

KG

11366

11363

Index to Light Equations Computations in
this book.

<u>Name Var.</u>	<u>Page.</u>
------------------	--------------

Index.Pages

200. Defective points about Comp. Plan for "60 Variables."
- 2 Light Equation for RR Lyrae
- 130 " " " U Cephei. (recomputation)
- 140 " " " Coraschi I. "
- 140 " " " +43° 4101
- 142 " " " U Sagittae.
- 142 " " " ~~Z~~ ~~S~~ Draconis.
- 150 Ephemeris for Andromedae
- 160 " " 14.1902 New Algol.
- 152 Ephemeris " U Sag. Edel's Formula.
- 145 Ephemeris " U Scuti. (Final, adopted formula)
- 144 " " β Persei (" " ")
- 190 " " U Coronae (" " ")
- 192 " " U Ophiuchi (" " ")
- 102 " " 4.1903 Provisional data.
- 119 " " X Cygni all terms used
- 146 Light Equation for U X Cygni.
- 164 " " " 14.1902 γ Persei
- 166 " " " 20.1902.
- 170 " " " 13.1902.
- 172 " " " δ Cygni.
- 140 " " " δ Cygni.
- 192 " " " Z Draconis.
- 156 " " " Messier 15
- 176 " " " Var. 3 1903 = γ Uro. Negl.
- 208 " " " Y Lyrae (Antalgol)
- 210 " " " U Cygni
- 212 " " " S Cygni.

New Variables of M. +42° 3332 = R R Lyrae. 1

$$\alpha = 19^h 20^m 50.5^s = 290^\circ 12' 32''$$

$$\delta = +42^\circ 30' 2''$$

$$\log \tan \delta = +9.96226$$

$$\log \sin \delta = +9.97240$$

$$\log \tan \alpha = +9.92926$$

$$\alpha = -44^\circ 19' 9''$$

$$\alpha - \delta = -67^\circ 47'$$

$$\log \cos (\alpha - \delta) = +9.57762$$

$$\log \tan \alpha = +0.43325$$

$$\text{Sum logs} = +0.01147$$

$$\log \cos \delta = +9.25442$$

$$\delta = 304^\circ 52' = +0.15699$$

$$\log \tan (\alpha - \delta) = +0.32222$$

$$\log \sin \delta = +9.91407$$

$$\beta = +63^\circ 32' = +0.30295$$

$$\log \cos (\alpha - \delta) = +9.57762$$

$$\log \cos (\delta) = +9.25442$$

$$\text{Diff. Logs} = +9.72314$$

$$\log \cos \beta = +9.64902$$

$$\log \sin \delta = +9.91407$$

$$\text{Sum logs} = +9.56309$$

$$\log \cos \delta = +9.26754$$

$$\log \sin \alpha = +9.97240$$

$$\text{Sum logs} = +9.23994$$

$$\log \text{check} = +9.72315$$

2 Computation of Light Equation for. $\text{Sun.} + \text{K}2^{\circ} 333\text{A.}$

$$\begin{aligned} \text{Log. cos lat. } \times &= +9.64902 \\ \text{Log. } \rho &= +2.69210 \\ &+2.34712 \end{aligned}$$

$$\begin{aligned} \text{Long.} &= 304.9 \\ \text{Lat.} &= +63.5 \end{aligned}$$

Date.	Sun's Long.	Long. \times - " 0	Log. cos. Col. 3.	Log ρ	Log Final 2y.	Final 2y.
Jan. 0	279.2	25.7 +9.95476	9.9927	+2.2946	+197.	
10	289.4	15.5 +9.92391	9.9927	+2.3237	+216.	+14 -7
20	299.5	5.4 +9.99207	9.9930	+2.3322	+212.	+7 -7
30	309.7	35.2 +9.99247	9.9935	+2.3391	+210.	0 -6
Feb. 9	319.2	345.1 +9.92515	9.9942	+2.3265	+212.	-6 -7
19	329.9	335.0 +9.95722	9.9951	+2.2995	+199.	-13 -6
Mar. 1	340.0	324.9 +9.91223	9.9961	+2.2560	+120.	-19 -5
11	350.0	314.9 +9.84273	9.9972	+2.1930	+156.	-24 -5
21	0.0	304.9 +9.75751	9.9984	+2.1030	+127.	-29 -4
31	9.2	295.1 +9.62757	9.9997	+1.9744	+95.	-33 -2
Apr. 10	19.6	285.3 +9.42140	0.0009	+1.7694	+59.	-35 -3
20	29.4	275.5 +8.92157	0.0022	+1.3309	+21.	-32 0
30	39.2	265.7 +8.27494	0.0033	+1.2253	-17.	-32 +1
May 10	49.2	256.1 +9.32062	0.0043	+1.7320	-54.	-37 +1
20	59.5	246.4 +9.60244	0.0053	+1.9542	-90.	-36 +3
30	69.1	236.2 +9.73243	0.0060	+2.0915	-123.	-33 +3
June 9	77.6	227.3 +9.83133	0.0066	+2.1250	-153.	-30 +4
19	87.2	217.7 +9.89230	0.0070	+2.2524	-179.	-26 +6
29	96.7	208.2 +9.94513	0.0072	+2.2994	-199.	-20 +5
July 9	106.2	198.7 +9.97645	0.0072	+2.3307	-214.	-15 +6
19	115.2	189.1 +9.99450	0.0070	+2.3426	-223.	-9 +6
29	125.4	179.5 +9.99992	0.0066	+2.3537	-226.	-3 +7
Aug. 2	134.9	170.0 +9.99335	0.0060	+2.3465	-222.	+4 +6
12	144.5	160.4 +9.97402	0.0052	+2.3264	-212.	+10 +6
22	154.2	150.7 +9.94055	0.0043	+2.2920	-196.	+16 +6
Sept 7	163.9	141.0 +9.89050	0.0032	+2.2402	-174.	+22 +5
17	173.6	131.3 +9.81955	0.0021	+2.1622	-148.	+26 +4
27	183.4	121.5 +9.71209	0.0009	+2.0661	-116.	+31 +4

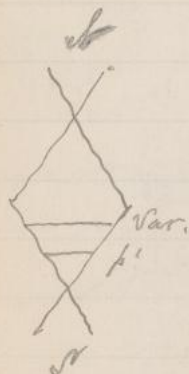
R R Lyrae.

3

Computation of Light Equation for. $\Delta\mu + K2^{\circ} 333A$.

Date.	Ames Long.	Long. * - " 0	Ly. cos. Col. 3.	Log p	Ly. Amal. 2y.	Amal. 2y.	
Oct. 7.	193.2	111.7	~ 9.56790	9.9996	~ 1.9146	-22.	+34 +2 +3
17.	203.2	101.7	~ 9.30704	9.9924	~ 1.6525	-45.	+37 +3 +2
27.	213.1	91.2	~ 8.9708	9.9972	~ 0.2414	-7.	-6 +32 +32 -1
Nov. 6.	223.2	21.7	$+9.15944$	9.9961	$+1.5026$	+32.	+39 -1 -1
16.	233.2	71.7	$+9.49692$	9.9950	$+1.2390$	+69.	+37 -2 -2
26.	243.3	61.6	$+9.67726$	9.9942	$+2.0126$	+104.	+35 +32 -3
Dec. 6.	253.5	51.4	$+9.79510$	9.9935	$+2.1357$	+132.	6 +22 +22 -4 -4
16.	263.6	41.3	$+9.27579$	9.9930	$+2.2159$	+164.	+27 +23 +23 -5 -5
26.	273.4	31.1	$+9.93261$	9.9927	$+2.2724$	+187.	

Location of star p' . (Comp. star for Hering.)



p'	Var.				
0 2 54.5 ^v	9 13.2 ^v				
9 43.7 ^v	10 36.0 ^v				
1A 34.2 ^v	19 49.2 ^v	-1 11.0 ^v	-0 35.50 ^v		
11 10.7 ^v	11 30.1 ^v				
11 59.2 ^v	12 51.2 ^v				
23 10.5 ^v	24 21.9 ^v	-1 11.4 ^v	-0 35.70 ^v		
13 20.5 ^v	13 39.9 ^v				
14 9.9 ^v	15 1.9 ^v				
27 30.7 ^v	28 41.4 ^v	-1 11.1 ^v	-0 35.55 ^v		
			1.75		
			-0 35.52		

$$\delta \text{Var.} = +vv^{\circ} 14.3 \quad (1900)$$

$\frac{\Delta \mu'}{49.2^{\circ}}$	$\frac{\Delta \text{Var.}}{1^{\circ} 22.2^{\circ}}$	33.6°	$433.03 = 1.51291^{\circ}$
			" $7.5 = 0.27506^{\circ}$
			" $\cos \delta = 9.75600^{\circ}$
			$-141.2 = 2.14997^{\circ}$
			70.6
49.1°	$1^{\circ} 21.7^{\circ}$	32.6°	

$$\begin{array}{r} +vv \quad 14.3 \\ -1.2 \\ \hline +vv \quad 13.1 \end{array}$$

49.1°	$1^{\circ} 22.0^{\circ}$	32.9°	1.51291°
		9.1	0.27506°
		33.03	9.75622
			$141.3 = 2.15019$

0	17	49.1°	$+vv \quad 14.3^{\circ} = \text{Var.} \quad (1900)$
		-36.1°	-2.4°
0	17	13°	$+vv \quad 11.9^{\circ} = \mu' \quad "$

6

Location of Faint Comp. Stars for R. Urs. Min.



$\frac{a}{b}$	$\frac{b}{a}$	Var.	$2(a - \text{Var.})$	$2(b - \text{Var.})$	$a - \text{Var.}$
22 32 51.4 ^v	33 37.0 ^v	32 52.5 ^v			
36 13.0	35 14.1 ^v	35 40.0 ^v			
69 2.4	62 51.1 ^v	67 32.5 ^v		+1 12.6 ^v	
32 57.0 ^v	39 43.0 ^v	32 52.0 ^v			
41 4.5 ^v	41 21.2 ^v	40 47.0 ^v			
20 1.5 ^v	21 4.2 ^v	79 45.0 ^v	+0 16.5 ^v	+1 19.2 ^v	+0 22.5 ^v
					+0 22.5 ^v

$$R. Urs. Min. (1900) = 16^h 31^m 18.7^s + 72^\circ 24.7'$$

$$\begin{array}{c} h-Var. \\ \hline \Delta a \\ \hline \Delta b \\ \hline \Delta Var. \\ \hline a-Var. \\ \hline Var.-b \end{array}$$

$$\begin{array}{ccc} +0 \ 39.30 & 97.1 & 107.5 \end{array}$$

$$\begin{array}{ccc} +0 \ 3960 & 127.5 & 98.2 \\ +0 \ 3940 & 97.6 & 108.2 \end{array}$$

$$\log. 19.25 = 1.28443$$

$$" \ 7.5 = 0.87506$$

$$" \ \cos \delta = 9.47266$$

$$K3.5 = 1.63215$$

$$+21.2 = 0.4$$

$$+72 \ 24.7$$

$$+72 \ 29.1$$

$$1.28443$$

$$0.87506$$

$$9.47266$$

$$+43.5 = 1.63799$$

$$\log. 10.60 = 1.02531$$

$$" \ 2.5 = 0.87506$$

$$" \ \cos \delta = 9.47266$$

$$23.94 \ 1.37903$$

$$-11.97 = -0.2$$

$$+72 \ 24.7$$

$$+72 \ 28.5$$

$$1.02531$$

$$0.87506$$

$$9.47266$$

$$23.94 = 1.37911$$

$$\begin{array}{ccc} Var. (1900) = 16 \ 31 \ 18.7 & +72 \ 24.7 & Var. (1900) = 16 \ 31 \ 18.7 \\ +2.1 & +0.7 & +39.5 \\ \hline a = p(1900) = 16 \ 31 \ 26.8 & +72 \ 29.4 & b(1900) = 16 \ 31 \ 57.2 \\ \hline \end{array}$$

$$\begin{array}{ccc} +2.1 & +0.7 & +39.5 \\ \hline a = p(1900) = 16 \ 31 \ 26.8 & +72 \ 29.4 & b(1900) = 16 \ 31 \ 57.2 \\ \hline \end{array}$$

Reduction of place of Var. R. Ursa Minoris from 1855 to 1900.

$$\begin{array}{r} \frac{L(1855)}{16^{\circ} 31' 57''} \\ \frac{M(1855)}{+72^{\circ} 34.4''} \\ 247^{\circ} 59' 15'' \end{array}$$

$$\begin{array}{r} \log \frac{u}{r} = +0.12607^{\circ} \\ \sin \delta = \sin 9.96713^{\circ} \\ \cos \delta = +0.50322^{\circ} \\ -39.44'' = \sin 0.59642^{\circ} \\ +3.0712 \\ -0.2772 = \sin 9.94310^{\circ} \\ 22.5 = +1.35212^{\circ} \\ -19.74 = \sin 1.29522^{\circ} \end{array}$$

$$\begin{array}{r} 16 \quad 31 \quad 57. \\ -19.7 \\ \hline \text{Mid. Pl.} = 16 \quad 31 \quad 37.3 \\ 247^{\circ} 54' 19'' \end{array}$$

$$\begin{array}{r} \log u = +1.30216^{\circ} \\ \cos \delta = \sin 9.57321^{\circ} \\ \sin 22.5 = +1.35212^{\circ} \\ -169.1 = \sin 2.22215^{\circ} \end{array}$$

$$\begin{array}{r} +72 \quad 34.4'' (1855) \\ -2.2 \\ \hline +72 \quad 31.6'' \end{array}$$

$$\begin{array}{r} \log \frac{u}{r} = +0.12607^{\circ} \\ \sin \delta = \sin 9.96622^{\circ} \\ \cos \delta = +0.50192^{\circ} \\ -39.349 = \sin 0.59493^{\circ} \\ +3.0712^{\circ} \\ -0.2637^{\circ} \\ \log. do. = \sin 9.93636^{\circ} \\ \sin 45. = +1.65321^{\circ} \\ -32.27 = \sin 1.52957^{\circ} \\ -19.44 \end{array}$$

$$\begin{array}{r} 16 \quad 31 \quad 57. \\ -32.27 \\ \hline \text{Var. 1900.} = 16 \quad 31 \quad 14.13 \end{array}$$

$$\begin{array}{r} \log u = +1.30216^{\circ} \\ \cos \delta = \sin 9.57535^{\circ} \\ \sin 22.5 = +1.35212^{\circ} \\ -169.7 = \sin 2.22969^{\circ} \end{array}$$

$$\begin{array}{r} \sin 45. = +1.65321^{\circ} \\ -339.4 = \sin 2.53072^{\circ} \end{array}$$

$$\begin{array}{r} +72 \quad 34.4 \\ -5.7 \\ \hline +72 \quad 28.7 \end{array}$$

$$\begin{array}{r}
 16 \ 31 \ 57.^\circ \\
 \underline{-19.4^\circ} \\
 \text{mid Pl.} = 16 \ 31 \ 37.56^\circ
 \end{array}
 \quad
 \begin{array}{r}
 +72 \ 38.4^\circ (12^\circ) \\
 \underline{-2.2^\circ} \\
 +72 \ 31.6^\circ
 \end{array}$$

$247^\circ \ 54' \ 23''$

$$\begin{aligned}
 \log u &= +1.30216 \\
 \log v &= +0.957533 \\
 \log w &= +1.65321 \\
 \hline
 -339.4 &= +2.53070
 \end{aligned}$$

$$\begin{array}{r}
 16 \ 31 \ 57.^\circ \\
 \underline{-32.2^\circ} \\
 16 \ 31 \ 12.13^\circ
 \end{array}
 \quad
 \begin{array}{r}
 +72^\circ \ 38.4^\circ \\
 \underline{-5.7^\circ} \\
 +72 \ 22.7^\circ = 1900 \text{ Var.}
 \end{array}$$

Location of Haint Comp. Stars for R Urs. Mini.

	<u>n</u>	<u>Var.</u>			
	22 K6 32.2 ^v	K7 35.0 ^v			
	K6 55.0 ^v	K6 24.0 ^v			
dr	<u>93 27.2^v</u>	<u>91 59.0^v</u>	+1 28.2 ^v	+0	K4.10 ^v

Var.	K9 10.5 ^v	K8 18.0 ^v			
	K9 37.2 ^v	K9 7.0 ^v			
	<u>92 K7.7^v</u>	<u>97 21.0^v</u>	+1 26.7 ^v	+0	K3.35 ^v

	V2 0.0 ^v	V1 3.2 ^v			
	V2 26.3 ^v	V1 52.2 ^v			
	<u>10K 26.3^v</u>	<u>102 55.4^v</u>	+1 30.9 ^v	+0	K5.45 ^v
				+0	K4.22 ^v

Δn $\Delta Var.$

22.8 K9.0

26.7 V3.0

$$Log. - 25.06 = m1.39292^{\vee}$$

$$" \quad 7.5 = +0.27506^{\vee}$$

$$" \quad 20.5 = +9.47266^{\vee}$$

$$- \sqrt{6.6} = m1.75270$$

$$\frac{226.0}{2/229.4}$$

$$- 414.7 = -6.9 \sqrt{V.}^{\vee}$$

$$\frac{72^{\circ} 24.7}{72 \quad 21.8}$$

$$72 \quad 21.8$$

$$\begin{array}{r} 26.3 \\ 15.2^{\vee} \\ + 25.27^{\vee} \\ \hline \end{array} \quad \begin{array}{r} K9.0 \\ 151.0^{\vee} \\ - \sqrt{0.33}^{\vee} \\ + 25.27^{\vee} \\ - 25.06^{\vee} \\ \hline \end{array}$$

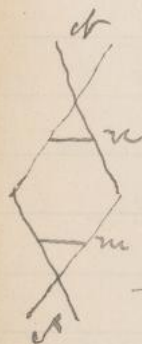
$$\begin{array}{r} 1.39292^{\vee} \\ 0.27506^{\vee} \\ 9.42141^{\vee} \\ - \sqrt{6.6}^{\vee} \\ \hline 226.0 \\ 229.1 = -13.249.1 \end{array}$$

$$Var.(1900) = 16 \quad 31 \quad 12.1^{\vee}$$

$$m (") = \frac{16 \quad 32 \quad 2.1^{\vee}}{+KK.1^{\vee}}$$

$$\begin{array}{r} +72 \quad 24.7^{\vee} \\ +72 \quad 14.9^{\vee} = m(1900) \end{array}$$

Location of Limit Comp. Stars for R. Urs. Mini.



	<u>m</u>		<u>n</u>			
22	52	12.4 ^v	57	40.2 ^v		
23	0	1.9 ^v	59	35.0 ^v		
	112	14.3 ^v	117	15.2 ^v	+0	59.1 ^v
					+0 ^m	29.5 ^v

23	6	45.0 ^v	6	11.5 ^v		
	2	31.6 ^v	2	2.0 ^v		
	15	16.6 ^v	14	19.5 ^v	+0	57.1 ^v
					+0	24.5 ^v

9	53.1 ^v	9	22.0 ^v		
11	41.3 ^v	11	16.9 ^v		
21	34.4 ^v	20	32.9 ^v	+0	55.5 ^v
				+0	27.7 ^v
					25.2 ^v
				+0	24.62 ^v

$$.72 \quad 14.9 = m(1900)$$

$$\Delta m$$

$$\Delta m$$

$$109.5^{\circ}$$

$$114.2^{\circ}$$

$$\log. 223.50 = 2.34920^{\circ}$$

$$" \quad 7.5 = 0.27506^{\circ}$$

$$" \cos \delta = 9.42415^{\circ}$$

$$\sqrt{11.1} = 2.70249^{\circ}$$

$$\frac{226.0}{2737.4}$$

$$= -3.1$$

$$\begin{array}{r} 72 \quad 14.9^{\circ} \\ +72 \quad 11.2^{\circ} \end{array}$$

$$106.6^{\circ}$$

$$116.5^{\circ}$$

$$2.34920^{\circ}$$

$$0.27506^{\circ}$$

$$9.42415^{\circ}$$

$$\sqrt{12.5} = 2.70971^{\circ}$$

$$\frac{226.0}{373.5} = -6.2^{\circ}$$

$$\begin{array}{r} 72 \quad 14.9^{\circ} \\ +72 \quad 0.7^{\circ} \end{array}$$

$$\begin{array}{r} 102.2^{\circ} \\ 24.3^{\circ} \\ \hline 102.10^{\circ} \end{array}$$

$$\begin{array}{r} 114.9^{\circ} \\ 16.2^{\circ} \\ \hline 115.40^{\circ} \\ 102.10^{\circ} \\ \hline 223.50^{\circ} \end{array}$$

$$16^{\circ} \quad 32^{\circ} \quad 2.5^{\circ}$$

$$+29.5^{\circ}$$

$$m(1900)$$

$$16 \quad 32 \quad 31.5^{\circ}$$

$$+72^{\circ} \quad 14.9^{\circ} = m(1900)$$

$$-6.2^{\circ}$$

$$+72 \quad 0.7^{\circ} = m(1900)$$

Location of Faint Comp. Stars for A Urs. Minor.

	$\gamma = 0$	m				
23	36 42.7 ^v	35 21.5 ^v				
	38 54.5 ^v	37 45.7 ^v				
δ	75 37.2 ^v	73 7.2 ^v	+2	30.0 ^v	+1	15.00 ^v
m	40 51.2 ^v	39 32.0 ^v				
	43 4.6 ^v	41 54.2 ^v				
γ	23 56.4 ^v	21 26.2 ^v	+2	30.2 ^v	+1	15.10 ^v
					+1	15.05 ^v

4 y4 m

131.2°

144.2°

$$\begin{array}{r} 132.2^\circ \\ 4.6 \\ \hline 132.30^\circ \end{array}$$

$$\begin{array}{r} 142.2^\circ \\ 6.0 \\ \hline 143.20^\circ \\ 132.30^\circ \\ \hline 275.50^\circ \end{array}$$

$$\begin{array}{r} 16 \quad 32 \quad 31.^\circ \\ +1 \quad 15.^\circ \\ \hline 16 \quad 33 \quad 46.^\circ \end{array}$$

$$\begin{array}{r} +72^\circ \text{ A.7} = m(1900) \\ -2.1 \\ \hline +72 \quad 6.6 = \text{windy pd.} \end{array}$$

$$\text{Eq. } 275.50 = 2.44012^\circ$$

$$" \quad 7.5 = 0.27506^\circ$$

$$" \quad \cos \delta = 9.44659$$

$$633.5 = 2.40177$$

$$\begin{array}{r} 246.0 \\ 275.5 \\ \hline 126.2 \end{array}$$

$$2.44012$$

$$0.27506$$

$$9.44741$$

$$634.7 = 2.40259$$

$$246.0$$

$$275.5 = -4' 11.3''$$

$$+72^\circ \text{ A.7}^\circ = m(1900)$$

$$-4.2^\circ$$

$$+72 \quad 4.5^\circ = y(1900) = 0$$

16

Location of
Stars near comp. Stars for J Cassiope.

ρ	ρ'	Var.	$2(\rho - \text{Var.})$	$\rho - \text{Var.}$	$2(\rho' - \text{Var.})$	$\rho' - \text{Var.}$
21 45 15.5"	45 17.5"	45 42.0"				
46 40.5"	46 31.0"	46 29.0"				
91 56.0"	91 42.5"	92 11.0"	-0 15.0"	-0 7.50"	-0 22.5"	-0 11.25"

47 6.0"	47 2.0"	47 32.3"				
48 31.5"	48 24.0"	48 22.0"				
95 37.5"	95 32.0"	95 54.3"	-0 16.0"	-0 2.40"	-0 22.3"	-0 11.15"

51 11.0"	51 13.0"	51 37.7"				
52 36.5"	52 20.0"	52 24.7"				
103 47.5"	103 41.0"	104 3.4"	-0 15.9"	-0 7.95"	-0 22.4"	-0 11.20"
				23.25"		.60
				-0 7.95"		-0 11.20"



$$V = +vv \quad 14.3 (1900)$$

Δp $\Delta p'$ $\Delta Var.$

$$25.0'' \quad 73.5'' \quad 47.0''$$

$$25.5'' \quad 76.0'' \quad 49.7''$$

$$\begin{array}{r} 25.5'' \\ 16.0 \\ \hline 25.33'' \\ 42.23 \\ \hline 37.10 \end{array} \quad \begin{array}{r} 75.0'' \\ 14.5'' \\ \hline 74.23'' \\ 42.23 \\ \hline 26.60 \end{array} \quad \begin{array}{r} 48.0'' \\ 24.7'' \\ \hline 42.23'' \\ 42.23 \\ \hline 26.60 \end{array}$$

$$\begin{array}{r} 25.33 \\ 74.23 \\ \hline 10.50 \\ 7.5'' \\ \hline 9.75600 \\ \hline 1.65225 \end{array} \quad \begin{array}{l} = 1.02119 \\ = 0.27506 \\ = 9.75600 \\ = 1.65225 \end{array}$$

$k = 44.9''$
 p'

$$\begin{array}{r} 25.37.10 = 1.56937'' \\ 7.5'' = 0.27506'' \\ \cos \delta = 9.75600'' \\ \hline 24.1506'' = 2.20043'' \\ 79.3 \\ \hline 14.3 \end{array}$$

$$\begin{array}{r} -1.3'' \\ \hline 13.0 \\ \hline 1.56937'' \\ 0.27506'' \\ 9.75624'' \\ \hline -15.07'' = 2.20067'' \end{array}$$

$$\begin{array}{r} 0 \quad 17 \quad 49.5'' \\ -2.5'' \\ \hline 0 \quad 17 \quad 41.5'' \end{array} \quad \begin{array}{r} +vv \quad 14.3'' = Var. (1900) \\ -2.6'' \\ \hline +vv \quad 11.7'' = p'' \end{array}$$

$$\begin{array}{r} 26.60 = 1.42422'' \\ 7.5'' = 0.27506'' \\ \cos \delta = 9.75600'' \\ \hline 24.113.7'' = 2.05594'' \\ -56.2 \end{array}$$

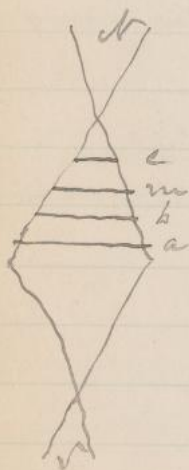
$$\begin{array}{r} +vv \quad 14.3'' \\ -1.0'' \\ \hline vv \quad 13.3'' \end{array}$$

$$\begin{array}{r} 1.42422'' \\ 0.27506'' \\ 9.75612'' \\ \hline 113.2'' = 2.05612'' \end{array}$$

$$\begin{array}{r} 0 \quad 17 \quad 49.5'' \\ -11.5'' \\ \hline 0 \quad 17 \quad 32.5'' \end{array} \quad \begin{array}{r} +vv \quad 14.3'' = Var. (1900) \\ -1.9'' \\ \hline +vv \quad 12.4'' = p'' \end{array}$$

Location of stars near comp. stars for Cassiopeia

<u>a</u>	<u>b</u>	<u>c</u>	<u>m</u>	<u>2(a-m)</u>	<u>(a-m)</u>	<u>2(b-m)</u>	<u>b-m</u>	<u>2(c-m)</u>
22 40 21.0 ^v	40 27.0 ^v	K1 44.2 ^v	40 45.0 ^v					
42 12.5 ^v	42 20.7 ^v	K2 31.7 ^v	K1 56.2 ^v					
22 39.5 ^v	22 19.7 ^v	AK 16.5 ^v	22 41.2 ^v	-0 2.3 ^v	-0 1.1 ^v	+0 5.9 ^v	+0 2.9 ^v	+1 34.7 ^v
44 2.5 ^v	44 13.2 ^v	K5 34.5 ^v	KK 31.0 ^v					
46 0.0 ^v	46 2.0 ^v	46 13.2 ^v	45 32.5 ^v					
90 2.5 ^v	90 15.2 ^v	91 17.7 ^v	90 9.5 ^v	-0 1.0 ^v	-0 0.5 ^v	+0 6.3 ^v	+0 3.1 ^v	+1 32.2 ^v
					-0 0.2 ^v		+0 3.0 ^v	



Approx. Dec. m (1900) = +72 12.

19

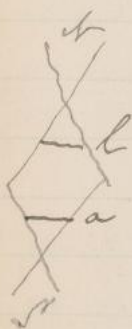
<u>c-m</u>	<u>Δa</u>	<u>Δb</u>	<u>Δc</u>	<u>Δm</u>	
+0 47.3v	117v	1127v	46.9v	71.2v	$\begin{aligned} \text{Log. } KKAR &= 1.65176v \\ " \quad 7.5 &= 0.27506v \\ " \quad \cos \delta &= 9.42529v \\ \hline &= 2.01211v \end{aligned}$

+0 49.10v	111.5v	102.2v	32.7v	67.5v
+0 42.22v	114v0	110.9v	42.20v	69.6v
	69.6v	69.6v	69.6v	
	KKAR	K1.30v	26.25v	

	<u>b</u>
Log. K1.30	= 1.6159v
7.5	= 0.27506v
cos δ	= 9.42529v
9K.7	= 1.97630v

	<u>c</u>
Log. 26.25	= 1.4229Kv
7.5	= 0.27506v
cos δ	= 9.42529v
61.6v	= 1.72929v

Location of stars near comp. stars for R Usc. min.



