1899phae.proj.1676.

KG
11366
v.672

Variable Stars.

Computations

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1078.

Variation of the magnetic needle is

1890 12.0° west.
1895 12.23 "
1900 12.4 "

* 30 Parker St. Inv. Williams Office Bay.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

γ Delphini.

Observe this variable for vertical parts of curve (for correction to period) from

$-4^h\ 19^m$ to $-1^h\ 41^m$ before minimum. – and

$+1^h\ 41^m$ " $+3^h$ v–o after " "

The Sid. Times when U Cephei for 1898 is equal to comp. star is about

$0^h\ 6^m$ (V.) on prec. side, and v

3 36 " " fol. " v

γ Delphini.

Observe this variable for vertical parts of curve (for correction to period) from.

$4^h\ 6^m$ to $1^h\ 24^m$ before minimum. – and

$1^h\ 24^m$ " $4^h\ 6^m$ after "

Cyrack's Var. (Dec. 19. 1899)

Observe this variable (for correction to period) from

$3^h\ 40^m$ to $1^h\ 48^m$ before minimum – and

1 41 " 3 24 after minimum

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj..1076.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Index.

Desig.	Page.
U Pegasi.	2.
R Delphini.	4.
Z Herculis.	30.
S Antliae.	34.
Y Aquilae.	50.
β Lyrae.	70.
o Ceti	100
R Virginis.	88.
Sapeluis.	92.
U Cephei.	62 cont. on p. 116 see p. 90 for corrected data.
S Cygni.	74.
U Vulpec.	70.
RS Sagittarii.	102.
R Delphini.	110. (Ephemeris) & p. 94
Sawyers Var.	80.
42° 3338	Ephemeris. p. 134. also. 141 also 196
T Monoc.	" " 188.
X Herculis	" P. 190
S Monoc.	" P. 192
Y Bootis	" P. 194
R Lyrae	" P. 200
Sawyers Var.	" P. 202. (41Z° 35-3-7).
Ephemeris of U Cephei for 1901.	P 214
" " η Aquilae	P. 156
" " δ Cephei.	P. 208
" " S Sagittae	P. 195
" " 78.1901	P. 14
Times Minima for S. U. Cygni (45° 3062)	P. 56

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

α Pegasi.

Groups in 1st, 3d, & 4th cols. are groups of p.p. 90 & 91. ~~4th~~ Cols. 2, 5, 6, & 7, are these same

Phase.	Diff Magn.	Mean of 5 groups (50 settings)				Phase.	Diff Magn.	Mean of 5 groups (50 settings)				Phase.	Diff. Magn.	Mean of 5 groups (50 settings)			
.0013	.96	.00430	6.1	.99		.0557	.50	.06061	27.3	.47		.1169	.46	.12172	55.3	.43	2
.0015	1.04	.00570	8.2	.98		.0582	.45	.06291	30.6	.47		.1182	.40	.12372	58.1	.43	
.0055	1.02	.00810	11.7	.96		.0605	.48	.06491	33.4	.44		.1232	.36	.12673	2.4	.44	
.0060	.95	.00990	14.3	.93		.0628	.45	.06711	36.6	.42		.1233	.46	.12913	5.9	.46	
.0074	.98	.01180	17.0	.90		.0657	.45	.06931	39.8	.42		.1266	.45	.13243	10.7	.47	
.0082	.90	.01430	20.6	.84		.0674	.40	.07111	42.4	.42		.1276	.44	.13523	14.7	.48	
.0134	.94	.01710	24.6	.80		.0679	.42	.07361	46.0	.42		.1332	.48	.13823	19.0	.49	
.0144	.86	.01900	27.3	.76		.0715	.38	.07611	49.6	.40		.1354	.44	.13983	21.3	.50	
.0156	.81	.02120	30.6	.74		.0739	.43	.07801	52.3	.42		.1401	.52	.14203	24.4	.52	
.0197	.71	.02340	33.7	.72		.0748	.46	.08021	55.4	.41		.1440	.53	.14333	26.3	.53	
.0223	.70	.02510	36.1	.71		.0799	.40	.08241	58.7	.39		.1415	.50	.14483	28.6	.54	
.0231	.73	.02730	39.3	.69		.0803	.34	.08392	0.9	.37		.1416	.53	.14653	31.0	.56	
.0255	.74	.02950	42.4	.67		.0812	.46	.08562	3.3	.40		.1462	.53	.14883	34.3	.57	
.0263	.72	.03150	45.3	.63		.0846	.37	.08742	5.9	.39		.1466	.56	.15013	36.1	.58	
.0282	.66	.03330	48.0	.61		.0860	.36	.08932	8.6	.40		.1483	.56	.15173	38.4	.60	
.0336	.59	.03560	51.3	.58		.0873	.33	.09112	11.1	.42		.1501	.61	.15313	40.4	.61	
.0337	.62	.03740	53.9	.54		.0887	.48	.09262	13.3	.44		.1527	.58	.15483	42.9	.63	
.0355	.56	.03920	56.4	.57		.0906	.39	.09502	16.9	.43		.1529	.57	.15643	45.2	.65	
.0355	.62	.04600	59.0	.57		.0940	.46	.09782	20.9	.43		.1545	.66	.15863	48.3	.68	
.0397	.52	.04791	1.7	.56		.0948	.42	.10022	24.3	.42		.1557	.64	.16063	51.3	.69	
.0425	.58	.04491	4.7	.56		.0949	.46	.10252	27.6	.42		.1588	.70	.16253	54.0	.71	
.0429	.58	.04631	6.7	.54		.1009	.43	.10502	32.3	.40		.1608	.70	.16403	56.1	.72	
.0445	.56	.04791	9.0	.53		.1046	.40	.10792	35.4	.39		.1633	.70	.16593	58.9	.73	
.0450	.54	.04971	11.6	.51		.1058	.40	.10942	37.6	.39		.1650	.73	.16734	0.9	.75	
.0494	.53	.05161	14.3	.49		.1065	.40	.11152	40.6	.40		.1651	.73	.16844	2.4	.76	
.0498	.48	.05291	16.1	.49		.1110	.38	.11362	43.6	.41		.1660	.74	.16964	4.3	.78	
.0509	.54	.05461	18.6	.48		.1115	.38	.11512	45.7	.41		.1701	.77	.17144	6.9	.80	
.0533	.46	.05651	21.3	.47		.1123	.40	.11742	49.0	.41		.1705	.77	.17244	8.3	.81	
.0548	.46	.05841	24.1	.47		.1164	.42	.11962	52.3	.42		.1705	.77	.17374	10.1	.82	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

α Pegasi

16 settings ~~chronologically~~ arranged by plate and copied from Book 6. groups combined in groups of 20 settings for plotting.

Phase	Diff Magn.	Mean of 5 group (80 settings)				Phase	Diff Magn.	Mean of 5 groups (80 settings)				Phase	Diff Magn.	Mean of 5 groups (80 settings)			
.1740	.85	.1756	4	12.9	.83	.2315	.52	.2356	5	39.3	.49	.3212	.52	.3248	7	47.7	.54
.1750	.82	.1779	4	16.1	.83	.2336	.52	.2377	5	42.3	.48	.3233	.58	.3267	7	50.4	.55
.1754	.84	.1795	4	18.4	.82	.2358	.52	.2405	5	46.3	.46	.3258	.50	.3284	7	52.9	.55
.1740	.82	.1811	4	20.7	.83	.2359	.44	.2431	5	50.0	.44	.3262	.55	.3297	7	54.7	.56
.1799	.80	.1832	4	23.9	.84	.2411	.43	.2465	5	55.0	.44	.3306	.56	.3325	7	58.9	.60
.1825	.87	.1849	4	26.3	.85	.2420	.48	.2489	5	58.4	.44	.3320	.58	.33398		0.9	.60
.1831	.79	.1861	4	25.0	.84	.2477	.44	.2517	6	2.4	.44	.3328	.66	.33528		2.7	.62
.1833	.88	.1880	4	30.7	.85	.2488	.40	.2535	6	5.0	.45	.3330	.58	.33728		5.6	.63
.1876	.84	.1902	4	33.9	.85	.2523	.44	.2556	6	8.0	.46	.3350	.60	.33928		8.4	.65
.1882	.87	.1920	4	36.4	.84	.2539	.45	.25756		10.9	.45	.3375	.60	.34138		11.4	.68
.1881	.80	.1946	4	40.3	.83	.2558	.48	.2594	6	13.6	.45	.3386	.68	.34368		14.5	.71
.1922	.88	.1979	4	45.0	.80	.2566	.47	.2615	6	16.6	.44	.3427	.68	.34598		18.1	.72
.1947	.85	.2006	4	48.9	.78	.2595	.46	.2640	6	20.1	.44	.3431	.67	.34808		21.1	.74
.1966	.78	.2037	4	53.3	.75	.2613	.38	.2671	6	24.6	.44	.3455	.78	.35018		24.1	.78
.2010	.85	.2066	4	57.6	.73	.2637	.45	.2710	6	30.3	.44	.3488	.72	.35218		27.0	.80
.2054	.66	.2094	5	1.6	.69	.2660	.44	.2753	6	36.4	.44	.3499	.75	.35418		29.9	.84
.2059	.75	.2117	5	4.9	.68	.2692	.48	.2794	6	42.3	.43	.3530	.80	.35598		32.4	.88
.2102	.72	.2141	5	8.3	.66	.2750	.44	.2840	6	49.0	.43	.3533	.84	.35748		34.7	.91
.2174	.66	.2160	5	11.0	.64	.2811	.40	.2876	6	54.1	.42	.3556	.88	.35988		38.1	.92
.2152	.67	.2183	5	14.3	.62	.2853	.43	.2909	6	58.9	.43	.3582	.94	.36198		41.1	.93
.2161	.58	.2199	5	16.7	.60	.2865	.42	.2938	7	3.0	.42	.3592	.94	.36398		44.0	.94
.2177	.66	.2214	5	18.9	.61	.2921	.44	.2969	7	7.6	.43	.3606	.93	.36618		47.1	.96
.2199	.62	.2234	5	21.7	.58	.2930	.43	.2994	7	11.1	.42	.3655	.93	.36838		50.3	.97
.2224	.58	.2252	5	24.3	.56	.2977	.43	.3033	7	16.7	.42	.3659	.92	.37018		53.4	.97
.2232	.58	.2268	5	26.6	.55	.2997	.39	.3046	7	23.0	.43	.3688	.98	.37258		56.4	1.00
.2242	.60	.2284	5	28.9	.54	.3019	.44	.3051	7	25.6	.46	.3701	1.02	.00000		00	1.00
.2274	.52	.2303	5	31.6	.52	.3047	.40	.3153	7	34.0	.48	.3719	.98	.00220		3.1	.99
.2289	.54	.2320	5	34.1	.52	.3124	.44	.3190	7	39.3	.51						
.2303	.50	.2333	5	36.0	.50	.3185	.50	.3217	7	43.3	.53						
						.3200	.53	.3233	7	45.6	.54						

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

W Delphini.

Phase	Diff. Magn.	Mean of 5 groups (80 Settings)			Curve
0.1567	9.49				
0.1655	+0.62	+.170	-.015	10.03	
0.1616	9.44				
0.1724	+0.54	+.148	-.018	9.96	
0.1716	9.76				
0.1824	+0.47	+.188	-.016	9.87	
0.1797	9.67				
0.1903	+0.38	+.201	-.021	9.70	
0.1861	9.49				
0.1969	+0.22	+.232	-.046	9.76	
0.1929	9.45				
0.2037	+0.18	+.241	-.044	9.71	
0.2047	9.47				
0.2155	+0.20	+.236	-.031	9.63	
0.2117	9.34				
0.2225	+0.08			9.59	
0.2291	9.33				
0.2696	+0.06				
0.2669	9.47				
0.2774	+0.20				
0.2719	9.39				
0.2824	+0.10				
0.2791	9.33				
0.2896	+0.06				
0.2859	9.39				
0.2964	+0.12				
2.0052	9.39				
2.0153	+0.12				
2.1622	9.33				
2.1730	+0.06				
3.1929	9.46				
3.2036	+0.21				
3.9999	9.35				
4.0106	+0.08				
4.4462	9.39				
4.4663	+0.12				
4.4601	9.33				
4.4703	+0.06				
4.4650	9.34				
4.4751	+0.07				
4.4691	9.39				
4.4792	+0.10				
4.4532	9.29				
4.4633	+0.02				
4.4429	9.29				
4.4530	+0.02				
4.4422	9.19				
4.4988	-0.08				
4.4962	9.29				
4.5043	+0.02				
4.5029	9.37				
4.5130	+0.10				
4.5118	9.45				
4.5219	+0.15				
4.5120	9.39				
4.5281	+0.12				
4.5222	9.17				
4.5329	-0.08				

Phase	Diff. Magn.	Mean of 5 groups (80 Settings)			Curve
4.5273	9.43				
4.5379	+0.16				
4.5370	9.49				
4.5467	+0.22				
4.5369	9.49				
4.5490	+0.22				
4.5496	9.55				
4.5597	+0.28	-.242	-.014		
-.1	10.21				
4.6570	+0.96	-.161	+.010	10.33	
-.1	10.49				
4.6579	+1.16	-.144	-.003	10.32	
-.1	10.46				
4.6661	+1.19	-.140	-.002	10.44	
-.1	10.52				
4.6707	+1.25	-.136	+.001	10.45	
-.1	10.57				
4.6766	+1.30	-.132	+.002	10.61	
-.1	10.68				
4.6821	+1.42	-.124	-.001	10.62	
					Curve .06
0.0033	+2.68	.0127	12.30	2.71	
0.0055	+2.69	.0166	12.36	2.73	
0.0152	+2.78	.0210	12.03	2.71	
0.0182	+2.72	.0234	12.02	2.67	
0.0212	+2.69	.0258	12.00	2.67	
0.0229	+2.78	.0292	11.99	2.64	
0.0265	+2.78	.0324	11.98	2.64	
0.0272	+2.76	.0350	11.95	2.55	
0.0305	+2.64	.0375	11.93	2.53	
0.0342	+2.76	.0405	11.83	2.46	
0.0347	+2.68	.0420	11.82	2.44	
0.0396	+2.61	.0435	11.81	2.44	
0.0401	+2.64	.0452	11.81	2.43	
0.0447	+2.31	.0476	11.71	2.36	
0.0479	+2.67	.0494	11.71	2.37	
0.0486	+2.68	.0514	11.71	2.32	
0.0481	+2.36	.0541	11.68	2.24	

Phase	Diff. Magn.	Mean 5 groups (80 Settings)			Curve
0.0519	+2.18	.0569	11.60	2.16	
0.0540	+2.36	.0594	11.57	2.10	
0.0561	+2.21	.0616	11.53	2.04	
0.0600	+2.08	.0640	11.45	1.97	
0.0621	+1.97	.0670	11.40	1.91	
0.0642	+1.90	.0705	11.36	1.85	
0.0655	+2.03	.0741	11.32	1.81	
0.0681	+1.88	.0775	11.28	1.74	
0.0703	+1.79	.0806	11.14	1.70	
0.0796	+1.64	.0828	11.04	1.65	
0.0818	+1.70	.0849	11.00	1.63	
0.0827	+1.70	.0868	10.98	1.62	
0.0836	+1.65	.0887	10.96	1.52	
0.0864	+1.54	.0909	10.92	1.51	
0.0902	+1.54	.0928	10.85	1.51	
0.0909	+1.65	.0940	10.83	1.49	
0.0924	+1.54	.0958	10.81	1.42	
0.0947	+1.60	.0976	10.77	1.41	
0.0956	+1.54	.0990	10.75	1.43	
0.0964	+1.60	.1018	10.75	1.36	
0.1001	+1.32	.1045	10.68	1.33	
0.1012	+1.50	.1069	10.67	1.31	
0.1016	+1.37	.1093	10.65	1.22	
0.1096	+1.20	.1118	10.53	1.20	
0.1098	+1.24	.1131	10.53	1.17	
0.1124	+1.22	.1157	10.50	1.14	
0.1129	+1.08	.1167	10.49	1.10	
0.1145	+1.27	.1182	10.48	1.12	
0.1107	+1.03	.1196	10.45	1.08	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

H Delphini:

				Curve					Curve							
		10.39					9.46				0.2278	0.24	.2379	9.51		0.18
.16	0.1198	1.12	.1213	10.40	1.04	0.1689	0.59	.1763	9.90	0.61	0.2338	0.22	.2422	9.48		0.19
		10.28					9.91							9.38		
.10	0.1204	1.01	.1229	10.40	1.03	0.1738	0.64	.1767	9.86	0.60	0.2391	0.10	.2461	9.46		0.18
		10.46					9.94							9.50		
.04	0.1206	1.14	.1247	10.38	1.05	0.1752	0.62	.1746	9.85	0.59	0.2438	0.23	.2492	9.45		0.21
		10.34					9.89							9.40		
.97	0.1218	1.07	.1260	10.38	1.00	0.1768	0.62	.1810	9.83	0.57	0.2459	0.13	.2529	9.44		0.20
		10.29					9.79							9.56		
.91	0.1242	1.02	.1281	10.35	1.00	0.1769	0.52	.1833	9.83	0.52	0.2492	0.29	.2566	9.43		0.19
		10.14					9.89							9.44		
.87	0.1240	0.83	.1294	10.30	0.99	0.1809	0.57	.1857	9.80	0.49	0.2531	0.17	.2600			0.18
		10.37					9.84							9.49		
.81	0.1241	1.10	.1309	10.30	0.99	0.1830	0.52	.1881	9.78	0.46	0.2557	0.22	.2637			0.19
		10.27					9.72							9.44		
.74	0.1244	0.96	.1327	10.30	0.96	0.1876	0.51	.1904	9.75	0.42	0.2619	0.17	.3956			0.18
		10.32					9.71							9.32		
.70	0.1320	1.04	.1344	10.26	0.97	0.1880	0.44	.1920	9.75	0.43	0.2631	0.10	.2727			0.17
		10.03					9.67							9.51		
.65	0.1327	0.76	.1361	10.25	0.91	0.1889	0.40	.1934	9.74	0.41	0.2672	0.25	.6604			0.16
		10.24					9.66							9.49		
.63	0.1332	0.97	.1383	10.25	0.96	0.1932	0.32	.1957	9.71	0.37	0.2716	0.22	.7946			0.12
		10.21					9.63							9.46		
.62	0.1360	0.95	.1409	10.21	0.89	0.1951	0.36	.1971	9.70	0.38	0.9153	0.17	.9244	+		0.11
		10.32					9.62							9.32		
.52	0.1380	1.09	.1433	10.19	0.89	0.1957	0.32	.1992	9.69	0.32	0.9215	0.10	1.1208	+		0.08
		10.67					9.63							9.34		
.51	0.1404	0.80	.1447	10.17	0.79	0.1969	0.36	.2018	9.68	0.31	0.9292	0.07	1.3129	+		0.07
		10.16					9.69							9.33		
.51	0.1440	0.89	.1457	10.13	0.79	0.1987	0.22	.2044	9.67	0.31	0.9362	0.06	1.5049	+		0.05
		9.99					9.69							9.42		
.49	0.1462	0.72	.1489	10.11	0.77	0.2001	0.42	.2068	9.66	0.32	0.9427	0.17	1.6968	+		0.07
		10.04					9.63							9.29		
.42	0.1479	0.74	.1508	10.09	0.72	0.2059	0.36	.2094	9.62	0.32	1.8476	0.00	1.8887			0.04
		10.07					9.77							9.32		
.47	0.1492	0.80	.1518	10.08	0.80	0.2076	0.50	.2120	9.61	0.32	1.8822	0.02	2.0431			0.05
		10.04					9.62							9.37		
.43	0.1500	0.74	.1533	10.07	0.72	0.2100	0.32	.2147	9.60	0.32	1.8891	0.04	2.1971			0.09
		10.07					9.55							9.34		
.36	0.1512	0.80	.1553	10.06	0.76	0.2106	0.24	.2163	9.60	0.33	1.8979	0.07	2.3509			0.06
		10.03					9.69							9.29		
.33	0.1541	0.76	.1573	10.03	0.72	0.2129	0.42	.2190	9.58	0.32	1.9022	0.02	2.4044			0.06
		10.14					9.62							9.38		
.31	0.1545	0.83	.1592	10.03	0.73	0.2190	0.32	.2211	9.56	0.29	2.6462	0.06	2.6541			0.07
		9.96					9.56							9.34		
.22	0.1566	0.69	.1616	10.01	0.70	0.2198	0.29	.2226	9.55	0.28	2.6522	0.04	3.0363			0.13
		10.06					9.57							9.36		
.20	0.1601	0.79	.1634	9.98	0.68	0.2200	0.30	.2241	9.55	0.27	2.6540	0.09	3.4162			0.20
		9.94					9.58							9.34		
.17	0.1612	0.64	.1653	9.97	0.63	0.2238	0.26	.2257	9.54	0.24	2.6639	0.04	3.7917			0.23
		9.91					9.52							9.35		
.14	0.1634	0.64	.1664	9.94	0.62	0.2236	0.27	.2277	9.53	0.22	2.6700	0.04	4.1700			0.27
		10.04												9.64		
.10	0.1662	0.73	.1688	9.92	0.62	~~0.2278~~	~~0.26~~				4.5373	0.33	4.5499			0.29
		9.86					9.53							9.43		
.12	0.1677	0.79	.1706	9.90	0.61	0.2261	0.26	.2304	9.52	0.19	4.5457	0.40	4.5572			0.26
		9.83					9.10							9.48		
.08	0.1677	0.76	.1712	9.90	0.62	0.2276	0.17	.2342	9.51	0.18	4.5586	0.21	4.5772			0.24

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

γ Delphini.

	9.57	0.2441				10.08	-0.1879				10.44	-0.1408			
K.rrrr	0.30	K.r620	0.2r	4.6130	0.73	K.6102	0.6a	4.6594	1.18	K.6653	1.21	K.			
	9.43	-0.2404			9.93	-0.1854				10.49	-0.1387				
K.rr92	0.16	K.r6r7	0.2?	4.6165	0.66	4.6207	0.6a	4.6641	1.22	4.6674	1.22	K.			
	9.rr	-0.2376			9.26	-0.1836				10.49	-0.1373				
K.r624	0.2K	K.r691	0.32	4.6177	0.59	K.622r	0.69	4.6653	1.17	K.66aa	1.21	K.			
	9.rr	-0.2339			9.24	-0.1811				10.rr	-0.1361				
K.r6K9	0.20	K.r722	0.3r	4.6212	0.67	K.62r0	0.77	4.6687	1.24	4.6700	1.27	K.			
	9.rr	-0.2306			10.02	-0.1792				10.49	-0.1353				
K.r6a2	0.20	K.r7rr	0.39	4.6228	0.75	K.6269	0.80	4.6691	1.22	4.6706	1.27	K.			
	9.6a	-0.2279			10.01	-0.1796				10.r4	-0.1341				
K.r7K0	0.K	K.r7a2	0.Kr	4.6253	0.74	K.62ar	0.81	4.6700	1.24	4.6720	1.29	K.			
	9.67	-0.2261			9.9a	-0.1764				10.K7	-0.1328				
K.r763	0.K0	K.rra00	0.K1	4.6257	0.71	4.6297	0.82	4.6707	1.17	4.6733	1.31	K.			
	9.62	-0.2244			10.27	-0.1743				10.7r	-0.1316				
K.r777	0.36	4.5820	0.K1	4.6301	1.00	K.631a	0.8r	4.6717	1.48	K.67Kr	1.3K	K.			
	9.76	-0.2221			10.07	-0.1731				10.rr	-0.1304				
K.rA1K	0.K	9K.r8K0	0.K2	4.6308	0.80	K.6330	0.80	4.6725	1.24	K.67r7	1.30	K.			
	9.72	-0.2205			10.09	-0.1719				10.57	-0.1288				
K.rA19	0.Kr	K.rAr6	0.Kr	4.6308	0.82	K.63K2	0.83	4.6751	1.30	K.6773	1.3K	K.			
	9.64	-0.2185			10.04	-0.1705				10.63	-0.1276				
K.rA2a	0.3	K.rA76	0.K8	4.6310	0.74	K.63r6	0.86	4.6765	1.35	K.67Ar	1.39	K.			
	9.67	-0.7165			10.17	-0.1691r				10.64	-0.1259				
K.rA63	0.K0	K.rA96	0.K0	4.6362	0.84	4.6370	0.89	K.6769	1.3K	4.6802	1.4K	K.			
	9.67	-0.2149			10.06	-0.1684				10.r3	-0.1243				
K.rA77	0.K0	4.5912	0.K2	4.6362	0.79	K.6377	0.90	K.677r	1.26	K.6A1a	1.46	K.			
	9.73	-0.2135			10.22	-0.1673				10.7K	-0.1223				
K.rA9r	0.K6	K.r926	0.Krr	4.6369	0.95	K.63aa	0.91	K.6A07	1.K7	K.6A3a	1.r2	K.			
K.r923	0.37	K.r9K3	0.K7		10.24	-0.1664				10.79	-0.1202				
K.r92r	0.3a	K.r9rK	0.r0	4.6376	0.94	K.6397	0.90	K.6A09	1.r2	K.6Arg	1.r3	K.			
	9.74	-0.2093			10.20	-0.1646				10.29	-0.1180				
K.rg Kr	0.K7	K.r96a	0.r2	4.6379	0.93	K.64rr	0.89	K.6AKa	1.62	K.6AA1	1.rK	K.			
	9.a3	-0.2081			10.17	-0.1628				10.69	-0.1165				
K.rgK9	0.r6	4.r980	0.r3	4.6400	0.90	4.6433	0.91	K.6Ar3	1.K2	4.6896	1.r3	K.			
	9.ar	-0.2067			10.12	-0.1612				10.a3	-0.1143				
K.rg7K	0.rA	K.r99K	0.rK	4.6415	0.85	K.6449	0.93	K.6A73	1.r6	4.6916	1.60	K.			
	9.77	-0.2057			10.13	-0.1598				10.91	-0.1120				
K.rg7a	0.r0	K.600K	0.rK	4.6417	0.86	K.6463	0.9r	K.6911	1.6K	4.69K1	1.63	K.			
	9.77	-0.2047			10.14	-0.1584				10.7K	-0.1105				
K.rg97	0.r0	K.601K	0.rA	4.6462	0.92	K.6K77	0.99	K.6920	1.K7	4.69r6	1.6r	K.			
	9.75	-0.2035			10.27	-0.1573				10.Ar	-0.1088				
4.6001	0.50	K.6026	0.r9	4.6471	1.00	K.6KAA	1.02	K.6921	1.rA	K.6973	1.72	K.			
	9.a9	-0.2020			10.27	-0.1562				11.03	-0.1666				
4.6022	0.62	4.6041	0.r9	4.6479	1.00	4.6499	1.01	K.6966	1.76	4.6995	1.77	K.			
	9.a6	-0.2007			10.2r	-0.1549				10.97	-0.1646				
4.6023	0.59	K.60rK	0.r7	4.6484	0.98	K.6r72	1.01	K.69Ar	1.70	K.706r	1.80	K.			
	9.9K	-0.1993			10.37	-0.1533				10.99	-0.1024				
4.6027	0.68	4.6068	0.61	4.6488	1.04	K.6r2a	1.03	K.69a6	1.72	K.7037	1.84	K.			
	9.a1	-0.1977			10.33	-0.1513				10.09	-0.0994				
4.6056	0.54	K.60aK	0.r9	4.6520	1.06	K.6r4a	1.06	K.700r	1.a2	K.7067	1.87	K.			
	9.77	-0.1963			10.22	-0.1498				11.13	-0.0964				
4.6076	0.50	4.6090	0.60	4.6524	0.95	K.6r63	1.09	K.7032	1.a6	K.7097	1.93	K.			
	9.a2	-0.1952			10.29	-0.1484				11.18	-0.0934				
4.6087	0.55	4.6109	0.6K	4.6542	1.02	4.6577	1.13	K.706r	1.92	4.7127	1.97	K.			
	10.03	-0.1936			10.37	-0.1465				11.16	-0.0899				
4.6092	0.76	K.612r	0.66	4.6566	1.10	4.6596	1.17	K.7096	1.a9	K.7162	2.02	K.			
	9.a9	-0.1919			10.K3	-0.1447				11.1r	-0.0862				
4.6110	0.62	K.61K2	0.63	4.6590	1.16	K.661K	1.19	K.713a	1.aa	4.7199	2.11	K.			
	9.a2	-0.1899			10.K7	-0.1428				11.37	-0.0829				
4.6124	0.55	K.6162	0.6K	4.6591	1.20	4.6633	1.20	K.71r3	2.0a	K.7232	2.20	K.			

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

4r Delphini.

