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Nos. 1201-1300

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Konkoly Observatory
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HS AURIGAE

Detached main-sequence eclipsing binaries of type later than the sun are very rare among known systems, nearly all the later type detached binaries being subgiants of the kind listed in IBVS 1083. The only detached system with main-sequence components later than the sun that has been analyzed is YY Gem (M1).

Spectrograms of the 10th magnitude eclipsing binary HS Aur obtained at the Lick Observatory show this system to consist of two similar stars of type G8V. HS Aur had been classified as a G star by Götz and Wenzel (1962) and by McDonald (1964). The period is $9^{d}.8$ rather than the GCVS value of $4^{d}.9$, so that the two minima of the light curve must be of approximately equal depth. Emission lines of Ca^{+} are not present in the spectrum. Young and Koniges (1976) have shown that emission is usually absent in main-sequence systems with periods as long as 10 days.

The principal purpose of this note is to call attention to the importance of obtaining a definitive photoelectric light curve of HS Aur on a standard color system. A complete analysis of the combined photometric and spectrographic observations should give a fundamental set of stellar parameters in a region of the H-R diagram heretofore provided definitely only by the more massive components of the visual binaries ξ Boo and 70 Oph.

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Budapest
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SPECTROSCOPIC OBSERVATIONS OF 53 Ari

53 Arietis (HD19374) is frequently listed as a "confirmed" member of the β Cephei (β CMa) class of pulsating variable stars. It has been studied spectroscopically by Blaauw and van Albada (1963), Münch and Flather (1957) and van Hoof and Blaauw (1964). All studies find radial velocity variations of a few km/sec. The latter two consider it to be a short period β Cephei variable ($P \simeq 4^h$), but the former considers any period present to be around 40 days. Bondal (1967) and Jerzykiewicz (1974) have studied 53 Arietis photometrically. Bondal claims to find variations of 0.03 to 0.07 magnitudes. Jerzykiewicz finds no variation on any one night greater than $0\overset{m}{.}002$ and concludes that the star is constant in light.

In the present study, 53 Arietis was followed spectroscopically over one cycle (3^h37^m) of its suspected variation on October 2-3, 1975. All plates were taken with the 1.88 m telescope of the David Dunlap Observatory on IIa-O emulsions at 12Å/mm. The average exposure time of the plates is 15.5 minutes. The velocities are listed in Table 1 and shown in Figure 1.

In order to determine whether any systematic variation exists in these data, an F-test was performed (Heard 1956). The probability exceeds 25% that the amount of variability seen in the velocities did indeed arise by chance. If the velocity variations found in previous studies are significant they must be due to a long term variation with a period of at least a month.

This work has been supported by a postgraduate scholarship from the National Research Council of Canada.

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Table 1

Radial Velocities of 53 Arietis

Julian Date (Heliocentric) 2442688+	Velocity (km/sec)	Probable Error (km/sec)
.782	21.9	1.3
.793	21.0	0.8
.803	20.7	1.0
.813	22.3	1.4
.823	22.7	0.8
.833	21.2	0.9
.843	22.0	0.9
.853	22.4	1.5
.863	21.7	1.0
.875	22.2	1.2
.898	22.6	0.9
.909	23.4	0.8
.921	22.8	0.9

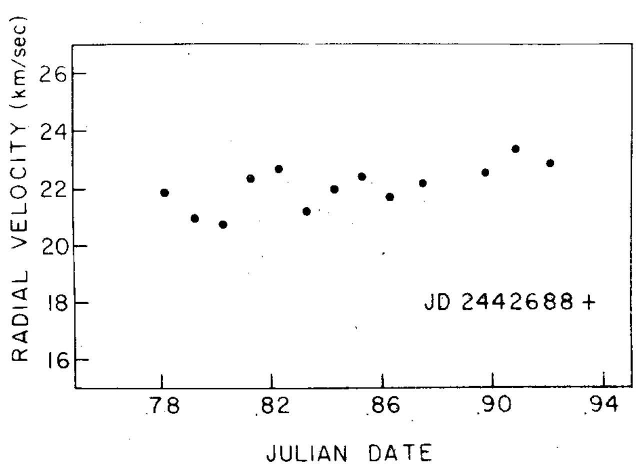

Figure 1 - Radial velocity versus Julian date for 53 Arietis.

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Budapest
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AN IMPROVED PERIOD OF V 387 Cyg

V 387 Cyg = 175.1935 was discovered by O.Morgenroth (Astr. Nachr.Bd.255, Nr.6119, 1935), who classified it as an eclipsing binary ($11^{m}.5-13^{m}.0$ ph).

V.P. Tsesevich (Isv.astr.obs.Odessa, Tom 4.1) studied the star and found that the star is of Algol-type with the elements:

(A) Min.(hel.)= JD 2427985.461+$0^{d}.640594\cdot E$ (EA).

I examined the star on Sky-patrol-plates of the Bruno-H.-Bürgel Observatory Hartha (JD 2438325-42775) and visually. So I found the following minima:

Min. (hel.) JD 244...		Epoch	$O-C_A$	$O-C_B$
1988.271	ph	+ 21859	$+0^{d}.066$	$+0^{d}.013$
2298.317	ph	22343	+0.064	+0.011
2631.4177	v	22863	+0.0561	+0.002
2638.4628	v	22874	+0.0546	±0.000

Using the minima published before (Tsesevich, V.P.,Isv. astr.obs. Odessa, Tom 4.1 and Peter, H., BBSAG Bull.29) I found improved elements:

(B) Min. (hel.)= JD 2427985.461+$0.6405964\cdot E$ (EA).

Further particulars will be published in "Mitteilungen der Bruno-H.-Bürgel-Sternwarte Hartha".

THOMAS BERTHOLD

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Correction to I.B.V.S. No. 1163

The minimum of TX Her is erroneously given. It should be read :

Min.hel. 2442561.498; O-C (I)= $-0^{d}.005$; O-C (II)= $+0^{d}.004$

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Budapest
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IS THE VARIABLE WX CETI A NOVA ?

I have examined more than 300 plates of the Harvard College Observatory Collection stretching from the year 1920 till 1951 and I have found three additional outbursts of WX Ceti. On the Palomar Chart (1949?) it is of the 18th mg.

1938	1939	1945	1945	1963
June 28.5	Oct.30.6	July 5.6	July 9.4	Sept.21.4
$9^m_.45$	$10^m_.20$	$13^m_.52$	$14^m_.14$	$10^m_.5$

Significant is that the new maximum of 1938 is much brighter than that of the discovery (1963); the three outbursts of mine and that of Strohmeier (1963) together with many important not seen observations permit to determine the cycle of the light variation: 450 days ± 25 days.

NOVAHOOD

Class:	U Geminorum Nova Dwarf	Subnova Novalike	Nova	Subsupernova	Supernova
Amplitude	$3-5^m$	$7-9^m$	$11-13^m$	$16:-20:^m$	$22:-26:^m$
Average	4^m	8^m	12^m	18^m	24^m

For the Subsupernova we have now two Novae: Nova Puppis 1942 and Nova Cygni 1975, both are with the range of 18^m.

The Table "Novahood" and the cycle of 450 days place this variable not in the class Nova but in a group of demidecoded U Geminorum (Dwarf Nova) or semiundecoded Nova like (Subnova).

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Reference:

Strohmeier, W. 1963, Inf.Bull.Var.Stars No.47

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OBSERVATIONS OF RECENT NOVAE

In IAU Circ. Nos. 2994 and 2997 the discovery of three novae is announced. These objects have been observed on plates of the Sonneberg Sky Patrol (Tessar 72/250 mm) with the following results:

Nova Ophiuchi 1976

1976 UT	Aug. 25.87	> 13.3	m_{pg}
	Sep. 22.82	9.3	
	Oct. 21.77	12.4	
	Oct. 26.74	12.3	

Nova Vulpeculae 1976

1976 UT	Sep. 23.87	> 12.3	m_{pg}		
	Oct. 21.79	7.6		6.3	m_{pv}
	Oct. 26.77	7.6		6.3	

Nova Sagittarii 1975 No. 2

1975 UT	Mai 12.98	> 11	m_{pg}
	June 1.99	9.4	
	July 5.92	> 11	

H. HUTH

Sonneberg Observatory of
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Number 1206

Konkoly Observatory
Budapest
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PHOTOGRAPHIC OBSERVATIONS OF GU Sgr

The R Cor Bor type variable, GU Sgr, has been examined on 1040 plates taken with the 7.5 inch Cooke triplet at the Maria Mitchell Observatory. The observations, shown in the Figure, represent the interval JD 36037 through 42992, or 17 July 1957 through 1 August 1976. These observations are in continuation of those published in 1959 (A.J. 64, 241).

DORRIT HOFFLEIT
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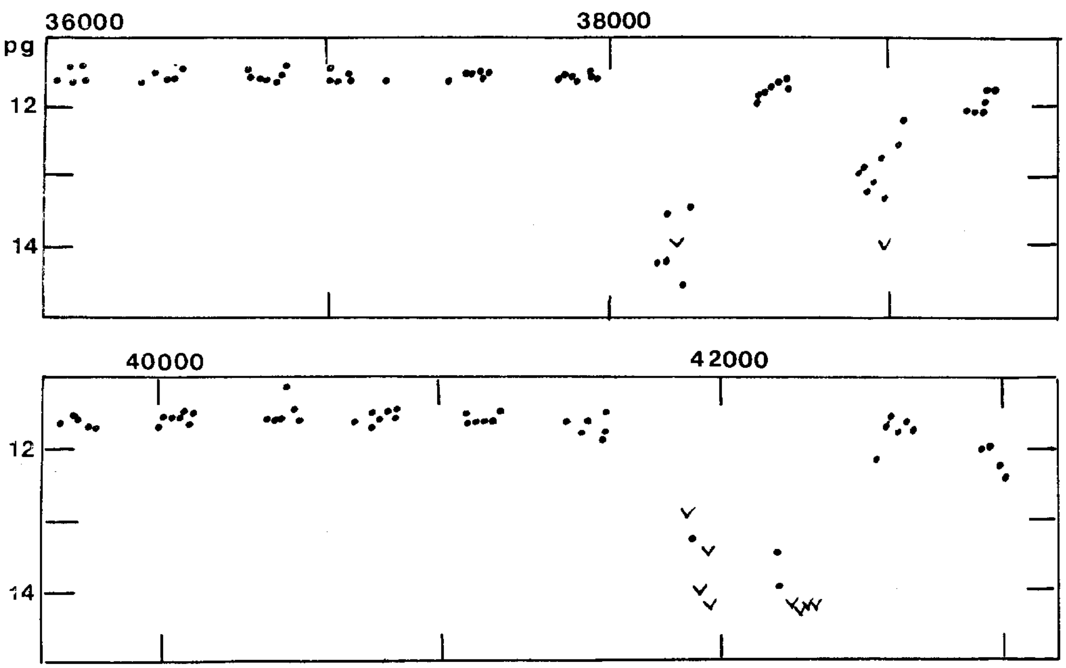
36000
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Konkoly Observatory
Budapest
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IMPROVED RESULTS FOR SEVEN SAGITTARIUS VARIABLES

The extensive collections of plates at Harvard and at the Maria Mitchell Observatory cover a sufficient time span for the detection of changes in period. We are therefore examining numerous periodic variables for which prior published results depended on observations made prior to 1960. In the Table, the first six of the seven listed had last been observed on Harvard plates taken through 1931, the seventh through 1953. Plates taken subsequently, mainly at the Maria Mitchell Observatory since 1956, have confirmed or slightly improved the constant periods previously found. The time interval represented ranges from 50 to 77 years. Only in two cases are changing periods necessary to account for the observed times of maximum: for V511 by an abrupt change at about JD 23950; for V515 by a secular change in period.

In the Table the initials in columns 3 and 6 indicate the people who made the new observations of brightness, or who determined the periods: MR, Dr. Marguerite Risley; PR, Pamela Robinson; CP, Constance Philips; and DH, myself. In all cases the revised periods depended upon the combination of the new with the older observations. Although the final determinations of period, as well as the older ones, are mainly mine, Miss Robinson and Miss Philips carried out the preliminary computations on the stars they had measured which led to the final values. Some of the early estimates date back as far as 1899 on the Harvard plates.

This work was accomplished under Grant NSF76-15444 from the U.S. National Science Foundation, for which it is a pleasure to express our appreciation.

Verified or improved periods for seven Sagittarius Variables

Var	Period in GCVS	New Obs. by	Revised Ephemeris $JD_o+nP+kn^2$	No. Epochs	Period by	Notes
GP Sgr	265.5	PR	40080 + 257.5n	122	DH	1
V509	0.53436	PR	41121.770+0.5343587n	36225	DH+PR	
V510	168	PR	42680 + 167.9n	187	DH+PR	
V511	158.5	MR+DH	23950-158.8n before JD_o	80	DH	
			+158.2n after JD_o	120		
V512	196	MR+DH	26500 + 196n	97	DH	2
V515	245.7	CP	$31635+246.5n+0.015n^2$	114	DH	
V1655	245	CP+DH	42980 + 245n	78	DH	

1. Considerable magnitude scatter in recent observations. Attempts by PR to fit the observations to a changing period yielded no improvement. The average period given holds fairly well from JD 14850 to the present.

2. V512 is too faint at maximum for meaningful observations from the Nantucket plates. The previously published JD_o should have been 26500, not 26400 as given in GCVS and the original reference (Harvard Annals, 90, 187, 1934).

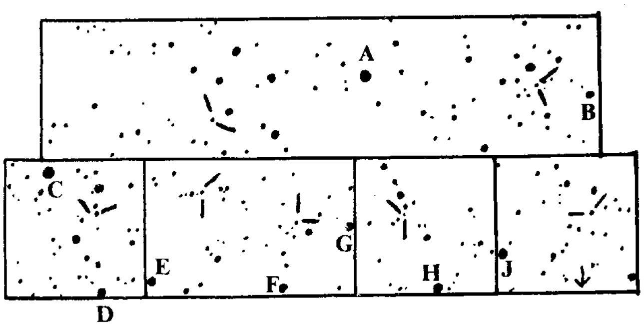

Figure: Finder charts for the variables tabulated. Width of all fields 10′, South at top. Markers indicate the variable stars, letters, CoD stars to aid in identification of field. Left to right, top strip: V 510 and V512 Sgr; A = CoD -26°13068, B = -26°13086.
Lower strip : V509, V511, GP, V515 and V 1655 Sgr; C = -25°13014, D = -25°13021, E = -24°14219, F=-24°14244, G = -25°13063, H = -25°13012, and J = -25°13082.

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FURTHER COMMENTS ON THE PERIOD OF V 743 Cen

In the discussion about the period of V 743 Cen by Geyer and Vogt (I.B.V.S. No.1172, 1976) the presented (O-C)'s are based on a period of 0.10225435 days. Its value, rounded to six decimals, as was given in that paper, yields much larger (O-C)'s for the recent observations, though it is close to the period given by Kukarkin et al. (2nd.Suppl.General Catalogue, 1974).

A further investigation of the observed maxima with the "period finding program" mentioned in I.B.V.S. No. 1172 gives another plausible slightly shorter period for this object, though the standard deviation for the (O-C)'s is a bit higher. In the Table below are listed the least square solutions for the light elements of the two possible periods, as well as the S. Dev. for the resulting (O-C)'s.

Table

Possible Light Elements for V 743 Cen

Epoch T_0(max.)	P	S.Dev.
J.D.hel. 240 0000+	days	days
3 9243.6436	0.10225435	$3.02 \cdot 10^{-3}$
3 9243.6465	0.10222560	$3.65 \cdot 10^{-3}$

Only future observations of this star can decide which period is the real one.

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THE DOUBLE-MODE CEPHEIDS GZ Car AND UZ Cen

Pel (1) in his photometric study of Southern Milky Way cepheids suspected that the intrinsic scatter in the light curves of five cepheids (Y Car, GZ Car, UZ Cen, AP Vel and AX Vel) was caused by double-mode behaviour. Observations of Y Car, AP Vel and AX Vel (references 2,3,4 respectively) have been analysed for the component periodicities present. However, in the case of GZ Car and UZ Cen only the primary periods are known. I decided to analyse Pel's observations to try to determine any secondary periods present.

The procedure adopted was to plot the B and V light curves assuming the values for the primary periods quoted by Pel. Mean light curves were drawn and the residuals from these mean light curves calculated. These residuals were analysed in the period range P > 1 day using a least squares Fourier technique developed by Barning (5). For each star, Fourier analysis of both the B and V residuals identified the same period as being the most significant secondary period. Given the primary and secondary periods the observations were decomposed into their component waveforms using an iterative technique (6). Fig. 1 illustrates the decomposition for GZ Car and UZ Cen using the B observations. Periods, amplitudes (ΔV, ΔB) and Julian dates of maximum light for each waveform are listed in the table. The two modes of pulsation present are identified as fundamental radial mode (≡0) and first overtone radial mode (≡1).

Star	Mode	P days	ΔV mag	ΔB mag	JD (Max.light) 2440000+
GZ Car	0	4.15885	0.16	0.23	742.6
	1	2.933	0.07	0.10	742.4
UZ Cen	0	3.33438	0.30	0.41	746.1
	1	2.355	0.06	0.09	746.2

The period ratios, P_1/P_0, for GZ Car and UZ Cen are 0.7052 and 0.7063 respectively, consistent with the period ratios obtained for other double-mode cepheids. The amplitudes of the secondary periods are in both cases by far the lowest known for double-mode cepheids. This supports Pel's suggestion that the excess scatter in some of his cepheid light curves may be caused by a low amplitude double-mode phenomenon. However, as the scatter for other stars is considerably less than the scatter exhibited in the light curves of GZ Car and UZ Cen, it would be exceedingly difficult to determine the values of any other secondary periods.

I am very grateful to Dr. M.J. Smyth for the use of his least squares Fourier analysis computer program.

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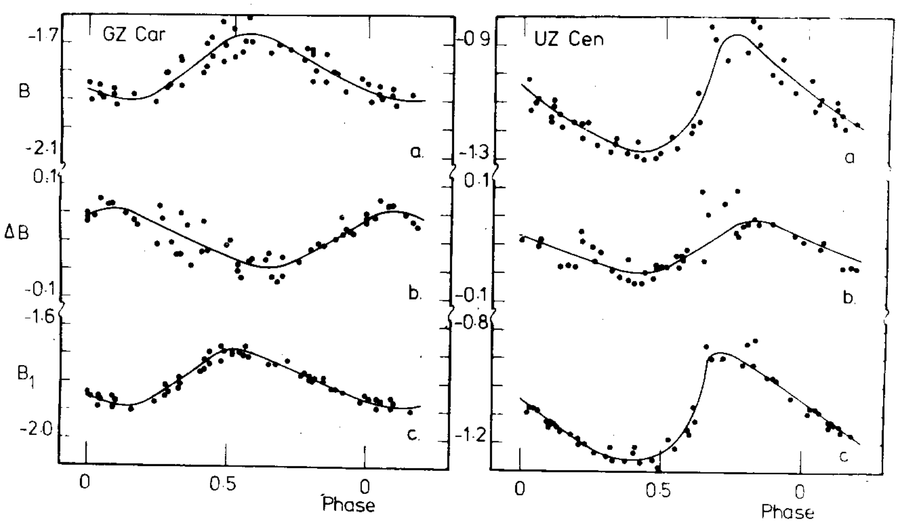

Fig. 1. Component waveforms for GZ Car and UZ Cen

(a) original B observations plotted with primary period

(b) residuals from mean B light curve plotted with secondary period

(c) B observations corrected for mean residual light curve plotted with primary period.

