96 = 1.832276
181.19
249.15

0.676940
145 = 1.161368
68.91 = 1.838308
181.19
250.10

0.676940
40.3 = 1.605305
191.53 = 2.282245
31.52
223.05

0.676940
141 = 1.149219
67.01 = 1.826159
302.50
369.51

0.676940
142 = 1.152288
= 1.829228
67.49
302.50
369.99
.950
10.940
.475
11.415

11.415
.475
11.890
.950
12.840

0.676940
165 = 1.217484
= 1.894424
78.42
152.83
231.25
1.900
233.150

.475

0.676940
15.1 = 1.178977
= 1.855917

71.77
3.15
74.92

~~0.676940~~
4.7527
40
190.1080
1.425
191.533
3.325
194.858
.475
195.333

285.1632
4
1140.6528
80.7959
213.47
1434.9187
1080.
354.92
1.900
356.820

4.7527
17
33 2689
47527
80.7959

Jan. 17.

4.7527
15.5
237635
237635
47527
73.66685

285.1632
6
1710.9792
73.6668
213.47
1998.1160
1800
198.1160
1.425
199.541

Jan. 19.

Jan. 30.
" 13.
17.

285.°1632
17
19961424
2851632
4847.7744
213.47
58.9335
360)5120.1779(14.
360
1520
1440
80.°1779
3.325
83.503

4.7527
12.4
190108
95054
47527
58.93348

.475
7
3.325

Jan. 30.

285.1632
3
855.4896
60.3593
5061.2444
5977.0933

4.7527
12.7
332689
95054
47527
60.35929

5977.0933(16.
360
2377
2160
217.°0933
1.425
218.518

Feb. 2.

285.1632
22
5703264
5703264
6273.5904
5916.7340
12190.3244(33.
1080
1390
1080
310.3244

Feb. 24.

X

24/285.1632 (11.°8818 = Hourly motion of Deimos.
24
45
24
211
192
196
192
43
24
192
192

11.8818
16.2
237636
712908
118818
192.48516
148.91 ✓
341.40
2.38
343.78

11.8818
.2
2.37636

Dec. 16. 1885.

11.8818
15.
594090
118818
178.2270 ✓
285.1632 ✓
209.56 ✓
672.9502 ✓
360.
312.9502 ✓
5.9409 ✓
318.8911 ✓
1.1882 ✓
320.0793 ✓
15.4463 ✓
335.5256 ✓
4.7527 ✓
340.2783 ✓

11.8818
1.3
356454
118818
15.44634

11.8818
.4
4.75272

Dec. 21.

11.8818
13.1
118818
356454
118818
155.65158 ✓
181.19 ✓
336.8416
3.5645 ✓
340.4061 ✓
3.5645 ✓
343.9706 ✓
7.1290 ✓
351.0996 ✓
2.3764 ✓
353.4760 ✓

11.8818
.3
3.56454

11.8818
.2
2.37636

Dec. 30.

11.8818 ✓
16.3
356454
712908
118818
193.67334 ✓
31.52 ✓
285.1632 ✓
510.3565 ✓
360.
150.3565 ✓

~~11.8818~~
~~16.3~~
~~356454~~
~~118818~~
~~15.44634~~ ✓
~~31.52~~
~~285.1632~~
~~332.1295~~

1886 Jan. 2.

114.782
1.188
115.970 ✓
2.376
118.346

Jan. 7.

11.8818
14.1
118818
475272
118818
167.53338 ✓
302.50 ✓
470.03
360.
110.03 ✓
1.188 ✓
111.218 ✓
2.376 ✓
113.594 ✓
1.188
114.782 ✓

11.8818
.2
2.37636

11.8818 ✓
16.5
594090
712908
118818
196.04970 ✓
152.83 ✓
348.88 ✓
4.75
353.63

11.8818
.4
4.75272

Jan. 9.

11.8818 ✓
15.1
118818
594090
118818
179.41518 ✓
3.15 ✓
182.57 ✓

Jan. 11.

11.8818 ✓
16.
712908 ✓
118818
190.1088 ✓
213.47 ✓
285.163 ✓
688.742 ✓
360.
328.742 ✓
3.564 ✓
332.306 ✓
8.317 ✓
340.623 ✓
1.188
341.811 ✓

Jan. 14.

11.8818
.3
3.56454

11.8818
.7
8.31726

11.8818 ✓
17.
831726
118818
201.9906 ✓

11.8818
.4
4.75272

285.1632 ✓
4
1140.6528 ✓
201.9906 ✓
213.47 ✓
1556.11 ✓
1440.
116.11 ✓
4.75
120.86

Jan. 17.

285.1632 ✓
6
1710.9792 ✓
213.47 ✓
184.168 ✓
2108.617 ✓
1800
30862 ✓
3.56 ✓
312.18 ✓

11.8818
15.5
594090
594090
118818
184.16790

11.8818
.3
3.56454

Jan. 19.

285.1632 ✓
17.
19961424
2851632
4847.7744 ✓
213.47 ✓
147.334 ✓
5208.578 ✓ (14
360
1608
1440
168.578 ✓
8.316 ✓
176.894 ✓

11.8818
12.4
475272 ✓
237636
118818
147.33432 ✓

11.88
.7
8.316

Jan. 30.

285.1632 ✓
20
5703.2640 ✓
150.8989 ✓
213.47 ✓
6067.63 ✓ (16
360
2467
2160
307.63 ✓
3.56 ✓
311.19 ✓

11.8818
12.7
831726 ✓
237636
118818
150.89886 ✓

Feb. 2.

11.88
.3
3.564

285.1632 ✓   11.8818 ✓
42 ✓   16.4 ✓
5703264   475272
11406528   712908
11976.8544 ✓   118818
194.8615 ✓   194.86152 ✓
213.47 ✓
12385.19 (= 34
1080
1585
1440
145.19

Feb. 24.

Phobos.

24)1128.8405(47.°0350
96
168
168
84
72
120
120
5

47.0350 ✓
11.5
235175
470350
470350
540.902550
297.48
838.38
720
118.38

Dec. 30

47.0350

Phobos.

```
  47.0350
     16.2
  -------
   940700
 2822100
 470350
 ------------
 761.96700
 297.48
 ---------
 1059.45
 720
 ---------
 339.45
```

```
   47.0350
      12.7
   -------
  3292450
  940700
 470350
 ----------
 597.34450
  35.16
 1128.840
 ----------
 1761.344(4
 1440
 --------
 321.344
```

Jan. 2. 82.

U Cephei.

Computation of 3 places, with Chandler's New Elements. (A.J. 396. p. 94.)

Elements = 1880 June 23^d 9^h 39^m.6 (Gr. m. T.) + 2^d 11^h 49^m 37^s.85 E
+ 130^m. sin (0°.06 E + 300°)

1880. June 23^d 9^h 39^m.6 = 2407890.4025000 ✓

2^d 11^h 49^m 37^s.85   2^d.4927992 × 2410 = 6007.6460720 ✓

(2410. × 0°.06) + 300° = 444°.6 = 84°.6

Logsin. 84°.6 × 130^m. = 129^m.4 = 0.0898611 ✓

2413898.1384331 ✓

2407890.4025000 ✓

2^d.4927992 × 2451. = 6109.8508392 ✓

(2451. × 0°.06) + 300° = 447.06 = 87°.06

Logsin 87°.06 × 130. = 129.8   0.0901389 ✓

2414000.3434781 ✓

2407890.4025000 ✓

2.4927992 × 2491.   6209.5628072 ✓

Dec. Comp. Stars for R. Camelop.

Dm. No.	Star.	R. A. 1855.	Dec.	Dm. Magn.
+84° 335	a	15h 6m 47.s	+84° 30.7′	7.5
+84 322	b	14 25 24.	+84 36.4	8.0
+84 326	c	14 36 34.	+84 21.9	8.6
+84 324	e	14 34 41.	+84 43.4	9.0
+84 333	d	14 51 12.	+84 28.7	9.1
+84 325	g	14 34 56.	+84 26.6	9.5
+84 332	f	14 50 30.	+84 24.8	9.5

1878

m = +3.0712

$\frac{n}{15}$ = 0.12607

log n = 1.30216

log $\frac{n}{15}$ = = +0.12607

" sin 226° 41′ 45″ = n9.86197

" tan +84° 30.7′ = +1.01735

= n1.00539

−10.1249

+ 3.0712

−7.0537

22.5

35 2685

141074

141074

= 158.70825

−2m 38.7s

15 6 47.

15 4 8. = 226° 2′ 0″

− 13.93″

22.5

6965

2786

2786

− 5.2′ 13.″ = 313.425

+84° 30.7

+84 25.5

log $\frac{n}{15}$ =

" sin 226° 2′ 0″ =

" tan +84° 25.5′ = +

= 226° 41′ 45.″ ✓
= 216 21 0. ✓
= 219 8 30. ✓
= 218 40 15. ✓
= 222 48 0. ✓
= 218 44 0. ✓
= 222 37 30. ✓

Computation of places of Comp. Stars for R Camelop.

	Middle Place. (1878)				Mid. Place.		
a	15h	4.2m	+84	25.4	226°	3'	0."
b	14	23.4	84	30.2	215	51	0.
c	14	34.4	84	16.0	218	36	0.
d	14	49.0	84	22.8	222	15	0.
e	14	33.0	84	38.7	218	15	0.
f	14	48.2	84	19.4	222	3	0.
	14	32.9			218	13	30.
g	~~14~~	~~34.8~~	+84	20.8	~~218~~	~~42~~	~~0.~~

(1878)

m = 3.0712

log n/15 = 0.12607

log n = 1.30216

log sin. 226° 3' = n9.85730

" tan 84° 25.4 = +1.01037

" n/15 = +0.12607

= n0.99374

Star a.