		11.33	-0.0794			11.63					9.94				
1.21	K7142	2.06	K7267	2.27	0.0542	2.36	0.0601	2.2v	0.1vK1		0.71	0.1633		0.70	
		11.47	-0.0758			11.v4					10.07				
1.22	K72K2	2.20	4.7303	2.32	0.0559	2.27	0.0631	2.1A	0.1vvA		0.A0	0.16Av		0.6A	
		11.v9	-0.0717			11.vv					9.97				
1.21	K72A1	2.32	K7284	2.39	0.0593	2.28	0.06v9	2.12	0.1609		0.70	0.17K3		0.61	
		11.v9	-0.0675			11.39					9.89				
1.27	K7304	2.32	K7386	2.46	0.0634	2.12	0.0646	2.0v	0.1706		0.62	0.1796		0.vK	
		11.74	-0.0609			11.49					9.93				
1.27	K7327	2.KK	K7Kv2	2.v3	0.0648	2.22	0.0717	1.99	0.17v2		0.66	0.1AK1		0.v7	
		11.61	+0.0538			11.27					9.87				
1.29	K7363	2.3K	K7v23	2.62	0.0689	2.00	0.07v6	1.89	0.1A01		0.60	1.062K		0.v0	
		11.79	-0.0471			11.24					9.7v				
1.31	K7KKK	2.v2	4.7590	2.72	0.0729	1.97	0.0A39	1.1v	0.1AK6		0.K4	1.9K11		0.KK	
		11.94	-0.0397			11.19					9.A2				
1.3K	K7K9K	2.67	K7664	2.7A	0.0731	1.92	0.0919	1.60	0.1AAK		0.vv	2.A200		0.K1	
		11.9K	-0.0328			11.99					9.A2				
1.30	K7633	2.67	K7733	2.A0	0.0787	1.82	0.100v	1.Kv	0.1920		0.vv	3.699v		0.37	
		12.17	-0.0278			11.01			-0.2393		9.vA	-0.2271			
1.3K	K7679	2.90	K77A3	2.Av	0.0842	1.74	0.10AK	1.33	K.v664		0.31	Kv790		0.3v	
		12.12	-0.0218			10.v6			-0.2323		9.v7	-0.2222			
1.39	K7694	2.Av	K7AK3	2.79	0.1106	1.29	0.1160	1.21	K.v734		0.30	Kv439		0.37	
		12.07	-0.0148			10.v1			-0.2271		9.60	-0.2174			
1.KK	K7A16	2.A0	4.7913	2.A1	0.1128	1.24	0.1183	1.16	K.v790		0.33	Kv4AK		0.40	
		12.08	-0.0093			10.43			-0.2200		9.6K	-0.2139			
1.46	K7A01	2.36	K7968	2.79	0.1161	1.16	0.1213	1.12	K.v4A61		0.37	Kv922		0.KK	
		12.07	-0.0040			10.49			-0.2167		9.69	-0.2107			
1.v2	K7A43	2.A0	K8021	2.A2	0.1183	1.22	0.1236	1.10v	K.v49K		0.K2	Kv9vK		0.K7	
		11.97	+0.0027			10.39			-0.2147		9.72	-0.2078			
1.3v	K7996	2.74	K80A8	2.A1	0.1221	1.12	0.1259	1.07	K.v91K		0.Kv	Kv9A3		0.v1	
		12.26	+0.0081			10.33			-0.2098		9.69	-0.2048			
1.vK	K80K7	2.99	K81K2	2.77	0.1223	1.06	0.1279	1.06	K.v963		0.K2	K6013		0.v2	
									-0.2083		9.A3	-0.2023			
1.v3					0.1276	1.0K	0.1302	1.0v	K.v97A		0.v6	K6034		0.vK	
						10.31			-0.2042		9.79	-0.1996			
1.60					0.1278	1.0K	0.1317	1.0K	K.6019		0.v2	K6064		0.vv	
						10.34			-0.2029		9.Av	-0.1974			
1.63	0.0036	12.02	2.75	0.0107	2.77	0.1299	1.11	0.133K	1.02	K.60K2		0.vA	K6042		0.v7
						10.36			-0.1996		9.77	-0.1955			
1.6v	0.0043	12.06	2.79	0.0151	2.7A	0.1320	1.03	0.13v2	1.01	K.606v		0.v0	K6106		0.v7
						10.29			-0.1976		9.A1	-0.1933			
1.72	0.0102	12.09	2.82	0.0202	2.7A	0.1336	1.02	0.1364	0.9A	K.60Av		0.vK	K6124		0.60
						10.27			-0.1948		9.A0	-0.1914			
1.77	0.0163	12.09	2.82	0.0244	2.7v	0.1373	1.00	0.1382	0.9v	K.6113		0.6	K6143		0.63
						10.23			-0.1932		9.26	-0.1896			
1.80	0.0193	11.94	2.67	0.0247	2.70	0.1362	0.96	0.1400	0.92	K.6129		0.v9	K6165		0.64
						10.29			-0.1922		9.Av	-0.1874			
1.AK	0.0253	12.09	2.82	0.0340	2.6A	0.1347	1.02	0.1420	0.90	K.6139		0.vA	K6167		0.6v
						10.1A			-0.1889		9.9v	-0.1850			
1.A7	0.0298	12.02	2.75	0.0389	2.60	0.1401	0.91	0.1441	0.Av	K.6172		0.6A	K6211		0.6A
						10.1v			-0.1880		9.9K	-0.1826			
1.93	0.0312	11.9v	2.68	0.0433	2.v3	0.1406	0.9A	0.1467	0.Av	K.6181		0.67	K6235		0.69
						10.0A			-0.1856		9.97	-0.1799			
1.97	0.0377	11.A7	2.60	0.0479	2.K7	0.1KKv	0.A1	0.1494	0.A2	K.6207		0.70	K6262		0.71
						10.17			-0.1823		9.AA	-0.1776			
1.02	0.0460	11.A3	2.56	0.0522	2.K0	0.1Kv9	0.90	0.1v17	0.A2	K.6234		0.61	K6292		0.7v
						10.00			-0.1804		10.03	-0.1756			
1.11	0.0497	11.67	2.40	0.0564	2.3v	0.1K9v	0.73	0.1vK7	0.7A	K.6297		0.76	K6305		0.A0
						10.21			-0.1767		9.99	-0.1732			
1.20	0.0521	11.70	2.43	0.0576	2.29	0.1v30	0.94	0.1v49	0.7v	K.6299		0.72	K6329		0.81

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

κ Delphini

	10.0 v	-0.1713				10.71	-0.1155					11.7 v	-0.0578		
K.631K	0.78	K.63K8	0.82	K.626K	1.KK	K.6906	1.0K	K.7K00			2.K8	K.7K83		262
	10.1K	-0.1699				10.49	-0.1137					11.8 v	-0.0512		
K.6320	0.88	K.6362	0.88	K.6901	162	K.6926	1.v7	K.7K0v			2.v8	K.7v49		267	
	10.1 v	-0.1676				10.79	-0.1125					11.89	-0.0432		
K.633A	0.8A	K.636v	0.89	K.6913	1.v2	K.6936	1.v8	K.7Kv8			262	K.7629		271	
	10.09	-0.1653				10.8v	-0.1118					11.9 v	-0.0353		
K.6380	0.82	K.6K06	0.87	K.6922	1.v8	K.69v1	1.63	K.7K7K			268	K.7704		273	
	10.17	-0.1641				10.82	-0.1092					11.99	-0.0276		
K.6386	0.90	K.64K0	0.89	K.6931	1.vv	K.6969	1.67	K.768A			2.72	K.77Av		27K	
	10.18	-0.1620				10.83	-0.1074					12.03	-0.0228		
K.6386	0.91	K.64K1	0.90	K.69v1	1.v6	K.6982	1.70	K.772A			2.06	K.7833		27v	
	10.19	-0.1598				10.9v	-0.1057					12.03	-0.0174		
K.6K36	0.92	K.6K63	0.91	K.6963	1.62	K.7004	1.7K	K.7A03			2.76	K.7A87		278	
	10.06	-0.1572				11.0K	-0.1036					12.02	-0.0126		
K.6KK3	0.79	K.6K89	0.94	K.6990	1.77	K.702v	1.79	K.7Av7			2.7v	K.7939		279	
	10.20	-0.1546				11.06	-0.1020					11.98	-0.0089		
K.6KK8	0.93	K.6v1v	1.01	K.7011	1.77	K.7041	1.81	K.7A79			2.71	K.7997		2A0	
	10.2K	-0.1517				10.98	-0.1004					12.03	-0.0042		
K.6K92	0.97	K.6vKK	1.0K	K.7021	1.71	K.7077	1.2K	K.7917			2.76	K.8019		2A1	
	10.19	-0.1489				11.0v	-0.0989					12.19	-0.0004		
K.6K97	0.92	K.6v67	1.07	K.7037	1.78	K.7072	1.8A	K.7998			2.92	K.80v7		2A2	
	10.37	-0.1470				11.17	-0.0973					12.07			
K.6v6v	1.10	K.6v91	1.11	K.7066	1.90	K.7088	1.92	K.8042			2.8080	0.0029		2A0	
	10.41	-0.1453		K.7068		11.2K	K.7108	-0.0939	1.9v						
K.6v73	1.1K	K.6608	1.11	K.7091	1.92	K.7122	1.98	K.8042			2.8080	0.0060		2A0	
	10.34	-0.1437				11.17	-0.0922								
K.6v9K	1.07	K.662K	1.11	K.7096	1.90	K.7139	2.00								
	10.37	-0.1424				11.27	-0.0900								
K.660K	1.10	K.6637	1.13	K.7120	2.08	K.7161	2.0v								
	10.40	-0.1410				11.3v	-0.0882								
K.661K	1.13	K.66v7	1.1K	K.71Kv	2.0A	K.7179	2.09								
	10.40	-0.1394				11.2A	-0.0869								
K.66K9	1.13	K.6670	1.1v	K.71v7	2.01	K.7192	2.10								
	10.37	-0.1378				11.29	-0.0854								
K.66v7	1.10	K.6683	1.17	K.7176	2.02	K.7207	2.1K								
	10.47	-0.1352				11.43	-0.0837								
K.66v7	1.20	K.6709	1.21	K.7208	2.16	K.7224	2.19								
	10.42	-0.1326				11.44	-0.0825								
K.667v	1.1v	K.673v	1.2K	K.7210	2.17	K.7236	2.22								
	10.4v	-0.1304				11.41	-0.0810								
K.6711	1.18	K.67v7	1.29	K.7211	2.1K	K.72v1	2.26								
	10.42	-0.1288				11.49	-0.0788								
K.671v	1.21	K.6773	1.3K	K.7220	2.24	K.7273	2.31								
	10.59	-0.1274				11.vv	-0.0765								
K.67Av	1.32	K.6790	1.36	K.7263	2.28	K.7293	2.3K								
	10.60	-0.1259				11.v7	-0.0755								
K.67A7	1.33	K.6A02	1.39	K.7270	2.30	K.7306	2.3v								
	10.70	-0.1245				11.62	-0.0739								
K.67A7	1.K3	K.6A16	1.K3	K.72A3	2.3v	K.7322	2.37								
	10.67	-0.1231				11.6v	-0.0718								
K.6792	1.K0	K.6A30	1.KK	K.7323	2.38	K.73K3	2.39								
	10.61	-0.1216				11.6K	-0.0702								
K.6A01	1.3K	K.6A4v	1.4v	K.7329	2.37	K.7359	2.41								
	10.73	-0.1196				11.62	-0.0686								
K.6A4v	1.K6	K.6A6v	1.v0	K.7330	2.3v	K.7374	2.K6								
	10.A1	-0.1183				11.64	-0.0661								
K.6Av3	1.vK	K.6A7A	1.v2	K.73v2	2.K1	K.7404	2.v1								
	10.73	-0.1169				11.73	-0.0636								
K.6A60	1.K6	K.6A9v	1.v2	K.73A7	2.K6	K.7K2v	2.v4								

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

W Delphini.

Correction to curve (as obtained from groups of 20 settings.)

Phase.	Obs. Mags.	Curve Mags.	C − O
	11.9 v		
.0033	2.62	12.07	+0.12
	12.16		
.004 vv	2.09	12.06	−0.10
	12.0 v		
.01 vv	2.76	12.03	−0.02
	11.79		
.01 4v	2.vv2	12.02	+0.23
	11.96		
.0212	2.69	12.00	+0.04
	12.0 v		
.0229	2.72	11.99	−0.06
	12.0 v		
.026 v	2.76	11.97	−0.04
	11.73		
.027 4	2.46	11.9 v	+0.22
	11.91		
.030 4	2.64	11.93	+0.02
	11.43		
.034 v	2.v6	11.44	+0.01
	11.7 v		
.0347	2.44	11.42	+0.07
	11.64		
.0396	2.41	11.41	+0.13
	11.41		
.0401	2.v4	11.41	000
	11.v4		
.04vv	2.31	11.72	+0.14
	11.74		
.04v9	2.47	11.72	−0.02
	11.7 v		
.046 v	2.44	11.72	−0.03
	11.63		
.0441	2.36	11.64	+0.0 v
	11.4 v		
.0519	2.14	11.61	+0.16
	11.63		
.0v44	2.36	11.v4	−0.0 v
	11.44		
.0v61	2.21	11.v4	+0.06
	11.3 v		
.0600	2.04	11.4v	+0.10
	11.24		
.0621	1.97	11.40	+0.16
	11.17		
.0642	1.90	11.36	+0.19
	11.30		
.06 vv	2.03	11.33	+0.03
	11.1 v		
.0641	1.42	11.20	+0.13
	11.06		
.07 v3	1.79	11.14	+0.08
	10.91		
.0796	1.64	11.04	+0.13
	10.97		
.0841	1.70	11.00	+0.03

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Z Herculis.

Method of overlapping means applied to means of 50 settings by phase.

Mean of 50 settings.	do.	Overlapping means 400 settings		Mean of 50 settings.		Overlapping means 400 settings	
0.0095	1.98			3.8803	2.50	3.8892	2.62
0.0252	1.98			3.8852	2.41	3.8947	2.39
0.8572	2.69	1.6217	2.74	3.8889	2.41	3.8993	2.38
1.6455	2.70	1.8209	2.71	3.8947	2.42	3.9039	2.36
1.8546	2.75	1.8806	2.74	3.8999	2.37	3.9083	2.33
1.8694	2.77	1.8926	2.72	3.9050	2.36	3.9125	2.31
1.8818	2.77	1.9050	2.70	3.9082	2.35	3.9165	2.28
1.8934	2.70	1.9156	2.68	3.9117	2.28	3.9207	2.24
1.9029	2.71	1.9256	2.67	3.9169	2.30	3.9252	2.21
1.9154	2.67	1.9356	2.67	3.9207	2.25	3.9293	2.17
1.9266	2.67	1.9453	2.67	3.9244	2.20	3.9336	2.14
1.9345	2.63	1.9537	2.64	3.9300	2.16	3.9381	2.12
1.9446	2.67	1.9635	2.64	3.9341	2.14	3.9422	2.09
1.9515	2.63	1.9737	2.64	3.9374	2.10	3.9461	2.04
1.9641	2.64			3.9420	2.11	3.9500	2.06
1.9739	2.63			3.9469	2.08	3.9541	2.04
1.9836	2.63			3.9504	2.04	3.9581	2.02
1.9956	2.69			3.9536	2.06	3.9621	2.01
3.0708	2.63	3.6655	2.64	3.9573	2.00	3.9668	1.99
3.7930	2.67	3.8172	2.69	3.9625	2.00	3.9727	1.99
3.8119	2.72	3.8270	2.64	3.9667	2.01	3.9807	1.99
3.8193	2.70	3.8346	2.65	3.9705	1.99	3.9909	1.98
3.8275	2.68	3.8455	2.61	3.9769	1.96		
3.8342	2.69	3.8534	2.58	3.9870	1.99		
3.8420	2.63	3.8630	2.55				
3.8502	2.56	3.8717	2.50				
3.8684	2.51	3.8794	2.47				
3.8743	2.53	3.8845	2.45				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of

7 B. 1201 Cygni.

From Nach. d h m d h m

Prin. Min. = 1901 Sept 7 9 43 G.M.T. + 3 10 49 E

Epoch	G.M.T. Min.	Epoch.	G.M.T. Min.
23	241 5714.7710	139	241 6115.0522
24	5718.2217	140	6118.5029
25	5721.6724	141	6121.9536
26	5725.1231	142	6125.4043
27	5728.5738	143	6128.8550
28	5732.0245	144	6132.3057
29	5735.4752	145	6135.7564
30	5738.9259	146	6139.2071
31	5742.3766	147	6142.6578
32	5745.8273	148	6146.1085
33	5749.2780	149	6149.5592
34	5752.7287	150	6153.0099
35	5756.1794	151	6156.4606
36	5759.6301	152	6159.9113
37	5763.0808	153	6163.3620
38	5766.5315	154	6166.8127
39	5769.9822	155	6170.2634
40	5773.4329		
41	5776.8836		
42	5780.3343		
43	5783.7850		
60	5842.4469		
135	6101.2494		
136	6104.7001		
137	6108.1508		
138	6111.6015		

Superseded see next page

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of U. W. Cygni (1900)

Ep 0 = 241 5635.4050 + 3.4510 E.

Date	H.	Ld. Eq.	Ep.	G.M.T. Min.	Corr. G.M.T. Min.
Oct	10 – 15	- .0017	11	5673.3660	5673.3643
	10 – 16	- .0017	11	5673.3660	5673.3643
	10 – 18	- .0015	11	5673.3660	5673.3645
	10 – 21	- .0014	12	5676.8170	5676.8156
	10 – 25	- .0013	13	5680.2680	5680.2667
	10 – 26	- .0012	14	5683.7190	5683.7178
	10 – 29	- .0010	15	5687.1700	5687.1690
	10 – 30	- .0010	15	5687.1700	5687.1690
	10 – 31	- .0010	15	5687.1700	5687.1690
	11 – 1	- .0009	15	5687.1700	5687.1691
			16	5690.6210	5690.6201
	11 – 15	- .0002	20	5704.4250	5704.4248
	12 – 2	+ .0007	24	5718.2290	5718.2297
Nov	1 – 9	+ .0023	35	5756.1900	5756.1923

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676..

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae..proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Z Herculis.

Even minima. (Dunér) See A.J. Vol. 18. No. 422. p. 104.

$1849^{d}.0 = 24/2429.^{v}$
$2^{v}.7.36^{d}$
$24/3046.36^{d} = $ Dunér's Fundm. Epoch for Even Min.
$1293.6^{v} 2296 = 6^{d}$ periods.
$24/43^{d}0.020\ 2960 = 90^{d}$ Greenw. $0^{d}\ 0^{h}\ 29^{m}$ M.T. Greenw.

~~Dunér's latest formula for Principal minima as given in above Journal is,~~

Dunér's latest formulae for computing times of minima as given in above Journal, is

Even minima $1849^{d}.+2^{v}.7.36^{d}+1.996377\ E.^{v}$
Odd " $1849^{d}.+2^{v}.7.31^{v}+1.996373\ E.^{v}$

The above periods, as given by Dunér, are really half periods, so that to get the even minima we multiply the half period above by 2. E. 6. &c., and to get the odd minima, we multiply corresponding by 1. 3. v. &c.

For Z Herculei

Period used is $3.9927^{v}{}^{d} = 1.996377 \times 2$ (see above)
and Fundamental Epoch $24/3046.36^{d}$ v v

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Z Herculis.

Add minima. (Junior) See A.J. Vol. 20. No. 422. p. 10v.

149K. = 2K12429.v

2v7.31v v

2K130846.31v v

1293.6K970K = 6K8 periods. G.m.T.

2K1K379.96K70K0 = 149d. Inter. 30d 1v h 3v m 34K s.

1.996730 v

2K1K3821.9610770 v = 149d. Mer. t. 23h 3m v7s. G.m.T.

~~It would seem that Junior's fundamental epoch for secondary minimum computations as given in the most quoted Astronomical Journal must be wrong by 1 day. This epoch then becomes 149K. + 2v8d.h31v = 2K130847.31v~~

All the below on this basis of even periods and epochs.

+2K13393.8100v8v = Eq. ☽ = 9v. July 18d 19h 26.v m G.m.T.

2K13397.802812 = " " 7K = " " 22. 19h 16.0m " " "

2K13K01.79v-v66 = " " 79 = " " 26. 19h v.6m " " "

2K13KKv.71v860 = " " 90 = " Sept. 8. 17h 10.8m " " "

2K13KK9.70861K = " " 91 = " " 12. 17h 0.K " " "

2K13K61.6868876 = " " 9K = " " 24. 16h 29.1 " " "

2K13K6v.679630 = " " 9v = " " 28. 16h 18.7 " " "

2K13K69.67238K = " " 96 = " Oct. 2. 16h 8.2 " " "

+2K13K73.66v138 = " " 97 = " " 6. 1vh v7.2 " " "

2K13K77.6v7892 = " " 98 = " " 10. 1vh K7.K " " "

2K13K81.6v066K6 = " " 99 = " " 14. 1vh 36.9 " " "

+2K13v01.61KK16 = " " 10K = " Nov. 3. 14h KK.8 " " "

2K13K97.621662 = " " 103 = " Oct. 30. 14h vv.2 " " "

2K13389.817308K = " " 76

2K13Kv7.69K122 = " " 93

2K13K98.628908 = " " 102

(over)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris ζ Herculis

Cont. from P. 31 lower half

All the below computed from Dunér's Elements / Even Rev. & Even Epochs

Ep.	J.D. of Prin. Perih.		d	h	m	Gr. M. Date 1900	Diff. 2nd Diff.
515	241 5142.636310	1900 May	2	15	6.3	"	
516	5146.629064	"	6	15	5.9	"	
517	5150.621818	1900 May	10	14	55.4	"	12 −.0036
518	5154.614572	"	14	14	45.0	"	
519	5158.607326		18	14	34.6	"	
520	5162.600080	"	22	14	24.1	"	
521	5166.592834	May	26	14	13.6	"	28 −.0043
522	5170.585588	"	30	14	03.3	"	
523	5174.578342	June	3	13	52.7	"	5 −.0044
524	5178.571096	"	7	13	42.4	"	7 −.0045 9 −.0046
525	5182.563850	"	11	13	31.9	"	11 −.0046
526	5186.556604	"	15			"	16 −.0046
527	5190.549358	"	19			"	21 −.0046
528	5194.542112	"	23			"	23 −.0046 26 −.0046
529	5198.534866	"	27			"	27 −.0046 29 −.0046
530	5202.527620	July	1				
531	5206.520374	"	5				
532	5210.513128	"	9			July	11 −.0043
533	5214.505882	"	13			"	14 −.0042
534	5218.498636	"	17				
535	5222.491390	"	21				
536	5226.484144	"	25				
537	5230.476898	"	29			"	29 −.0036
547	5270.404438	Sept.	7				
548	5274.397192	"	11				
549	5278.389946	"	15				
~~554~~	~~5298.353776~~	~~Oct.~~	~~5~~			~~Oct.~~	~~5 .0010~~

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ep.			
550	24[illegible]5282.342700		
551	5286.375434		
552	5290.364204		
553	5294.360962		
554	5298.353716	Oct. 5.	Oct 5. + .0010
555	5302.346470		
556	5306.339224		
557	5310.331978	Oct. 17	Oct. 17 + .0020
558	5314.324732		
559	5318.317486	Oct. 23	Oct. 23 + .0024
560	5322.310240		

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

S Aurigae.

Period = 7ᵈ 6ʰ 0ᵐ 0ˢ.0 = 0.32 1667

Cat. Epoch = 2 41 07 41.26 3 49 = 1888 Apr. 13ᵈ 12ʰ 3ᵐ 0ˢ

36 7.0 7 7 9 = 11337 periods.

2 41 16.60 266 = 9ᵈ May 6. 1ʰ 30ᵐ G. M. T.

.9 72 001

Ep. 113 0 = 2 41 17.7 7 669 = 9ᵈ. May 7. 13ʰ 0ᵐ G. M. T.

1.9 0002

Ep. 113 6 = 2 41 19.7 21 671 = 9ᵈ. May 9. 12ʰ 31ᵐ.3 " " "

0.9 72 001

Ep. 113 9 = 2 41 20.49 2672 = 9ᵈ. May 10. 11ʰ 51ᵐ " " "

0.9 72 001

" 113 2 = 2 41 21.66 7673 = 9ᵈ May 11.

0.9 72 001

" 113 5 = 2 41 22. 39 267 = 9ᵈ May 12. 10ʰ 32ᵐ " " "

.21 1671

" 1136 = 2 41 26.6 3 3 5 = 9ᵈ May 16. 1ʰ 0ᵐ.9 " " "

.32 1667

" 1136 = 2 41 26.32 9267 = 9ᵈ May 16. 7ʰ 0ᵐ.1 " " "

1.9 0002

" 1137 = 2 41 27.27 2640 = 9ᵈ May 18. 6ʰ 34ᵐ.9 " " "

.32 1667

" 1137 = 2 41 28.9 3 37 = 9ᵈ May 18.ᵈ 14ʰ 21ᵐ.7 " " "

.9 72 001

" 1137 = 2 41 29.7 093 = 9ᵈ May 19.ᵈ 13ʰ 2ᵐ.1 " " "

10.6 97 011

" 11410 = 2 41 0.26 3 39 = 9ᵈ May 31ᵈ 6ʰ 26ᵐ " " "

.32 1667

" 11411 = 2 41 0.9 26026 = 9ᵈ May 31ᵈ 18ʰ 13.3 " " "

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Antliae.

Cat. Epoch = 2K107K1.V263449 V
36K0.06742K3 = 11229 periods.
2K1K381.V9K2632 V = 9A Appr. 1. 1K 10.7 Gr. m. S.

2K107K1.V263449 V
366V.02A7102 = 11306. periods.
2K1KK06.VVV0991 = 9A. Appr. 26.d 13.h 19.3 Gr. m. S.

2K1K381.V9K2632 V = Eph. 11229 V
- 0.32K166 V
2K1K381.27006V V = Eph 11228 V
2K.960283V9 V
2K1KK06.230932K V = Eph. 11130V V
0.32K166 V
2K1KK06.VVV0991 = Eph. 11306 V
10.697V011 V
2K1K417.2V26002 V = Eph. 11339 V
0.32K166 V
2K1K417.V767669 V = Eph. 113K0 V
1.9KV0002 V
2K1KK19.V21767 1 V = Eph. 113K6 V
0.972V001 V
2K1KK20.K9K2672 V = Eph. 113K9 V

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.prpj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

γ Aquilae.

Prin. Epoch = 2K130K7.7^{v}

1371.170^{v} = 27^{v} periods.

2K1KK1A.AV0^{v}

F.9A6^{v}

2K1KK23.A36^{v} = 276 " = 9A. May 13.^{d}

F.9A6^{v}

2K1KK2A.A22^{v} = 277 " = 9A May 1A.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.prpj.1676.

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Sextical.
Computation of Diff. Absorption. (Vast.)

$\varphi = +42^\circ\ 23'$

$PZ = +7^\circ\ 37'$

$\alpha' =$ R. A. Var.

$\delta' =$ " Comp. Star.

$\alpha =$ Dec. Var.

$\delta =$ " Comp. Star.

$\alpha' - \alpha = +1^m\ 39.^s$

$\delta' - \delta = -2'$

Log. 99.0 $= +1.9956$

" cos δ $= +9.9993$

" 1v. $= +1.1760$

$\alpha' - \alpha = +21.^s4 = 1311.'' = +3.1176$

$\angle P = +1^h = 15.^\circ0$

$Z\nu = 71.^\circ4$

Log sin P = 9.4130

" " PZ = 9.4644

Sum log. = 9.2774

Log sin $Z\nu$ = 9.9771

" " ν = 9.3003

Log α = +1.3346

" sin ν = 9.3003

$+4.39^s = +0.6419$

" δ = n0.3010

" cos ν = 9.9901

$-1.96'' = n0.2920$

-4.39
$+1.96$
-2.43

Log. 1v = 9.1903

2.43 = 0.3861

9.5764

60. = 1.7782

.006 = 7.7978

.26

136

.0016 Mayer = Diff. Abs.

1899phae.proj.1676.

N Antliae.

Computation of Diff. Absorption. (Weak)

$\angle P = +2^h\ 0^m = 30.0^\circ$ V

$ZV = 7V.7^\circ$ V

Log sin P. = 9.6982 V
" " PZ = 9.8648 V
Sum logs. = 9.5630 V
Log sin ZV = 9.9863 V
" " S = 9.5767 V
Log t = +1.3348
" sin V = 9.5767 V
+8.31 = 0.9115 V
" t = n0.30103 V
" cos V = 9.9693 V
−1.8V− = n9.26796 V
−8.31
+1.8V
= 6.86°

0.23V = 9.3710 V
6.46 = 0.8102 V
0.1813 V
60. 1.7781 V
= 8.6031 V
.02V
.26
52V0
V0
.0065V0 wages. = Diff. Abs.