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PHOTOELECTRIC OBSERVATIONS OF UV CETI

The results of photoelectric monitoring of the flare star UV Ceti are herein reported. The star was monitored as part of a collaborative programme for a total of 11^h38^m spread over 5 nights during December 1975, using the Sampurnanand 104 cm reflector equipped with a refrigerated EMI 6094S photomultiplier. A total of 17 flares were detected.

The observed flare light curves (Figs. 1-17), monitoring intervals (Table I) and flare characteristics (Table II) are presented.

For energy estimates quiescent state luminosity of the star UV Ceti in B band is taken to be 7.31×10^{27} ergs sec^{-1}.

The peak of flare No.8 was lost while taking sky measures and peak of flare No. 15 could not be covered for a very small interval due to instrumental limitations.

The author is thankful to Dr.S.D. Sinvhal for suggestions and guidance. Part of this work was carried out with financial assistance under Smithsonian Institution Project No. SFG-0-6425.

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Reference:

Cristaldi, S. and Rodono, M., 1973, Astron.Astrophys.Suppl.10,47

Table I

Monitoring Intervals
(Times rounded off to nearest minute of U.T.)

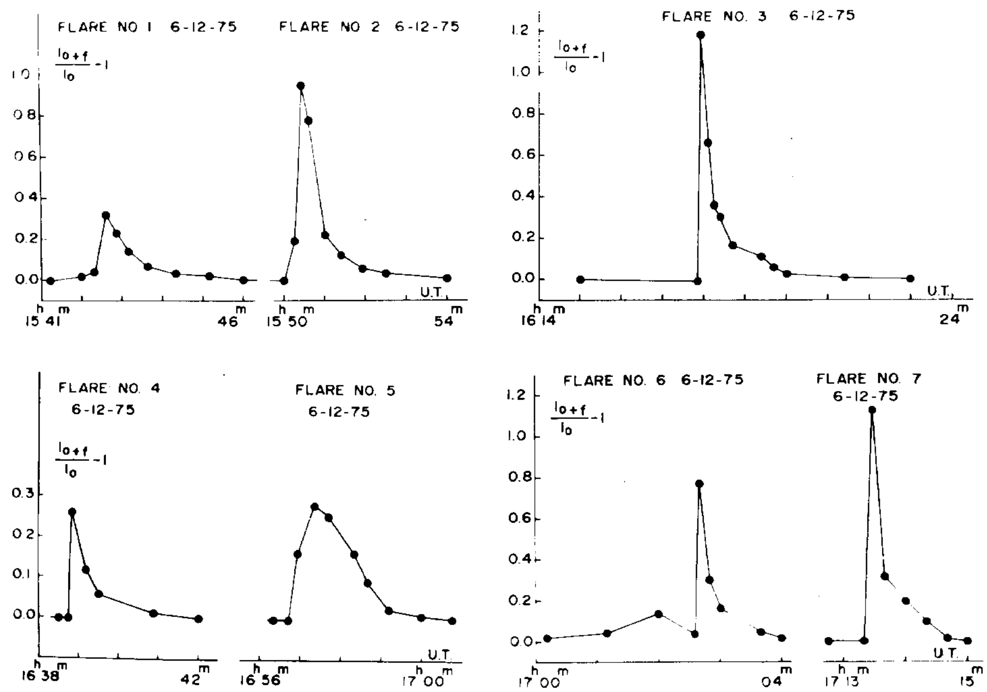
Date Dec. 1975				
6	15^h22^m - 16^h25^m	16^h32^m - 17^h24^m	17^h32^m - 17^h54^m	18^h11^m-18^h56^m
7	15 11 - 16 37	16 42 - 17 15	17 18 - 17 36	17 49 - 18 25
8	14 03 - 15 41	16 13 - 17 05	17 11 - 18 11	18 14 - 18 27
	18 30 - 18 39			
9	16 22 - 17 23	17 25 - 17 51	17 53 - 18 26	
10	17 44 - 18 13	18 25 - 18 36	18 43 - 18 53	

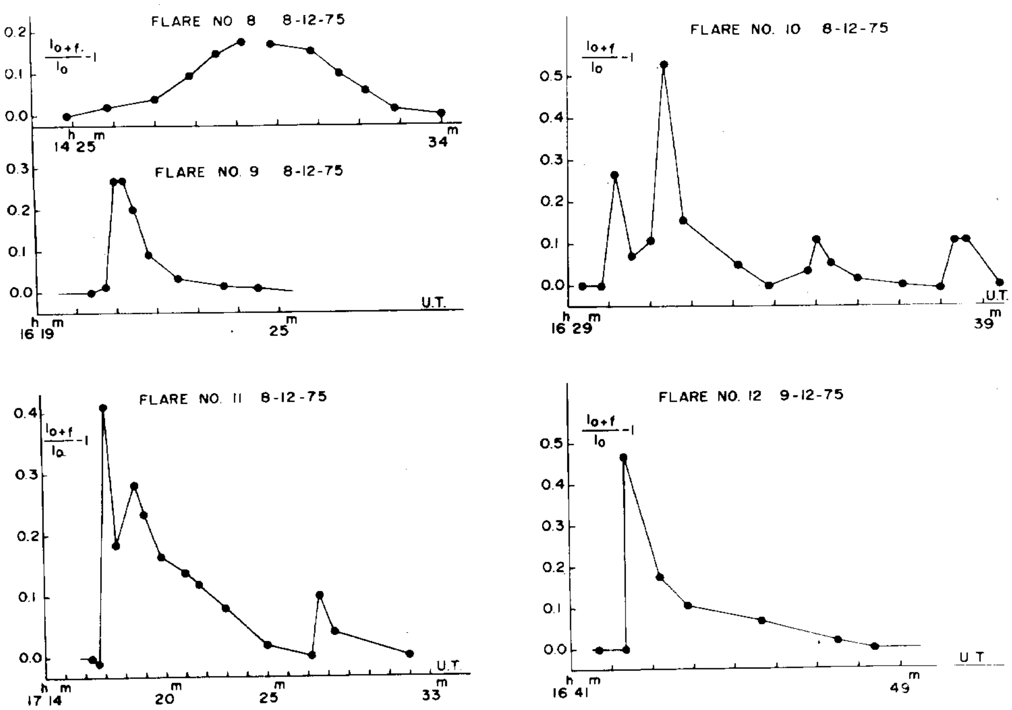
Table II

Characteristics of the Flare Events on UV Ceti (dM4.5e: V=11.95;B-V=1.76)

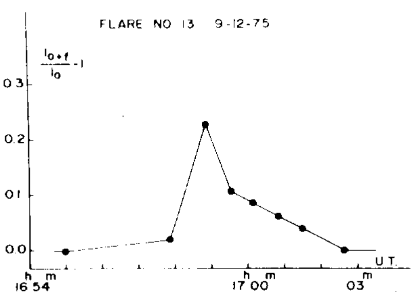
Flare No.	Date Dec.1975	U.T.max.	Flare duration (in minutes) Before max t_b	After max t_a	$\frac{I_{o+f}}{I_o}$	Δm_B	$\frac{\sigma}{X_s}$	P (min)	F(z)	Energy*	Total emission**
1	6	$15^h42^m.50$	1.40	3.40	1.321	0.302	.020	0.300	1.023	0.96	1.31
2	6	15 50.25	0.40	3.50	1.925	0.726	.023	0.625	1.026	1.43	2.74
3	6	16 18.00	0.15	5.40	2.172	0.842	.018	0.565	1.047	1.59	2.48
4	6	16 38.80	0.17	3.17	1.256	0.247	.022	0.233	1.071	0.92	1.02
5	6	16 57.30	0.67	2.67	1.279	0.267	.031	0.370	1.101	0.93	1.62
6	6	17 02.66	0.10	1.33	1.767	0.618	.051	0.303	1.109	1.29	1.33
7	6	17 13.45	0.13	1.58	2.127	0.819	.018	0.171	1.133	1.55	0.75
8	8	-	-	-	-	-	.016	-	-	-	-
9	8	16 21.00	0.60	4.00	1.296	0.281	.018	0.255	1.059	0.95	1.12
10	8	16 31.30	1.53	7.33	1.529	0.461	.031	0.737	1.072	1.12	3.32
11	8	17 17.03	0.73	15.00	1.408	0.368	.022	1.366	1.160	1.03	5.99
12	9	16 42.66	0.33	5.66	1.468	0.417	.041	0.537	1.096	1.07	2.35
13	9	16 58.83	1.00	4.00	1.195	0.280	.037	0.426	1.127	0.95	1.87
14	9	17 26.63	0.20	8.13	1.372	0.343	.030	0.255	1.197	1.00	1.11
15	9	17 54.41	0.166	4.50	4.777	1.698	.017	2.800	1.293	3.49	12.28
16	10	18 00.83	0.26	6.33	1.365	0.338	.033	0.488	1.304	0.99	2.14
17	10	18 08.00	0.26	5.33	1.170	0.017	.033	0.200	1.370	0.85	0.88

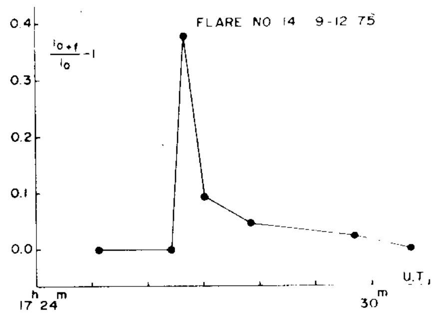
* Energy released at flare maximum 10^{29} ergs/s.
**Total emission during the event 10^{29} ergs.

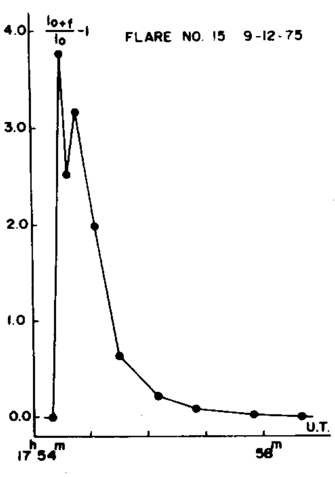

FLARE NO 1 6-12-75
FLARE NO 2 6-12-75
FLARE NO. 3 6-12-75
FLARE NO. 4
6-12-75
FLARE NO. 5
6-12-75
FLARE NO. 6 6-12-75
FLARE NO. 7
6-12-75
$\frac{I_{o+f}}{I_o}-1$
U.T.
$15^h 41^m$
46^m
$15^h 50^m$
54^m
$16^h 14^m$
24^m
$16^h 38^m$
42^m
$16^h 56^m$
$17^h 00^m$
$17^h 00^m$
04^m
$17^h 13^m$
15^m

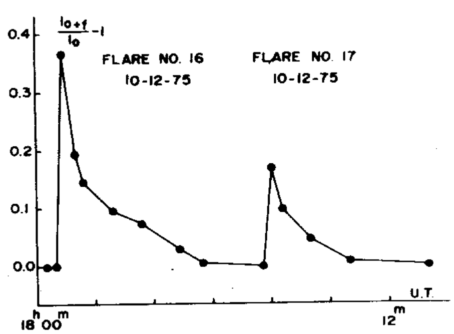

FLARE NO 8 8-12-75
FLARE NO. 9 8-12-75
FLARE NO. 10 8-12-75
FLARE NO. 11 8-12-75
FLARE NO. 12 9-12-75
U.T.

4


FLARE NO 13 9-12-75
$\frac{I_{0+f}}{I_0}-1$
0.3
0.2
0.1
0.0
U.T.
16^h54^m
17^h00^m
03^m


FLARE NO 14 9-12-75
$\frac{I_{0+f}}{I_0}-1$
0.4
0.3
0.2
0.1
0.0
U.T.
17^h24^m
30^m


FLARE NO. 15 9-12-75
$\frac{I_{0+f}}{I_0}-1$
4.0
3.0
2.0
1.0
0.0
U.T.
17^h54^m
58^m


FLARE NO. 16
10-12-75
FLARE NO. 17
10-12-75
$\frac{I_{0+f}}{I_0}-1$
0.4
0.3
0.2
0.1
0.0
U.T.
18^h00^m
12^m

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Number 1211

Konkoly Observatory
Budapest
1976 December 1

A TENTATIVE SPECTROSCOPIC ORBIT OF ϑ^1 Ori A *

Three out of four spectrograms of ϑ^1 Ori A = HD 37020 taken by M. de Groot (ESO) at the 1.5 m telescope at 12.3 Å/mm dispersion show the Balmer absorption lines clearly blue-shifted against the nebular emission lines. Two of the spectra, 524 d apart, suggest a new period of 130.864 d, i.e. one third of the "fundamental" period of 392.594 d (Lohsen 1976 IBVS 1129). The former period has to be halved according to observations by M. Baldwin (1976 IAU Circ.3004). Fig.1 shows our observed radial velocities together with older ones, using the period 65.43233 d and the primary minimum of 1977 JAN 01, 02^{h}2 = JD 2443 144.600 as phase zero.

The curve represents an estimated orbit based on $e = 0.60$, $\omega = 180^\circ$, $K_1 = 33.3$ km/s, and $\gamma = 13.3$ km/s + V_{neb}. Together with a photometrically estimated relative tangential velocity of 140 km/s ($=K_1+K_2$ if $\omega=180^\circ$) at primary minimum in the transit case this implies the masses to be

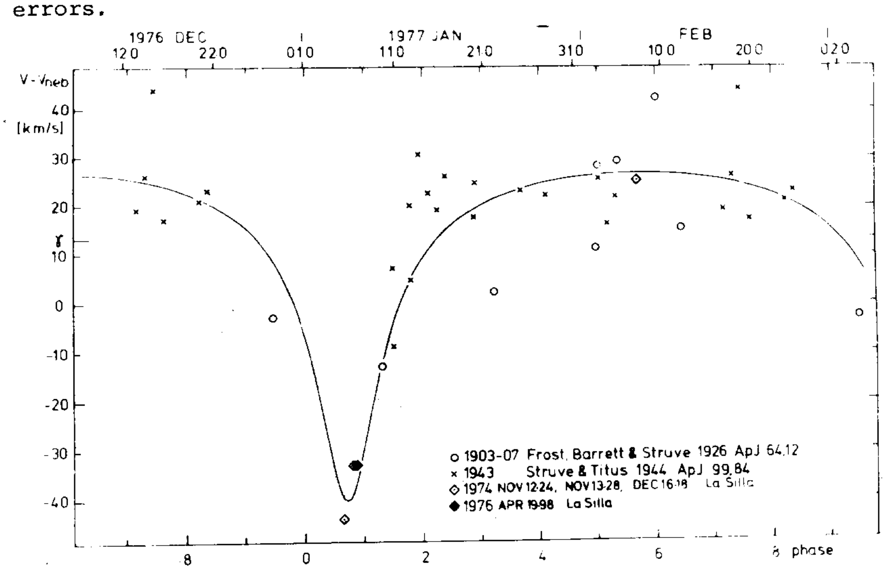
$$M_1 = 1.036.10^{-7}(K_1+K_2)^2 K_2 P(1-e^2)^{3/2} = 7.3\ M_\odot$$

and $$M_2 = M_1K_1/K_2 = M_1/3.2 = 2.3\ M_\odot.$$

The low mass ratio explains why the colours of the system do not change significantly during primary minimum and makes it improbable to detect the companion spectroscopically. Better light and RV curves, however, would supply us with a rigid mass-radius relation for both components. The radius may be obtained by photometric comparison with BM Ori, where it can be measured directly (Popper and Plavec 1976 ApJ 205, 462).

* Based on observations made at the European Southern Observatory.

An interesting implication of this orbit of ϑ^1 Ori A is that it reduces significantly the kinetic energy of the Trapezium system in Parenago's calculation (1954 Trudy Sternberg Inst. Vol.25) and together with the absence of measurable relative tangential motions (Allen and Poveda 1974 Rev. Mexicana Astr. Ap.1, 101) makes the system stable within the observational errors.



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Konkoly Observatory
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COPERNICUS OBSERVATIONS OF THE NON-ECLIPSING RS CVn BINARY HR 1099

Photoelectric spectrum scans of the Mg II h&k and Lyman-alpha emission lines of HR 1099 were obtained in September,1976 with the ultraviolet spectrometers aboard COPERNICUS (Rogerson et al. 1973). Both spectral regions were scanned continuously throughout two complete orbital cycles. The resolution at Lyman-alpha was 5 m Å while that at Mg II was 510 m Å.

Both the Mg II and Lyman-alpha emission features exhibited marked profile and intensity variations over short time scales of less than five hours. In addition, multiple Mg II velocity components (±200 Km/s) were observed to appear and disappear over similar intervals. The velocity direction of these components was correlated to the orbital motion of the secondary star, that is, they were usually negative when the secondary was approaching the observer, and positive when receding. This result may imply mass transfer from the primary to secondary star in this system. Since the strongest feature was usually observed with the same velocity as the primary, this component is likely the more active star. In addition, Bopp and Fekel (1976) have found the primary to be the main source of the Ca II H&K and H-alpha emission observed in HR 1099.

Although the Lyman-alpha profiles were too noisy in most cases to allow detection of multiple velocity components, a good correlation was found between the relative strength of the emission and orbital phase. Strongest emission was usually observed around phase (ORB) 0.35 while weakest emission was usually found near phase (ORB) 0.85. The phase of maximum emission intensity agrees well with that found for the minimum of the photometric distortion wave (phase (ORB) 0.38) by Bopp et al. (1977). This result is in good agreement with similar emission-wave correlations found in other RS CVn binaries by Weiler (1975), Mulligan and Bopp (1975), and Bopp (1976).

Hall (1972) has hypothesized that similar photometric distortion waves in other RS CVn binaries are produced by starspot concentrations in preferred longitudes on the active star. This concept of preferred longitudes of activity has its solar precedent as reported by Bumba and Howard (1965) and Dodson and Hedeman (1968). The aforementioned correlations support Hall's model as the plage and flare activity necessary to produce chromospheric emission lines would likely be concentrated in similar longitudes. Extensive and variable chromospheric activity is also indicated by Owen's (1976) recent observations of solar-type radio emission from HR 1099.

Analysis of the current data is continuing and a more detailed report of this research and additional studies of UX Ari will appear elsewhere. This study was conducted as part of an international project aimed at monitoring chromospheric activity in HR 1099 and UX Ari. The project consisted of coordinated satellite UV spectrophotometry as well as radio, UBV photometry, H-alpha and Ca II H&K, and polarimetric observations. Analyses of the combined data set will begin shortly, and any reports of additional observations of these two systems during 1976 would be greatly appreciated.

The satellite research discussed in this note was supported by the National Aeronautics and Space Administration.