<u>a</u>	<u>l</u>			
0 37 22.0 ^v	37 K3.5 ^v			
32 10.2 ^v	39 10.7 ^v			
75 32.2 ^v	77 22 ^v	-1 30.0 ^v	-0 Kv.00 ^v	
K3 20.6 ^v	K3 K1.5 ^v			
KK 2.5 ^v	Kv 10.5 ^v			
27 29.1 ^v	29 0.0 ^v	-1 30.9 ^v	-0 Kv. Kv ^v	
			-0 Kv.22 ^v	

Approx. Dec " (1900) = $77^{\circ} 14'$

21

 Δa Δl $42.2''$ $95.2''$

$$\begin{aligned}
 & \text{Log. } 144.15 = 2.15222 \\
 & \quad \quad \quad = 0.27506 \\
 & \quad \quad \quad = 9.42450 \\
 & \quad \quad \quad = 2.51232 \\
 & \quad \quad \quad \underline{329.9} \\
 & \quad \quad \quad \underline{226.0} \\
 & \quad \quad \quad 556.1
 \end{aligned}$$

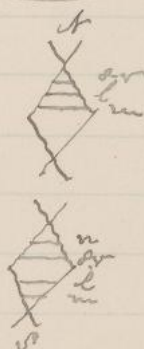
$$\begin{array}{r}
 47.9'' \\
 \underline{16.1} \\
 32.05 \\
 \underline{96.10} \\
 148.15
 \end{array}$$

$$\begin{array}{r}
 97.0'' \\
 \underline{12.2} \\
 84.8 \\
 \underline{96.10}
 \end{array}$$

22 Location of stars near Comp. Stars for R. Uss. Venn.

<u>m</u>	<u>Av mag.</u>	<u>l</u>	<u>m</u>	<u>2(m-l)</u>	<u>m-l</u>
0 59 40.2	1 1 10.5	0 52 29.5			
1 2 40.6	1 2 15.7	1 0 52.5			
2 2 29.4	2 3 34.2	1 59 20.0			
				+3 1.4	+1 30.70
1 5 20.0	1 6 27.5	1 3 45.0	1 5 25.0		
1 7 45.0	1 8 16.7	1 6 26.0	1 6 50.5		
2 13 13.0	2 14 17.4	2 10 11.0	2 12 15.5	+3 2.0	+1 31.00
					1 30.20

<u>Δm</u>	<u>ΔAv</u>	<u>Δl</u>	<u>Δm</u>	<u>ΔAv</u>	<u>Δl</u>	<u>m-l</u>	<u>Av-l</u>
2 5 17.5	0 57.2	2 29.0				22.4	91.2
2 17.0	2 12.0	2 41.0	1 25.5				



Approx. Dec. of "L" (1900) = $+72^{\circ} 14'$

23

$$\frac{2(p-r-l)}{p-r-l} \quad \frac{2(u-l)}{u-l}$$

$$+4 \quad 6.2 \quad +2 \quad 3.10$$

$$+4 \quad 6.4 \quad \frac{+2 \quad 3.20}{+2 \quad 3.15} \quad +2 \quad 4.5 \quad \frac{+1 \quad 2.25}{+1 \quad 2.25}$$

$$\left. \begin{array}{l} \log 22.4 = 1.35793 \\ \log 7.5 = 0.87506 \\ \cos \delta = 9.42450 \\ (m-l) = \sqrt{2.2} = 1.71749 \end{array} \right\} \begin{array}{l} \log 91.2 = 1.96244 \\ \log 7.5 = 0.87506 \\ \cos \delta = 9.42450 \\ (p-r-l) = 210.1 = 2.32240 \end{array} \quad \left. \vphantom{\begin{array}{l} \log 22.4 \\ \log 7.5 \\ \cos \delta \\ (m-l) \end{array}} \right\} \text{First est.}$$

$$\begin{array}{l} \log 24.0 = 1.38021 \\ \log 7.5 = 0.87506 \\ \cos \delta = 9.42450 \\ (m-l) = \sqrt{4.9} = 1.73977 \end{array}$$

$$\begin{array}{l} \log 293.0 = 2.46627 \\ \log 7.5 = 0.87506 \\ \cos \delta = 9.42450 \\ 670.6 = 2.82643 \\ 226.0 \\ (p-r-l) = 215.4 \end{array}$$

$$\begin{array}{l} \log 246.5 = 2.39122 \\ \log 7.5 = 0.87506 \\ \cos \delta = 9.42450 \\ 564.1 = 2.75132 \\ 226.0 \\ (m-l) = 321.9 \end{array}$$

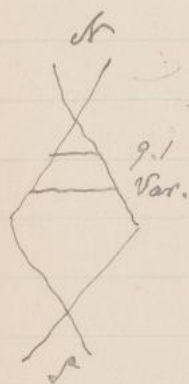
4	4.4	-30.9	11
1	1.6	-34.7	7
2	12.2	-32.1	10
	11.2	-38.1	6
1	16.2	-22.1	7
1	40.2	-4.1	14
2	40.0	-4.3	12
	44.4	+0.1	12
	42.4	-1.9	10
	42.1	+2.2	11
	44.4	40.2	16
	174.5	134.2	31
	44.3		147
	44.3		
	147/531.7		

Location of Comp. Stars near δ Bootes.

$$\begin{array}{rcl}
 \delta & & \\
 22 \quad 32 \quad 31.1^{\vee} & 32 \quad 9.0^{\vee} & \\
 \hline
 33 \quad 25.2^{\vee} & 33 \quad 0.5^{\vee} & \\
 \hline
 65 \quad 56.3^{\vee} & 65 \quad 9.5^{\vee} & +0 \quad 46.8
 \end{array}$$

$$\begin{array}{rcl}
 35 \quad 30.7^{\vee} & 35 \quad 12.1^{\vee} & \\
 36 \quad 31.9^{\vee} & 36 \quad 40.3^{\vee} & \\
 \hline
 72 \quad 2.6^{\vee} & 71 \quad 52.4^{\vee} & 0 \quad 10.2
 \end{array}$$

$$\begin{array}{rcl}
 39 \quad 51.2^{\vee} & 39 \quad 22.2^{\vee} & \\
 40 \quad 37.1^{\vee} & 40 \quad 5.0^{\vee} & \\
 \hline
 20 \quad 22.9^{\vee} & 79 \quad 33.2^{\vee} & 0 \quad 55.7
 \end{array}$$

✓ Agg.Location of g.i. close to Var., with reference to latter.

<u>g.i.</u>		<u>Var.</u>			
0	54 13.2°	0	54 7.5°		
55	25°	55	70°		
109	15.7°	109	18.5°	-0	1.2°
				-0	0.60°
55	54.5°	55	47.5°		
56	43.5°	56	47.0°		
112	32.0°	112	34.5°	-0	3.5°
				-0	1.75°
57	36.5°	57	31.0°		
58	26.0°	58	30.5°		
116	2.5°	116	1.5°	-0	1.0°
				-0	0.50°
2	42.5°	2	37.5°		
3	32.0°	3	36.0°		
126	14.5°	126	13.5°	-0	1.0°
				-0	0.50°
8	56.7°	8	51.0°		
9	46.0°	9	49.0°		
132	42.7°	132	40.0°	-0	2.7°
				-0	1.35°
12	10.5°	12	11.0°		
13	7.5°	13	11.5°		
145	26.0°	145	22.5°	-0	3.5°
				-0	1.75°
				-0	1.00°

$$\begin{array}{r} 20 \quad 3 \quad 24. \\ \hline 20 \quad 3 \quad 23. \end{array}$$

$$\begin{array}{r} + \sqrt{7}^{\circ} 41' (1900.) \\ \hline + \sqrt{7} \quad 42.6 \end{array}$$

$$\frac{\Delta \varphi}{49.3''}$$

$$\frac{\Delta \varphi_{\text{var.}}}{\sqrt{9}.r''}$$

$$9.92 = 0.99913''$$

$$7r = 0.87506''$$

$$\cos \delta = \frac{9.72745''}{40.0''} = 1.60204''$$

$$49.0''$$

$$\sqrt{9}.r''$$

$$49.r''$$

$$\sqrt{9}.r''$$

$$49.r''$$

$$\sqrt{2}.r''$$

$$49.3''$$

$$\sqrt{2}.0''$$

$$\frac{49.0''}{1.6}$$

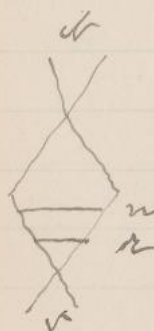
$$49.27''$$

$$\frac{60.r''}{3\sqrt{r}.r''}$$

$$\sqrt{9}.2r$$

$$\frac{49.27}{9.92}$$

Location of Giant Comp. Star for γ Boötes:



<u>n</u>	<u>n</u>				
22	$\gamma 1 \ 3.5''$	$\gamma 1 \ 6.2''$			
	$\gamma 1 \ 30.5''$	$\gamma 1 \ 59.5''$			
102	$42.0''$	103	$5.7''$	- 0	$23.7''$
				- 0	$11.8''$
	$\gamma 3 \ 12.5''$	$\gamma 3 \ 16.0''$			
	$\gamma 4 \ 14.0''$	$\gamma 4 \ 35.5''$			
107	$26.5''$	107	$51.5''$	- 0	$25.0''$
				- 0	$12.50''$
	$\gamma 6 \ 46.0''$	$\gamma 6 \ 49.7''$			
	$\gamma 7 \ 50.0''$	$\gamma 8 \ 11.7''$			
114	$36.0''$	115	$1.4''$	- 0	$25.4''$
				- 0	$12.70''$
					$37.0''$
				- 0	$12.3''$

$+54^{\circ} 11' = \text{Approx Dec. } \alpha (1900)$

$\Delta \alpha$

$\Delta \alpha$

$35.0''$

$53.3''$

$$\text{Lg. } 14.10 = 1.25762''$$

$$75 = 0.47506''$$

$$\cos \delta = 9.76730''$$

$$79.4 = 1.90004''$$

$61.5''$

$79.5''$

$64.0''$

$22.0''$

$160.5''$

$214.2''$

$53.50''$

$71.60''$

\therefore c.v. α ^{by} α $0^{\text{h}} 12.35$ and is 1.3 south of it.

(See R III. p. 26-7)

$14 \ 19 \ 49''$

$+54 \ 11.4'' = \alpha (1900)$

-12.1

-1.3

$14 \ 19 \ 37''$

$+54 \ 10.1'' = \alpha$

Location of Faint Comp. Star for β Cygni.



	<u>u</u>		<u>Var.</u>			
23	49	16.2"	49.	25.1"		
	50	18.0"	50	2.0"		
	99	34.2"	99.	33.1"	+0	1.7"
					+0	0.8v"
	51	25.0"	51	31.0"		
	52	24.2"	52	15.5"		
	103	49.2"	103	46.5"	+0	3.3"
					+0	1.6v"
	54	35.0"	54	40.0"		
	55	31.5"	55	23.7"		
	110	6.5"	110	3.7"	+0	2.2"
					+0	1.40"
					mean	+0 1.30"

$$\begin{array}{r} \text{Var.} = 20 \quad 3 \quad 24. \quad + 1. \quad + 1.9 \quad (1900) \\ \hline u = 20 \quad 3 \quad 25. \quad + 1. \quad + 1.9 \quad " \end{array}$$

$$\Delta u \quad \Delta \text{Var.}$$

$$61.2 \quad 42.9$$

$$\log. 15.47 = 1.18949$$

$$" \quad 7.5 = 0.87506$$

$$" \quad \cos \delta = 9.72725$$

$$-62.0 = 1.79240$$

$$59.2 \quad 44.5$$

$$\begin{array}{r} 56.5 \\ \hline 177.5 \end{array} \quad \begin{array}{r} 43.7 \\ \hline 131.1 \end{array}$$

$$59.17 \quad 43.70$$

Location of Faint Comp. Star for R Camelopard.

<u>R</u>	<u>Var.</u>
0 3A 12.0"	37 35.5"
42 32.3"	40 9.5"
20 44.3"	77 45.0" + 2 59.3

42 45"	42 12.5"
53 26.5"	50 47.0"
101 31.0"	99 5.5" 2 25.5"

R

R Camelopard.

$$\begin{array}{r}
 R - g \\
 + 10.7 \\
 + 10.0 \\
 + 10.2 \\
 + 9.3 \\
 + 10.7 \\
 + 9.5 \\
 + 12.0 \\
 \hline
 772.4 \\
 + 10.3
 \end{array}$$

$\therefore R$ fol. g by 10.3 and is 2.4 north

$$\begin{array}{r}
 14^h 26^m 39^s + 24^s 12.2 = g(1900) \\
 \hline
 14^h 26^m 49^s + 24^s 14.6 = R
 \end{array}$$

(See R 111, p. 107-2)

Location of faint comp. star β for R Cassiopeia, 35

K₁VK₁VK₁OK₁2K₁OK₁AK₁OK₁VK₁OK₁OK₁OK₁OK₁O
$$\begin{array}{r} \text{K}_1\text{O} \\ 13 \overline{) 25} \\ \text{K}_1\text{2} \end{array}$$

$$\begin{array}{ccccccc} 23 & 53 & 19.5 & +50 & K_{9.9} = \text{Var. (1900)} \end{array}$$

$$\begin{array}{ccccccc} & & -4. & & & & \end{array}$$

$$\begin{array}{ccccccc} 23 & 53 & 15.5 & +50 & K_{8.6} = \beta & & \end{array}$$

(See R. ill. p. 116-7)

Location of faint comp. star δ for δ Bootis.

26.0

25.2

25.3

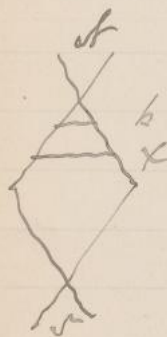
25.0
 $\frac{422.1}{25.6}$

\therefore δ fol. var. by 25.6 and is 1.4 north of it.

14 19 32.	+ 26.	14 19 32.	+ 1.4	= Var. 1900.
<hr/>		<hr/>		
14 19 58.		14 19 58.	+ 1.4	= δ

X 6
22 23 1

provis.
Location of star "X" for δ Cassio.



<u>X</u>	<u>b</u>
22 23 15.0"	21 32.7"
24 39.7"	22 39.0"
47 54.7"	44 11.7" +3 43.0" +1 51.50"
27 12.3"	25 30.9"
28 37.3"	26 37.2"
55 49.6"	52 21.1" +3 41.5" +1 50.75"
30 55.5"	29 14.2"
32 21.5"	30 21.7"
63 17.0"	59 35.9" +3 41.1" +1 50.55"
34 54.7"	33 17.7"
36 26.6"	34 25.7"
71 25.3"	67 43.4" +3 41.9" +1 50.95"
	+1 50.94"

$$\text{Pos. C. S. } \underline{b} \text{ for } 1900. = 1 \ 11 \ 25.^\circ + 71 \ 52.9^\circ$$

$$\begin{array}{r} 22.0 \\ \hline 30.9 \end{array}$$

$$\begin{array}{cc} \underline{\Delta 10} & \underline{\Delta 6} \end{array}$$

$$24.7^\circ \quad 66.3^\circ$$

$$\text{Ly. } 10.29 = 1.27623^\circ$$

$$7.5 = 0.27506^\circ$$

$$\text{on } \delta = 9.49265^\circ$$

$$-44.0 = 1.64394^\circ$$

$$25.0^\circ \quad 66.3^\circ$$

$$10.29 = 1.27623^\circ$$

$$7.5 = 0.27506^\circ$$

$$\text{on } \delta = 9.50106^\circ$$

$$-44.9 = 1.65235^\circ$$

$$26.0^\circ \quad 67.5^\circ$$

$$\begin{array}{r} 27.9^\circ \\ \hline 4/23.6^\circ \\ 25.90^\circ \\ \hline 67.01^\circ \\ \hline 10.29^\circ \end{array} \quad \begin{array}{r} 62.0^\circ \\ \hline 4/22.1^\circ \\ 67.01^\circ \end{array}$$

$$\begin{array}{r} 1^\circ \ 11^\circ \ 25.^\circ + 71^\circ \ 52.9^\circ = b \ (1900) \\ +1 \ 51.^\circ \quad -0.7^\circ \\ \hline 1 \ 13 \ 16.^\circ + 71 \ 52.2^\circ = "x" \ (1900) \end{array}$$

This is not comp. star x . (See R.p. 140.)

Charluis' New Asteroid discovered
Dec. 4. 1899.

$$\begin{array}{rcl}
 4^h 32^m 11.96 & +13 & \sqrt{2} \quad \sqrt{2.4} = \text{hr. } 4^h 733 \\
 +4 \quad 10.05 & +9 & 15.0 \\
 \hline
 4^h 36 \quad 22.01 & +14 & 2 \quad 13.4 = (1899.0) \\
 +6.33 & +10.6 & \\
 \hline
 4^h 36 \quad 28.34 & +14 & 2 \quad 24.0 = \text{App. Pl. } * \\
 -41.7 & +13 & 12. \\
 \hline
 4^h 35 \quad 46.6 & +14 & 21 \quad 36. = \text{Place (approx.)} \\
 \text{asteroid Dec. 6.611 S.M.T.} & & = 14^h 40^m \text{ S.M.T.}
 \end{array}$$

$$\begin{array}{rcl}
 \text{Dec. 4.377} & 4^h 37^m \quad \sqrt{6} & +14^{\circ} 13' (\text{Disc. Pos.}) \\
 14^h 40^m \text{ S.M.T.} = & \text{" } 6.611 & 4^h 35 \quad 47. \quad +14 \quad 21.6 \\
 & 2.234 & -2 \quad 9. \quad +4.6
 \end{array}$$

$$\begin{array}{r}
 2.234 \times 29,000 (\sqrt{2} \text{ per day.}) \\
 \underline{111 \quad 70} \\
 17 \quad 3 \quad 00 \\
 \underline{17 \quad 2 \quad 72}
 \end{array}$$

$$\begin{array}{r}
 2.6 \\
 60. \\
 2.234 \times 16,000 (231. \\
 \underline{4462} \text{ per day.} \\
 6920 \\
 \underline{6702} \\
 2120 \\
 \underline{2234}
 \end{array}$$

$$\begin{array}{r}
 +3.379 \\
 \underline{74.} \\
 13 \quad 5 \quad 16 \\
 23653 \\
 \hline
 250.046
 \end{array}$$

$$\begin{array}{r}
 +7.50 \\
 \underline{74.} \\
 3000 \\
 \sqrt{250} \\
 \hline
 555.00
 \end{array}$$

~~$$\begin{array}{rcl}
 4 & 30 & 39.1 \\
 +4 & 10.0 & \\
 \hline
 4 & 34 & 49.1 \\
 +6.3 & & \\
 \hline
 4 & 34 & 55.4 \\
 -39.5 & & \\
 \hline
 4 & 34 & 15.9
 \end{array}
 \qquad
 \begin{array}{rcl}
 +14 & 23.3 & = +14^\circ 731 (9.4) (1000) \\
 +9.2 & & \\
 \hline
 +14 & 32.5 & \\
 +0.2 & & \\
 \hline
 +14 & 32.7 & = +14^\circ 731 (9.4) (1000 \text{ off}) \\
 +2.2 & & \\
 \hline
 +14 & 34.9 &
 \end{array}$$~~

Dec. 2. 523

" 4. 377

$$\begin{array}{rcl}
 4 & 30 & 39.1 \\
 +2 & 22.7 & \\
 \hline
 4 & 32 & 7.2 \\
 +6.3 & & \\
 \hline
 4 & 33 & 14.1 \\
 +39.5 & & \\
 \hline
 4 & 33 & 53.6
 \end{array}
 \qquad
 \begin{array}{rcl}
 +14 & 23.3 & = +14^\circ 731 (9.4) (1000) \\
 +5.5 & & \\
 \hline
 +14 & 28.8 & \\
 +0.2 & & \\
 \hline
 +14 & 29.0 & = \text{Ap. pl. } 731 (1000) \\
 -2.2 & & \\
 \hline
 +14 & 26.8 & = \text{Ap. pl. det. } (1000)
 \end{array}$$

1099. Dec. 2. 523 = 4 33 53.6

" Dec. 4. 377 = 4 37 56.

$$\begin{array}{rcl}
 4.206 & 4 & 2, \\
 & & 13.4
 \end{array}$$

$$\begin{array}{r}
 4.206 \overline{) 242.000} \quad (57.5 + \text{per day}) \\
 \underline{21030} \\
 31700 \\
 \underline{29442} \\
 22520 \\
 \underline{21030}
 \end{array}$$

$$\begin{array}{r}
 3.379 \\
 \underline{KK} \\
 13516 \\
 \underline{13516} \\
 100676
 \end{array}$$

$$\begin{array}{r}
 +7.5 \\
 \underline{KK} \\
 300 \\
 \underline{300} \\
 3300
 \end{array}$$

$$\begin{array}{r}
 10.2 \\
 60 \\
 4.206 \overline{) 10920} \quad (259) \\
 \underline{2412} \\
 25020 + 260 \\
 \underline{21030} \\
 40500 \\
 \underline{37244} \\
 26456
 \end{array}$$

$$\begin{array}{r}
 24 \overline{) 260} \\
 +11. " \text{ per hour.}
 \end{array}$$

Lunar Eclipse of Dec. 16, 1899.Dec. 16. 10^h

11.

12. 5 34 24.21" +22 52 22" } App. Pl. Moon

13. 36 47.54" 56 26.4" } for Dec. 16.

14. 39 6.71" 54 43.1" } at hour spec-

15. 41 25.71" 52 52.3" } if ind.

16.

12^h 5 31 42.02 +22 56 32.1 } Pos. Moon

13 34 1.41 54 56.3 } (geocentric)

14 36 20.52 53 13.0 } referred to mean

15 32 39.52 51 22.2 } place 1899. but
uncorrected for
parallax.12^h 5 34 32.1" +22 27 30.1" } Moon for (1899)

13 36 29.1" 29 24.1" } corrected for

14 32 19.1" 30 43.1" } parallax.

15 5 39 58.1" +22 31 9.1"

$$\begin{array}{r}
 3.637 \\
 \hline
 44. \\
 1454A \\
 1454A \\
 \hline
 +160.02A
 \end{array}
 \qquad
 \begin{array}{r}
 +2.0 \\
 \hline
 44. \\
 +22.11
 \end{array}$$

App. Sh.
mean Sh.

$$\begin{array}{r}
 \text{L. Tauri.} \\
 \begin{array}{r}
 \sqrt{31} \quad 42.5A \quad +21 \quad \sqrt{33} \quad \sqrt{33} \\
 \sqrt{31} \quad 36.4A \quad +21 \quad \sqrt{12} \quad \sqrt{12} \\
 \hline
 -6.10 \quad -2.1
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 17 \quad 40 \quad 29.16 \quad \sqrt{33} \\
 +1\sqrt{33} \quad 27.67 \quad \sqrt{33} \\
 \hline
 17 \quad 55 \quad 56.83 \quad = \text{Sid. T. East, mean noon.} \\
 7
 \end{array}$$

$$\begin{array}{r}
 24 \quad 55 \quad 56.83 \\
 +1 \quad 9.0 \\
 \hline
 24 \quad 57 \quad 5.8 = \text{Sid. Time at 7h East. T.} \\
 \sqrt{31} \quad 42. \quad \sqrt{33} \\
 \hline
 -4 \quad 34 \quad 36. = \text{H. A. at 7h East. T.} \quad (12^h)
 \end{array}$$

$$\begin{array}{r}
 1 \quad 57 \quad 16. \\
 \sqrt{31} \quad 34 \quad 1. \\
 \hline
 -3 \quad 36 \quad 45. = \text{H. A. at 8h East. T.} \quad (13^h)
 \end{array}$$

$$\begin{array}{r}
 2 \quad 57 \quad 26. \\
 \sqrt{31} \quad 36 \quad 21. \\
 \hline
 -2 \quad 32 \quad 55. = \text{H. A. at 9h East. T.} \quad (14^h)
 \end{array}$$

$$\begin{array}{r}
 3 \quad 57 \quad 36. \\
 \sqrt{31} \quad 3A \quad 40. \\
 \hline
 -1 \quad 41 \quad 40. = \text{H. A. at 10h East. T.} \quad (15^h)
 \end{array}$$

$$\log \tan \phi' = +9.95742$$

$$\text{At } 12^h \text{ G.M.T. H.A.} = -K 34 36. = -62^\circ 39' 0''$$

$$\text{" } 13 \text{ " " } = -3 36 \text{ Kr.} = -54 11 \text{ Kr.}$$

$$\text{" } 14 \text{ " " } = -2 32 \text{ Kr.} = -39 43 \text{ Kr.}$$

$$\text{" } 15 \text{ " " } = -1 41 \text{ Kr.} = -25 16 0.$$

		$\log \tan \phi'$	χ
" 12 ^h	$\log \cos. +62^\circ 39' 0'' = +9.56112$	$+0.39630$	$+62^\circ 7'$
" 13	$+54 11 \text{ Kr.} = +9.76726$	$+0.19022$	$+57 10$
" 14	$+39 43 \text{ Kr.} = +9.82597$	$+0.07151$	$+49 42$
" 15	$+25 16 0. = +9.95633$	$+0.00115$	$+45 5$

$$\text{Eq. Hor. Par. at } 12^h \text{ G.M.T.} = 56' 12''$$

$$\text{" " " } 13 \text{ " } = 56 11.3$$

$$\text{" " " } 14 \text{ " } = 56 10.0$$

$$\text{" " " } 15 \text{ " } = 56 9.7$$

Hor. Par. in R.A. 12 ^h = 170"	}	1742" = 29' 2" = 29.0
" " " 13 ^h = 140.		1532. = 25 32. = 25.5
" " " 14 ^h = 110.		1350. = 22 30. = 22.5
" " " 15 ^h = 70.		1213. = 20 13. = 20.2

Therefore the effect of parallax is to increase the R. A. and diminish the Declinations in ^{all} the above hour angles. Hence increase all the R. A.s and diminish all the Decs.

46 Occultations observed by H. with 15 inch Equatorial during Lunar Eclipse of Dec. 16. 1899.

Times by Prod. 3451.			Observed Pos. Aug.	Plan.	Power used.	mag.	Correction for Clock + Chr. error.
1	59	44.3	5.0	Imm.	103	9.5	-1" 35.2
2	7	43.3	35.	"	270	9.3	
2	15	52.5	350.	Imm.	"	9.3	
2	27	3.2	95.	Imm.	"	9.2	
2	27	50.0	120.	"	"	9.5	
2	49	20.7	290.	Imm.	103	9.2	
2	51	12.5	315.	"	"	9.3	

Prod. 1327 was fast 1" 24.62 ✓
 " 3451 " " 10.6 ✓
 1 35.22 ✓

1 ~~R Hydrae~~ 13 22 -22.5

All finished, corr

R Aquarii 23 36 -16.1

~~R Hercules~~ 16 48 +19.2

All corrected ✓

~~R Delphinii~~ 20 2 +2.7

All corrected ✓

~~X Cygni~~ 19

All corrected

~~L Librae~~ 14 13 -19.9

All corrected ✓

~~L Serpenti~~ 15 15 +14.0

Extend pt. star a little.

~~R Coronae~~ 15 43 +20.6

All corrected ✓

~~R Scorp ii~~ 16 9 -22.6

R Arietis

~~U Virginis~~ 12 44 +6.3

All corrected ✓

~~L Aquarii~~ 22 49 -21.1

~~R Can. Ven.~~ 13 43 +40.3

All corrected

R Ophiuchi 16 59 +17.0

~~U Hercules~~ 16 19 +19.2

All corrected

~~X Hercules~~ 16 30 +37.6

All corrected

~~R Corvi~~

R Sagittarii: Extend sequence of comp. stars a little to 13.0 mag.

~~X Virginis~~ Locate positions of All corrected ✓

~~L Serpenti~~ Extend faint stars All corrected ✓

+K2° 333A. $\frac{1}{24}$ parts of Final Curve..0000 - 2.420^v.0236 - 2.300^v.0472 - 2.205^v.0708 - 2.110^v.0944 - 2.020^v.1180 - 1.945^v.1416 - 1.890^v.1652 - 1.840^v.1888 - 1.795^v.2124 - 1.760^v.2360 - 1.730^v.2596 - 1.710^v.2832 - 1.690^v.3068 - 1.680^v.3304 - 1.670^v.3540 - 1.660^v.3776 - 1.650^v.4012 - 1.640^v.4248 - 1.630^v.4484 - 1.620^v.4720 - 1.610^v.4956 - 1.600^v.5192 - 1.590^v.5428 - 2.440^v.5664 - 2.420^v

<u>Corrected</u> <u>sid. Time</u> <u>of Oscillations.</u>	<u>East. T.</u> <u>Oscillations.</u>	<u>Gr. m. T.</u> <u>Oscillations.</u>
1 52 9.1 ✓	= 2 0 53.3	13 0 53.3 = +22° 1022 (9.3) ✓
2 6 2.1 ✓	2 2 51.0	13 2 51.0 = +22° 1025 (2.3)
2 16 17.3 ✓	2 16 52.9	13 16 52.9 = +22° 1022 (9.3)
2 25 22.6 ✓	2 22 2.3	13 22 2.3 = +22° 1031 (2.2)
2 26 14.2 ✓	2 22 54.4	13 22 54.4 = +22° 1030 (9.5)
2 43 15.5 ✓	2 50 21.6	13 50 21.6 = +22° 1024 (9.2)
2 50 7.3 ✓	2 52 43.0	13 52 43.0 = +22° 1025 (2.3)

$$\begin{array}{r}
 17 \quad 40 \quad 29.16 \\
 15 \quad 27.67 \\
 \hline
 17 \quad 55 \quad 56.83 =
 \end{array}$$

$$\begin{array}{rcl}
 4 & 25 & 3.2 \\
 \hline
 & & -13.6 \\
 11^h & 25^m & 4 & 24 & 50.2 & +14 & 53.0 & 9.5 = +14^{\circ} 717 \\
 \hline
 & & & & & & -5.3
 \end{array}$$

= deter. (12.5.99) Dec. 15. 99

$$\begin{array}{rcl}
 4 & 19 & 30.1 \\
 \hline
 & & +1 & 16. \\
 2 & 10 & 4 & 20 & 46.1 & +15 & 6.2 & (9.4) +15^{\circ} 622 \\
 \hline
 & & & & & & +1.0
 \end{array}$$

= deter. (12.5.99) Dec. 20. 99

June. Perseus Var. = +45° 3062

$$\begin{array}{r} 20^h \quad 2^m \quad 24^s \quad +45^\circ \quad 32.9'' = \text{Sun. Place 1867} \\ 300' \quad 36' \quad 7'' \end{array}$$

$$\begin{array}{r} +1.24'' \quad +10.21'' \\ \hline \text{Kv.} \quad \text{Kv.} \\ 9 \text{ K } 2'' \quad \sqrt{10''} \\ 7 \text{ K } 40 \quad \text{K } 0.2 \text{ K} \\ \hline 24.22'' \quad \text{Kv } 9.4'' \end{array}$$

$$\begin{array}{r} 20^h \quad 2^m \quad 24^s \quad +45^\circ \quad 32.9'' \quad (1867) \\ \quad \quad +1 \quad 24.2'' \quad \quad \quad +7.7'' \\ \hline 20 \quad 3 \quad 49.3'' \quad +46 \quad 0.6'' \quad (1900) \end{array}$$

Derivation of Formulae for Circumpolar Variables.

$$y = ax + b$$

♂ Cassiopeiae.

$$\text{Ep. 15} = 1195 = 0a + b$$

$$.. 23 = 4734 = 2a + b$$

$$3539 = 2a$$

$$a = 1769.5$$

$$b = 1195.$$

$$\therefore \text{max} = 24/1195 + 1769.5 \text{ } \delta.$$

♂ Cassiopeiae.

$$1312 - 39 = 1273 = \text{Ep. 16.}$$

$$4466 + 62 = 4528 = .. 21.$$

$$1273 = 0a + b$$

$$4528 = 5a + b$$

$$3255 = 5a$$

$$a = 651.0$$

$$b = 1273.$$

$$\therefore \text{max.} = 24/1273 + 651.0 \text{ } \delta.$$

♂ Petae.