$\angle P = +3^h\ 0^m = 45.0^\circ$ V

$ZV = 81.7^\circ$ V

Log sin P = 9.8489 V
" " PZ = 9.8648 V
Sum logs = 9.7137 V
Log sin ZV = 9.9975 V
" " S = 9.7112V0 V
Log t = +1.3348 V
" sin V = +9.7112V0 V
+11.'V1 V = +1.0609 V
" t = n0.30103 V
" cos V = 9.9290V V
−1.'70 = n0.2300 8
−11.'V1
+1.70
−9.81

0.6V = 9.8129 V
9.81 = 0.9916 V
0.8045V8 V
60. = 1.7781 V
= 9.0265 3 V
.106
.26
636
212
.0275V6 = Diff. Abs.

over.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

S Antliae. Diff. Abs.

The diff abs. has been computed for Hour Angles $+1^h$, $+2^h$ $+3^h$ on p.p. K2. K3. but it is so small that it has not been applied to the observations.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Objects to be observed.

98. Nov.	16.	
	17.	
	18.	
	19.	U Cephei.
	20.	
	21.	
	22.	
	23.	
	24.	U Cephei.
	25.	
	26.	
	27.	4 Delphini.
	28.	
	29.	U Cephei.
	30.	
Dec.	1.	
	2.	4 Delphini.
	3.	V Cygni.
	4.	U Cephei.
	5.	
	6.	
	7.	4 Delphini.
	8.	
	9.	U Cephei.
	10.	
	11.	
	12.	
	13.	
	14.	U Cephei.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

98. Dec. 15.
16.
17.
18.
19. U Cephei.
20.
21.
22.
23.
24. U Cephei.
25.
26.
27.
28.
29. U Cephei.
30.
31. W Delphini.
99. Jan. 1.
2.
3. U Cephei.
4.
5.
6.
7.
8.
9.
10.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

β Lyrae.

Min. = 1Aννν. Jan 6^{d} 1ν.^{h}0 = 239Aν90.62ν0000^{ν}
1st term = 12^{d} 21^{h} 47^{m} 23.72^{ν} = 12.907913ν^{ν}
2^{d} " = +0.31ν93A $\mathcal{E}^{2}$ ^{ν} =
3^{d} " = −0.00001211 $\mathcal{E}^{3}$ ^{ν} =

12.907913ν^{ν}
1220
2νA1νA2700
2νA1νA270
129079 13ν
1ν7K76νKK700^{ν}
239Aν90.62ν00000^{ν}
+ν.1AA1019^{ν}
2K1K3K3.K67ν719^{ν}

Log. 1220. = 3.0A63ν9A^{ν}
2
6.172719 6
" 0.31ν93A = 9.K99601 9^{ν}
+K702K2.^{ν} = ν.672321ν^{ν}

Log. 1220. = 3.0A63ν9A^{ν}
3
9.2ν90799K^{ν}
Log. −0.00001211 = nν.0A31KK1^{ν}
−21990.^{n} = K.3K2223ν^{ν}
+K702K2.^{ν}
+KKA2ν2^{n}.^{ν} = 5^{d} 4^{h} 30^{m} ν2^{n}.^{ν} =
= +5.^{d}1AA1019^{ν}

12.907913ν^{ν}
12K0
ν16316νK00
2νA1νA270
129079 13ν
1600ν.A127K00^{ν}
239Aν90.62ν00000^{ν}
+ν.3νν2A93^{ν}
2K1K601.793029 3^{ν}

Log. 12K0. = 3.093K217^{n}
2
6.1A6AK3K^{ν}
" 0.31ν93A = 9.K99601 9^{ν}
+KAν7A6.^{ν} = ν.6A64Kν3^{ν}

Log. 12K0. = 3.093K217^{ν}
3
9.2A026ν1^{ν}
" −0.00001211 = nν.0A31KK1^{ν}
−230A9.^{n} ^{ν} = nK.3634092^{ν}
+KAν7A6.
+462697.^{n} ^{ν} = 5^{d} A^{h} 31^{m} 37.^{n} =
= 5.^{d}3ννA93^{ν}

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

β Lyrae.

241°601.7930293″
241°343.467″719″
20/2″4.32″°″7°″
12.91627+″

Mic. = 1°″″ Jan. 6^{d} N.^{h} = 239°″90.62″0000

12.907913″
12°°
1032633040
1032633040
2″°1″°270
1290791 3″
1662″.392″°°0″
+″.766 7″92″
16631.1″9347 2″
239°″90.62″ 0000″
241″221.7°4343 7 2″

Eq. 12°°. = +3.10991″9″
+6.219°31°″
" 0.31″938 = +9.49960 19″
″241241^{n} = +″.7191337″

Eq 12°°. = +3.1099 1″9″
+9.3297477″
" -0.0000121 1 = -″.0°31441″
-2″°76.^{n} = -4.412°91°″
+″241241.
+499°2°°.^{n} = ″^{d} 1°^{h} 2°^{m} °^{s} =
= ″.766 7″92″

241″221.7°4343 7 2″ = Eq. 12°°″
241°343.467″719″ = " 1220″
6°/°7°.3167 7″3″
12.^{d}916+″

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

β Lyrae. Ephemeris obtained by determining accurate value of epoch 1220 by means of Chandler's 3½ Cat. and adding 12.916 for each succeeding one. (See pp. v0 and v1 of this book).

1220.	241 K34	4.10	3.460	1895.	Feb.	22.	
	K3v	7.024	6.344		Mar.	7.	
	K369	.940	.300	"	"	20.	
	K3K2	.846	.246	"	Apr.	2.	
	K39v	.772	.732	"	"	15.	
122v	KK0K	.604	.000	"	"	28.	
	KK20	1.604	.964	"	May	10.	
	KK3	4.v20	3.000	"	"	23.	
	KKK	7.436	6.796	"	June	5.	
	KK60	4.3v2	9.712	"	"	18.	
1230	KK7	3.264	2.620	"	July	1.	
	KKK	6.144	.vvKK	"	"	14.	
	KK9	9.100	K.K60	"	"	27.	
	Kv1	2.016	.370	"	Aug.	9.	
	Kv2K	.934	.292	"	"	22.	
123v	Kv37	.4K4	.200	"	Sept.	4.	
	Kvv0	.764	.vKK	"	"	17.	
	Kv63	.640	.040	"	"	30.	
	Kv7	6.v96	.vv6	"	Oct.	12.	
	Kvv2	9.v12	.272	"	"	25.	
1240	K60	2.428	.200	"	Nov.	7.	
	K61	5.3K4	.v04	"	"	20.	
	K62	8.260	.620	"	Dec.	3.	
	K6K0	1.176	.536	"	"	16.	
	K6v	4.092	3.vv2	"	"	29.	
124v	4666	7.008	.368	1899.	Jan.	11.	

	24146	.924	79.	1899.			
	469	.240	2.				
	470v	.756	.116				
	471	.672	.032				
12v0	473	1.vK8	.948				
	474	4.v04	.064				
	47v	7.420	.780		Apr.	11.	
	477	0.336	.696		"	24.	
	47K	3.2v2	2.612		May	7.	1K 41m 3.m.t.
12vv	479	6.168	.v28		"	20.	12 40 "
	K00	9.0K4	.KKK		June	2.	10 40 "
	K21	2.000	.360		"	15.	6 38 "
	K34	.916	.276		"	28.	6 37 "
	K47	.832	.192		July	11.	4 36 "
1260	4K60	.748	.105		"	24	2 35 "
	4F73	.664	.024		Aug.	6	0 35 "
	4F85	6.v80	.940		"	19	22 33 "
	4F98	9.496	.856		"	31	20 33 "
	491	2.412	.772		Sept.	13	18 32 "
1265	492	5.328	.688		"	26	16 31 "
	493	8.244	7.604		Oct.	9.	14 30 "
	495	1.160	.520		"	22.	12 29 "
	496	4.076	3.436		Nov.	4.	10 28 "
	497	6.992	.352		"	17.	8 27 "
1270	499	.908	.268		"	30.	6 26 "
	50 02	.824	.184		Dec.	13.	4 25 "
	50 15	.740	.100		Dec.	26	2 24 "

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of β Lyrae for 1900.

Continued from previous page.

Epoch 1273	J. M. T. Minimum	year	month	Day	Greenwich Mean Time h.	m.	Uncor East M. T.	Cor. E. M. T. (+12.0 h)
241	50 28.076	1900	January	08	0	23		
	50 4 0.932	"	"	20	22	22		
1275	50 5 3.848	"	February	02	20	21		
	50 6 6.764	"	"	15	18	20		
	50 7 9.680	"	"	28	16	19		
	50 9 2.596	"	March	13	14	18		
	51 0 5.512	"	"	26	12	17		
1280	51 1 8.428	"	April	08	10	16		
	51 2 1.344	"	"	21	8	15		
	51 4 4.260	"	May	4	6	14		
	51 5 7.176	"	"	17	4	13		
	51 7 0.092	"	"	30	2	12		
1285	51 8 3.008	"	June	12	0	11	June 11. 19:11	June 12. 7:11
	51 9 5.924	"	"	24	22	10	24. 17:10	25 5:10
	52 0 8.840	"	July	07	20	9	July 07 15:9.	08 3:9
	52 2 1.756	"	"	20	18	8	20. 13:8	21 1:8.
	52 3 4.672	"	August	02	16	7	Aug 02. 11:7	02 23:7
1290	52 4 7.588	"	"	15	14	7	15. 9:7	
	52 6 0.504	"	"	28	12	6	28 7:6.	
	52 7 3.420	"	September	10	10	5	Sept 10. 5:5.	
	52 8 6.336	"	"	23	8	4	23. 3. 4.	
	52 9 9.252	"	October	06	6	3	Oct. 6. 1:3.	
1295	53 1 2.168	"	"	19	4	2	" 18 23:2.	
	53 2 5.084	"	November	01	2	1	Nov 00 21:1.	
	53 3 8.000	"	"	14	0	0	" 13. 19:0.	
	53 5 0.916	"	"	26	23	59	" 26 16:59	
1299	53 6 3.832	"	December	09	19	58	Dec 09. 16:58	
1307	54 6 7.160							
1308	54 8 0.076							

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

β Lyrae.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

56 The following checked.

S W. Cygni (Graski I)

Computation of times of minimum.

Date	Epoch.	L-C Eq.	Uncorrected Time of Minimum	Correction to Time of Minimum
99 6 3	757	-.0008	H805.3206	H805.3198
6 5	758	-.0009	H809.8935	H809.8926
6 8	759	-.0010	H814.4665	H814.4655
6 17	760	-.0014	H819.0394	H819.0380
" "	761	-.0014	H823.6123	H823.6109
6 26	762	-.0017	H828.1853	H828.1836
" "	763	-.0017	H832.7582	H832.7565
7 1	764	-.0018	H837.3312	H837.3294
7 10	766	-.0021	H846.4770	H846.4749
7 19	767	-.0023	H851.0500	H851.0477
" "	768	-.0023	H855.6229	H855.6206
7 28	769	-.0024	H860.1959	H860.1935
9 21	781	-.0021	H915.0711	H915.0690
" "	782	-.0021	H919.6441	H919.6420
10 5	785	-.0017	H933.3629	H933.3612
10 14	787	-.0014	H942.5088	H942.5074
10 23	788	-.0010	H947.0817	H947.0807
" "	789	-.0010	H951.6547	H951.6537
11 6	792	-.0004	H965.3795	H965.3731
11 24	795	+.0004	H979.0923	H979.0927
12 26	802	+.0017	5011.1029	5011.1046
00 1 9	806	+.0021	5029.3946	5029.3967
1 27	809	+.0025	5043.1135	5043.1160
12 27	883	+.0017	5381.5110	5381.5127
01 1 5	884	+.0020	5386.0840	5386.0860
1 19	887	+.0023	5404.3757	5404.3780
6 5	918	-.0009	5541.5639	5541.5630
7 16	926	+.0022	5578.1474	5578.1452
11 21	964	+.0002	5706.1898	5706.1900
12 5	968	+.0008	5724.4815	5724.4823

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Canis Majoris.

For H. A. $+3^h\ 0^m = 45^\circ\ 0'$

$45^\circ\ 0'$	Log sin P	= 9.8499
	" " PZ	= 9.0628
	Sum logs.	= 9.7127
71.7	Log sin Z	= 9.9776
$33^\circ\ 23'$	" " S	= 9.7351

	Log R	= w1.2772
33 23	" sin S	= 9.7351
-9.90		= 0.9972
	" J	= w1.1990
33 23	" cos S	= 9.9269
-13.11		= w1.1172
-9.90		
+23.01		

.160 = 9.2012
23.01 = 1.3619
0.5660
60. = 1.7781
.061 = 8.7859
.26
366
122
.0156

H. A. $2^h\ 30^m = 37^\circ\ 30'$

37 30	Log sin P	= 9.7855
	" " PZ	= 9.8655
	Sum logs	= 9.6509
6.0	Log sin Z	= 9.9617
$29^\circ\ 1'$	" " S	= 9.6892

	Log R	= w1.2772
	" sin S	= 9.6892
-8.73		= w0.9899
	" J	= w1.1990
	" cos S	= 9.9781
-13.73		= w1.1671
-8.73		
+22.56		

.120 = 9.0791
22.56 = 1.3521
0.4309
60. = 1.7781
.0469 = 8.6724
.26
2814
938
.01167

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Canis Majoris.

H. A. +1h 0m = 15°.0

15 0 Log sin P1 = 9.8131 v °
" " P2 = 9.2626 n °
Sum log = 9.2757 v °
60.2 Log sin Z = 9.9350 v °
12 KK " " = 9.3830 K v °

Log = = wl. 2727 v °
12 KK " sin = 9.3830 K v °
−3.97 = w0.7931 v °
" δ = wl. 1970 v °
" cos = 9.9819 v °
−15.31 = wl. 1707 v °
−3.97
+19.22 v °

.060 = 2.7715 v °
19.2 = 1.2711 v °
0.06326 v °
60. = 1.7715 v °
= 2.2711 v °

.019
.26
114
38
.0049

H. A. −1h 0m = 15°.0

−3.97
+15.31
+11.34

.060 = 2.7715 v °
11.3 = 1.0561 v °
9.32976 v °
60. = 1.7715 v °
2.0561 v °

.0113
.26
678
226
.00293

H. A. −1h 45m = 26° 15′

26 15 Log sin P1 = 9.6457 v °
" " P2 = 9.2662 K v °
Sum log = 9.9119 K v °
63.3 Log sin Z = 9.9103 v °
21 27 " " = 9.7312 v °

Log = = wl. 2727 v °
" sin = 9.7312 v °
−6.72 = w0.2139 v °
" δ = wl. 1970 v °
" cos = 9.9623 v °
−14.61 = wl. 1693 v °

−6.72
+14.61
+7.89

.040 = 2.9031 v °
.03 = 0.9031 v °
9.8062 v °
60. = 1.7715 v °
= 2.0277 v °

.0107
.26
642
214
.00278

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

~~U Cephei. Computation of times of minima, using epoch and principal term only, from Chandler's Revised Elements. See A. J. Vol. 17 p. 94.~~

~~Epoch = 1880 June 23d 9h 39m.6 (G.M.T.) =~~
~~= 2407890.402v000~~

~~Prin. term = 2d 11h 49m 37s.4v = 2.492799v~~

The above abandoned for the following formula.

U Cephei.

Fund. Eq. 2407890,3200 Eq. = 0. = 1880. June 23.d 7h 21.m5 G.M.T.
= 2.492d

Provis. Period =

7990.0320v	Eq. 40	Ā0. Oct. 1.	
8014.9600v	" 50		
8039.8880v	" 60		
8064.8160v	" 70		
8089.7440v	" 80		
8114.6720v	" 90		
8139.6000v	" 100	Ā1 Feb. 27.	
8164.5280v	" 110		
8189.4560v	" 120		

Con on next page.

For some other computed times of minimum, see p. 110.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Cephei.

Period 2.4920

Fund. Epoch = 2407490.3200

2413474.1920 = Eqp. 2240. = 9r Oct. 7.
3499.1200 " 2250. = " Nov. 1.
3524.0440 " 2260. = " " 26.
3548.9760 " 2270. = " Dec. 20.
3573.9040 " 2280. = 96. Jan. 14.
3598.8320 " 2290. = " Feb. 8.
3623.7600 " 2300 = " Mar. 4.
3648.6880 " 2310. = " " 29.
3673.6160 " 2320 = " Apr. 23.
3698.5440 " 2330. = " May 18.
3723.4720 " 2340. = " June 12.
3748.4000 " 2350. = " July 7.
3773.3280 " 2360. = " Aug. 1.
3798.2560 " 2370. = " " 26.
3823.1840 " 2380. = " Sept. 20.
3848.1120 " 2390. = " Oct. 15.
3873.0400 " 2400. = " Nov. 9.
3897.9680 " 2410. = " Dec. 3.
3922.8960 " 2420. = " " 28.
3947.8240 " 2430. = 97 Jan. 22.
3972.7520 " 2440. = " Feb. 16.
3997.6800 " 2450 = " Mar. 13.
4022.6080 " 2460 = " Apr. 7.
4047.5360 " 2470 = " May 2.
4072.4640 " 2480 = " " 27.
4097.3920 " 2490 = " June 21.
4122.3200 " 2500 = " July 16.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Cephei.

Period 2.4920

2K1K122.3200 = 2v00 = 97. July 16.
K1K7.2K80 = 2v10 = " Aug. 10.
K172.1760 = 2v20 = " Sept. 4.
K197.1080 = 2v30 = " " 29.
K222.0320 = 2vK0 = " Oct. 24.
K2K6.9600 = 2vv0 = " Nov. 17.
K271.8880 = 2v60 = " Dec. 12.
K296.8160 = 2v70 = 98. Jan. 6.
K321.7K40 = 2v80 = 98. Feb. 0.
K346.6720 = 2v90 = " " 2v.
K371.6000 = 2600 = " Mar. 22.
K620.8800 = 2700 = " Nov. 30.26
K870.1600 = 2800 = 99 Aug. 3.

4v83.4880 = 268v = 98. Oct. 20.d 11h K3.
Kv88.4736 = 2687 = " " 2v.d 11h 22.
4633.3K40 = 270v = " Dec. 9.d 8 1v.
46v3.2864 = 2713 = " " 29. 6 v2.
46v8.2720 = 271v = 99 Jan. 3. 6 32.
4663.2v76 = 2717 = " " 8. 6 11.
4673.2288 = 2721 = " " 18. v 29.
4688.1Av6 = 2727 = " Feb. 2. 4 27.
Kv98.4K48 = 2691 = 98. Nov. K. 10 K1.
4608.4160 = 269v = " " 1K. 9 v9.
K638.3296 = 2707 = " Dec. 1K. 7 vv.
46K3.31v2 = 2709 = " " 19. 7 3K.
46v3.2864 = 2713 = " " 29. 6 v2.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

U Cephei.

Period 2.4928

No.	Epoch.		
24147 38.0416	= 2747	= 99	Mar. 24d 1h 0m
4740.5344	= 2748	=	26 12 50
4947.4364	= 2831	= 99	Oct. 19
5012.2496	= 2857	= 99	Dec. 23
5017.2352	= 2859	= 99	Dec 28
5022.2208	= 2861	= 1900	Jan. 2.
5097.0048	= 2891	= 1900	Mar. 18
5099.4976	= 2892	= 1900	Mar. 20
5101.9904	= 2893	= "	Mar. 22
5104.4832	= 2894	= "	Mar. 25
5106.9760	= 2895	= "	Mar. 27
5109.4688	= 2896	= "	Mar. 30
5111.9616	= 2897	= "	Apr. 1
5114.4544	= 2898	= "	Apr. 4
5116.9472	= 2899	= "	Apr. 6
5119.4400	= 2900	= "	Apr. 9
5273.9936	= 2962		Sept. 10
5276.4864	= 2963		Sept. 13
5278.9792	= 2964		" 15
5281.4720	= 2965		" 18
5306.4000	= 2975		Oct. 13
5316.3712	= 2979		" 23
5318.8640	= 2980		" 25
5321.3568	= 2981		" 28
5323.8496	= 2982		" 30
5326.3424	= 2983		= Nov. 2
5331.3280	= 2985		= Nov. 7
5336.3136	= 2987		= Nov. 12
5361.2416	= 2997		= Dec 7
5366.2272	= 2999		= Dec 12

Continued on page 116

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

2d Ceti. Obs. from A.J. 9. v1.

Fundamental Epoch = 2407490.3200

1	2 Times of min. corr. for Light Eq.			3 Col. 2. red. to Jul. Day + dec. d	4 H.C.O. Times d	5 Col. 3 − Col. 4. d
1880.	Oct. 8.	12h	32.7	7997.v242	7997.v10K	+0.013
1881.	Feb. 7.	16	27	8119.669v	8119.6v76	+0.0119
"	" 17.	1v	21.7	8129.6K07	8129.62AA	+0.0119
"	" 22.	1v	1.7	8134.626v	8134.61KK	+0.0121
"	Mar. 24.	12	9.4	8166.vK13	8166.v2A0	+0.0133
"	Apr. 3.	12	20.7	8174.v127	8174.K992	+0.013v
"	Nov. 16.	A	37.A	AK01.3620	AK01.3KK0	+0.01A0
"	Nov. 26.	A	2.1	AK11.3374	AK11.31v2	+0.0222
1882	Mar. 13.	12	K3.2	Av1A.v29v	Av1A.v0v6	+0.0239
"	" 18.	12	17.7	Av23.v123	Av23.K912	+0.0211
"	" 23.	11	v6.7	Av2A.K967	Av2A.K76A	+0.0199
"	Sept. 1.	12	K3.9	A690.v312	A690.v0AA	+0.0226
"	" 16.	11	3A.3	A70v.KAK9	A70v.46v6	+0.0193
1883	Mar. 17.	11	11.7	AAA7.466v	AAA7.K400	+0.026v
"	Aug. 21.	12	24.9	904K.v173	904K.4A64	+0.0309
"	" 26.	12	6.v	9049.v046	9049.K720	+0.0326
"	" 31.	11	K2.9	90vK.KAA1	90vK.4v76	+0.030v
"	Sept. 10.	11	A.6	906K.46K3	906K.K2AA	+0.03vv
1884	Mar. 17.	10	16.A	92v1.K2A4	92v1.3AAA	+0.0396
"	Apr. 4.	A	v7.1	9271.3716	9271.3312	+0.0K0K
1887	Nov. 1.	1v	36.K	0v77.6v03	0v77.vvAK	+0.0919
"	Nov. 6.	1v	33.3	0vA2.6366	0vA2.vKK0	+0.0926
"	Nov. 16.	1K	16.7	0v92.6072	0v92.v1v2	+0.0920
"	Nov. 21.	1K	3K.K	0v97.vA91	0v97.v00A	+0.0A23
"	Dec. 1.	13	30.9	0607.v621	0607.K726	+0.0A9v
"	Dec. 6.	13	A.3	0612.vK66	0612.Kv76	+0.0A90
"	Dec. 16.	12	29.K	0622.v19A	0622.K2AA	+0.0910
			7.2			
			3.v			
			2.A.6			
			2v.0			

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

6

0^{h}	19.9^{m}
0	17.1
0	17.1
0	17.4
0	19.1
0	19.4
0	25.9
0	32.0
0	34.4
0	30.4
0	28.7
0	32.3
0	27.9
0	38.1
0	44.4
0	47.0
0	48.9
0	57.1
0	57.0
0	58.1
2	12.3
2	13.3
2	12.4
2	7.1
2	8.9
2	8.1
2	11.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Cephei. Obs. from A. J. 9. v 1.

1882	Mar. 17.^{d}	18	~~7.0~~ 6.v	071K.7v46	071K.662K 1130	+0.0922	v
"	Apr. 6.	16	~~7.1~~ K.9	073K.6700	073K.6044 1141	+0.06v2	v
"	" 16.	16	~~10.3~~ 7.6	07KK.6719	07KK.v760 114v	+0.09v9	v
"	Oct. 10.	~~16~~ 16	~~v.0.2~~ 1.0	0921.667K	0921.v64A 1216	+0.1026	v
1883	May v.	13	~~v4.2~~ v4.A	112A.v79A	112A.K672 1299	+0.1126	v

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

2h 12.7m.
1 33.9.
2 18.1
2 27.7.
2 42.1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Variable desc. by Müller + Kempf. = U Vulpec.

Dec. + 20° K200.

Les A. N. Vol. 146. p. 37.

Ephemeris.

Gr. M. T.	Epoch.	Date.
24, K200. K]	+0	
K20A. K]	1	
K216. K]	2	
K22K. K]	3	
K232. K]	K	
K2K0. K]	5	
K24A. K]	6	
K256. K]	7	
K26K. K]	A	
K272. K]	9	
K2A0. K]	10	
K2AA. K]	11	
K296. K]	12	
K30K. K]	13	
K312. K]	14	

24 1162K. K] = Ep. = 322.

24 1372. K] = " - A6.

K536. K700	K2	9A. 9. 3.
K5KK. K700	K3	9A. 9. 11.
K552. K700	KK	" " 19.
K560. K700	K5	" " 27.
K56A. K700	K6	" 10 7.
76. K700	K7	" " 13.
84. K700	K8	" " 21.
92. K700	K9	" " 29
4600. K700	50	" 11
4608. K700	51	" "
4616. K700	52	"
4624. K700	53	"
4632. K700	5K	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Variable Dm. +20° 4200. = U Vulpec.

Obs. by Müller + Kempf.

See A. N. Vol. 146, p. 37.

Observations.	Phase.	Obs. Magn.	Epoch.
2 K1 K2N.32	+6.8 V	7.04	1
K216.2V	7.78	6.99	1
K216.2V	7.78	6.91	1
K216.37	7.90	6.96	1
K218.27	1.7V	7.21	2
K218.27	1.80	7.24	2
K221.38	4.91	7.V2	2
K221.40	4.93	7.40	2
K221.41	4.94	7.V8	2
K222.27	V.80	7.34	2
K222.33	V.86	7.23	2
K222.41	V.94	7.38	2
K22V.37	0.90	6.88	3
K226.24	1.77	7.32	3
K226.27	1.80	7.1V	3
K227.2V	2.78	7.V6	3
K228.24	3.77	7.VV	3
K228.33	3.86	7.V6	3
K233.21	0.74	6.96	4
K233.28	0.81	7.06	4
K23K.3V	1.88	7.26	4
K236.3V	3.88	7.V1	4
K237.26	4.79	7.VV	4
K237.3V	4.88	7.47	4
K238.23	V.76	7.37	4
K239.27	6.80	6.80	4
K239.29	6.82	7.0V	4
K240.30	7.83	6.91	4
K240.31	7.84	7.03	4

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Variable Stars. +20° K200 = U. Vulpec.
Observations by Müller + Kempf, cont.
See A. N. Vol. 146. p. 37.

Observations cont.	Phase.	Obs. Magn.	No. Epoch.	
2K1 & 2K1. 23	+0.76	6.9v	v	
K2K2. 24	1.77	7.20	v	
K2K2. 2v	1.7A	7.12	v	
K2K3. 30	2.A3	7.K0	v	
K2Kv. 23	K.76	7.K9	v	
K2K9. 2A	0.A1	7.13	6	
K26A. 20	3.73	7.62	A	
K27K. 20	1.73	7.22	9	
K27v. 22	2.7v	7.v0	9	
K276. 22	3.9v	7.v0	9	
K277. 21	K.74	7.K1	9	
K27A. 19	v.72	7.K1	9	+
K27A. 20	v.73	7.29	9	+
K2Av. 20	K.73	7.vA	10	
K2A6. 20	v.73	7.37	10	+
K2A7. 20	6.73	7.02	10	
K2AA. 16	7.69	7.22	10	
K2AA. 17	7.70	7.06	10	
K2A9. 17	0.70	7.02	11	
K2A9. 1A	0.71	7.03	11	
K291. 1A	2.71	7.31	11	
K29K. 1A	v.71	7.3v	11	+
K30K. 19	7.72	7.0v	12	
K30A. 20	3.73	7.7v	13	−

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676

U Vulpeculae.

Observations.	Phase.	Obs. magn.	No. Epoch.
24/4203.39	+2.92	7.53	0
4207.36	+6.89	6.93	0
4213.25	+4.78	7.62	1
" .50	+4.93	7.65	1
" .53	+4.96	7.57	1
4214.22	+5.75	7.34	1
1630.52	+5.95	7.38	-322
3520.24	+7.77	6.85	-86

Mean epoch of K's obs. = 46.

" " " M. + K's obs. not including the first two early ones = 5.

$0.^d40 \div 41. = 0.^d019$ Corr. to percod.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Variable Star B.D. +20° 3460 = NP Cygni.
Discovered by Müller & Kempf.