−9.8570
+3.0712

Log. −6.7858 = n0.83160

45." = +1.65321

−5m 5.s" = −305.36 = n2.48481

15 6 47.

(1900) 15 1 42.

log n = +1.30216

" cos = n9.84138

" 45." = +1.65321

a −10' 26."3 = −626."3 = n2.79675

+84 30.7

+84 20.3 = (1900)

---

log sin. 215° 51' = n9.76765

" n/15 = +0.12607

" tan 84 30.2 = +1.01669

= n0.91041

−8.1360

3.0712

−5.0648 = n0.70456

45. = +1.65321

= −227.92 = n2.35777

b −3m 48.s

14 25 24.

14 21 36. = (1900)

log n = +1.30216

" cos = n9.90878

" 45. = 1.65321

−731."4 = n2.86415

−12.'2 ~~11."4~~

+84 36.4

+84 24.2 (1900)

Comp. Stars for R Camelopa.

c

log $\frac{n}{15}$ = +0.12607 ✓
log sin 218° 36′ = n9.79510 ✓
„ tan 84° 16.′0 = +0.99826 ✓
−8.3068 ✓ = n0.91943
+3.0712 ✓
−5.2356 ✓ = n0.71897 ✓
45. = +1.65321 ✓
−235.60 ✓ = n2.37218

−3^m 56.^{s}
14 36 34. ✓
14 32 38. ✓ (1900)

log n = +1.30216 ✓
„ cos 218° 36′ = n9.89294
„ 45. = +1.65321 ✓
−705.″2 = n2.84831 ✓

−11.′8 ~~45.″2~~ ✓
+84 21.9 ✓
+84 10.1 ✓ (1900)

---

d

log $\frac{n}{15}$ = +0.12607 ✓
„ sin 222° 15.′ = n9.82761 ✓
„ tan. 84° 22.′8 = +1.00699 ✓
−9.1342 ✓ = n0.96067 ✓
+3.0712 ✓
−6.0630 ✓ = n0.78269 ✓
45. = +1.65321 ✓
−272.84 ✓ = n2.43590

−4^m 32.^{s}8 ✓
14 51 12. ✓
14 46 39. ✓ (1900)

log n = +1.30216 ✓
„ cos 222° 15′ = n9.86936 ✓
„ 45. = +1.65321. ✓
−667.9 ✓ = n2.82473

−11.′1 ~~7.″9~~ ✓
+84 28.7
+84 17.6 ✓ (1900)

---

e

log $\frac{n}{15}$ = +0.12607
„ sin 218° 15′ = n9.79176 ✓
„ tan 84° 38.′7 = +1.02809 ✓
−8.8292 ✓ = n0.94592 ✓
+3.0712 ✓
−5.7580 ✓ = n0.76027 ✓
45. = +1.65321 ✓
−259.11 ✓ = n2.41348

−4^m 19.^{s}1 ✓
14 34 41. ✓
14 30 22. ✓ (1900)

log n = +1.30216 ✓
„ cos 218° 15′ = n9.89504 ✓
„ 45. = +1.65321 ✓
−708.″6 ✓ = n2.85041 ✓

−11.′8 ~~48.″6~~ ✓
+84 43.4 ✓
+84 31.6 ✓ (1900)

Comp. stars for R Camelop.

f

log $\frac{n}{15}$ = +0.12607 ✓
" sin 222° 3′ = n9.82593 ✓
" tan. 84° 19′.4 = +1.00261 ✓
−9.0076 = n0.95461
+3.0712
−5.9364 ✓ = n0.77352 ✓
45. = +1.65321 ✓
−267.1 ✓ = n2.42673 ✓
−4ᵐ 27ˢ.1 ✓
14 50 30. ✓
14 46 3. ✓ (1900)

log n = = +1.30216 ✓
" cos. 222° 3′ = n9.87073 ✓
" 45. = +1.65321 ✓
−670″.0 = n2.82610 ✓
−11′.2 ~~+0″.0~~ ✓
+84 24.8 ✓
+84 13.6 ✓ (1900)

---

g

~~log $\frac{n}{15}$ = +0.12607 ✓~~
~~" sin 218° 42′ = n9.79605 ✓~~
~~" tan +84 20.8 = +1.00440 ✓~~
~~−8.4434 ✓ = n0.92652~~
~~+3.0712 ✓~~
~~−5.3722 = n0.73016 ✓~~
~~45. = +1.65321 ✓~~
~~−241.7 = n2.38337 ✓~~
~~−4ᵐ 1ˢ.7 ✓~~
~~14 34 56. ✓~~
~~14 30 54. ✓ (1900)~~

~~log n = = +1.30216 ✓~~
~~" cos 218° 42′ = n9.89233 ✓~~
~~" 45. = +1.65321 ✓~~
~~−704″.2 = n2.84770~~
~~−11′.7~~ ~~44″.2~~ ✓
~~+84. 26.6~~
~~+84 14.9 ✓ (1900)~~

---

a

Comp. Stars for R Camelop.

$\log \frac{n}{15}$ = 0.12607^{g} ✓ log n = +1.30216 ✓

" sin 218° 13' 30." ✓ = n9.79152 ✓ " cos = n9.89519 ✓

" tan 84° 20.8 ✓ = +1.00440 ✓ " 45. = +1.65321 ✓

− 8.3558 ✓ = n0.92199 −708.9" = n2.85056 ✓

+ 3.0712

− 5.2846 = n0.72301 ✓ −11' ~~48.9"~~

45. = +1.65321 ✓ +84 26.6 ✓

− 237.8s = n2.37622 +84 14.8 ✓ (1900)

−3m 57.8s

14 34 56. ✓

14 30 58. ✓ (1900)

U Pegasi.

Calculation of Time of max. for Oct. 18. 1897 from elements in Chandler's 3^{d} Cat.

3094.8231250 = Ep. in Ch. 3^{d} cat.

4216.5000000

.2307291) 1121.6768750

4861.+

+3094.8231250

0.2307291 × 4861. = 4216.3972801 =

= 1897. Oct. 18^{d} 9^{h} 32^{m} 5^{s}. Gr. m. T.

5 32 15.

1897. Oct. 18^{d} 15^{h} 4^{m} 20^{s} Gr. m. T.

Corr. to Eph. for Lt. Eq. = −7 32^{s}.

1897. Oct. 18^{d} 14^{h} 56^{m} 48^{s}. Gr. m. T. ✓

1897. Oct. 18^{d} 14^{h} 57^{m} Gr. m. T.

11 1 48. = 48 periods.

1897. Oct. 29 16 45 Gr. m. T.

1897. Oct. 18^{d} 15^{h} 4^{m} 20^{s} Gr. m. T.

11 1 48 0

1897. Oct. 29 16 52 20 " " "

−6 52

" " " 16 45 28 " " "

U Pegasi.

Observations of Oct. 18. 1897. Phot. J. Comp. star = d.M. + 15° 4916. (A.G.). Obs. arranged in phase order.

	Unfixed Groups: Phase	Diff. Magn.	Mean of 3 groups.	
2	0^h $5^m.3$	+0.46	0^h $17^m.5$	+0.44
	0 15.7	+0.48	0 30.5	+0.40
	0 31.6	+0.38	0 43.1	+0.35
	0 44.2	+0.34	0 54.3	+0.38
	0 53.4	+0.33	1 6.0	+0.40
	1 5.3	+0.46	1 17.9	+0.41
	1 19.2	+0.40	1 28.4	+0.41
	1 29.1	+0.38	1 39.1	+0.43
	1 36.9	+0.46	1 49.6	+0.47
	1 51.3	+0.48	2 1.4	+0.49
	2 0.5	+0.48	2 12.6	+0.53
	2 12.5	+0.50	2 23.4	+0.58
	2 24.8	+0.61	2 32.6	+0.65
	2 32.8	+0.64	2 40.2	+0.69
	2 40.1	+0.70	2 47.3	+0.74
	2 47.6	+0.74	2 54.1	+0.78
2	2 54.2	+0.77		
2	3 0.6	+0.82		
1	3 6.6	+0.58		
2	3 7.6	+0.79		
1	3 19.3	+0.66		
1	3 28.4	+0.68		
	3 38.6	+0.78		
	3 49.7	+0.84		
	4 0.0	+0.93		
	4 16.4	+0.98		
	4 28.6	+1.02		
	4 40.1	+0.94		

Phase.		Diff. magn.
4	49.0	+0.71
4	58.7	+0.72
5	9.4	+0.59
15	24.8	+0.56

Iapetus.

a = phase ang.) $\sin\frac{1}{2}a = \frac{1}{2}\sqrt{\frac{(R+r-\Delta)(R-r+\Delta)}{r\Delta}}$

		Log. R.	Log r	Log Δ	
Opposition.	May 17.	0.00511	0.99849	0.95202	a = 0° 12′
Midway.	June 22	0.00710	0.99876	0.96062	a = 3 26
Stationary.	July 28.	0.00655	0.99902	0.98267	a = 5 32
Last obs.	Sept. 17.	0.00191	0.99938	1.01822	a = 5 4

1.0118	9.96525	8.95400
1.0165	9.97150	9.13320
1.0152	9.97750	9.60880
1.0044	9.98575	10.42854

May 17.

6.0118
.9965
2.0083
.8954
1.1129

1.0118
.8954
1.9072
.9965
0.9107

Log. do = 0.04646
9.95938
0.00584
1.95051
2/8.05533
9.02766
log 0.5 = 9.69897
8.72663

0.99849
9.5202
1.95051

½ a = 3° 3′
a = 6° 6′

June 22.