R. Aurigae.

Derivation of Formula for Circumference Variables.

$$y = ax + b$$

♂ Cassiopeiae.

$$\text{Ep. 15} = 1195 = 0a + b$$

$$\text{" 23} = 4734 = 2a + b$$

$$3539 = 2a$$

$$a = 1769.5$$

$$b = 1195$$

$$\therefore \text{max.} = 241195 + 1769.5 \text{ E.}$$

♂ Cassiopeiae. 1st line (to left)

$$\text{Ep. 16} = 1312 - 12 = 1294$$

$$\text{" 21} = 4466 + 3 = 4469$$

$$\text{Ep. 16} = 1294 = 0a + b$$

$$\text{" 21} = 4469 = 5a + b$$

$$3175 = 5a$$

$$a = 635.0$$

$$b = 1294.0$$

$$\therefore \text{max.} = 241294 + 635.0 \text{ E.}$$

R. Chiriac.

$$\text{Ep. } 21 = 1133 + 0 = 1133 = 0a + b$$

$$\text{" } 22 = 4314 + 6 = 4320 = 7a + b$$

$$\underline{3187 = 7a}$$

$$a = 455.3$$

$$\therefore \text{max.} = 241133 + 455.3 \text{ } \epsilon.$$

R. Lyncei. 1st line (atom)

$$\text{Ep. } 14 = 1125 - 7 = 1118 = 0a + b$$

$$\text{" } 24 = 4912 - 12 = 4900 = 10a + b$$

$$\underline{3782 = 10a}$$

$$a = 378.2 \quad b = 1118$$

$$\therefore \text{max.} = 241118 + 378.2 \text{ } \epsilon.$$

R. Urs. maj.

$$\epsilon = 44 = 1226 + 14 = 1240 = 0a + b$$

$$\text{" } = 56 = 4862 - 9 = 4853 = 12a + b$$

$$\underline{3613 = 12a}$$

$$a = 301.1$$

$$b = 1240.$$

$$\therefore \text{max.} = 241240 + 301.1 \text{ } \epsilon.$$

Urs. maj. 1st line (below.)

$$\epsilon = 41 = 1280 - 9 = 1271 = 0a + b$$

$$.. = 55 = 4832 - 3 = 4829 = 14a + b$$

$$3581 = 14a$$

$$a = 254.6$$

$$b = 1271$$

$$\therefore \text{max.} = 24/1271 + 254.6 \epsilon$$

Urs. maj.

$$\epsilon = 47 = 1260 - 7 = 1253 = 0a + b$$

$$.. = 63 = 4846 - 2 = 4844 = 16a + b$$

$$3591 = 16a$$

$$a = 224.4$$

$$b = 1253$$

$$\therefore \text{max.} = 24/1253 + 224.4 \epsilon$$

Bootes.

$$\epsilon = 36 = 1379 - 1 = 1378 = 0a + b$$

$$.. = 49 = 4840 + 5 = 4845 = 13a + b$$

$$3467 = 13a$$

$$a = 266.7$$

$$b = 1378$$

$$\therefore \text{max.} = 24/1378 + 266.7 \epsilon$$

R Camelops.

$$\epsilon = 27 = 1201 + 4 = 1197 = 0a + b$$

$$.. = 40 = 4804 - 10 = 4794 = 13a + b$$

$$3597 = 13a$$

$$a = 276.7$$

$$b = 1197$$

$$\therefore \text{max.} = 24/1197 + 276.7 \epsilon$$

R Draconis.

$$\begin{aligned} \delta = 12 &= 1142 - 7 = 1141 = 0a + b \\ \delta = 33 &= 4202 + 9 = 4217 = 15a + b \\ \hline 3676 &= 15a \end{aligned}$$

$$a = 245.1 \quad b = 1141$$

$$\therefore \text{Max.} = 241141 + 245.1 \delta$$

N Cygni.

$$\begin{aligned} \delta = 27 &= 1162 - 0 = 1162 = 0a + b \\ \delta = 36 &= 4045 + 4 = 4049 = 9a + b \\ \hline 2881 &= 9a \end{aligned}$$

$$a = 320.1 \quad b = 1162$$

$$\therefore \text{Max.} = 241162 + 320.1 \delta$$

T Cephei.

$$\begin{aligned} \delta = 15 &= 1153 + 5 = 1158 = 0a + b \\ \delta = 25 &= 5005 + 12 = 5017 = 10a + b \\ \hline 3859 &= 10a \end{aligned}$$

$$a = 385.9 \quad b = 1158$$

$$\therefore \text{Max.} = 241158 + 385.9 \delta$$

R Cassiope.

$$\begin{aligned} \delta = 30 &= 1310 - 15 = 1295 = 0a + b \\ \delta = 38 &= 4792 - 0 = 4792 = 8a + b \\ \hline 3503 &= 8a \end{aligned}$$

$$a = 437.9 \quad b = 1295$$

$$\therefore \text{Max.} = 241295 + 437.9 \delta$$

U. maj. (2^d line.) (above)

$$E = 41 = 1220 - 9 = 1271 = 0a + b$$

$$" = 55 = 4032 + 1 = 4039 = 14a + b$$

$$3562 = 14a$$

$$a = 254.9$$

$$b = 1271$$

$$\therefore \text{max.} = 24/1271 + 254.9 E.$$

R. Hyrcis (2^d line)

$$E = 14 = 1125 - 6 = 1119 = 0a + b$$

$$" = 28 = 4912 - 26 = 4886 = 10a + b$$

$$3767 = 10a$$

$$a = 376.7$$

$$b = 1119$$

$$\therefore \text{max.} = 24/1119 + 376.7 E.$$

U. Carriopais. 2^d line (to right)

$$E = 16 = 1312 - 31 = 1221 = 0a + b$$

$$" = 21 = 4466 + 4 = 4470 = 5a + b$$

$$3129 = 5a$$

$$a = 637.2$$

$$b = 1221$$

$$\therefore \text{max.} = 24/1221 + 637.2 E.$$

~~Time~~
~~Time~~
 I Urae majoris. ~~max~~

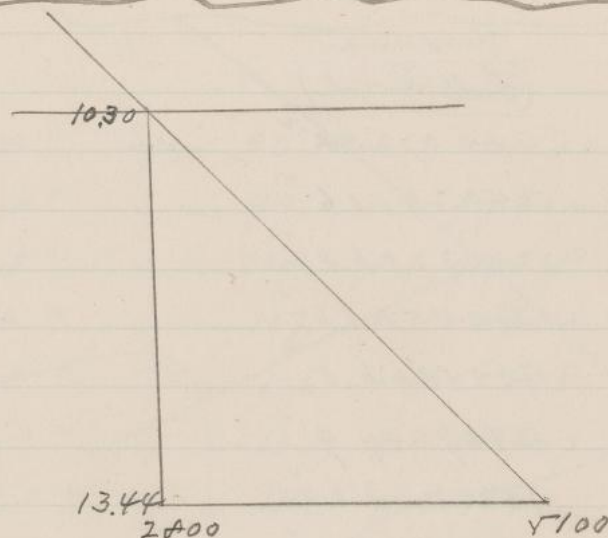
Time of maxima computed from Chandler's 1st term only.

to. Epoch.	First Term.	Lyapun.	Log. 2 nd term.
0	2400705.2 ^v	Lyapun 90° = +0.00000	+1.30103 ^v
5	2401991.2 ^v	" " 99. +9.99462	+1.29565 ^v
10	2403277.2 ^v	" " 102. +9.97821	+1.27924 ^v
15	2404563.2 ^v	" " 117. +9.94922	+1.25091 ^v
20	2405849.2 ^v	" " 126. +9.90796	+1.20299 ^v
25	2407135.2 ^v	" " 135. +9.84949	+1.15052 ^v
30	2408421.2 ^v	" " 144. +9.76922	+1.07025 ^v
35	2409707.2 ^v	" " 153. +9.65705	+0.95202 ^v
40	2410993.2 ^v	" " 162. +9.48992	+0.79101 ^v
45	2412279.2 ^v	" " 171. +9.19433	+0.49536 ^v
50	2413565.2 ^v	" " 180.	
55	2414851.2 ^v	" " 189. = 9.19433	= 0.49536 ^v
60	2416137.2 ^v	" " 198. = 9.48992	= 0.79101 ^v

$2 \frac{d}{dt} \log m.$			Calculated.	
			maxima	
			(Full Period)	
+ 20.0			240 0725.2	✓
+ 19.2	-2	-6	240 2011.6	✓
+ 19.0	-2	-4	240 3296.2	✓
+ 17.2	-1.2	-4	240 4521.6	✓
+ 16.2	-1.6	-5	240 5266.0	✓
+ 14.1	-2.1	-2	240 7149.9	✓
+ 11.2	-2.3	-4	240 8433.6	✓
+ 9.1	-2.7	-2	240 9716.9	✓
+ 6.2	-2.9	-2	241 1000.0	✓
+ 3.1	-3.1	0	241 2222.9	✓
0.0	-3.1	0		
- 3.1	-3.1	0	241 4242.7	✓
- 6.2	-3.1		241 6131.6	✓

Nova Aurigae.
 Derivation of straight line formula from observations
 with Photometer R + G.

<u>J. S.</u>	<u>magn.</u>
2200	10.30
3000	10.60
3200	10.84
3400	11.15
3600	11.42
3800	11.72
4000	12.07
4200	12.29
4400	12.57
4600	12.84
4800	13.14
5000	13.23
5100	13.44



$$10.30 = 0a + b$$

$$13.44 = 2300a + b$$

$$3.14 = 2300a$$

$$a = 0.00137 \text{ magn. per day.}$$

$$b = 10.30 \text{ magn.}$$

*Ursae Majoris.*Computation of First and Second Terms by Chandler's Formula.

Ep. 0 = 240 0 26.0 ^v		181.50 ^v = 141° 30' = " 2.41792 ^v		Legend.	
v =	1716.5 ^v	210.30 ^v	210 12.	"	9.70222 ^v
10	2047.0 ^v	239.10 ^v	239 6.	"	9.93352 ^v
15	3977.5 ^v	267.90 ^v	267 54.	"	9.99971 ^v
20	5102.0 ^v	296.70 ^v	296 42.	"	9.95103 ^v
25	6232.5 ^v	325.50 ^v	325 30.	"	9.75313 ^v
30	7369.0 ^v	354.30 ^v	354 12.	"	2.99704 ^v
35	2499.5 ^v	23.10 ^v	23 6.	+	9.59366 ^v
40	9630.0 ^v	51.90 ^v	51 54.	+	9.29594 ^v
45	2410760.5 ^v	80.70 ^v	80 42.	+	9.99425 ^v
50	2411291.0 ^v	109.50 ^v	109 30.	+	9.97435 ^v
55		138.30 ^v	138 12.	+	9.22297 ^v
60		167.10 ^v	167 6.	+	9.34279 ^v
65		195.90 ^v	195 54.	"	9.43769 ^v

<u>Log. 2^d term.</u>	<u>2^d term.</u>
~ 0.05139 ✓	-1.1 ✓
~ 1.33635 ✓	-21.7 ✓
~ 1.56699 ✓	-36.9 ✓
~ 1.63312 ✓	-43.0 ✓
~ 1.52450 ✓	-32.4 ✓
~ 1.32660 ✓	-24.4 ✓
~ 0.63051 ✓	-4.3 ✓
$+1.22713$ ✓	$+16.9$ ✓
$+1.52941$ ✓	$+33.2$ ✓
$+1.62772$ ✓	$+42.4$ ✓
$+1.60722$ ✓	$+40.5$ ✓
$+1.45644$ ✓	$+22.6$ ✓
$+0.92226$ ✓	$+9.6$ ✓
~ 1.07116 ✓	-11.2 ✓

Schoufeldts' maxima.R Ursae Majoris.

$$\begin{array}{rcl}
 \text{Ep. 0} & = & 2397951.2 \quad 302.1 \\
 & & \underline{906.3} \quad \underline{3} \\
 & & \quad 906.3 \\
 \text{" 3} & = & 2398257.5 \\
 \text{" 4} & = & 2399159.6 \\
 \text{" 5} & = & 2399461.7
 \end{array}$$

S Ursae Majoris.

$$\begin{array}{rcl}
 \text{Ep. 0.} & = & 2400526.0 \quad 226.1 \\
 & & \underline{-12022.2} \quad \underline{2} \\
 & & \quad 12022.2 \\
 \text{" -2} & = & 2398777.2 \\
 & & \underline{452.2} \\
 & & \quad 452.2 \\
 \text{" -6} & = & 2399229.4 \quad 226.1 \\
 & & \underline{226.1} \quad \underline{2} \\
 & & \quad 452.2 \\
 \text{" -5} & = & 2399455.5
 \end{array}$$

R Cassiope.

$$\begin{array}{rcl}
 \text{Ep. 0} & = & 2398404. \quad 429.5 \\
 & & \underline{429.5} \\
 \text{" 1} & = & 2398233.5 \\
 & & \underline{429.5} \\
 \text{" 2} & = & 2399263.0 \\
 & & \underline{259.0} \\
 \text{" 4} & = & 2400122.0
 \end{array}$$

Jurassae Majorae.

Computation of 1st and 2^d Terms by Chandler's Formula.

No. Epoch.			<u>Longitude</u>	
0	240 0705.2 ^v	90°	+0.00000 ^v	+1.30103 ^v
5	1991.2 ^v	135.	+9.24949 ^v	+1.15052 ^v
10	3277.2 ^v	180	—	—
15	4563.2 ^v	225	-9.24949 ^v	-1.15052 ^v
20	5849.2 ^v	270	-0.00000 ^v	-1.30103 ^v
25	7135.2 ^v	315	-9.24949 ^v	-1.15052 ^v
30	8421.2 ^v	0	—	—
35	9707.2 ^v	45.	+9.24949 ^v	+1.15052 ^v
40	241 0993.2 ^v	90.	+0.00000 ^v	+1.30103 ^v
45	2279.2 ^v	135.	+9.24949 ^v	+1.15052 ^v
50	3565.2 ^v	180.	—	—
55	4851.2 ^v	225.	-9.24949 ^v	-1.15052 ^v
60	6137.2 ^v	270	-0.00000 ^v	-1.30103 ^v

2 $\frac{d}{u}$ term.

+20.0 ✓

+14.1 ✓

0.0 ✓

-14.1 ✓

-20.0 ✓

-14.1 ✓

0.0 ✓

+14.1 ✓

+20.0 ✓

+14.1 ✓

0.0 ✓

-14.1 ✓

-20.0 ✓

P Cassio.Computation of 1st + 2^d terms by Ch and his Full Hor.

No. Epoch.

Log sin do.Log 2^d term.

0	2401523.0 ^v	50°	+9.22425 ^v	+1.52322 ^v
5		100	+9.99335 ^v	+1.69232 ^v
10		150	+9.69497 ^v	+1.39794 ^v
15		200	+9.53405 ^v	+1.23302 ^v
20		250	+9.97299 ^v	+1.67196 ^v
25		300	+9.93753 ^v	+1.63650 ^v
30				
35				
40				
45				
50				
55				
60				

$2 \frac{1}{2}$ hr.

+ 32.3 ✓

+ 49.2 ✓

+ 25.0 ✓

- 17.1 ✓

- 47.0 ✓

- 43.5 ✓

R. Urae. Majoris.

No. Epoch

Lysini do.

0	190.	$\approx 9.23967''$	$\approx 0.41576''$
5	240.	$\approx 9.93753''$	$\approx 1.11362''$
10	290.	$\approx 9.97299''$	$\approx 1.14902''$
15	340.	$\approx 9.53405''$	$\approx 0.71014''$
20	30.	$+9.69297''$	$+0.27506''$
25	20.	$+9.99335''$	$+1.16944''$
30	130.	$+9.22425''$	$+1.06034''$
35	120.	<hr/>	<hr/>
40	230.	$\approx 9.22425''$	$\approx 1.06034''$
45	220.	$\approx 9.99335''$	$\approx 1.16944''$
50	330.	$\approx 9.69297''$	$\approx 0.27506''$
55	20.	$+9.53405''$	$+0.71014''$
60	70.	$+9.97299''$	$+1.14902''$

- 2.6²
- 13.0
- 14.1
- 5.1
+ 7.5
+ 14.2
+ 11.5
00
- 11.5
- 14.1
- 7.5
+ 5.1
+ 14.1

St Cygni

$$322.2^\circ + 15 \sin(12^\circ E + 66^\circ)$$

		<i>St Cygni</i> do.	<i>St Cygni</i> do.
0	2402417.0 ^v	66 ^v	+9.96073 ^v +1.13622 ^v
5		126 ^v	+9.90796 ^v +1.02405 ^v
10		126 ^v	-9.01923 ^v -0.19532 ^v
15		246 ^v	-9.96073 ^v -1.13622 ^v
20		306 ^v	-9.90796 ^v -1.02405 ^v
25		6 ^v	+9.01923 ^v +0.19532 ^v
30		66 ^v	+9.96073 ^v +1.13622 ^v
35		126 ^v	+9.90796 ^v +1.02405 ^v
40		126 ^v	-9.01923 ^v -0.19532 ^v

$2 \frac{1}{2} \text{ cm}$ $+13.7^\circ$ $+12.1^\circ$ -1.6 -13.7 -12.1 $+1.6$ $+13.7$ $+12.1$ -1.6

N Boötes:

$$+ 264.2 \varepsilon + 0.246 \varepsilon^2 - 0.005 \varepsilon^3$$

		$\frac{\varepsilon^2}{0.}$	$\frac{4}{3} \varepsilon^2$	$\frac{4}{3} 2 \frac{1}{2} \text{ term.}$
0	2401636.0	0.		
5		25.	+1.39794	+0.72222
10		100.	+2.00000	+1.39094
15		225.	+2.35212	+1.74312
20		400.	+2.60206	+1.99300
25		625.	+2.79522	+2.12622
30		900.	+2.95424	+2.34512
35		1225.	+3.08214	+2.47902
40		1600.	+3.20412	+2.59506
45		2025.	+3.30643	+2.69737
50		2500.	+3.39794	+2.72222

<u>2 $\frac{1}{2}$ term.</u>	<u>E^3</u>	<u>Log. E^3</u>	<u>Log. $\frac{1}{2}$ term.</u>	<u>3 $\frac{1}{2}$ term.</u>
	0			
+6.15 ^{vv}	125. ^v	+2.09691 ^{vv}	-9.79522 ^{vv}	-0.62 ^{vv}
+24.60 ^{vv}	1000. ^v	+3.00000 ^{vv}	-0.69297 ^{vv}	-5.00 ^{vv}
+55.35 ^{vv}	3375. ^v	+3.52227 ^{vv}	-1.22724 ^{vv}	-16.27 ^{vv}
+92.40 ^{vv}	2000. ^v	+3.90309 ^{vv}	-1.60206 ^{vv}	-40.00 ^{vv}
+153.75 ^{vv}	15625. ^v	+4.19322 ^{vv}	-1.29279 ^{vv}	-72.12 ^{vv}
+221.40 ^{vv}	27000. ^v	+4.43136 ^{vv}	-2.13033 ^{vv}	-135.00 ^{vv}
+301.36 ^{vv}	42275. ^v	+4.63220 ^{vv}	-2.33117 ^{vv}	-214.37 ^{vv}
+393.60 ^{vv}	64000. ^v	+4.20612 ^{vv}	-2.50515 ^{vv}	-320.00 ^{vv}
+492.16 ^{vv}	91125. ^v	+4.95963 ^{vv}	-2.65260 ^{vv}	-455.62 ^{vv}
+615.00 ^{vv}	125000. ^v	+5.09691 ^{vv}	-2.79522 ^{vv}	-625.00 ^{vv}
				-10.00 ^{vv}

R Cassiope.+429.^d E + 25 min (15° E + 0°)

No. Epoch.		<u>Ly. an. do.</u>	<u>Ly 2 $\frac{1}{2}$ min.</u>	
-10		210. ^v	-9.69297 ^v	-1.09691 ^v
-5		225. ^v	-9.92494 ^v	-1.32222 ^v
0	2392404.0 ^v	0. ^v	<u> </u>	
+5		75. ^v	+9.92494 ^v	+1.32222 ^v
10		150. ^v	+9.69297 ^v	+1.09691 ^v
15		225. ^v	-9.24949 ^v	-1.24743 ^v
20		300. ^v	-9.93753 ^v	-1.33547 ^v
25		15. ^v	+9.41300 ^v	+0.21094 ^v
30		90. ^v	+0.00000 ^v	+1.39794 ^v
35		165. ^v	+9.41300 ^v	+0.21094 ^v
40		240. ^v	-9.93753 ^v	-1.33547 ^v

$2^{\text{d}} \text{ Grm.}$

- 12.5 "

- 24.1 "

—

+ 24.1 "

+ 12.5 "

- 17.7 "

- 21.7 "

+ 6.5 "

+ 25.0 "

+ 6.5 "

- 21.7 "

J. Cassiopeiae. Theoretical times of maxima from Chandler's first term only.

<u>J. Cassiopeiae.</u>	
Ep. 0 =	240 45 15.0 ✓
1	240 49 60.0 ✓
2	240 54 05.0 ✓
3	240 58 50.0 ✓
4	240 62 95.0 ✓
5	240 67 40.0 ✓
6	240 71 45.0 ✓
7	240 76 30.0 ✓
8	240 80 75.0 ✓
9	240 85 20.0 ✓
10	240 89 65.0 ✓
11	240 94 10.0 ✓
12	240 98 55.0 ✓
13	241 03 00.0 ✓
14	241 07 45.0 ✓
15	241 11 90.0 ✓
16	241 16 35.0 ✓
17	241 20 20.0 ✓
18	241 25 25.0 ✓
19	241 29 70.0 ✓
20	241 34 15.0 ✓
21	241 38 60.0 ✓
22	241 43 05.0 ✓
23	241 47 50.0 ✓

<u>R. Aurigae.</u>	
Ep. 0 =	240 14 62.0 ✓
1	240 19 22.2
2	240 23 22.4
3	240 28 22.6
4	240 33 02.8
5	240 37 63.0
6	240 42 23.2
7	240 46 23.4
8	240 51 43.6
9	240 56 03.8
10	240 60 64.0
11	240 65 24.2
12	240 69 24.4
13	240 74 44.6
14	240 79 04.8
15	240 83 65.0
16	240 88 25.2
17	240 92 25.4
18	240 97 45.6
19	241 02 05.8
20	241 06 66.0
21	241 11 26.2
22	241 15 26.4
23	241 20 46.6
24	241 25 06.8
25	241 29 67.0
26	241 34 27.2
27	241 38 27.4 ✓
28	241 43 47.6
29	241 48 07.8
30	241 52 68.0

380.0

R Lyrae.

Ep. 0. = 2405722.

1	2406162.0
2	2406542.0
3	2406922.0
4	2407302.0
5	2407682.0
6	2408062.0
7	2408442.0
8	2408822.0
9	2409202.0
10	2409582.0
11	2409962.0
12	2410342.0
13	2410722.0
14	2411102.0
15	2411482.0
16	2411862.0
17	2412242.0
18	2412622.0
19	2413002.0
20	2413382.0
21	2413762.0
22	2414142.0
23	2414522.0
24	2414902.0
25	2415282.0
26	2415662.0
27	2416042.0 ^r

Coordinates of α Cephei curve (Plot. 2)
read up to each hundredth of a day.

- .06	-1.56 ^v	+ .07	-0.69 ^v
- .05	-1.56 ^v	+ .08	-0.48 ^v
- .04	-1.55 ^v	+ .09	-0.22 ^v
- .03	-1.54 ^v	+ .10	+0.10 ^v
- .02	-1.51 ^v	+ .11	+0.41 ^v
- .01	-1.47 ^v	+ .12	+0.61 ^v
.00	-1.42 ^v	+ .13	+0.75 ^v
+ .01	-1.35 ^v	+ .14	+0.80 ^v
+ .02	-1.28 ^v	+ .15	+0.82 ^v
+ .03	-1.19 ^v	+ .16	+0.82 ^v
+ .04	-1.10 ^v	+ .17	+0.83 ^v
+ .05	-0.98 ^v	+ .18	+0.84 ^v
+ .06	-0.85 ^v	+ .19	+0.84 ^v

+20	+0.24 ^v	+33	-1.36 ^v
+21	+0.21 ^v	+34	-1.42 ^v
+22	+0.72 ^v	+35	-1.46 ^v
+23	+0.50 ^v	+36	-1.50 ^v
+24	+0.16 ^v		
+25	-0.20 ^v		
+26	-0.42 ^v		
+27	-0.61 ^v		
+28	-0.79 ^v		
+29	-0.95 ^v		
+30	-1.02 ^v		
+31	-1.19 ^v		
+32	-1.22 ^v		

Circumpolar Variables. $\frac{M_0 - m}{2}$ and $\frac{m - M_0}{2}$

	Ch. Period.	$M_0 - m$ H.C.O.	$\frac{M_0 - m}{2}$	$\frac{(1^{st} \text{ term})}{-(M_0 - m)}$	$\frac{m - M_0}{2}$			
γ Cassio.	445.0	260.6	130.3	184.4	92.2	140	100	+35
δ "	610.5	273.4	136.7	337.1	168.6	140	160	-10
γ Persei	Irregular							
δ "	Ir. Periodic							
α Aurigae	460.2	242.2	121.2	217.9	109.0	120	100	-20
α Lyrae	320.0	123.1	61.6	196.9	98.4	100	100	+20
α Urs. maj.	302.1	122.4	61.2	179.7	89.8	60	80	-20
γ " "	257.2	107.2	53.6	150.0	75.0	60	80	+20
δ " "	226.1	107.3	53.6	112.2	56.1	60	60	+14
α Bootis	262.2	131.9	66.0	136.3	68.2	60	60	-44
α Camelop.	269.5	132.0	66.0	137.5	68.8	60	60	-49
α Urs. min.	Ir. Per.							
α Draconis	245.6	107.3	53.6	132.3	66.2	60	80	-35
α Cygni	322.2	161.5	80.8	161.3	80.6	80	80	-3
γ Cephei	327.0	206.7	103.4	120.3	60.2	100	100	-12
δ " "	424.0	264.3	132.2	219.7	109.8	140	100	-4
α Cassio.	429.5	171.4	85.7	252.1	126.0	80	120	

For more Cases, back
" Min. " forward

140
130.3 forward
" back
100.
92.2

N Cassio. (610.5)

Maxima	Maxima - 116 - 116	Maxima + 116 - 116
1312	1175.3	1480.6
1931	1794.3	2099.6
2549	2412.3	2727.6
3164	3027.3	3332.6
3836	3699.3	4004.6
4466	4329.3	4634.6

R Cygni. (340.0)

1125	1033.4	1223.4
1425	1393.4	1523.4
1822	1790.4	1920.4
2242	2156.4	2346.4
2622	2536.4	2726.4
3016	2924.4	3114.4
3356	3264.4	3454.4
3720	3620.4	3810.4
4132	4046.4	4236.4
4512	4426.4	4616.4
4912	4820.4	5010.4

R Aurigae. (460.2)

1133	1011.2	1242.0
1527	1465.2	1696.0
2041	1919.2	2150.0
2510	2322.2	2619.0
2953	2731.2	3062.0
3403	3201.2	3512.0
3870	3740.2	3979.0
4314	4192.2	4423.0
4772	4656.2	4887.0

R Urs. Maj. (302.1)

1226	1164.2	1315.2
1539	1477.2	1622.2
1855	1793.2	1944.2
2153	2091.2	2242.2
2454	2392.2	2543.2
2747	2685.2	2836.2
3042	2980.2	3131.2
3337	3275.2	3426.2
3636	3574.2	3725.2
3942	3886.2	4037.2
4264	4202.2	4353.2
4562	4500.2	4651.2

4 hours

Trans. mag. (257.2)

1220	1226.4	1355.0
1512	1464.4	1593.0
1775	1721.4	1850.0
2024	1970.4	2099.0
2226	2232.4	2361.0
2541	2487.4	2616.0
2826	2772.4	2901.0
3049	2995.4	3124.0
3305	3251.4	3320.0
3562	3502.4	3637.0
3832	3772.4	3907.0
4020	4026.4	4155.0
4312	4264.4	4393.0
4520	4526.4	4655.0
4832	4724.4	4913.0

Trans. mag. (226.1)

1260	1206.4	1319.4
1525	1431.4	1544.4
1691	1637.4	1750.4
1923	1869.4	1922.4
2155	2101.4	2214.4
2373	2319.4	2432.4
2572	2524.4	2637.4
2807	2753.4	2866.4
3052	3004.4	3117.4
3276	3222.4	3335.4
3492	3432.4	3551.4
3719	3665.4	3772.4
3970	3916.4	4029.4
4177	4123.4	4236.4
4399	4343.4	4456.4
4610	4556.4	4669.4
4846	4792.4	4905.4

Trans. mag.