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Konkoly Observatory
Budapest
1976 December 5

SPECTRAL INFORMATION ON NEW AND KNOWN LONG-PERIOD AND RELATED VARIABLES AND SOME NEW LATE-TYPE EMISSION-LINE STARS

The stars discussed in this Bulletin were all found in the course of the Cleveland objective prism surveys for luminous stars in the Milky Way. Nearly all were found in our recent survey of the southern Milky Way, using plates taken with the Curtis Schmidt at Cerro Tololo in 1967 and 1968. Spectral dispersions were 580 A/mm at Hγ and 1000 A/mm at Hα.

The stars in Table 1 are all classifiable as M-type long-period variables, in that they show, besides TiO bands, strong hydrogen emission with Balmer decrement highly distorted (Hδ much the strongest line, etc.) that characterizes Mira-type variables near maximum light. Since the spectra of certain semiregular variable stars grade into those of the Mira stars, a few of the stars of Table 1 may not in fact be true Mira variables, especially in the case of stars previously classified SR variables; nevertheless we feel that the variability classification of such SR stars deserves further attention. The magnitudes quoted are photographic, derived from eye estimates of spectral image densities calibrated by magnitude sequences for each plate, or (with the letter v) visual ones from Kodak 103a-F plates, based on a mean calibration for all plates; the probable error for the former is $\pm\frac{1}{3}$ mag. and for the latter ± 1 mag. or so. When both kinds of magnitude are given at rather different phases the blue magnitude, for clarity, also carries the letter p, meaning photographic. Where indicated, these are named variables or have been listed in the Catalogue of Stars Suspected of Variability (CSV); but none are classified, if at all, as Mira-type in the variable star catalogue (GCVS). The quoted coordinates are independent re-determinations, and in general agree very well with the published ones. An asterisk in the Remarks column of all tables denotes additional notes on a star following the table.

The format for Table 2 (see heading for contents description) is as for Table 1. In a few cases we have not re-measured the coordinates. Besides providing spectral types (all are M stars), our Balmer-line observations independently confirm these stars as Mira-type.

Table 3 is arranged like the others, except that the magnitudes are visual and as described above, unless carrying the letter p, since most of these stars were observed only on Hα plates. Apart from the already-named variables, most of these stars (especially the first two) will probably turn out to be variable stars. In the "Hα" column we give the Hα emission strength as strong, moderate, or weak.

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TABLE 1.

Stars Not Classified (if listed at all) by the Variable Star Catalogue, Third Edition through Third Supplement, as Mira-Type, but so classified by Us Spectroscopically.

GCVS	α (1900)	δ	Spec	Mag.	Remarks
	6 29 26.5	-10 12 26	M5	13.9	
	6 29 52.1	-13 37 04	M4	13.9	
CSV 792	6 31 48.6	-16 49 53	M4	14.4	
	7 09 52.8	-30 24 26	M6e!	13.1	
	7 10 49.0	-32 49 15	M7	13.1	
	7 17 18.2	-29 06 35	M7	13.3	*
CSV 1084	7 29 50.7	-28 10 40	M8:	13.8	
YZ Pup, SR	7 39 58.4	-21 37 30	M5-7	11.7-12.5	
	7 43 06.8	-38 23 40	M8:	13.7	
CSV 1218	8 02 28.0	-37 00 25	M	14.5	
	8 05 04.9	-45 26 42	M	14.0	
	8 16 56.2	-26 21 32	M2	12.1	*
	8 24 30.8	-29 13 32	M	14.8	
CSV 1405	9 00 00.3	-42 06 27	M8	13.3	
	9 00 30.6	-36 27 13	M	14.2	
	9 05 32.2	-56 25 07	M3	13.4	
	9 34 31.7	-44 43 51	M6:	13.4	
	9 45 27.4	-54 25 47	M6	14.7	
CSV 1530	9 50 25.1	-59 53	M5	13.5	
	10 04 09.4	-60 03 38	M5	13.6	*
	10 05.9	-64 17	M	13	
	10 09 17.7	-49 47 22	M5:	13.5	*
CSV 1609	10 20 57.3	-50 44 27	M5	12.9-14.1	
VZ Vel, SRa	10 24 09.9	-50 40 25	M6	10.3p-14V	HD 298126
	10 24 28.7	-49 35 00	M5-6	13.3p-11V	*
	10 39 11.2	-53 01 49	M5	13.4	*
	10 45 42.4	-52 14 18	M5-7e!	14.3,13.1V	
CSV 1669?	10 49 41.0	-48 49 18	M7e!	12.5,11.4p	*
	11 07 44.1	-53 42 08	M2	12.4	
	11 52 25.9	-68 17 00	M6	12.3	
	12 16 53.3	-55 10 35	M7	13.4	
	12 21.3	-59 28	M8:	13	
	12 23 01.1	-68 01 56	M5	13.2:	
CSV 1889	12 29.7	-60 10	M5:	13	*
AL Cen, SRa	12 30 32.8	-53 03 03	M3-4	10.3	HD 109576*
RW Cru	12 34 15.5	-60 52 21	M8	13.5	*
DW Mus, Cep	13 01 06.8	-68 21 27	M5	12.2	*
	13 45.4	-63 58	M	13	
CSV 2278	15 04 23.8	-68 21 54	M4	12.4	
CSV 2301	15 09 39.6	-70 50 59	M4	11.1	C.P.D. -70^{c}2005
	15 19 28.9	-65 16 24	M5	12.4	
	15 31 40.1	-59 42 54	M4	12.2	
	15 36.0	-64 49	M	13	
SY TrA	15 37.0	-66 22	M	14	
	15 42.4	-66 37	M8:	13	
	16 04 03.7	-58 32 29	M5	12.7	

Table 1, continued

GCVS	α (1900)	δ	Spec	Mag.	Remarks
CSV 2591	16 04.8	-59 29	M	13	
	16 27 52.1	-52 01 49	M6	13.3	
	16 31 21.6	-53 52 37	M4-5	12.9	
CSV 2791	16 36 57.3	-56 57 23	M	13.9	
V503 Oph, SR	16 47 16.9	- 5 17 23	M3	12.7	
CSV 2862	16 52 12.0	-44 41 20	M	12.4	
NX Oph,M?	16 53 21.1	-27 50 25	M	13.6	
FR Oph,L	16 57 01.6	-28 42 17	M	13.6	
GP Oph	16 58 47.2	-27 04 39	M6	13.3	
	17 01 52.4	-51 33 07	M3	12.4	
CSV 3218	17 24 43.2	-16 25 40	M	12.4	
	17 35 41.3	-15 49 37	M2:	12.4	
UV Ser	17 38 28,4	-14 53 30	M	12.9	
PU Sco, SRa	17 38 43.8	-43 04 23	M3	12.3	
CSV 3420	17 40 00.0	-13 46 21	M	13.2	
V1278 Sgr, M?	18 02 02.3	-34 02 35	M5	13.1	*
	18 09 14.2	-29 36 19	M1:	13.2	*
	18 15 27.9	-30 21 20	M	13.2	
	18 16 11.9	-29 09 35	M2	13.2	
	18 17 26.3	-28 10 28	M	13.2	
	18 18 31.4	-29 06 59	M	12.8	
	18 19 15.6	-29 04 17	M	13.2	

Notes to Table 1.

07^h17^m.	Detected in the two-micron survey, therein -30086; type M6 by Hansen and Blanco, Astron. J. 80, 1011, 1975.
08^h16^m	CaI λ4227 is markedly weak.
$10^h\ 04^m$	CSV 1563, which has no published identification chart, has a published position differing by 2½' - 3½' from ours. Our position is only a single determination.
10^h09^m	Near, but different from, the planetary nebula PK 278 + 5^o1.
10^h24^m	One of the few cases in which, at 1000 Å/mm, we have been able to see Hα emission in a long-period variable. Ca I λ4227 weak.
10^h39^m	Hδ ∿ Hγ emission on the blue plate, but Hβ and Hα (plate taken 2 days later) are absent so the star should be a long-period variable.
10^h49^m	The CSV star has no published identification chart; the published position is 5^s west of us. Our position is the result of two accordant plates. A 12th-mag. F star lies about $1\overset{s}{.}5$ west of our star, and a 10th-mag. early A star is about $4\overset{s}{.}0$ west of us.
$12^h29\overset{m}{.}7$	CSV 1889 has no identification chart, and a published r.a. different from ours by $0\overset{m}{.}2$. Ours is uncertain by about this amount.
AL Cen	Spectrum already quoted as Me in the 2nd supplement to the GCVS, and by Houk and Cowley (Mich. Spectral Survey, Vol. 1).
RW Cru	Spectrum given as M6-7e by Loden (no 8765), Astr. & Ap. Suppl. 23, 1976.
DW Mus	Our identification of the variable is confirmed by the chart published by Van Hoof in IBVS No. 233, 1967. In this paper the author identifies the star as having a one-day period, on the basis of seven hours' unquoted observations plus scattered observations which previously had indicated a much longer period.
V1278 Sgr	Our position, derived from only one plate measure, differs from the GCVS by about 1/2' in decl. The GCVS already has the spectral type Me.
18^h09^m	V1582 Sgr, which has a published identification chart in the paper following the one cited in the GCVS, is about 2' away.

TABLE 2.

Named Variables, Classified in GCVS as Mira-Type, But Lacking Published Spectral Types or Observations of Emission. All Show Emission of the LPV Type on Our Plates.

GCVS	α (1900)	δ	Spec	Mag	Remarks
DL CMa	6 47 26.7	-18 55 00	M6-8	11.8-12.7	*
BI CMa	6 58 33.6	-23 43 41	M5	13.5	
UV CMa	7 01 08.9	-28 09 20	M5-8	12.0	
SY CMa	7 06 12.1	-19 40 16	M4-6	11.4-12.3	*
EG Pup	7 32 01.8	-26 16 49	M8:	13.4-15.0	
CN Pup	8 00 30.3	-48 10 38	>M5	13.5	
BK Vel	8 05 20.3	-43 41 57	M	14.2	
FP Pup	8 11 39.5	-23 00 45	M4	14.3	
CC Vel	9 34 14.5	-44 56 35	M7	12.5	
DW Vel	9 46 28.9	-51 31 56	M8:	14.1 p,13.5V	
DY Vel	9 48 31.9	-49 03 13	M7	13.1	
AF Car			M8	13:	*
TT Car	10 17 17.6	-61 14 34	M6	13.6	
BQ Mus	11 25 16.7	-69 16 38	M6	12.9	
Y Cru			M6:	13:	
UU Cen			M8	14:	
QU Cen			M	13	
UU Cir	14 03 25.4	-66 35 25	M6	13.1	
VX Cir	14 14 34.2	-69 30 13	M7	11.1-12.4	
AA Lup	15 02 00.9	-48 30 35	M5	12.8	
AU Lup	14 17 18.5	-44 02 48	M5:	13.0	
BN Lup	15 27 24.1	-47 37 12	M2	14.0	
AS Nor	15 49 00.8	-44 20 53	M6	11.8-13.6	
BM Nor	15 57 51.7	-59 28 34	M6	12.7	
CD Nor	16 02 42.5	-57 17 06	M4	12.7	
CC TrA	16 14 11.7	-61 31 28:	M	13.2	
RY Nor	16 23 38.3	-58 08 17	M7	12.7	
CR Oph	16 49 02.3	-28 44 32	M	13.5	
DU Oph	16 51 48.6	-27 51 12	M	14.0	
HR Oph	17 01 02.1	-28 03 47	M	14.0	
AK Ara	17 12 42.4	-47 16 02	M5:	12.9	
KZ Sco	17 14 54.0	-45 28 39:	M4	13.3p,10.5V	
LO Sco	17 18 23.9	-44 22 27	>M5	11.9	
V439 Sco	17 50 36.6	-37 16 05:	M0	13.2	
FY Sgr	18 04 39.7	-33 06 54	M4	13.1	
LP Sgr	18 21 43.9	-27 44 08	M	12.9	
V3876 Sgr	18 27 17.3	-20 10 19	M8	14.3	*
BI Aql	19 16 45.5	- 8 34 32	M0	13.4	
V497 Aql	19 44 25.4	+ 6 36 04	M1	13.3	
V427 Aql	19 52 39.5	+ 8 26 23	M4	12.6	*
EK Aql	20 08 42.5	- 5 28 21	M3-4	11.8-12.3	
V519 Aql	20 09 29.9	- 1 28 47	M	13.3	

Notes to Table 2.

DL CMa — Already classified M7 by Hansen and Blanco, Astron. J. 80, 1011. Identified in the two-micron survey, -20110 therein.

SY CMa — Spectrum washed out.

AF Car — Hα emission seen by Henize, Astrophys. J. Suppl. 30, 491.

BQ Mus — Our position, based on only one measured plate but confirmed (to about 0!2) by computer overlay, differs from the GCVS position by 0!7 in decl. and 0!3 in r.a.

V3876 Sgr — Found in the two-micron survey; there numbered - 20494. Also classified M8 by Hansen and Blanco, Astron. J. 80, 1011. Emission outstanding on our plate.

V427 Aql — The published identification chart makes our star the variable, but our position, checked by computer overlay, disagrees with the GCVS one.

TABLE 3.

Definite or Suspected Late-Type Stars Showing Hα or Other Emission

α	δ	Spec	Hα	Mag.	Remarks
8 08 49.4	-33 56 09	?	s	13.5:	*
8 10 10.0	-35 49 50		m	13.5:	Wray 18. *
8 52 25.7	-48 07 11	M4	w	12.5	
8 57 43.9	-49 22 05	M4:	m	12.5	
10 50 36.4	-50 10 59	M6:	m	12.5	
11 02 08.6	-48 45 35	M5	w	12.1	
12 34 08.2	-61 47 47	M2	m	9.7	
14 19 51.7	-57 52 20	M1	s	11.7	
17 04 32.5	-27 33 20	Red	m	12.5	*
17 16 32.9	-29 06 28	M5	-	11.7p	V520 Oph, SRd. *
17 19 04.5	-47 12 48	M1	-	12.9p	AN Ara, SR. *
17 21 18.7	-44 19 36	M1	s	11.4	
18 35 48.1	- 4 50 06	M1:	m	12.5	
19 10 50.0	- 8 28 16	M?	m	13.0	
19 15 56.4	- 6 57 56	M?	s	12.8	BH Aql, L.

Notes to Table 3.

8^h08^m A deep blue plate shows a weak continuum without absorption features at 580 Å/mm, with Balmer series and H and K emission.

8^h10^m Our declination, based on only one plate, is 27" north of Wray's (table XV of his Ph.D. thesis, unpublished). A blue plate shows, at the plate limit, no absorption features, with Ca H and K and probably Hβ, in emission.

17^h04^m May be early M-type. On the boundary of a dark cloud.

V520 Oph. GCVS spectrum K0? The blue-region hydrogen emission is suggestive, but inconclusively, of a Mira variable.

AN Ara Blue-region emission inconclusively suggestive of a Mira variable.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1214

Konkoly Observatory
Budapest
1976 December 7

ECLIPSING BINARIES FOUND SPECTROSCOPICALLY
III. HD 199497

In the two previous papers of this series (Bond 1970, 1975), the writer has shown that eclipsing binaries of the W Ursae Majoris type show diffuse lines on moderate-dispersion spectrograms. Hence it has proven possible to discover new members of the W UMa class purely from their appearance on objective-prism plates.

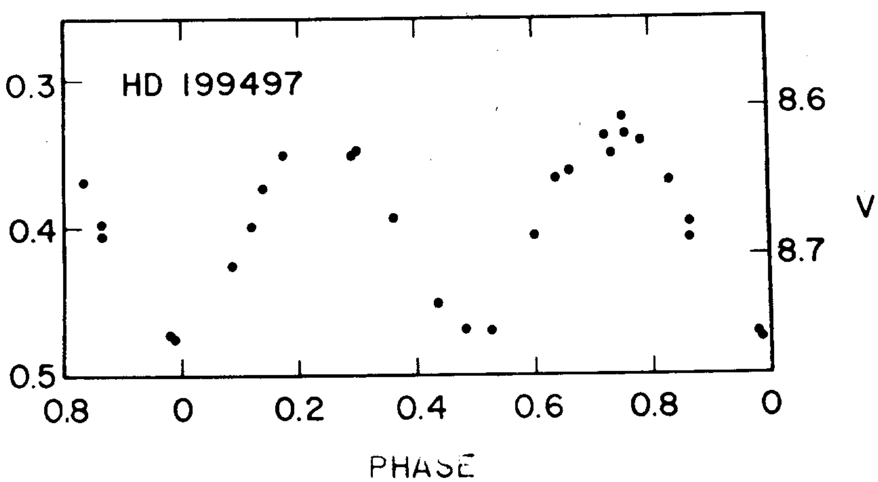
The writer noted HD 199497 (1900 position: $20^h52^m.5, +19^\circ15'$, HD spectral type G5) as having diffuse spectral lines on a plate obtained in 1966 with the Michigan Curtis Schmidt telescope and a 10° objective prism. During October 1975 and April 1976, 24 photoelectric observations of HD 199497 were made with 41- and 61-cm telescopes at Kitt Peak National and Cerro Tololo Inter-american Observatories. For convenience, the y filter of the Strömgren four-colour system was used, and the nearby K-type star HD 199549 was chosen as comparison star.

These observations showed that HD 199497 is indeed a new W UMa-type eclipsing system, with a range of 0.15 mag. The following ephemeris was found:

$$JD_\odot \text{ (primary minimum)} = 2442687.418 + 0^d.3638 \cdot E.$$

The light curve obtained with these elements is shown in Fig.1. The magnitude difference in the y band is in the sense variable minus comparison, and the conversion to V magnitudes of the variable star is shown on the right-hand side of the figure.

Two further F- or G-type stars showing diffuse lines on Curtis Schmidt objective-prism plates, CD $-33^\circ362$ (1900: $0^h54^m.4$, $-32^\circ59'$) and HD 114726 (1900: $13^h07^m.3$, $+3^\circ13'$) were also monitored photoelectrically. Magnitude ranges of 0.05 mag were found for both stars. Because of the small amplitudes and marginal weather conditions under which some of the observations were made, the writer was unable to find the periods for these stars' variations. The writer will supply the individual observations of these three stars to anyone requesting them.



Light curve for the new eclipsing binary HD 199497.

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References:
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*Visiting Astronomer, Kitt Peak National and Cerro Tololo Interamerican Observatories, which are operated by the Association of Universities for Research in Astronomy, Inc., under contract with the U. S. National Science Foundation.

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Number 1215

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Budapest
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PI PISCIS AUSTRINI

This star was announced as a Cepheid variable of amplitude 0.3 mag and period $7\overset{d}{.}975$ by Strohmeier et al. (1965). However, Petit (1972a,b) pointed out that the star's spectral type is FO IV-V, making it extremely doubtful that it could be a Cepheid. Janot-Pacheco (1974a,b) made seven photoelectric observations of π PsA that showed no variations in excess of the photometric errors. Bopp et al. (1970) found the star to be a single-lined spectroscopic binary of period $178\overset{d}{.}3$.