1.0165
9972
2.0137
.9133
1.1004

1.0165
9133
1.9298
.9972
0.9326

Log. do = 0.04155
9.96970
0.07125
1.95938
2/8.05187
9.02594
9.69897
8.72491

0.99876
0.96062
1.95938

½ a = 3° 2′
a = 6 4′

July 28.

$$\begin{array}{r} 1.0152 \\ .9978 \\ \hline 2.0130 \\ .9609 \\ \hline 1.0521 \end{array} \qquad \begin{array}{r} 1.0152 \\ .9609 \\ \hline 1.9761 \\ .9978 \\ \hline 0.9783 \end{array}$$

$$\begin{array}{rr} \text{Log do.} = & 0.02206 \\ & 9.99047 \\ \hline & 0.01253 \\ & 1.98169 \\ \hline 2 \,| & 8.03084 \\ \hline & 9.01542 \\ & 9.69897 \\ \hline & 8.71439 \end{array} \qquad \begin{array}{r} 0.99902 \\ .98267 \\ \hline 1.98169 \end{array}$$

$\frac{1}{2} a = 2° 58′$

$a = 5 \; 56$

Sept. 17.

Iapetus.

a = Phase Ang. $\sin \frac{1}{2}a = \frac{1}{2}\sqrt{\frac{(R+r-\Delta)(R-r+\Delta)}{r\Delta}}$

		Log. R.	Log r	Log Δ	
Opposition	May 17.	0.00511	0.99849	0.95202	a = 0° 12'
Quadrat.	June 22.	0.00710	0.99876	0.96062	a = 3 26
Stationary	July 28.	0.00655	0.99902	0.98267	a = 5 32
Last Obs.	Sept. 17.	0.00191	0.99938	1.01822	a = 5 4

R	r	Δ
1.0118	9.96525	8.95400
1.0165	9.97150	9.13320
1.0152	9.97750	9.60880
1.0044	9.98575	10.42854

U Cephei. Formula from ~~Chandler's 3d Cat.~~ A.J. 396. p. 98.

Min. = 1880. June 23d 9h 39m.6 + 2d 11h 49m 37s.85 E + 130m sin(0°.06 E + 300°)

1880. June 23d 9h 39m.6 = 2407890.4025000 ✓ ✓

2d 11h 49m 37s.85 = 2.4927992 ✓

2.4927992 × 2240 = 5583.8702080 ✓

(2240 × 0.06) + 300° = 434°.4 = 74°.4

U Cephei. Chandler's last value in A. J. 396. p. 94.)

		Log sin do.		
2240 × 0.06) + 300° = 434.40 =	74.40°	9.98370	2.09764	125.21
2280 " " =	76.80	9.98837	2.10231	126.56
2320 " " =	79.20	9.99224	2.10618	127.70
2360 " " =	81.60	9.99532	2.10926	128.61
2400 " " =	84.00	9.99761	2.11155	129.29
2440 " " =	86.40	9.99914	2.11308	129.74
2480 " " =	88.80	9.99990	2.11384	129.97
2520 " " =	91.20	9.99988	2.11382	129.97
2560 " " =	93.60	9.99914	2.11308	129.74

2240. × 2.4927992 = 5583.8702080

2280 " " = 5683.5821760

2320 " " = 5783.2941440

2360 " " = 5883.0061120

2400 " " = 5982.7180800

2440 " " = 6082.4300480

2480 " " = 6182.1420160

2520 " " = 6281.8539840

2560 " " = 6381.5659520

Con. on p. 186.

U Cephei:

Con. from prec. page.

			2d term.	1st term.	
~~12.52~~	~~= 12^m~~	~~31.2^s~~	~~= 0.0086994~~	~~+5583.8702080 + Epoch~~	~~=~~
~~12.66~~	~~= 12~~	~~39.6~~	~~= 0.0087917~~	~~5683.5821760~~	~~=~~
~~12.77~~	~~= 12~~	~~46.2~~	~~= 0.0088680~~	~~5783.2941440~~	~~=~~
~~12.86~~	~~= 12~~	~~51.6~~	~~= 0.0089306~~	~~5883.0061120~~	~~=~~
~~12.93~~	~~= 12~~	~~55.8~~	~~= 0.0089792~~	~~5982.7180800~~	~~=~~
~~12.97~~	~~= 12~~	~~58.2~~	~~= 0.0090069~~	~~6082.4300480~~	~~=~~
~~13.00~~	~~= 13~~	~~0.0~~	~~= 0.0090278~~	~~6182.1420160~~	~~=~~
~~13.00~~	~~= 13~~	~~0.0~~	~~= 0.0090278~~	~~6281.8539840~~	~~=~~
~~12.97~~	~~= 12~~	~~58.2~~	~~= 0.0090069~~	~~6381.5659520~~	~~=~~

~~= 2413474.2814074 =~~
~~= 2413573.9934677 =~~
~~= 2413673.7055120 =~~
~~= 2413773.4175426 =~~
~~= 2413873.1295592 =~~
~~= 2413972.8415549 =~~
~~= 2414072.5535438 =~~
~~= 2414172.2655118 =~~
~~= 2414271.9775589 =~~

U Cephei. Elements from A. J. 396. p. 94.)

Con. from p. 183.

$125^m.21 = 2^h\ 5^m\ 12^s.6 = .0869514$ | $+ 5583.8702080^d$ + Epoch.
126.56 = 2 6 33.6 = .0878889 | 5683.5821760
127.70 = 2 7 42.0 = .0886805 | 5783.2941440
128.61 = 2 8 36.6 = .0893126 | 5883.0061120
129.29 = 2 9 17.4 = .0897847 | 5982.7180800
129.74 = 2 9 44.4 = .0900972 | 6082.4300480
129.97 = 2 9 58.2 = .0902569 | 6182.1420160
129.97 = 2 9 58.2 = .0902569 | 6281.8539840
129.74 = 2 9 44.4 = .0900972 | 6381.5659520

U Cephei con.

		Gr. m. T. min.	Epoch.	
= 2413474.3596594	= 1895	Oct. 7d 8h 37m 55s	2240	
= 2413574.0725649	= 1896	Jan. 15d 1h 44m 30s	2280	
= 2413673.7853245	= "	Apr. 23d 18h 50m 52s	2320	
= 2413773.4979246	= "	Aug. 1d 11h 57m 1s	2360	
= 2413873.2103647	= "	Nov. 9d 5h 2m 47s	2400	
= 2413972.9226452	= 1897	Feb. 16d 22h 8m 37s	2440	34.2s
= 2414072.6347729	= "	May 27d 15h 14m 4s	2480	2.4
= 2414172.3467409	= "	Sept. 4d 8h 19m 18s	2520	16.2
= 2414272.0585492	= "	Dec. 13d 1h 24m 19s	2560	16.2

Computation of 1900 positions for Dun. comp. stars for SS Cygni.
(Dun. places carried forward)

Taking the mean of the Dun. places of k and o (21h 39m +42° 55') (now c and g) respectively, and near the variable, we have for approx. annual precession in R.A. +2.s346 and in Dec. +16.″27

2.s346 × 22.5 = 52.s78

16.″27 × 22.5 = 366.″1

h = a in final notation.

$\frac{m}{15}$ (1875) = +3.s0712

log $\frac{n}{15}$ " = 0.12607

" n " = 1.30216

21 39 3.8 +42 46.6 1855
52.8 +6.1
21 39 56.6 +42 52.7

log $\frac{n}{15}$ = = +0.12607
" sin 324° 59.′24″ = n9.75873
" tan 42° 52.7 = +9.96781
= n9.85261

-0.7122
+3.0712
log 2.3590 = +0.37273
" 45. = +1.65321
+106.s16 = 2.02594

log n = +1.30216
" cos δ = +9.91330
" 45 = +1.65321
+739.″1 = +2.86867
+ 12′ 19.″1

21h 39m 3.s8 +42° 46.′6
+1 46.2 +12.3
21 40 50.0 +42 58.9 (1900)

61st Cygni comp. stars con:

k = b

~~log $\frac{w}{w'}$ = +0.12607~~
~~" sin 324 21 42. = n9.76542~~
~~" tan 42° 55.3 = +9.96847~~
~~-0.7244 = n9.85996~~

k = c in final rotation.

21 37 26.8 +42 55.3
+52.8 +6.1
21 38 19.6 +43 1.4
324° 34' 54."

log. $\frac{w}{w'}$ = = +0.12607
" sin t = = n9.76309
" tan 43° 1.4 = +9.97001
-0.7230 = n9.85917
3.0712
log. 2.3482 = 0.37074
" 45. = 1.65321
+105.7 = 2.02395

21 37 26.8
+1 45.7
21 39 12.5

log w = +1.30216
" cos t = +9.91113
" 45 = +1.65321
+735.4" = +2.86650

+12.3' ~~+55.4"~~

+42° 55.3'
+12.3
+43 7.6 (1900)

l = d in final rotation.

21 39 41.9 +43 16.0
+52.8 +6.1
21 40 34.7 +43 22.1
325° 8' 40."

log. $\frac{w}{w'}$ = +0.12607
" sin t = n9.75702
" tan δ = +9.97525
-0.7217 = n9.85834
+3.0712
+2.3495 = +0.37098
45. = +1.65321
+105.7 = +2.02419

21 39 41.9
+1 45.7
21 41 27.6 (1900)

log w = +1.30216
" cos t = +9.91413
" 45 = +1.65321
= +2.86950 = 740.4"
12'.3 ~~20.4"~~
+43 16.0
+43 28.3 (1900)

S S Cygni comp. stars corr.

m = e in final notation.