1120	1049.7	1272.2
1636	1505.7	1722.2
2029	1952.7	2121.2
2531	2400.7	2623.2
2964	2833.7	3056.2
3405	3274.7	3497.2
3872	3741.7	3964.2
4223	4152.7	4375.2
4739	4602.7	4831.2

S Bootes (262.2)

1379	1313.0	1447.2
1653	1527.0	1721.2
1903	1837.0	1971.2
212K	2112.0	2252.2
2K36	2370.0	2504.2
2690	2624.0	2752.0
296K	2992.0	3032.2
3275	3209.0	33K3.2
3516	3450.0	354K.2
3772	3706.0	3840.2
K0K2	3922.0	4116.2
K316	4250.0	432K.2
K522	4516.0	4650.2
K2K0	4774.0	4902.2

R Camelopard (269.5)

1201	1135.0	1269.2
1K95	1429.0	1563.2
1775	1709.0	1843.2
2022	1962.0	2096.2
2229	2223.0	2357.2
2570	2505.0	2632.2
28K0	2774.0	2902.2
3113	3047.0	3121.2
3411	33K5.0	3479.2
3703	3637.0	3771.2
3970	3905.0	4032.2
4233	4167.0	4301.2
K502	44K2.0	4576.2
K204	4732.0	4872.2

R Draconis (245.6)

11K2	1094.4	1217.2
1372	1312.4	1441.2
1629	1575.4	1692.2
1875	1821.4	1944.2
2132	2072.4	2201.2
237K	2320.4	2443.2
2606	2552.4	2675.2
2852	2792.4	2921.2
3110	3056.4	3179.2
3351	3297.4	3420.2
3521	3527.4	3650.2

R Draconis com

3229	3775.4	3892.2
4025	4031.4	4154.2
K323	4269.4	4392.2
K573	4519.4	4642.2
4802	4754.4	4877.2

S Cygni. (322.0)

1162	1027.2	1242.6
1423	1402.2	1563.6
1213	1732.2	1293.6
2442	2367.2	2522.6
2765	2624.2	2245.6
3021	3000.2	3161.6
3412	3331.2	3492.6
3730	3649.2	3210.6
4045	3964.2	4125.6

(1)

S Cephei. (347.0)

1153	1049.6	1243.2
1550	1446.6	1640.2
1932	1222.6	2022.2
2312	2214.6	2402.2
2700	2596.6	2790.2
3076	2972.6	3166.2
3479	3375.6	3569.2
3263	3759.6	3953.2
4262	4152.6	4352.2
4612	4514.6	4702.2
5005	4901.6	5095.2

S Cephei. (424.0)

1109	976.2	1212.2
1655	1522.2	1764.2
2020	1947.2	2129.2
2572	2445.2	2627.2
3022	2949.2	3191.2
3520	3447.2	3629.2
4002	3275.2	4117.2
4602	4469.2	4711.2

R Cassiope. (429.5)

1310	1224.3	1439.0
1723	1637.3	1252.0
2176	2090.3	2305.0
2522	2502.3	2717.0
3032	2946.3	3161.0
3472	3392.3	3607.0
3930	3244.3	4059.0
4792	4712.3	4927.0

(1)

<i>maxima.</i>	<i>γ Cassiopeiae. New. (max.)</i>	<i>maxima</i>	<i>γ Cassiope. New. (max.)</i>
1120	1040 ^v	1240 ^v	1312 1172 ^v 1472 ^v
1636	1496 ^v	1736 ^v	1931 1791 ^v 2091 ^v
2029	1949 ^v	2129 ^v	2549 2409 ^v 2709 ^v
2531	2391 ^v	2631 ^v	3164 3024 ^v 3324 ^v
2964	2824 ^v	3064 ^v	3236 3696 ^v 3996 ^v
3405	3265 ^v	3505 ^v	4466 4326 ^v 4626 ^v
3872	3732 ^v	3972 ^v	
4223	4143 ^v	4323 ^v	
4739	4599 ^v	4839 ^v	

<i>maxima.</i>	<i>β Aurigae.</i>
1133	1013
1527	1467
2041	
2510	
2953	
3403	
3870	
4314	
4772	

<i>minima</i>	<i>γ Cassiope. New. (min.)</i>
1395	1295 1535
1812	1712 1952
2252	2152 2392
2667	2567 2807
3162	3062 3302
3600	3500 3740
4036	3936 4176
4504	4404 4644

<i>minima</i>	<i>γ Cassiope. New. (min.)</i>
1677	1517 ^v 1817 ^v
2315	2155 ^v 2455 ^v
2869	2709 ^v 3009 ^v
3550	3390 ^v 3690 ^v
4170	4010 ^v 4310 ^v

S. Cassiopeae

Epoch. 0.	50°	9.22425
2	150°	+9.69297
3	200	-9.53405
4	250	-9.97299
5	300	-9.93753
7	40	+9.20207
12	290	-9.97299
15	20	+9.99335
16	130	+9.22425
17	120	—
18	230	-9.22425
19	240	-9.99335
20	330	-9.69297
21	20.	+9.53405

S. Boötis Nov. (max.)

1379	1319 ^v	1439 ^v
1653	1593 ^v	1713 ^v
1903	1843 ^v	1963 ^v
2124 ^v	2124 ^v	2244 ^v
2436 ^v	2376 ^v	2496 ^v
2690	2630 ^v	2750 ^v
2964	2904 ^v	3024 ^v
3275 ^v	3215 ^v	3335 ^v
3516 ^v	3456 ^v	3576 ^v
3772	3712 ^v	3832 ^v
4042	3982 ^v	4102 ^v
4316	4256 ^v	4376 ^v
4522	4462 ^v	4622 ^v
4840	4780 ^v	4900 ^v

S. Boötis Nov. (min.)

1254 ^v	1194 ^v	1314 ^v
1513	1453 ^v	1573 ^v
1724 ^v	1724 ^v	1844 ^v
2056	1996 ^v	2116 ^v
2299	2239 ^v	2359 ^v
2522 ^v	2522 ^v	2642 ^v
2851	2791 ^v	2911 ^v
3100	3040 ^v	3160 ^v
3366	3306 ^v	3426 ^v
3642	3582 ^v	3702 ^v
3910	3850 ^v	3970 ^v
4272	4212 ^v	4332 ^v

R. Aurigae Nov. (max.)

1133	1013 ^v	1233 ^v
1527	1467 ^v	1627 ^v
2041	1921 ^v	2141 ^v
2510	2390 ^v	2610 ^v
2953	2833 ^v	3053 ^v
3403	3283 ^v	3503 ^v
3870	3750 ^v	3970 ^v
4314	4194 ^v	4414 ^v
4772	4652 ^v	4872 ^v

R. Aurigae Nov. (min.)

1337	1237 ^v	1457 ^v
1803	1703 ^v	1923 ^v
2252	2152 ^v	2372 ^v
2730	2630 ^v	2850 ^v
3162	3062 ^v	3282 ^v
3626	3526 ^v	3746 ^v

*S Cassiopeiae*1st term.

Epoch	0	2401523.0 ^v	50.0 ^v	+9.22425 ^v	1.52322 ^v
	2	2204.0 ^v	70.0 ^v	+9.97299 ^v	1.67196 ^v
	3	3414.5 ^v	20.0 ^v	+9.99335 ^v	1.69232 ^v
	4	4025.0 ^v	90.0 ^v	+0.00000 ^v	1.69297 ^v
	5	4635.5 ^v	100.0 ^v	+9.99335 ^v	1.69232 ^v
	7	5256.5 ^v	120.0 ^v	+9.93753 ^v	1.63650 ^v
	12	2909.0 ^v	170.0 ^v	+9.23967 ^v	1.03264 ^v
	15	2410740.5 ^v	200.0 ^v	+9.53405 ^v	1.23302 ^v
	16	1351.0 ^v	210.0 ^v	+9.69497 ^v	1.39794 ^v
	17	1961.5 ^v	220.0 ^v	+9.20207 ^v	1.50704 ^v
	18	2572.0 ^v	230.0 ^v	+9.22425 ^v	1.52322 ^v
	19	3122.5 ^v	240.0 ^v	+9.93753 ^v	1.63650 ^v
	20	3793.0 ^v	250.0 ^v	+9.97299 ^v	1.67196 ^v
	21	4403.5 ^v	260.0 ^v	+9.99335 ^v	1.69232 ^v

$2 \frac{d}{dt} \text{ term.}$	$\frac{1st}{u} + 2 \frac{d}{dt} \text{ term.}$
+ 32.3	2401621.3 ✓
+ 47.0	2851.0 ✓
+ 49.2	3463.7 ✓
+ 50.0	4075.0 ✓
+ 49.2	4624.7 ✓
+ 43.3	5299.2 ✓
+ 2.7	5917.7 ✓
- 17.1	2410723.4 ✓
- 25.0	1326.0 ✓
- 32.1	1929.4 ✓
- 32.3	2533.7 ✓
- 43.3	3139.2 ✓
- 47.0	3746.0 ✓
- 49.2	4354.3 ✓

A Ursae majoris.

Epoch	<u>1st Column.</u>		<u>Log. sin. do.</u>	
0	2397951.2	190°	~ 9.23967	~ 0.41576
2	2398555.4	210°	~ 9.69297	~ 0.27506
3	2398247.5	220°	~ 9.20207	~ 0.92416
K	2399159.6	230°	~ 9.22425	~ 1.06034
V	2399461.7	240°	~ 9.93753	~ 1.11362
6	2399763.2	250°	~ 9.97299	~ 1.14902
7	2400065.9	260°	~ 9.99335	~ 1.16944
15	2422.7	340°	~ 9.53405	~ 0.71014
16	2724.2	350°	~ 9.23967	~ 0.41576
17	3026.9	0°		0.0
18	3329.0	10°	$+9.23967$	$+0.41576$
19	3691.1	20°	$+9.53405$	$+0.71014$
20	3993.2	30°	$+9.69297$	$+0.27506$
21	4295.3	40°	$+9.20207$	$+0.92416$
22	4597.4	50°	$+9.22425$	$+1.06034$
23	4899.5	60°	$+9.93753$	$+1.11362$
24	5201.6	70°	$+9.97299$	$+1.14902$
25	5503.7	80°	$+9.99335$	$+1.16944$
26	5805.2	90°	$+0.00000$	$+1.17609$
27	6107.9	100°	$+9.99335$	$+1.16944$
29	6712.1	120°	$+9.93753$	$+1.11362$
30	7014.2	130°	$+9.22425$	$+1.06034$
34	2222.6	170°	$+9.23967$	$+0.41576$
35	2524.7	180°		0.0
36	2826.2	190°	~ 9.23967	~ 0.41576
37	9122.9	200°	~ 9.53405	~ 0.71014
38	9431.0	210°	~ 9.69297	~ 0.27506
44	2411243.6	270°	~ 0.00000	~ 1.17609
45	2411545.7	280°	~ 9.99335	~ 1.16944

239 7942.6 ✓
 2547.9 ✓
 2247.9 ✓
 9142.1 ✓
 9442.7 ✓
 9749.7 ✓
 24000 51.1 ✓
 2477.6 ✓
 2742.2 ✓
 3046.9 ✓
 3391.6 ✓
 3696.2 ✓
 4000.7 ✓
 4304.9 ✓
 4602.9 ✓
 4912.5 ✓
 5215.7 ✓
 5512.5 ✓
 5820.8 ✓
 6122.7 ✓
 6725.1 ✓
 7025.7 ✓
 2225.2 ✓
 2524.7 ✓
 2224.2 ✓
 9123.4 ✓
 9423.5 ✓
 2411220.6 ✓
 1530.9 ✓

Epoch.

Log. sin. ds.

46	2411247.2 ^v	290. ^v	-9.97299 ^v	-1.14902 ^v	- 14.1 ^v
47	2412149.9 ^v	300. ^v	-9.93753 ^v	-1.11362 ^v	- 13.0 ^v
48	2412452.0 ^v	310. ^v	-9.88425 ^v	-1.06034 ^v	- 11.5 ^v
49	2412754.1 ^v	320. ^v	-9.80207 ^v	-0.92416 ^v	- 9.6 ^v
50	2413056.2 ^v	330. ^v	-9.69297 ^v	-0.87506 ^v	- 7.5 ^v
51	2413358.3 ^v	340. ^v	-9.53405 ^v	-0.71014 ^v	- 5.1 ^v
52	2413660.4 ^v	350. ^v	-9.23967 ^v	-0.41576 ^v	- 2.6 ^v
53	2413962.5 ^v	0. ^v	<u> </u> ^v	<u> </u> ^v	<u> </u> ^v
54	2414264.6 ^v	10. ^v	+9.23967 ^v	+0.41576 ^v	+ 2.6 ^v
55	2414566.7 ^v	20. ^v	+9.53405 ^v	+0.71014 ^v	+ 5.1 ^v
56	2414868.8 ^v	30. ^v	+9.69297 ^v	+0.87506 ^v	+ 7.5 ^v

241 1A 33.7 ✓
21 36.9 ✓
24 40.5 ✓
27 44.5 ✓
30 48.7 ✓
33 53.2 ✓
36 57.2 ✓
39 62.5 ✓
42 67.2 ✓
45 71.2 ✓
48 76.3 ✓

T Umas hujoris.

Epoch.

6	2402249.0	144°
7	2406.2	153.
2	2763.4	162.
9	3020.6	171.
11	3535.0	189
12	3792.2	190
13	4049.4	207
14	4306.6	216
15	4563.2	225
16	4821.0	234
17	5072.2	243
18	5335.4	252
19	5592.6	261
20	5849.2	270
21	6107.0	279
22	7907.4	342
29	8164.6	351
30	8421.2	0
31	8679.0	9
32	8936.2	18
34	9450.6	36
37	241 0222.2	63
38	0479.4	72
39	0736.6	81
40	0993.2	90
41	1251.0	99
42	1508.2	108
43	1765.4	117

*T Ursae majoris, con.*Epoch.

44	2412022.6
45	2279.2
46	2537.0
47	2794.2
48	3051.4
49	3302.6
50	3565.2
51	3823.0
52	4020.2
53	4337.4
54	4594.6
55	4851.2 ^v

+ 73.533 (2.5) 4.1903. = 2 Draconis.
 Minor Ceresides New Algol Var.

Provisional elements =

Mar. 18 07 49 +1 A 34.7 E. =

Principal 241 6192.3260 +1.3574 S. 4 M. T. Secondary Min.
 S. M. T. 9 M. T. Min. 9 M. T. 4 M. T. Min.

Epoch 0	241 6192.3260	Mar 18	7 50	6193.0047	Mar 19	0 7
1	6193.6834	19	16 24	6194.3621	20	A 43
2	6195.0408	21	0 59	6195.7195	21	17 17
3	6196.3982	22	9 33	6197.0769	23	1 51
4	6197.7556	23	18 08	6198.4343	24	10 25
5	6199.1130	25	2 43	6199.7917	25	19 00
6	6200.4704	26	11 17	6201.1491	27	3 24
7	6201.8278	27	19 52	6202.5065	28	12 08
8	6203.1852	29	4 26	6203.8639	29	20 44
9	6204.5426	30	13 02	6205.2213	31	5 18
10	6205.9000	31	21 36	6206.5787	Apr 1	13 54
11	6207.2574	Apr 2	6 10	6207.9361	2	22 28
12	6208.6148	3	14 46	6209.2935	4	7 04
13	6209.9722	4	23 20	6210.6509	5	15 38
14	6211.3296	6	7 55	6212.0083	7	0 12
15	6212.6870	7	16 30	6213.3657	8	8 47
16	6214.0444	9	1 04	6214.7231	9	17 21
17	6215.4018	10	9 39	6216.0805	11	1 55
18	6216.7592	11	18 23	6217.4379	12	10 31
19	6218.1166	13	2 48	6218.7953	13	19 05
20	6219.4740	14	11 23	6220.1527	15	3 40
21	6220.8314			6221.5101	16	12 15
22	6222.1888			6222.8675		
23	6223.5462	18	13 06	6224.2249		
24	6224.9036			6225.5823	20	13 58
25	6226.2610			6226.9397		

H. 1903 Draconis. = Z Draconis.

103

		Primary		Secondary	
		9 m. T.	8 m. T.	7 m. T.	8 m. T.
Ep 26	241	6227.6184	Apr. 22 14:50	241 6228.2971	
27		6228.9758		62 29.6545	Apr. 24 15:43
28		6230.3332		6231.0119	
29		6231.6906	Apr. 26 16:35	6232.3693	
30		6233.0480		6233.7267	
31		6234.4054		6235.0841	
32		6235.7628		6236.4415	May 1 10:36
33		6237.1202		6237.7989	
34		6238.4776	May 3 11:28	6239.1563	
35		6239.8350		6240.5137	May 5 12:20
36		6241.1924		6241.8711	
37		6242.5498	May 7 13:12	6243.2285	
38		6243.9072		6244.5859	May 9 14:04
39		6245.2646		6245.9433	
40		6246.6220	May 11 14:55	6247.3007	
41		6247.9794		6248.6581	May 13 15:48
42		6249.3368		6250.0155	
43		6250.6942	May 15 16:40	6251.3729	
44		6252.0516		6252.7303	
45		6253.4090		6254.0877	
46		6254.7664		6255.4451	
47		6256.1238		6256.8025	
48		6257.4812	May 22 11:33	6258.1599	
49		6258.8386		6259.5173	May 24 12:28
50		6260.1960		6260.8747	
51		6261.5534	May 26 13:16	6262.2321	
52		6262.9108		6263.5895	May 28 14:22
53		6264.2682		6264.9469	
54		6265.6256	May 30 15:01	6266.3043	

H. 1903 Draco. Cont.

9. m. Principal

E. M. T.

Secondary

PK	2416297.3476	July 1	31	21	July 1	19	38
	6298.7050	" 2	11	55	3	4	12
	6300.0624	" 3	20	30	4	12	47
	6301.4198	" 5	5	05	5	21	22
	6302.7772	" 6	13	39	7	5	56
	6304.1346	" 7	22	15	8	14	32
	6305.4920	" 9	6	48	9	23	05
	6306.8494	" 10	15	22	11	7	39
	6308.2068	" 11	23	58	12	16	15
	6309.5642	" 13	8	32	14	00	49
94	6310.9216	" 14	17	07	15	9	24
95	6312.2790	" 16	1	42	16	17	59
96	6313.6364	" 17	10	16	18	2	33
97	6314.9938	" 18	18	52	19	11	09
98	6316.4512	" 20	3	25	20	19	42
99	6317.7086	" 21	12	01	22	4	18
100	6319.0660	" 22	20	35	23	12	52
1	6320.4234	" 24	5	09	24	21	26
2	6321.7808	" 25	13	45	26	6	02
3	6323.1382	" 26	22	19	27	14	36
4	6324.4956	" 28	6	54	28	23	11
5	6325.8530	" 29	15	28	30	7	45
6	6327.2104	July 31	0	03	31	16	20
Ep. 120	6355.2140	Aug 28	0	8			
121	6356.5714	Aug 29	8	42			
122	6357.9288	Aug 30	17	18			
123 *	6359.2862	Sept 1	1	52			
124	6360.6436	" 2	10	28			
125	6362.0010	" 3	19	01			

Principal Min

g. m. t.

East. M. T.

Secondary
E. m. T.

cf. 126

6363.3584	Sept. 5	3:35
6364.7168	6	12:11
6366.0732	7	20:45
6367.4306	9	5:19
6368.7880	10	13:55
6370.1454	11	22:29
6371.5028	13	7:03
6372.8602	14	15:39
6374.2176	16	0:14
6375.5750	17	8:48
6376.9324	18	17:22
6378.2898	20	1:58
6379.6472	21	10:32
6381.0046	22	19:07
6382.3620	24	3:42
6383.7194	25	12:15
6385.0768	26	20:51
6386.4342	28	5:25
6387.7916	29	14:00
6389.1490	31	22:35

136

6390.5064	Oct 2	7:08	Oct 2	23:25
-----------	-------	------	-------	-------

146	6390.5864	Oct 2	7:08	Oct 2	23:25
147	91.8638	3	15:44	4	8:00
148	93.2212	5	0:18	5	16:35
149	94.5786	6	8:54	7	1:10
150	95.9360	7	17:28	8	9:45
151	97.2934	9	2:02	9	18:20
152	98.6508	10	10:37	11	2:55
153	6400.0082	11	19:02	12	11:30
154	01.3656	13	3:47	13	20:05
155	02.7230	14	12:21	15	4:40

4.1903 = 2 Draconis.

Principal

Secondary

9 M.T.

2 M.T.

E. M.T.

Op. 156.	241	6404.0804 ^v	Oct 15	20:55	Oct 16	13	15
		05.4378	17	5:31	17	21	50
		06.7952	18	14:05	19	6	25
		08.1526	19	22:44	20	15	00
		09.5100	21	7:14	21	23	35
		10.8674	22	15:48	23	8	10
		12.2248	24	0:24	24	16	45
		13.5822	25	8:58	26	24	20
		14.9396	26	17:34	27	9	55
16 ⁵		16.2970	28	2:07	28	18	30
166		17.6544 ^v	29	10:42	30	23	05
167		6419.0118 ^{vv}	30	19:08	31	11	40

R. Lyncis. Star. (max.)
minimum.

1125 ^v	1025 ^v	1225 ^v
1425 ^v	1325 ^v	1525 ^v
1822 ^v	1722 ^v	1922 ^v
2240 ^v	2140 ^v	2340 ^v
2620 ^v	2520 ^v	2720 ^v
3016 ^v	2916 ^v	3116 ^v
3356 ^v	3256 ^v	3456 ^v
3720 ^v	3620 ^v	3820 ^v
4130 ^v	4030 ^v	4230 ^v
4510 ^v	4410 ^v	4610 ^v
4912 ^v	4812 ^v	5012 ^v

R. Lyncis. Star. (min.)
minimum.

1320 ^v	1220 ^v	1420 ^v
1690 ^v	1590 ^v	1790 ^v
2092 ^v	1992 ^v	2192 ^v
2472 ^v	2372 ^v	2572 ^v
2825 ^v	2725 ^v	2925 ^v
3106 ^v	3006 ^v	3206 ^v
3526 ^v	3426 ^v	3626 ^v
3933 ^v	3833 ^v	4033 ^v
4316 ^v	4216 ^v	4416 ^v
4696 ^v	4596 ^v	4796 ^v

R. Ursae Tuj. Star. (max.)

1226 ^v	1166 ^v	1306 ^v
1539 ^v	1479 ^v	1619 ^v
1855 ^v	1795 ^v	1935 ^v
2153 ^v	2093 ^v	2233 ^v
2554 ^v	2494 ^v	2534 ^v
2947 ^v	2887 ^v	3027 ^v
3042 ^v	2982 ^v	3122 ^v
3337 ^v	3277 ^v	3417 ^v
3636 ^v	3576 ^v	3716 ^v
3940 ^v	3880 ^v	4020 ^v
4564 ^v	4504 ^v	4604 ^v
4862 ^v	4802 ^v	4902 ^v

R. Ursae Tuj. Star. (min.)

1117 ^v	1037 ^v	1177 ^v
1433 ^v	1353 ^v	1493 ^v
1730 ^v	1650 ^v	1790 ^v
2020 ^v	1940 ^v	2080 ^v
2344 ^v	2264 ^v	2404 ^v
2610 ^v	2530 ^v	2670 ^v
2929 ^v	2849 ^v	2989 ^v
3207 ^v	3127 ^v	3267 ^v
3522 ^v	3442 ^v	3582 ^v
3844 ^v	3764 ^v	3904 ^v
4120 ^v	4040 ^v	4200 ^v
4710 ^v	4630 ^v	4770 ^v

S. Ursae Majoris. Star. (max.)

<i>maxima</i>	1220	1360
1512	1452	1592
1775	1715	1855
2024	1964	2104
2226	2226	2366
<u>2541</u>	2421	2621
2626	2766	2906
3049	2929	3129
3305	3245	3325
3562	3502	3642
3832	3772	3912
4020	4020	4160
4312	4252	4392
4520	4520	4660
4832	4772	4912

S. Ursae Majoris. Star. (min.)

<i>minima</i>	1152	1212
1402	1322	1462
1676	1596	1736
1922	1842	1962
2176	2096	2236
2469	2329	2529
2705	2625	2765
2956	2876	3016
3201	3121	3261
<u>3421</u>	3341	3481
3727	3647	3787
4920	4900	5040

S. Ursae Majoris. Star. (max.)

<i>maxima</i>	1260	1320
1425	1425	1545
1691	1631	1751
1923	1863	1943
2155	2095	2215
2373	2313	2433
<u>2572</u>	2512	2632
2807	2747	2867
3052	2992	3112
3276	3216	3336
3492	3432	3552

S. Ursae Majoris. Star. (max./com.)

<i>maxima</i>	3719	3779
3970	3910	4030
<u>4177</u>	4117	4237
4397	4337	4457
4610	4550	4670
4846	4786	4906

<i>St. Ursae</i> <i>minima.</i>	<i>Majoris</i>	<i>Star. (min.)</i>
1144	1024	1204
1371	1311	1431
1602	1542	1662
1824	1764	1884
2037	1977	2097
2262	2202	2322
2494	2434	2554
2705	2645	2765
2934	2874	2994
3163	3103	3223
3387	3327	3447
3614	3554	3674

<i>St. Ursae</i> <i>minima.</i>	<i>Majoris</i>	<i>Star. (min.)</i>
3837	3777	3897
4074	4014	4134
4347	4287	4407

<i>St. Boötes</i> <i>minima.</i>	<i>Star. (max.)</i>
1379	1319
1653	1593
1903	1843
2144	2124
2436	2376
2690	2630
2964	2904
3275	3215
3516	3456
3772	3712
4044	3984
4316	4256
4582	4522
4840	4780

<i>St. Boötes</i> <i>minima.</i>	<i>Star. (min.)</i>
1254	1194
1513	1453
1744	1724
2056	1996
2299	2239
2582	2522
2851	2791
3100	3040
3366	3306
3642	3582
3910	3850
4272	4212

B. Camelopard. Nov. (max.)

<i>maxima</i> 1201	1141 ^v	1261 ^v
149 ^v	143 ^v	155 ^v
177 ^v	171 ^v	183 ^v
202 ^v	196 ^v	202 ^v
222 ^v	222 ^v	234 ^v
<u>2570</u>	<u>2510</u>	2630 ^v
2840	2720 ^v	2900 ^v
3113	3053 ^v	3173 ^v
3411	3351 ^v	3471 ^v
3703	3643 ^v	3763 ^v
3970	3910 ^v	4030 ^v
4233	4173 ^v	4293 ^v
4502	4442 ^v	4562 ^v
4804	4744 ^v	4864 ^v

B. Camelopard. Nov. (min.)

<i>minima</i> 1072	1012 ^v	1132 ^v
1346	1226 ^v	1406 ^v
1632	1572 ^v	1692 ^v
1924	1864 ^v	1924 ^v
2190	2130 ^v	2250 ^v
2720	2660 ^v	2720 ^v
2999	2939 ^v	3059 ^v
<u>3254</u>	3194 ^v	3314 ^v
<u>3532</u>	3472 ^v	3592 ^v
3820	3760 ^v	3820 ^v
<u>4110</u>	4050 ^v	4170 ^v
4372	4312 ^v	4432 ^v

mean by years of ^{vis.} observations of ~~Persei~~
in Table IV. Vol. 37.

1889	$214.57 \div 25 = 2.74$ mag.
1890	$461.15 \div 53 = 2.70$ "
1891	$622.32 \div 72 = 2.64$ "
1892	$175.52 \div 20 = 2.72$ "
1893	$72.32 \div 9 = 2.70$ "
1894	$74.70 \div 9 = 2.74$ "
1895	$111.99 \div 13 = 2.61$ "
1896	$151.72 \div 12 = 2.43$ "
1897	$101.12 \div 12 = 2.43$ "
1898	$23.92 \div 10 = 2.39$ "
1899	$44.24 \div 5 = 2.85$ "
1900	$95.01 \div 11 = 2.64$ " (Obs. to July 27 only incl.)

X Cygni

Computation of epochs from 3 term formula given in Chandler's 3^d Cat. This complete formula used in obtaining phases for Vol. 49.

$$\begin{array}{r} 2365136.500 \\ 49534.440 \\ \hline \end{array}$$

$$\begin{array}{r} 2414670.940 \\ +111.634 \\ \hline \end{array}$$

$$\begin{array}{r} 2414782.574 \\ +7.725 \\ \hline \end{array}$$

$$\text{ep. } 122 = 2414790.299$$

$$\begin{array}{r} 406.02 \\ 122. \\ \hline \end{array}$$

$$\begin{array}{r} 2120K \\ 2120K \\ \hline \end{array}$$

$$\begin{array}{r} 40602 \\ 49534.44 \\ \hline \end{array}$$

$$\text{Log. } 122 = 2.02636$$

$$\text{" } [u]^2 = 4.17272$$

$$\text{" } .0075 = 7.27506$$

$$111.634 = 2.04772$$

$$\begin{array}{r} 122. \\ \sqrt{} \\ \hline 610. \\ 272. \\ \hline 222 \\ 720 \\ \hline 162. \end{array}$$

$$\text{Log. sin } 162^\circ = +9.42992$$

$$\text{" } 25. = +1.39794$$

$$+7.725 = +0.22792$$

X Cygni.

117

$$\begin{array}{r}
 236^{\circ}136.500 \\
 49940.468 \\
 \hline
 2415076.968 \\
 +113.469 \\
 \hline
 2415190.437 \\
 +5.624 \\
 \hline
 2415196.061
 \end{array}$$

Sp. 123 =

$$\begin{array}{r}
 +406.02 \\
 123. \\
 \hline
 121206 \\
 21204 \\
 40602 \\
 \hline
 49940.468
 \end{array}$$

$$\begin{array}{l}
 \text{Ly. } 123. = 2.02991'' \\
 \text{" (ii) } = +4.17922'' \\
 \text{" .0075 } = +2.27506'' \\
 113.4692 + 2.05422''
 \end{array}$$

$$\begin{array}{r}
 123. \\
 5. \\
 \hline
 615. \\
 272. \\
 \hline
 227. \\
 720. \\
 \hline
 167.
 \end{array}$$

$$\begin{array}{l}
 \text{Ly. eni. } 167' = +9.35209'' \\
 \text{" } 25. = +1.39794'' \\
 +5.624 = +0.75003''
 \end{array}$$

2 Hercules.

Times of min. from Hartweg's Ephemeris,
about the first of each month in 1901.

<u>1901.</u>	<u>Gr. m. J.</u>	
Jan. 1.	4	40.1
Feb. 2.	3	16.4
Mar. 2.	2	3.2
Apr. 3.	0	39.5
May 0.	23	26.3
June 1.	22	2.6
July 3.	20	34.9
Aug. 0.	19	25.7
Sept. 1.	12	2.0
Oct. 3.	16	34.3
Nov. 0.	15	25.1
Dec. 2.	14	1.4

X Cygni. Computation of times
of maxima from formula in Chandler's 3^d Cat.
(For Ep. 117.)

$$406.02 \times 117 =$$

$$\begin{array}{r} 2365136.500 \\ 47504.340 \\ \hline \end{array}$$

$$2412640.840$$

$$102.667$$

$$17.050$$

$$\text{Comp. T. 117}^{\text{th}} \text{ max.} = \underline{2412760.557}$$

$$(117)^2 = 13649$$

$$\text{Log. } 13649 = 4.13637$$

$$+ .0075 = 4.14387$$

$$102.667 = 2.01143$$

$$v^0 \times 117 = v^0 v^1$$

$$\begin{array}{r} 272. \\ 257 \\ \hline 220 \\ 137^0 \end{array}$$

$$\text{Log sin } 137^0 = +9.43374$$

$$+ 25. = +1.39794$$

$$+ 17.050 = +1.23172$$

(For Ep. 112.)

$$406.02 \times 112 =$$

$$\begin{array}{r} 2365136.500 \\ 47910.360 \\ \hline \end{array}$$

$$2413046.860$$

$$+ 104.429$$

$$+ 15.391$$

$$\text{Comp. T. 112}^{\text{th}} \text{ max.} = \underline{2413166.680}$$

$$112^2 = 12544$$

$$\text{Log } 12544 = 4.14376$$

$$+ .0075 = 4.15126$$

$$+ 104.429 = 2.01622$$

$$\text{Log sin } 142^0 = +9.78934$$

$$+ 25. = +1.39794$$

$$+ 15.391 = +1.12722$$

χ Cygni.