Ephemeris. d	Obs'n intervals. d	Phase. d	Magn.	No. Epoch.
2421 K202.660	K203.392	+0.732	6.9v	0
21 K206.V0K	K207.367	0.463	6.93	1
22 K210.3K2	K213.2VV	2.907	7.V1	2
23 K21K.192	K213.399	3.049	7.3K	2
24 K21A.036	K213.K2A	3.0A0	7.K0	2
25 K221.AA0	K21K.226	0.03K	6.A3	3
26 K22V.72K	K21V.323	1.131	7.0A	3
27 K229.V6A	K216.2V3	2.061	7.19	3
28 K233.K12	K216.2V6	2.06K	7.06	3
29 K237.2V6	K216.371	2.179	7.13	3
210 K2K1.100	K21A.220	0.12K	6.61	K
211 K2KK.9KK	K21A.3A3	0.3K7	6.70	K
212 K2KA.7AA	K221.3A2	3.3K6	7.1A	K
213 K2V2.632	K221.397	3.361	7.06	K
214 K2V6.K76	K222.276	0.396	6.A7	V
215 K260.320	K222.32A	0.KKA	6.62	VV
216 K26K.16K	K222.K0A	0.V2A	6.77	VV
217 K26A.0AA	K22V.371	3.K91	6.91	VV
218 K271.AV2	K226.2K2	0.V1A	6.AV	6
219 K27V.696	K226.267	0.VK3	6.69	6
220 K279.VK0	K227.2VV	1.V31	7.2V	6
221 K2A3.3AK	K22A.2K0	2.V16	7.K0	6
222 K3A7.22A	K22A.333	2.609	7.36	6
223 K291.072	K233.216	3.6KA	6.A7	7
224 K29K.916	K233.2AV	3.717	6.77	7
225 K29A.760	K23K.3V6	0.9KK	6.96	A
226 K302.60K	K236.3V1	2.939	7.30	A
227 K306.KKA	K237.262	0.006	6.VK	9
228 K310.292	K23A.3V6	0.100	6.KA	9
229	K23A.227	0.971	7.0V	9

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Var. Star B.D. +24° 3760 = V Cygni.
Disc. by Müller + Kempf.
See A. N. Vol. 146. p. 60.

Observations. d	Phase. d	Mags.	No. Epoch.
K2 39.273	+2.017	7.32	9
K239.284	2.031	7.16	9
K240.300	3.044	7.23	9
K240.312	3.056	7.41	9
K241.234	0.138	6.64	10
K242.245	1.145	7.03	10
K242.251	1.151	7.04	10
K243.305	2.205	7.34	10
K244.233	0.249	6.62	11
K244.283	0.459	6.74	12
K246.199	0.191	6.51	17
K247.206	2.356	7.41	18
K247.222	3.370	7.16	18
K246.224	0.528	6.92	19
K247.216	1.520	7.14	19
K247.198	2.502	7.23	19
K247.199	2.503	7.30	19
K248.194	1.411	7.22	21
K248.196	2.411	7.34	21
K249.199	3.414	6.70	21
K24A.167	0.939	6.91	22
K24A.171	0.943	6.84	22
K24A.176	1.946	7.20	22
K249.141	1.953	7.11	22
K291.179	0.107	6.53	23
K294.147	3.111	7.17	23
K30K.190	3.116	7.24	26
K300.199	1.751	7.09	27
K309.220	2.772	7.35	27
90. Sept. 18 = 1629.462	2.246	6.37	= Ep. 670.
96. Oct. 24 = 3847.324	0.646	6.75	= " 90.

Mean mag. of 46 obs. (Nov. + Dec.) = 11. = 6.70 ÷ 19
(Nov.) = 46. = 874 ÷ 19
3

3.1.160 (.004 6 days correction to given d.
200
210

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Period 3.0KK

Variable disc. by Müller & Kempf. con.
= 47 Cygni. = 2 m. +20° 3460.

Ephemeris. con.	Epoch.		
24KK40.932	00		
KK44.776	09		
KK48.620	90	Sept.	15
KK52.464	91		19
KK56.308	92		23
K560.152	93	= 9 0. Sept.	27.
K563.996	9K	= " "	30.
K567.840	9K	= " Oct.	4.
K571.684	96	= " "	8.
K575.528	97	= " "	12.
K579.372	98	= " "	16.
K583.216	99	= " "	20.
K587.060	100	= " "	24
4590.904	101	= " "	27
4594.748	102	= " "	31
4598.592	103	= " Nov.	4.
4602.436	10K	= " "	8.
4606.280	10K	= " "	12.
4610.124	106	= " "	16.
4613.968	107	= " "	19.
4617.812	108	= " "	23.
4621.656	109	= " "	27.
4625.500	110	= " Dec.	1.
4629.344	111	= " "	5.
4633.188	112	= " "	9. +

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Vulpeculae. Müller

Observations grouped by

0d to 1d	Diff. reqn.	1d to 2d	Diff. reqn.	2d to 3d	Diff. reqn.	3d to 4d	Diff. reqn.	4d to 5d	Diff. reqn.
0.90	6.88	1.75	7.21	2.78	7.56	3.77	7.57	4.91	7.52
0.74	6.96	1.80	7.24	2.83	7.40	3.86	7.56	4.93	7.40
0.81	7.06	1.77	7.32	2.75	7.50	3.88	7.51	4.94	7.58
0.76	6.95	1.80	7.15	2.71	7.31	3.73	7.62	4.79	7.57
0.81	7.13	1.88	7.26			3.75	7.50	4.88	7.47
0.70	7.02	1.77	7.20			3.73	7.57	4.76	7.49
0.71	7.03	1.78	7.12					4.74	7.41
		1.73	7.22					4.73	7.58
5.43	49.03	14.28	57.72	11.07	1.77	4.72	3.49	6.68	4.00
0.776	7.004	1.728	7.218	2.768	7.442	3.748	7.582	4.838	7.500

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

† Kenyon Observatory.
phase days. (See also pp. 71-72.)

5d to 6d	Diff. longs.	6d to 7d	Diff. longs.	7d to 8d	Diff. longs.
5.80	7.34	6.85	7.04	7.78	6.99
5.86	7.23	6.80	6.80	7.78	6.91
5.94	7.38	6.82	7.05	7.90	6.96
5.96	7.37	6.73	7.02	7.83	6.91
5.92	7.41			7.84	7.03
5.93	7.29			7.69	7.22
5.93	7.37			7.90	7.06
5.91	7.35			7.92	7.05
6.25	2.74	3.20	27.91	6.24	5613
5.941	7.342	6.800	6.978	7.940	7.016

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Period = 21h 21m = 0.8899v83

Sawyer's Star Var. = Stn. +12° 3vv7
1900.
18h 26m 1.u +12° 32' 36.''

Comp. Star = +12° 3v66(93)

Epoch of min. by Sawyer = 1898 Oct. 3.vK233
G.m.T. = 241Kv66.vK233 G.m.T.

Ep. 37 = 32.91Kv7
Kv99.Kv690 = 90. hour v. G.m.T.
19.v7083 = 22 periods.
K619.02773
0.8899v8 = 1 "
K619.91731

241Kv66.vK233 v G.m.T. Ep. 0.
v3.37K80 v
K619.91713 " Ep. 60
K620.80671 v " " 61
K621.69629 v " " 62
K622.v8v87 v " " 63
K623.K7vKv v " " 6K
K624.36v03 v " " 6v
K62v.2vK61 v " " 66
K626.1KK19 v " " 67
K627.03377 v " " 68
K627.9233v v " " 69
Dec. K. K628.81293 v " " 70
Dec. v. K629.70 2v1 v " " 71
Dec. 6. K630.v9209 v " " 72
98. Dec. 7. K631.K8167 v " " 73
" " 8. K632.3712v v " " 7K

min. 6h K2 E.T.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Parkhurst' Var.

Sun. +18° 40' 2 = Parkhurst' Var. = 20h 1m 12.1s +18° 37.7' 0.0

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

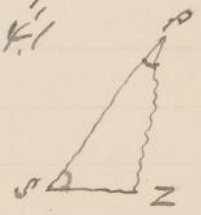
1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Computation of Differential Absorption on Seven years Harv Var. for different hour angles and ~~and~~ corresponding altitudes.

R. A. of Var. = $18^h\ 23^m\ 57^s.6$
Dec. " " = $+12°\ 31'.0$
R.A. " C. S. = $18^h\ 24^m\ 36^s.4$
Dec " " = $+12°\ 32'.1$
$\therefore \Delta\alpha = 14^s.9$ or $\alpha' - \alpha = -14^s.9$
$\therefore \Delta\delta = 1'.1$ " $\delta' - \delta = -1'.1$



Log 61.2 = 1.7867
" $1^s.$ = 1.17609
" cos δ = 9.9899
$14^s.9$ = 896." = 2.9523

$P = 4^h = 60°$ $\angle P = 60°$
$P = 60°$ Log sin P = 9.9373 $ZS = 79.7$
" " PZ = 9.8644
Sum logs = 9.8017
Log sin ZS = 9.93621
$S = 47° 44'$ " " S = 9.86976

$P = 7^h = 75°$
$P = 75°$ Log sin P = 9.9849
" " PZ = 9.8644
Sum logs = 9.8493
$ZS = 70°.6$ Log sin ZS = 9.97461
$S = 49°\ 9'$ " " S = 9.87877

$P = 6^h = 90°$
$P = 90°$ Log sin P. = 0.00000
" " PZ = 9.8644
Sum logs. = 9.8644
$ZS = 41°.6$ Log sin ZS = 9.99732
$48°\ 18'$ = 9.87312

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Formula for Diff. Zenith Distance.

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

Then, generally.

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

$P = 6^h\ 30^m = 97^\circ\ 30'$

$P = 97^\circ\ 30'$ Log sin P = 9.99627
" " $\frac{P}{2}$ = 9.86444
Sum logs = 9.86071
$z s = 47.0$ Log sin $z s$ = 9.99940
$s = 47^\circ\ 10'$ " " s = 9.86131

For 4^h R. A.

-14.9 Log $\Delta\alpha$ = n1.17319
$s = 47^\circ\ 40'$ " sin s = +9.86970
-11.04 = n1.04289

-4.1 Log $\Delta\delta$ = n0.61278
$s = 47^\circ\ 40'$ " cos s = +9.82719
$-2.7\,r$ = n0.43997

Δ path for 1° =
$+11.04$
$+2.7\,r$
$+13.79$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

58 Virginis.

2K0'270A.2666 = Gr. mn. T. transp. from Ch. 3 Cat.

2K1K7AK.6V0A

17.2711) 12076.3AK2 (699.
103A266
171372K
1VVK399
1V932V2
1VVK399
3AAV3

17.2711 X 699 = 12072.K9A9 v
2K0270A.2666 v

Ep. 699. 1899. transp 5.76VV = 2K1K7A0.76VV v = Gr. mn. T. transp.
17.2711 v

" 700 " " 23.0366 v = K79A.0366 v = " " " "
17.2711 v

" 701 " June 9.3077 v = KA1V.3077 v = " " " "
17.2711 v

" 702 " " 26.V7AA v = KA32.V7AA v = " " " "
17.2711 v

" 703 " July 13. = KA49.A499 v
17.2711 v

" 704 " July 31 = KA67.1210 v
17.2711 v

" 705 = KAAK.3921 v
17.2711 v

" 706 = K901.6632 v
17.2711 v

" 707 = K91A.93K3 v
17.2711 v

" 70A = K936.20VK v
17.2711 v

" 709 = K9V3.K76V v

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Cephei.

2413474.1920 = Ep. 2240 = 9v Obs.
2413499.1200 = " 2250 = 9v Obs. 1.
2.4924
2413501.6124 = " 2251 = 9v
+.1423611
2413501.7547611 = Corrected value for Ep. 2251
2415500.4344 = 3053

$1^h\ 37^m = \frac{d\ 0.0673611}{402.} = +0.0000440 = $ Cor. to Period.
2.4924000
2.4924440 = Corrected Period.

2413501.7547611
+.0274000
2413501.7821611 = Corrected Value for Epoch 2251.

Epoch.	3255	241 6002.1455131	Ep. 3275	6054.4957771
"	3265	241 6029.5669371	3276	6056.9886611
		32.0598211	3277	6059.4815451
		34.5527051	3307	6134.2680651
		37.0455891	3312	6146.7324051
	3269	39.5384731	3313	6149.2253691
	70	42.0313571	3314	6151.7182531
	71	44.5242411	3315	6154.2111371
	72	47.0171250	3316	6156.7040211
	73	49.5100091	3344	6226.5047731
	74	52.0028931	3348	6236.4763091

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ef. 3368	241	6286.333988791
		6288.826873 1
		6291.319757 1
		6293.812641 1
		6296.305525 1
		6298.798409 1
		6301.291293 1
		6303.784177 1
		6306.277061 1
		6308.769945 1
3378		6311.262829 1
		6313.755713 1
		6316.248597 1
		6318.741481 1
82		6321.234365 1
83		6323.727249 1
84		6326.220133 1
3385		6328.713017 1
3395		6353.641857 1
96		6356.134741 1
97		6358.627625 1
98		6361.120509 1
99		6363.613393 1
3400		6366.106277 1
01		6368.599161 1
02		6371.092045 1
03		6373.584929 1
04		6376.077813 1
05		6378.570697 1

Ef. 3406	241	6381.063581 1
07		6383.556465 1
08		6386.049349 1
09		6388.542233 1
3410		6391.035117 1
11		6393.528001 1
12		6396.020885 1
13		6398.513769 1
14		6401.006653 1
15		6403.499537 1
16		6405.992421 1
17		6408.485305 1
18		6410.978189 1
19		6413.471073 1
20		6415.963957 1
3421		6418.456841 1
22		6420.949725 1
23		6423.442609 1
24		6425.935493 1
25		6428.428377 1
26		6430.921261 1
27		6433.414145 1
3428		6435.907029 1
3457		6508.206665 1
3458		6510.693549 1
3461		6518.172201 1
3532		6697.661845 1

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Sapeleu.

For May 12. 1899.

Eastern Elong. = 1899 Apr. 21. = J. D. 2414766.
" May 12 = " 4787.
+21 days.

For 21 days. Pos. Ang. = 219° (240°) Conn. des Temps. 1899. p. 657

(A) = mean dist. from Sun.
ρ = geocentric dist.
a = semi-major axis expressed in seconds of arc.
by a $\frac{(A)}{\rho}$ = 2.724 VK from Conn. des Temps. 1899. p. 646.
" " in sec. = 537." = 8.9

In Conn. des Temps. the pos. ang. is reckoned in the usual way, that is N. f. v. f.

The times of conj. and opp. are given (in Conn. des Temps) on p. 662.
P and F for Δt are given on p. 657.
Δt is reckoned from Eastern Elongation.
See p. 770 for text.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of W Delphini (4806)

Continued from P. 115

Epoch	G.M.T. Minimum		East mean Time, Decim.		Ep.	G.M.T. Minimum		E.M.T. Min.	
764	5674.4675	1901 Oct.	16	6:14	806	5876.3237		May 6	2:46
765	5679.2736	"	21	1:34	807	5881.1298		10	22:07
766	5684.0797	"	25	20:55	808	5885.9359		15	17:28
767	5688.8858	"	30	16:15	809	5890.7420		20	12:49
768	5693.6919	Nov.	4	11:36	810	5895.5481		25	8:09
769	5698.4980	"	9	6:57	811	5900.3542		30	3:30
770	5703.3041	"	14	2:18	812	5905.1603		June 3	22:50
771	5708.1102	"	18	21:38	813	5909.9664		" 8	18:11
772	5712.9163	"	23	16:59	814	5914.7725		13	13:31
773	5717.7224	"	28	12:20	815	5919.5786		18	8:54
774	5722.5285	Dec.	03	7:42	816	5924.3847		23	4:15
775	5727.3346	"	8	3:03	817	5929.1908		27	23:35
776	5732.1407	"	12	22:23	818	5933.9969		July 2	18:55
777	5736.9468	"	17	17:44	819	5938.8030		" 7	14:06
778	5741.7529	"	22	13:05	820	5943.6091			
779	5746.5590	"	27	8:25	821	5948.4152			
780	5751.3651	1902 Jan.	1	3:45	822	5953.2213			
781	5756.1712	"	6	23:06	823	6001.2823			
782	5760.9773	"	10	18:27	824	6006.0884			
783	5765.7834	"	15	13:48	825	6010.8945			
784	5770.5895	"	20	9:08	826	6015.7006			
785	5775.3956	"	25	4:30	827	6020.5067		Sept. 27	7:10
786	5780.2017	"	30	23:52	828	6025.3128		Oct 2	2:31
800	5847.4871	Apr.	7	6:42	829	6030.1189		" 6	21:52
801	5852.2932	"	12	2:02	830	6034.9250		Oct 11	17:10
802	5857.0993	"	16	21:23	831	6039.7311		Oct 16	12:32
803	5861.9054	"	21	16:43	841	6044.5372		" 21	7:54
804	5866.7115	"	26	12:05	842	6049.3433		" 26	3:14
805	5871.5176	May	1	7:26	843	6054.1494		" 30	22:35

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Epoch.	G. M. T. Minimum	E. M. T. Minimum d h m
444	241 6058.9555	Nov. 14 17 55
445	63.7616	19 13 18
446	68.5677	24 8 38
447	73.3738	29 3 58
448	78.1799	Dec. 3 23 19
449	82.9860	8 18 40
450	87.7921	13 14 00
456	6116.6287	Jan. 1 10:06
457	6121.4348	Jan. 6 5:25
458		
468		
469		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

o Ceti.

The ephemeris below was computed from the following formula 2402963.4 + 331.6 E which is the formula of Chandler's Third Catalogue.

2412579.8	= epoch 29	2411253.4	= Epoch 25
2911.4	30	1585.0	= 26
3243.0	31	1916.6	= 27
3574.6	32	2248.2	= 28
3906.2	33		
4237.8	34		
4569.4	35		
4901.0	36		
5232.6	37		
5564.2	38		
5895.8	39		
6227.4	40		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Sagittarii.

Computation of Times of Min. (G. M. T.) from formula in Chandler's 3d Cat.

Min. = 1871, Sept. 16d 16h 0m = 2405676.6666667
Period = 2d 9h 45m.6 = 2.4157

Epoch 0 = 2405676.6666667
= 10141.0 × 110
" 4190 = 2414417.7 × 21777 = 1899. June 11.d 18h 3m.4 G.M.T.
2.415769
" 4199 = 2414420.167 × 722 = " June 14.d 4h 1m.4 " "
2.41569
" 4200 = 2414422.5 × 3667 = " " 16.
2.4157
" 4201 = 2414424.9993 = " " 18.
2.4157
" 4202 = 2414427.4150 = " " 21.
2.4157
" 4203 = 2414429.830 = " " 23.
2.4157
" 4204 = 2414432.246 = " " 26.
2.4157
" 4205 = 2414434.6621 = " " 28.
2.4157
" 4206 = 2414437.078 = " July 1.
2.4157
" 4207 = 2414439.493 = " " 3.
2.4157
" 4208 = 2414441.9092 = " " 6.
2.4157
" 4209 = 2414444.3249 = " " 8.
2.4157
" 4210 = 2414446.7406 = " " 10.
2.4157
" 4211 = 2414449.163 = " " 13.
2.4157
" 4212 = 2414451.5720 = " " 15.
2.4157
" 4213 = 2414453.977 = " " 17.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R. S. Sagittarii, com.

Computations of Times of min. (B. m. T.) from formulæ in Chandler's 3d Cat.

Epoch 4213 = 24144.3.9477

4214 44.6.4034

4215 44.4.4191

4216 4461.2344

4217 4463.6505

4218 4466.0662

4219 4468.4819

4220 4470.8976

This ephemeris is correct.

Oct. 31, 1900.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Time term.	No. Epoch.
24 K200. K700	0
K20A. KV00	1
K216. K300	2
K22K. K100	3
K232. 3900	K
K2K0. 3700	V
K2KA. 3V00	6
K2V6. 3300	7
K26K. 3100	A
K272. 2900	9
K2A0. 2700	10
K2AA. 2V00	11
K296. 2300	12
K30K. 2100	13
K312. 1900	1K
K320. 1700	1V
K32A. 1V00	16
KV3V. 6300	K2
KVK3. 6100	K3
KVV1. V900	KK
KV59. V700	KV
KV67. VV00	K6
KV7V. V300	K7
KVA3. V100	KA
KV91. K900	K9
KV99. K700	V0
K607. KV00	V1
	V2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676

Ephemeris of γ Delphini on the basis of K. 2061 for period.
The ephemeris computed on the basis of the correction indicated in Astro. Phys. Journ. VIII, p. 23 [0m.4v (E − 3v7)]

No. Epoch.	Ephemeris.	Date of Minimum m	d
263	32 66. 6114	1895 3	13
264	32 71.4175		18
265	32 76.2236		23
266	32 81.0297		28
267	32 85.8358	4	1
268	32 90.6419		6
269	32 95.4480		11
270	33 00.2541		16
271	33 05.0602		21
272	33 09.8663		25
273	33 14.6724		30
274	33 19.4785	5	5
275	33 24.2846		10
276	33 29.0907		15
277	33 33.8968		19
278	33 38.7029		24
279	33 43.5090		29
280	33 48.3151	6	3
281	33 53.1212		8
282	33 57.9273		12
283	33 62.7334		17
284	33 67.5395		22
285	33 72.3456		27
286	33 77.1517	7	2
287	33 81.9578		6
288	33 86.7639		11
289	33 91.5700		16
290	33 96.3761		21
291	34 01.1822		26

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

The ephemeris was first computed on ~~on~~ the bases of the period 4.8061 and correction $[0.85\,(E - 385)]^2$ from epoch 320 to 481 as indicated on pp. 112–113. The rest of the necessary ephemeris was computed by differencing from this.

No. Epoch.	Ephemeris.	Date of Minimum	m	d
292	3405.9883	1895	7	30
293	3410.7944		8	4
294	3415.6005			9
295	3420.4066			14
296	3425.2127			19
297	3430.0188			24
298	3434.8249			28
299	3439.6310		9	2
300	3444.4371			7
301	3449.2432			12
302	3454.0493			17
303	3458.8554			21
304	3463.6615			26
305	3468.4676		10	1
306	3473.2737			6
307	3478.0798			11
308	3482.8859			15
309	3487.6920			20
310	3492.4981			25
311	3497.3042			30
312	3502.1103		11	4
313	3506.9164			8
314	3511.7225			13
315	3516.5286			18
316	3521.3347			23
317	3526.1408			28
318	3530.9469		12	2
319	3535.7530			7

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

γ Delphini. Ephemeris on basis 4406 and corr. [0.4r.(6-3r)/]

Epoch 3r7 = 24137/8.d 3248r. Formula used =

Epoch.	Ephemeris	Lt. Equation	
320	3rF0.rr91	+0.0027	3rF0.r618
320	3540.5591	+0.0025	3540.5619
321	3545.3652	+0.0029	3545.36F1
321	3545.3652	+0.0030	3545.36F2
321	3545.3652	+0.0030	3545.36F2
322	3550.1713	+0.0032	3550.1745
323	3554.9774	+0.0036	3554.9F10
324	3559.7F35	+0.0039	3559.7F74
337	3622.262F	+0.0040	3622.266F
349	3679.9360	+0.0002	3679.9362
350	36F4.7421	+0.0002	36F4.7423
356	3713.57F7	-0.0021	3713.5766
35F	3723.1909	-0.0030	3723.1F79.
360	3732.F031	-0.0036	3732.7995
361	3737.6092	-0.0036	3737.6056
367	3766.4455F	-0.0046	3766.4412
374	3F00.0F55	-0.0044	3F00.0F41
376	3F09.7007	-0.0042	3F09.6965
377	3F14.5065F	-0.0040	3F14.502F
379	3F24.1190	-0.0033	3F24.1157
3F0	3F2F.9251	-0.0030	3F2F.9221
3F5	3F52.9556	-0.0014	3F52.9542
3F5	3F52.9556	-0.0012	3F52.9544
3F6	3F57.7617	-0.0011	3F57.7606
391	3FF1.7922	+0.0011	3FF1.7933
437	4102.F72F	-0.003F	4102.F690
43F	4107.67F9	-0.003F	4107.6751
444	4136.5155	-0.0047	4136.510F

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

γ Delphini. Ephemeris on basis K. 4061 and corr. [0.ᵈ⁰⁰⁰⁰ (E − 3V)]

= 2K1371ᵈ.3ᵈ4ᵈ4ᵈ + 4.4061 E.

No.	Epoch.	Ephemeris.	Lt. Equation.	
452	H174.9643	−0.0040	H174.9603	
457	419F.994F	−0.0027	419F.9921	
460	4213.4131	−0.0020	4213.4111	
463	4227.F314	−0.0005	4227.F309	
46F	4251.F619	+0.0014	4251.F633	
469	4256.66F0	+0.001F	4256.669F	
470	4261.4741	+0.001F	4261.4759	
473	4275.F924	+0.0031	4275.F955	
47F	4314.3412	+0.0045	4314.3457	

		Date of Minimum			Lt Eq.
			m	d.	
594	4F57.4305	1899	7	21	+0046
595	4F62.2366			26	
596	4F67.0427			31	
597	4F71.F4FF		F	4	
59F	4F76.6549			9	
599	4FF1.4610			14	
600	4FF6.2671			19	
601	4F91.0732			24	
602	4F95.F793			2F	
603	4900.6F54		9	2	
604	4905.4915			7	
605	4910.2976			12	
606	4915.1037			17	
607	4919.909F			21	
60F	4924.7159			26	
609	4929.5220		10	1	
610	4934.32F1			6	
611	4939.1342			11	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

γ Delphini. Ephemeris on the basis K. A061 and corr. [0.ᵐ4r (E − 3r)]

Epoch.	Ephemeris.	Date of Minimum.			Epoch	Gr. M.T. Ephemeris	East. Time of Minimum		
			m	d				h	m
612	49 43.9403	1899.	10	15	654	07 43.7965	1900 – 5 – 5	14	6
613	49 48.7464			20	655	50.6026	10	9	28
614	49 53.5525			25	656	55.4087	15	4	49
615	49 58.3586			30	657	60.2148	20	0	09
616	49 63.1647		11	4	658	65.0209	24	19	30
617	49 67.9708			8	659	69.8270	29	14	51
618	49 72.7769			13	660	74.6331	6 – 3	10	12
619	49 77.5830			18	661	79.4392	8	5	33
620	49 82.3891			23	662	84.2453	13	0	54
621	49 87.1952			28	663	89.0514	17	20	14
622	49 92.0013		12	3	664	93.8575	22	15	35
623	49 96.8074			7	665	98.6636	27	10	56
624	50 01.6135			12	666	02 03.4697	7 – 2	6	17
625	50 06.4196			17	667	08.2758	7	1	38
626	50 11.2257			22	668	13.0819	12	20	58
627	50 16.0318			27	669	17.8880	16	16	19
628	50 20.8379			31	670	22.6941	21	11	40
629	50 25.6440	1900	1	5	671	27.5002	25	7	00
630	50 30.4501			10	672	32.3063	31	2	20
631	50 35.2562			15	673	37.1124			
632	50 40.0623			20	674	41.9185			
633	50 44.8684			24	675	46.7246			
634	50 49.6745			29	676	51.5307			
635	50 54.4806		2	3	677	56.3368			
636	50 59.2867			8	678	61.1429			
637	50 64.0928			13	679	65.9490			
638	5 068.8989				680	70.7551			
639	5 073.7050								

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Epoch.	G.M.T. Min.		East Time of Minimum		
					L.Eq.
681	5275.5612	0	Sept. 12.	8:28	
682	80.3673		" 17	3:48	
683	85.1734				
684	89.9795				
685	94.7856				
686	99.5917		Oct. 6	9:13	
687	5304.3978		" 11	4:33	-0023
688	5309.2039				
689	5314.0100				
690	18.8161				
691	23.6222		" 30	9:55	
692	28.4283		Nov. 4	5:17	
693	33.2344				
694	38.0405				
695	42.8466				
696	47.6527		" 23	10:41	
697	5352.4588		" 28	6:02	
698	5357.2649				
699	5362.0710				
700	5366.8771				
701	5371.6832		Dec. 17	11:24	
702	5376.4893		22	6:44	
703	5381.2954				
704	5386.1015				
705	5390.9076				
706	5395.7137				
707	5400.5198		Jan 15	7:29	
708	5405.3259		" 20	2:49	
709	5410.1320				

Cont. on p. 94 2 this book.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Ephemeris of U Cephei.

2.4928.

Continued from P. 65.