21 38 40.7   +43 8.6
+52.8   +6.1
21 39 33.5   +43 14.7
324° 53' 23."

log $\frac{m}{15}$ = +0.12607
" sin α = n9.75978
" tan δ = +9.97338
−0.7232 = n9.85923
+3.0712
+2.3480 = +0.37070
45" = +1.65321
+105.7 = +2.02391

21 38 40.7 ✓
+1 45.7 ✓
21 40 26.4 ✓ (1900)

log m = +1.30216
" cos α = +9.91277
" 45" = +1.65321
+738.1" = +2.86814 = 12' 18.1"

+43° 8.6
+12.3
+43 20.9 ✓ (1900)

---

m = f in final notation.

21 37 1.2 ✓   +43 3.4 ✓
+52.8   +6.1
21 37 54.0 ✓   +43 9.5 ✓
324° 28' 30."

log $\frac{m}{15}$ = +0.12607 ✓
" sin α = n9.76422 ✓
" tan δ = +9.97206 ✓
−0.7284 ✓ = n9.86235 ✓
+3.0712 ✓
+2.3428 = +0.36973 ✓
45" = +1.65321 ✓
+105.4 = +2.02294

log m = +1.30216 ✓
" cos α = +9.91056 ✓
" 45" = +1.65321 ✓
+734.4" ✓ = +2.86593 = +12' 14.4"

21 37 1.2 ✓   +43 3.4 ✓
+1 45.4 ✓   +12.2 ✓
21 38 46.6 (1900)   +43 15.6 (1900)

SS Cygni comp. stars con.

o = g in final notation.

21 36 39.1 +42 54.4
+52.8 +6.1

21 37 31.9 +43 0.5

324 22 59.

log $\frac{u}{15}$ = +0.12607 ✓

" sin t = n9.76519

" tan δ = +9.96978

−0.7262 = n9.86104

+3.0712

+2.3450 = +0.37014

45 = +1.65321

+105.5 = +2.02335

log u = +1.30216 ✓

" cos δ = +9.91005

" 45 = +1.65321

= +2.86542 = 733.5"

+12'.2 ~~13.5"~~

21 36 39.15 ✓ +42 54.45 ✓
+1 45.55 ✓ +12.2 ✓

21 38 24.6 ✓ +43 6.6 ✓ (1900)

c in final notation.

SS Cygni Comp. Stars.

h' = +43° 4024 = 21 37 40.0 ✓ +43 40.7 (8.1) (1855)
+52.8 +6.1
Mid. Pl. = 21 38 32.8 ✓ +43 46.8 ✓
324° 38' 12''

log $\frac{m}{n}$ = +0.12607 ✓
" sin t = n9.76250 ✓
" tan δ = +9.98150 ✓
−0.7414 ✓ = n9.87007 ✓
+3.0712 ✓
+2.3298 ✓ = +0.36732 ✓
45 = +1.65321 ✓
+104.8 ✓ = +2.02053

+1 44.8
21 37 40.0 ✓
h' = h = 21 39 24.8

log u = +1.30216 ✓
" cos t = +9.91143 ✓
" 45 = +1.65321 ✓
735''.9 ✓ = +2.86680

+12'.3 ~~+5.9''~~
43 40.7
+43 53.0 (1900.0)

U Pegasi.

5h 32m 15s = 0.d2307291

2413094.8231250 = Epoch.

2414287.5833333

.2307291) 1192.7602083 (5169.

11536455

3911470

2307291

16041798

13843746

21980523

20765619

1214904

0.2307291

5170

16151037 0

2307291

11536455

11928694470

2413094.8231250

2414287.6925720

4259.

1897. Dec. 28.6925720

.6666667 = 16h

.0259053

.0256944 = 37m

.0002109 = 18s+.

Max. (Gr. m. T.) = 1897 Dec. 28d 16h 37m 18s.

5 32 15.

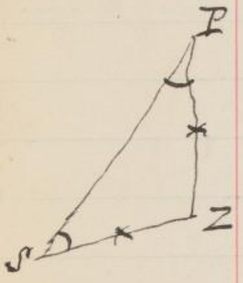
1897 Dec. 28 11 5 3.

δ Cephei.

1840 Sept. $26^{d}\ 10^{h}\ 50^{m} = 2393375\overset{\text{j.d.}}{.}4153889$ ✓

$5^{d}\ 8^{h}\ 47^{m}\ 39\overset{s}{.}3 = 5\overset{d}{.}3664271$ ✓

Computation of Differential Absorption on U Pegasi for different hour angles and corresponding altitudes.



$\varphi = 42° 23'$

$PZ = 47° 37'$

For H. A. = 4^h = 60°

$\angle P = 60°$

$ZS = 57°.7$

Log sin P = 9.93753

" " PZ = 9.86844

Sum logs. = 9.80597

Log sin ZS = 9.92699

49° 11' = " " S = 9.87898

For H. A. 5^h = 75°

$\angle P = 75°$

$ZS = 68.7$

Log sin P = 9.98494

" " PZ = 9.86844

9.85338

" " ZS = 9.96927

49° 59' = " " S = 9.88411

Diff. Abs. on U Pegasi.

For. H. A. $6^h = 90°$

$\angle P = 90°$

$ZS = 79°.8$

Log sin $P = 0.00000$ ✓

" " $PZ = 9.86844$ ✓

9.86844 ✓

" " $ZS = 9.99308$ ✓

$48°\ 38' =$ " " $S = 9.87536$

For. H. A. $6^h\ 30^m = 97°\ 30'$

$\angle P = 97°\ 30'$

$ZS = 85°.0$

Log sin $P = 9.99627$ ✓

" " $PZ = 9.86844$ ✓

9.86471 ✓

" " $ZS = 9.99834$ ✓

$47°\ 19' =$ " " $S = 9.86637$ ✓

Diff. $ZD = \alpha \sin S - \delta \cos S$ (α being the diff. of R. A. between the two stars in minutes of arc, and δ the diff. of dec.

Diff. R. A. = Var. − (C. S.) $= -53^s.1$

" Dec. = " − " $= +7'.1$

~~Log 54.5 = 1.73640~~ ✓

~~" cos δ = 9.98412~~ ✓

~~" 15 = 1.17609~~ ✓

~~13'.1 = 788" = 2.89661~~ ✓

Log 53.1 = 1.72509 ✓

" cos δ = 9.98412 ✓

" 15 = 1.17609 ✓

12'.8 = 768" = 2.88530

U Pegasi has smaller R. A. but greater dec. than comp. star.

Diff. Abs. on U Pegasi.

For 4h H. A. West.

.052 = Δ path for 1°

(12.8)
(49° 11′)

Log. d = 1.10721 ✓
" sin v = 9.87898 ✓
9.69 ✓ = 0.98619

9′.69 ✓
4′.64 ✓
5′.05 ✓

Log .052 = 8.71600 ✓
" 5.05 = 0.70329 ✓
= 9.41929 ✓
" 60. = 1.77815 ✓
Δ path = .0044 = 7.64114 ✓

(7.1)

Log δ = 0.85126 ✓
" cos v = 9.81534 ✓
4′.64 ✓ = 0.66660 ✓

ZD 57°.7

For 5h H. A. West.

.123 = Δ path for 1°

49° 59′

Log d = 1.10721 ✓
" sin v = 9.88415 ✓
9′.80 = 0.99136

9.80
4.57
5.23

Log. .123 = 9.08991 ✓
" 5.23 = 0.71850 ✓
9.80841 ✓
" 60. = 1.77815 ✓
= 8.03026
Δ path = .0107

Log δ = 0.85126 ✓
" cos v = 9.80822 ✓
4′.57 = 0.65948

ZD = 68°.7

For 6h H. A. West.

.455 = Δ path for 1°

48° 38′

Log. d = 1.10721 ✓
" sin v = 9.87535 ✓
9.61 = 0.98256

9.61
4.69
4.92

Log .455 = 9.65801 ✓
" 4.92 = 0.69197 ✓
0,34998 ✓
" 60. = 1.77815 ✓
= 8.57183
Δ path = .0373

Log δ = 0.85126 ✓
" cos v = 9.82012
4′.69 = 0.67138

ZD = 79°.8

Diff. Abs. on U Pegasi.

For 6h 30m H.A. West.

1.46 = Δ path for 1°.

47° 19'

Log t = 1.10721 ✓
" sin δ = 9.86635 ✓
9.41 = 0.97356

Log δ = 0.85126 ✓
" cos δ = 9.83120 ✓
4.81 = 0.68246

9.41
4.81
4.60

Log 1.46 = 0.16435
" 4.60 = 0.66276
0.82711
" 60. = 1.77815
Δ path = .1119 ✓ = 9.04896

Z δ 85.0

No observations as yet on U Pegasi as much as 2h east of the meridian, hence no computation for diff. abs. east of the meridian needed.

Col. 1. H. A.	Col. 2. Δ Path.	Diff. Abs. Col. 2. × 0.26
~~+2.0~~ h		
+4.0	.004 ✓	.001 ✓
+5.0	.011 ✓	.003 ✓
+6.0	.037 ✓	.010 ✓
+6.5	.112 ✓	.029 ✓
+6.3	.071 ✓	.018 ✓

U Pegasi. Diff. Abs.