During October and November 1975, the writer made 6 photoelectric observations of π PsA with 61- and 91-cm telescopes at Cerro Tololo Interamerican Observatory. The y filter of the Strömgren four-color system was used, and the nearby star HR 8760 AB was chosen as comparison star. The heliocentric times of observation and magnitude differences (variable minus comparison) are given below:

JD 2442709.652	-1.338 mag
710.561	-1.321
712.634	-1.320
728.581	-1.325
729.591	-1.324
731.648	-1.335

If the star is variable at all, the evidence of Janot-Pacheco and the present work indicates that the amplitude is less than 0.02 mag. The earlier observations of Strohmeier et al. must be erroneous or refer to another star. It seems improbable that they could represent an eclipse of the primary star.

The writer thanks G. Wallerstein for suggesting these observations.

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*Visiting Astronomer, Cerro Tololo Inter-American Observatory, which is operated by the Association of Universities for Research in Astronomy, Inc., under contract with the U.S. National Science Foundation.

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INFORMATION BULLETIN ON VARIABLE STARS
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Budapest
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INFRARED AND OPTICAL PHOTOMETRY OF T Tau AND RY Tau IN 1975 - 1976

Since the discovery of IR excesses in T Tau variables (1,2) infrared photometry of many young stars has been made by Glass and Penston (3) and Cohen (4 and references therein). Recently the results of simultaneous optical and infrared monitoring for variability of 22 T Tau type stars and related objects were presented by Cohen and Schwartz (5).

At the Crimean station of Sternberg Astronomical Institute some studies of T Tau itself and RY Tau (InT type), including UBV photometry (6), photoelectric measurements of the Hα-emission intensities (7) and observations of variations in the Hα-emission line profiles (8,9,10) have been made. Here we present the results of optical (UBV) and infrared (JKL) observations of these two stars made during 1975, October - 1976, February.

The observations in UBV were carried out at the 60-cm reflector using the photon counting photoelectric photometer. JKL measurements were made on the 125-cm reflector using the infrared photometer with cooled PbS photodetector (10" diaphragm was used). For the infrared observations 44 Per (BS 1203) was taken as standard star, its JKL values were determined by Johnson et al. (11). Tables I and II present our results, the time of observations is given in Julian dates. Standard deviations of the means were estimated from the statistical errors of measurement only; the observational uncertainties of the infrared photometry are as follows: $\pm 0^{m}.04$ in J, $\pm 0^{m}.03$ in K and $\pm 0^{m}.18$ in L.

T Tau. In 1971-72 years the T Tau optical brightness has remained practically constant (6). Since the beginning of this observing program, the star has clearly exhibited the monotonic decline in the optical fluxes (see values B and V in Table I). One may compare the photometric results obtained between J.D.2442731 and ...826-829 (mean values for two dates) and the amplitudes of the brightness decrease follow: $\Delta U \approx 0\overset{m}{.}53$, $\Delta B \approx 0\overset{m}{.}31$, $\Delta V \approx 0\overset{m}{.}16$, $\Delta J \approx 0\overset{m}{.}08$ and $\Delta K \approx 0\overset{m}{.}04$. The possible reason for this decline may be the existence of selective dust absorption. However, this procedure seems to be somewhat formal and cannot allow to make definite conclusions for the next reasons: a) it is well-known that UV-excess in T Tau stars can change independently on the stellar brightness; b) the decrease of optical flux was not profound; c) as can be seen from sets of JK values in Table I, the infrared brightness did not change sistematically with time.

During the observations the star's brightness at 3.5μ changed in the range of $3\overset{m}{.}85$ - $4\overset{m}{.}60$, the time scale of variability was smaller than one day. The dependence of colour indexes (V - 3.5μ) upon 3.5μ magnitudes from Cohen (5) (dots) and our measurements (crosses) are shown in Fig.1. There is a good agreement between the two sets of data.

<u>RY Tau</u>. The decreases in optical brightness on time lapse of 50-100 days were early mentioned (6,7) as characteristic detail of its light curve. Probably such phenomenon has occurred during the period of our observations. The following amplitudes of the brightness decrease of RY Tau can be inferred comparing the measurements made between J.D. 2442731 and ...826-829 (mean values): $\Delta U \approx 0\overset{m}{.}57$, $\Delta B \approx 0\overset{m}{.}55$, $\Delta V \approx 0\overset{m}{.}62$, $\Delta J \approx 0\overset{m}{.}44$ and $\Delta K \approx 0\overset{m}{.}21$.

The magnitudes of RY Tau at 3.5μ scattered within the range of $4\overset{m}{.}06$ - $4\overset{m}{.}46$ and did not seem to depend on the brightness declining in V.

During the simultaneous optical and infrared observations by Cohen and Schwartz (5) the radiations of T Tau and RY Tau were found to be constant. In spite of the marked variability for RY Tau than for T Tau, the explanation from our measurements of its persistent decline in brightness is not obvious. Further observations of this kind are needed to improve our knowledge of T Tau type variables.

Table I

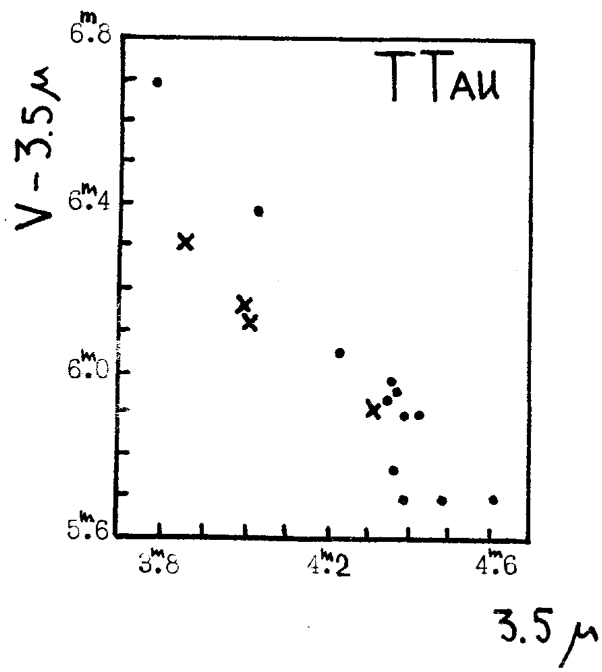
T Tau

J.D.	U	B	V	J	K	L
2442702.58	-	-	-	7.57	5.57	-
731.30	11.27	11.11	10.05	-	-	-
.42	-	-	-	7.36	5.68	-
746.29	11.82	11.28	10.10	-	-	-
.43	-	-	-	-	-	3.96
758.44	-	-	-	-	-	4.60
759.35	-	-	-	7.58	5.75	4.05
760.36	-	-	-	-	-	4.25
768.36	-	-	-	7.26	5.47	-
824.24	-	-	-	-	-	3.85
.25	11.87	11.35	10.14	-	-	-
825.18	-	-	-	-	-	3.99
.25	11.81	11.31	10.11	-	-	-
826.18	-	-	-	7.46	5.75	-
.27	11.70	11.37	10.18	-	-	-
829.22	-	-	-	7.43	5.69	4.32
.29	11.99	11.47	10.24	-	-	-

Table II

RY Tau

J.D.	U	B	V	J	K	L
2442689.55	-	-	-	7.84	5.79	-
691.53	-	-	-	-	5.68	4.06
702.52	-	-	-	7.63	5.63	4.29
731.28	11.88	11.55	10.52	-	-	-
.47	-	-	-	7.72	5.64	-
759.34	-	-	-	7.75	5.83	4.14
760.33	12.22	11.75	10.70	-	-	-
.35	-	-	-	-	-	4.46
768.38	-	-	-	7.61	5.60	-
825.20	-	-	-	-	-	4.29
.23	12.44	12.06	11.10	-	-	-
826.20	-	-	-	8.12	5.77	-
.26	12.38	12.07	11.12	-	-	-
819.23	-	-	-	8.20	5.92	4.41
.27	12.51	12.12	11.17	-	-	-



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INFORMATION BULLETIN ON VARIABLE STARS
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REMARK ON THE PERIOD OF AU MONOCEROTIS

From a series of photoelectric observations, L.Lorenzi (1) has determined four epochs of primary minimum of AU Monocerotis. Taking furthermore into consideration the other visually observed primary minima, he determined a rapid cyclic variation of the orbital period. In this way, Lorenzi concluded "AU Mon shows unusually rapid fluctuations in the epochs of minima; if these fluctuations can be represented by a formula of type (7), the only possible physical interpretation is an apsidal motion".

Now, having in view the very short value of the apsidal period ($P_{aps.} = 243\overset{d}{.}23?$) and the general difficulties concerning apsidal period determination, we propose new series of observations which could be done in the winter of the next year.

- In order to resume the corresponding cyclic variation which was found by Lorenzi, new primary minima could be observed in February - March of the next year.

- In order to prove the presence of apsidal motion, secondary minima must be observed. The coming winter and spring (January - May) are very suitable for such observations.

- As the corresponding orbital period is $P = 11\overset{d}{.}11306$, there are few suitable nights for observations in a season, that is why an extensive co-operation is very much required.

- In order to stimulate the interest of the observers for this star, we give here the corresponding ephemeris for the two kinds of minima.

Lorenzi's elements are used :

$$M(E) = 2442801.3602 + 11\overset{d}{.}11306 \cdot E .$$

Primary minima J.D.hel	Secondary minima J.D.hel
2443112.526	2443118.082
123.639	129.195
134.752	140.309
145.865	151.422
156.978	162.535
168.091	173.648
179.204	184.761
190.317	195.874
201.430	206.987
212.543	218.100
223.656	229.213
234.770	240.326
245.883	251.439
256.996	262.552
268.109	273.665
279.222	284.778

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Reference:

Lorenzi, L. 1976, Astron. and Astrophys. 29, 10, 1976 (in press)

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Konkoly Observatory
Budapest
1976 December 16

THE SPECTRUM OF WX HYDRI

WX Hyi is now classified as a U Gem star in accord with its photometric behavior (IBVS 1185) and color indices (IAUC 2348). Philip (IAUC 2308) first correctly noted its blue color, rapid light variations and emission-line spectrum on a low-dispersion objective-prism plate. More recently, on J.D. 2442742.6, we observed the spectrum using the Carnegie image-tube Cassegrain spectrograph on the 1 meter Yale telescope at the Cerro Tololo Inter-American Observatory. The dispersion was 125 Å mm^{-1} and the coverage from about λ3500 to λ6700. The star appeared to be near minimum light (m_B~13), requiring an exposure of 94 minutes on baked Kodak IIa-O emulsion.

On this low-resolution spectrogram, the Balmer series is seen in emission down to H_9 with the lines having a width of about 12 Å and giving no indication of duplicity. The emission is only moderately strong relative to the continuum and the decrement is nearly flat, a common spectral characteristic of dwarf novae. However, a peculiarity is that Hα appears much weaker than expected from the strength of the other Balmer lines and the known wavelength response of the image-tube. No emission lines other than those of hydrogen are evident and no strong absorption features are present.

The broad lines preclude an accurate radial velocity measurement, but we can conclude that the radial velocity probably does not exceed 50 km sec^{-1} and may be much smaller. This dispels any lingering suspicion that WX Hyi could be associated with the nearby Small Magellanic Cloud. The star does not appear in the BPM catalog of Luyten, suggesting a small proper motion. If one assumes that WX Hyi (galactic latitude b=-51°.6) has a z distance comparable to the average shown by the brighter U Gem stars ($\bar{z}$ = 37 pc according to Kraft in Advances in Astron. and Astrophys. 2, 43, 1963), its distance would be about 50 pc.The presumably small proper motion would obviously yield a low tangential velocity at this distance. Thus, it appears likely that this star has a comparatively low space velocity, consistent with the disk-population kinematics shown by the dwarf novae.

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SHORT TERM PERIODICITY OF V 1500 CYGNI IN JULY - AUGUST OF 1976

TV photometric observations of V 1500 Cygni (Nova Cygni 1975) were carried out at the Crimean Astrophysical Observatory using a 0.5 meter telescope and the television pick up tube LI-217 with a multialkali input photocathode. Special combination of glass filters allowed to register practically only the continuum radiation (see Fig.1).

Date of observations, number of TV pictures, duration of patrol and moments of extreme value of light variation are listed in Table 1.

Date 1976	Number of pictures	Duration of patrol	Moments J.D.$_{\odot}$ = 2442... min.	max.
July 23-24	865	2^h27^m	-	$983^d.377$
28-29	259	2 01	-	988.474
29-30	579	2 12	-	-
Aug. 2- 3	847	4 46	$993^m.394$	993.456
Summary	2550	11^h26^m		

The following method has been used for photometric calibration of TV pictures. Images of 8 artificial stars of known brightness (calibrating marks) have been projected on to the input photocathode of TV pick up tube during the exposures of the Nova. One brightness step of these marks was $0^m.1 \div 0^m.2$.
Visual estimates of the brightness of Nova and the comparison star 1 (see Fig.2) have been made in the scale of artificial star's magnitudes. The star 2 was used as a control star.

The period of short term variations of Nova has been calculated using observed moments of extreme brightness (see Table 1) and moments published by Semeniuk et al.(1). Determination of the moments of minima was more accurate than that of maxima owing to the observed light fluctuation of the Nova at maxima. The period has been found for the interval of July 2 -August 2. It appears to be slightly less than the published ones (1,2,3).

Examination of the data obtained showed the forms of neighbouring maxima were different. That was the reason for doubling of the value of the period. Fig.3. shows the light-curves of Nova constructed with the elements

$$T_O = 2442962^d_.404 + 0^d_.27664 \cdot E.$$

The accuracy of each mark on the graph is about $\pm 0^m_.05$. Fig. 3 shows shows variability of the peak brightnesses of the Nova. The mean amplitude of light variations is about $0^m_.45$. It is also possible that the distance between two maxima is not constant.

Numerous TV observations obtained during ten days show that Nova Cygni 1975 is probably a close binary system with the period of light variations about 6.5 hours.

The authors are grateful to Drs. R.E. Gershberg and N.M. Shachovskoj for discussions.

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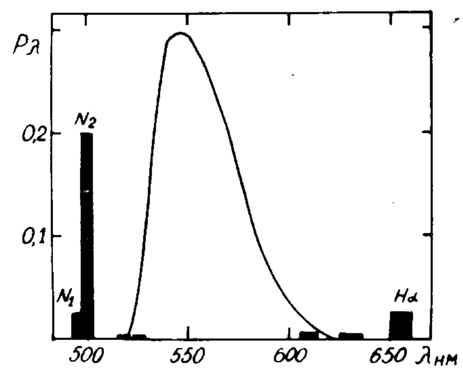

Fig.1. Response curve of TV apparatus for a star of type G2. Filled rectangles show emission lines observed in summer of 1976 in the spectrum of V 1500 Cygni.

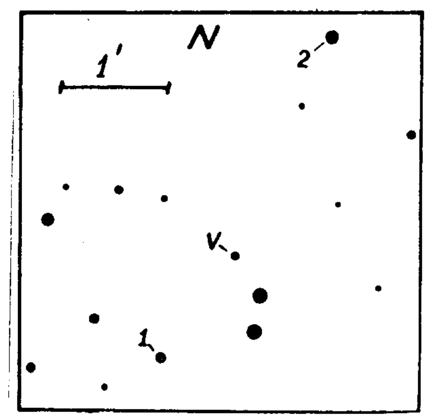

Fig.2. The chart of V 1500 Cygni region; 1-comparison star, 2-control star.

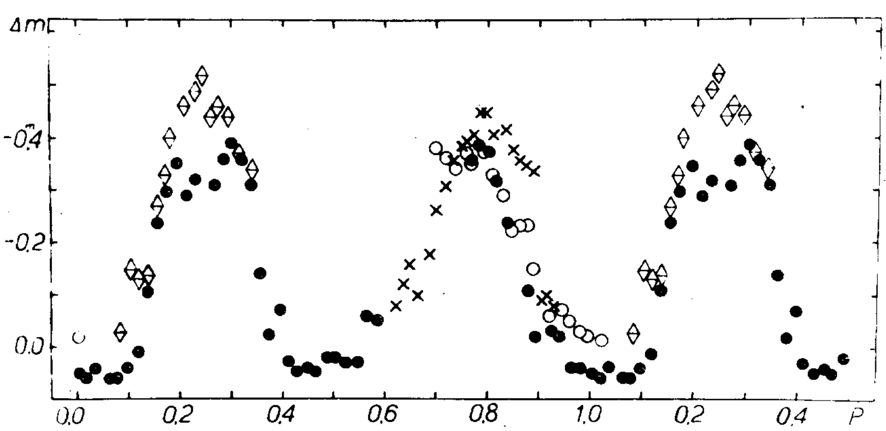

Fig.3. Television light - curves of V 1500 Cygni obtained on July 23 (crosses), 28 (rhombes), 29 (open circles) and August 2 (filled circles). Ordinates are stellar magnitudes of Nova minus that of star 1.

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Konkoly Observatory
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1976 December 20

AN EXTREME REDDENING OF THE CARBON STAR RW LMi=CIT 6

The photographic observations of RW LMi=CIT 6 made at the Radioastrophysical Observatory at the end of the last October, J.D. 2443073 to 2443080, show that since the end of the previous observing season, J.D. 2442873 to 2887, the colour index B-V of this infrared carbon star has increased from the value B-V=$1^m.5$ to B-V=$2^m.5$, while at only a little earlier time interval, J.D. 2442760 to 2868, the mean of the colour index values for 10 nights was B-V=$1^m.0$.

The blue-red ($\lambda_{eff.}$=0.63μ) colour index at the same time has increased from B-R=$2^m.6$ to B-R=$4^m.2$, while at the interval J.D. 2442760 to 2868 it was B-R=$2^m.2$.

The range of the B-V variations according to our observations made in B and V magnitudes since J.D. 2441060 as well as others published and made in B and V since J.D. 2439889 by Kruszewski (1971, 1973) is B-V=$0^m.9$ to B-V=$1^m.6$. The observations in B and G filters by Kruszewski and Coyne (1976) show that sometimes the colour index of CIT 6 was even smaller.

The usual range of colour index B-R variations was $1^m.9$-$2^m.9$.

Only the first ever made (probably in May, 1966) and published observations of B and V magnitudes by Wisniewski et al., (1967) also show similar colour index: B-V=$2^m.47$ extremely large for this star (but still very small to compare with other infrared carbon stars).

The other, third, occasion when CIT 6 is known to be unusually red was in April-May 1970, J.D. 2440677 to 0713, when our blue-red observations indicated the value of the colour index B-R=$4^m.1$ (Alksnis and Eglitis, 1973).

On all three occasions of extreme reddening the star was near its maximum phase according to the elements Max.=J.D. 2441880 + 640·E (Alksnis and Khozov, 1975), the epochs and phases being 5.9 (?), 2.16 and 1.87. In the latest reddening, however, the star is more than 1 magnitude fainter than in the other two previous cases, B magnitude being at its faintest value, $17^{m}.4$.

The B and R (0.63) magnitude long period variations for RW LMi based on our observations are shown in Fig.1 where dots represent the mean values for time intervals 0.1 P; period P= =640^{d}.

Polarization measurements of CIT 6 (Khozov, unpubl., Kruszewski 1971, 1973, Kruszewski and Coyne, 1976) have never been made at the intervals of extreme redness of the star, although they might be of great importance for studying the processes taking place in the object. Thus polarization measurements in blue, visual and red are now urgently needed.