(For Ep. 119)

$$\begin{array}{r}
 119 \times 406.02 \\
 2365136.500'' \\
 = 48316.300'' \\
 + 106.207'' \\
 \underline{13.616''} \\
 \text{Comp. J. 119 max.} = 2413572.703''
 \end{array}$$

$$119^2 = 14161''$$

$$\begin{array}{r}
 \text{Log } 14161. = +4.15109'' \\
 \text{" } .0075 = +7.27506'' \\
 \underline{106.207} = +2.02615''
 \end{array}$$

$$\begin{array}{r}
 \text{Log sin } (K) = +9.73611'' \\
 \text{" } 25. = +1.39794'' \\
 \underline{+13.616} = +1.13405''
 \end{array}$$

For Ep. 116.

$$\begin{array}{r}
 116 \times 406.02 \\
 2365136.500'' \\
 = 47092.320'' \\
 \underline{2412234.820''} \\
 + 100.921''
 \end{array}$$

$$116^2 = 13456''$$

$$\begin{array}{r}
 \text{Comp. J. 116}^{\frac{1}{2}} \text{ max.} = 2412354.319'' \\
 \underline{+12.572''} \\
 \text{Log } 13456. = +4.12892'' \\
 \text{" } .0075 = +7.27506'' \\
 \underline{+100.921''} = +2.00392''
 \end{array}$$

$$\begin{array}{r}
 \text{Log sin } 132^\circ = +9.27107'' \\
 \text{" } 25. = +1.39794'' \\
 \underline{+12.572''} = +1.26901''
 \end{array}$$

$\propto \text{Egri.}$

(For Epoch 124.)

$$\begin{array}{r} 2365136.500'' \\ +50346.420'' \\ +115.312'' \\ +3.479'' \\ \hline \end{array}$$

$$\text{Comp. J. 124 Ep.} = 2415601.777''$$

$$\begin{array}{r} \text{Log. 124} = 2.09342'' \\ \text{" } (124)^2 = 4.12644'' \\ \text{" } .0075 = 7.47506'' \\ 115.312'' = 2.06190'' \end{array}$$

(For Epoch 125.)

$$\begin{array}{r} 2365136.500'' \\ +50752.500'' \\ +117.126'' \\ +1.302'' \\ \hline \end{array}$$

$$\text{Comp. J. 125 Ep.} = 2416007.494''$$

$$\begin{array}{r} 124 \times 5 = 620'' \\ 620 + 272 = 892'' \\ 892 - 720 = 172'' \\ \text{Log sin } 172'' = +9.14356'' \\ \text{" } 25'' = +1.39794'' \\ +3.479'' = +0.54150'' \end{array}$$

$$\begin{array}{r} \text{Log. 125} = 2.09691'' \\ \text{" } 125^2 = 4.19322'' \\ \text{" } .0075 = 7.47506'' \\ +117.126'' = 2.06422'' \end{array}$$

$$\begin{array}{r} 125 \times 5 = 625'' \\ 625 + 272 = 897'' \\ 897 - 720 = 177'' \\ \text{Log sin } 177'' = +8.71220'' \\ \text{" } 25'' = +1.39794'' \\ +1.302'' = +0.11674'' \end{array}$$

γ Cancri. Computation of Longitude
+ Latitude Apr. 3, 1902, to check previous values.

$$R.A. (1900) = 2^h 32^m 16^s = 129^\circ 33' 30''$$

$$Dec. \quad = +19^\circ 23' 6''$$

$$\log \sin \delta = +9.54673$$

$$\log \sin t = +9.82699$$

$$\log \sin \epsilon = +9.65974$$

$$\delta = +24^\circ 24'$$

$$\epsilon = +23 \quad 27$$

$$\delta - \epsilon = +1 \quad 1$$

$$\log \cos (\delta - \epsilon) = +9.99993$$

$$\log \sin t = +0.02247$$

$$= 0.02240^\circ$$

$$\log \cos \delta = +9.95914^\circ$$

$$\delta = 126^\circ 57' = 0.12366$$

$$\log \sin \delta = +9.90263^\circ$$

$$\log \sin (\delta - \epsilon) = +9.24910$$

$$\log \sin \beta = +9.15173^\circ$$

$$\beta = +0^\circ 49'$$

$$\log \cos (\delta - \epsilon) = +9.99993$$

$$\log \cos \delta = +9.95914$$

$$\log \text{Fraction} = +0.04079$$

$$\log \cos \beta = +9.99996$$

$$\log \sin \delta = +9.90263$$

$$\text{Sum} = +9.90259$$

$$\log \cos \delta = +9.97461$$

$$\log \sin t = +9.82699$$

$$\text{Sum} = +9.80160$$

$$\log \text{Check} = +0.04099^\circ$$

U Cephei: Computations of Longitude
 + Latitude Apr. 3, 1902, to check previous values.

$$R.A. = 0^h 53^m 23^s = 13^\circ 20' 45''$$

$$\Delta L = +41^\circ 20' 2''$$

$$\begin{array}{r} +0.21694 \\ +9.36342 \\ \hline = +1.45352 \end{array}$$

$$A = 27 \ 59$$

$$C = 23 \ 27$$

$$A-C = 64 \ 32$$

$$\begin{array}{r} +9.63345 \\ +9.37532 \\ +9.00277 \\ +2.54642 \\ \hline \end{array}$$

$$A=70^\circ 52' = +0.46235$$

$$\begin{array}{r} +9.97552 \\ +0.32215 \\ \hline \end{array}$$

$$+0.29773$$

$$B = +63^\circ 16'$$

$$\begin{array}{r} +9.63345 \\ +2.54642 \\ \hline \end{array}$$

$$+1.02703$$

$$+9.65306$$

$$+9.97552$$

$$+9.62264''$$

$$+9.17207$$

$$+9.36342$$

$$+2.54149$$

$$+1.02715'' \text{ Check.}$$

I Herculis. Computation of Longitude + Latitude (to check) Apr. 4. 1902.

$$R.A. = 17^h 53^m 36.^s = 262^{\circ} 24' 0''$$

$$Dec. = +15^{\circ} 22'$$

$$\log \tan \delta = +9.43252$$

$$\log \sin \delta = +9.99923$$

$$\log \tan \epsilon = +9.43275$$

$$\delta = -9^{\circ} 9'$$

$$\epsilon = 23 27$$

$$\delta - \epsilon = -32 36$$

$$\log \cos(\delta - \epsilon) = +9.92555$$

$$\log \tan \delta = +1.55329$$

$$= +1.47944$$

$$\log \cos \delta = +9.99444$$

$$\delta = 262^{\circ} 2' = +1.42500$$

$$\log \sin \delta = +9.99977$$

$$\log \tan(\delta - \epsilon) = +9.40526$$

$$\log \tan \beta = +9.40563$$

$$\beta = +32^{\circ} 35'$$

$$\log \cos(\delta - \epsilon) = +9.92555$$

$$\log \cos \delta = +9.99444$$

$$\log \text{Fraction} = +9.93111$$

$$\log \cos \beta = +9.92563$$

$$\log \sin \delta = +9.99977$$

$$\text{Sum} = +9.92540$$

$$\log \cos \delta = +9.92464$$

$$\log \sin \delta = +9.99923$$

$$\text{Sum} = +9.92447$$

$$\log \text{Check} = 9.94093$$

Wrong.

$$-15^{\circ} 9'$$

$$23 27$$

$$-32 36$$

$$+9.29294$$

$$+1.55329$$

$$+1.44623$$

$$+9.92464$$

$$+1.46219 = 262^{\circ} 1'$$

$$+9.99974$$

$$+9.90216$$

$$+9.90190$$

$$\beta = 32^{\circ} 35'$$

$$+9.29294$$

$$+9.92464$$

$$+9.90230$$

$$+9.29304$$

$$+9.99974$$

$$+9.29274$$

$$+9.92464$$

$$+9.99923$$

$$+9.92447$$

$$+9.90231$$

R. Canis majoris. Computation of Long. + Lat. 125
(to check), Apr.-X. 1902.

$$R.A. = 7^h 14^m 56.^s = 10A^{\circ} 44' 0''$$

$$\text{Dec.} = -16^{\circ} 12'$$

$$\sim 9.46319$$

$$+9.97636$$

$$\sim 9.42623$$

$$\lambda = -17^{\circ} 3'$$

$$\epsilon = 23 27$$

$$\lambda - \epsilon = -40 30$$

$$+9.22105$$

$$\sim 0.46963$$

$$\sim 0.35062$$

$$+9.92042$$

$$\lambda = 113^{\circ} 6' = \sim 0.37020$$

$$+9.96370$$

$$\sim 9.93150$$

$$\sim 9.29520$$

$$\beta = -32^{\circ} 9' +$$

$$+9.22105$$

$$+9.92042$$

$$+9.90057$$

$$+9.29564$$

$$+9.96370$$

$$+9.25934$$

$$+9.92240$$

$$+9.97636$$

$$+9.95876$$

$$+9.90052$$

Check.

Mathews, Computation of Long. + Lat.
(to check). - Apr. 8. 1902.

$$R.A. = 9^h 25^m 56^s = 141^\circ 59' 0''$$

$$Dec. = -24^\circ 11'$$

$$\log \tan \delta = +9.72902$$

$$\text{" sin } \delta = +9.72950$$

$$\text{" tan } \delta = +9.93952$$

$$\delta = -41^\circ 11'$$

$$e = 23^\circ 27'$$

$$\delta - e = -64^\circ 20'$$

$$\text{" cos } (\delta - e) = +9.63451$$

$$\text{" tan } \delta = +9.29307$$

$$\text{Sum} = +9.52752$$

$$\text{" cos } \delta = +9.27767$$

$$\delta = 155^\circ 56' = +9.64991$$

$$\log \sin \delta = +9.61045$$

$$\text{" tan } (\delta - e) = +0.32025$$

$$\text{" tan } \beta = +9.93130$$

$$\beta = -40^\circ 29'$$

$$\text{" cos } (\delta - e) = +9.63451$$

$$\text{" cos } \delta = +9.27767$$

$$\text{" Fraction} = +9.75624$$

$$\text{" cos } \beta = +9.22115$$

$$\text{" sin } \delta = +9.61045$$

$$\text{Sum} = +9.49160$$

$$\text{" cos } \delta = +9.94519$$

$$\text{" sin } \delta = +9.72950$$

$$\text{Sum} = +9.73469$$

$$\text{" Check} = +9.75691$$

127

of Cygni. Computation of Longitude & Latitude
(to check). Apr. 4. 1902.

$$R.A. = 20^h 42^m 4^s = 312^\circ 1' 0." \quad \checkmark$$

$$Dec. = +34^\circ 17' \quad \checkmark$$

$$+9.23361 \quad \checkmark \checkmark$$

$$-9.92234 \quad \checkmark$$

$$-9.90527 \quad \checkmark$$

$$-32^\circ 42' \quad \checkmark$$

$$23 \ 27 \quad \checkmark$$

$$-62 \ 15 \quad \checkmark$$

$$+9.66203 \quad \checkmark$$

$$-0.04531 \quad \checkmark$$

$$-9.71334 \quad \checkmark$$

$$+9.29173 \quad \checkmark$$

$$\lambda = 326^\circ 27' = -9.22161 \quad \checkmark$$

$$-9.74246 \quad \checkmark$$

$$-0.27291 \quad \checkmark$$

$$+0.02137 \quad \checkmark$$

$$+46^\circ 25' \quad \checkmark$$

$$+9.66203 \quad \checkmark$$

$$+9.29173 \quad \checkmark$$

$$+9.77630 \quad \checkmark$$

$$+9.23242 \quad \checkmark$$

$$-9.74246 \quad \checkmark$$

$$-9.52094 \quad \checkmark$$

$$+9.91712 \quad \checkmark$$

$$-9.92234 \quad \checkmark$$

$$-9.24546 \quad \checkmark$$

$$+9.73542 \quad \checkmark$$

Wrong.

$$+9.23361 \quad \checkmark$$

$$-9.27096 \quad \checkmark$$

$$-9.96265 \quad \checkmark$$

$$-42^\circ 32' \quad \checkmark$$

$$23 \ 27 \quad \checkmark$$

$$-65 \ 59 \quad \checkmark$$

$$+9.60960 \quad \checkmark$$

$$-0.04531 \quad \checkmark$$

$$-9.65491 \quad \checkmark$$

$$+9.26740 \quad \checkmark$$

$$-9.72751 \quad \checkmark = \lambda = 322^\circ 29'$$

$$-9.71229 \quad \checkmark$$

$$-0.35102 \quad \checkmark$$

$$+0.06937 \quad \checkmark$$

$$\beta = +49^\circ 33' + \quad \checkmark$$

$$+9.60960 \quad \checkmark$$

$$+9.26740 \quad \checkmark$$

$$+9.74220 \quad \checkmark$$

$$+9.21210 \quad \checkmark$$

$$-9.71229 \quad \checkmark$$

$$-9.53039 \quad \checkmark$$

$$+9.91712 \quad \checkmark$$

$$-9.27096 \quad \checkmark$$

$$-9.72202 \quad \checkmark$$

$$+9.74231 \quad \checkmark = \text{by check.}$$

U Pegasi. Computation of Longitude & Latitude (to check). Apr. K. 1902.

$$R.A. = 23^{\circ} 2' 3'' = 352^{\circ} 13' 15''$$

$$Dec. = +15^{\circ} 24'$$

$$\log \tan \delta = +9.44004$$

$$\text{" sin } \delta = +9.49304$$

$$\text{" tan } \delta = +0.94700$$

$$\delta = -23^{\circ} 33'$$

$$\epsilon = 23^{\circ} 27'$$

$$\delta - \epsilon = -107^{\circ} 0'$$

$$\text{" cos } (\delta - \epsilon) = +9.46594$$

$$\text{" tan } \delta = +9.49325$$

$$\text{Sum} = +7.95919$$

$$\text{" cos } \delta = +9.05052$$

$$\delta = 4^{\circ} 34' = +9.90267$$

$$\log \sin \delta = +9.90730$$

$$\text{" tan } (\delta - \epsilon) = +0.51466$$

$$\text{" tan } \beta = +9.82196$$

$$\beta = +14^{\circ} 42'$$

$$\text{" cos } (\delta - \epsilon) = +9.46594$$

$$\text{" cos } \delta = +9.05052$$

$$\text{" Fraction} = +0.41542$$

$$\text{" cos } \beta = +9.92535$$

$$\text{" sin } \delta = +9.90730$$

$$\text{Sum} = +9.92265$$

$$\text{" cos } \delta = +9.92412$$

$$\text{" sin } \delta = +9.49304$$

$$\text{Sum} = +9.47716$$

$$\text{" Check} = +0.41549$$

129

Hells Variable. Computation of Longitude and Latitude (to check) Apr. 5. 1902.

$$R.A. = 20^h 33^m 32^s = 302^\circ 24' 30''$$

$$Dec. = +17^\circ 55' 2''$$

$$\log \tan \delta = +9.51005$$

$$\log \sin \delta = +9.29415$$

$$\log \tan \delta = +9.61590$$

$$\delta = -22^\circ 26'$$

$$\epsilon = 23^\circ 27'$$

$$\delta - \epsilon = -45^\circ 53'$$

$$\log \cos(\delta - \epsilon) = +9.24269$$

$$\log \tan \delta = +0.10095$$

$$\text{Sum} = +9.34364$$

$$\log \cos \delta = +9.96522$$

$$A = 316^\circ 22' = +9.97722$$

$$\log \sin A = +9.23202$$

$$\log \tan(\delta - \epsilon) = +0.01339$$

$$\log \tan \beta = +9.25147$$

$$\beta = +35^\circ 23'$$

$$\log \cos(\delta - \epsilon) = +9.24269$$

$$\log \cos \delta = +9.96522$$

$$\log \text{Fractoria} = +9.27627$$

$$\log \cos \beta = +9.91132$$

$$\log \sin A = +9.23202$$

$$\text{Sum} = +9.74940$$

$$\log \cos \delta = +9.97237$$

$$\log \sin \delta = +9.29415$$

$$\text{Sum} = +9.27252$$

$$\log \text{Check} = +9.27622$$

Recomputation of Light Equation for

U Cephei. U Cephei, with computed values of λ and β
 See p. 123 of this book for new values of λ and β .

$$\lambda = 71.0^\circ$$

$$\beta = +63.3^\circ$$

$$\log \beta = 9.6526$$

Date	Time Long.	Long. λ - 110	Log. cos. Col. 3	Log R	Log Final λ	Final λ
Jan. 0	279.2	151.2	~ 9.9451	9.9927	2.2225	+194
10	289.4	141.6	~ 9.2942	9.9927	2.2376	+173 -21 -6
20	299.5	131.5	~ 9.2213	9.9930	2.1650	+146 -27 -4
30	309.7	121.3	~ 9.7156	9.9935	2.0592	+115 -31 -4
Feb. 9	319.2	111.2	~ 9.5523	9.9942	1.9032	+20 -35 -2
19	329.9	101.1	~ 9.2245	9.9951	1.6303	+43 -37 -2
Mar. 1	340.0	91.0	~ 2.2419	9.9961	0.5227	+4 -39 0
11	350.0	81.0	+9.1943	9.9972	1.5422	-35 -39 +1
21	0.0	71.0	+9.5126	9.9984	1.2617	-73 -32 +3
31	9.2	61.2	+9.6222	9.9997	2.0332	-108 -35 +3
Apr. 10	19.6	51.4	+9.7951	0.0009	2.1467	-140 -32 +3
20	29.4	41.6	+9.2732	0.0022	2.2267	-169 -29 +6
30	39.2	31.2	+9.9294	0.0033	2.2234	-192 -23 +5
May 10	49.2	22.2	+9.9666	0.0043	2.3216	-210 -12 +6
20	59.5	12.5	+9.9296	0.0053	2.3456	-222 -5 +7
30	69.1	2.9	+9.9994	0.0060	2.3561	-227 +1 +6
June 9	77.6	353.4	+9.9971	0.0066	2.3544	-226 +7 +6
19	87.2	343.2	+9.9224	0.0070	2.3401	-219 +7 +7
29	96.7	334.3	+9.9542	0.0072	2.3127	-205 +14 +5
July 9	106.2	324.2	+9.9123	0.0072	2.2702	-186 +19 +5
19	115.2	315.2	+9.2510	0.0070	2.2027	-162 +24 +5
29	125.4	305.6	+9.7650	0.0066	2.1223	-133 +29 +4
Aug. 8	134.9	296.1	+9.6434	0.0060	2.0001	-100 +33 +3
18	144.5	286.5	+9.4533	0.0052	1.2092	-64 +36 +1
28	154.2	276.2	+9.0734	0.0043	1.4224	-27 +37 +1
Sept. 7	163.9	267.1	~ 2.7041	0.0032	1.0520	+11 +32 0
17	173.6	257.4	~ 9.3327	0.0021	1.6915	+49 +32 -2
27	183.4	247.6	~ 9.5210	0.0009	1.9326	+26 +32 -2

U Cygni. Light Equation (New)

131

Date.	Obs. Long.	Long. * - " 0	Log. cos Col. 3.	Log. R	Log. Final Lj.	Final Lj.
Oct. 7	193.2	237.2	9.7266	9.9996	2.0769	+119 +38 -2-3
17	203.2	227.2	9.2272	9.9924	2.1763	+150 +31 -5
27	213.1	217.9	9.2971	9.9972	2.2450	+176 +26 -5
Nov. 6	223.2	207.2	9.9467	9.9961	2.2935	+197 +21 -7
16	233.2	197.2	9.9727	9.9950	2.3244	+211 +14 -6
26	243.3	187.7	9.9961	9.9942	2.3410	+219 +2 -6-7
Dec. 6	253.5	177.5	9.9996	9.9935	2.3434	+222 +2 -6
16	263.6	167.4	9.9294	9.9930	2.3331	+215 -8 -6-7
26	273.2	157.2	9.9647	9.9927	2.3021	+203 -12

This is the new Table, derived from computed values of δ and β , instead of scaled values from maps. This table is to supplant the old table given in Book 9, p. 160. This table goes into current use Apr. 1st. 1902.

U. Sphincter. Computation of Longitude and Latitude (to check) Apr. 5. 1902.

$$R.A. = 17^h 11^m 27^s = 257^\circ 51' 45''$$

$$Dec = +1^\circ 19.3'$$

$$\log \tan \delta = +0.36143$$

$$\sin \delta = 0.99019$$

$$\tan \delta = 0.37124$$

$$\delta = -1^\circ 21'$$

$$\epsilon = 23^\circ 27'$$

$$\delta - \epsilon = -24^\circ 48'$$

$$\cos(\delta - \epsilon) = 0.90792$$

$$\tan \delta = 0.66754$$

$$\text{Sum} = 0.62556$$

$$\cos \delta = 0.99922$$

$$\lambda = 256^\circ 41' = 0.62562$$

$$\log \sin \lambda = 0.99927$$

$$\tan(\delta - \epsilon) = 0.66470$$

$$\tan \beta = 0.66397$$

$$\beta = 24^\circ 46'$$

$$\cos(\delta - \epsilon) = 0.90792$$

$$\cos \delta = 0.99922$$

$$\text{Fraction} = 0.95410$$

$$\cos \beta = 0.95210$$

$$\sin \lambda = 0.99927$$

$$\text{Sum} = 0.95737$$

$$\cos \delta = 0.99929$$

$$\sin \delta = 0.99019$$

$$\text{Sum} = 0.99002$$

$$\text{check} = 0.96729$$

$$0.92216$$

$$0.66470$$

$$0.65226$$

$$\beta = 24^\circ 13'$$

$$0.90792$$

$$0.99922$$

$$0.95410$$

$$0.96000$$

$$0.92216$$

$$0.94216$$

$$0.99929$$

$$0.99019$$

$$0.99002$$

$$0.95200$$

γ Librae. Computation of Longitude and Latitude (to check) Apr. 5. 1902.

$$R.A. = 18^h 55^m 32.^s = 223^\circ 54' 30''$$

$$Dec. = -2^\circ 7.3'$$

$$+9.15417$$

$$+9.24092$$

$$+9.31319$$

$$+11^\circ 37'$$

$$23 \ 27$$

$$-11 \ 50$$

$$+9.99067$$

$$+9.92332$$

$$+9.97399$$

$$+9.99101$$

$$\lambda = 223^\circ 53' = +9.92292$$

$$+9.24025$$

$$+9.32122$$

$$+9.16207$$

$$\beta = +2^\circ 16'$$

$$+9.99067$$

$$+9.99101$$

$$+9.99966$$

$$+9.99546$$

$$+9.24025$$

$$+9.23631$$

$$+9.99563$$

$$+9.24092$$

$$+9.23661$$

$$+9.99970$$

α Tauri, Computation of Longitude and Latitude (to check) Apr. 7. 1902.

$$R. A. = 3^h 55^m 25^s = 54^{\circ} 47' 0''$$

$$Dec. = +12^{\circ} 12' 5''$$

$$\log \tan \delta = +9.33427''$$

$$\text{" sin } \delta = +9.93207''$$

$$\text{" tan } \delta = +9.80240''$$

$$\delta = +14^{\circ} 11''$$

$$\epsilon = +23^{\circ} 27''$$

$$\delta - \epsilon = -9^{\circ} 16''$$

$$\text{" cos } \delta - \epsilon = +9.99429''$$

$$\text{" tan } \delta = +0.21751''$$

$$\text{Sum} = +0.21180''$$

$$\text{" cos } \delta = +9.94656''$$

$$\delta = 59^{\circ} 14' = +0.22524''$$

$$\log \sin \delta = +9.93412''$$

$$\text{" tan } (\delta - \epsilon) = +9.21261''$$

$$\text{" tan } \beta = +9.14673''$$

$$\beta = -7^{\circ} 59'$$

$$\text{" cos } (\delta - \epsilon) = +9.99429''$$

$$\text{" cos } \delta = +9.94656''$$

$$\text{" Fraction} = +0.00773''$$

$$\text{" cos } \beta = +9.99577''$$

$$\text{" sin } \delta = +9.93412''$$

$$\text{Sum} = +9.92929''$$

$$\text{" cos } \delta = +9.99002''$$

$$\text{" sin } \epsilon = +9.93207''$$

$$\text{Sum} = +9.92215''$$

$$\text{" Check} = +0.00774''$$

Massiv 5. Computation of Longitude and Latitude (to check). Apr. 10. 1902.

$$R.A. = 15^h 13^m 29^s = 224^\circ 22' 15''$$

$$\text{Dec.} = +2^\circ 26' 2''$$

$$+0.63131''$$

$$-9.27356''$$

$$-4.75775''$$

$$\Delta = -3^\circ 17' 1''$$

$$\epsilon = 23^\circ 27'$$

$$(\Delta - \epsilon) = -26^\circ 44''$$

$$+9.95090''$$

$$+0.05116''$$

$$+0.00206''$$

$$+9.99929''$$

$$\Delta = 225^\circ 11' = +0.00277''$$

$$-9.25027''$$

$$-9.70215''$$

$$+9.55302''$$

$$B = +19^\circ 40' 1''$$

$$+9.95090''$$

$$+9.99929''$$

$$+9.95161''$$

$$+9.97390''$$

$$-9.25027''$$

$$-9.22477''$$

$$+9.99960''$$

$$-9.27356''$$

$$-9.27316''$$

$$+9.95161''$$

Masses 3. Computation of Longitude and Latitude (to check.) Apr. 10. 1902.

$$R.A. = 13^h 37^m 35^s = 204^\circ 23' 45''$$

$$Dec. = +24^\circ 52' 9''$$

$$\log \tan \delta = +9.74166''$$

$$\log \sin \delta = +9.61606''$$

$$\log \tan \delta = +0.12560''$$

$$\delta = -53^\circ 10'$$

$$L = 23 27''$$

$$(L - \delta) = -76 37''$$

$$\log \cos (L - \delta) = +9.36449''$$

$$\log \tan \delta = +9.65669''$$

$$\text{Sum} = +9.02112''$$

$$\log \cos \delta = +9.77772''$$

$$\delta = 190^\circ 10' = +9.25340''$$

$$\log \sin \delta = +9.24677''$$

$$\log \tan (L - \delta) = +0.62356''$$

$$\log \tan \delta = +9.47033''$$

$$\beta = +36^\circ 34'$$

$$\log \cos (L - \delta) = +9.36449''$$

$$\log \cos \delta = +9.77772''$$

$$\log \text{Fraction} = +9.52671''$$

$$\log \cos \beta = +9.90220''$$

$$\log \sin \delta = +9.24677''$$

$$\text{Sum} = +9.15157''$$

$$\log \cos \delta = +9.94231''$$

$$\log \sin \delta = +9.61606''$$

$$\text{Sum} = +9.55237''$$

$$\text{check} = +9.59320''$$

$$+9.24340'' = 129^\circ 56' = \lambda$$

$$\log \sin \delta = +9.23679''$$

$$\log \tan \delta = +0.62356''$$

$$+9.26035''$$

$$\beta = +35^\circ 57'$$

$$+9.36449''$$

$$+9.77772''$$

$$+9.52671''$$

$$+9.90223''$$

$$\log \sin \delta = +9.23679''$$

$$\log \cos \delta = +9.15157''$$

$$+9.94231''$$

$$\log \sin \delta = +9.61606''$$

$$\log \cos \delta = +9.55237''$$

$$+9.52665''$$

w Centauri. Computation of Longitude and
Latitude (to check). Apr. 10. 1902.

137

$$R.A. = 13^h 20^m 46.^s = 200^\circ 11' 30''$$

$$Dec. = -46^\circ 47' 4''$$

$$= +0.02705''$$

$$= +9.53402''$$

$$= +0.44903''$$

$$d = +72^\circ 2'$$

$$e = +23 27''$$

$$d - e = +48 35''$$

$$= +9.22055''$$

$$= +9.56557''$$

$$\text{Sum } +9.32612''$$

$$= +9.44920''$$

$$z = 212^\circ 16' = +9.29692''$$

$$= +9.79192''$$

$$= +0.05446''$$

$$= +9.24632''$$

$$p = -35^\circ 41'$$

$$= +9.22055''$$

$$= +9.44920''$$

$$+0.33135''$$

$$= +9.91301''$$

$$= +9.79192''$$

$$= +9.70493''$$

$$+9.23542''$$

$$= +9.53402''$$

$$= +9.37350''$$

$$+0.33143''$$

+43° 41' 01"Photographic Variable.