For H.A. = 6.3^h = 94° 30′

∠P = 94° 30′ ✓
Z S = 83.0°

Log sin P = 9.99866 ✓
" " PZ = 9.86844 ✓
Sum logs. = 9.86710 ✓
Log sin Z S = 9.99675 ✓
47° 54′ = " " S = 9.87035 ✓

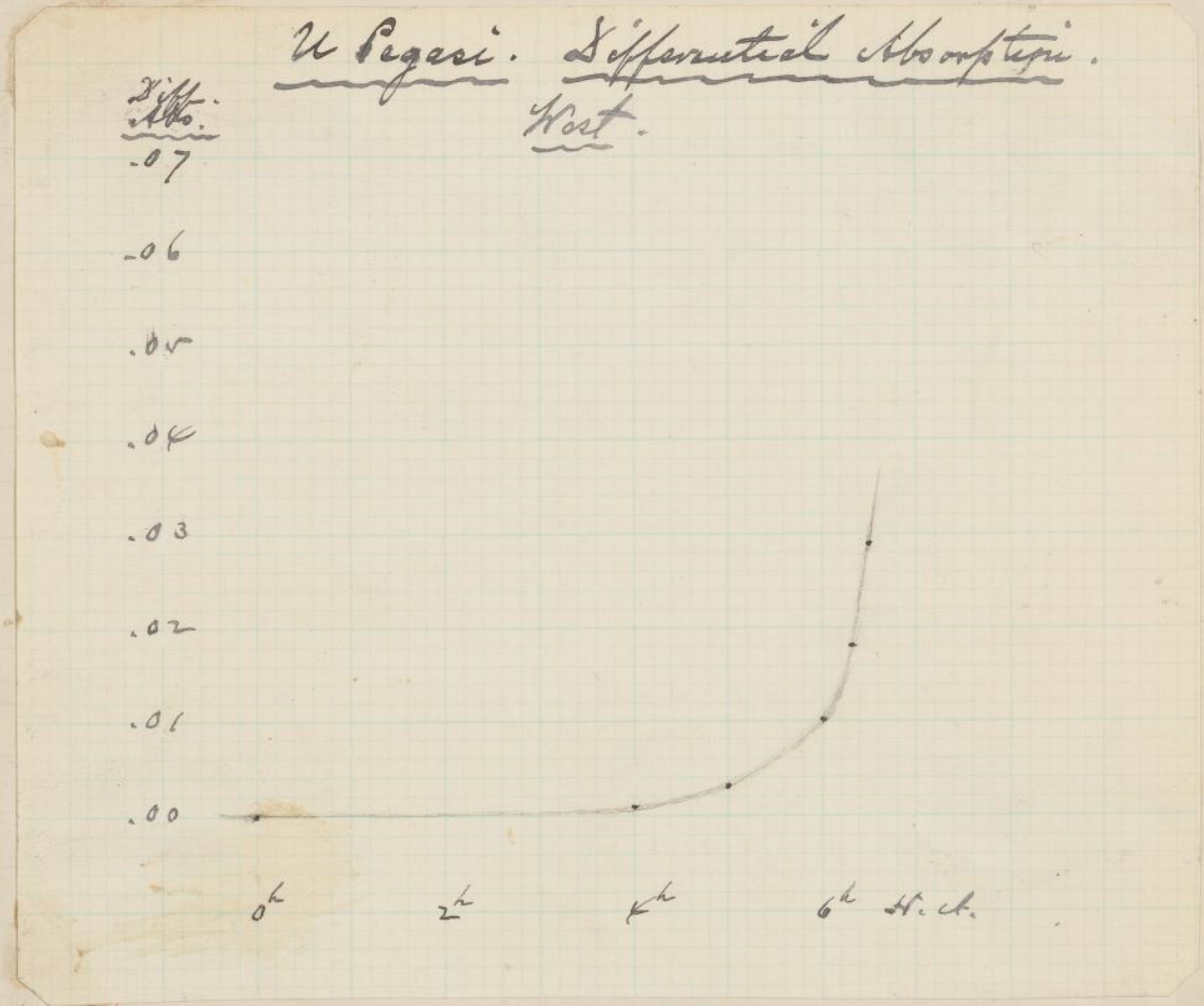
12.8 Log r = 1.10721 ✓
" sin s = 9.87039 ✓
9.50 ✓ = 0.97760 ✓
7.1 Log d = 0.85126 ✓
" cos s = 9.82635 ✓
4.76 = 0.67761 ✓
9.50
4.74

0.90 = Δ path for 1°.

Log 0.90 = 9.95424
" 4.74 = 0.67578
0.63002
" 60. = 1.77815
Δ path = .0711 = 8.85187 ✓

Z S = 83.0°

U Pegasi. Diff. Abs.

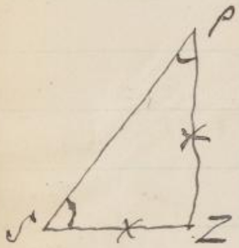


U Pegasi, west of the meridian, is lower than the comp. star which makes the variable relatively too faint.

Hence to correct for Diff. Abs. west of the meridian, subtract Diff. Abs. numerically from Diff. magn. (since the variable is always ftr. than comp. star) and should be made brighter.

~~(U Pegasi is always ftr. than comp. star)~~

W Delphini: Diff. Absorption.



$\varphi = 42° 23'$
$PZ = 47° 37'$

For H.A. = 4^h = 60°
$\angle P = 60°$ ✓
$ZS = 56°.1$ ✓

(60°) Log sin P = 9.93753 ✓
" " PZ = 9.86844 ✓
Sum logs. = 9.80597 ✓
(56°.1) Log sin ZS = 9.91908 ✓
(50° 25′) " " S = 9.88689 ✓

For. H. A. = 5^h = 75°

(75°) Log sin P. = 9.98494 ✓ $\angle P = 75°$ ✓
" " PZ = 9.86844 ✓ $ZS = 67°.1$ ✓
Sum logs. = 9.85338 ✓
(67°.1) Log sin ZS = 9.96435 ✓
(50° 46′) " " S = 9.88903

For. H. A. = 6^h = 90°

(90°) Log sin P = 0.00000 ✓ $\angle P. = 90°.0$ ✓
" " PZ = 9.86844 ✓ $ZS = 78°.1$ ✓
Sum logs = 9.86844 ✓
(78°.1) Log sin ZS = 9.99056 ✓
(49° 1′) " " S = 9.87788 ✓

α Delphini: Diff. Abs.

For. H. A. $6^h\ 30^m = 97°\ 30'$ ✓

(97° 30') Log sin P. = 9.99627 ✓
" " PZ = 9.86844 ✓
Sum logs = 9.86471 ✓
(83.4) Log sin Zv = 9.99711 ✓
(47° 30') " " v. = 9.86760 ✓

∠P. = 97° 30' ✓
Zv = 83.4 ✓

For. H. A. $6^h\ 45^m = 101°\ 15'$ ✓ ✓

(101° 15') Log sin P. = 9.99157 ✓
" " PZ = 9.86844 ✓
Sum logs = 9.86001 ✓
(86.0) Log sin Zv = 9.99894 ✓
(46° 34') " " v = 9.86107 ✓

∠P = 101° 15' ✓
Zv = 86.0 ✓

Diff. Z. D. = α sin v − δ cos v
α = Diff. R. A. between stars.
δ = " Dec. " "
Diff. R. A. = Var. − C. S. = − 2.9
" Dec. = " − " = +10.9 ✓

Var. prec. c. s. and is north of it.

(4^h)

(2.9)
50° 25'
Log α = 0.46240 ✓
" sin v = 9.88688 ✓
2.24 0.34928

6.95 ✓
2.24 ✓
4.71 ✓

Log δ = 1.03743
" cos v = 9.80428
6.95 = 0.84171

.048 = Δ path for 1°
Log. 048 = 8.68124
" 471 = 0.67302
9.35426
" 60. = 1.77815
Δ path = .0038 = 7.57611

(5^h)

50° 46'
Log α = 0.46240 ✓
" sin v = 9.88906 ✓
2.25 ✓ 0.35146 ✓

6.89 ✓
2.25 ✓
4.64 ✓

Log δ = 1.03743 ✓
" cos v = 9.80105 ✓
6.89 ✓ = 0.83848 ✓

.111 = Δ path for 1°.
Log. 111 = 9.04532
464 = 0.66652
9.71184
" 60. = 1.77815
Δ path = .0086 = 7.93369

W Delphini: Diff. Abs.

(6h) ✓

(49° 1')

Log a = 0.46240 ✓
" sin δ' = 9.87789 ✓
2.19 ✓ 0.34029 ✓

Log δ = 1.03743 ✓
" cos δ' = 9.81680 ✓
7.15 0.85423 ✓

7.15 ✓
2.19 ✓
4.96 ✓

.350 = Δ path for 1°.