It is difficult to tell how long this state of extreme redness will last; the observations of the last two cycles of long period variations of the star, however, give evidence, that after the calculated phase of maximum brightness, colour indices of the star decrease (Fig.2). But the next predicted maximum time is at the middle of January 1977.

Finding chart of RW LMi=CIT 6 can be found in our previous paper (Alksnis and Eglitis, 1975).

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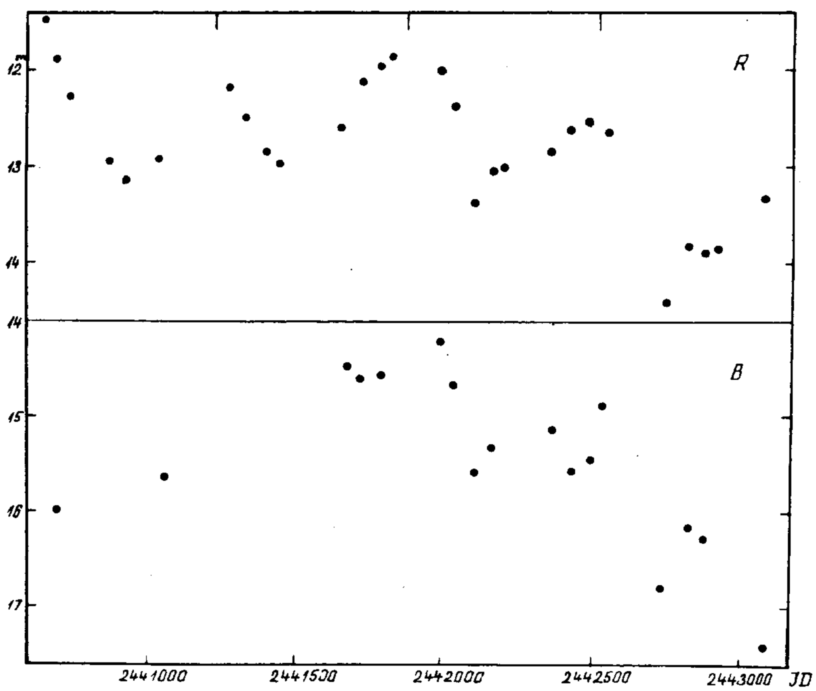

Fig.1. Long period variations of RW LMi according to the mean values of the magnitude R(0.63) and B for time intervals 0.1 P= = 64 days. Calculated times of maxima are indicated at the top.

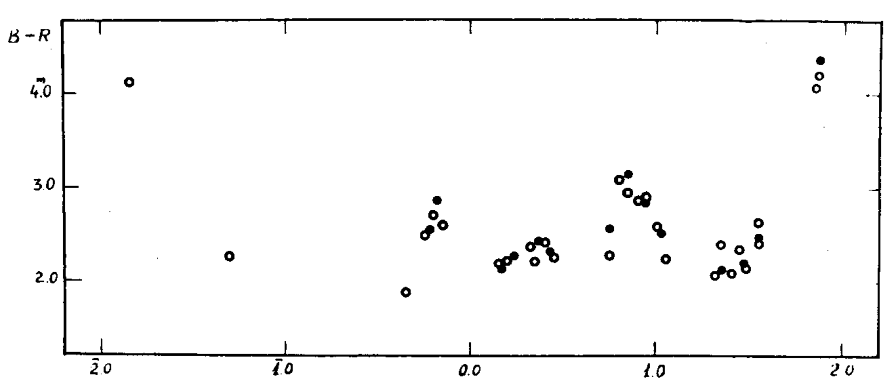

Fig.2. Colour index B-R(0.63) variations. Dots - one day mean values of B-R(0.63) averaged over time intervals 0.1 P; circles - differences between B - and R(0.63)-magnitude 64-day-means or sum of B-V and V-R(0.63) 64-day-means. Abscissa - time in periods.

References:

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1221

Konkoly Observatory
Budapest
1976 December 23

ON THE PERIOD BETWEEN FLARES OF V1216 SAGITTARII

Since 1969 numerous observations have been made at Boyden Observatory of the flare star V1216 Sagittarii (R.A. $18^h47^m42^s$, declination $-23^o52'$, visual magnitude 10.5).

The telescope used during this work was the 41 cm Nishimura Reflector, fitted with a cooled EMI 6256A photomultiplier tube and a standard Johnson B. filter.

The following table gives a summary of the observations:

Interval between flares			Total Monitoring time	Reference
1	and	6	$47^h38^m00^s$	$25^h11^m0^s$	(1)
3	"	6	46 48 45		
3	"	7	48 35 35		
5	"	8	45 13 10		
7	"	10	46 47 56		
8	"	11	145 47 01		
8	"	12	144 43 00		
1	"	6	48 26 30	50 24 0	(2)
3	"	6	46 51 45		
3	"	7	48 39 30		
5	"	8	46 59 45		
7	"	10	46 47 42		
1	"	3	46 02 42	41 54 0	(3)
3	"	4	45 09 48		
4	"	5	97 57 48		
1	"	3	45 53 54	41 54 0	(4)
2	"	3	46 02 42		
3	"	4	45 09 48		
4	"	5	97 57 48		
1	"	2	48 06 48	24 42 0	(5)
1	"	5	95 10 00	20 03 0	(6)
2	"	3	50 25 30		
5	"	7	94 23 30		

(1) I.B.V.S. No. 379, September 15, 1969,
A.H. Jarrett and J.P. Eksteen.

(2) MNASSA, 28, 11 and 12, p. 131, 1969,
A.H. Jarrett and J.P. Eksteen.

(3) I.B.V.S. No. 481, October 31, 1970,
A.H. Jarrett.

(4) MNASSA, Vol. 30, No.7, July 1971, p. 94,
A.H. Jarrett and J.P. Eksteen.

(5) I.B.V.S. No. 711, August 31, 1972,
A.H. Jarrett and J.P. Eksteen.

(6) I.B.V.S., No. 968, March 3, 1975,
A.H. Jarrett and G. Grabner.

From the above the mean period for the interval between flares is $47^h55^m45^s$. Although realizing that it by no means provides conclusive evidence, it is a fact that a significant number of the flares observed (just over 87%) indicate an interval between flares of approximately 48^h, $2x48^h$ or $3x48^h$. This might be regarded as further support for the 48^h interval previously reported for this star (Andrews, 1966).

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Reference:

Andrews, A.D. 1966, P.A.S.P. 78, 542

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1222

Konkoly Observatory
Budapest
1976 December 27

LIGHT CURVE OF THE EMISSION VARIABLE IN SAGITTA

The emission object announced by O.D. Dokuchaeva in IAU Circ. 2995 and IBVS 1189 was observed on Sonneberg field and patrol plates mainly taken by R.Brandt and H.Huth. The variable was invisible (fainter than 15^m to 16^m) on roughly 250 blue sensitive plates of the 14 cm lenses in the years 1930 to 1969 and invisible (fainter than $13\overset{m}{.}2$ pg or $12\overset{m}{.}5$ pv) on blue and photovisual material of the sky patrol from 1970 to 1974 Dec. 13.

The outburst of 1975/76 as observed in photovisual (x) and blue light (•) is shown in the Figure. The object's red colour which obviously also belonged to the minimum (see Palomar charts), was strongly present at the ascending branch, smaller during maximum and no longer conspicuous in 1976. The systematic difference between the Harvard data (IAU Circ. 3005) and ours has still to be explained.

The comparison stars were tied to SA88 (Mt. Wilson system) for m_{pg} and to our sequence near WW Vul (Astron.Nachr. 294,p.29) for m_{pv}. They can be identified on the map in IBVS 1189 with respect to the variable star, as follows:

	$\Delta\alpha$	$\Delta\delta$	m_{pg}	m_{pv}
B	4.'6 E	3.'1 S	10.2	9.3
A	5.0 W	1.1 S	11.2	10.75
Z	1.0 W	2.9 N	11.7	11.3
Y	0.3 E	1.5 N	12.1	11.7
X	2.1 E	2.1 S	13.0	12.5:

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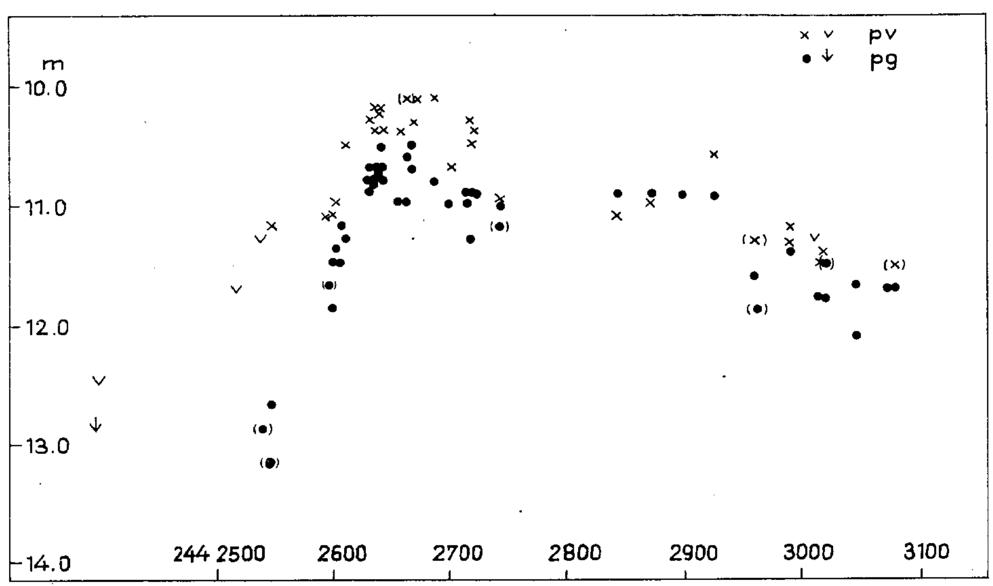

m
10.0
11.0
12.0
13.0
14.0
244 2500
2600
2700
2800
2900
3000
3100
pv
pg

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1223

Konkoly Observatory
Budapest
1976 December 30

PHOTOELECTRIC OBSERVATIONS OF u HERCULIS AND A REMARK ON ITS PERIOD

The early type eclipsing binary u Herculis may represent a very interesting case of close binary evolution and studies of its period can, in principle, contribute significantly to our understanding the system. This may justify the belated publication of a set of photoelectric observations secured at the Hoher List station of the Bonn Observatory in August-September 1959 and March-May 1961. The measurements define six epochs of minimum brightness.

The series comprises 194 observations obtained with the 34-cm reflector, 97 in each of the colors b and r of the instrumental system; the latter has an isophotic wavelength near 6000 Å. Comparison star was d Herculis, check star e Herculis and the magnitude differences (d-e) indicate for the mean error of a single observation ± 0.009 mag. in the blue, ± 0.008 mag. in the red region. Only measurements close to the light minima were taken and they allow the derivation of the following minimum epochs.

Min. I (hel) :	JD 2436831.304	O-C= $-0\overset{d}{.}002$	
	37366.6240	+0.0002	
	37422.5059	-0.0059	(n)
Min.II (hel) :	JD 2436793.3500	O-C= -0.0117	(n)
	36832.3279	-0.0033	(n)
	37365.596	-0.002	(n)

The symbol (n) indicates that the epoch is based on two sets of observations separated by two, in one case six nights. The 0-C values correspond to the elements:

Min.I = JD 2405830.0326 + $2\overset{d}{.}0510270$ E (Catalano 1967)

Due to the relatively few observations, the average error of a minimum epoch is $\pm$ $0\overset{d}{.}002$. Where the timing is given to the third decimal of the day only, the observations either barely bracket the minimum brightness (JD 2436831) or the time of minimum was calculated from two short runs of observation, one on each branch of the eclipse.
(The minimum JD 2436793 depends appreciably on the extinction correction, as the observations on August 18, 1959 were carried out up to z = 56°.)

Timings of primary minimum go back more than a century for u Herculis; photoelectric observations are not too frequent but they are fairly evenly distributed over nearly 60 years. The period was studied, among others, by Martin (1938) and Catalano (1967). No definite changes of the period have been found; in particular, early reports of an apsidal rotation are discounted now. The following tabulation of later photoelectric minima - not necessarily complete - can be considered as continuation of Martin's table (loc.cit.p.270); the 0-C values are calculated using Catalano's formula again.

RUIZ	1955.6	p	2435317.6460	0-C=	-0.0018	(Ruiz 1957)
		s	35318.6734		+0.0001	
HERCZEG	1959.6/7 1961.2/4		See p.1 of this paper			
ENGELKEIMER	1961.5	p	2437448.6619	0-C=	-0.0029	(private comm.)
CATALANO	1964.6	p	38605.4445		+0.0004	(Catalano 1967)
		p	38607.4955		+0.0004	
BATTISTINI et al.	1968.5	p	40053.4646		-0.0045	(Battistini et al. 1973)
	1971.6	s	41176.402	0-C=	-0.004	

D.Engelkeimer's result was kindly communicated to me by the Data Center for Eclipsing Binaries maintained at the University of Florida, Gainesville; information from the files of the Data Center is gratefully appreciated.

Among the more recent photometric elements, those of Catalano's give the best representation of the minima. Elements by Ruiz (1957) are almost equally good while the formula given by Miczaika and Keutmann (1936) gives slightly higher negative residuals for all later determinations.

Although the epochs for secondary minimum are, as a rule, less accurate and in a few cases show unexpectedly large residuals (notably those observed in 1913, 1934 and 1959) the lack of apsidal motion with any detectable amplitude - say, above $0^{d}.01$ - is rather obvious. It has been pointed out, on the other hand, that reasonable values of the orbital elements and apsidal motion coefficients would require a relatively rapid rotation of the major axis; its period may be of the order of 40-80 years. Thus the orbit must be very nearly circular, rendering the case of u Herculis favorable for studying spectroscopic effects of gas streaming and circumstellar matter; this point was emphasized by Kovachev and Seggewiss (1975). Nevertheless, the lack of secular period changes during the last 100 years may not mean that the period is strictly constant. Differences between the time residuals given by Catalano for 1964 and the predominantly negative 0-C values found in the years preceeding as well as following that date, are probably real. This can be the consequence of small, irregular, short term changes of the period or perhaps temporary distortions of the eclipsing light curve. It is worth noting, that a number of qualified visual determinations (BAV, SAG) yield for 1972 a normal epoch with 0-C= $-0^{d}.007 \pm 0^{d}.010$.

This particular question of random period changes deserves further studies, preferably by more frequent and more regular photoelectric observations.

I should like to thank Mrs. Helga Hagen for her assistance in the reduction of the measurements and Mr. J. Ruiz for kindly sending me the unpublished details of his observations. Tables of the individual measurements obtained at the Observatorium Hoher List are available on request.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1224

Konkoly Observatory
Budapest
1976 December 30

INPROVED LIGHT ELEMENTS OF HX ARAE

HX Ara was identified as a RR_c variable in 1975 (Duerbeck and Walter, Astr. Astrophys. 49, 471 (1976). A new light maximum is derived from observations in B and V made by one of us (K.W.) with the 50cm telescope of the European Southern Observatory in 1976 :

J.D.hel. = 2 443 005.5745 ± 0.0020.

The following improved light elements are derived :

$$J.D.hel.(max.) = \underset{\pm .0010}{2\,442\,638.5138} + \underset{\pm .000002}{0.219403} \cdot E.$$

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INFORMATION BULLETIN ON VARIABLE STARS
Number 1225

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Budapest
1976 December 30

VARIABLE STAR IN EE CEPHEI COMPARISON SEQUENCE

The star BD +55°2691 is included (as star c) in the comparison sequence of the system EE Cephei (Romano,G.,1956,Coelum 24, 135; Meinunger,L.,1976, M.V.S.,7,97). During the observations of this system small light variations of the c star were obtained. Using the photodensitometric reductions of the plates taken during the 1969 EE Cep minimum (Baldinelli,L.,Ghedini,S.,Tubertini, C.,1975,I.B.V.S.No.1009) we have found for the c star the value listed below:

J.D. 2440...	m_{ph}	J.D. 2440...	m_{ph}
395.420	11.44	437.369	11.68
397.442	.39	438.405	.45
398.463	.48	439.395	.50
399.397	.30	440.375	.64
400.456	.84	447.412	.52
407.398	.43	454.354	.57
408.406	.28	482.342	.53
410.397	.56	496.376	.43
426.392	.60	498.358	.49
427.401	.45	499.344	.70
431.421	.58	500.351	.53

Column m_{ph} contains photographic magnitudes with a mean error of $0^m.07$. The material used is Ilford Zenith Astronomical with 10 minutes exposures. The observations were carried out at the "G. Horn D'Arturo" observatory at Bologna.

The list shows a $0^m.5$ mean variation of BD +55°2691.At present we are observing photoelectrically the star to find out the kind of variation and an eventual period.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1226

Konkoly Observatory
Budapest
1977 January 7

PHOTOELECTRIC UBV PHOTOMETRY OF SY For

In the GCVS, SY For was classified as U Geminorum type star. However, Wenzel (1973) doubted this classification and concluded from a survey on Sonneberg patrol plates that SY For is a semiregular reddish variable star of a cycle length of 50 to 60 days and an amplitude of roughly $1^m.5$.

SY For was included in a photoelectric survey of southern U Gem stars which was carried out in Dec. 1972 with the 1 meter telescope of the European Southern Observatory in La Silla/Chile. The telescope was equipped with a single channel photometer and a dry ice cooled EMI 6256 A multiplier. All observations were obtained in the UBV system.

The finding chart shows SY For as well as 5 field stars for which UBV values have been obtained (Table 1). Star 1 was selected as main comparison star and was monitored always together with the variable. All data were first reduced to the UBV standard system. Afterwards, the results of the variable were corrected according to the difference between the accompanying measurement of the comparison star and its general mean value.

Normally, 1 to 3 UBV sets per night were obtained. Only on Dec. 15, SY For was monitored for 104 min revealing a total of 82 UBV observations. In none of these cases short time scale variations exceeding $0^m.01$ could be found. Therefore nightly averages were calculated and listed in Table 2.

The present photometry confirms that SY For is a red star probably of spectral type K. During the time of observation (10 days) it showed quite linear gradients in V and B-V (+0.042 and -0.015 mag per day,respectively), well compatible with cycle length and amplitude of Wenzel (1973). SY For can definitely be excluded from the U Gem class and classified as SR star.