U 2 Cygni.

$$R.A. = 21^h 55.2^m (1900) = 32^\circ 44' 0''$$

$$Dec. = +43^\circ 52'$$

$$\log \tan \delta = +9.92221$$

$$\text{" sin } \delta = \underline{+9.71435}$$

$$\text{" tan } \delta = \underline{+0.26246}$$

$$\delta = -61^\circ 41'$$

$$\epsilon = \underline{23 \ 27}$$

$$(\delta - \epsilon) = \underline{-25^\circ 14'}$$

$$\text{" cos } (\delta - \epsilon) = +9.92259$$

$$\text{" tan } \delta = \underline{+9.72220}$$

$$\text{Sum} = \underline{+9.71079}$$

$$\text{" cos } \delta = +9.67609$$

$$\delta = 353^\circ 49' = \underline{+9.03470}$$

$$\log \sin \delta = \underline{+9.03226}$$

$$\text{" tan } (\delta - \epsilon) = \underline{+1.06924}$$

$$\text{" tan } \beta = \underline{+0.10210}$$

$$\beta = \underline{+51^\circ 40'}$$

$$\text{" cos } (\delta - \epsilon) = +9.92259$$

$$\text{" " } \delta = +9.67609$$

$$\text{" Fraction} = \underline{+9.25250}$$

$$\text{" cos } \beta = +9.79256$$

$$\text{" sin } \delta = \underline{+9.03226}$$

$$\text{Sum} = \underline{+9.22422}$$

$$\text{" cos } \delta = +9.25791$$

$$\text{" sin } \delta = \underline{+9.71435}$$

$$\text{Sum} = \underline{+9.57226}$$

$$\text{" check} = \underline{+9.25256}$$

$$A. A. = 19^h 14^m 26." \quad (1900) = 22^h 36' 30." \quad \checkmark$$

$$Dec. = +19^\circ 25' 4"$$

$$\log \tan \delta = +9.54730 \quad \checkmark$$

$$\text{" sin } t = \underline{\underline{+9.97662 \quad \checkmark}}$$

$$\text{" tan } t = \underline{\underline{+9.57062 \quad \checkmark}}$$

$$t = -20^\circ 25' \quad \checkmark$$

$$L = \underline{\underline{23 \quad 27 \quad \checkmark}}$$

$$t - L = \underline{\underline{-43 \quad 52 \quad \checkmark}}$$

$$\text{" cos } (t - L) = +9.25791 \quad \checkmark$$

$$\text{" tan } t = \underline{\underline{+0.47276 \quad \checkmark}}$$

$$\text{Sum} = \underline{\underline{+0.33067 \quad \checkmark}}$$

$$\text{" cos } t = \underline{\underline{+9.97122 \quad \checkmark}}$$

$$\lambda = 293^\circ 32' = \underline{\underline{+0.35225 \quad \checkmark}}$$

$$\log \sin \lambda = \underline{\underline{+9.96196 \quad \checkmark}}$$

$$\text{" tan } (t - L) = \underline{\underline{+9.92201 \quad \checkmark}}$$

$$\text{" tan } \beta = \underline{\underline{+9.94477 \quad \checkmark}}$$

$$\beta = \underline{\underline{+41^\circ 22' \quad \checkmark}}$$

$$\text{" cos } (t - L) = +9.25791 \quad \checkmark$$

$$\text{" " } t = \underline{\underline{+9.97122 \quad \checkmark}}$$

$$\text{" Fraction} = \underline{\underline{+9.22609 \quad \checkmark}}$$

$$\text{" cos } \beta = \underline{\underline{+9.27535 \quad \checkmark}}$$

$$\text{" sin } \lambda = \underline{\underline{+9.96196 \quad \checkmark}}$$

$$\text{Sum} = \underline{\underline{+9.23731 \quad \checkmark}}$$

$$\text{" cos } \delta = \underline{\underline{+9.97455 \quad \checkmark}}$$

$$\text{" sin } t = \underline{\underline{+9.97662 \quad \checkmark}}$$

$$\text{Sum} = \underline{\underline{+9.95123 \quad \checkmark}}$$

$$\text{" check} = \underline{\underline{+9.22609 \quad \checkmark \quad \checkmark}}$$

$$\lambda = 353.4$$

$$\beta = +1.7$$

+43° 4101 (Photo. Var.) Computation of Light Equation for
+43° 4101, with computed values of λ and β .

Date	Long.	Lat. \odot - " *	Log. cos. col. 3.	Log. R.	Log. Final Ly.	Final Ly.
Jan. 6	279.2	225.4	+9.42476	9.9927	+1.9072	-21
10	289.4	295.6	+9.63507	9.9927	+2.1126	-131
20	299.5	305.7	+9.76647	9.9930	+2.2494	-172
30	309.7	315.9	+9.25622	9.9935	+2.3400	-219
Feb. 9	319.2	326.0	+9.91257	9.9942	+2.4031	-253
19	329.9	336.1	+9.96107	9.9951	+2.4465	-280
Mar. 1	340.0	346.2	+9.92722	9.9961	+2.4737	-292
11	350.0	356.2	+9.99904	9.9972	+2.4265	-307
21	0.0	6.2	+9.99745	9.9984	+2.4261	-306
31	9.2	16.0	+9.92222	9.9997	+2.4722	-297
Apr. 10	19.6	25.2	+9.95442	0.0009	+2.4456	-279
20	29.4	35.6	+9.91014	0.0022	+2.4026	-253
30	39.2	45.4	+9.84642	0.0033	+2.3400	-219
May 10	49.2	55.0	+9.75279	0.0043	+2.2532	-179
20	59.5	64.7	+9.63077	0.0053	+2.1264	-134
30	69.1	74.3	+9.43232	0.0060	+1.9226	-85
June 9	77.6	83.2	+9.03342	0.0066	+1.5303	-34
19	87.2	93.4	+8.77312	0.0070	+1.2704	+19
29	96.7	102.9	+9.34479	0.0072	+1.4463	+70
July 9	106.2	112.4	+9.52107	0.0072	+2.0725	+120
19	115.2	122.0	+9.72427	0.0070	+2.2215	+167
29	125.4	131.6	+9.82212	0.0066	+2.3190	+202
Aug. 2	134.9	141.1	+9.29112	0.0060	+2.3274	+244
12	144.5	150.7	+9.94055	0.0052	+2.4361	+273
22	154.2	160.4	+9.97402	0.0043	+2.4627	+294
Sept. 7	163.9	170.1	+9.99342	0.0032	+2.4270	+307
17	173.6	179.2	+0.00002	0.0021	+2.4924	+311
27	183.4	189.6	+9.99322	0.0009	+2.4256	+306

+43° 4101 (Phot. Var.) Computation of Light Equation for
+43° 4101, with computed values of λ and β .

Date.	Sun's Long.	Long. \odot - " *	Log. cos. col. 3,	Log R	Log. Final λ	Final λ	
Oct. 7	193.2	199.4	9.9746X	9.9996	+2.4645	+291	-15 -10
17	203.2	209.4	9.94012	9.9984	+2.4222	+262	-23 -2
27	213.1	219.3	9.8826X	9.9972	+2.3761	+232	-30 -7
Nov. 6	223.2	229.4	9.81342	9.9961	+2.2992	+199	-39 -9
16	233.2	239.4	9.7067X	9.9950	+2.1920	+156	-43 -4
26	243.3	249.5	9.54433	9.9942	+2.0222	+107	-49 -6
Dec. 6	253.5	259.7	9.25237	9.9935	+1.7362	+54	-53 -4
16	263.6	269.8	7.5429X	9.9930	+0.0262	+1	-53 0
26	273.2	280.0	9.23987	9.9927	+1.7227	-53	-54 51

42

$$\lambda = 293.6''$$

$$\beta = +41.4''$$

U Sagittae (Schwab's Var.)

$\mu_{\alpha} = 2.6941''$
 $\mu_{\delta} = 9.2751''$
 $\mu_{\alpha} = 2.5732''$

Computation of Light Equation for *U Sagittae*,
 with computed values of λ and β .

Date	Days Long.	Long. @ - ... *	Log cos col. 3	Log R	Log Final Ly.	Final Ly.
Jan. 6	279.2	345.6 + 9.9461	9.9927	2.5520	-356	-11
10	289.4	355.2 + 9.9922	9.9927	2.5647	-367	+12
20	299.5	5.9 + 9.9977	9.9930	2.5689	-366	+11
30	309.7	16.1 + 9.9426	9.9935	2.5493	-354	+12
Feb. 9	319.2	26.2 + 9.9529	9.9942	2.5203	-331	+23
19	329.9	36.3 + 9.9063	9.9951	2.4746	-292	+33
Mar. 1	340.0	46.4 + 9.2326	9.9961	2.4079	-256	+42
11	350.0	56.4 + 9.7430	9.9972	2.3134	-206	+50
21	0.0	66.4 + 9.6024	9.9984	2.1740	-149	+57
31	9.2	76.2 + 9.3776	9.9997	1.9545	-29	+60
Apr. 10	19.6	86.0 + 2.2436	0.0009	1.4177	-26	+63
20	29.4	95.2 + 9.0046	0.0022	1.5400	+32	+64
30	39.2	105.6 + 9.4296	0.0033	2.0061	+101	+63
May 10	49.2	115.2 + 9.6292	0.0043	2.2067	+161	+60
20	59.5	124.9 + 9.7575	0.0053	2.3360	+217	+56
30	69.1	134.5 + 9.2457	0.0060	2.4249	+266	+49
June 9	79.6	144.0 + 9.9020	0.0066	2.4272	+307	+41
19	89.2	153.6 + 9.9522	0.0070	2.5324	+341	+34
29	96.7	163.1 + 9.9202	0.0072	2.5612	+364	+23
July 9	106.2	172.6 + 9.9964	0.0072	2.5762	+377	+13
19	115.2	182.2 + 9.9997	0.0070	2.5799	+380	+3
29	125.4	191.2 + 9.9907	0.0066	2.5705	+372	+12
Aug. 8	134.9	201.3 + 9.9693	0.0060	2.5425	+354	+12
18	144.5	210.9 + 9.9335	0.0052	2.5119	+325	+29
28	154.2	220.6 + 9.2204	0.0043	2.4579	+287	+32
Sept. 7	163.9	230.3 + 9.2053	0.0032	2.3217	+241	+46
17	173.6	240.0 + 9.6990	0.0021	2.2743	+182	+53
27	183.0	249.2 + 9.5322	0.0009	2.1123	+130	+58

U Sagittae. (Schroter's Var.)

143

Computation of Light Equation for U Sagittae,
with computed values of λ and β .

Date.	Line's Long.	Long. 0 - " *	Log cos. col. 3.	Log. R.	Log. Final λ	Final λ	
Oct. 7	193.2	259.6	~ 9.2565	9.9996	+1.8293	+62	-62 -4
17	203.2	269.6	~ 7.8439	9.9984	+0.4155	+3	-65 -3
27	213.1	279.5	+9.2176	9.9972	~ 1.7220	-61	-64 +1
Nov. 6	223.2	289.6	+9.5256	9.9961	~ 2.0949	-124	-63 +4
16	233.2	299.6	+9.6937	9.9950	~ 2.2619	-123	-59 +6
26	243.3	309.7	+9.8053	9.9942	~ 2.3727	-236	-53 +7
Dec. 6	253.5	319.9	+9.8236	9.9935	~ 2.4503	-222	-46 +9
16	263.6	330.0	+9.9375	9.9930	~ 2.5037	-319	-37 +10
26	273.2	340.2	+9.9735	9.9927	~ 2.5394	-346	-27

72. 1901 Cygni. Williams (Var.)
W W Cygni.

$$R. A. = 20^h 19^m 36.^s = 304^\circ 54'$$

$$Dec. = +42^\circ 55'$$

$$\log \tan \delta = +9.96239^v$$

$$" \sin \delta = +9.91329^v$$

$$" \tan \delta = +0.05450^v$$

$$\delta = -42^\circ 35'$$

$$\epsilon = 23^\circ 27'$$

$$\delta - \epsilon = -72^\circ 2'$$

$$" \cos (\delta - \epsilon) = +9.42920^v$$

$$" \tan \delta = +0.15639^v$$

$$\text{Sum} = +9.64559^v$$

$$" \cos \delta = +9.22055^v$$

$$\delta = 326^\circ 14' = +9.22504^v$$

$$\log \sin \delta = +9.74493^v$$

$$" \tan (\delta - \epsilon) = +0.42902^v$$

$$" \tan \beta = +0.23401^v$$

$$\beta = +59^\circ 44'$$

$$" \cos \delta - \epsilon = +9.42920^v$$

$$" \cos \delta = +9.22055^v$$

$$" \text{Fraction} = +9.66265^v$$

$$" \cos \beta = +9.70245^v$$

$$" \sin \delta = +9.74493^v$$

$$\text{Sum} = +9.44732^v$$

$$" \cos \delta = +9.26472^v$$

$$" \sin \delta = +9.91329^v$$

$$\text{Sum} = +9.77461^v$$

$$" \text{check} = +9.66277^v$$

$$\lambda = 326.2^{\circ}$$

$$\beta = +59.7^{\circ}$$

U H Cygni.

72.1901 Cygni. Williams Var.

$$\log 499. = 2.6981^{\circ}$$

$$\cos \beta = 9.7029^{\circ}$$

$$2.4010^{\circ}$$

Computation of Light Equation for U H Cygni
with computed values of λ and β .

Date.	Days Long.	Long 0 - " *	Log. cos. Col. 3.	Log R	Log Final 2y.	Final 2y.	
Jan. 0	279.2	313.0	+9.2332	9.9927	2.2275	-169	-29
10	229.4	323.2	+9.9035	9.9927	2.2972	-192	+6
20	299.5	333.3	+9.9510	9.9930	2.3450	-221	+6
30	309.7	343.5	+9.9817	9.9935	2.3762	-232	+2
Feb. 9	319.2	353.6	+9.9973	9.9942	2.3925	-247	+2
19	329.9	3.7	+9.9991	9.9951	2.3952	-242	+7
Mar. 1	340.0	13.2	+9.9273	9.9961	2.3244	-242	+7
11	350.0	23.2	+9.9614	9.9972	2.3596	-229	+13
21	0.0	33.2	+9.9196	9.9984	2.3190	-202	+2
31	9.2	43.6	+9.2592	9.9997	2.2605	-122	+2
Apr. 10	19.6	53.4	+9.7754	0.0009	2.1773	-150	+32
20	29.4	63.2	+9.6541	0.0022	2.0573	-114	+36
30	39.2	73.0	+9.4659	0.0033	1.8702	-74	+39
May 10	49.2	82.6	+9.1099	0.0043	1.5152	-33	+42
20	59.5	92.3	+9.6035	0.0053	1.0092	+10	+43
30	69.1	101.9	+9.3143	0.0060	1.7213	+53	+43
June 9	79.6	111.4	+9.5622	0.0066	1.9692	+93	+40
19	89.2	121.0	+9.7112	0.0070	2.1192	+132	+39
29	98.7	130.5	+9.8125	0.0072	2.2207	+166	+37
July 9	106.2	140.0	+9.2242	0.0072	2.2924	+196	+30
19	115.2	149.6	+9.9352	0.0070	2.3432	+221	+25
29	125.4	159.2	+9.9707	0.0066	2.3723	+239	+12
Aug. 2	134.9	162.7	+9.9915	0.0060	2.3925	+250	+11
12	144.5	172.3	+9.9992	0.0052	2.4060	+255	+5
22	154.2	182.0	+9.9952	0.0043	2.4011	+252	-3
Sept. 7	163.9	197.7	+9.9729	0.0032	2.3231	+242	-10
17	173.6	207.4	+9.9423	0.0021	2.3514	+225	-17
27	183.5	217.2	+9.9012	0.0009	2.3031	+201	-24

U & Cygni.
72.1901 Cygni. Williams Var.

147

Computation of Light Equation for U & Cygni
with computed values of k and β .

Date.	Star's Long.	Long. 0 - " *	Log. cos. Col. 3.	Log. R.	Log. Final L.	Final L.	
Oct. 7	193.2	227.0	n 9.2332	9.9996	2.2344 + 172	-29	-6
17	203.2	237.0	n 9.7361	9.9984	2.1355 + 137	-35	-4
27	213.1	246.9	n 9.5937	9.9972	1.9919 + 92	-39	-3
Nov. 6	223.2	257.0	n 9.3521	9.9961	1.7492 + 56	-42	-1
16	233.2	267.0	n 2.7122	9.9950	1.1142 + 13	-43	-1
26	243.3	277.1	+ 9.0920	9.9942	1.4272 - 31	-44	+1
Dec. 6	253.5	287.3	+ 9.4733	9.9935	1.2672 - 74	-43	+3
16	263.6	297.4	+ 9.6630	9.9930	2.0570 - 114	-40	+3
26	273.2	307.6	+ 9.7254	9.9927	2.1791 - 151	-37	

Messer 15.

R. A.	$21^h 27^m 6.^s \quad = 321^\circ 16.' \quad \checkmark$
Dec.	$+11^\circ 43.0' \quad \checkmark$
$\log \tan \delta$	$+9.31679 \quad \checkmark$
" $\sin \delta$	$\approx 9.79622 \quad \checkmark$
" $\tan \delta$	$\approx 9.52051 \quad \checkmark$
δ	$-12^\circ 20.5' \quad \checkmark$
ϵ	$23 \quad 27.1 \quad \checkmark$
$\delta - \epsilon$	$-41 \quad 47.6 \quad \checkmark$
" $\cos(\delta - \epsilon)$	$+9.87242 \quad \checkmark$
" $\tan \delta$	$\approx 9.90410 \quad \checkmark$
Sum	$\approx 9.77652 \quad \checkmark$
" $\cos \delta$	$+9.97736 \quad \checkmark$
$\delta = 327^\circ 47.6' \approx$	$\approx 9.79922 \quad \checkmark$
$\log \sin \delta$	$\approx 9.72667 \quad \checkmark$
" $\tan(\delta - \epsilon)$	$\approx 9.95129 \quad \checkmark$
" $\tan \beta$	$+9.67796 \quad \checkmark$
$\beta =$	$+25^\circ 22.3' \quad \checkmark$
" $\cos(\delta - \epsilon)$	$+9.87242 \quad \checkmark$
" " δ	$+9.97736 \quad \checkmark$
" Fraction	$+9.89512 \quad \checkmark$
" $\cos \beta$	$+9.95559 \quad \checkmark$
" $\sin \delta$	$\approx 9.72667 \quad \checkmark$
Sum	$\approx 9.62226 \quad \checkmark$
" $\cos \delta$	$+9.99026 \quad \checkmark$
" $\sin \delta$	$\approx 9.79622 \quad \checkmark$
Sum	$\approx 9.72714 \quad \checkmark$
" check	$9.89512 \quad \checkmark$

I Andromedae

Formula

$$\text{Period} = 2398587.0 + 281.0 E$$

Ep 50	241 2637.0
51	2918.0
Ep. 52	= 241 3199.0
53	3480.0
54	3761.0
55	4042.0
56	4323.0
57	4604.0
58	4885.0
59	5166.0
60	5447.0
61	5728.0
62	6009.0

22 Sagittae Ebeli Formula.
 AM. 158, 32.

$241\ 5690.276 + 3.380674\ E.$

Epoch.	g. m. t.	Jul. Day Min.
100	241	6028.343400"
		6031.724074"
		6035.104748"
		6038.485422"
		6041.866026"
		6045.246770"
		6048.627444"
		6052.008118"
		6055.388792"
		6058.769466"
110		6062.150140"
		6065.530814"
		6068.911488"
		6072.292162"
		6075.672836"
		6079.053510"
		6082.434184"
		6085.814858"
		6089.195532"
		6092.576206"
120		6095.956880"
		6099.337554"
		6102.718238"
		6106.098902"
		6109.479586"
125		6112.8602650"

(The above formula was the one finally used to obtain final epochs and phases as used for printing.)

54

$$\lambda = 327^{\circ} 47.2'$$

$$\beta = +25^{\circ} 24.3'$$

Massier 15.

Computation of Light Equation for Massier 15

$$\mu. 499. = 2.6941''$$

$$\cos \beta =$$

56

$$\alpha = 327^\circ 47.2'$$

$$\beta = +25^\circ 24.3'$$

Messer 15.

Computation of Light Equation for Messier 15,
with computed values of α and β .

Date.	Time Long.	Lat. 0- * -	Log. cos. Col. 3.	Log R	Log Final Ly.	Final Ly.	
Jan. 0.	279.2	311.4	+9.82041	9.99270	2.46620	-293	
10.	289.4	321.6	+9.89415	9.99270	2.54054	-347	-54 +11
20.	299.5	331.7	+9.94472	9.99300	2.59141	-390	-43 +11
30.	309.7	341.9	+9.97796	9.99350	2.62515	-422	-32 +11
Feb. 9.	319.2	352.0	+9.99575	9.99420	2.64364	-440	-12 +11
19	329.9	2.1	+9.99971	9.99510	2.64250	-445	-5 +14
Mar. 1	340.0	12.2	+9.99002	9.99610	2.63927	-436	+9 +13
11	350.0	22.2	+9.96655	9.99720	2.61744	-414	+22 +12
21	0.0	32.2	+9.92747	9.99840	2.57956	-380	+34 +11
31	9.2	42.0	+9.87107	9.99970	2.52446	-335	+45 +11
Apr. 10	19.6	51.2	+9.79122	0.00090	2.44527	-279	+56 +2
20	29.4	61.6	+9.67726	0.00220	2.33315	-215	+64 +6
30	39.2	71.4	+9.50374	0.00330	2.16073	-145	+70 +4
May 10	48.2	81.0	+9.19433	0.00430	1.85232	-71	+74 +3
20	58.5	90.7	+8.02696	0.00530	0.74595	+6	+77 -1
30	68.1	100.3	+9.25237	0.00600	1.91206	+22	+76 -2
June 9	77.6	109.2	+9.52926	0.00660	2.19015	+15	+73 -5
19	87.2	119.4	+9.69100	0.00700	2.35169	+225	+70 -6
29	96.7	128.9	+9.79793	0.00720	2.45222	+222	+63 -2
July 9	106.2	138.4	+9.87372	0.00720	2.53467	+343	+55 -9
19	115.2	148.0	+9.92442	0.00700	2.52911	+322	+45 -12
29	125.4	157.6	+9.96593	0.00660	2.62622	+423	+34 -12
Aug. 8	134.9	167.1	+9.98290	0.00600	2.64259	+445	+22 -12
18	144.5	176.7	+9.99922	0.00520	2.65217	+455	+10 -13
28	154.2	186.4	+9.99722	0.00430	2.65527	+452	-3 -13
Sept. 7	163.9	196.1	+9.92620	0.00320	2.63951	+436	-16 -13
17	173.6	205.8	+9.95440	0.00210	2.61019	+408	-22 -11
27	183.4	215.6	+9.91014	0.00090	2.56473	+367	-44 -11

Computation of Light Equation for Messier 15,
with computed values of δ and β .

Date.	Sun's Long.	Long. 0 - δ * + δ	Long. 200. Col. 3.	Long. R.	Long. Final Ly.	Final Ly.	
Oct. 7	193.2	225.4	u 9.24643	9.99960	2.49972	+316	-51 [✓] -10 [✓]
17	203.2	235.4	u 9.75423	9.99240	2.40632	+255	-61 [✓] -7 [✓]
27	213.1	245.3	u 9.62104	9.99720	2.27193	+127	-62 [✓] -6 [✓]
Nov. 6	223.2	255.4	u 9.40152	9.99610	2.05131	+113	-74 [✓] -3 [✓]
16	233.2	265.4	u 2.90417	9.99500	1.55226	+36	-77 [✓] -2 [✓]
26	243.3	275.5	+2.92157	9.99420	1.62946	-43	-79 [✓] +2 [✓]
Dec. 6	253.5	285.7	+9.43233	9.99350	2.07952	-120	-77 [✓] +4 [✓]
16	263.6	295.2	+9.63272	9.99300	2.22541	-193	-73 [✓] +6 [✓]
26	273.2	306.0	+9.76922	9.99270	2.41561	-260	-67 [✓]

e/

14. 1902 William's new Algol.

$$Ep 0 = 2416009.6934$$

$$Per = 3.056623$$

Epoch

9 M.T. Min. Epoch 9 M.T. Min.

0	241 6009.693400	28	241 6095.278844
1	6012.750023	29	6098.335467
2	6015.806646	30	6101.392090
3	6018.863269	31	6104.448713
4	6021.919892	32	6107.505336
5	6024.976515	33	6110.561959
6	6028.033138	34	6113.618582
7	6031.089761	35	6116.675205
8	6034.146384	36	6119.731828
9	6037.203007	37	6122.788451
10	6040.259630	38	6125.845074
11	6043.316253	39	6128.901697
12	6046.372876	40	6131.958320
13	6049.429499	41	6135.014943
14	6052.486122	42	6138.071566
15	6055.542754	43	6141.128189
16	6058.599368	44	6144.184812
17	6061.655991	45	6147.241435
18	6064.712614	46	6150.298058
19	6067.769237	47	6153.354681
20	6070.825860	48	6156.411304
21	6073.882483	49	6159.467927
22	6076.939106	50	6162.524550
23	6079.995729	51	6165.581173
24	6083.052352	52	6168.637796
25	6086.108975	53	6171.694419
26	6089.165598	54	6174.751042
27	6092.222221		

14.1902. = Σ Persei.

R. A.	$2^h 33^m 41^s = 32^\circ 24' 15''$
Dec.	$+41^\circ 46'$
Log tan δ	$+9.95022$
" sin δ	$+9.79339$
" tan δ	$+0.15749$
δ	$+55^\circ 10.1$
Σ	$23 \quad 27.1$
$\delta - \Sigma$	$+31 \quad 43.0$
" cos $(\delta - \Sigma)$	$+9.92976$
" tan δ	$+9.29937$
Sum	$+9.22913$
" cos δ	$+9.75676$
$\delta = +49^\circ 45.1$	$= +0.07237$
Log. sin δ	$+9.22267$
" tan $(\delta - \Sigma)$	$+9.79100$
" " β	$+9.67367$
β	$+25 \quad 15.2$
" cos $(\delta - \Sigma)$	$+9.92976$
" " δ	$+9.75676$
" Fraction	$+0.17300$
" cos β	$+9.95632$
" sin δ	$+9.22267$
Sum	$+9.23905$
" cos δ	$+9.27266$
" sin δ	$+9.79339$
Sum	$+9.66605$
" chg δ	$+0.17300$

+ 20.1902. = VV Cygni.

163

$$R. A. = 21^h 2^m 20.^s = 315^\circ 35' 0''$$

<u>Dec.</u>	<u>+45° 22'6"</u>
Log tan δ	+0.0057 ^v
" sin δ	<u>+9.2450^v</u>
" tan δ	<u>+0.1607^v</u>
δ	-55° 22'0"
ϵ	<u>23 27.1^v</u>
$\delta - \epsilon$	<u>-78 49.1^v</u>
" cos ($\delta - \epsilon$)	+9.2276 ^v
" tan ϵ	<u>+9.9912^v</u>
Sum	<u>+9.2722^v</u>
" cos δ	<u>+9.7546^v</u>
$A = 341.30.2$	<u>+9.5242^v</u>
Log sin A	+9.5012 ^v
" tan ($\delta - \epsilon$)	<u>+0.7041^v</u>
" " β	+0.2053 ^v
β	<u>+52° 41'</u>
" cos ($\delta - \epsilon$)	+9.2276
" " δ	<u>+9.7546</u>
" Fraction	<u>9.5330</u>
" cos β	+9.7234
" sin A	<u>+9.5012</u>
Sum	<u>+9.2246^v</u>
" cos δ	+9.2466
" sin ϵ	<u>+9.2450</u>
Sum	<u>+9.6916</u>
" check	9.5330 ^v

$$\lambda = 49^{\circ} 45.1''$$

$$\beta = +25^{\circ} 15.2''$$

14. 1902.

Computation of Light Equation for 14. 1902
with computed values of λ and β .

Date.	Line Long.	Long. 0 - " *	Log. cos. Col. 3.	Log. R.	Log. Final 2y	Final 2y.	
Jan. 0	279.2	229.4	9.21343	9.99270	2.46061	+229	
10	289.4	239.6	9.70412	9.99270	2.35136	+225	-64
20	299.5	249.7	9.54025	9.99300	2.12773	+154	-71
30	309.7	259.9	9.24395	9.99350	1.29193	+72	-5
Feb. 9	319.2	270.0		9.99420		0	-76
19	329.9	280.1	+9.24395	9.99510	1.29353	-72	-2
Mar. 1	340.0	290.2	+9.53219	9.99610	2.12277	-154	-72
11	350.0	300.2	+9.70159	9.99720	2.35327	-226	+4
21	0.0	310.2	+9.20927	9.99840	2.46275	-290	-64
31	9.2	320.0	+9.22425	9.99970	2.53243	-345	-55
Apr. 10	19.6	329.2	+9.93665	0.00090	2.59203	-391	+9
20	29.4	339.6	+9.97127	0.00220	2.62255	-425	-46
30	39.2	349.4	+9.99252	0.00330	2.65030	-447	+12
May 10	42.2	359.0	+9.99993	0.00430	2.65271	-456	-22
20	52.5	2.7	+9.99497	0.00530	2.65475	-452	-9
30	62.1	12.3	+9.97746	0.00600	2.63794	-434	+13
June 9	77.6	27.2	+9.94674	0.00660	2.60722	-405	+4
19	27.2	37.4	+9.90005	0.00700	2.56153	-364	+12
29	96.7	46.9	+9.23459	0.00720	2.49627	-314	+10
July 9	106.2	56.4	+9.74303	0.00720	2.40471	-254	+8
19	115.2	66.0	+9.60931	0.00700	2.27079	-127	+6
29	125.4	75.6	+9.39566	0.00660	2.05674	-114	+73
Aug. 2	134.9	25.1	+2.93154	0.00600	1.59202	-39	+2
12	144.5	94.7	+2.91349	0.00520	1.57317	+37	+1
22	154.2	104.4	+9.39566	0.00430	2.05444	+113	+76
Sept. 7	163.9	114.1	+9.61101	0.00320	2.26269	+126	+76
17	173.6	123.2	+9.74531	0.00210	2.40129	+252	+73
27	183.4	133.6	+9.23261	0.00090	2.49399	+312	+6

14, 1902.

165

Computation of Light Equation for 14. 1902.
with computed values of δ and Δ .

Date.	Sun's Long.	Long. \odot - " * Col. 3.	Ly. an. Col. 3.	Ly. δ .	Ly. Final δ .	Final δ .	
Oct. 7	193.2	143.4	9.90462	9.99960	2.55270	+362	-10
17	203.2	153.4	9.95141	9.99240	2.60429	+402	+40 -12
27	213.1	163.3	9.92129	9.99720	2.63297	+430	+26 -14
Nov. 6	223.2	173.4	9.99711	9.99610	2.64769	+444	+14 -13
16	233.2	183.4	9.99923	9.99500	2.64271	+445	+1 -13
26	243.3	193.5	9.92723	9.99420	2.63651	+433	-12 -14
Dec. 6	253.5	203.7	9.96174	9.99350	2.60972	+407	-26 -12
16	263.6	213.2	9.91959	9.99300	2.56707	+369	-32 -12
26	273.2	224.0	9.25693	9.99270	2.50411	+319	-50

66

$$\lambda = 341^{\circ} 31' "$$

$$\beta = +52^{\circ} 4' "$$

20.1902.