Log. .350 = 9.54407
" 4.96 = 0.69548
0.23955
" 60. = 1.77815
Δpath = .0289 ✓ = 8.46140

(6h 30m)

47° 30'

Log a = 0.46240 ✓
" sin δ' = 9.86763 ✓
2.14 0.33003 ✓

Log δ = 1.03743 ✓
" cos δ' = 9.82968 ✓
7.36 = 0.86711 ✓

7.36 ✓
2.14 ✓
5.22

0.99 = Δ path for 1°

Log. 0.99 = 9.99564
" 5.22 = 0.71767
0.71331
" 60 = 1.77815
Δpath = .0861 = 8.93516

(6h 45m)

46° 34'

Log a = 0.46240 ✓
" sin δ' = 9.86104 ✓
2.11 = 0.32344 ✓

Log δ = 1.03743 ✓
" cos δ' = 9.83728 ✓
7.49 = 0.87471

7.49
2.11
5.38

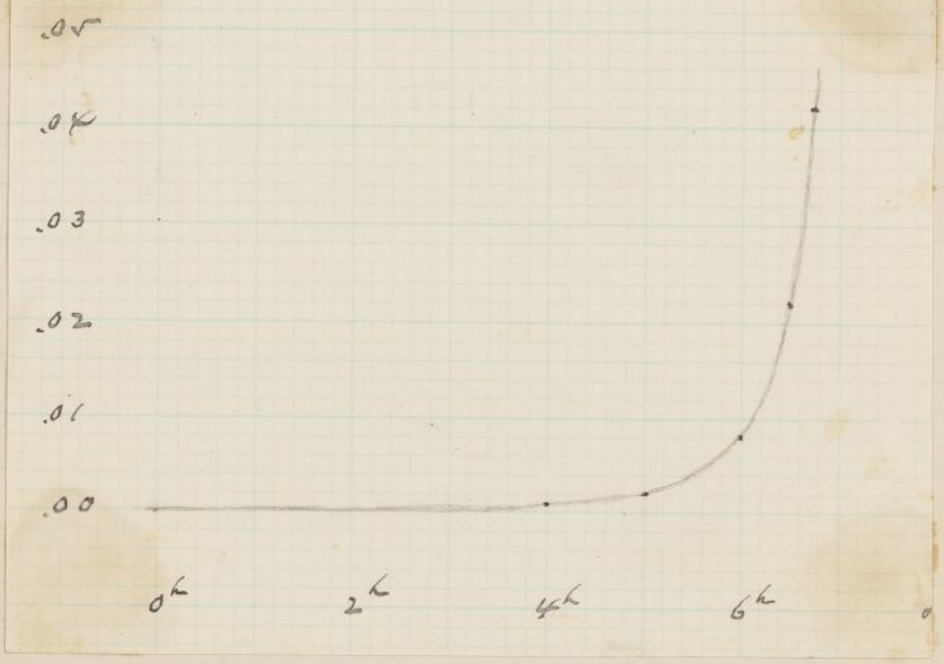
1.80 = Δ path for 1°.

Log 1.80 = 0.25527
" 5.38 = 0.73078
0.98605
" 60. = 1.77815
Δpath = .1614 = 9.20790

Col. 1. H-A.	Col. 2. Δpath.	Diff. Abs. Col. 2 × 0.26
4h	.004	.001
5h	.009	.002
6h	.029	.008
6h 30m	.086	.022
6 45	.161	.042

W Delphini. Diff. Abs.

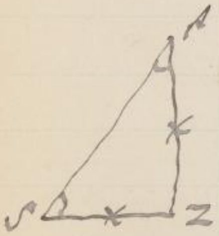
Diff. Abs. W Delphini. (Wat.)



S Cancri. Diff. Absorption.

φ = 42° 23'
PZ = 47 37

For H.A. 4h = 60°.
∠P = 60°
ZS =



Log sin P. = 9.93753 ✓
" " PZ = 9.86844 ✓
Sum logs. = 9.80597 ✓
55°.1 ✓ Log sin ZS = 9.91389 ✓
51° 16' " " S = 9.89208 ✓

For H.A. 5h = 75°
Log sin P = 9.98494 ✓
" " PZ = 9.86844 ✓
Sum logs = 9.85338 ✓
66°.2 ✓ Log sin ZS = 9.96140 ✓
51° 14' " " S = 9.89198 ✓

For H.A. = 6h = 90°
Log sin P = 0.00000 ✓
" " PZ = 9.86844 ✓
Sum logs = 9.86844 ✓
77°.1 ✓ Log sin ZS = 9.98890 ✓
49° 16' " " S = 9.87954 ✓

S Cancri. Diff. Abs.

For R.A. $6^h\ 30^m = 97°\ 30'$
$\angle P = 97°\ 30'$
$ZS =$

Log sin P = 9.99627 ✓
" " PZ = $\underline{9.86844}$ ✓
Sum logs = 9.86471 ✓
82.3 ✓ Log sin ZS = $\underline{9.99607}$ ✓
47° 38′ " " S = 9.86864 ✓

$\alpha' - \alpha = +\ 48.5$
$\delta' - \delta = -\ 2'.4$
Var. has the larger R.A. but smaller Dec.

Log. 48.5 = 1.68574 ✓
" 15. = 1.17609 ✓
" cos δ = $\underline{9.97461}$ ✓
11′.4 = 686″.2 = 2.83644 ✓

(4^h) East.

11′.4 Log t = 1.05690 ✓
51° 16′ Log sin S = $\underline{9.89213}$ ✓
8′.89 = 0.94903 ✓

+1.50
$\underline{+8.89}$
10.39

2′.4 Log δ = 0.38021 ✓
" cos S = $\underline{9.79636}$ ✓
+1.50 = 0.17657 ✓
$\underline{+8.89}$
10.39

.044 = Δ path for 1°
Log .044 = 8.64345 ✓
" 10.39 = $\underline{1.01662}$
9.66007 ✓
" 60. = $\underline{1.77815}$ ✓
.0076 = 7.88192 ✓

(5^h) East.

Log t = 1.05690
51° 14′ Log sin S = $\underline{9.89193}$
8.89 0.94883 ✓

8.89
$\underline{1.50}$
10.39 ✓

Log δ = 0.38021 ✓
" cos S = $\underline{9.79668}$
1.50 0.17689 ✓

.101 = Δ path for 1°
Log .101 = 9.00432
" 10.39 = $\underline{1.01662}$
0.02094
" 60. = $\underline{1.77815}$
.0175 − = 8.24279

δ Cancri. Diff. Abs.

(6h) East.

Log t = 1.05690
49° 16' " sin z = 9.87953
8.64 0.93643

Log δ = 0.38021
49° 16' " cos z = 9.81461
1.57 = 0.19482

8.64
1.57
10.21

.251 = Δ path for 1°

Log .251 = 9.39967
" 10.21 = 1.00903
0.40870
" 60. = 1.77815
.0427 = 8.63055

(6h 30m) East.

Log t = 1.05690
47° 38' Log sin z = 9.86855
8.42 = 0.92545

Log δ = 0.38021
47° 38' " cos. z = 9.82858
1.62 = 0.20879

8.42
1.62
10.04

0.77 = Δ path for 1°

Log 0.77 = 9.88649
" 10.04 = 1.00173
0.88822
" 60 = 1.77815
.1288 = 9.11007

Col 1. H. A.	Col. 2. Δ path.	Diff. Abs. Col. 2 × 0.26
4h	.008	.002
5h	.018	.005
6h	.043	.011
6h 30m	.129	.034

For H. A. East.

S Cancri: Diff. Abs.

For. H. A. West.

(4h) West

−8.89
+1.50
7.39

Log .044 = 8.64345
" 7.39 = 0.86864
=9.51209
" 60. = 1.77815
.0054 = 7.73394

(5h) West.

Log .101 = 9.00432
" 7.39 = 0.86864
9.87296
" 60. = 1.77815
.0124 = 8.09481

(6h) West.

−8.64
+1.57
7.07

Log .251 = 9.39967
" 7.07 = 0.84942
0.24909
" 60. = 1.77815
.0296 = 8.47094

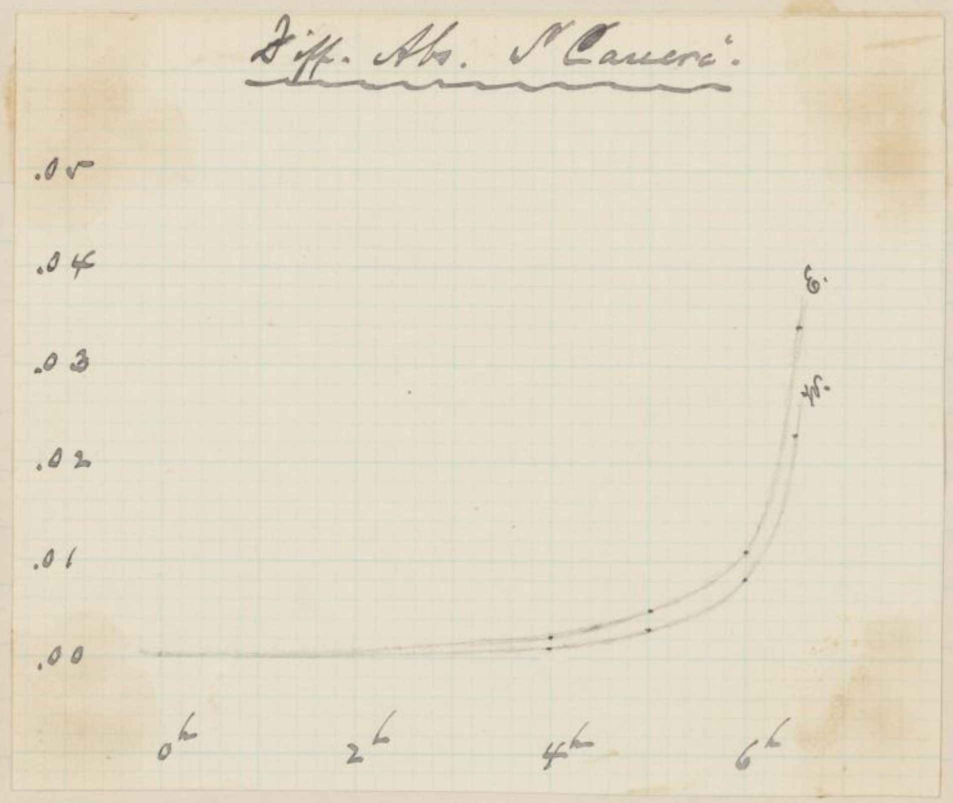
(6h 30m) West.