Table 1

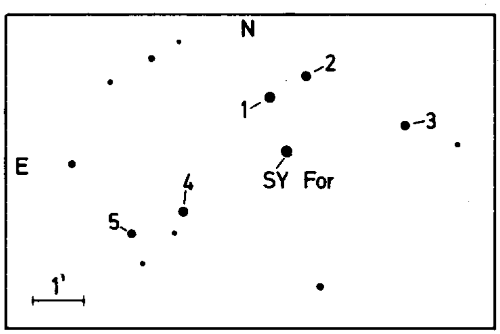
Mean UBV Values for the Field Stars around SY For

Star	V	B-V	U-B	n
1	12.44	0.77	0.17	16
2	13.98	0.70	0.00	2
3	13.37	0.20	0.09	3
4	13.21	0.77	-0.11	2
5	13.93	0.72	0.15	2

Table 2

Nightly Averaged UBV Values of SY For

HJD 244...	V	B-V	U-B	n
1661.665	10.89	1.41	0.61	3
1664.597	11.05	1.35	0.51	2
1665.540	11.07	1.35	0.51	1
1666.573	11.09	1.34	0.42	82
1667.543	11.14	1.31	0.42	2
1668.549	11.17	1.32	0.42	2
1669.549	11.19	1.30	0.48	2
1671.559	11.31	1.26	0.49	1



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Reference:

Wenzel, W., 1973, IAU Inf.Bull.Var.Stars No. 763

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1227

Konkoly Observatory
Budapest
1977 January 7

REMARKS CONCERNING IZ CYGNI

We have recently found, by reference to the original plate material,that star no. 8353 in the 1965 catalogue of suspected variables is, in fact, identical with the 441-day Mira variable star IZ Cygni. As the latter star appears to be of considerable interest, we give in the following our objective-prism data near maximum and minimum light, in all but the last instance determined from the infrared spectral region:

Date (UT)	Spectral Type
June 17, 1947	M4
Sept.21, 1951	M10+
Sept. 1, 1954	M3
June 13, 1956	M10
July 7, 1959	M2e (blue spectral region)

We find the following ranges in light: m_{ir}=8.0-11.5; m_{pg}=11.0-17.5. The star was near minimum at the time of the Palomar Sky Survey exposure taken on August 10, 1950. Our spectral and magnitude data are in good agreement with the light elements given in the GCVS. The star's unusually early spectral type at maximum and its very large spectral range are noteworthy, and the object merits further spectroscopic observation.The next maximum will occur in Aug.-Sept. 1977.

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INFORMATION BULLETIN ON VARIABLE STARS
Number 1228

Konkoly Observatory
Budapest
1977 January 10

PHOTOGRAPHIC AND PHOTOELECTRIC OBSERVATIONS OF RZ Oph

RZ Oph is an eclipsing binary with a period of approximately 262 days. We began following it photographically in 1969 at the "G. Horn D'Arturo" Observatory. The list below contains the photodensitometric reductions of the 1969 and 1971 observations.

1969	J.D. 2440...	m_{ph}	m.e.	N
	359.500	10.85	-	1
	363.488	10.98	±0.09	4
	368.509	12.50	.07	2
	372.505	12.63	.04	2
	373.463	12.70	.07	2
	380.488	10.88	.04	2

1971	J.D. 2441...	m_{ph}	m.e.	N
	149.434	11.15	-	1
	153.403	12.68	±0.10	2
	157.406	12.55	-	1
	159.409	12.60	.00	2
	160.422	12.53	.04	2
	162.468	11.15	-	1
	163.471	11.10	.07	2
	164.492	11.08	.18	2

Column "m_{ph}" contains photographic magnitudes, "m.e." the mean errors and "N" the number of plates. The material used is Ilford Zenith Astronomical with 10 minutes exposure.

During 1976 RZ Oph has been observed photoelectrically with the 400 mm ∅, f=200 cm Newtonian reflector of our observatory. The magnitude differences ΔV near the minimum are in UBV system.

1976	J.D. 2442...	m_{ph}	m.e.	N
	982.4150	- 0.21	± 0.03	3
	984.3706	- 0.04	.01	8
	984.4294	0.00	.00	4
	987.4076	+ 0.40	.01	3
	989.3989	+ 0.39	.01	3
	993.3774	+ 0.40	.00	5
	994.3888	+ 0.38	.01	4

Column "m.e." reports the mean errors and column "N" the number of observations. The star BD +6°3928 (CI) has been used as comparison star.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1229

Konkoly Observatory
Budapest
1977 January 12

VARIABLE STARS IN THE GLOBULAR CLUSTER NGC 6362

NGC 6362 was studied in Córdoba, Republic of Argentina and was made a colour-magnitude diagram of this cluster (Fourcade, The Variable Stars,Suppl.Vol.2, No.7,p.18.,1974,Moscow).

Thirty two plates in yellow (103a-D+GG 11) were obtained with the telescope at Bosque Alegre in order to study the variable stars of this cluster.

The periods for representing the light curves were taken from A.Van Hoof (Publications du Laboratoire d'Astronomie et de Géodésie de l'Université de Louvain, No 126, 1961). The variables No 7,10,13,16,22,25 and 30 were studied in the Catalogue and Atlas of Variable Stars in Globular Cluster NGC 6362, C. Fourcade and R. Laborde, 1966 Córdoba Observatory, Arg.Rep.

The light curves of the mentioned variables are shown in the Figures.

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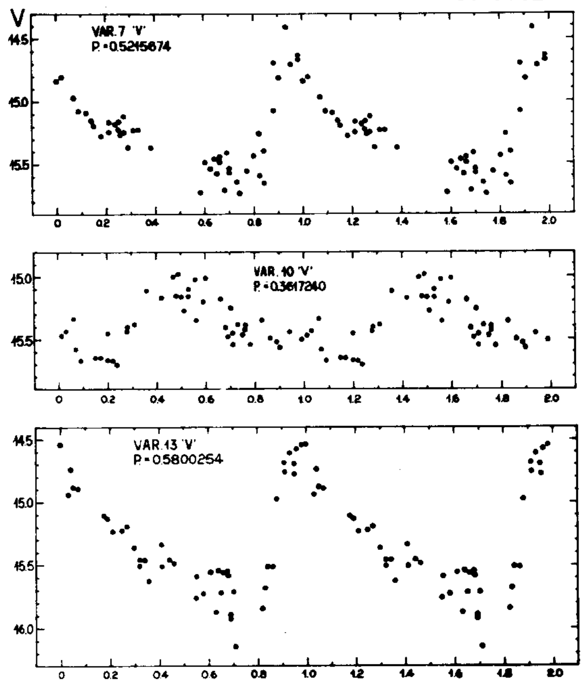
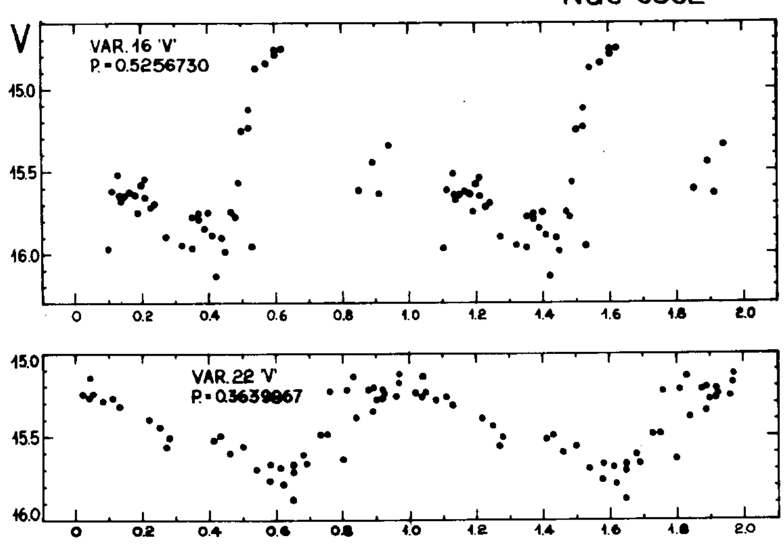
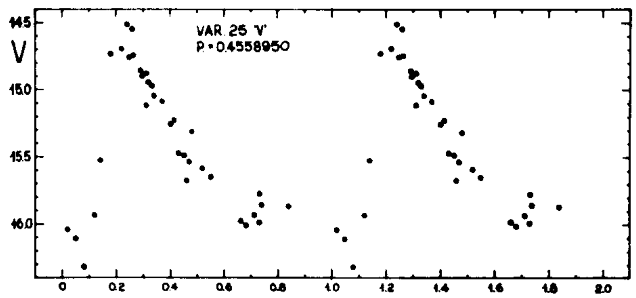
NGC 6362



NGC 6362

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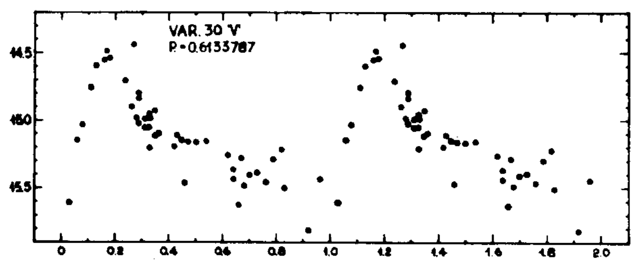
2.0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15.5
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0.4
0.6
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1.2
1.4
1.6
1.8
2.0

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Konkoly Observatory
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1977 January 19

u v b y PHOTOMETRY OF THE SUSPECTED VARIABLE ω^2 Sco

The star ω^2 Sco (HR 5997, V=4.31) is classified as a suspected variable of spectral type gG2 in the Catalogue of Bright Stars (Hoffleit 1964). The star was listed by Crawford and Barnes (1970) as a standard star in the Strömgren system, and recently Grønbech et al. (1976) used ω^2 Sco as a standard for ubvy photometry of bright O to G0 stars south of declination +10°. The author used this star as a standard star for four-colour observations at La Silla, Chile in 1973. In view of its suspected character, however, measurements of the nearby bright stars ν Sco (HR 6026-27, A0IV-B2IV, V=4.00) and ω^1 Sco (HR 5993, B1V, V=3.95) were made immediately before and after each measurement of ω^2 Sco. Although the spectral types of the suspected variable and the comparison stars differ more than one might like, all stars are very bright and one may expect high-precision differential photometry.

The measurements were corrected for atmospheric extinction and the indices b-y, m_1 and c_1 were transformed to the standard system of Crawford and Barnes (1970). The y observations were transformed to the standard V magnitudes of the UBV system. Table 1 gives the mean values of the non-differential nightly means of b-y, m_1 and c_1 calculated from measurements obtained during 7 nights in 1973. The mean error σ on one nightly mean value is given. The Table also contains the results of Grønbech et al. (1976) and those of Crawford and Barnes (1970).

Table 1

	ν Sco=HR 6026-27			ω^1Sco=HR 5993			ω^2 Sco=HR 5997			
	b-y	m_1	c_1	b-y	m_1	c_1	b-y	m_1	c_1	
$\overline{m}$	0.078	0.056	0.140	0.036	0.048	0.005	0.516	0.298	0.419	This
σ	0.001	0.004	0.004	0.001	0.004	0.005	0.004	0.006	0.007	work
$\overline{m}$	0.083	0.047	0.142	0.044	0.037	0.008	0,499	0.329	0.407	Grønbech
σ	0.003	0.004	0.004	0.003	0.004	0.003	0.003	0.004	0.004	et al. 1976
$\overline{m}$	0.072	0.059	0.150	0.033	0.041	0.022	0.521	0.284	0.448	Crawford et al. 1970

Table 2 gives the mean values of the differential results for ω^2 Sco relatively to ν Sco and also for ν Sco relatively to ω^1 Sco.

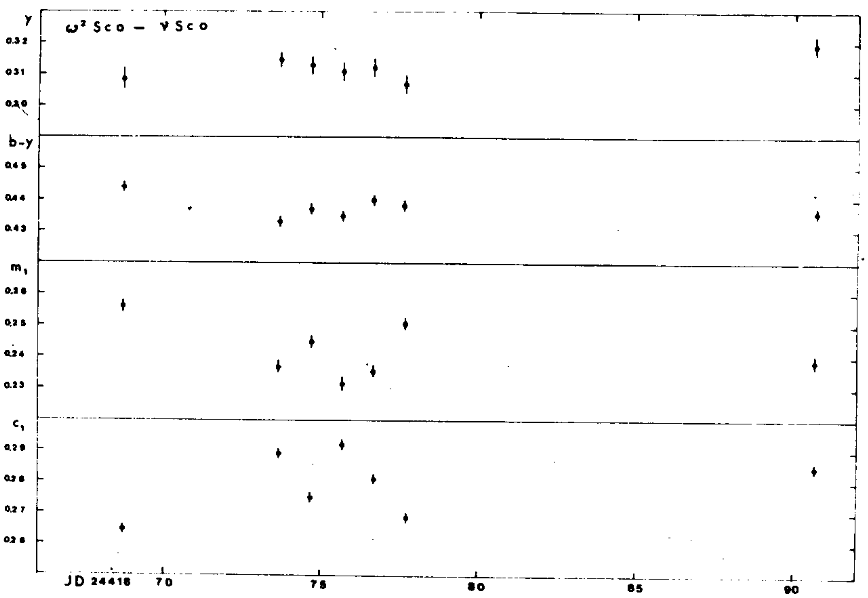
Table 2

	ω^2 Sco - ν Sco				ν Sco - ω^1 Sco			
	y	b-y	m_1	c_1	y	b-y	m_1	c_1
$\overline{m}$	0.312	0.438	0.242	0.279	0.052	0.043	0.007	0.135
σ	0.004	0.004	0.009	0.010	0.003	0.001	0.002	0.001

The standard deviations in y for the differences ω^2Sco-ν Sco and ν Sco -ω^1 Sco are similar, but the mean errors in b-y, and especially in m_1 and c_1 are significantly different for both groups. Figure 1 gives a plot of the differential nightly mean values y, b-y, m_1 and c_1. The Figure clearly indicates that ω^2 Sco shows significant variations in b-y, m_1 and c_1, while more measurements are needed to conclude whether the y-fluctuations are significant or not. Further observations are planned.

Acknowledgement

The author wishes to express his thanks to the University of Copenhagen for the use of the 50 cm Danish Telescope and photometric equipment.
Part of this research was supported by the National Foundation of Collective Fundamental Research of Belgium (FKFO) under contract n° 2.9002.76.



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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1231

Konkoly Observatory
Budapest
1977 January 24

NN CEPHEI AND PP LACERTAE

NN Cephei and PP Lacertae, catalogued as RR ? in the Second Supplement to the Third Edition of the General Catalogue of Variable Stars (1974), are in fact two eclipsing binaries.

NN Cep = HD 217796

From 20 May to 6 August 1976, R.Rolland followed continuously this star, performing 751 visual estimations with binoculars. The resulting light-curves have revealed the eclipsing binary character of NN Cep, previously known as a spectroscopic binary. The period was found to be 2.058 days.

The best observed minima obtained by Rolland are listed below. Reductions were made using the tracing paper method.

JD 2442 919.49	Minimum	II	O - C = + 0.05 d
922.51		I	- 0.02
991.49		II	+ 0.02
994.56		I	+ 0.00

The O - C values refer to this calculated ephemeris :

$$\text{Min I} = \text{JD hel. } 2442\ 959.57 \underset{\pm 7}{} + 2.058 \underset{\pm 2}{} \cdot E$$

The shape of the mean light-curve suggests that NN Cep is a Beta Lyrae system rather than an EA type variable.

PP Lac = CSV 8787

From 29 August to 17 October 1976, A.Figer made 228 visual estimates of PP Lac on 9 nights with a 10 inch-reflector.

The light-curves show that PP Lac is a new EW type variable with a period of 0.4011 day.

Times of the best observed minima, obtained using the tracing paper method are listed below:

JD hel. 2443 023.391	$O - C = + 0^{d}.005$
040.434	+ 0.001
040.625	- 0.008
050.442	- 0.018
068.320	+ 0.011
068.516	+ 0.007
069.312	+ 0.000

The O-C values refer to either one of these calculated ephemerides, since the precision of the mean light-curve does not allow us to discriminate the primary minimum from the secondary one:

$$\text{Min I} = \text{JD hel. } 2443\ 050.\underset{\pm 2}{46} + \underset{\pm 4}{0.4011} \cdot E$$

$$\text{Min I} = \text{JD hel. } 2443\ 050.\underset{\pm 2}{66} + \underset{\pm 4}{0.4011} \cdot E$$

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Budapest
1977 January 25

θ^2 TAURI A POSSIBLE NEW δ SCUTI STAR

Photoelectric observations of θ^2 Tauri (HR 1412) were obtained during a 3 hour period on 31 December 1976 with the 40 cm reflector on Tortugas Mountain using a dry ice cooled 1P21. Observations were made in V only using θ^1 Tauri as the comparison star. θ^2 Tauri has been listed as a member of the Hyades by both van Bueren (1952, VB72) and van Altena (1966, VA491).

The variability had an amplitude of approximately 0.03 magnitude with a period of 0.07 day. Thus the star seems to belong to the δ Scuti class. Using the (b-y) color index as listed by Lindemann and Hauck (1973) and the P-C-L relation for δ Scuti stars given by Breger and Bregman (1975) one finds the absolute magnitude of θ^2 Tauri to be 1.26 magnitudes. This is comparable with the spectral classification of A7 IV as given by Iriarte et al. (1965).

Further observations are needed to confirm the variability.

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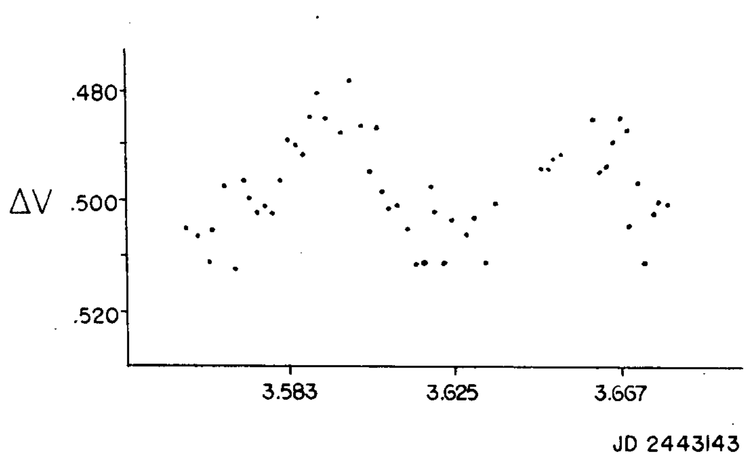

Figure 1. The light curve of θ^2 Tauri. Each point represents a single magnitude difference in the sense variable minus comparison.

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Konkoly Observatory
Budapest
1977 January 31

PHOTOELECTRIC PHOTOMETRY OF NOVA VULPECULAE

On October 22 and 26, 1976 Nova Vulpeculae was photographed by G.A. Becker and C.R. Chambliss at Kutztown, Pennsylvania. Photoelectric observations were made on 17 nights using the 46 cm Cassegrain reflector of the Kutztown State College Observatory. The photomultiplier used was an EMI 6256SA with standard UBV filters. Each of the following observations represents a nightly mean:

Hel.JD 2443...	V	B-V	U-B	Hel.JD 2443...	V	B-V	U-B
078.51	6.58:	+1.12:	+0.22:	099.49	7.58	1.00	-0.05
80.51	7.08	1.04	+0.08	101.49	7.72	1.05	-0.14
81.50	7.03	1.03	+0.11	102.48	7.88	1.07	-0.16
84.51	6.45	1.10	+0.14	112.48	8.34	0.95	-0.07
87.52	8.49:	1.02:	-0.08:	113.47	8.46	1.01	-0.05
89.50	8.00	1.01	-0.12	118.46	8.65	1.02	-0.11
91.49	7.95	1.00	-0.04	126.47	8.91	0.97	-0.08
95.50	7.48	0.99	-0.09	131.46	9.20	0.97	-0.08
96.49	7.51	1.03	-0.09				

As comparison stars the following were used. The magnitudes and colors of these stars listed here were obtained by this investigator.