Epoch	3003	241 5376.1984	
	3013	5401.1264	
	3023	5426.0544	
	3033	5450.9824	
	3043	5475.9104	
	3053	5500.8384	
	3054	5503.3312	
	3055	5505.8240	
	3056	5508.3168	
	3057	5510.8096	
	3058	5513.3024	
	3059	5515.7952	
	3060	5518.2880	
	3061	5520.7808	
	3062	5523.2736	
	3063	5525.7664	
	3064	5528.2592	
	3104	5627.9712	
	3105	5630.4640	
	3106	5632.9568	
	3107	5635.4496	
	3108	5637.9424	
	3109	5640.4352	
	3110	5642.9280	
	3111	5645.4208	
	3112	5647.9136	
	3113	5650.4064	
	3114	5652.8992	
	3115	5655.3920	
	3119	5665.3648	
Epoch	3125	5680.3200	
		5682.8128	
		5685.3056	
		5687.7984	
		5690.2912	
		5692.7840	
		5695.2768	
		5697.7696	
		5700.2624	
		5702.7552	
	3135	5705.2480	
		5707.7408	
		5710.2336	
		12.7264	
		15.2192	
		17.7120	
		20.2048	
		22.6976	
	3143	25.1904	
	3149	5740.1472	
	3150	42.6400	
	3151	45.1328	
	3152	47.6256	
	3153	50.1184	
	3161	70.0608	
	3162	72.5536	
	3164	77.5392	
	3166	82.5248	
	3168	86.5104	
	3170	9X.4960	

1899phae.proj.1676

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

24928

Ef. 3180	24135.8717.4248	Ef. 3255	6004.3840
	58 19.9168		6.8768
	58 22.4096		9.3696
	58 24.9024		11.8624
	58 27.3952		14.3552
	58 29.8880		16.8480
	58 32.3808		19.3408
	58 34.8736		21.8336
	58 37.3664		24.3264
	58 39.8592		26.8192
3190	58 42.3520	3265	29.3120
	58 44.8448		31.8048
	58 47.3376		34.2976
	58 49.8304		36.7904
	58 52.3232		39.2832
	58 54.8160	3270	6041.7760
	58 57.3088	3308	6136.5024
	59.8016	3318	6161.4304
	62.2944	3328	6186.3584
	64.7872	3338	6211.2864
3200	67.2800	39	6213.7792
	69.7728	40	6216.2720
	72.2656	41	6218.7648
	74.7584	42	6221.2576
	77.2512	43	6223.7504
	79.7440	44	6226.2432
	82.2368	45	6228.7360
	84.7296	46	6231.2288
	87.2224	47	6233.7216
	89.7152	3348	6236.2144
3260	92.2080		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676

Continued from Page. 62.

Ephemeris of U Cephei. Per = 2.4928

Epoch.	Ephemeris	Date of Minimum y.	m	d.
40	7990.0320	1880.	10	1
41	7992.5248			3
42	7995.0176			6
43	7997.5104			8
44	8000.0032			11
45	8002.4960			13
46	8004.9888			15
47	8007.4816			18
48	8009.9744			20
49	8012.4672			23
50	8014.9600			25
51	8017.4528			28
52	8019.9456			30
53	8022.4384		11	2
54	8024.9312			4
55	8027.4240			7
56	8029.9168			9
57	8032.4096			12
58	8034.9024			14
59	8037.3952			17
60	8039.8880			19
61	8042.3808			22
62	8044.8736			24
63	8047.3664			27
64	8049.8592			29
65	8052.3520		12	2
66	8054.8448	1880	12	4
67	8057.3376			7
68	8059.8304			9
69	8062.3232			12
70	8064.8160			14
71	8067.3088			17
72	8069.8016			19
73	8072.2944			22
74	8074.7872			24
75	8077.2800			27
76	8079.7728			29
77	8082.2656	1881	1	1
78	8084.7584			3
79	8087.2512			6
80	8089.7440			8
81	8092.2368			11
82	8094.7296			13
83	8097.2224			16
84	8099.7152			18
85	8102.2080			21
86	8104.7008			23
87	8107.1936			26
88	8109.6864			28
89	8112.1792			31
90	8114.6720		2	2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of U. Cephei.

Epoch.	Ephemeris.	Date of Minimum.	Epoch.	Ephemeris.	Date of Minimum.
91	F117.1648	1881 - 2 - 5	116	A179.4848	1881. - 4 - 8
92	F119.6576	7	117	81F1.9776	10
93	F122.1504	10	118	81H4.4704	13
94	F124.6432	12	119	A186.9632	15
95	F127.1360	15	120	F189.4560	18
96	F129.6288	17	121	A191.9488	20
97	F132.1216	20	122	A194.4416	23
98	F134.6144	22	123	A196.9344	25
99	F137.1072	25	124	A199.4272	28
100	F139.6000	27	125	A201.9200	30
101	8142.0928	3 2	126	A204.4128	5 3
102	A144.5856	4	127	A206.9056	5
103	8147.0784	7	128	A209.3984	8
104	8149.5712	9	129	A211.8912	10
105	A152.0640	12	130	8214.3840	13
106	A154.5568	14	131	8216.8768	15
107	A157.0496	17	132	8219.3696	18
108	8159.5424	19	133	8221.8624	20
109	8162.0352	22	134	8224.3552	23
110	F164.5280	24	135	8226.8480	25
111	8167.0208	27	136	A229.3408	28
112	8169.5136	29	137	8231.8336	30
113	A172.0064	4 1	138	8234.3264	6 2
114	F174.4992	3	139	A236.8192	4
115	A176.9920	5	140	8239.3120	7

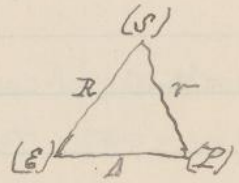
John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Sapetus

Computation of Phase Angle.

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



in which a = Phase Angle.

R = Dist. from Sun to Earth.

r = " " " " Sapetus. (or Saturn)

Δ = " " Earth " " " "

1899.

Date.	Epoch.	Log. R	Log. r	Log. Δ	A
99. V. 9.	Sup.	0.0043	1.0024	0.9639	1.010
" V 30.	H.E.	0.0061	1.0024	0.9573	1.014
" 6 14.	Inf.	0.0070	1.0025	0.9566	1.040
" 7 2.	E.E.	0.0072	1.0025	0.9612	1.040
" 7 26.	Sup.	0.0067	1.0026	0.9696	1.039
" 8 16.	H.E.	0.0053	1.0026	0.9828	1.036
" 9 5.	Inf.	0.0034	1.0027	0.9970	1.031
" 9 25.	E.E.	0.0010	1.0027	1.0112	1.031

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Iapetus.

Computation of Phase Angle.

$$\sin \tfrac{1}{2} a = \tfrac{1}{2} \sqrt{\frac{(R+r-\Delta)(R+\Delta-r)}{r\,\Delta}}$$

in which a = Phase Angle.
R = Dist. from Sun to Earth.
r = " " " " " Iapetus (Saturn)
Δ = " " Earth " " "

1899.

Date.	J.D.	Phen.	Log R	Log r	Log Δ	R	r
99. 3. 13.	4727	□ ☽ ☉	9.9997	1.0021	1.0007	0.994	10.0702
" 4 27.	4772		0.0030	1.0023	0.9699	1.007	10.0732
" 6. 10.	4816	☽ ☉	0.0067	1.0024	0.9624	1.015	10.0763
" 7. 26.	4862		0.0067	1.0027	0.9697	1.015	10.0793
" 9. 9.	4907	□ ☽ ☉	0.0029	1.0026	0.9994	1.006	10.0619

J.D.	(Fract.)²	Log. Fraction.	Log. sin ½a	½ a	a
4727	7.9916	9.9993	9.6990	2° 70′	5° 40′
4772	7.7190	9.9971	9.5249	2 0	4 0
4816	7.0470	7.2394	7.2291	0 6	0 12
4862	7.7177	9.9976	9.5773	2 0	4 0
4907	9.0017	9.00077	9.69974	2 02	5 0

	J.D.	Log R.	Log. r	Log Δ	R	r
99. June 7.	4813	0.0067	1.0024	0.9636	1.012	10.0763
" " 13.	4819	0.0062	1.0024	0.9626	1.012	10.0763

		Log. Fract.	Log sin ½ a	½ a	a
99. June 7.	4813	7.9025	7.6042	0° 13.4	0° 27.6
" " 13.	4819	7.7339	7.4336	0 9.3	0 18.6

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Δ	R + r − Δ	R + Δ − r	Log. R + r − Δ	Log. R + Δ − r	Log. Numerator.	Log r Δ
10.0120	+1.0327	+0.9863	0.013997	9.9808	9.9946	2.00270
9.3304	+1.7301	+0.2839	0.238407	9.4531	9.69124	1.97222
9.0418	+2.0308	+0.0008	0.30760	6.6982	7.0067	1.9869
9.3232	+1.7816	+0.2794	0.243483	9.4466 23	9.62966	1.97214
9.9977	+1.0712	+0.9424	0.029827	9.97424	0.00411	2.0027

Δ	R + r − Δ	R + Δ − r	Log. R + r − Δ	Log. R + Δ − r	Log Numerator.	Log r Δ	Log. (Fract.)
9.0440	2.0277	0.0029	0.30696	7.462440	7.76936	1.9828 40	5.8106
9.0420	2.0303	0.0013	0.30786	7.113944	7.42180	1.9828 42	5.4627 8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Saphira.

Computation of Phase Angle.

1899.

Date.	J.D.	Log. R.	Log. r	Log. Δ	R	r
99. Apr. 7.	4750	0.00043	1.00226	0.9839	1.0010	10.0521
" May 27.	4800	0.00070	1.00241	0.9583	1.0132	10.0576
" July 14.	4850	0.00710	1.00254	0.96363	1.016 5	10.0586
" Sept. 2.	4900	0.00371	1.00266	0.99482	1.0086	10.0614
" Oct. 22.	4950	9.99766	1.00276	1.02769	0.9946	10.0627
" June 27.	4833	0.00718	1.00250	0.9580	1.0167	10.057
" Aug. 14.	4881.	0.00547	1.00262	0.9839	1.0127	10.0606

Δ J.	Log. (Fract.)	Log. Fract.	Log sin ½ a	½ a	a
4750	7.93279	8.96640	8.6637	2° 39'.1	5° 18'.
4800	6.97013	8.4405	8.1803	0 52.5	1 45.
4850	7.4969	8.74829	8.44726	1 36.3	3 13.
4900	7.9952	8.99796	8.69693	2 57.2	5 52.
4950	7.7744	8.84720	8.5817	2 12.6	4 25.
4833	6.91024	8.4512	8.1549	0 49.0	1 38.
4881	7.9164	8.9522	8.6219	2 36.2	5 12.

	J.	Log. R.	Log. r	Log. Δ	R	r
96. Mar. 31.	3650	9.99982	0.9946	0.9573	0.9997	0.9882
" May 20.	3700	0.00539	0.9935	0.9006	1.0125	0.9894
" July 9.	3750	0.00718	0.9982	0.97478	1.0167	0.9904
" Aug. 28.	3800	0.00412	0.9929	1.01044	1.009 5	0.9915

Δ J.	Log. (Fract.)²	Log. Fract.	Log sin ½ a	½ a	a
3650	8.04459	9.02230	8.72127	3° 1.0	6° 2.0
3700	8.06129	9.03064	8.72961	3 4.5	6 9.0
3750	8.04286	9.02143	8.72040	3 0.7	6 1.4
3800	8.00102	9.00051	8.69948	2 52.2	5 44.4

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Δ	R+r−Δ	R+Δ−r	Log. R+r−Δ	Log. R+Δ−r	Log. numerator	Log. r Δ
9.6372	1.4179	0.9861	0.1703	9.76797	9.91900	1.9862
9.0825	1.9836	0.0830	0.2971	8.6336	8.9308	1.9607
9.1966	1.8705	0.1968	0.2732	9.1883	9.4627	1.9661
9.8815	1.1805	0.8205	0.0700	9.9184	9.9934	1.9974
10.6983	0.4020	1.9872	9.6023	0.2006	9.8046	2.0306
9.0782	1.9962	0.0372	0.3002	8.9707	8.9709	1.9605
9.9805	1.0927	0.9727	0.1739	9.7264	9.9004	1.9841

Δ	R+r−Δ	R+Δ−r	Log(R+r−Δ)	Log(R+Δ−r)	Log numerator	Log r Δ
0.9065	1.0814	0.9180	0.0339	9.9628	9.9963	1.9522
0.8918	1.1105	0.8918	0.0492	9.9611	9.0067	1.9541
0.9436	1.0635	0.9699	0.0273	9.9873	0.0136	1.9706
1.0243	0.9767	1.0423	9.9897	0.0179	0.0077	2.0067

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Lapelcus.

Computation of Phase Angle.

1897.

Date.	J. D.	Log. R.	Log. r	Log. Δ	R	r	Δ
97. May 5.	4050	0.00399	0.99839	0.9[illegible]320	1.0092	9.9630	[illegible]
" June 24.	4100	0.0071[illegible]	0.99877	0.961[illegible]7	1.0166	9.9717	9.1[illegible]32
" Aug. 13.	4150	0.00[illegible]48	0.99913	0.99[illegible]27	1.0127	9.9900	9.8690
" Oct. 2.	4200	0.00007	0.999[illegible]	1.026[illegible]	1.0002	9.9880	10.6312

	Log Fract.	Log sin ½ a	½ a	a
4050	8.369[illegible]2	8.068849	0° 40.3	1° 20.6
4100	8.80010	8.99907	1 48.[illegible]	3 37.0
4150	9.00616	8.70[illegible]13	2 [illegible]4.4	[illegible] 48.8
4200	8.8711[illegible]	8.[illegible]701[illegible]	2. 7.8	4 [illegible]5.6

Date.	J. D.	Log. R.	Log r	Log Δ	R	r	Δ
'97 May 30.	4070	0.00612	0.998[illegible]8	0.9[illegible]310	1.0142	9.9634	8.9764
" July 19.	4125	0.00692	0.998[illegible]	0.976[illegible]1	1.0161	9.97[illegible]8	9.4712
" Sept. 7.	4175	0.00306	0.99931	1.011[illegible]	1.0071	9.9[illegible]42	10.2774
8 " May 17.	4062	0.00[illegible]11	0.99[illegible]49	0.9[illegible]202	1.011[illegible]	9.96[illegible]2	8.9[illegible]40

	Log. Fract.	Log sin ½ a	½ a	a
'97. May 30.	4070	8.3[illegible]798	8.0[illegible]69[illegible]	0 39.2	1 18.4
" July 19.	4125	8.9[illegible]776	8.6[illegible]673	2 36.0	[illegible] 12.0
" Sept. 7.	4175	8.9788[illegible]4	8.677721	2 43.[illegible]	[illegible] 27.0
8 " May 17.	4062	7.[illegible]6[illegible]74	7.26[illegible]71	0 6.3	0 12.6

Date.	Phase.	J. D.	Log. R.	Log Δ	Log sin a	a
'97. Feb. 18.	□ ☽ ☉	3974	9.99[illegible]12	0.99[illegible]87	8.9992[illegible]	[illegible]° 42.0
□ " Aug 16.	□ ☽ ☉	4153	0.00[illegible]24	0.9966[illegible]	9.00878	[illegible] 49.6

	J. D.	Log. R.	Log. r.	Log. Δ	R.	r	Δ
97. June 12.	4048	0.00678	0.99886	0.9[illegible]6[illegible]4	1.01[illegible]7	9.9696	9.0478
" July 6.	4112	0.00720	0.99846	0.96810	1.0167	9.9738	9.2918

	Log Fract.	Log sin ½ a	½ a	a
4048	8.6[illegible]234	8.3[illegible]131	1° 17.[illegible]	2 34.4
4112	8.8[illegible]91	8.[illegible]9788	2 16.[illegible]	4 32.4

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R+r−Δ	R+Δ−r	Log (R+r−Δ)	Log (R+Δ−r)	Log Numerator	Log r Δ	Log (Fract.)²
1.9938	0.0246	0.29969	8.39094	8.69063	1.9515	6.73948
1.8315	0.1941	0.26366	9.29688	9.5605	1.96034	7.60020
1.1237	0.9017	0.05065	9.95506	0.00571	1.99340	8.01231
0.3570	1.6434	9.55267	0.21574	9.76841	2.02606	7.74235

R+r−Δ	R+Δ−r	Log. (R+r−Δ)	Log (R+Δ−r)	Log. Numerator.	Log r Δ	Log (Fract.)²
2.00552	0.02332	0.30215	8.36549	8.66764	1.95168	6.71596
1.5207	0.5115	0.18204	9.70888	9.89089	1.97536	7.91553
0.7139	1.3003	9.88364	0.11404	9.99768	2.01119	7.98649
2.0130	0.0056	0.30388	6.77815	7.08199	6.95051	6.13182

R+r−Δ	R+Δ−r	Log (R+r−Δ)	Log (R+Δ−r)	Log Numerator	Log r Δ	Log. Fract²
1.9375	0.0939	0.28724	8.97267	9.25991	1.95522	7.30469
1.6987	0.3347	0.24012	9.52466	9.76478	1.96696	7.79782

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Asteroids.

Computation of Phase Angle.

1896.

Date.	J. D.	Log R.	Log r	Log. Δ	R.	r	Δ
96. Mar. 31.	36r0	9.9998A	0.99K86	0.9r738	0.9997	9.AA2K	9.06r2
" May 20.	3700	0.00r39	0.99r3r	0.9r006	1.012r	9.A935	A.9138
" July 9.	37r0	0.0071A	0.99rA2	0.97K7A	1.0167	9.90K2	9.K3rA
" Aug. 28.	3A00	0.00K12	0.99629	1.010KK	1.009r	991r0	10.2K33
" Mar. 6.	362r	9.9968r	0.99461	0.97223	0.992A	9.A766	9.3A06
" Apr. 25.	367	0.00291	0.99r10	0.9K930	1.0067	9.AA7A	A.A9A2
" June 14.	372r	0.00649	0.99rr9	0.9r936	1.0160	9.A990	9.1066
" May r.	36Ar	0.00400	0.99r26	0.94Ar0	1.0093	9.A900	AAA1A

	Log Fract.	Log sin ½ a	½ a	a
36r0	A.78K1A	A.KA31r	1° KK.6	3° 29.2
3700	A.K3K90	A.1338A7	0 46.A	1 33.6
37r0	A.97009	A.66906	2 40.r	r 21.0
3A00	A.976K6	A.67rK3	2 K2.9	r 2r.A
362r	A.9r10A	A.6r00r	2 33.6	r 7.2
367	A.2944r2	7.9933 9	0 33.9	1 7.A
372r	A.4A2r91	A.5724A	1 rr1	3 r0.2
36Ar	7.7018.6	7.K00A3	A.6	

Date.	Phen.	L. M.	Log. R.	Log. Δ	Log sin ½ a	a
96. Feb. 7.	□ ☽ ☉	3r97	9.9941r	0.992rK	9.001rA	r° K3.9
" Aug. K.	□ ☽ ☉	3776	0.0061K	0.99362	9.012r2	r r2.6

		Log. R.	Log r	Log. Δ.	R.	r	Δ
96. June 1.	371r	0.00624	0.99r46	0.9r3r7	1.01Kr	9.A960	A.9A60
" " 27.	373A	0.0071A	0.99r71	0.966A2	1.0167	9.901A	9.26KK

	Log. Fract.	Log sin ½ a	½ a	a
371r	A.67720	A.37617	1° 21.7	2° K3.K
373A	A.917r1	A.616KA	2 22.2	K KK.K

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R+r−Δ	R+Δ−r	Log. R+r−Δ	Log. R+Δ−r	Log. Numerator	Log. rΔ	Log. (Fract.)
1.2169	0.1232	0.29933	9.26126	9.5209	1.9522	7.5637
1.9922	0.0322	0.29933	2.5152	2.2120	1.9551	6.26979
1.4225	0.5523	0.17176	9.73902	9.91072	1.97060	7.94012
0.6212	1.3372	9.23327	0.12639	9.59966	2.00673	7.92293
1.4222	0.4962	0.17222	9.69612	9.26900	1.96622	5.90216
1.9963	0.0171	0.30023	2.23300	2.53323	1.94440	6.5222 3
1.2024	0.2236	0.25730	9.34947	9.60677	1.95491	7.61212
2.0175	0.0011	0.30422	7.04139	7.34621	1.94370	5.40251

R+r−Δ	R+Δ−r	Log. R+r−Δ	Log. R+Δ−r	Log. Numerator	Log. rΔ	Log. (Fract.)
1.9254	0.1054	0.28432	9.01912	9.30344	1.94903	7.35441
1.6541	0.3793	0.21257	9.57292	9.79755	1.96253	7.83502

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Saphetis.

Computation of Phase angle.

1899 A. + 1897

Date.	$\odot$ λ.	Log. R.	Log. r.	Log. Δ.	R	r	Δ
98. May 15.	44250	0.00492	1.00024	0.97624	1.0114	10.0197	9.0417
" May 29.	44339	0.00601	1.00093	0.97463	1.0139	10.0214	9.0020
" June 9.	44470	0.00664	1.00099	0.97434	1.0154	10.0224	9.0224
" July 4.	44707	0.00719	1.00112	0.96304	1.0167	10.0254	9.1442
" " 29.	45000	0.00649	1.00124	0.97732	1.0150	10.0246	9.0491
" June 21.	44462	0.00702	1.00104	0.97404	1.0164	10.0242	9.0790
" July 17.	44842	0.00701	1.00064	0.96943	1.0163	10.0272	9.3242
" May 26.	44436	0.00754	1.00094	0.97464	1.0174	10.0291	9.0104
" June 1.	44442	0.00620	1.00064	0.97464	1.0144	10.0218	9.0084

	Log. Heat.	Log sin ½ a	½ a	a
44250	8.43396	8.13293	0° 46.7	1° 33.4
44339	7.92916	7.72413	0 52.8	0 11.6
44470	8.26778	7.96679	0 31.8	1 3.6
44707	8.77412	8.47309	1 42.2	3 24.4
45000	8.96972	8.66472	2 31.8	5 3.6
44462	8.59300	8.29197	1 7.3	2 14.6
44842	8.88276	8.58171	2 11.2	4 22.4
44436	7.90647	7.60524	0 13.9	0 27.8
44442	7.74928	7.41425	0 8.9	0 17.8

					R	r	Δ
96. Apr. 30.	36480	0.00346	0.99521	0.94872	1.0080	9.8890	9.8826
" May 12.	36692	0.00470	0.99527	0.94882	1.0109	9.8918	9.8828
97. " 14.	40579	0.00444	0.99846	0.95212	1.0112	9.9646	9.9562
" " 20.	40654	0.00536	0.99851	0.95206	1.0124	9.9654	9.9542

	Log Heat.	Log sin ½ a	½ a	a
36480	8.03775	7.73672	0° 18.7	0° 37.4
36692	8.11755	7.81652	0 22.5	0 45.0
40579	7.90092	7.59989	0 13.7	0 27.4
40654	7.86786	7.56643	0 12.7	0 25.4

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R+r−Δ	R+Δ−r	Log(R+r−Δ)	Log(R+Δ−r)	Log. numerator.	Log r Δ	Log (Fract.)²
1.9892	0.0336	0.29867	8.52634	8.82201	1.97710	6.86791
2.0273	0.0005	0.30692	6.69899	7.00589	1.99996	5.00033
2.0154	0.0154	0.30436	8.18752	8.49188	1.99633	6.53555
1.8823	0.1751	0.26912	9.25329	9.52241	1.96416	7.56225
1.9556	0.0776	0.19100	9.67906	9.87006	1.97856	7.89150
1.9616	0.0912	0.29261	8.82624	9.11809	1.99209	7.11600
1.7147	0.3179	0.23419	9.50229	9.73648	1.99101	7.76553
2.0239	0.0029	0.30699	7.46240	7.76939	1.99966	5.01294
2.0276	0.0012	0.30699	7.07918	7.38616	1.99999	5.43057

R+r−Δ	R+Δ−r	Log (R+r−Δ)	Log (R+Δ−r)	Log. numerator.	Log r Δ	Log Fract.
2.0108	0.0052	0.30337	7.71600	8.01937	1.99438	6.02550
2.0143	0.0027	0.30413	7.87506	8.17919	1.99609	6.23510
2.0196	0.0026	0.30527	7.44716	7.75243	1.99705	5.80126
2.0236	0.0024	0.30604	7.30421	7.60829	1.99705	5.73572

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Computation of Phase Angles for Sapeter.

Tabulation.

1896.

Date.	J. D.	Phase Ang.
96. Feb. 7.	3v-97 □	v° 44'.
" Mar. 6.	362v.	v 7.
" Mar. 31.	36v0.	3 29.
" Apr. 25.	367v.	1 4.
" Apr. 30.	36A0	0 37.
" May v.	36Av	0 17.
" " 12.	3692	0 4v.
" " 20.	3700	1 34.
" June 1.	3712	2 43.
" " 14.	372v	3 v0.
" " 27.	373A	4 44.
" July 9.	37v0	v 21.
" Aug. 4.	3776 □	v v3.
" " 24.	3A00	v 26.

1897.

Date.	J. D.	Phase Ang.
97. Feb. 18.	3974	v° 42'.
" May v.	40v0	1 21.
" " 14.	40v9	0 27.
" " 17.	4062	0 13.
" " 20.	406v	0 2v.
" " 30.	407v	1 1A.
" June 12.	40A4	2 34.
" " 24.	4100	3 37.
" July 6.	4112	4 32.
" " 19.	412v	v 12.
" Aug. 13.	41v0	v 49.
" " 16.	41v3	v v0.
" Sept. 7.	417v	v 27.
" Oct. 2.	4200	4 16.

1898.

98. May v.	44 2v	1° 33'.
" " 26.	4436	0 2A.
" " 29.	4439	0 12.
" June 1.	4442	0 1A.
" " 9.	44v0	1 4.
" " 21.	4462	2 1v.
" July 4.	447v	3 24.
" " 17.	44A4	4 22.
" " 29.	4500	v 4.

1899.

99 Mar. 13.
" Apr. v.
" " 27.
" May 2v.
" June 7.
" " 10.
" " 27.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris Jup. +42° 3334.

(4456.5388 + 0.5662 E)

No. Epoch.	Time max.	No. Epoch.	Time max.	No. Epoch.	Time max.
0	4456.0688	132	4930.7522	160	4947.1720
1	4456.5200	133	4931.3184	161	4947.7388
2	.1956	134	4931.8846	162	4948.3044
3	4808.2786	135	4932.4508	163	4948.8706
4	.7432	136	4933.0170	164	4949.4368
5	4884.3238	137	4933.5832	165	4950.0030
6	.4520	138	4934.1494	166	4950.5692
7	4907.5380	139	4934.7156	167	4951.1354
8	.4214	140	4935.2818	168	4951.7016
9	4911.6014	141	4935.8480	169	4952.2678
10	.5538	142	4936.4142	170	4952.8340
11	4912.6338	143	4936.9804	171	4953.4002
12	.1200	144	4937.5466	172	4953.9664
13	4913.2000	145	4938.1128	173	4954.5326
14	.6862	146	4938.6790	174	4955.0988
15	4913.7662	147	4939.2452	175	4955.6650
16	.2524	148	4939.8114	176	4956.2312
17	4914.3324	149	4940.3776	177	4956.7974
18	.8186	150	4940.9438	178	4957.3636
19	4915.3848	151	4941.5100	179	4957.9298
20	.9510	152	4942.0762	180	4958.4960
21	4916.5172	153	4942.6424	181	4959.0622
22	.0834	154	4943.2086	182	4959.6284
23	4916.6496	155	4943.7748	183	4960.1946
24	.2158	156	4944.3410	184	4960.7608
25	4917.2820	157	4944.9072	185	4961.3270
26	.8482	158	4945.4734	186	4961.8932
27	4918.4144	159	4946.0396	187	4962.4594
28	.9806	160	4946.6058	188	4963.0256

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of Nu. + 42° 3398.

No. Epoch.	Time max.	No. Epoch.	Time max.	No. Epoch.	Time max.	No. Epoch.	Time max.
189	4963.5718	218	4986.0116				
190	4964.0780	219	4980.5778				
191	4964.7242	220	4981.1440				
192	4965.2804	221	4981.7102				
193	4965.8566	222	4982.2764				
194	4966.4228	223	4982.8426				
195	4966.9890	224	4983.4088				
196	4967.5552	225	4983.9750				
197	4968.1214	226					
198	4968.6876	227					
199	4969.2538	228					
200	4969.8200	229					
201	4970.3862	230					
202	4970.9524						
203	4971.5186						
204	4972.0848						
205	4972.6510						
206	4973.2172						
207	4973.7834						
208	4974.3496						
209	4974.9158						
210	4975.4820						
211	4976.0482						
212	4976.6144						
213	4977.1806						
214	4977.7468						
215	4978.3130						
216	4978.8792						
217	4979.4454						

This ephemeris supplanted by another more correct one.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of Dm. +42° 3338.

48 v 6.5000 + 0.v 666 E.