−8.42
+1.62
6.80

Log 0.77 = 9.88649
" 6.80 = 0.83251
0.71900
" 60. = 1.77815
.0873 = 8.94085

Col. 1. H. A.	Col. 2. Δ path.	Diff. Abs. Col. 2. × 0.26
4	.005	.001
5	.012	.003
6	.030	.008
6h 30m	.087	.023

δ Cancri. Diff. Abs.


Diff. Abs. δ Cancri.

Formula for Diff. Zenith Distance.

Let α' = R. A. of Variable.
" δ' = Dec. " "
" α = R. A. " Comp. Star.
" δ = Dec. " " "

Then generally.

$-\Delta(\alpha'-\alpha)\sin\nu - \Delta(\delta'-\delta)\cos\nu = \Delta ZD$ for stars West.
$+\Delta(\alpha'-\alpha)\sin\nu - \Delta(\delta'-\delta)\cos\nu = \Delta ZD$ " " East.

R Canis Majoris. $\varphi = 42° 23'$

$\alpha' =$ R.A. Var.
$\delta' =$ Dec. "
$\alpha =$ R.A. Comp. Star.
$\delta =$ Dec. " "

~~For H.A. $5^h.0 = 75°.0$~~

~~$\angle P = 75°$~~
~~$ZS =$~~

For H.A. $4^h\ 48^m = 72°.0$

$\angle P = 72°.0$
$ZS = 88°.2$

72°	Log sin P	=	9.97821
42° 23'	" " PZ	=	9.86844
	Sum logs.		9.84665
88°.2	Log. sin ZS	=	9.99979
44° 39'.0	" " S	=	9.84686

$\alpha' = 7^h\ 12^m\ 54^s.5$
$\alpha = 7\ \ 14\ \ 9.5$
$\alpha' - \alpha = -1\ \ 15.0$

$\delta' = -16°\ 7'.9$
$\delta = -15\ \ 52.2$
$\delta' - \delta = -0\ \ 15.7$

$\alpha' - \alpha = -75^s.0$ Log $-75.0 = n1.87506$
" cos δ = 9.98262
" 15. = 1.17609
$n3.03377 = -1081'' = -18'.0$

R Canis majoris.

(−18'.0) Log α = n1.25527
44° 39' " sin δ = 9.84682
−12.65 = n1.10209

(−15'.7) " δ = n1.19590
44° 39' " cos δ = 9.8~~4682~~ 5212
~~−11'.03 = n1.04272~~
−11.17 = n1.04802

~~+12.68~~
~~+11.03~~
~~+23.68~~

+12.65
+11.17
23.82

2.80 = 0.44716
23.82 ~~23.68~~ = 1.37~~438~~ 694
1.82~~450~~ 410

60. = 1.77815
~~1.1054 = 0.04339~~
~~.26~~
~~6630~~
~~2210~~
~~.28730~~ mag.

0.04595 = 1.112
.26
6672
2224
.28912
mag.

For H. A. 4h 40m = 70°

∠P = 70°
Zδ = 86°.9

Log sin P = 9.97299
" " PZ = 9.86844
Sum logs. = 9.84143
86°.9 Log sin Zδ = 9.99936
44° 2' " " δ = 9.84207

−18'.0 Log α = n1.25527
44 2 " sin δ = 9.8420~~7~~ 3
−12.51 = n1.0973~~4~~ 0
−15'.7 " δ = n1.19590
44 2 " cos δ = 9.8~~4207~~ 5669
= ~~n1.03797~~
= n1.05259 = +11.29

~~+10.91~~
~~+12.51~~
~~+23.42~~

+11.29
+12.51
23.80

2.15 = 0.33244
23.80 1.37658
~~23.42 = 1.36959~~
1.70902
~~1.70203~~

60. = 1.77815
= ~~9.92388~~
9.93087

~~0.839~~
~~.26~~
~~5034~~
~~1678~~
~~.21814~~ mag.

9.93087 =
= .853
.26
5118
1706
.22178
mag.

R Canis majoris.

For H.A. = 4h 30m = 67° 30'

∠P = 67° 30'
ZS = 85°.2

67° 30' Log sin P = 9.96562
" " PZ = 9.86844
Sum logs. = 9.83406
85°.2 Log sin ZS = 9.99847
43° 13' " " S = 9.83559

Log α = n1.25527
43 13 " sin S = 9.83558
−12.33 = n1.09085
" δ = n1.19590
43 13 " cos S = 9.86259
+11.44 = n1.05849
+12.33
23.77

150 = 0.17609
2377 = 1.37603
1.55212
60. = 1.77815
.594 = 9.77397
.26
3564
1188
.15444 major

For H. A. = 4h 20m = 65° 0m

∠P = 65°.0
ZS = 83°.7

65° 0' Log sin P = 9.95728
" " PZ = 9.86844
Sum logs = 9.82572
83°.7 Log sin ZS = 9.99737
42° 20' " " S = 9.82835

R Canis majoris.

~~Log sin P =~~
~~" " PZ =~~
~~Sum logs =~~
~~Log sin ZS =~~
~~"~~

Log t = n1.25527
" sin v = 9.82830
−12.12° n1.08357
" δ = n1.19590
" cos v = 9.86879
n1.06469
−11.61°
+23.73°

1.05 = 0.02119
23.73 = 1.37530
1.39649
60. = 1.77815
.415 = 9.61834
.26
2490
830
.10790 mags.

For H.A. 4h 10m = 62° 30′

∠P = 62° 30′
ZS = 82.0°

62 30 Log sin P = 9.94793
" " PZ = 9.86844
Sum logs = 9.81637
82.0 Log sin ZS = 9.99575
41 26 " " S = 9.82062

Log t = n1.25527
41 . 26 " sin v = 9.82069
−11.91° = n1.07596
" δ = n1.19590
41 26 " cos v = 9.87490
n1.07080
+11.77°
+11.91°
23.68°

0.70 = 9.84510
23.68 = 1.37438
1.21948
60. = 1.77815
.276 = 9.44133
.26
1656
552
.07176 mags.

In determining diff. due to star on right and on left, (in Argelander's method) ~~we~~ we have the following rule, viz;

When one comparison star is underlined and the other not, change sign of second residual and take algebraic sum. Enter this result in column a (first col.) when first star is underlined, and in column b when second star is underlined.

When both stars, or neither star, is underlined, do nothing with them.

R Canis Majoris.

For H. A. $4^h\ 0^m = 60°\ 0'$

60° 0′	Log sin P. = 9.93753	
	" " PZ = 9.86844	0.50 = 9.69897
	Sum logs = 9.80597	23.62 = 1.37328
80.5	Log sin Zs = 9.99400	1.07225
40° 26′	" " s = 9.81197	60. = 1.77815
	Log t = n1.25527	.197 = 9.29410
40 26	" sin s = 9.81195	.26
	−11.67 = n1.06722	1182 394
	" δ = n1.19590	.05122 mags.
40 26	" cos s = 9.88148	
	−11.95 n1.07738	
	−11.67	
	+23.62	

R Canis Majoris.

Hor. H. A. $3^h\ 40^m = 55^\circ\ 0'$

55° 0' Log sin P = 9.91336 ✓ 0

" " PZ = 9.86844 ✓ 0

Sum logs = 9.78180 ✓ 0

77.4° Log sin zv = 9.98981 ✓ 0

~~36° 12~~ " " δ = ~~9.77121~~ ✓

38° 19' = 9.79239

Log t = n1.25527 ✓ 0

~~36 12~~ 38° 19' " sin δ = ~~9.77121~~ 79239 ✓

11.16

−10.63 = n1.02648 1.04766 ✓

" δ = n1.19590 ✓ 0 89465

36 12 " cos δ = 9.90685 ✓

~~−12.96~~ 12.32 n1.10275 ✓ 1.09055

−12.67 ✓ +11.16

−10.63 ✓ 12.32

+23.30 ✓ +23.48

0.31 = 9.49136 ✓ 0

23.30 = 1.36736 ✓ 0

0.85872 ✓

60. = 1.77815 ✓

.120 = 9.08057 ✓ 0

.26

720

240

.03120 0 magn.

9.49136

1.37070

0.86206

1.77815

9.08391

.121

.26

726

242

.03146

N. A.

0 ✓	$+3^h\ 40^m$	.031 magn.
0 ✓	+4 0	.051 "
0 ✓	+4 10	.072 "
0 ✓	+4 20	.108 "
0 ✓	+4 30	.154 "
0 ✓	+4 40	.222 "
0 ✓	+4 48	.289 "
0 ✓	+3 0	.016 "
0 ✓	+2 30	.012 "
0	+1 0	.005 "

~~$2^h\ 30^m$~~

0	$-1^h\ 0^m$	.003
0	−1 45	.003
	−2 0m	.00259
	−3 0	.00152

Corr. in Book 15. p. 60.

S Antliae.

Period = 7h 46m 48.0s = 0.3241667 ✓
Cat. Epoch = 2410741.5263889 ✓

.3241667 × 11220. = 3637.1503740
2410741.5263889
2414378.6767629 =
= 1898 Mar. 29d 16h 14m 32s.3 ✓

2414378.6767629 ✓
2.9175003 ✓
2414381.5942632 ✓ =
= True Min. = 1898. Apr. 1. 14h 15m 44s Gr. m. T. =
= " " " " " 1. 9h 15 44. East. Time. =
= Epoch 11229.

2414381.5942632 ✓
2.9175003 ✓ = 9 Epochs
2414384.5117635 ✓ Gr. m. T. =
= True min. = 1898. Apr. 4d 12h 16m 56s. " " " =
= " " = " " " 7 16 56s = Epoch 11238.