		V	B-V	U-B
4 Vul	KO III	5.15	+0.99	+0.81
5 Vul	AO V	5.61	-0.03	-0.06
7 Vul	B5 V	6.32	-0.09	-0.56
8 Vul	G6 III	5.81	+1.01	+0.84

The most unusual trend in the observations of Nova Vulpeculae was the sharp decrease which occured on November 3-4. This has been confirmed by other observers as well. Over the two-month period covered by the observations listed above, a mean decrease of between 0.04 and 0.05 mag. per day is indicated. According to the data listed by C. Payne-Gaposchkin (The Galactic Novae, 1957) it can be classified as a moderately fast nova. Nova Vulpeculae is strongly reddened, but this is to be expected as its galactic latitude is only +1°.

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Budapest
1977 January 31

PROGRAMME OF COOPERATIVE FLARE STAR OBSERVATIONS FOR 1977

The Working Group on Flare Stars announces the following programme of cooperative observations for the year 1977:

AD Leo	11-25	February
V 1216 Sgr	9-23	July
EV Lac	6-20	September
UV Cet	6-20	October

L.N. MAVRIDIS
Chairman
Working Group on Flare Stars

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1235

Konkoly Observatory
Budapest
1977 February 1

PHOTOELECTRIC OBSERVATIONS OF UW CMa

BV photoelectric observations were carried out with the 20 cm refractor at the Kanagawa Education Centre, Japan, on 68 nights during the winters of 1973, 1974 and 1975.

The photometer is furnished with the Hitachi 1P21 photomultiplier tube and Schott filters BG12+GG13 (for B) and GG14 (for V). HD54669 (BD-23°4949, Sp=B3V) was used as the comparison star throughout the course of the observations and Johnson's standard stars were observed on each night.

For the photometric reduction to the standard BV system the following formulae were used:

$$\Delta V = \Delta v - k_v \cdot \Delta F(z) + \varepsilon \cdot \Delta(b-v) ,$$

$$\Delta(B-V) = \mu\{\Delta(b-v) - k_{bv} \cdot \Delta F(z) - k'_{bv}\Delta[F(z)\cdot(b-v)]\} .$$

The photometric constants are $\varepsilon = -0.111$ and $\mu = 1.080$ for the observations from November 24 to December 16, 1974 and $\varepsilon = -0.144$ and $\mu = 1.094$ for the observations from December 20, 1974 to January 13, 1976. New light elements from the present observations are

$$\text{Min.I} = \text{Hel.JD } 2442424{\cdot}014 + 4.39341{\cdot}E.$$

It is interesting to note a strange hump at the phase 2.5 days which can be seen on both light curves in B, V.

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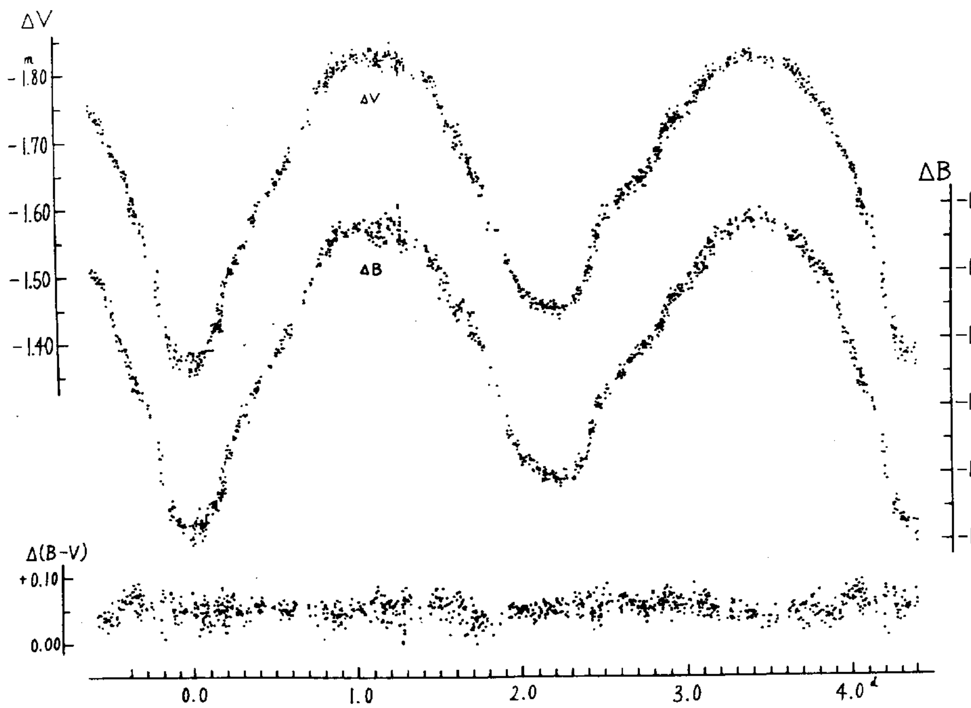


ΔV
m
-1.80
-1.70
-1.60
-1.50
-1.40
ΔV
ΔB
ΔB
-1.80
-1.70
-1.60
-1.50
-1.40
-1.30
Δ(B-V)
+0.10
0.00
0.0
1.0
2.0
3.0
4.0 d

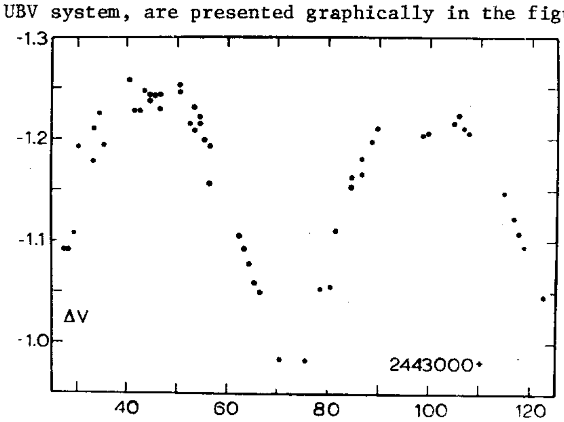
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1236

Konkoly Observatory
Budapest
1977 February 10

1976 PHOTOELECTRIC PHOTOMETRY OF λ ANDROMEDAE

λ And, a one-lined spectroscopic binary of orbital period $20^{d}.52$, displays a number of the properties of the RS CVn-type binaries (Hall 1976). Among these are late spectral type (G8 IV-III), H and K emission (Herbst 1973), a quasi-sinusoidal light variability (Archer 1960), and radio emission (Bath 1976). It differs from the RS CVn binaries in that the period of light variability is very different from the orbital period: $\sim 50^{d}$ versus $\sim 20^{d}$.

On 45 different nights between 2,443, 027.5 and 2,443, 122.5 we made a total of 135 differential photoelectric observations of λ And in the visual wavelength region, all of us using 1P21 photomultipliers and using Ψ And as the comparison star. At Landis Observatory, 24 observations were made with the 8-inch (20-cm); at Hickox Observatory, 83 with the 10-inch (25-cm); at Dyer Observatory, 28 with the 24-inch (60-cm). Nightly means of these observations, corrected for atmospheric extinction and transformed to V of the UBV system, are presented graphically in the figure.



The interval between the two rising branches, measured at $\Delta V = 1^m.1$, is 52^d; the interval between the two falling branches is 55^d. Maxima occurred at approximately 2,443,045 and 2,443,100; minimum occurred at approximately 2,443,073; the amplitude in V is about $0^m.25$, whereas Archer found it to vary between $0^m.19$ and $0^m.35$ in the photographic. Our two maxima appear to differ by about $0^m.03$.

The data in Table IV of Archer show that successive maxima occur at intervals which range between 48 and 57 days and average about 51 days. Because of this range, which appears to be intrinsic rather than a result of observational uncertainty, proper count of the integral number of elapsed cycles cannot be maintained over intervals longer than about one year. Gaps of up to 22 years exist in Archer's Table IV. For this reason it would seem that the O–C curve in Archer's Figure 5 is not a meaningful representation of the long-term behavior of the light variation and that the value $55^d.82$ is of no particular significance. Our own photoelectric observations and those of Archer are separated by 18 years and therefore probably can never be phased together properly.

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 February 10

PERIOD CHANGES OF THE EARLY TYPE ECLIPSING BINARY SZ CAMELOPARDALIS

Five new minima of the eclipsing binary SZ Cam (HD 25638, Sp. 09.5 V + B2?) were obtained photoelectrically with the 60cm telescope at Skalnaté Pleso Observatory in intermediate passband filters (halfwidth 195 Å) centered at 4700 and 5200 Å.

All available minima are listed in Table 1.

Table 1

J.D. hel. 2400000+	Minimum	E	O - C days	Observer
27533.5191	prim.	0	0	Wesselink
40897.5387	sec.	4952.5	0.1114	Olsen
40911.0264	sec.	4957.5	0.1070	Kitamura-Yamasaki
40915.0722	prim.	4959	0.1052	Kitamura-Yamasaki
40924.5237	sec.	4962.5	0.1122	Olsen
41666.6009	sec.	5237.5	0.1249	Chochol
42762.2083	sec.	5643.5	0.1751	Chochol
42775.7037	sec.	5648.5	0.1784	Chochol
43076.5917	prim.	5760	0.1930	Chochol
43134.6074	sec.	5781.5	0.1927	Chochol

Predicted times of minima were calculated according to Wesselink's ephemeris,(Wesselink , 1941):

$$\text{Min.} = \text{JD } 2427533.5191+2.6984166 \cdot E.$$

We assume that the secondary minimum is at the phase 0.5.

As it is seen in the Figure, the original Wesselink's period does not agree with our measurements. The same problem is with the revised period of Kitamura and Yamasaki (1972) : 2.6984378 days. The new ephemeris as derived from Skalnaté Pleso measurements is:

$$\text{Min.} = \text{JD } 2441666.6009+2.69854365 \ (E+0.5).$$

It seems that there occurred an abrupt change of the period around the year 1972. The increase of the period is probably due to the change in the rate of mass transfer between the components. The effects of mass transfer are seen quite well on the spectrograms taken in the years 1972-1975 in coudé focus of the Ondřejov 2 m telescope.

The interpretation of spectroscopic and photometric observations will be published in a forthcoming paper.

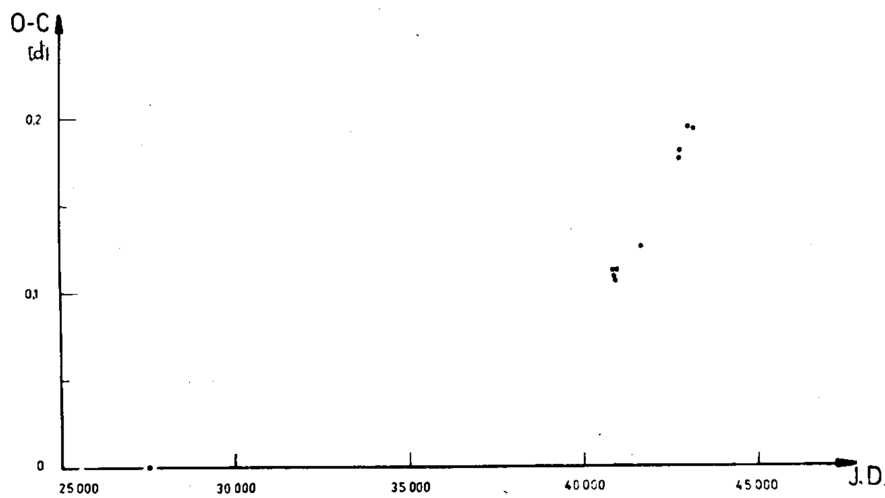

Fig. 1

O-C for SZ Cam based on the original Wesselink's period.

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INFORMATION BULLETIN ON VARIABLE STARS
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1977 February 14

OBSERVATIONS OF PRIMARY MINIMUM OF θ^1Ori A

Photoelectric observations of the January 1, 1977 (UT), primary minimum of θ^1Ori A were obtained by the writer using the 24-inch reflector of the Lick Observatory. The photometer employed a refrigerated 1P21 photomultiplier and the observations were made in yellow light through a Corning 3384 (standard thickness) filter. Owing to poor seeing, it was necessary to use a focal plane diaphragm 17" in diameter. θ^1Ori D was used as the comparison star, and sky readings were taken as follows: θ^1Ori A, 17" east of the star; θ^1Ori D, 17" west of the star. To avoid the effects of neighboring stars, the observations were made with the stars de-centered in the diaphragm by about half the radius of the diaphragm, θ^1Ori A being displaced to the east of the diaphragm center and θ^1Ori D to the west of the center.

The observing conditions were rather poor during this night. The early portion of the night was completely cloudy, and the observations were later interrupted several times by clouds. During most of the night, the humidity was extremely high so that even during clear periods it was only possible to observe occasionally for short intervals of time in order to prevent condensation of moisture on the telescope and optics.

The observations obtained are listed in the accompanying table in terms of the instrumental magnitude difference, θ^1Ori A minus θ^1Ori D. It is to be noted that θ^1Ori E was included in the diaphragm with θ^1Ori A.

An attempt to measure the contribution from θ^1Ori E on this night using a focal plane diaphragm 11" in diameter gave a $\Delta \underline{V}$ for θ^1Ori E minus θ^1Ori D of +3.21. However, this measure may be somewhat uncertain owing to the poor seeing. A similar measurement on March 22, 1976 (UT), using the 11" diaphragm in better seeing gave $\Delta \underline{V}$ = +3.62. Both of these observations give visual magnitudes for θ^1Ori E substantially brighter than those given by Jeffers, Van den Bos, and Greeby (1963) ($\underline{V}$ = 11.1) and Parenago (1954) ($\underline{V}$ = 11.4). This difference could result from the difficulty in making photoelectric observations in this crowded, nebulous field, but it is also possible that θ^1Ori E may be variable; variability of this star was suspected by the earliest observers (Webb 1881). While the observations of θ^1Ori A should be corrected for the effect of θ^1Ori E, it is not clear from the present data how this should properly be done, and it has therefore seemed better to list them here without correction.

$JD_\odot$ 2443140.+	$\Delta \underline{V}$ mag	$JD_\odot$ 2443140.+	$\Delta \underline{V}$ mag	$JD_\odot$ 2443140.+	$\Delta \underline{V}$ mag
4.6498	+0.960	4.8819	+0.318	4.9593	+0.142
4.6537	0.954	4.8849	0.318	4.9630	0.185
4.7630	0.705	4.9075	0.260	4.9658	0.156
4.7652	0.695	4.9106	0.261	4.9720	0.065
4.8061	0.583	4.9145	0.247	4.9776	0.145
4.8094	0.553	4.9175	0.242	4.9804	0.090
4.8114	0.542	4.9415	0.190	4.9843	0.100
4.8150	0.537	4.9444	0.183	4.9869	0.100
4.8506	0.418	4.9477	0.185	4.9901	0.093
4.8533	0.414	4.9520	0.173	4.9942	+0.085
4.8562	+0.390	4.9551	+0.173		

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 February 14

A PERIOD-LUMINOSITY RELATION FOR SHORT PERIOD MIRA VARIABLES

The validity of the period-luminosity relation of Mira type variables, published previously by the present author (Ferrari, 1973), was limited to stars with periods nearly equal to, or longer than 160 days. Now, another formula has been established for short period variables of the same type. On the assumption that the latter ones are undergoing overtone pulsations, a formal similarity between the period-luminosity relations of both groups, and a numerator of about 100 (instead of 200) days for the shorter periods were theoretically reasonable. The expected slope of the function wanted, the constant part of denominator, and the zero point - by chance reducing the additional constant itself to zero - could be derived from observational data (Osvalds&Risley, 1961; Clayton&Feast, 1969).

Hence, M_m being the visual absolute magnitude of mean maxima of any Mira type variable with mean period P days, it has been found that

$$M_m = - \frac{100}{P - 67} \; ; \; 100^d \leq P \leq 158^d.$$

The upper limit of validity was suggested by a pronounced frequency gap, while typical Mira variables with periods shorter than 100 days are lacking at all, and therefore the extrapolation beyond the lower limit by no means could be warranted. But within the limits specified here, slight changes of the numerator might be compensated by suitable adjustments of the constant part of the denominator and an additional constant restoring the zero point, without significant deviations from the results of the preceding two-parametric formula.

A detailed discussion of the problem will be published elsewhere.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1240

Konkoly Observatory
Budapest
1977 February 15

FOUR-COLOUR PHOTOMETRY OF THE BRIGHT SOUTHERN VARIABLE HD100198

HD 100198 (HR 4438, V=6.36, A0Ia) was observed photoelectrically in the uvby system with the Danish National 50 cm Telescope and the ESO 50 cm Telescope at La Silla, Chile, on 17 nights in 1973 as comparison star for the variable O^2 Cen (HD 100262). The observations quickly revealed night-to-night variations in all colours. Since a second comparison star was always observed, differential measurements of HD 100198 relatively to HD 100380 (V=6.76, A0) are available. The observed colours b-y, v-b and u-v were transformed to the standard system of Crawford and Barnes (1970). The y observations were transformed to the standard V magnitudes of the UBV system. In each observing night two to ten differential measurements of each star were made. Fig.1 shows a plot of the nightly mean values of y, b-y, v-b and u-v. The average nightly mean error is about 0.005 mag. in all colours.

HD 100198 shows small irregular variations in y, b and v with additional larger variations in u on a time scale of several days. The individual differential measurements obtained during single nights were checked for short term variations, but no indications for the presence of significant fluctuations on a time scale of several hours was found.

The author wishes to express his thanks to the University of Copenhagen for the use of the 50 cm Danish Telescope and photometric equipment.