No. Epoch	Time of minimum	No. Epoch.	Time of minimum
0	4856.5000	196	4967.5536
		197	4968.1202
3	4858.1998	198	4968.6868
		218	4980.0188
49	4884.2634	219	4980.5854
90	4907.4940	220	4981.1520
97	4911.4602	221	4981.7186
99	4912.5934	222	4982.2852
100	4913.1600	223	4982.8518
101	4913.7266	224	4983.4184
102	4914.2932	225	4983.9850
106	4916.5596	226	4984.5516
109	4918.2594	236	4990.2176
113	4920.5258	246	4995.8836
114	4921.0924	247	4996.4502
115	4921.6590	248	4997.0168
121	4925.0046	249	4997.5834
122	4925.6252	250	4998.1500
123	4926.1918	260	5003.8160
127	4928.4582	270	5009.4820
130	4930.1580	271	5010.0486
132	4931.2912	272	5010.6152
134	4932.4244	273	5011.1818
135	4932.9910		
136	4933.5576	274	5011.7484
144	4938.0904	275	5012.3150
145	4938.6570	276	5012.8816
155	4944.3230	277	5013.4482
160	4947.1560	278	5014.0148
161	4947.7226	288	5019.6808
173	4954.5218	293	5022.5138
195	4966.9870		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of Jupiter. + 42° 3238.

48 v6. v000 + 0. v668 E.

No. Epoch.	Time of Minimum.	No. Epoch.	Time of Minimum.	No. Epoch.	Time of Minimum.	No. Epoch.	Time of Minimum.
0	48v6.v000	110	4918.8480	139	4935.2802	168	4952.7224
1	4857.0668	111	4919.4148	140	4935.8520	169	4953.2892
2	4857.6336	112	4919.9816	141	4936.4188	170	4953.8560
3	4858.2004	113	4920.5484	142	4936.9856	171	4954.4228
4	4858.7672	114	4921.1152	143	4937.5524	172	4954.9896
48	4883.7064	115	4921.6820	144	4938.1192	173	4955.5564
49	4884.2732	116	4922.2488	145	4938.6860	174	4956.1232
50	4884.8400	117	4922.8156	146	4939.2528	175	4956.6900
89	4906.9452	118	4923.3824	147	4939.8196	176	4957.2568
90	4907.5120	119	4923.9492	148	4940.3864	177	4957.8236
91	4908.0788	120	4924.5160	149	4940.9532	178	4958.3904
92	4908.6456	121	4925.0828	150	4941.5200	179	4958.9572
93	4909.2124	122	4925.6496	151	4942.0868	180	4959.5240
94	4909.7792	123	4926.2164	152	4942.6536	181	4960.0908
95	4910.3460	124	4926.7832	153	4943.2204	182	4960.6576
96	4910.9128	125	4927.3500	154	4943.7872	183	4961.2244
97	4911.4796	126	4927.9168	155	4944.3540	184	4961.7912
98	4912.0464	127	4928.4836	156	4944.9208	185	4962.3580
99	4912.6132	128	4929.0504	157	4945.4876	186	4962.9248
100	4913.1800	129	4929.6172	158	4946.0544	187	4963.4916
101	4913.7468	130	4930.1840	159	4946.6212	188	4964.0584
102	4914.3136	131	4930.7508	160	4947.1880	189	4964.6252
103	4914.8804	132	4931.3176	161	4947.7548	190	4965.1920
104	4915.4472	133	4931.8844	162	4948.3216	191	4965.7588
105	4916.0140	134	4932.4512	163	4948.8884	192	4966.3256
106	4916.5808	135	4933.0180	164	4949.4552	193	4966.8924
107	4917.1476	136	4933.5848	165	4950.0220	194	4967.4592
108	4917.7144	137	4934.1516	166	4950.5888	195	4968.0260
109	4918.2812	138	4934.7184	167	4951.1556	196	4968.5928

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

No Ep.	Time of Maximum	No Ep.	Time of Minimum	No Ep.	Time of Maximum	No Ep.	Time of Minimum	No Ep.	Time of Maximum
197	4968.1096	226	4984.5968	255	5001.0340	284	5017.6712	480	5731.3980
198	4968.7264	227	4985.1636	256	5001.6008	285	5018.2380	486	5731.9648
199	4969.2932	228	4985.7304	257	5002.1676	286	5018.8048	487	5732.5316
200	4969.8600	229	4986.2972	258	5002.7344	287	5019.3716	488	5733.0984
201	4970.4268	230	4986.8640	259	5003.3012	288	5019.9384	489	5733.6652
202	4970.9936	231	4987.4308	260	5003.8680	289	5020.5052	490	5734.2320
203	4971.5604	232	4987.9976	261	5004.4348	290	5020.0720	491	5734.7988
204	4972.1272	233	4988.5644	262	5005.0016	291	5021.6388	492	5735.3656
205	4972.6940	234	4989.1312	263	5005.5684	292	5022.2056	493	5735.9324
206	4973.2608	235	4989.6980	264	5006.1352	293	5022.7724	494	5736.4992
207	4973.8276	236	4990.2648	265	5006.7020	294	5023.3392	495	5737.0660
208	4974.3944	237	4990.8316	266	5007.2688	295	5023.9060	496	5737.6328
209	4974.9612	238	4991.3984	267	5007.8356	296	5024.4728	497	5738.1996
210	4975.5280	239	4991.9652	268	5008.4024	297	5025.0396	498	5738.7664
211	4976.0948	240	4992.5320	269	5008.9692	298	5025.6064	499	5739.3332
212	4976.6616	241	4993.0988	270	5009.5360	299	5026.1732	500	5739.9000
213	4977.2284	242	4993.6656	271	5010.1028	300	5026.7400	510	5745.5680
214	4977.7952	243	4994.2324	272	5010.6696	301	5027.3068	511	5746.1348
215	4978.3620	244	4994.7992	273	5011.2364	302	5027.8736	512	5746.7016
216	4978.9288	245	4995.3660	274	5011.8032	303	5028.4404	513	5747.2684
217	4979.4956	246	4995.9328	275	5012.3700	304	5029.0072	514	5747.8352
218	4980.0624	247	4996.4996	276	5012.9368	431	5100.7908	515	5748.4020
219	4980.6292	248	4997.0664	277	5013.5036	478	5127.4304	516	5748.9688
220	4981.1960	249	4997.6332	278	5014.0704	479	5127.9972	517	5749.5356
221	4981.7628	250	4998.2000	279	5014.6372	480	5128.5640	518	5750.1024
222	4982.3296	251	4998.7668	280	5015.2040	481	5129.1308	519	5750.6692
223	4982.8964	252	4999.3336	281	5015.7708	482	5129.6976		
224	4983.4632	253	4999.9004	282	5016.3376	483	5130.2644		
225	4984.0300	254	5000.4672	283	5016.9044	484	5130.8312		

Con. on Page 196

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ceraskis Variable

DM + 45° 4062

Ephemeris of Ceraskis Variable for 1900. continued from Circular 45 of H.C.O. Per. = 4.057294 d

		d	h	m			d	h	m	
804	50020.24876	12	31	5	58	G.M.T.	12	31	0	58	G.M.T.
805	50248.2170	1	4	19	44	"	1	4	14	44	"
806	50293.9464	1	9	9	29	"	1	9	4	29	"
807	50339.6758	1	13	23	14	"	1	13	18	14	"
808	50385.4052	1	18	12	58	"	1	18	07	58	"
809	50431.1346	1	23	2	44	"	1	22	21	44	"
810	50476.8640	1	27	16	28	"	1	27	11	28	"
811	50522.5934	2	1	6	13	"	2	1	1	13	"
812	50568.3228	2	5	19	58	"	2	5	14	58	"
813	50614.0522	2	10	9	43	"	2	10	4	43	"
814	50659.7816	2	14	23	28	"	2	14	18	28	"
815	50705.5110	2	19	13	14	"	2	19	08	14	"
816	50751.2404	2	24	2	58	"	2	23	21	58	"
817	50796.9698	2	28	16	43	"	2	28	11	43	"
818	50842.6992	3	5	6	29	"	3	5	1	29	"
819	50888.4286	3	9	20	14	"	3	9	15	14	"
820	50934.1580	3	14	9	59	"	3	14	4	59	"
821	50979.8874	3	18	23	44	"	3	18	18	44	"
822	51025.6168	3	23	13	30	"	3	23	8	30	"
823	51071.3462	3	28	3	14	"	3	27	22	14	"
824	51117.0756	4	1	17	00	"	4	1	12	00	"
825	51162.8050	4	6	6	43	"	4	6	1	43	"
826	51208.5344	4	10	20	28	"	4	10	15	28	"
827	51254.2638	4	15	10	14	"	4	15	5	14	"
828	51299.9932	4	19	23	58	"	4	19	18	58	"
829	51345.7226	4	24	13	44	"	4	24	08	44	"
830	51391.4520	4	29	3	29	"	4	28	22	29	"

Epoch. Minimum — Gr. Mean Time of Minimum — East. Mean Time of Minimum

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Over lapping means of DM 42° 3338
by formula 24480-6-5000 +0.0668 E.

Phase	Diff Magn	mean Phase	mean Diff Magn	Phase	Diff Magn	mean Phase	mean Diff Magn	Phase	Diff Magn	mean Phase	mean Diff Magn
.0049	2.38	.0052	2.39	.1093	1.95	.1089	1.97	.2308	1.68	.2310	1.74
.0085	2.34	.0088	2.36	.1147	2.00	.1151	1.96	.2342	1.70	.2340	1.73
.0135	2.38	.0124	2.36	.1182	1.92	.1202	1.94	.2351	1.80	.2367	1.72
.0135	2.31	.0152	2.34	.1293	1.90	.1264	1.93	.2413	1.64	.2392	1.72
.0174	2.39	.0183	2.34	.1294	1.92	.1323	1.90	.2422	1.78	.2419	1.71
.0189	2.29	.0201	2.32	.1404	1.89	.1397	1.89	.2430	1.69	.2454	1.71
.0243	2.34	.0219	2.33	.1444	1.88	.1449	1.88	.2479	1.63	.2479	1.71
.0243	2.28	.0239	2.30	.1550	1.86	.1578	1.87	.2527	1.79	.2505	1.70
.0245	2.35	.0270	2.31 2.28	.1555	1.84	.1571	1.85	.2538	1.68	.2548	1.70
.0273	2.22	.0292	2.28	.1636	1.86	.1617	1.84	.2553	1.69	.2598	1.71
.0345	2.34	.0317	2.28	.1671	1.82	.1653	1.84	.2640	1.69	.2623	1.70
.0353	2.20	.0345	2.25	.1674	1.84	.1690	1.85	.2686	1.72	.2670	1.69
.0369	2.28	.0372	2.26 2.30	.1727	1.86	.1725	1.85	.2693	1.70	.2717	1.70
.0384	2.22	.0396	2.24	.1767	1.88	.1750	1.85	.2775	1.66	.2761	1.69
.0410	2.23	.0422	2.24	.1785	1.84	.1791	1.85	.2788	1.71	.2797	1.70
.0462	2.24	.0446	2.22	.1796	1.83	.1824	1.83	.2863	1.67	.2847	1.69
.0486	2.21	.0477	2.22	.1881	1.84	.1850	1.82	.2868	1.76	.2901	1.70
.0488	2.21	.0507	2.20	.1892	1.77	.1891	1.81	.2942	1.64	.2968	1.70
.0538	2.20	.0530	2.19	.1895	1.83	.1932	1.79	.3042	1.70	.3062	1.70
.0563	2.13	.0556	2.16	.1992	1.76	.1964	1.78	.3127	1.71	.3167	1.68
.0576	2.18	.0582	2.16	.1999	1.75	.2003	1.77	3331	1.68	.3260	1.69
.0614	2.09	.0605	2.14	.2043	1.80	.2045	1.77	.3392	1.68	.3388	1.69
.0620	2.19	.0647	2.13	.2086	1.73	.2072	1.76	.3407	1.66	.3406	1.69
.0652	2.12	.0699	2.10	.2106	1.80	.2117	1.75	.3432	1.74	.3439	1.67
.0774	2.09	.0753	2.08	.2138	1.74	.2154	1.75	.3466	1.67	.3464	1.67
.0835	2.00	.0825	2.04	.2214	1.68	.2190	1.74	.3499	1.58	.3510 .3489	1.64
.0884	2.02	.0903	2.02	.2227	1.80	.2226	1.75	.3516	1.69	.3522	1.66
.0982	1.96	.0967	1.99	.2264	1.70	.2260	1.74	.3582	1.66	.3556	1.64
.1039	2.02	.1029	1.99	.2287	1.82	.2286	1.74	.3596	1.68	.3585	1.66

Continued Cover

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Continued from Previous Page.

Phase	Diff Magn	mean Phase	mean Diff Magn	Phase	Diff Magn	mean Phase	mean Diff Magn	Phase	Diff Magn	mean Phase	mean Diff Magn
.3635	1.60	3604	1.64	.4410	1.56	.4412	1.60	.4793	1.84	.4793	1.78
.3638	1.76	———	———	.4412	1.58	.4417	1.60	.4801	1.87	.4802	1.79
.3665	1.68	.3657	1.64	.4427	1.62	.4429	1.60	.4809	1.85	.4810	1.81
.3719	1.73	———	———	.4428	1.60	.4443	1.62	.4814	1.72	.4824	1.79
.3727	1.60	.3717	1.63	.4470	1.65	.4458	1.62	.4832	1.78	.4837	1.80
.3761	1.66	.3756	1.64	.4477	1.60	.4473	1.62	.4863	1.73	.4854	1.83
.3805	1.62	.3808	1.63	.4486	1.60	.4489	1.63	.4867	1.92	.4872	1.88
.3832	-1.66	.3836	1.64	.4502	1.60	.4523	1.61	.4896	1.98	.4887	1.91
.3876	1.60	.3887	1.65	.4512	1.63	.4526	1.60	.4902	2.01	.4896	1.97
.3896	-1.68	.3909	1.65	.4540	1.58	.4530	1.61	.4907	1.90	.4909	1.95
.3914	1.68	.3911	1.66	.4540	1.59	.4549	1.62	.4909	2.05	.4920	1.93
.3915	1.61	.3954	1.66	.4558	1.66	.4566	1.62	.4932	1.82	.4931	1.95
.4026	1.69	.4012	1.66	.4596	1.62	.4580	1.64	.4948	1.85	.4943	1.97
.4052	1.66	.4065	1.65	.4598	1.67	.4594	1.64	.4961	2.11	.4957	1.99
.4099	1.72	———	———	.4606	1.66	.4605	1.63	.4964	2.04	.4969	2.04
.4102	1.66	.4120	1.65	.4612	1.58	.4611	1.63	.4982	2.14	.4977	2.03
.4182	1.65	.4164	1.64	.4613	1.62	.4622	1.63	.4988	2.04	.4985	2.06
.4184	1.74	———	———	.4625	1.62	.4636	1.62	.4989	1.84	.4995	2.07
.4188	1.59	.4209	1.63	.4655	1.67	.4652	1.63	.5000	2.22	.5003	2.04
.4248	1.62	.4237	1.62	.4674	1.60	.4669	1.65	.5017	2.13	.5012	2.02
.4275	1.62	.4262	1.62	.4695	1.64	.4684	1.66	.5020	1.98	.5021	2.10
.4296	1.62	.4288	1.63	.4697	1.70	.4695	1.66	.5032	1.97	.5032	2.07
.4303	1.66	.4302	1.63	.4699	1.68	.4703	1.67	.5037	2.18	.5042	2.04
.4318	1.65	.4311	1.64	.4709	1.67	.4710	1.69	.5054	2.10	.5052	2.04
.4318	1.62	.4323	1.64	.4715	1.64	.4717	1.71	.5065	1.96	.5061	2.16
.4322	1.63	.4340	1.63	.4731	1.78	.4730	1.71	.5072	2.18	.5070	2.18
.4352	1.64	.4336	1.63	.4732	1.77	.4762	1.71	.5079	2.40	.5080	2.21
.4390	1.60	.4372	1.63	.4761	1.70	.4767	1.72	.5079	2.26	.5092	2.28
.4396	1.64	.4388	1.63	.4772	1.68	.4770	1.73	.5116	2.26	.5102	2.26
.4400	1.66	.4399	1.63	.4791	1.68	.4786	1.70	.5116	2.30	.5113	2.21
.4403	1.60	.4403	1.62								
.4407	1.63	.4406	1.61								

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

Continued from Previous Page.

Phase	Diff. Mag.	Mean Phase	Mean Diff Mags.
0.119	2.09	0.125	2.18
0.137	2.15	0.136	2.19
0.139	2.12	0.147	2.19
0.171	2.28	0.168	2.26
0.171	2.32	0.173	2.30
0.172	2.42	0.188	2.38
0.213	2.38	0.198	2.35
0.214	2.48	0.214	2.30
0.221	2.16	0.237	2.30
0.249	2.30	0.262	2.33
0.287	2.43	0.267	2.30
0.289	2.28	0.280	2.32
0.289	2.32	0.299	2.30
0.309	2.28	0.316	2.34
0.319	2.42	0.342	2.37
0.376	2.40	0.381	2.40
0.417	2.46	0.423	2.46
0.483	2.46	0.483	2.43
0.521	2.48	0.530	2.46
0.570	2.26		
0.616	2.46	0.585	2.43
0.660	2.48	0.632	2.44
0.665	2.39	0.010	2.41

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Cephei. Plot. I.

Observations of 1895 and 1896 arranged in phase order from −0.0d2 to +0.d36 (on basis of uniform period 2.d4928), to obtain typical curve on this basis.

Phase	Diff mag	mean Phase	mean Diff mag	Phase	Diff mag	mean Phase	mean Diff mag	Phase	Diff mag	mean Phase	Diff mag
−0.0706	−1.61			+.0216	−1.32	+0.0196	−1.28	.0989	+.06		
.0660	−1.60			.0226	−1.27			.1003	0.00		
.0597	−1.50	−0.0617	−1.57	.0243	−1.20			.1053	+0.24		
.0569	−1.60			.0282	−1.32			.1061	+0.23	+0.1063	+0.23
.0554	−1.55			.0288	−1.13			1076	+0.37		
.0532	−1.62			.0346	−1.13	+0.0331	−1.19	.1129	+0.39		
.0472	−1.53			.0370	−1.18			.1139	+0.46		
.0410	−1.50	−0.0432	−1.55	.0371	−1.19			.1149	+0.30		
.0380	−1.52			.0434	−1.01			.1180	+0.62	+0.1172	+0.51
.0367	−1.58			.0448	−0.98			.1182	+0.65		
.0273	−1.54			.0458	−1.13	+0.0474	−0.99	.1212	+0.62		
.0208	−1.52			.0512	−0.93			.1216	+0.60		
.0221	−1.53	−0.0226	−1.53	.0520	−0.90			.1227	+0.72		
.0217	−1.52			.0582	−0.87			.1242	+0.59	+0.1244	+0.65
.0162	−1.52			.0600	−0.92			.1268	+0.64		
.0152	−1.52			.0613	−0.84	+0.0626	−0.84	.1269	+0.68		
.0108	−1.40			.0645	−0.74			.1275	+0.78		
.0088	−1.49	−0.0092	−1.48	.0692	−0.83			.1307	+0.88		
.0059	−1.51			.0709	−0.72			.1317	+0.68	+0.1315	+0.77
.0052	−1.46			.0750	−0.42			.1321	+0.70		
−.0009	−1.42			.0761	−0.58	+0.0768	−0.52	.1364	+0.80		
+.0034	−1.35			.0805	−0.39			.1373	+0.80		
.0063	−1.50	+0.0064	−1.37	.0817	−0.49			.1396	+0.75		
.0112	−1.20			.0847	−0.68			.1398	+0.80	+0.1397	+0.80
.0122	−1.38			.0863	−0.42			.1409	+0.78		
.0130	−1.29			.0923	−0.30	+0.0911	−0.28	.1411	+0.88		
+0.0163	−1.31			.0935	−0.16			.1427	+0.80		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

U Cephei continued.

Phase	Diff mag.	mean Phase	mean Diff mag.	Phase	Diff mag.	mean Phase	mean Diff mag.	Phase	Diff mag.	mean Phase	mean Diff mag.
.1481	+0.76			.2501	-.024	+.02498	-.019	.2988	-1.14		
.1495	+.89			.2517	-.22			.2992	-1.06		
.1502	+.80	+.01489	+.810	.2546	-.18			.3018	-1.21		
.1538	+.73			.2590	-.40			.3030	-1.08		
.1548	+.78							.3030	-1.21	+.3034	-1.10
.1592	+.86			.2596	-.33			.3040	-.87		
.1602	+.80	+.01599	+.882					.3053	-1.15		
.1612	+.76			.2610	-.46	+.02617	-.044	.3073	-1.28		
.1642	+.819			.2642	-.52			.3095	-1.18		
.1673	+.841										
.1716	+.880			.2645	-.049			.3102	-1.10	+.3101	-1.21
.1724	+.90	+.0178	+.883								
.1848	+.81			.2685	-.059			.3113	-1.27		
								.3122	-1.24		
.1957	+.84			.2686	-.067			.3139	-1.20		
								.3141	-1.24		
.1993	+.86			.2696	-.063	+.02706	-.061	.3147	-1.21	+.3153	-1.22
.2067	+.71			.2724	-.060			.3160	-1.28		
								.3180	-1.17		
.2078	+.79	+.02075	+.883	.2741	-.058			.3184	-1.33		
.2079	+.92			.2770	-.099			.3189	-1.38		
.2109	+.87			.2770	-.071			.3208	-1.40	+.3207	-1.33
.2166	+.863			.2781	-.082	+.02789	-.078	.3223	-1.28		
				.2808	-.079						
.2188	+.875			.2815	-.079			.3227	-1.27		
								.3233	-1.32		
.2234	+.870	+.02225	+.868	.2837	-.097			.3239	-1.26		
				.2846	-.083						
.2256	+.860			.2850	-.090	+.02861	-.091	.3264	-1.39	+.3257	-1.30
				.2856	-.086						
.2279	+.871			.2888	-1.01			.3271	-1.27		
.2296	+.858			.2889	-.097			.3276	-1.26		
								.3280	-1.38		
.2343	+.842			.2919	-1.07			.3306	-1.35		
.2365	+.810	+.02369	+.823	.2927	-1.060	.2922	-1.01	.3307	-1.34	+.3306	-1.36
.2416	+.802			.2933	-1.01			.3315	-1.36		
								.3320	-1.35		
.2425	+.803			.2940	-.096			.3332	-1.37		
				.2964	-.096						
.2454	-.012			.2977	-1.005			.3344	-1.42		
.2474	-.017			.2988	-1.11	+.02982	-1.06	.3357	-1.42	+.3358	-1.39
				29				.3370	-1.30		

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

U Cephei.

Continued from previous page.

Phase	Diff Magn	Mean Phase	Mean Diff Mag
.3387	-1.42		
.3414	-1.35		
.3430	-1.52		
.3459	-1.38	0.3447*	-1.43*
.3467	-1.42		
.3467	-1.48		
.3482	-1.70		
.3502	-1.41		
.3503	-1.53	0.3508*	-1.51*
.3504	-1.50		
.3567	-1.42		
.3583	-1.50		
.3593	-1.40	0.3584*	-1.46*
.3573	-1.50		-1.37
.3593	-1.44		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

I Inoculatis.

Times of minima computed from Ephemeris given in Chandler's 3d Cat. which is

2409633.63 + 27.0122 E

27.0122 × 199. = 3795.4278 v

2409633.63 v

2413009.0578 v = Ep. 199.

27.0122

2413036.0700 = Ep 200

27.0122

2413063.0822 = Ep. 201

27.0122

2413090.0944 = Ep. 202

27.0122

2413117.1066 = Ep 203

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Dates of Eclipses of Sat. IV sent Rev. Sampson.

1878 Sept 1. R
Nov. 7. D.
1879 Aug. 2. R.
Oct. 25. R.
1882 Sept. 12. D.
Oct. 7. R.
Nov. 24. D.
Dec. 24. R.
1883 Mar. 4. R.
Apr. 23. D.
May 10. R.
1886 Feb. 22. D.
Apr. 30. R.
1889. Aug. 14. D.
1890. July 19. D.
Aug. 5. R.
Sept. 24. D.
1891 July 6. R.
Sept. 24. R.
1892 Feb. 19. D.
Oct. 28. D.
1896 Jan. 3. D.
Nov. 27. D.
Apr. 13. R.
June 2. D.
June 19. R.
Dec 3. D.
Dec 20. R.

1897 Feb. 25. R.
Nov. 3. D.
1898 Jan. 9. D.
Jan. 9. R.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Computation of Times of Maxima of Circumpolar Variables from Chandler's 3d Cat.

No. Ep.	Max.
	T. Cassiopeiae.
15 241	1190
16	1635
17	2080
18	2525
19	2970
20	3600
21	3860
22	4305
23	4750
	S Cassiopeiae

No. Ep.	Max
	R Aurigae.
21 241	1126.2
22	1586.4
23	2046.6
24	2506.8
25	2967.0
26	3427.2
27	3887.4
28	4347.6
29	4807.8
	R Lyncis.
14 241	1102
15	1482
16	1862
17	2242
18	2622
19	3002
20	3382
21	3762
22	4142
23	4522
24	4902

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

No. Sp. Max
R Ursae Majoris

No. Sp. Max
S Ursae Majoris

T Ursae Majoris

S Böötis

Continued on next page.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Continued from page 153

No & p.	Max.
R Canum Venaticorum.	
27	241 1215.5
28	1485.0
29	1764.5
30	2024.0
31	2293.5
32	2563.0
33	2832.5
34	3102.0
35	3371.5
36	3641.0
37	3910.5
38	4180.0
39	4449.5
40	4719.0
R Draconis.	
18	241 1136.6
19	1382.2
20	1627.8
21	1873.4
22	2119.0
23	2364.6
24	2610.2
25	2855.8
26	3101.4
27	3347.0
28	3592.6
29	3838.2
30	4083.8

No & p.	Max.
R Draconis (cont.)	
31	241 4329.4
32	4575.0
33	4820.6
S Cygni.	
T Cephei.	
15	241 1164
16	1505.1
17	1938
18	2325
19	2712
20	3099
21	3486
22	3873
23	4260
24	4647
25	5034

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

No. of. Max.
S Ophei.

18 24 11 12
19 16 05
20 20 89
21 25 73
22 30 07
23 35 41
24 40 25
25 45 09

R Cassiopeiae

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of η Aquilae
compt' from Chand. 3d Cat.

	d.	
Ep 0 =	239 6168.6253	Per = 7.176381
Ep. 2600	241 4827.215900	
2601	4834.392281	
2623	4992.272663	
2648	5171.682188	
2649	5178.858569	
2650	5186.034950	
2651	5193.211331	
2652	5200.387712	
2653	5207.564093	
2654	5214.740474	
2655	5221.916855	
2656	5229.093236	
2657	5236.269617	
2658	5243.445998	
2659	5250.622379	
2664	5286.504284	
2667	5308.033427	
2668	5315.209808	
2669	5322.386189	
2670	5329.562570	
2671	5336.738951	
2672	5343.915332	
2673	5351.091713	
2693	5494.619333	
2694	5501.795714	
2695	5508.972095	
2696	5516.148476	
2697	5523.324857	
2698	5530.501238	
2699	5537.677619	

Ep. 2700 =	241 5544.854000
2701 =	5552.030381
2702 =	5559.206762
2703 =	5566.383143
2704 =	5573.559524
2705 =	5580.735905
2706 =	5587.912286
2707	5595.088667
2708	5602.265048
2709	5609.441429
2710	5616.617810
2711	5623.794191
2712	5630.970572
2713	5638.146953

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

δ Cassiop. Values from Chandler's full formula.

(Epoch 15.)

10° × 15 = 150°

150
200

Log sin 200° = ug. 7340 ″
″ 70. = +1. 69897 ″
−17.10″ = ul. 23302 ″

2410740. ″
2410723.4 ″ for Ep. 15.

(Epoch 16.)

10° × 16 = 160°

150
210°

Log sin 210° = ug. 69897 ″
″ 70. = +1. 69897 ″
−20.00″ = ul. 39794 ″

2410740.7 ″
+610.7 ″
2411350.0 ″
−20.0 ″
2411326.0 ″ = Ep. 16.

(Epoch 17.)

10° × 17 = 170.0″

150
220° = ug. 80807 ″
70. = +1. 69897 ″
−32.1″ = ul. 50704 ″

2411350.0 ″
610.7 ″
2411960.7 ″
−32.1 ″
2411928.6 ″ = Ep. 17.

(Epoch 18.)

10° × 18 = 180

150
230° = ug. 84427 ″
70. = +1. 69897 ″
−34.30″ = ul. 54322 ″

2411960.7 ″
610.7 ″
2412572.0 ″
−34.3 ″
2412537.7 ″ = Ep. 18.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

S Cassiop.

(Epoch 19.)