Computation of Light Equation for 20.1902,
with computed values of λ and β .

$$\begin{aligned} \log .499 &= 2.6921 \\ \cos \beta &= 9.7234 \\ 2.4215 \end{aligned}$$

Date.	Long.	Long. 0	Log. cos	Log R	Log. Final Lp.	Final Lp.	
		- " *	Col. 3.				
Jan. 0	279.2	297.7	+9.6673	9.9927	2.0215	-120	
10	229.4	307.9	+9.7224	9.9927	2.2026	-159	-39 +5
20	299.5	312.0	+9.4711	9.9930	2.2256	-193	-34 +6
30	309.7	322.2	+9.9294	9.9935	2.3444	-221	-22 +7
Feb. 9	319.2	332.3	+9.9621	9.9942	2.3232	-242	-21 +7
19	329.9	342.4	+9.9910	9.9951	2.4076	-256	-14 +9
Mar. 1	340.0	352.5	+9.9992	9.9961	2.4174	-261	-5 +7
11	350.0	2.5	+9.9952	9.9972	2.4139	-259	+2 +2
21	0.0	12.5	+9.9770	9.9984	2.3969	-249	+10 +7
31	9.2	22.3	+9.9447	9.9997	2.3659	-232	+17 +7
Apr. 10	19.6	32.1	+9.2959	0.0009	2.3123	-202	+24 +6
20	29.4	47.9	+9.2264	0.0022	2.2501	-172	+30 +6
30	39.2	57.7	+9.7272	0.0033	2.1526	-142	+36 +40 +4
May 10	42.2	67.3	+9.5265	0.0043	2.0123	-103	+39 +2
20	52.5	77.0	+9.3521	0.0053	1.7729	-60	+42 +2
30	62.1	86.6	+2.7731	0.0060	1.2006	-16	+44 0
June 9	77.6	96.1	+9.0264	0.0066	1.4545	+22	+44 +0
19	87.2	105.7	+9.4323	0.0070	1.2602	+73	+45 -2
29	96.7	115.2	+9.6292	0.0072	2.0579	+114	+47 -2 -3
July 9	106.2	124.7	+9.7553	0.0072	2.1240	+153	+39 -5
19	115.2	134.3	+9.2441	0.0070	2.2726	+127	+34 +29 -4
29	125.4	143.9	+9.9074	0.0066	2.3355	+217	+32 +3 -2 -6
Aug. 2	134.9	153.4	+9.9514	0.0060	2.3729	+239	+22 +16 -6 -7
12	144.5	163.0	+9.9206	0.0052	2.4073	+255	+9 -7
22	154.2	172.7	+9.9965	0.0043	2.4223	+264	+9 +11 -7 -2
Sept. 7	163.9	182.4	+9.9996	0.0032	2.4243	+266	+22 +6 -7 -7
17	173.6	192.1	+9.9902	0.0021	2.4132	+259	+7 -7 -7
27	183.4	201.9	+9.9675	0.0009	2.3299	+245	+14 -7

20.1902

167

Computation of Light Equation for 20.1902,
with computed values of t and β .

Date.	Star's Long.	Long. 0 - " *	Log. cos. Col. 3.	Log. A.	Log. Final L.	Final L.	
Oct. 7	193.2	211.7	~ 9.9290	9.9996	2.3509	+ 224	-7
17	203.2	221.7	~ 9.9273	9.9994	2.2930	+ 196	-22
27	213.1	231.6	~ 9.7932	9.9972	2.2119	+ 163	-33
Nov. 6	223.2	241.7	~ 9.6759	9.9961	2.0935	+ 124	-6
16	233.2	251.7	~ 9.4969	9.9950	1.9134	+ 22	-39
26	243.3	261.2	~ 9.1542	9.9942	1.5699	+ 37	-42
Dec. 6	253.5	272.0	+ 2.5420	9.9935	0.9572	- 9	-45
16	263.6	282.1	+ 9.3214	9.9930	1.7359	- 54	-46
26	273.2	292.3	+ 9.5792	9.9927	1.9934	- 92	-44

(Algol Type)

13.1902. = R V Lyrae.

(Re p. 170)

R. A.	19 12 30" = 222° 7' 30." ✓
Dec.	+32 14.6 ✓
Log. tan δ	+9.79929 ✓
" sin δ	+9.97790 ✓
" tan δ	+9.22199 ✓
δ	-33 34.4 ✓
ϵ	23 27.1 ✓
$\delta - \epsilon$	-57 1.5 ✓
" cos($\delta - \epsilon$)	+9.73521 ✓
" tan δ	+0.42501 ✓
Sum	+0.22022 ✓
" cos δ	+9.92074 ✓
$\delta = 296^{\circ} 36.9' =$	+0.30002 ✓
Log. sin δ	+9.95136 ✓
" tan($\delta - \epsilon$)	+0.12790 ✓
" " β	+0.13926 ✓
β	+54 20. ✓
" cos($\delta - \epsilon$)	+9.73521 ✓
" " δ	+9.92074 ✓
" Fraction	+9.21507 ✓
" cos β	+9.76227 ✓
" sin δ	+9.95136 ✓
Sum	+9.72023 ✓
" cos δ	+9.92726 ✓
" sin δ	+9.97790 ✓
Sum	+9.90516 ✓
" check	+9.21507 ✓

B. A.	19 42 44" = 295° 41' 0" ✓
Dec.	+32 27.4" ✓
Log tan δ	+9.20346" ✓
" sin δ	+9.95422" ✓
" tan δ	+9.24264" ✓
"	-35 12.7" ✓
"	23 27.1" ✓
$\delta - \epsilon$	-52 39.2" ✓
" cos ($\delta - \epsilon$)	+9.71606" ✓
" tan δ	+0.31794" ✓
Sum	+0.03400" ✓
" cos δ	+9.91224" ✓
$\delta = 307^\circ 4.3'$	+0.12176" ✓
Log sin δ	+9.90194" ✓
" tan ($\delta - \epsilon$)	+0.21546" ✓
" " β	+0.11740" ✓
β	+52 39.1" ✓
" cos ($\delta - \epsilon$)	+9.71606" ✓
" " δ	+9.91224" ✓
" Fraction	+9.20322" ✓
" cos β	+9.72294" ✓
" sin δ	+9.90194" ✓
Sum	+9.62422" ✓
" cos δ	+9.92624" ✓
" sin δ	+9.95422" ✓
Sum	+9.22106" ✓
" Check	+9.20322" ✓

$$\lambda = 296^{\circ} 37' \frac{1}{2}$$

$$\beta = +54 \frac{1}{2}$$

13. 1902. RV Lyrae. (Algol Type)

(See p. 16A)

$$499. = 2.6921$$

$$\cos. \beta = +9.7629$$

$$2.4670$$

Date.	Time Long.	Long. @ - #	Log. cos. Col. 3.	Log. R	Log. Final Ly.	Final Ly.
Jan. 0	279.2	342.6	+9.9797	9.9927	2.4394	-275
10	289.4	352.2	+9.9966	9.9927	2.4563	-246
20	299.5	2.9	+9.9994	9.9930	2.4594	-242
30	309.7	13.1	+9.9226	9.9935	2.4491	-241
Feb. 9	319.2	23.2	+9.9634	9.9942	2.4246	-266
19	329.9	33.3	+9.9221	9.9951	2.3242	-242
Mar. 1	340.0	43.4	+9.8613	9.9961	2.3244	-211
11	350.0	53.4	+9.7754	9.9972	2.2396	-174
21	0.0	63.4	+9.6510	9.9984	2.1164	-131
31	9.2	73.2	+9.4610	9.9997	1.9277	-25
Apr. 10	19.6	83.0	+9.0259	0.0009	1.5532	-36
20	29.4	92.2	+9.6229	0.0022	1.1521	+14
30	39.2	102.6	+9.3327	0.0033	1.2090	+64
May 10	42.2	112.2	+9.5773	0.0043	2.0426	+112
20	52.5	121.9	+9.7230	0.0053	2.1953	+157
30	62.1	131.5	+9.8213	0.0060	2.2943	+197
June 9	77.6	141.0	+9.8905	0.0066	2.3641	+231
19	87.2	150.6	+9.9401	0.0070	2.4141	+259
29	96.7	160.1	+9.9733	0.0072	2.4475	+280
July 9	106.2	169.6	+9.9922	0.0072	2.4670	+293
19	115.2	179.2	+0.0000	0.0070	2.4740	+292
29	125.4	188.2	+9.9949	0.0066	2.4625	+294
Aug. 2	134.9	192.3	+9.9775	0.0060	2.4505	+222
12	144.5	207.9	+9.9463	0.0052	2.4125	+262
22	154.2	217.6	+9.8929	0.0043	2.3702	+235
Sept. 7	163.9	227.3	+9.8313	0.0032	2.3015	+200
17	173.6	237.0	+9.7361	0.0021	2.2052	+160
27	183.4	246.2	+9.5954	0.0009	2.0633	+116

Date.	Long. Long.	Long. 0 - " *	Log. cos. Col. 3.	Log. R	Log. Final. Ly.	Final Ly.	
Oct. 7	193.2	256.6	u 9.3650	9.9996	1.2316	+ 62	- 3 ^v
17	203.2	266.6	u 9.7731	9.9924	1.2325	+ 17	- 51 ^v + 1 ^v
27	213.1	276.5	+ 9.0539	9.9972	1.5121	- 33	- 50 ^v 0 ^v
Nov. 6	223.2	286.6	+ 9.4559	9.9961	1.9190	- 23	- 50 ^v + 3 ^v
16	233.2	296.6	+ 9.6510	9.9950	2.1130	- 130	- 47 ^v + 4 ^v
26	243.3	306.7	+ 9.7764	9.9942	2.2376	- 173	- 43 ^v + 5 ^v
Dec. 6	253.5	316.9	+ 9.2634	9.9935	2.3239	- 211	- 32 ^v + 7 ^v
16	263.6	327.0	+ 9.9236	9.9930	2.3236	- 242	- 31 ^v + 7 ^v
26	273.2	337.2	+ 9.9647	9.9927	2.4244	- 266	- 24 ^v

$$\lambda = 307^{\circ} 41'$$

$$\beta = +52^{\circ} 39'$$

N Y Cygni. = Ceres K II.

$$\log 499 = 2.6981$$

$$\cos \beta = \frac{9.7229}{2.4010}$$

Date	Time Long.	Long. @ - " *	Log. cos. Col. 3.	Log. R	Log. Final Sy.	Final Sy.	
Jan. 0	279.2	332.1	+ 9.9463	9.9927	2.4200	- 263	-21
10	289.4	342.3	+ 9.9789	9.9927	2.4526	- 224	+10
20	299.5	352.4	+ 9.9962	9.9930	2.4702	- 295	+9
30	309.7	2.6	+ 9.9996	9.9935	2.4741	- 298	+2
Feb. 9	319.2	12.7	+ 9.9292	9.9942	2.4644	- 291	+10
19	329.9	22.2	+ 9.9647	9.9951	2.4402	- 276	+9
Mar. 1	340.0	32.9	+ 9.9241	9.9961	2.4012	- 252	+8
11	350.0	42.9	+ 9.2642	9.9972	2.3430	- 220	+32
21	0.0	52.9	+ 9.7205	9.9984	2.2599	- 122	+32
31	9.2	62.7	+ 9.6615	9.9997	2.1422	- 139	+43
Apr. 10	19.6	72.5	+ 9.4721	0.0009	1.9600	- 91	+48
20	29.4	82.3	+ 9.1271	0.0022	1.6103	- 41	+50
30	39.2	92.1	+ 2.5640	0.0033	1.0423	+ 11	+52
May 10	49.2	101.7	+ 9.3070	0.0043	1.7923	+ 62	+51
20	59.5	111.4	+ 9.5622	0.0053	2.0425	+ 112	+50
30	69.1	121.0	+ 9.7112	0.0060	2.1922	+ 152	+46
June 9	77.6	130.5	+ 9.2125	0.0066	2.3001	+ 200	+42
19	87.2	140.1	+ 9.2249	0.0070	2.3729	+ 236	+36
29	96.7	149.6	+ 9.9352	0.0072	2.4240	+ 265	+29
July 9	106.2	159.1	+ 9.9704	0.0072	2.4526	+ 227	+22
19	115.2	168.7	+ 9.9915	0.0070	2.4795	+ 302	+15
29	125.4	178.3	+ 9.9992	0.0066	2.4274	+ 307	+5
Aug. 2	134.9	187.2	+ 9.9960	0.0060	2.4230	+ 304	-3
12	144.5	197.4	+ 9.9797	0.0052	2.4659	+ 292	-12
22	154.2	207.1	+ 9.9495	0.0043	2.4342	+ 272	-20
Sept. 7	163.9	216.2	+ 9.9035	0.0032	2.3277	+ 244	-22
17	173.6	226.5	+ 9.2372	0.0021	2.3209	+ 209	-35
27	183.4	236.3	+ 9.7442	0.0009	2.2261	+ 162	-41

Date.	Time Long.	Long. 0 - " *	Log. cos. Col. 3.	Log. R.	Log. Final. 2y.	Final 2y.	
Oct. 7	193.2	246.1	9.6076	9.9996	2.0222	+123	-50 -2
17	203.2	256.1	9.3206	9.9924	1.2600	+72	-52 -1
27	213.1	266.0	2.2436	9.9972	1.3212	+21	-54 -2
Nov. 6	223.2	276.1	9.0264	9.9961	1.5035	-32	-53 +2
16	233.2	286.1	9.4430	9.9950	1.9190	-23	-51 +2
26	243.3	296.2	9.6449	9.9942	2.1201	-132	-49 +4
Dec. 6	253.5	306.4	9.7734	9.9935	2.2479	-177	-45 +6
16	263.6	316.5	9.2606	9.9930	2.3346	-216	-39 +6
26	273.2	326.7	9.9221	9.9927	2.3952	-249	-33

74 W. Ursa Maj = Variable 3. 1903 (Mot. 4 hrs.) = $+56^{\circ} 14' 00''$
 Disc. by Müller & Kieppf.
 $9^h 36^m 44.^s + 56^{\circ} 24.6'' (1900)$

$$R.A. = 9^h 36^m 44.^s = 144^{\circ} 11' 0''$$

$$Dec. = +56^{\circ} 24.6'' =$$

$$\log \tan \delta = +0.17774$$

$$\text{" sin } \delta = +9.76730$$

$$\text{" tan } \delta = +0.41044$$

$$\delta = +62^{\circ} 45.7'$$

$$\epsilon = +23^{\circ} 27.1'$$

$$\delta - \epsilon = +45^{\circ} 18.6'$$

$$\text{" cos } (\delta - \epsilon) = +9.24712$$

$$\text{" tan } \epsilon = +9.25234$$

$$\text{Sum} = +9.70546$$

$$\text{" cos } \delta = +9.55901$$

$$\delta = 125^{\circ} 31.0' = +0.14645$$

$$\log \sin \delta = +9.91060$$

$$\text{" tan } (\delta - \epsilon) = +0.00470$$

$$\text{" tan } \beta = +9.91530$$

$$\beta = +39^{\circ} 26.9'$$

$$\text{" cos } (\delta - \epsilon) = +9.24712$$

$$\text{" " } \delta = +9.55901$$

$$\text{" Fraction} = +0.22211$$

$$\text{" cos } \beta = +9.22773$$

$$\text{" sin } \delta = +9.91060$$

$$\text{Sum} = +9.79233$$

$$\text{" cos } \delta = +9.74292$$

$$\text{" sin } \epsilon = +9.76730$$

$$\text{Sum} = +9.51022$$

$$\text{" Check} = +0.22211$$

(See p. 192)

$$A. d. = 11^h 39^m 49^s (1900) = 174^\circ 57' 15''$$

$$Dec. = +72^\circ 49.0'$$

$$\log \tan \delta = +0.50971$$

$$+0.5097142$$

$$" \sin \delta = +2.94425$$

$$+2.9442482$$

$$" \tan \delta = +1.56546$$

$$+1.5654654$$

$$\delta = +22^\circ 26.5'$$

$$\epsilon = +23^\circ 27.1'$$

$$\delta - \epsilon = +64^\circ 59.4'$$

$$\log \cos (\delta - \epsilon) = +9.62611$$

$$" \tan \delta = +2.94594$$

$$\text{Sum} = +2.57205$$

$$" \cos \delta = +2.43442$$

$$\delta = 126^\circ 4.4' = +0.13757$$

$$\log \sin \delta = +9.90755$$

$$" \tan (\delta - \epsilon) = +0.33113$$

$$" \beta = +0.23262$$

$$\beta = +60^\circ 0.4'$$

$$" \cos (\delta - \epsilon) = +9.62611$$

$$" \delta = +2.43442$$

$$" \text{Fraction} = +1.19163$$

$$" \cos \beta = +9.69222$$

$$" \sin \delta = +9.90755$$

$$\text{Sum} = +9.60643$$

$$" \cos \delta = +9.47045$$

$$" \sin \delta = +2.94425$$

$$\text{Sum} = +2.41470$$

$$" \text{Check} = +1.19173$$

Recompensation of Light Equation for Ceres I See next page for corresponding correct Light Equation Table.

179

$$\epsilon = 23^{\circ} 27' \checkmark$$

$$R.A. = 20^{\text{h}} 2^{\text{m}} 24^{\text{s}} = 300^{\circ} 36.1' \checkmark$$

$$\text{Dec.} = +45^{\circ} 52.9' \checkmark$$

$$\log \tan \delta = +0.01339 \checkmark$$

$$\text{" sin } \delta = \underline{-9.93427} \checkmark$$

$$\text{" tan } \delta = \underline{-0.07452} \checkmark$$

$$\delta = -50^{\circ} 9' \checkmark$$

$$L = \underline{23 \ 27} \checkmark$$

$$\delta - \epsilon = -73 \ 36 \checkmark$$

$$\text{" cos } (\delta - \epsilon) = +9.45077 \checkmark$$

$$\text{" tan } \epsilon = \underline{-0.22412} \checkmark$$

$$\text{Sum} = \underline{-9.67339} \checkmark$$

$$\text{" cos } \delta = \underline{+9.20671} \checkmark$$

$$\delta = 323^{\circ} 19' = \underline{-9.27218} \checkmark$$

$$\log \sin \delta = \underline{-9.77626} \checkmark$$

$$\text{" tan } (\delta - \epsilon) = \underline{-0.53119} \checkmark$$

$$\text{" tan } \beta = \underline{+0.30745} \checkmark$$

$$\beta = +63^{\circ} 46' \checkmark$$

$$\text{" cos } (\delta - \epsilon) = +9.45077 \checkmark$$

$$\text{" cos } \delta = \underline{+9.20671} \checkmark$$

$$\text{" Fraction} = \underline{+9.64406} \checkmark$$

$$\text{" cos } \beta = \underline{+9.64545} \checkmark$$

$$\text{" sin } \delta = \underline{-9.77626} \checkmark$$

$$\text{Sum} = \underline{-9.42171} \checkmark$$

$$\text{" cos } \delta = \underline{+9.24269} \checkmark$$

$$\text{" sin } \delta = \underline{-9.93427} \checkmark$$

$$\text{Sum} = \underline{-9.77756} \checkmark$$

$$\text{" check} = \underline{+9.64415} \checkmark$$

Recomputation of Light Equation for Cerastium, $\log \cos. \beta = 9.64545$
 with correct value of λ . This table is the " 499. = 2.69210"
 $\lambda = 323^\circ 19'$ final one and supplants the " 2.34355"
 $\beta = +63^\circ 46'$ table in Book 9. p. 194.

Date.	\odot Long.	Long. \odot	$\log \cos. \text{Col. } 3$	$\log p$	$\log \text{Final } 19$	Final 29
Jan. 0	279.2	44.1	+9.85628	9.9927	2.1925	-156
10	289.4	33.9	+9.91908	9.9927	2.2554	-120 -24 +5
20	299.5	23.2	+9.96148	9.9930	2.2920	-199 -19 +7
30	309.7	13.6	+9.98768	9.9935	2.3247	-211 -12 +6
Feb. 9	319.2	3.5	+9.99918	9.9942	2.3370	-217 -6 +6
19	329.9	353.4	+9.99718	9.9951	2.3352	-217 0 +7 +7
Mar. 1	340.0	343.3	+9.98128	9.9961	2.3209	-209 -210 +14 +7
11	350.0	333.3	+9.95103	9.9972	2.2912	-196 +13 +7 +6
21	0.0	323.3	+9.90408	9.9984	2.2460	-176 +20 +4
31	9.2	313.5	+9.83728	9.9997	2.1211	-152 +24 +5
Apr. 10	19.6	303.7	+9.74418	0.0009	2.0227	-123 +29 +4
20	29.4	293.9	+9.60768	0.0022	1.9534	-90 +33 +3
30	39.2	284.1	+9.38678	0.0033	1.7336	-54 +36 +1
May 10	49.2	274.5	+9.09468	0.0043	1.2425	-17 +37 0
20	59.5	264.2	+8.95728	0.0053	1.3062	+20 +37 0
30	69.1	255.2	+8.80738	0.0060	1.7569	+57 +37 -2
June 9	77.6	245.7	+8.61438	0.0066	1.9645	+92 +35 -2
19	87.2	236.1	+8.46648	0.0070	2.0970	+125 +33 -4
29	96.7	226.6	+8.23708	0.0072	2.1272	+154 +29 -4
July 9	106.2	217.1	+8.01728	0.0072	2.2525	+179 +25 -5
19	115.2	207.5	+7.94798	0.0070	2.2925	+199 +20 -6
29	125.4	197.9	+7.97248	0.0066	2.3226	+213 +14 -6
Aug. 8	134.9	188.4	+7.99538	0.0060	2.3449	+221 +2 -6
18	144.5	178.2	+7.99998	0.0052	2.3427	+223 -4 -6
28	154.2	169.1	+7.99208	0.0043	2.3399	+219 -11 -7
Sept. 7	163.9	159.4	+7.97138	0.0032	2.3121	+202 -17 -6
17	173.6	149.7	+7.93628	0.0021	2.2219	+191 -22 -5
27	183.4	139.9	+7.82368	0.0009	2.2221	+169 -27 -5

Recomputations of Light Equation for Cresche I.
with correct value of λ . This table is the final one
and supplants the table in Book 9. p. 194.

Date.	\odot Long.	Long. * - " \odot	Log. Col. 3.	Log. ρ	Log. Final Ry.	Final Ry.
Oct. 7	193.2	130.1	9.40497	9.9996	2.1522 +42	-32
17	203.2	120.1	9.70024	9.9924	2.0423 +110	-35
27	213.1	110.2	9.53219	9.9972	1.8790 +76	-37
Nov. 6	223.2	100.1	9.24395	9.9961	1.5236 +32	-32
16	233.2	90.1	7.24124	9.9950	9.5204 +0	-32
26	243.3	80.0	9.23967	9.9942	1.5775 -32	-37
Dec. 6	253.5	69.2	9.53219	9.9935	1.8753 -75	-35
16	263.6	59.7	9.70224	9.9930	2.0395 -110	-31
26	273.2	49.5	9.21254	9.9927	2.1422 -141	

This is the Correct Light Equation Table of this
star, and supplants the old one in Book 9.

73.1901 U. Sec. 1.

Exp. 0	= 241.5651.0000 ² h. m. s.
1	5651.9542
2	5652.9124
3	5653.2726
4	5654.2262
5	5655.7210
6	5656.7352
7	5657.6294
8	5658.6436
9	5659.5972
10	5660.5520
11	5661.5062
12	5662.4604
13	5663.4146
14	5664.3622
15	5665.3230
16	5666.2772
17	5667.2314
18	5668.1256
19	5669.1392
20	5670.0940
21	5671.0532
22	5672.0074
23	5672.9616
24	5673.9152
25	5674.2700
26	5675.2242

73.1901 U. Scuti.

183

Provisional Ephemeris computed on the basis 2415651.0000
G. M. T. + 0.95428.

This is assuming Sept. 3.2000 (G. M. T.) 1901 as the fundamental epoch
and $22.9 = 0.9542$ as the period.

Ep.	0	2415651.0000 ^v
1		5651.9542 ^v
2		5652.9084 ^v
3		5653.8626 ^v
4		5654.8168 ^v
5		5655.7710 ^v
6		5656.7252 ^v
7		5657.6794 ^v
8		5658.6336 ^v
9		5659.5878 ^v
10		5660.5420 ^v
11		5661.4962 ^v
12		5662.4504 ^v
13		5663.4046 ^v
14		5664.3588 ^v
15		5665.3130 ^v
16		5666.2672 ^v
17		5667.2214 ^v
18		5668.1756 ^v
19		5669.1298 ^v
20		5670.0840 ^v
21		5671.0382 ^v
22		5671.9924 ^v
23		5672.9466 ^v
24		5673.9008 ^v
25		5674.8550 ^v
26		5675.8092 ^v

73. 1901 U Senta:

Ep. 26 = 2415675.2092
 27 5676.7634^v
 28 5677.7176^v
 29 5678.6712^v
 30 5679.6260^v
 31 5680.5202^v
 32 5681.5344^v
 33 5682.4226^v
 34 5683.4422^v
 35 5684.3970^v
 36 5685.3512^v
 37 5686.3054^v
 38 5687.2596^v
 39 5688.2132^v
 40 5689.1620^v
 41 5690.1222^v
 42 5691.0764^v
 43 5692.0306^v
 44 5692.9242^v
 45 5693.9390^v
 46 5694.2932^v
 47 5695.2474^v
 48 5696.2016^v
 49 5697.7552^v
 50 5698.7100^v
 51 5699.6642^v
 52 5700.6124^v

73. 1901. U. Scutu.

The ephemeris below computed on the basis (final)
 $2415651.0410 + 0.9545E$. This ephemeris is the one finally
 used on my photometric observations of this variable, for phases.

Ep. 0	5651.0410 ^v
1	5651.9955 ^v
2	5652.9500 ^v
3	5653.9045 ^v
4	5654.8590 ^v
5	5655.8135 ^v
6	5656.7680 ^v
7	5657.7225 ^v
8	5658.6770 ^v
9	5659.6315 ^v
10	5660.5860 ^v
11	5661.5405 ^v
12	5662.4950 ^v
13	5663.4495 ^v
14	5664.4040 ^v
15	5665.3585 ^v
16	5666.3130 ^v
17	5667.2675 ^v
18	5668.2220 ^v
19	5669.1765 ^v
20	5670.1310 ^v
21	5671.0855 ^v
22	5672.0400 ^v
23	5672.9945 ^v
24	5673.9490 ^v
25	5674.9035 ^v
26	5675.8580 ^v
27	5676.8125 ^v

73.1901 U Scuti.

Epoch 27	5676.4125 ^v
28	5677.7670 ^v
29	5678.7215 ^v
30	5679.6760 ^v
31	5680.6305 ^v
32	5681.5250 ^v
33	5682.5395 ^v
34	5683.4940 ^v
35	5684.4485 ^v
36	5685.4030 ^v
37	5686.3575 ^v
38	5687.3120 ^v
39	5688.2665 ^v
40	5689.2210 ^v
41	5690.1755 ^v
42	5691.1300 ^v
43	5692.0845 ^v
44	5693.0390 ^v
45	5693.9935 ^v
46	5694.9480 ^v
47	5695.9025 ^v
48	5696.8570 ^v
49	5697.8115 ^v
50	5698.7660 ^v

Ephemeris for Observations of β Persei.

The final formula to be used for Vol. 49, is the following
single term formula = $2410640.3411 + 2.26731$

Fund. Epoch =	2410640.3411°
Ep. 1617 =	5276.78137°
" 1635	5324.39295°
" 1636	5331.26026°
" 1669	5425.22149°
" 1670	5422.74820°
" 1671	5431.61611°
" 1672	5434.42342°
" 1672	5451.62722°
" 1763	5695.40263°
" 1762	5709.74512°
" 1792	5795.76442°
" 1800	5801.49910°
" 1804	5812.96234°
1805	5815.23565°
1806	5818.70296°
1807	5821.57027°
1808	5824.43758°
1809	5827.30489°
1810	5830.17220°
1811	5833.03951°
1812	5835.90682°
1813	5838.77413°
1814	5841.64144°
1815	5844.50875°
1816	5847.37606°
1817	5850.24337°

ep. 1818	5853.11068
1819	5855.97799
1820	5858.84530
1821	5861.71261
1822	5864.57992
1823	5867.44723
1824	5870.31454
1834	5898.98764
1844	5927.66074
1854	5956.33384
1864	5985.00694
1874	6013.68004
1884	6042.35314
1894	6071.02624
1904	6099.69934
1905	6102.56665
1906	6105.43396
1907	6108.30127
1908	6111.16858
1909	6114.03589
1910	6116.90320
1911	6119.77051
1912	6122.63782
1913	6125.50513
1914	6128.37244
1927	6165.64747

Ephemeris of α CoronaeFormula = $240\ 4147.4434 + 3.4522269E$

of M.T. Min.

Lock.

3075	241 4763.0411175	241 4763.0411175
3076	4766.4933444	4766.4933444
3077	4769.9455713	4769.9455713
3082	4787.2067058	4787.2067058
3086	4804.4678403	4801.0156134
3087	4807.9200672	4804.4678403
3116	4908.0346473	4904.5824204
3118	4914.9391011	4911.4868742
3120	4921.8435549	4918.3913280
3122	4928.7480087	4925.2957818
3123	4932.2002356	4928.7480087
3125	4939.1046894	4935.6524225
3127	4946.0091432	4942.5568463
3129	4952.9135970	4949.4613501
3133	4966.7225046	4963.2702577
3444		6036.9128436

<i>Dates Obs.</i>	<i>Lt. Eq.</i>	<i>Corr. of time.</i>
1899		
4 19	-.0039	4763.0372 ✓
4 21	- 0039	4766.4894 ✓
4 22	-.0039	4766.4894 ✓
4 24	-.0039	4766.4894 ✓
4 26	-.0039	4769.9417 ✓
5 12	- 0038	4787.2029 ✓
5 26	- 0034	4801.0122 ✓
5 31	-.0032	4804.4646 ✓
9 6	+ 0025	4904.5849 ✓
9 16	+ 0029	4911.4898 ✓
9 23	+ 0033	4918.8946 ✓
9 30	+ 0035	4925.2993 ✓
10 7	+ 0036	{ 4935.65617 4932.2039 } ✓
10 14	+ 0038	{ 4942.56072 4939.10805 } ✓
10 21	+ 0038	4949.4652 ✓
'99 11 7	+ 0038	4963.2741 ✓
'02 10 15	+ 0038	6036.9166 ✓

U Ophiuchi

2408279.6146 + 0.8386870 E.

Date	Δ _{Eq.}	S.M.T. Min.	Ep.	Corr. S.M.T. Min.
02 5 15	-0049	5884.828360	9068	5884.8284
		5885.6670030	9069	5885.6621
5 17	-0050	5887.3443770	9071	5887.3394
5 20	-0051	5889.8604380	9074	5889.8533
5 22	-0052	5892.3764990	9077	5892.3713
5 31	-0053	5900.7633690	9087	5900.7581
		5901.6020560	9088	5901.5968
7 16	-0043	5946.8911540	9142	5946.8869

!