2414384.5117635
1.9450002
2414386.4567637 = 1898. Apr. 6d 10h 57m 44s Gr. m. T.
0.9725001
2414387.4292638 = " " 7d 10h 18m 7s " " "

East. True Min. = 1898. Apr. 6d 5h 57m 44s.
" " " = " " 7. 5 18 7.
+23 20 24. = 3 periods.
" " " = " " 8d 4h 38m 31s
23 20 24.
" " " = " " 9d 3 58 55.
23 20 24.
" " " = " " 10d 3 19 19.
7 46 48.
" " " = " " 10d 11 6 7.

East.	True	noon	=	1898	Apr.	10d	11h	6m	7s		
"	"	"	=	"	"	11	10	26	31		
"	"	"	=	"	"	12	9	46	55		
"	"	"	=	"	"	13	9	07	19		
"	"	"	=	"	"	14	8	27	43		
"	"	"	=	"	"	15	7	48	7		
"	"	"	=	"	"	16	7	8	31		
"	"	"	=	"	"	17	6	28	55		
"	"	"	=	"	"	18	5	49	19		
"	"	"	=	"	"	19	5	09	43		
"	"	"	=	"	"	20	4	30	07		
"	"	"	=	"	"	21	3	50	31		
"	"	"	=	"	"	22	3	10	55		
"	"	"	=	"	"	23	2	31	19	— 10h	18m
"	"	"	=	"	"	24	1	51	43	9	38
"	"	"	=	"	"	25	1	12	07	8	58
"	"	"	=	"	"	26	0	32	31	8	18
"	"	"	=	"	"	26	23	52	55	7	38
"	"	"	=	"	"	27	23	13	19		
"	"	"	=	"	"	28	22	33	43		
"	"	"	=	"	"	29	21	54	07		
"	"	"	=	"	"	30	21	14	31		

δ Antliae.

.3241667 = Period.

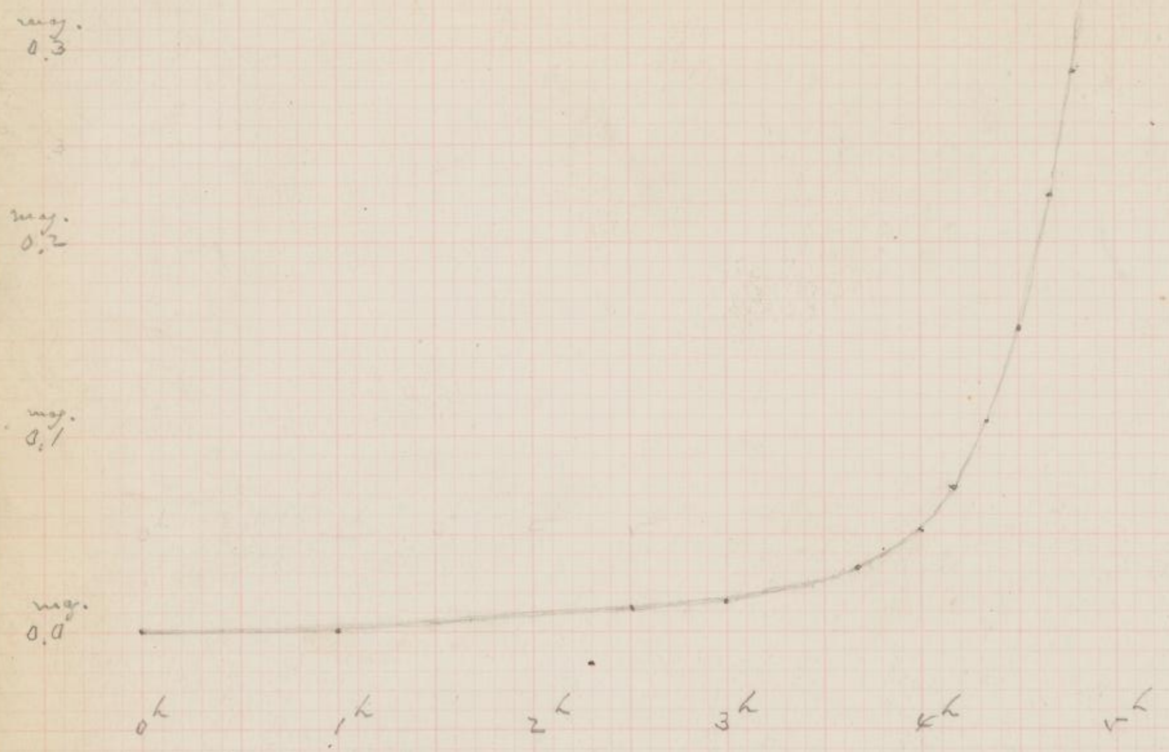
.3241667 × 11304. = 3664.3803768
2410741.5263859

= 2414405.9067627

1898. Apr. 25.

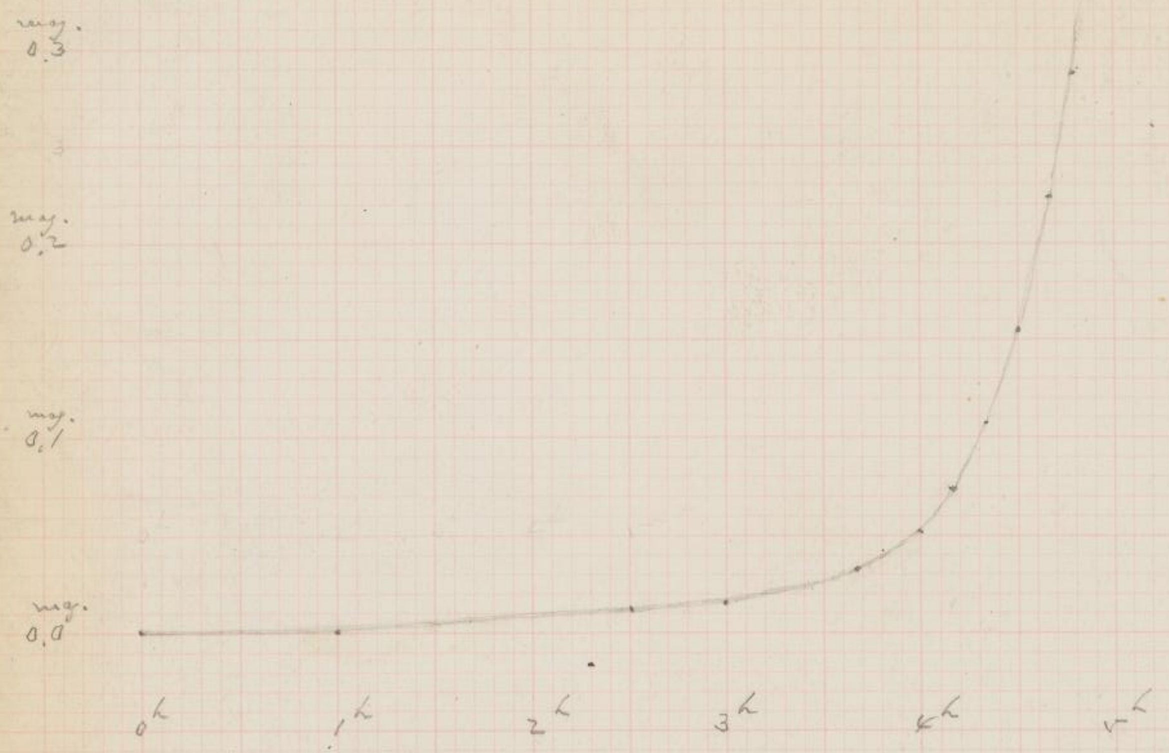
Diff. Absorption.

R Canis Majoris. Western Hour Angles.



Diff. Absorption.

R Canis Majoris. Western Hour Angles.



1895phae.proj.167I

7 468
2 31,3

10 181

Dates wanted on U Cephei.

97. Feb 4,
" " 9
" " 19
" " 24

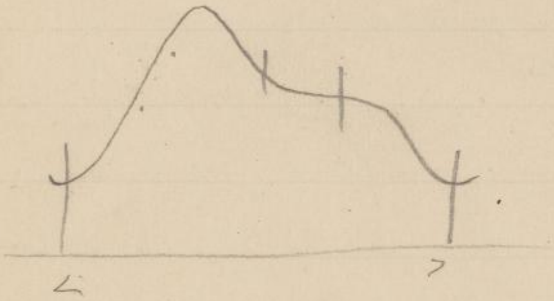
T Monocerotis.

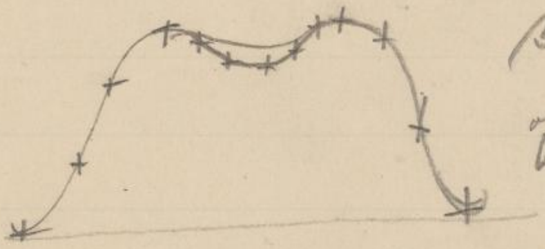
Var. = 6^h 17^m 24^s. $+7^\circ$ $9.7'$

$+7^\circ$ 1267 = 6 16 26. +7 8.7

Mar 10	95,3,10	31 56	$13^h.6$	4.26	001.100	+.25	4.28	-.02

Get 24 points of 24 settings each on both the δ Cephei and β Lyrae stars. If need be, taking two series on δ Cephei (one only in each division) as widely separated in the evening as possible, but only one series an evening on β Lyrae. As the period of δ Cephei is $5^d.37$ 24 points would subdivide the curve into 24 parts of 5.37 hours each, so that ~~possibly~~, one might get sometimes ~~a~~ two series of 24 settings an evening.





120^h

10^h

5^h

0) –
5) –
10

In the case of β Lyrae, the period of $12^d.91$ is to be subdivided into 24 parts of $12^h.91$ each, and 24 settings made in each of these subdivisions.