$10 \times 19 = 190.0$

$\log \sin \frac{\quad}{240.} = \overline{1}.99375$

$\quad\quad 0. = +1.69897$

$-43.30 = \overline{1}.63560$

2421272.0
$\quad 610.$
$2421882.$
$\quad -43.3$
$2421839.2 = \text{Ep. } 19.$

(Epoch 20.)

$10 \times 20 = 200.$

$\log \sin \frac{\quad}{240.} = \overline{1}.99299$

$\quad\quad 0. = +1.69897$

$-46.98 = \overline{1}.67196$

$2421882.$
$\quad 610.$
2422493.0
$\quad -47.0$
$2422446.0 = \text{Ep. } 20.$

(Epoch 21.)

$\log \sin 260. = \overline{1}.99933$

$\quad\quad 0. = +1.69897$

$-49.24 = \overline{1}.69232$

2422998.0
$\quad 610.$
$2423608.$
$\quad -49.2$
$2423558.8 = \text{Ep. } 21.$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

N Boston.

$+26\mathrm{A}.2^{d} \quad +0.246\,\mathrm{E}^{2} - 0,00\mathrm{V}\,\mathrm{E}^{3}$

(Epoch 36)

Log. E = Log. 36. = 1.VV630 (2)

" 36^2 = 3,11260

" 0.246 = 9.39094

+31AA = 2,V03VK

− 233.3

+ AV.V

24112 91.2

24113 76.7 = Value for Ep. 36.

Log. E = 1.VV630 (3)

K.66A90

" ,00V = 7.69A97

233,3 = 2,367A7

(Epoch 37)

Log. E = Log. 37. = 1.V6A20 (2)

" 36^2 = 3,13640

" ,246 = 9.39094

+336.A

− 2V3.3

+A3.V

Log E = 1.V6A20 (3)

K,70K60

" ,00V = 7.69A97

− 2V3.3 = 2,K03V7

24112 91.2

26A.2

24 1VV9.K

+A3.V

24116K2.9 = Value for Epoch 37.

(Epoch 38)

Log E = Log 38. = 1.V797A (2)

" 38^2 = 3,1V9V6

" .2K6 = 9.39094

+3VV.2

−27K.K

+A0.A

Log. 38 = 1.V797A (3)

" 38^3 = K,7393K

" ,00V = 7.69A97

−27K.K = 2,K3A31

24 1VV9.K

26A.2

A0.A

24119 0A.K = Value for Epoch 38.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

ν Boötis.

(Epoch 39.)

Log. E. = Log. 39. = 1.v9106

" 39^2 = 3.1A212

" .2K6 = 9.3909K

+374.2 = 2.v7306

−296.6

+77.6

Log. 39. = 1.v9106

" 39^3 = 4.7731A

" .00v = 7.69A97

−296.6 = 2.K721v

2K11A27.6

26A.2

77.6

2K12173.4 = Value for Epoch 39.

(Epoch 40)

Log E = Log. 40. = 1.60206

3.20K12

" .2K6 = 9.3909K

393.6 = 2.v9v06

320.0

+73.6

1.60206

4.A061A

7.69A97

320.0 = 2.v0v1v

2K1209v.A

26A.2

73.6

2K12437.6 = Value for Epoch 40.

Log E = Log 41. = 1.61276 (Epoch 41)

= 3.22vv6

.246 = 9.3909K

413.v = 2.6160

344.6

6A.9

1.61276

4.A3A3K

7.69A97

344.6 = 2.v3731

2K1236K0

26A.2

6A.9

2K12701.1 = Value for Epoch 41.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

N Boötis.

(Epoch 42)

log L = log. 42. = 1.6232 (2)

3.2426 (0)

.246 = 9.3909 4

43 4.0 = 2.6374 4

370.4

63.6

1.6232 (3)

4.2697

.00 7 = 7.6999

370.4 = 2.7672

24126322

2642

63.6

24129640 = Value for Ep. 42.

(Epoch 43)

log. 43. = 1.6334 (2)

3.2669 4

9.3909 4

4 7 4.9 = 2.6774 4

397.7

7.4

1.6334 (3)

4.9004 1

.00 7 = 7.6999

397.7 = 2.7993 4

24129004

2642

7.4

24 13226.0 = Value for Ep. 43.

(Epoch 44)

log 44. = 1.6434 (2)

3.2690

9.3909 4

476.3 = 2.6779 4

42 7.9

70.4

1.6434 (3)

4.9303 7

7.6999

42 7.9 = 2.6293 2

24131646

2642

70.4

24134497 = Value for Ep. 44.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Boötes.

(Epoch 1875)

Log. 1875. = 1.6[2]3216

3.3064[2]
9.3909[4]
49[2].2 = 2.6[3]936
1875[2].6
42.6

1.6[2]3216[3]
4.9[2]9963
7.69[4]97
1875.6 = 2.6[2]4860

24134[2]36.4
26[4].2
42.6
2413[3]47.6 = Value for Ep. 1875.

(Epoch 46) Log. 46. = 1.66276[2]

3,32[2][2]
9.3909[4]
[2]0.6 = 2.[3]1646
[4]6.[3]
33.9

1.66276[3]
4.9[4]24
7.69[4]97
[4]6.[3] = 2.6[4]32

24137[0]0.0
26[4].2
33.9
2413[3]00.1 = Value for Ep. 46.

(Epoch 4) Log. 4). = 1.6[3]210[2]

3.3[4][4]20
9.3909[4]
[2]03.4 = 2.[3]31[4]
[2]19.1
2[4].3

1.6[3]210[3]
[2].01630
7.69[4]97
[2]19.1 = 2.[3]1[2]7

24139[3].2
26[4].2
2[4].3
2413[4]26[2].7 = Value for Ep. 4).

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

N Böötis.

(Epoch KA)

Log KA. = 1.6A12K

2	
3.362KA	
9.3909K	
=2.7V3K2	

3	
1.6A12K	
V.0K372	
7.69A99	
VV3.0 = 2.7K269	

V66.A	
VV3.0	
+13.A	

2K1K2K1.K	
26A.2	
13.A	
2K1KV23.K = Value for Ep. KA.	

(Epoch K9)

Log.K9. = 1.69020

2	
3.3A0K0	
9.3909K	
=2.7713K	

3	
1.69020	
V.07060	
7.69A99	
VAA.3 = 2.7697	

V90.7	
VAA.3	
+2.K	

2K1KV09.6	
26A.2	
2K	
2K1K7A0.2 = Value for Ep. K9.	

(Epoch V0)

Log. V0. = 1.6A997

2	
3.39794	
9.3909K	
=2.7AAAA	

3	
1.69A997	
V.09691	
7.69A99	
-62V.0 = 2.799VAA	

+61V.0	
-62V.0	
-10.0	

2K1K777.A	
26A.2	
2K1V0K6.0	
-10.0	
2K1V026.0 = Value for Ep. V0.	

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics - Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

A Urs. Majoris.

$10^{\circ} \times 44. = 440^{\circ}$
190
630
360
$270.^{\circ} = n0.00000$
Log sin $= +1.17609$
" 1V. $n1.17609$
$-1V.0$

2K1124K3.6
$-1V.0$
2K1122K.6 = Value for Ep. KK.

Log sin. $280 = n9.99337$
" 1V. $= 1.17609$
$-14.77 = n1.16944$

2K1124K3.6
302.1
2K11V4V.7
$-1K.8$
2K11V30.9 = Value for Epoch 4V.

Log sin $290 = n9.99299$
1.17609
$-14.10 = n1.16908$

2K11V4V.7
302.1
2K11A47.8
$-1K.1$
2K11A33.7 = Value for Ep. 46.

Log sin $300^{\circ} = n9.93753$
1.17609
$12.99 = n1.11362$

2K11A47.8
302.1
2K121K9.9
-13.0
2K12136.9 = Final Val. (47)

Log sin $310. = n9.88425$
1.17609
$11.49 = n1.06034$

2K121K9.9
302.1
2K12K52.0
-11.5
2K12440.5 = Final Val. (KA)

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Ursae Majoris.

Log sin 320° = ug. 80807
1.17609
−9.64 = u0.98416

241247.0
302.1
241274.1
−9.6
241274.5 =
Final Value (4q)

Log sin 330° = ug. 69897
1.17609
−7.50 = u0.87506

241274.1
302.1
241306.2
−7.5
241304.7 =
Final Val. (50)

Log sin 340° = ug. 53401
1.17609
−5.13 = u0.70514

241306.2
302.1
241333.3
−5.1
241332.2 =
Final Value (51)

Log sin 350° = ug. 23967
1.17609
−2.60 = u0.41576

241333.3
302.1
241366.4
−2.6
241367.8 =
Final Value (52)

Log sin 360° = 0.00000

241366.4
302.1
241396.5
0.0
Final Value (53)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Ursae Majoris.

Log sin 10° = +9.23967
" lv. = +1.17609
+2.60 = +0.41576

241962.
302.1
241426.6
+2.6
241426[illegible].2 =
Value for Ep. 1

Log sin 20° = +9.53401
lv. = +1.17609
+5.13 = +0.70101

241426.6
302.1
241466[illegible].7
+5.1
241471.8 =
Value for Ep. 2

Log sin 30° = +9.69897
" lv. = +1.17609
+7.50 = +0.87506

241466.7
302.1
241468.8 =
+7.5
241476.3 =
(6)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Three Majors.

$9° \times 41. = 369°$
90
$4 \quad 9$
360

Log sin $99.° = +9.99462$
" $20. = +1.30103$
$+19.7 = +1.29565$

$24112 \quad 1.0$
$+19.8$
$24112708 =$

Value for Exp. 41.

$9° \times 42. = 378$
90
468
360

Log sin $108.° = +9.99821$
" $20. = +1.30103$
$+19.02 \quad +1.29924$

$24112 \quad 1.0$
$2 \quad 7.2$
$2411 \quad 08.2$
$+19.0$
$2411 \quad 27.2 =$

Value for 42.

Log sin $117° = +9.99498$
" $20. = +1.30103$
$+17.82 = +1.29091$

$2411 \quad 08.2$
$2 \quad 7.2$
$24117 \quad 6.4$
$+17.8$
$24117 \quad 83.2$

Value for 43.

Log sin $126° = +9.90796$
" $20. = +1.30103$
$+16.18 = +1.20899$

$24117 \quad 6.4$
$2 \quad 7.2$
$2411 \quad 2022.6$
$+16.2$
$2411 \quad 2038.8 =$

Value for 44.

$24117 \quad 6.4$
$2 \quad 7.2$
$2411 \quad 2022.6$

John C. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1 Ursae Majoris.

Log sin 134° = +9.8498
" 20. = +1.30103
+14.14 = +1.1508

24120226
2.7
24122798
+14.1
24122939 = Value for 47.

Log sin 144° = +9.7692
" 20. = +1.30103
+11.76 = +1.0702

24122798
2.7
24125370
+11.8
24125488 = Value for 46.

Log sin 153° = +9.6570
" 20. = +1.30103
+9.08 = +0.9580

24125370
2.7
24127942
+9.1
24128033 = Value for 47.

Log sin 162° = +9.4899
" 20. = +1.30103
+6.18 +0.79101

24127942
2.7
24130514
+6.2
24130576 = Value for 48.

Log sin 171° = +9.1943
" 20. = +1.30103
+3.13 = +0.4957

24130514
2.7
24133086
+3.1
24133117 = Value for 49.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ursae Majoris.

Log sin 180° = 0.00000
" 20. = +1.30103
20 +1.30103

2K1 3302.6
2v7.2
2K1 3v6v.8 =
Value for v0.

Log sin 189° = n9.19K33
" 20. = +1.30103
-3.13 = n0.K9v36

2K1 3v6v.8
2v7.2
2K1 3823.0
-3.1
2K1 3819.9 =
Value for v1.

Log sin 198° = n9.K899
" 20. = +1.30103
-6.18 = n0.79101

2K1 3823.0
2v7.2
2K1 K084.2
-6.2
2K1 K077.0 =
Value for v2.

Log sin 207° = n9.6v70v
" 20. = +1.30103
-9.08 n0.9v808

2K1 K084.2
2v7.2
2K1 K337.K
-9.1
2K1 K328.3 =
Value for v3.

Log sin 216° = n9.7692
" 20. = +1.30103
-11.76 = n1.0702v

2K1 K337.K
2v7.2
2K1 Kv9K6
-11.8
2K1 Kv82.8 =
Value for vK.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj.1676.

Ilias Evagoras.

$\log \sin 22\overset{\circ}{.}5 = \overline{1}.9\,4\,4\,9\,9$

" $20 = +1.3\,0\,1\,0\,3$

$-14.14 = \overline{1}.1\,5\,0\,5\,2$

$2\,4\,1\,4\,5\,9\,4\,6$

$2\,5\,7.2$

$2\,4\,1\,4\,2\,5\,1.2$

-14.1

$2\,4\,1\,4\,2\,3\,7.1 = (5\,5)$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

S Wis. Nov.

.76 × 47. = 270.72		24112[1]82.7
	121.50	+43.0
	392.22	24112[5]7.7 = Value
360.		
Log sin	92.22 = +9.99967	for 47.
	43. = +1.6334	
	42.97 = +1.63314	
(47)		
		24112[5]82.7
		226.1
(42)	9222	24114[3]42.4
	.76	+42.6
Log sin	97.94 = +9.9977	24114[3]41.4 =
	43. = +1.6334	Value for 42.
	+42.54 = +1.62924	
	97.94	24114[3]42.4
(49)	.76	226.1
Log sin	103.74 = +9.9870	24116[6]49
	43. = +1.6334	+41.8
	+41.77 = +1.62087	24117[2]6.7 = Ep. 49.
	103.74	24116[6]49
(50)	.76	226.1
Log sin	109.50 = +9.9743	24119[3]41.0
	43. = +1.6334	+40.5
	+40.53 = +1.60782	24119[3]1.5 =
		Ep. 50.
	109.50	24119[3]41.0
(51)	.76	226.1
Log sin	111.26 = +9.9763	24121[1]7.1
	43. = +1.6334	+38.9
	+38.89 = +1.58940	24121[1]6.0 =
		Ep. 51.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

S Ursae majoris.

(2)

log sin 11.26 = 9.29299
.76
121.02 = +9.99299
K3. = +1.63347
+36.42 = +1.56646

2K12[1]1.1
226.1
2K123[4]3.2
+36.4
2K12[3]0.0 =

Ep. 2.

(3)

log sin 121.02
.76
126.78 = +9.90342
K3. = +1.63347
+34.44 = +1.53708

2K123[4]3.2
226.1
2K12[5]9.3
+34.4
2K126[0]3.7 =

Ep. 3.

(4)

log sin 126.78
.76
132.54 = +9.96740
K3. = +1.63347
+31.69 = +1.50087

2K12[5]9.3
226.1
2K12[7]5.4
+31.7
2K12[8]7.1 =

Ep. 4.

(5)

log sin 132.54
.76
138.30 = +9.98126
K3. = +1.63347
+28.49 = +1.45473

2K12[7]5.4
226.1
2K13[0]1.5
+28.5
2K13[0]0.0 =

Ep. 5.

(6)

log sin 138.30
.76
144.06 = +9.99642
K3. = +1.63347
+27.23 = +1.43199

2K13[0]1.5
226.1
2K13[2]7.6
+27.2
2K13[2]2.8 =

Ep. 6.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

S Ursae Majoris.

(57)

144.06	24132[6]7.6
.76	226.1
Log sin 149.42 = +9.70137	24134[6]3.7
43. = +1.63346	+21.6
+21.62 = +1.33482	24134[6]5.3 =

Ep. 57.

(58)

149.42	24134[6]3.7
.76	226.1
Log sin 157.28 = +9.61634	24132[6]9.8
43. = +1.63346	+17.8
+17.78 = +1.24981	24132[6]7.6 =

Ep. 58.

(59)

157.28	24132[6]9.8
.76	226.1
Log sin 161.34 = +9.70723	24139[2].9
43. = +1.63346	+13.8
13.76 = +1.13870	24139[2]9.7 =

Ep. 59.

(60)

161.34	24139[2].9
.76	226.1
Log sin 167.10 = +9.34499	24141[2].0
43. = +1.63346	+9.6
+9.60 = +0.98226	24141[2]1.6 =

Ep. 60.

(61)

167.10	24141[2].0
.76	226.1
Log sin 172.46 = +9.09400	24143[2]8.1
43. = +1.63346	+5.3
+5.34 = +0.72752	24141[2]3.4 =

Ep. 61.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ursae Majoris.

(62)

172.46 v
.76 v
Log sin 17.62 v = +9.3[illegible]276 v
43. = +1.6337 v
+ 1.0 +0.01623 v

2[illegible]1[illegible]3[illegible]1 v
226.1 v
2[illegible]1[illegible]6[illegible]4.2 v
+1.0 v
2[illegible]1[illegible]6[illegible]2.2 v =
Eq. 62.

(63)

17.62 v
.76 v
Log sin 14.34 v = +9.[illegible]326 v
43. = +1.6337 v
− 3.29 v = w 0.[illegible]1673 v

2[illegible]1[illegible]6[illegible]2.2 v
226.1 v
2[illegible]1[illegible]4[illegible]0.3 v
−3.3 v
2[illegible]1[illegible]4[illegible]7.0 v =
Eq. 63.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

N Cygni. Maxima.

(27)

12° × 27 = 324.
66.
390.

Log sin 30° = +9.69897 v
" 1v. = +1.17609 v
+7.v0 = +0.87v06 v

2K11132.6 v
+7.v v
2K111K0.1 =

Ep. 27.

---

(28)

Log sin K2° = +9.82vv1 v
1v. = +1.17609 v
+10.0K = +1.00160 v

2K11132.6 v
322.8 v
2K11Kvv.K v
+10.0 v
2K11K6v.K v =

Ep. 28.

---

(29)

Log sin vK° = +9.90796 v
1v = +1.17609 v
12.1K = +1.08K0v v

2K11Kvv.K v
322.8 v
2K1177.2 v
+12.1 v
2K1790.3 =

Ep. 29.

---

(31)

Log sin 78° = +9.99040 v
1v. = +1.17609 v
1.467 = +1.16649 v

2K1177.2 v
6Kv.6 v
2K12K3.8 v
+1K.7 v
2K12K3.8v v =

Ep. 31.

---

(32)

Log sin 90° = +0.00000
1v. = +1.17609 v
+1v.00 = +1.17609 v

2K12K3.8 v
322.8 v
2K127K6.6 v
+1v.0
2K(2)61.6 =

Ep. 32.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1 Cygni. Maxima.

(33)

$\log \sin 102° = +9.99040$ v
$M = +1.17609$ v
$+14.67 = +1.16649$ v

2421766.6 v
322.4
2421069.2 v
+14.7
2421084.1 =

Ep. 33.

---

(34)

$\log \sin 114° = +9.96073$ v
$M = +1.17609$ v
$+13.70 = +1.13682$ v

2421069.2 v
322.4 v
2421391.6 v
+13.7 v
2421405.9 =

Ep. 34.

---

(35)

$\log \sin 126° = +9.90796$ v
$M = +1.17609$ v
$+12.14 \quad +1.08405$ v

2421391.6 v
322.4 v
2421715.0 v
+12.1 v
2421727.1 =

Ep. 35.

---

(36)

$\log \sin 138° = +9.82771$ v
$M = +1.17609$ v
$+10.06 = +1.00160$ v

2421715.0 v
322.4 v
2422037.4 v
+10.0 v
2422047.4 v =

Ep. 36.

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Cassiop.

(30)

$1v \times 30 = 4v.0$

$\frac{0}{4v.0.}$

$\frac{360}{90.} = 0.00000$

Log sin $90. = 0.00000$

" $2v. = 1.39794$

$+2v.00 = +1.39794$

$24112A9.0$ v

$+2v.0$

$24113 1K.0 = .$

Ep. 30.

---

(31) Log sin $10v = +9.9AK9K$ v

" $2v. = +1.39794$

$+2K.1v- = +1.3A2AA$

$24112A9.0$ v

$K29.v$ v

$24117 1A.v$ v

$+2K.2$

$24117K27$

(31)

---

(32) Log sin $120. = +9.937v3$ v

1.39794

$+21.6v+ = +1.33vK7$

$24117 1A.v$ v

$K29.v$ v

$24121KA.0$ v

21.6

24121694.6

(32)

---

(33) Log sin $13v^{\circ} = +9.AK9K9$

1.39794

$+17.6A = +1.2K7K3$

$24121KA.0$ v

$K29.v$ v

$2412v77.v$ v

$+17.7$

$2412v9v.2$

(33)

---

(34) Log sin $1v0^{\circ} = +9.69A97$

1.39794

$+12.v0 = +1.09691$

$2412v77.v$ v

$K29.v$ v

$24130 07.0$ v

$+12.v$

$24130 19.v$

(34)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Cassiop.

(3V) $\log \sin 16^{v}.2 = +9.41300^{v}$
1.39794
$+6.K7 = +0.81094$

$2K13007.0^{v}$
$K2.9^{v}$
$2K13K36.V^{v}$
$+6.V$
$2K13KK3.0$
(3V)

(36) $\log \sin 180 =$

$2K13K36.V^{v}$
$K2.9^{v}$
$2K13866.0^{v}$

(3A) $\log \sin 210 = \overline{1}.69897^{v}$
1.39794^{v}
$-12.V0 = \overline{1}.09691^{v}$

$2K13866.0^{v}$
$AV9.0^{v}$
$2K1K72V.0^{v}$
$-12.V$
$2K1K712.V$
(3A)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Chandler's Formulae for Circumpolar Vars.

γ Cassiop.	$445.0\,\varepsilon$ Periodic inequality.
S "	$610.5\,\varepsilon + 50 \sin(10°\,\varepsilon + 50°)$
γ Persei.	Irregularly ~~periodic~~
S "	Irregularly periodic.
R Aurigae.	$460.2\,\varepsilon$
R Lyncis.	$380.0\,\varepsilon$
R Urs. Maj.	$302.1\,\varepsilon + 15 \sin(10°\,\varepsilon + 190°)$
T " "	$257.2\,\varepsilon + 20 \sin(9°\,\varepsilon + 90°)$
S " "	$226.1\,\varepsilon + 43 \sin(5.°76\,\varepsilon + 184.°5)$
S Bootis.	$268.2\,\varepsilon + 0.246\,\varepsilon^2 - 0.005\,\varepsilon^3$
R Canel op.	$269.5\,\varepsilon$
R Urs. Min.	Irregularly periodic.
R Draconis.	$245.6\,\varepsilon$
S Cygni.	$322.8\,\varepsilon + 15 \sin(12°\,\varepsilon + 66°)$
T Cephei.	$387\,\varepsilon$
S "	$488\,\varepsilon$
R Cassiop.	$429.5\,\varepsilon + 25 \sin(15°\,\varepsilon + 0°)$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ursae Majoris.

No. Ep.	J. D.	No. Ep.	J. D.
0	2400046.0	47	2411212.7
- 3	2399907.7	48	1438.8
- 2	2400133.8	49	1664.9
- 1	2400309.9	50	1891.0
+ 8	2402894.8	51	2117.1
9	2620.9	52	2343.2
10	2847.0	53	2569.3
11	3073.1	54	2795.4
13	3525.3	55	3021.5
14	3751.4	56	3247.6
15	3977.5	57	3473.7
16	4203.6	58	3699.8
17	4429.7		
18	4655.8		
19	4881.9		
20	5108.0		
21	5334.1		
22	5560.2		
23	5786.3		
24	6012.4		
32	7821.2		
34	8273.4		
35	8499.5		
36	8725.6		
37	8951.7		
39	2409403.9		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

1 Cygni.

No. Ex.	J. D.
2	2403062.6
3	2403344.4
4	3704.2
5	4031.0
6	4353.2
7	4676.6
8	4999.4
10	5646.0
11	5967.8
30	2411 2101.0
32	2746.6
33	3069.4
34	3392.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R Cassiop. | Ilw. my.

No. Ep.	J. D.	No. Ep.	J. D.	No. Ep.	J. D.
−12	239 3250.0	0	240 0706.8	47	241 2794.2
−3	7110.5	6	2249.0	48	3051.4
0	8404.0	7	2506.2	49	3308.6
1	8833.5	8	2763.4	50	3565.8
2	9263.0	9	3020.6	51	3823.0
3	9692.5	10	3277.8	52	4080.2
4	240 0122.0	11	3535.0	53	4337.4
9	2269.0	12	3792.2	54	4594.6
10	2699.0	13	4049.4	55	4851.8
11	3128.5	14	4306.6		
13	3987.0	15	4563.8		
14	4417.0	16	4821.0		
15	4846.5	17	5078.2		
16	5276.0	18	5335.4		
17	5705.5	19	5592.6		
18	6135.0	20	5849.8		
19	6564.5	21	6107.0		
20	6994.0	28	7907.4		
21	7423.5	29	8164.6		
22	7853.0	30	8421.8		
23	8282.5	31	8679.0		
24	8712.0	32	8936.2	37 = 240 2222.2	
25	9141.5	33	9193.4	38 = 0479.4	
31	241 1718.5	34	9450.6	39 = 0736.6	
32	2148.0	42	241 1508.2	40 = 0993.8	
33	2577.5	43	1765.4	41 = 1251.0	
35	3436.5	44	2022.6		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R. Ursae Maj.

No. Ep.	J. D.
0	2397951.2
2	80505.4
3	8857.0
4	9159.6
5	9461.7
6	9763.8
7	240 0065.9
8	0368.0
15	2482.7
16	2784.8
17	3086.9
18	3389.0
19	3691.1
20	3993.2
21	4295.3
22	4597.4
23	4899.5
24	5201.6
25	5503.7
26	5805.8
27	6107.9
29	6712.1
30	7014.2
34	8222.6
35	8524.7
36	8826.8
37	9128.9
38	9431.0
40	241 0540.7
46	1847.8
47	2149.9
48	2452.0
49	2754.1
50	3056.2
51	3358.3
52	3660.4
53	3962.5
54	4264.6
55	4566.7
56	4868.8

S. Bootis

No. Ep.	J. D.
0	240 1636.0
3	2440.6
4	2708.8
5	2977.0
6	3245.2
7	3513.4
8	3781.6
9	4049.8
10	4318.0
11	4586.2
12	4854.4
13	5122.6
14	5390.8
15	5659.0
16	5927.2
17	6195.4
18	6463.6
19	6731.8
20	7000.0
21	7268.2
22	7536.4
23	7804.6
24	8072.8
25	8341.0
26	8609.2
27	8877.4
37	241 1559.4
38	1827.6
39	241 2095.8
40	2364.0
41	2632.2
42	2900.4
43	3168.6
44	3436.8
45	3705.0
46	3973.2

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Schönfeld's Maxima

R Ursae Majoris.

Ep. 0 = 23979d1.2 + 302.1 E.
906.3

" 3 = 23982d7.8
" 4 = 23991d9.6
" 5 = 23994d61.7

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Times of Maxima for
X Herculis
comp. from Chandler's 3d Catalogue.

$= 24110^d.3 + 92.5^d E$ = Chandler's Formula.

$92.5^d \times 38 =$ 3520.0

24110.3.0
24150.8.0 = Ep. 38
92.5
24151 60.5 = Ep 39
92.5
5253.0 48
92.5
5345.5 49
92.5
5438.0 42
92.5
5530.5 43
92.5
5623.0 44
92.5
5715.5 45
92.5
5808.0 46
92.5
5900.5 47
92.5
5993.0 48

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Times of Maxima for
S Monocerotis.
Computed from Chandler's 2nd Catalogue

240 4094.83 + 3.44305 = Chandler's formula.

3.44305 × 2900 = 9984.84500

240 4094.83000

241 4079.67500 = Ep. 2900

3.44305

241 4083.11805 = Ep. 2901

3.44305

241 4086.56110 = Ep. 2902

3.44305

241 4090.00415 = Ep. 2903

3.44305

241 4093.44720 = Ep. 2904

3.44305

241 4096.89025 = Ep 2905

3.44305 × 3190 = 10983.32950

240 4094.83000

241 5078.15950 = Ep 3190

3.44305

5081.60255 = Ep 3191

3.44305

5085.04560 = Ep. 3192

3.44305

5088.48865 = Ep 3193

3.44305

5091.93170 = Ep 3194

3.44305

5095.37475 = Ep 3195

Correct. (Oct 31, 1900)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Times of maxima for S Monocerotis.