72° 51' 2 (A.3)

Computation of Position for 1900.

$$15^h 34^m 43.^s = 233^\circ 40' 45'' (1255)$$

$$+ 72^\circ 42.9'' \quad (")$$

$$\begin{array}{r} 15 \ 34 \ 43.^s \\ - 154.^s \\ \hline 15 \ 33 \ 49 \\ 233^\circ 27' 15'' \end{array} \quad \begin{array}{r} + 72^\circ 42.9'' \\ - 4.4'' \\ \hline + 72^\circ 44.5'' (1277.5) \end{array}$$

$$\frac{w}{15} = +3.0712''$$

$$\log \frac{w}{15} = +0.12607''$$

$$\text{" sin } \delta = 29.90492''$$

$$\text{" tan } \delta = +0.70101''$$

$$- \sqrt{3951} = 20.73200''$$

$$+ 3.0712''$$

$$\log - 2.3239 = 20.36622''$$

$$\log 45. = +1.65321''$$

$$- 104.6'' = 2.01943''$$

$$\log w = +1.30216''$$

$$\log \cos \delta = 29.77426''$$

$$\text{" } 45. = +1.65321''$$

$$- \sqrt{37.3} = 2.73023''$$

$$\begin{array}{r} 15^h 34^m 43.^s \\ - 1 \ 45.^s \\ \hline 1900.0 = 15 \ 32 \ 58.^s \end{array} \quad \begin{array}{r} + 72^\circ 42.9'' (1255) \\ - 9.0'' \\ \hline + 72^\circ 39.9'' \end{array}$$

+72° 736 (A.9)

195

$$16^h 34^m 15.^s = 242^\circ 33' 45''$$

$$+72^\circ 42.7''$$

$$16 \ 34 \ 15.^s$$

$$-21.^s$$

$$16 \ 33 \ 54.^s$$

$$242^\circ 22' 30.''$$

$$\frac{w}{N} = +3.0712''$$

$$\log \frac{w}{N} = +0.12607''$$

$$\text{" sin } \delta = w 9.96260''$$

$$\text{" tan } \delta = +0.50233''$$

$$-4.0026'' = w 0.60300''$$

$$+3.0712''$$

$$-0.9374'' = w 9.97192''$$

$$\log \mu = +1.65321''$$

$$-42.12'' = w 1.62513''$$

$$+72^\circ 42.7''$$

$$-22.^s$$

$$+72^\circ 45.9'' (1277.5)$$

$$\log w = +1.30216''$$

$$\text{" cos } \delta = w 9.56456''$$

$$\text{" } \mu = +1.65321''$$

$$331.1'' = w 2.51993''$$

(1255)

$$16 \ 34 \ 15.^s$$

$$-42.4''$$

$$16 \ 33 \ 33.^s$$

$$+72^\circ 42.7''$$

$$-5.5''$$

$$+72^\circ 43.2''$$

(1900)

$$+79^{\circ} 46' 7'' (9.4)$$

$$\begin{array}{r} 15^{\circ} 35' 12'' \\ + 79^{\circ} 6' 0'' \\ \hline \end{array} = 233^{\circ} 49' 30''$$

$$\begin{array}{r} 15 \quad 35 \quad 12 \\ - 57 \\ \hline 15 \quad 34 \quad 21 \\ 233^{\circ} 35' 15'' \\ + 3.0712 \\ \hline \end{array} \quad \begin{array}{r} + 79^{\circ} 6' 0'' \\ - 4.4 \\ \hline + 79 \quad 1.6 \quad (1277.5) \end{array}$$

$$\begin{array}{l} \log \frac{w}{15} = +0.12607 \\ \text{" sin } \delta = \sim 9.90567 \\ \text{" tan } \delta = +0.71243 \\ - 5.5424 = \sim 0.74417 \\ + 3.0712 \\ - 2.4772 = \sim 0.39396 \\ \log 45 = +1.65321 \\ - 111.47 = \sim 2.04717 \end{array}$$

$$\begin{array}{l} \log w = +1.30216 \\ \text{" cos } \delta = \sim 9.77349 \\ \text{" } 45 = +1.65321 \\ - 535.6 = \sim 2.72246 \end{array}$$

(1255)

$$\begin{array}{r} 15 \quad 35 \quad 12 \\ - 1 \quad 51.4 \\ \hline \end{array}$$

$$+ 79^{\circ} 6' 0''$$

(1900)

$$\begin{array}{r} 15 \quad 33 \quad 27 \\ - \\ \hline \end{array}$$

$$\begin{array}{r} - 2.9 \\ + 72 \quad 57.1 \end{array}$$

198 $\lambda = 126^\circ 44'$ Variable 4. 1903. Z (Draconis) (Cune Crasski) (See p. 175)
 $\beta = +60^\circ 04'$

$\log 499 = 2.6981$
 $\log \beta = 9.7229$
 2.4210

Date	Time Long.	Long. \odot - " *	Long. cos. Col. 3	Log R	Log Final Ly.	Final Ly.	
Jan. 0	279.2	153.1	n 9.9503	9.9927	2.4240	+ 265	+20
10	289.4	163.3	n 9.9213	9.9927	2.4550	+ 245	-9
20	299.5	173.4	n 9.9971	9.9930	2.4711	+ 296	+11 -9
30	309.7	183.6	n 9.9991	9.9935	2.4736	+ 292	+2 -10
Feb. 9	319.2	193.7	n 9.9275	9.9942	2.4627	+ 290	-2 -2
19	329.9	203.2	n 9.9614	9.9951	2.4375	+ 274	-16 -9
Mar. 1	340.0	213.9	n 9.9191	9.9961	2.3962	+ 249	-25 -7
11	350.0	223.9	n 9.2577	9.9972	2.3359	+ 217	-32 -7
21	0.0	233.9	n 9.7703	9.9924	2.2497	+ 172	-39 -5
31	9.2	243.7	n 9.6465	9.9997	2.1272	+ 134	-44 -4
Apr. 10	19.6	253.5	n 9.4533	0.0009	1.9352	+ 26	-42 -3
20	29.4	263.3	n 9.0670	0.0022	1.5502	+ 35	-51 0
30	39.2	273.1	+ 2.7330	0.0033	1.2173	- 16	-51 0
May 10	49.2	282.7	+ 9.3421	0.0043	1.2274	- 67	-51 +1
20	59.5	292.4	+ 9.5210	0.0053	2.0673	- 117	-50 +4
30	69.1	302.0	+ 9.7242	0.0060	2.2112	- 163	-46 +5
June 9	77.6	311.5	+ 9.2213	0.0066	2.3029	- 204	-41 +6
19	87.2	321.1	+ 9.2911	0.0070	2.3791	- 239	-35 +6
29	96.7	330.6	+ 9.9401	0.0072	2.4223	- 262	-29 +2
July 9	106.2	340.1	+ 9.9733	0.0072	2.4615	- 229	-21 +2
19	115.2	349.7	+ 9.9929	0.0070	2.4209	- 303	-14 +2
29	125.4	359.3	+ 0.0000	0.0066	2.4276	- 307	-5 +2
Aug. 2	134.9	2.2	+ 9.9949	0.0060	2.4219	- 303	+4 +2
12	144.5	12.4	+ 9.9772	0.0052	2.4634	- 291	+12 +9
22	154.2	22.1	+ 9.9455	0.0043	2.4302	- 270	+21 +2
Sept. 7	163.9	37.2	+ 9.8977	0.0032	2.3219	- 241	+29 +7
17	173.6	47.5	+ 9.2297	0.0021	2.3122	- 205	+36 +5
27	183.4	57.3	+ 9.7326	0.0009	2.2145	- 164	+41 +5

Date	Time Long.	Long. 0 - * *	Log. cos. Col. 3.	Log. R	Log. Final Log	Final Log	
Oct. 7	193.2	67.1	+ 9.5901	9.9996	2.0707	-11.2	+46 +4
17	203.2	77.1	+ 9.3422	9.9924	1.2222	- 67	+50 +2
27	213.1	87.0	+ 2.7122	9.9972	1.1970	- 16	+52 +1
Nov. 6	223.2	97.1	n 9.0920	9.9961	1.5691	+ 37	+53 -2
16	233.2	107.1	n 9.4624	9.9950	1.9444	+ 22	+51 -2
26	243.3	117.2	n 9.6600	9.9942	2.1352	+ 137	+49 -2
Dec. 6	253.5	127.4	n 9.7435	9.9935	2.2520	+ 121	+44 -2
16	263.6	137.5	n 9.2676	9.9930	2.3416	+ 220	+39 -7
26	273.2	147.7	n 9.9270	9.9927	2.4007	+ 252	+32

Incomplete phases of comp. stars for "60 Variables."

- ~~R. Aquarii. 23^h 36^m -16.1 Identify comp. stars α and τ (in final notation) at telescope, and take transits to locate them. Corrections all made.~~
- ~~\checkmark R. Hercules. 18 45 +15.2 There is a little question about the identification of comp. stars α , ν , τ , ϵ (in final notation) on Hagen's chart, as compared with sketch. Look up the region in the sky and settle it. Corrections all made.~~
- ~~\checkmark R. Delphinus. 20^h 2^m +4.7 Look up and identify star α and its relation to star β . Possibly α not the one marked so on the Hagen chart, but it may be the one a little over the 15' border and so not on Hagen's chart. Corrections all made.~~
- ~~R. Cygni. Identify star α at telescope. (Final notation).~~
 ~~\checkmark Delphinus. " " α with certainty, and see what Hagen star it corresponds to. (A little doubt as to its identification).~~
- ~~\checkmark R. Cygni. Identify star α at telescope. Corrections all made.~~
- ~~R. Vulpeculae. " stars α , ν , τ , ϵ at telescope.~~
- ~~R. Aquarii. 23 36 -16.1 Locate comp. stars α and ν at telescope. Corrections all made.~~
- ~~\checkmark R. Hydra. 15 22 +2.9 No Hagen chart. Take transits of faint comp. stars. Corrections all made.~~
- ~~\checkmark R. Librae. 15 13 +19.9 Measure faint comp. stars, and locate them. Corrections all made.~~
- ~~R. Pegasus. 10 10 +14.0 Measure faint comp. stars and locate them. Also extend selection a little. All corrected.~~

~~✓ R. Corvus. Identify stars in at telescope~~
~~15 43 +28.6~~

~~Corrections all made.~~

~~I Scap. Two more faint stars on two nights, and the 3~~
~~16 9 -22.6 stars already seen on one night again.~~

R. Arietis. Identify (and obtain positions, if necessary) of
 comp. stars t and w . It would be well, also, to
 identify comp. star s and obtain its position, as
 it has been interpolated, and may be affected
 by some uncertainty on account of its relation
 to comp. star t which is somewhat uncertain.

~~✓ U. Virginis. Finish records of faint comp. stars.~~
~~12 14 +6.3~~

~~Corrections all made.~~

~~I. Aquarii. Stars s , t , w have been interpolated on the~~
~~22 49 -21.1 Hagen chart, not being Hagen stars, apparently.~~

~~It is hardly safe to interpolate t , β , γ al-~~
~~though one of the latter may be a Hagen star.~~

~~Hence examine t , β , γ at telescope and lo-~~
~~cate them. It would also be well to examine~~
 ~~s , t , w , and locate them also.~~

~~✓ U. Virginis. Finish records of faint Comp. stars wanted.~~
~~Corrections all made.~~

~~R. Can. Ven. records of faint Comp. Stars wanted.~~

~~13 43 +40.3 At the same time examine the brightness at tel. of m ,
 n , o , p (faint not.) relatively, as well as the relation
 of the δ var. & δ var. of the last half with reference
 to R's "Provis. mag" - the diff. being rather large.~~

~~Corrections all made.~~

~~R Arcturus. Identify, and locate (if need be) by transits, the faint stars on sketch.~~

~~R Hydrae. It would be well to examine the relative brightness of comp. stars α and γ at telescope. The stars apparently identify well on the Hagen chart, α is about 2 mag. brighter than γ by both my visual and photometric, but Hagen makes γ 0.3 mag. brighter than α .~~

~~R Vulture. All the comp. stars right except possibly star g . Star g has been all mislaid and is probably all right. It is just outside the central Hagen square and not given by him, although there is a faint star close to position which, from its faintness, is probably not the star g . It would be well to look up star g at the telescope for a final position. (Present position, provisionally, assumed.) Star g (as identified at telescope is Hagen No. 10.)~~

~~R Arcturus. Comp. stars δ , ϵ , ζ as identified and interpolated on Hagen chart. Thought to be all right, but it would be well to examine at sky, when it comes round in the east.~~

R Aphelion. No faint chart ^{to be} found and no entry of faint stars in Book 5. Possibly selection of faint stars not yet made.

~~U Herculis. do entry of faint stars in Book. 5. Apparently
 16^h 19^m +19^s selection of faint stars not made. Look up ⁱⁿ record
 books. All corrected.~~

~~U Herculis. Identify faint stars at telescope.
 16^h 30^m +37^s Finished. Corrections all made.~~

~~X Virginis. Locate positions of new stars. do. Hagen chart.
Corrections all made.~~

~~R Virginis. " " " " " " " " " " " "~~

R Cygni. Apparently faint comp. stars need to be
located.

γ Lyrae. (Antalgol).

$$R.A. = 12^h 34^m 12^s = 272^\circ 33' 0''$$

$$Dec. = +43^\circ 51.2'$$

$$\log \tan \delta = +9.92276$$

$$\text{" sin } \delta = \underline{9.99515}$$

$$\text{" tan } \delta = \underline{9.92761}$$

$$\delta = -44^\circ 11.0'$$

$$\epsilon = +23^\circ 27.1'$$

$$\delta - \epsilon = -67^\circ 38.1'$$

$$\text{" cos } (\delta - \epsilon) = +9.52036$$

$$\text{" tan } \delta = \underline{9.92292}$$

$$\text{Sum} = \underline{9.40322}$$

$$\text{" cos } \delta = +9.25559$$

$$\delta = 224^\circ 49.2' = \underline{9.54769}$$

$$\log \sin \delta = \underline{9.92323}$$

$$\text{" tan } (\delta - \epsilon) = \underline{9.32562}$$

$$\text{" tan } \beta = +0.36291$$

$$\beta = +66^\circ 50.2'$$

$$\text{" cos } (\delta - \epsilon) = +9.52036$$

$$\text{" " } \delta = +9.25559$$

$$\text{" Fraction} = +9.72477$$

$$\text{" cos } \beta = +9.59461$$

$$\text{" sin } \delta = \underline{9.92323}$$

$$\text{Sum} = \underline{9.57724}$$

$$\text{" cos } \delta = 9.25793$$

$$\text{" sin } \delta = \underline{9.99515}$$

$$\text{Sum} = \underline{9.25308}$$

$$\text{" Check} = +9.72476$$

U Y Cygni. (Antalgol)

205

$$R. A. = 20^h 52^m 16^s \checkmark = 313^\circ 4' 0'' \checkmark$$

$$Dec. = +30^\circ 3' 0'' \checkmark$$

$$\log \tan \delta = +9.76231 \checkmark$$

$$\text{" sin } \delta = \underline{+9.26366 \checkmark}$$

$$\text{" tan } \delta = \underline{+9.29265 \checkmark}$$

$$\delta = -32^\circ 22.5' \checkmark$$

$$\epsilon = \underline{23^\circ 27.1' \checkmark}$$

$$\delta - \epsilon = \underline{-61^\circ 49.6' \checkmark}$$

$$\text{" cos } (\delta - \epsilon) = +9.67404 \checkmark$$

$$\text{" tan } \epsilon = \underline{+0.02933 \checkmark}$$

$$\text{Sum} = \underline{+9.70340 \checkmark}$$

$$\text{" cos } \delta = \underline{+9.29430 \checkmark}$$

$$A = 327^\circ 12.3' \checkmark = \underline{+9.20910 \checkmark}$$

$$\log \sin A = \underline{+9.73371 \checkmark}$$

$$\text{" tan } (\delta - \epsilon) = \underline{+0.27116 \checkmark}$$

$$\text{" " } \beta = \underline{+0.00427 \checkmark}$$

$$\beta = \underline{+45^\circ 19.3' \checkmark}$$

$$\text{" cos } (\delta - \epsilon) = +9.67407 \checkmark$$

$$\text{" " } \delta = \underline{+9.29430 \checkmark}$$

$$\text{" Fraction} = \underline{+9.77977 \checkmark}$$

$$\text{" cos } \beta = \underline{+9.24703 \checkmark}$$

$$\text{" sin } A = \underline{+9.73371 \checkmark}$$

$$\text{Sum} = \underline{+9.52074 \checkmark}$$

$$\text{" cos } \delta = \underline{+9.93731 \checkmark}$$

$$\text{" sin } \delta = \underline{+9.26366 \checkmark}$$

$$\text{Sum} = \underline{+9.20097 \checkmark}$$

$$\text{" Check} = \underline{+9.77977 \checkmark}$$

Note.

V Virginis.
C. S. Star η in final notation is a Δ m. star
~~is~~ but is not on photographic enlargements as
such. For its place and number see Double
Sheets of comp. stars.

δ Cygni. Cerauti II. (Cerauti - Bluy'ko.) 207
 $19^h 42^m 44.^s + 32^\circ 27.4' (1900)$

$$R.A. = 19^h 42^m 44.^s = 295^\circ 41' 0."^v$$

$$Dec. = +32^\circ 27.4'$$

$$\log \tan \delta = +9.20346^v$$

$$" \sin \delta = \underline{+9.95422^v}$$

$$" \tan \delta = \underline{+9.24264^v}$$

$$\delta = -35^\circ 12.7^v$$

$$E = \underline{+23 \ 27.1^v}$$

$$\delta - E = \underline{-58 \ 39.2^v}$$

$$" \cos(\delta - E) = +9.71606^v$$

$$" \tan \delta = \underline{+0.31794^v}$$

$$\text{Sum} = \underline{+0.03400^v}$$

$$" \cos \delta = \underline{+9.91224^v}$$

$$\delta = 307^\circ 4.3' = \underline{+0.12176^v}$$

$$\log \sin \delta = \underline{+9.90194^v}$$

$$" \tan(\delta - E) = \underline{+0.21546^v}$$

$$" \tan \beta = \underline{+0.11740^v}$$

$$\beta = +52^\circ 39.1^v$$

$$" \cos(\delta - E) = +9.71606^v$$

$$" \cos \delta = \underline{+9.91224^v}$$

$$" \text{Fraction} = \underline{+9.20322^v}$$

$$" \cos \beta = +9.72294^v$$

$$" \sin \delta = \underline{+9.90194^v}$$

$$\text{Sum} = \underline{+9.62422^v}$$

$$" \cos \delta = +9.92624^v$$

$$" \sin \delta = \underline{+9.95422^v}$$

$$\text{Sum} = \underline{+9.22106^v}$$

$$" \text{Check} = \underline{+9.20322^v}$$

$$\lambda = 245.2^\circ$$

$$\beta = +66.2^\circ$$

Y Lyrae. (Antalgol)

$12^h 34^m 12^s + 43^\circ 51.2' (1900)$

Date	Time Long.	Long. 0 - α	Long. cos. Col. 3.	Long. R	Long. Final Ly.	Final Ly.	
Jan. 0	279.2	353.4	+9.9971	9.9927	+2.2225	-192	
10	289.4	3.6	+9.9991	9.9927	+2.2245	-193	-1
20	299.5	13.7	+9.9275	9.9930	+2.2732	-122	+6
30	309.7	23.9	+9.9611	9.9935	+2.2473	-177	+11
Feb. 9	319.2	34.0	+9.9126	9.9942	+2.2055	-161	+16
19	329.9	44.1	+9.2562	9.9951	+2.1440	-140	+22
Mar. 1	340.0	54.2	+9.7671	9.9961	+2.0559	-114	+24
11	350.0	64.2	+9.6327	9.9972	+1.9226	-25	+29
21	0.0	74.2	+9.4350	9.9984	+1.7261	-53	+32
31	9.2	84.0	+9.0192	9.9997	+1.3116	-20	+33
Apr. 10	19.6	93.2	u9.2213	0.0009	u1.1149	+13	+33
20	29.4	103.6	u9.3713	0.0022	u1.6662	+46	+33
30	39.2	113.4	u9.5990	0.0033	u1.2950	+74	+33
May 10	49.2	123.0	u9.7361	0.0043	u2.0331	+102	+30
20	59.5	132.7	u9.8313	0.0053	u2.1293	+135	+29
30	69.1	142.3	u9.8923	0.0060	u2.1970	+157	+27
June 9	77.6	151.2	u9.9451	0.0066	u2.2444	+176	+19
19	87.2	161.4	u9.9767	0.0070	u2.2764	+129	+13
29	96.7	170.9	u9.9945	0.0072	u2.2944	+197	+2
July 9	106.2	180.4	u0.0000	0.0072	u2.2999	+199	+2
19	115.2	190.0	u9.9934	0.0070	u2.2931	+196	-3
29	125.4	199.6	u9.9741	0.0066	u2.2734	+122	-2
Aug. 2	134.9	209.1	u9.9414	0.0060	u2.2401	+174	-14
12	144.5	218.7	u9.8923	0.0052	u2.1902	+155	-19
22	154.2	228.4	u9.8221	0.0043	u2.1191	+132	-23
Sept. 7	163.9	238.1	u9.7230	0.0032	u2.0129	+104	-22
17	173.6	247.2	u9.5773	0.0021	u1.8721	+74	-30
27	183.4	257.6	u9.3319	0.0009	u1.6255	+42	-32

Y Lyrae. (Antalgol)

209

Date.	Star's Long.	Long. 0 - 1. *	Log. cos. Col. 3	Log. R	Log. Final Sy.	Final Sy.	
Oct. 7	193.2	267.4	4.46567	9.9996	20.9490	+ 9	-1
17	203.2	277.4	+9.1099	9.9924	+1.4010	- 25	-34 +1
27	213.1	287.3	+9.4733	9.9972	+1.7632	- 52	-33 +2
Nov. 6	223.2	297.4	+9.6630	9.9961	+1.9512	- 29	-31 +2
16	233.2	307.4	+9.7235	9.9950	+2.0712	- 112	-29 +4
26	243.3	317.5	+9.2676	9.9942	+2.1545	- 143	-25 +5
Dec. 6	253.5	327.7	+9.9270	9.9935	+2.2132	- 163	-20 +4
16	263.6	337.2	+9.9666	9.9930	+2.2523	- 179	-16 +6
26	273.2	342.0	+9.9904	9.9927	+2.2752	- 129	-10

210 $\lambda = 327.2$
 $\beta = +45.3$

U Y Cygni. (Antalya)

$\log K99 = 2.6921$
 $\cos \beta = 9.2470$
 2.5451

Date	Long.	Lat. θ	Long. \cos	Lat. θ	Long. \cos	Lat. θ	Long. \cos	Lat. θ
Jan. 0	279.2	312.0	+9.4255	9.9927	+2.3633	-231	-42	
10	289.4	322.2	+9.2977	9.9927	+2.4355	-273	+9	
20	299.5	332.3	+9.9471	9.9930	+2.4252	-306	+9	
30	309.7	342.5	+9.9794	9.9935	+2.5120	-330	+10	
Feb. 9	319.2	352.6	+9.9964	9.9942	+2.5357	-343	+11	
19	329.9	2.7	+9.9995	9.9951	2.5397	-347	+12	
Mar. 1	340.0	12.2	+9.9291	9.9961	2.5303	-339	+10	
11	350.0	22.2	+9.9647	9.9972	2.5070	-321	+12	
21	0.0	32.2	+9.9246	9.9924	2.4621	-294	+9	
31	9.2	42.6	+9.2669	9.9997	2.4117	-252	+2	
Apr. 10	19.6	52.4	+9.7254	0.0009	2.3314	-214	+6	
20	29.4	62.2	+9.6622	0.0022	2.2161	-164	+5	
30	39.2	72.0	+9.4900	0.0033	2.0324	-109	+3	
May 10	42.2	21.6	+9.1646	0.0043	1.7140	-52	+1	
20	52.5	91.3	+2.3552	0.0053	0.9062	+2	0	
30	62.1	100.9	+9.2767	0.0060	1.2272	+67	-2	
June 9	77.6	110.4	+9.5423	0.0066	2.0940	+124	-3	
19	27.2	120.0	+9.6990	0.0070	2.2511	+172	-5	
29	96.7	129.5	+9.2035	0.0072	2.3552	+227	-7	
July 9	106.2	139.0	+9.2772	0.0072	2.4301	+269	-7	
19	115.2	142.6	+9.9312	0.0070	2.4233	+304	-2	
29	125.4	152.2	+9.9672	0.0066	2.5195	+331	-10	
Aug. 2	134.9	167.7	+9.9299	0.0060	2.5410	+342	-10	
12	144.5	177.3	+9.9995	0.0052	2.5492	+355	-10	
22	154.2	127.0	+9.9962	0.0043	2.5462	+352	-10	
Sept. 7	163.9	196.7	+9.9213	0.0032	2.5296	+339	-10	
17	173.6	206.4	+9.9522	0.0021	2.4994	+316	-9	
27	183.4	216.2	+9.9062	0.0009	2.4522	+224	-2	

U Y Cygni. (Antalgol)

211

Date	Star's Long.	Long. \odot - \times	Log. cos. Col. 3.	Log. R	Log. Final dy.	Final dy.	
Oct. 7	193.2	226.0	n 9.2412	9.9996	2.3265	+244	-40 ⁰ - ⁰
17	203.2	236.0	n 9.7476	9.9924	2.2911	+19 ⁶	-4 ⁰ - ⁶
27	213.1	245.9	n 9.6110	9.9972	2.1533	+142	-5 ³ - ⁴
Nov. 6	223.2	256.0	n 9.3237	9.9961	1.9249	+24	-5 ² - ²
16	233.2	266.0	n 2.2436	9.9950	1.3237	+24	-60 ⁰ - ¹
26	243.3	276.1	+ 9.0264	9.9942	1.5657	-37	-61 ⁰ + ¹
Dec. 6	253.5	286.3	+ 9.4422	9.9935	1.9262	-97	-60 ⁰ + ⁴
16	263.6	296.4	+ 9.6420	9.9930	2.1261	-153	-56 ⁰ + ³
26	273.4	306.6	+ 9.7754	9.9927	2.3132	-206	-53 ⁰

212 $\lambda = 307.1$
 $\beta = +52.7$

γ Cygni. (Caraski - Blajko) = Caraski II.

$\log 499 = 2.6981$
 $\cos \beta = 9.7229$
 2.4210

Date	Time Long.	Long. 0 - " *	Log. cos. Alt. 3.	Log. R	Log Final Sy.	Final Sy.	
Jan. 0	279.2	332.1	+9.9463	9.9927	2.4200	-263	
10	289.4	342.3	+9.9729	9.9927	2.4526	-224	-21
20	299.5	352.4	+9.9962	9.9930	2.4702	-295	+10
30	309.7	2.6	+9.9996	9.9935	2.4741	-292	-11
Feb. 9	319.2	12.7	+9.9292	9.9942	2.4644	-291	-3
19	329.9	22.2	+9.9647	9.9951	2.4402	-276	+7
Mar. 1	340.0	32.9	+9.9241	9.9961	2.4012	-252	+15
11	350.0	42.9	+9.2642	9.9972	2.3430	-220	+24
21	0.0	42.9	+9.7205	9.9924	2.2599	-122	+9
31	9.2	62.7	+9.6615	9.9997	2.1422	-139	+2
Apr. 10	19.6	72.5	+9.4721	0.0009	1.9600	-91	+43
20	29.4	82.3	+9.1271	0.0022	1.6103	-41	+42
30	39.2	92.1	+2.5640	0.0033	1.0423	+11	+52
May 10	42.2	101.7	+9.3070	0.0043	1.7923	+62	+51
20	52.5	111.4	+9.5622	0.0053	2.0425	+112	+50
30	62.1	121.0	+9.7112	0.0060	2.1922	+152	+46
June 9	77.6	130.5	+9.2125	0.0066	2.3001	+200	+42
19	87.2	140.1	+9.2249	0.0070	2.3729	+236	+36
29	96.7	149.6	+9.9352	0.0072	2.4240	+265	+29
July 9	106.2	159.1	+9.9704	0.0072	2.4526	+227	+22
19	115.2	168.7	+9.9915	0.0070	2.4795	+302	+15
29	125.4	172.3	+9.9992	0.0066	2.4274	+307	+6
Aug. 2	134.9	187.2	+9.9960	0.0060	2.4230	+304	-3
12	144.5	197.4	+9.9797	0.0052	2.4659	+292	-12
22	154.2	207.1	+9.9495	0.0043	2.4342	+272	-20
Sept. 7	163.9	216.2	+9.9035	0.0032	2.3277	+244	-22
17	173.6	226.5	+9.2372	0.0021	2.3209	+209	-35
27	183.4	236.3	+9.7442	0.0009	2.2261	+162	-41

Date	Lat Long.	Long. O - 1 *	Log. cor. Col. 3.	Log. R.	Log Final Ly	Final Ly.	
Oct. 7	193.2	246.1	9.6076	9.9996	2.0222	+123	-45 ⁰ -6 ⁰
17	203.2	256.1	9.3206	9.9924	1.2600	+7 ³	-5 ⁰ -2 ⁰
27	213.1	266.0	2.2436	9.9972	1.3212	+21	-5 ⁰ -1 ⁰
Nov. 6	223.2	276.1	+9.0264	9.9961	1.5035	-32	-5 ⁰ +2 ⁰
16	233.2	286.1	+9.4430	9.9950	1.9190	-23	-5 ⁰ +2 ⁰
26	243.3	296.2	+9.6449	9.9942	2.1201	-132	-49 ⁰ +4 ⁰
Dec. 6	253.5	306.4	+9.7734	9.9935	2.2479	-177	-45 ⁰ +6 ⁰
16	263.6	316.5	+9.2606	9.9930	2.3346	-216	-39 ⁰ +6 ⁰
26	273.2	326.7	+9.9221	9.9927	2.3952	-249	-33 ⁰ +6 ⁰

to Delphinus.

Observe this variable for rapidly varying parts of curve (for correction to period) from

-4^h 6^m to -1^h 24^m before minimum, and
+1 24 " +4 6 after "

Corvus is Var.

Observe this variable (for correction to period) from
-3^h 40^m to -1^h 40^m before minimum, and
+1 41 " +3 24 after "

U Cephei.

Breadth of curve when var. is equal to comp. star
is $3^h 30^m$

One half breadth of curve at same place = $1^h 45^m$

~~According to obs. on U Cephei made Sept. 8, 1900,
through more or less cloud, the correction to Hart-
wig's Ephemeris was $+1^h 30^m$~~

According to obs. of U. Cephei made Sept. 13,
1900, the correction to Hartwig's Ephemeris in V.J.
for 1900 was $+1^h 43^m$

From the above obs. on Sept. 13, 1900, the sidereal
time when U Cephei is equal to comp. star on
preceding side of curve is $21^h 14^m$
on following " " " " $1^h 44^m$

180708ae, proj. 1167

1902BAS, VOL. 186