No.	Epoch.	Time max:
3195		5090.37475
3196		5098.81780
3197		5102.26085
3198		5107.70390
3199		5109.14695
3200		5112.59000
3201		5116.03305
3202		5119.47610
3203		5122.91915
3204		5126.36220
3205		5129.80525

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of γ Boötis. Checked Nov. 1, 1900

Assumed Principal Epoch. = 241 ⁺ 5117.5000 = Ep. 0.
Per. from Ch. 3d Cat. 26000

5120.1000	=	Ep 1
5122.7000	=	2
5125.3000	=	3
5127.9000	=	4
5130.5000	=	5
5133.1000	=	6
5135.7000	=	7
5138.3000	=	8
5140.9000	=	9
5143.5000	=	10
5146.1000	=	11
5148.7000	=	12
5151.3000	=	13
5153.9000	=	14
5156.5000	=	15
5159.1000	=	16
5161.7000	=	17
5164.3000	=	18
5166.9000	=	19
5169.5000	=	20
5172.1000	=	21
5174.7000	=	22
5177.3000	=	23
5179.9000	=	24
5182.5000	=	25

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj.1676.

Ephemeris of δ Sagittae

240 6602.60 + 2.3P320 E

Ef	1063	241 3573.94160
	64	22.32480
	65	30.70800
	66	39 40.09120
	67	48.47440
	68	56.85760
	69	65.24080
	70	73.62400
	71	82.00720
	72	89 90.39040
	73	98.77360
	74	3606.15680
	75	5614.54000
	76	22.92320
	77	31.30640
	78	39.68960
	79	48.07280
	80	56.45600

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris for 42° 3338

48356.5000 + 0.56688 E.

Cont'd from page 139.

No. Epoch.	Time of Maxima	No. Epoch.	Time of Maxima.	Epoch.	Time of Maxima
519	5150.6692	546	5165.9728	574	5781.8432
520	51.2360	547	5166.5396	575	82.4100
521	51.8028	548	67.1064	576	82.9768
522	52.3696	549	67.6732	577	83.5436
523	52.9364	550	68.2400	578	84.1104
524	53.5032	551	68.8068	579	84.6772
525	54.0700	552	69.3736	580	85.2440
526	54.6368	553	69.9404	581	85.8108
527	55.2036	554	70.5072	582	86.3776
528	55.7704	555	71.0740	583	86.9444
529	56.3372	556	71.6408	584	87.5112
530	56.9040	557	72.2076	585	88.0780
531	57.4708	558	72.7744	586	88.6448
532	58.0376	559	73.3412	587	89.2116
533	58.6044	560	73.9080	588	89.7784
534	59.1712	561	74.4748	589	90.3452
535	59.7380	562	5175.0416	590	90.9120
536	60.3048	563	5175.6084	591	91.4788
537	60.8716	564	76.1752	592	92.0456
538	61.4384	565	76.7420	593	92.6124
539	62.0052	566	77.3088	594	93.1792
540	62.5720	567	77.8756	595	93.7460
541	63.1388	568	78.4424	596	94.3128
542	63.7056	569	79.0092	597	94.8796
543	64.2724	570	79.5760	598	95.4464
544	64.8392	571	80.1428	599	96.0132
545	5165.4060	572	80.7096	600	5196.5800
		573	81.2764		

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

K2° 3338.

No. Epoch.	Time of max	No. Epoch.	Time of Maxima	No. Epoch.	Time of maxima
600	5196.5800	629	5201.9172	658	5229.4454
	5197.1468	630	5213.8840		5230.0212
	5197.7136		5214.8508	660	5230.5880
	5198.2804		5214.8176	771	5293.5028
	5198.8472		5215.2844	772	94.0696
	5199.4140		5215.7512	773	94.6364
	5199.9808		5216.2180	774	95.2032
	5200.5476		5216.6848	775	95.7700
	5201.1144		5217.1516	776	96.3368
	5201.6812		5217.6184	777	96.9036
610	5202.2480		5218.0852	778	97.4704
	5202.8148	640	5219.2520	779	98.0372
	5203.3816		5219.7188	780	98.6040
	5203.9484		5220.2856	781	99.1708
	5204.5152		5220.8524	782	5299.7376
	5205.0820		5221.4192	783	5300.3044
	5205.6488		5222.0860	784	5300.8712
	5206.2156		5222.5528	785	01.4380
	5206.7824		5223.2196	786	02.0048
	5207.3492		5223.7864	787	02.5716
620	5207.9160		5224.3532	788	03.1384
	5208.4828	650	5224.8200	789	03.7052
	5209.0496		5225.4868	790	04.2720
	5209.6164		5226.0536	791	04.8388
	5210.1832		5226.6204	792	05.4056
	5210.7500		5227.1872	793	05.9724
	5211.3168		5227.7540	794	06.5392
	5211.8836		5228.3208	795	07.1060
628	5212.4504	657	5228.8876	796	5307.6728

over.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of Dn 42° 3388.

Continued from Previous Page.

Epoch.	Time of max.	Epoch.	Time of max.	Epoch.	Time of max.
797	5308.2396	718	5263.4624	748	5280.4664
798	08.8064	719	64.0292	749	81.0332
799	09.3732	720	64.5960	750	81.6000
800	09.9400	721	65.1628	751	82.1668
801	10.5068	722	65.7296	752	82.7336
802	11.0736	723	66.2964	753	83.3004
803	11.6404	724	66.8632	754	83.8672
804	12.2072	725	67.4300	755	84.4340
805	12.7740	726	67.9968	756	85.0008
806	13.3408	727	68.5636	757	85.5676
807	13.9076	728	69.1304	758	86.1344
808	14.4744	729	69.6972	759	86.7012
809	15.0412	730	70.2640	760	87.2680
810	15.6080	731	70.8308	761	87.8348
811	16.1748	732	71.3976	762	88.4016
812	16.7416	733	71.9644	763	88.9684
813	17.3084	734	72.5312	764	89.5352
814	17.8752	735	73.0980	765	90.1020
815	18.4420	736	73.6648	766	90.6688
816	19.0088	737	74.2316	767	91.2356
817	19.5756	738	74.7984	768	91.8024
818	20.1424	739	75.3652	769	92.3692
819	20.7092	740	75.9320	770	92.9360
820	21.2760	741	76.4988		
821	21.8428	742	77.0656		
822	22.4096	743	77.6324		
823	22.9764	744	78.1992		
824	23.5432	745	78.7660		
825	24.1100	746	79.3328		
826	53 24.6768	747	5279.8996		

(see next page 199)

Ep. 718 to 770 inclus belong properly on preceding page - omitted by accident

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Continued on p. 20K.

Epoch.							
827	5325.2436	857	5342.2476	887	5359.2516	917	5376.2556
828	5329.8104		42.8144		59.8184		76.8224
829	5326.3772		43.3812		60.3852		77.3892
830	26.9440	860	43.9480	890	60.9520	920	77.9560
831	27.5108		44.5148		61.5188		78.5228
832	28.0776		45.0816		62.0856		79.0896
833	28.6444		45.6484		62.6524		79.6564
834	29.2112		46.2152		63.2192		80.2232
835	29.7780		46.7820		63.7860		80.7900
836	30.3448		47.3488		64.3528		81.3568
837	30.9116		47.9156		64.9196		81.9236
838	31.4784		48.4824		65.4864		82.4904
839	32.0452		49.0492		66.0532		83.0572
840	32.6120	870	49.6160	900	66.6200	930	83.6240
841	33.1788		50.1828		67.1868		84.1908
842	33.7456		50.7496		67.7536		84.7576
843	34.3124		51.3164		68.3204		85.3244
844	34.8792		51.8832		68.8872		85.8912
845	35.4460		52.4500		69.4540		86.4580
846	36.0128		53.0168		70.0208		87.0248
847	36.5796		53.5836		70.5876		87.5916
848	37.1464		54.1504		71.1544		88.1584
849	37.7132		54.7172		71.7212		88.7252
850	38.2800	880	55.2840	910	72.2880	940	89.2920
851	38.8468		55.8508		72.8548		89.8588
852	39.4136		56.4176		73.4216		90.4256
853	39.9804		56.9844		73.9884		90.9924
854	40.5472		57.5512		74.5552		91.5592
855	41.1140		58.1180		75.1220		92.1260
856	5341.6808	886	5358.6848	916	5375.6888	946	5392.6928

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Times of Maxima.
for R. Lyrae
comp from Chandlers 3d Catalogue.

2410559.3 + 46.4 E = Chandlers Formula.

46.4 × 99 = 4593.6 ×

2410559.3 ×

2415152.9 × = Ep. 99.

46.4

2415199.3 × = Ep 100

46.4

2415245.7 = Ep. 101

46.4

5292.1 ✓ Ep 102

46.4

5338.5 ✓ Ep 103

46.4

5384.9 ✓ Ep 104

5431.3 ✓ 105

5477.7 ✓ 106

5524.1 ✓ 107

5570.5 ✓ 108

5616.9 ✓ 109

5663.3 ✓ 110

5848.9 ✓ 114

5895.3 115

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

δ Serpentis

Dates when phases $4^d.0$ & $6^d.0$ occur.

$4^d.0$	$6^d.0$
J.D. 5569.6	5571.6
5577.3	5580.3

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of DM +12° 3337
Sawyer's Variable.

Per = 0.8895833.

Prin Ep. = 4566.542 3611

Epoch.	Gr M. Time of Min.	Epoch.	Gr M. Time of Min.	Epoch	Gr M.T. of Minimum
708	5196.367 3375	735	5220.386 0866	795	5273.761 0846
709	97.256 9208		21.275 6699	796	74.650 6679
710	98.146 5041		22.165 2532	797	75.540 2512
711	99.036 0874		23.054 8365	798	76.429 8345
712	99.925 6707		23.944 4198	799	77.319 4178
713	5200.815 2540	740	24.834 0031	800	78.209 0011
714	01.704 8373		25.723 5864	801	79.098 5844
715	02.594 4206		26.613 1697	802	79.988 1677
716	03.484 0039		27.502 7530	803	80.877 7510
717	04.373 5872		28.392 3363	804	81.767 3343
718	05.263 1705	745	29.281 9196	805	82.656 9176
719	06.152 7538		30.171 5029	806	83.546 5009
720	07.042 3371		31.061 0862	807	84.436 0842
721	07.931 9204		31.950 6695	808	85.325 6675
722	08.821 5037		32.840 2528	809	86.215 2508
723	09.711 0870	750	5233.729 8361	810	87.104 8341
724	10.600 6703	754	5263.973 5664	811	87.994 4174
725	11.490 2536		64.862 5216	812	88.884 0007
726	12.379 8369		65.752 0849	813	89.773 5840
727	13.269 4202		66.641 6482	814	90.663 1673
728	14.159 0035		67.531 2115	815	91.552 7506
729	15.048 5868		68.420 7748	816	92.442 3339
730	15.938 1701		69.310 3381	817	93.331 9172
731	16.827 7534		70.200 0014	818	94.221 5005
732	17.717 3367		71.089 5647	819	95.111 0838
733	18.606 9200		71.979 1280	820	96.000 6671
734	5219.496 5033	794	5287.150 1213	821	5296.890 2504

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ep. 1200	34.0423211
	33.9319044
	35.8214877
	36.7110710
	37.6006543
	38.4902376
	39.3798209
	40.2694042
	41.1589875
	42.0485708
1210	42.9381541
	43.8277374
	44.7173207
	45.6069040
	46.4964873

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris ζ +42° 3338

Continued from Page 199

Epoch.	G.M.T. Mag.	Epoch.	G.M.T. Mag.	Epoch.	Mag.
946	241 53926928	974	5408.5632	1370	56330460
	53932596	975	09.1300		33.5828
	53938264		09.6968		34.1496
	53943932		10.2636		34.7164
950	53949600		10.8304		35.2832
	53955268		11.3972		35.8500
	53960936	980	11.9640		36.4168
	53966604		12.5308		36.9836
	53972272		13.0976		37.5504
955	53977940		13.6644		38.1172
	53983608		14.2312	1380	38.6840
	53989276	985	14.7980		39.2508
	53994944		15.3648		39.8176
	54000612		15.9316		40.3844
960	54006280		16.4984		40.9512
	54011948		17.0652		41.5180
	54017616	990	17.6320		42.0848
	54023284		18.1988		42.6516
	54028952		18.7656		43.2184
965	54034620		19.3324		43.7852
	54040288		19.8992	1390	44.3520
	54045956	995	20.4660		44.9188
	54051624		21.0328		45.4856
	54057292		21.5996		46.0524
970	54062960		22.1664		46.6192
	54068628		22.7332	1395	56 47.1860
	54074296	1000	5423.3000		
973	54077.9964				

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

see next page

Epoch	Max.	Ep. 1475	5692.5300		09 5340
1396	5647.7528		93.0968		571X.1004
	5648.3196		93.6636		571X6676
	5648.8864		94.2304		571X.2364
	5649.4532		94.7972		1X.8012
1400	5650.0200	1480	95.3640	1510	1X.3680
1423	5650.5564		95.9308		1X.9348
	63.6232		96.4976		1X.5016
	64.1900		97.0644		1X.0684
	64.7568		97.6312		1X.6352
	65.3236	1485	98.1980	1515	1X.2020
	65.8904		98.7648		1X.7688
	66.4572		5699 3316		1X.3356
	67.0240		5699 .8984		1X.9024
	67.5908		5700.4652		1X.4692
	68.1576	1490	5701.0320	1520	1X.0360
1433	68.7244		701X.5988	—	1X.6028
	69.2912		02.1656		19.1696
1435	69.8580		02.7324		19.7364
	70.4248		03.2992		0 2X.3032
	70.9916	1495	03.8660	1525	57 2X.8700
	71.5584		04.4328		2X.4368
	72.1252		04.9996		25.0036
	72.6920		05.5664	—	25.5704
	73.2588		06.1332		2X.1372
	73.8256	1500	06.7000	1530	2X.7040
	74.3924		07.2668		25.2708
	74.9592		07.8336		25.8376
1445	75.5260		08.4004		26.4044
			08.9672		26.9712

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

See previous page

Ep.	Gr. M.T. Max.	Ep.	Gr. M.T. Max.	Ep.	Gr. M.T. Max.
1535	24 5 57 28.0	1563	24 5 7 43.4	1591	24 5 59 27.8
	28.1		43.9		58.4
	28 6 7 16.5		44.5		60.4
	28 23.8		45.1		60.9
	28 8 0.5		45 6.7	1595	60.5
1540	29 3 7.2		46.2		61.1
	29 9.3		46.8		61.6
	3 5 0 5.6	1570	47.3		62.2
	3 1 7.2		47.9		62.8
	3 1 8.6		48.5	1600	63.3
1545	3 2 2.0		49 0.7		63.9
	3 2 7.7		49.6		64.5
	3 3 3.9	57	50.2		65.0
	3 3 9.0		50.7		65.6
	3 4 4.7		50.3	1605	66.2
1550	3 5 0.4		50.9		66.7
	3 5 6.0		51.4		67.3
	3 6 1.7	1580	51 5 0.0		67.9
	3 6 7.4		51 6.1		68.4
	3 7 3.0		51 6.7	1610	69 0.4
1555	3 7 8.7		51 7.4		69 6.1
	3 8 4.4		52 3.1		70 1.8
	3 9 0.0	1585	52 8.8		70 7.4
	24 1 57 39 5.7		52 9.4		71 3.1
	40.1		53 0.1	1615	71 8.8
1560	40.7		53 5.7		72 4.4
	41.2		53 1.4		73 0.1
1562	41.8	1590	53 7.1	1618	73 5.8

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

R R Lyrae

Ep		
1793	241	5872.7724
1794		73.3392
1795		73.9060
1796		74.4728
1797		75.0396
1798		75.6064
1799		76.1732
1800		76.7400
1801		77.3068
1802		77.8736
1803		78.4404
1804		79.0072
1805		79.5740
1806		80.1408
1807		80.7076
1808		81.2744
1809		81.8412
1810		5882.4080
2200		6103.4600
2201		6104.0268
2202		6104.5936
2203		6105.1604
2204		6105.7272
Ep.	2755	6418.0340
	2756	6418.6008

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ephemeris of δ Cephei.

Period from Ep 4000 on to 4100 =
5.3662667 assumed.

Ep. 4000 = 241 4840.9005296 accurately computed from 8th Cat.
4100 = 241 5377.5271964

100) 536.26266668 (5.3662667 = assumed Per.

Epoch.	241 + Time of Max	Epoch	Time of Max	Epoch	Time of Max
Ep. 4000	4840.900530	4046	5087.748805	4071	5221.905480
4010	4894.563197		5098.115072		5227.271747
4020	4948.225864		5098.481339		5232.638014
4025	4975.057198		5103.847606		5238.004281
	4980.423464	4050	5109.213873	4075	5243.370548
	4985.789732		5114.580140		5248.736815
	4991.155999		5119.946407		5254.103082
	4996.522266		5125.312674		5259.469349
4030	5001.888533		5130.678941		5264.835616
	5007.254800	4055	5136.045208	4080	5270.201883
	5012.621067		5141.411475		5275.568150
	5017.987334		5146.777742		5280.934417
	5023.353601		5152.144009		5286.300684
4035	5028.719868		5157.510276		5291.666951
	5034.086135	4060	5162.876543	4085	5297.033218
	5039.452402		5168.242810		5302.399485
	5044.818669		5173.609077		5307.765752
	5050.184936		5178.975344		5313.132019
4040	5055.551203		5184.341611		5318.498286
	5060.917470	4065	5189.707878	4090	5323.864553
	5066.283737		5195.074145		5329.230820
	5071.650004		5200.440412		5334.597087
	5077.016271		5205.806679		5339.963354
4045	5082.382538		5211.172946		5345.329621
		4070	5216.539213	4095	5350.695888

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

δ Cephei - cont.

Epoch	Time of max.
4096	5356.062155
	5361.628422
	5366.794689
	5372.160956
4100	5377.527223
	5382.893490
	5388.259757
	5393.626024
	5398.992291
4105	5404.358558
	5409.724825
	5415.091092
	5420.457359
	5425.823626
4110	5431.189893
	5436.556160
	5441.922427
	5447.288694
4115	

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Cambridge. Feb. 17, 1900.

Sent Mr. Sampson the following eclipses.

95	1.	14.	Re.
	2.	26.	Re.
	3.	5.	Dis.
	3.	5.	Re.
	4.	17.	Dis.
	4.	17.	Re.
96	1.	14.	Dis.
	2.	19.	Re.
97	2.	4.	Dis.
	3.	12.	Re.
	4.	17.	Re.
	4.	24.	Dis.
99.	3.	20.	Dis.
	6.	14.	Dis.
	7.	20.	Re.

95	12	2	Dis.
96	11	3	Re.
96	12	23	Re.
99	3	20	Re.
~~99~~	~~3~~	~~29~~	~~Re.~~ Brent.
1900	1	22	Re.
"	4	11	Re.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Cambridge July 6. 1900.

Bal. of eclipses of Sat. III. sent to Prof. Lampson, Tare

1 1878 June 23, Dis.
14 " Sept. 10. "
15 " " " Rs.
16 " " " " (W. Eq.)
24 1879 Dec. 20. Dis.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Sidereal Times When U Cephei is Equal to the Comparison Star

	Descending	Ascending
Jan 6	10:00	13:30
Jan 8	22:00	1:30
11	10:00	13:30
13	22:00	1:30
16	10:00	13:30
18	22:00	1:30
21	10:00	13:30
23	22:00	1:30
26	10:00	13:30
28	22:00	1:30
31	10:00	13:30

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Jan. 30. 1899.

γ Delphini. (Photometric Ledger) Revised and up to date.
" " (Visual ") " " " " " "
μ Cephei. (Phot. ('98-'99.) " " " " " "
ο Ceti. (" ") " " " " " " all but
" " (Visual ") " " " " " " " "
I Andromm. (Phot. ") " " " " " "
W. P. 4411. (" ") " " " " " "
μ Cephei. (" " ('80-1)) " " " " " "

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Objects to be observed.

Algol Stars.					
δ^{1} Librae	14h 53m	−7° 56′			
U Coronae	15 12	+32 11	C		
R S Sag.	18 9	−34 A	C		
Cor. +4v° 3062.	20 2	+4v.9	C		
New Phot. Var.	19 21	+42v			
π Virg.	13 19	−2,6	C		
+12° 3vv)	18 24	+12 31			
Nova Sag.	18 vv±	−13 22±			
X Cygni	19 4v	+32 33			
Sagittae.					
N.P. 44).					
π Delphini.	20 31	+17,A	C		
Z Herculis.	17 v4	+1v.1			
U Cephei.			C		
Y Cygni.	20 4A	+34,3			
S Monocerotis.	6 3v	+10.0	C	not variable	
Y Bootis	14 17	+20,3	(A.0 to A.6)	" "	C
η Herculis.	16 32	+7.3	(6.9 to A.0)	" "	
d Serpentis.	18 22	+0,1	(v.0 to v.7)	" "	
Y Aquilae.	19 2	+10,9	(v.3 to v.7)	" "	C
X Sagittarii.				changes rapidly curve reversed.	
R S "					
X Herculis.	16 0	+47.v	(v.9 to 7.2)	Period 92.5 dys.	
o Ceti					
Nova Aurigae					
~~U Cephei~~					
~~π Delphini~~					
+42° 3336					
Eros.					

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Look out for remarks on large resids. from Circumpolar Curves.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Mme. Ceraski's Var. Var.

Eph.	G.M.T.	
99 June 3d.	21h	v 2m
" 8.	11	37
" 13.	1	22
" 17.	14	7
" 22.	4	v 2
" 26.	14	37

Cor. Eph.		
99. June 3.	20	32.
8.	10	22.
13.	0	7.
17.	13	v 2.
22.	3	37.
26.	17	22.

KA09. 9111 v

KA1

4

~~ζ Herculis~~ ~~variable~~

~~γ Bootis~~ " "

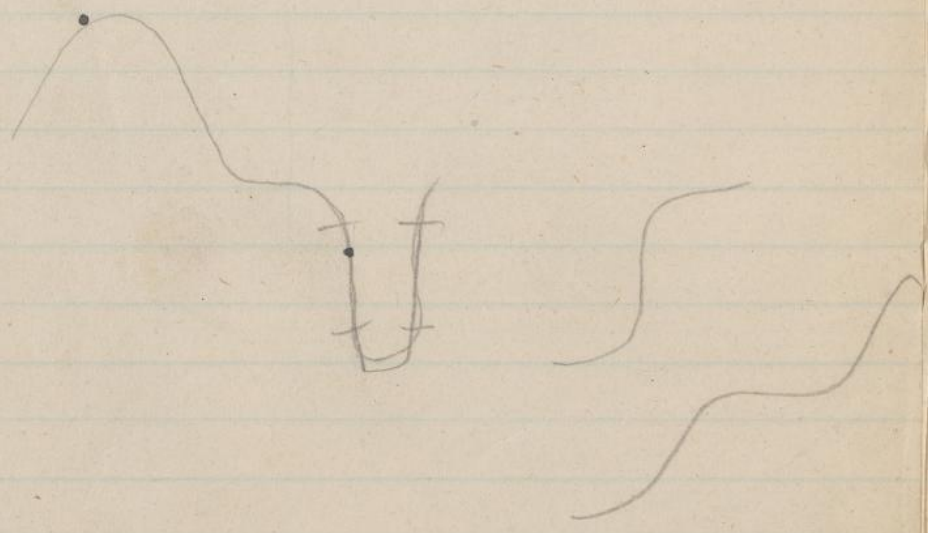
γ Herculis " "

δ Serpentis " " (or slightly fainter)

~~γ Aquilae~~ " " or ↓

X Sagittarii changes gradually

RS " over marked.



John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Nova Coronæ Nov Var.

Epoch.	G.M.T.			
99 June 3.	21h	v 2m	KA09.9111 v	
" 8.	11	37	KA14.4460 v	.466 Fol. sile.
" 13.	1	22	KA19.0769 v	
" 17.	14	7	KA23.6299 v	Min. night.
" 22.	4	v 2	KA28.2028 v	
" 26.	14	37	KA32.7757 v	Min. night.

Cor. Epoch.		
99. June 3.	20	38.
8.	10	22.
13.	0	7.
17.	13	v 2.
22.	3	37.
26.	17	22.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1999phae.proj.1676.

Last hyp ~~and~~ K22.

~~of the emergent pencils from one prism is exactly~~
~~another~~

ν Monocerotis.

Var. = Sm. +10° 1220 = 6h 33m 0.2s +10° 1.A (K.9 to ν.K)
" +10° 1211 = 6 31 3K.9 +10 22.0 (A.2)
" +9° 133K = 6 32 K3.ν +9 K7.3 (A.2)
" +9° 1324 = 6 31 37.6 +9 ν2.6 (A.0)
* " +9° 13KK = 6 33 11.A +9 36.3 (A.1)
" +9° 13ν0 = 6 33 2A.7 +9 ν9.0 (A.3)
" +9° 1322 = 6 31 13.3 +9 K6.A (A.1)

X Herculis.

ν. = Sm. +K7° 2291 = 1ν.h νA.m 19.νs +K7° 3A.2
" +K7° 22AA = 1ν νK AA.A +K7 32.9 (7.0)
" +K7° 2292 = 1ν νA 2ν.6 +K7 A.0 (A.1) *

d Serpentis.

. = Sm. +0° 3936 = 1A 19 KA.3 +0 6.9 = d Ser.
" +0° 39K0 = 1A 20 2ν.1 +0 7.3 (A.1)
" −0° 3KAK = 1A 19 9.A −0 1ν.9 (A.K)
" +0° 3931 = 1A 1A K1.7 +0 K2.6 (7.0)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Stars that do not appear to vary. To be observed with Phot. I.

~~δ Monocerotis~~		6^h	33^m	0.2	$+10°$ 1.8 (V.? to V.?)
~~γ Bootis~~		13	47	48.0	+19 7.7 (3.2)
γ Herculis		16	37	56.2	+39 11.0 (3.0)
~~γ Aquilae~~		19	0	9.	+10 V1.0 (V.3 to V.?)
X Herculis	(var.?)	1V	V4	17.	+47 34.4 (V.? to ?.?)
δ Serpentis	(var.?)	1A	19	4A	+0 6A (V.0 to V.?)
R Lyrae	(46.4d)	1A	V0	VV.	+43 4V.V (4.0 to 4.?)
Sawyer's Var.	(+12° 3VV?)	1A	23	V6.	+12 31.0
R Scuti	(71.7d)	1A	39	4V.	−V V1.4 (4.?) − 9.0 (6.0)

Comp. Star for R Scuti should probably be SD −6° 4497 (7.0) or SD −6° 4913 (7.?)

Comp. Star for R Lyrae probably should be DM. +43° 3111 (7.3) or +43° 3112 (7.V) or +44° 3017 (7.1)

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ledgers (Phot. & Visual) thoroughly checked &c.

20) R Canis majoris. (Phot.) ✓✓ Inversions regarded.
21) Y Delphini " ✓✓ " "
22) S S Cygni. (Visual) No inversions.
23) Y Delphini Visual. " "
24 S Mensae minoris (Phot.) ✓
25. S Cephei. " ✓ ✓
26 Y 13. " ✓ ✓
27 Japetus & Titan (1899) " " ✓
28 Y Virginis.
29 U Coronae.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Ledgers. (Phot. and Visual.) thoroughly checked since errors discovered. (Done since Mar. 16. '99)

1)	S Cygni (Phot.)	✓✓	Inversions regarded.
2)	o Ceti. (Visual)		No inversions. ✓
3)	Standards of mag. near Pole (Phot.)	✓	" " ✓
4)	" in Pleiades "	✓	" " ✓
5)	S Cygni. (Phot.)	✓	No inversions. ✓
6)	η Aquilae "	✓✓	" "
7)	χ Cygni. "	✓	Inversions regarded. ✓
8)	o Ceti. "	✓	" " ✓
9)	Nova Aurigae "	✓	" " ✓
10)	R. P. 4451. "	✓	" " ✓
11)	U Vulpeculae "	✓✓	" "
12)	S Antliae. "	✓	" " ✓
13)	T Androm. "	✓	" " ✓
14)	U Pegasi. "	✓✓	" "
15)	U Cephei. "	✓	" "
16)	S Cancri. "	✓✓	Inversions altered & checked
17)	Z Herculis. "	✓✓	(Inversions altered & checked)
18)	U Ophiuchi "	✓✓	" " " "
19)	β Persei. " V.	✓✓	" " " "

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Cor

1898

May 1.
" 2
" 3
" 4
" 5
" 10
" 15
" 20
" 25
" 30

Mercier 5" - # 33

May 1. $8^h\ 33^m$ P.M. Eastern T.
" 30 9 37 " " "

Possibly 10m - 20m earlier.

d
.521808 = $12^h\ 31^m.4$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

Computed time of Maxima

1898	G.M.T.	
May 1.	16^h	5^m
" 2	17	10
" 3	18	15
" 4	19	20
" 5	20	24
" 10	12	58
" 15	18	15
" 20	23	31
" 25	16	5
" 30	21	22

Period $0^d.521808 = 12^h\ 31^m.4$

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

1899phae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System

nnnphae.proj.1676.

John G. Wolbach Library, Harvard-Smithsonian Center for Astrophysics • Provided by the NASA Astrophysics Data System