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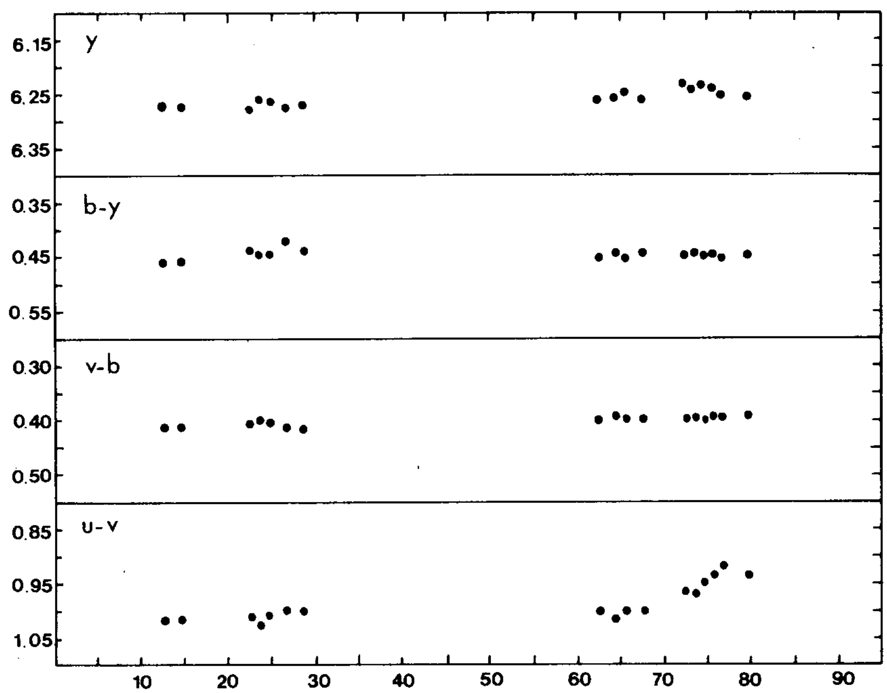
HD 100198



J.D. - 2441800 (1973)

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Reference:

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 February 16

VARIABILITY OF HR 904 AND HR 8421

In a recent photometric study of northern OB stars at intermediate galactic latitudes (Hill & Lynas-Gray 1977), UBV standards were selected from Johnson et al. (1966). Improved transformations were obtained by rejecting HR 904 and HR 8421 as standards. Both stars are listed as variable by Eggen (1966). Our individual observations are listed in Table I, the reductions having been effected in the manner described by Hill & Lynas-Gray (1977). Observations published by other authors are also listed in Table I, the means being presented in Table II if the individual observations were not published.

Significant systematic errors were not found for early-type stars (Hill & Lynas-Gray 1977) and as the colour coefficients show no significant night to night variation, any late-type stars observed should also be free of systematic errors. Observations over four nights of the late-type standards HR 2, HR 14, HR 201, HR 307 and HR 507 gave mean residuals and standard deviations, in the sense Johnson et al. - Lynas-Gray & Hill, of -0.006 ± 0.004, 0.001 ± 0.007 and 0.006 ± 0.006 for ΔV, $\Delta(B-V)$ and $\Delta(U-B)$, respectively. This demonstrates the reality of the difference between our observations of HR 8421 and those obtained by Johnson et al. (1966) and Eggen (1966).

Light curves cannot be obtained as the temporal distribution of the observations is inadequate. Radial velocity determinations give -13 km/sec for HR 8421 (Harper 1934) and 81 km/sec for HR 904 (Przybylski & Kennedy 1965, Abt 1970). Small amplitude irregular or semi-regular M-type variables have been discussed by Eggen (1973). HR 904 and HR 8421 may be of this type, though more observations are needed before a confident classification can be made.

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Table I

Individual Observations of HR 904 and HR 8421

HR	JD (Heliocentric)	V	B-V	U-B	Note
904	2438019.	6.16	1.65	2.17	1
	2438020.	6.14	1.67	2.18	1
	2439092.	6.24	1.74	2.05	1
	2439096.	6.29	1.73	2.04	1
	2439118.	6.13	1.77	2.07	1
	2439176.	6.22	1.70	2.00	1
	2441571.921	6.21	1.75	2.04	
8421	2438620.	6.09	1.58	1.68	1
	2438621.	6.15	1.60	1.73	1
	2438622.	6.18	1.58	1.72	1
	2439005.	6.12	1.60	1.76	1
	2439006.	6.13	1.61	1.73	1
	2439056.6281	6.139	1.591	1.767	2
	2439057.6465	6.144	1.608	1.753	2
	2439056.5985	6.118	1.599	1.788	2
	2439060.6046	6.081	1.613	1.768	2
	2439090.	6.14	1.61	1.71	1
	2439091.	6.13	1.60	1.74	1
	2439092.	6.10	1.62	1.68	1
	2439096.	6.10	1.61	1.77	1
	2439299.	6.23	1.50	1.93	1
	2441567.620	6.21	1.64	1.72	
	2441567.710	6.24	1.62	1.74	
	2441567.763	6.25	1.62	1.72	
	2441571.639	6.31	1.60	1.73	
	2441573.631	6.32	1.60	1.74	
	2441589.774	6.23	1.63	1.79	
	2441590.789	6.23	1.63	1.79	
	2441591.798	6.22	1.61	1.77	
	2441592.782	6.26	1.62	1.77	
	2441592.925	6.22	1.59	1.81	

1 - Observations by Eggen (1966)
2 - Observations by Johnson et al. (1966)

Table II

Mean UBV Photometry of HR 904

HR	V	B-V	U-B	N	MK	Referenes
904	6.10	1.77	2.06	6		1
	6.12	1.73	1.99	2	M1 III	2
	6.11	1.77	2.07	3		3
	6.2V	1.74	2.04	8	M2 III	4
					M1 III	5
	6.2	1.74	2.06			6

Note: N - Denotes number of observations on which the mean is based
V - Denotes variability

References:

1 - Cousins (1962) : Observed range in V is $0\overset{m}{.}06$

2 - Przybylski & Kennedy (1965)

3 - Johnson et al. (1966)

4 - Eggen & Stokes (1970)

5 - Olson (1971):

Also gives b-y=1.16, m_1=0.64, c_1=0.57,u-b=4.20

6 - Cousins (1971)

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Konkoly Observatory
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ETOILES VARIABLES DE GRANDE PARALLAXE

Le "Catalogue of nearby stars" de Gliese (1969) contient plus de 220 étoiles dont la variabilité a été reconnue ou soupçonnée. La plupart de ces étoiles ont une parallaxe supérieure à 0".045 et leur magnitude absolue est souvent bien connue.

Dans cette liste les naines rouges sont nombreuses: j'ai récemment (Petit, 1976) publié une liste de 47 naines M dont la variabilité est probable ou possible.

Le tableau suivant présente 42 étoiles de type spectral A ou F. La première colonne donne la numérotation du Catalogue de Gliese, d'où sont extraits aussi la position (1950) et une partie des renseignements concernant V et le type spectral.

Parmi ces étoiles, 6 ont recu une désignation définitive: 2 sont du type δ Scuti: Gl 8=β Cas et 822.1=τ Cyg; les 4 autres sont des binaires à éclipses: Gl 58.1=δ Cas; 167.1=γ Dor; 501.1=RS CVn; 837=δ Cap. De nombreuses autres étoiles de notre liste figurent dans les deux éditions du "Catalogue of Suspected Variable Stars" (CSV).

Parmi les 42 étoiles du tableau, 23 appartiennent probablement au type δ Sct; plusieurs d'entre elles sont dans 3 listes publiées par Frolov (1970), Hauck (1971), Seeds et Yanchak (1972); elles sont notées dans les Remarques par les lettres F, H et SY. Pour 8 étoiles (Gl 23, 178, 391, 525.1, 527, 615.2, 648 et 686.2) l'appréciation du type est de l'auteur.

Pour quelques étoiles (Gl 54.2, 105.6, 110, 303, 403.1, 459, 549, 673.1 et 827) la variation est possible, mais nous ne disposons pas d'observations recentes qui permettent de le confirmer.

Gl	Désignation	A.R.	Dec	V	Sp	Type	Remarques
8	β Cas	$0^h06^m30^s$	+58°52'4	2.27	F2IV	δ Sct	
23	-4°62 AB	0 32 40	- 3 52 1	5.20	F8V	δ Sct?	
54.2	-8°216 A	1 11 53	- 8 11 5	5.13	F5V	?	
58.1	δ Cas	1 22 31	+58 58 6	2.68	A5V	EA	
80	β Ari	1 51 52	+20 33 9	2.65	A5V	δ Sct?	F,SY
105.6	+39°610	2 39 05	+39 59 0	4.92	F9V	?	
110	-67°142	2 42 34	-66 55 5	6.25	F8	?	
167.1	γ Dor	4 14 43	-51 36 7	4.24	FOV	EW	
170.1	+15°637	4 27 42	+16 05 2	4.78	A7V	δ Sct?	H,SY
178	π 3 Ori	4 47 07	+ 6 52 3	3.19	F6V	δ Sct?	
242	ξ Gem	6 42 29	+12 57 1	3.36	F5IV	δ Sct?	F,SY
278	α Gem AB	7 31 25	+32 00 0	1.58	AIV	?	
280	α CMi A	7 36 41	+ 5 21 3	0.37	F5IV	δ Sct?	F
303	χ Cnc	8 17 02	+27 22 9	5.14	F6V	?	
331	ι UMa A	8 55 48	+48 14 4	3.14	A7V	?	
378.3	+35°2110	10 04 29	+35 29 4	4.49	A7V	δ Sct	F,SY
388.1	+20°2466	10 17 01	+19 43 5	4.80	F6IV	δ Sct?	H,SY
391	l Car	10 23 24	-73 46 6	3.99	F3IV	δ Sct?	
403.1	-19°3125	10 51 03	-19 52 1	5.23	F6V	?	
419	δ Leo	11 11 27	+20 47 9	2.56	A4V	δ Sct?	F,H,SY
426.1	ι Leo A	11 21 19	+10 48 3	4.02	F2IV	δ Sct?	F,SY
448	β Leo	11 46 31	+14 51 1	2.14	A3V	δ Sct?	SY
459	δ UMa	12 12 58	+57 18 6	3.31	A3V	?	
471.2	η Crv	12 29 29	-15 55 2	4.32	FOIV	δ Sct?	SY
482	γ Vir AB	12 39 07	- 1 10 5	2.74	FOV	?	SY
501.1	RS CVn	13 08 18	+36 12 0	8.0	F4	EA	
525.1	-32°9603	13 42 50	-32 47 5	4.23	F2III	δ Sct?	
527	τ Boo A	13 44 53	+17 42 3	4.50	F7V	δ Sct?	
549	ϑ Boo A	14 23 30	+52 04 9	4.06	F7V	?	
557	σ Boo	14 32 30	+29 57 7	4.47	F2V	δ Sct?	F,SY
615.2	σ CrB A	16 12 48	+33 59 0	5.69	F8V	δ Sct?	
648	+65°1157	16 55 45	+65 12 7	4.90	F6V	δ Sct?	
673.1	-24°13337	17 23 19	-24 07 9	4.16	A9V	?	
681	α Oph	17 32 27	+12 35 7	2.07	A5III	δ Sct?	F,SY
686.2	λ Ara	17 36 32	-49 23 2	4.76	dF4	δ Sct?	
721	α Lyr	18 35 15	+38 44 2	0.03	AOV	?	
760	δ Aql	19 22 59	+ 3 00 8	3.36	FOIV	δ Sct?	F,SY
822.1	τ Cyg A	21 12 48	+37 49 9	3.82	FOIV	δ Sct	
826	α Cep	21 17 23	+62 22 4	2.45	A7IV	δ Sct?	H,SY
827	γ Pav	21 22 20	-65 35 6	4.21	F8V	?	
837	δ Cap	21 44 17	-16 21 3	2.83	A6m	EA	
886.1	+41°4665A	23 00 18	+42 29 3	5.14	AOV	δ Sct?	F,SY

Remarques:

23 CSV 100041 Couple très serré (0"2); A est binaire spectroscopique (P=2.08186j); variation suspectée par Luyten, confirmée par Eggen (1956); ΔV=0.05

54.2 CSV 100097

80 CSV 100146 binaire spectroscopique P=106.99j

105.6 CSV 100211 binaire spectroscopique P=331.0j

110 CSV 100221

178 CSV 100411; amplitude 0.05 V; type δ Sct probable

242 CSV 100763

278 Jackisch (1963) signale une variation du couple de 0.09 V; des observations photoélectriques seraient nécéssaires pour le confirmer

280 CSV 100884 type δ Sct possible selon Frolov (1970), mais cette étoile n'a pas été retenue par Seeds et Yanchak (1972)

303 CSV 100939

331 binaire spectroscopique; Jackisch (1963) a trouvé une variation de 0.02 V et une période de 0.071j

378.3 CSV 6770 variation certaine $\Delta V=0.03$ P=0.10j

388.1 CSV 101116; amplitude 0.02 V

391 CSV 101128; variation nette dans le rouge

403.1 CSV 101166; l'amplitude atteint 0.2m

419 CSV 101190

426.1 CSV 101199

448 CSV 101225

459 CSV 101249; variabilité suspectée antérieurement (Zinner 1929) mais non retenue par Jackisch (1963)

471.2 binaire spectroscopique; type δ Sct possible (Breger 1969)

482 la variation du couple semble réelle; $\Delta V=0.02$; étoile magnétique

525.1 binaire spectroscopique; amplitude 0.02V; type δ Sct possible

527 CSV 7085; varie de 4.40 a 4.58 V (Johnson et Iriarte 1961) type δ Sct probable

549 CSV 101448

615.2 CSV 101569; binaire spectroscopique

648 CSV 101623 binaire spectroscopique P=52.11j; type δ Sct probable

673.1 CSV 101656; signalée par Schilt et Hill (1937) aucune observation récente

681 CSV 101662 binaire spectroscopique

721 CSV 101745 variabilité déjà suspectée par Guthnick et Prager; Jackisch (1963) a trouvé ΔV=0.02 et P=0.07j; des observations suivies seraient nécessaires

760 CSV 101835 binaire spectroscopique

886.1 CSV 103110, binaire spectroscopique

MICHEL PETIT

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ABSOLUTE MAGNITUDES AND LOCAL FREQUENCY OF β CEPHEI STARS

Lesh & Aizenman (1973) have determined MK spectral types, effective temperatures, and visual absolute magnitudes for 17 stars considered to be unambiguously certain specimens of β Cephei type variability. Among this small sample, there are only two spectral sub-groups which comprise more than 2 objects, viz., B1 III: 4 stars, and B2 IV: 6 stars. In both these groups the M_V, as given by Lesh & Aizenman, reveal a very significant but certainly unreal dependence on the apparent magnitudes, the intrinsic brightness of the more distant objects being systematically overestimated. At present, one cannot decide, whether this effect is originating in the spectrophotometric behaviour of the fainter stars, or may be caused by misinterpretation of some really interstellar influence on the luminosity criteria used by the authors of that calibration. Thus, an interpolation formula for the absolute magnitudes of the β Cephei stars is to be based only on 10 objects brighter than m = 4.1. By a least squares solution we readily get the formula:

$$M_V = \underset{\pm.06}{-3.80} + \underset{\pm.10}{0.44}\,(\mathrm{Sp{-}B1,5}) + \underset{\pm.08}{0.35}\,(\mathrm{LC{-}III}). \qquad \text{(p.e.)} \qquad (1)$$

$$\sigma(M_V) = \pm 0\overset{m}{.}21 \quad \text{(standard deviation)}$$

This result reveals the good internal consistency of the three parameters involved in formula (1). Indeed, if the inevitable deviations in the practically continuous scale of magnitudes due to the relatively coarse frame of spectral and luminosity classes are taken intc account, the formally calculated standard deviation ±0.21 nearly equals to its theoretically possible minimum value.

Now, this formula may be safely used to determine the visual absolute magnitudes not only for the 17 stars considered by Lesh & Aizenman, but for any other β Cephei star with spectral and luminosity class known. Among those stars included in the Supplement issues 1 to 3 (1971 to 1976) to the GCVS 1969, there are 11 brighter than BW Vul (m=6.52), the faintest one in Lesh & Aizenman's list. Since beyond this limit the completeness of information available for stars of this type is rapidly decreasing, in the present investigation the distance moduli E=m-M have been determined only for that relatively complete sample of 28 β Cephei stars, after having applied, in some instances of spectroscopically or interferometrically known companions, the appropriate corrections to m. The distances themselves were derived with due regard to the galactic absorbing layer, according to a table given previously by Ferrari & Jenkner (1973).

Thus, it has been found that 24 out of the 28 stars considered here are situated within a cylindrical space of 450 pc radius, and 350 pc height perpendicular to the galactic plane. A more realistic measure for the local frequency of β Cephei stars is derived from the fact that 15 of them are included in a cylindrical space of only 250 pc radius, and 300 pc height. From the latter data we conclude that there are, at least,

$$25 \ \beta \text{ Cephei stars per } 10^8 \text{ cubic parsec.} \qquad (2)$$

The limits just given for the space under consideration are sufficiently large so that any accidental or systematic error, increasing the true distances of some marginal stars by about 10 percent, would not at all diminish the numerical value (2). We arrive at the conclusion that β Cephei stars, notwithstanding the small number of specimens recognized with certainty, are nearly equally frequent as, e.g., Mira type variables.

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ON THE PERIOD OF THE ECLIPSING BINARY RW PERSEI

The aim of this note is to establish a numerical value of the period change of the eclipsing binary RW Persei and to test its significance. Hall (1969) collected all available times of minimum till 1968 and mentioned a sudden period decrease around 1925. A period increase, suspected around 1960 (Baldwin, 1974), has been confirmed by Hall & Stuhlinger (1974), but their observational data were not sufficient for a refinement of Baldwin's period ($13^d.198940$). Bush (1976) recently published additional times of minimum which enable us to get an idea of the behaviour of the period of RW Persei during the last fifteen years.

The whole set of data can be divided in three time intervals in which a linear regression of the times of minimum yields periods which differ significantly (Table 1, Fig. 1). The number of cycles elapsed at each minimum has been calculated from Woodward's linear ephemeris

$$\text{Min } (JD_{hel.}) = 2429217.587 + 13^d.198454 \; E$$

From table 1 we conclude that the amount of period decrease around 1925 is $4.95 \; 10^{-4} \pm 2.15 \; 10^{-4}$ days, while we find an increase of $5.11 \; 10^{-4} \pm 3.38 \; 10^{-4}$ days around 1960.

Table 1

Time interval	Epoch of Mid interval	Period	Mean error
1898 - 1924	-745	$13^d.198938$	$\pm 0^d.000099$
1925 - 1955	+ 55	$13^d.198443$	$\pm 0^d.000116$
1955 - 1972	+794	$13^d.198954$	$\pm 0^d.000222$

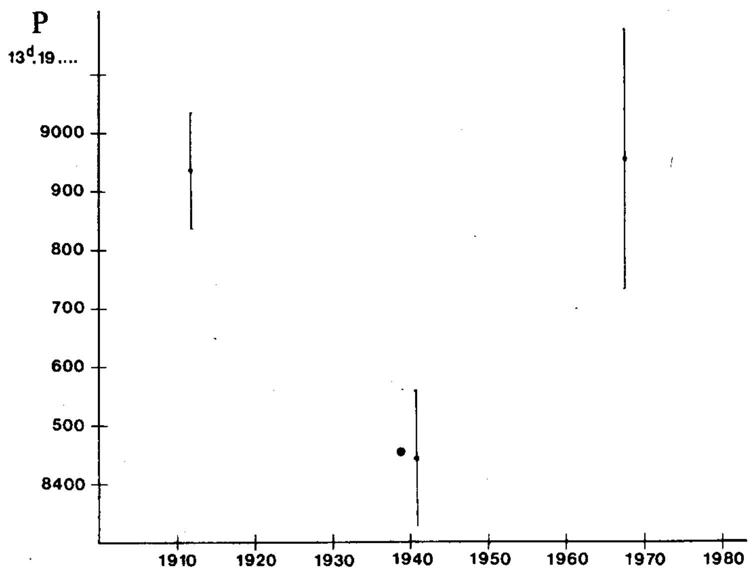

Fig. 1 : The variation of the period of RW Persei

⊙ : Woodward's value

• : this note (the mean errors are indicated)

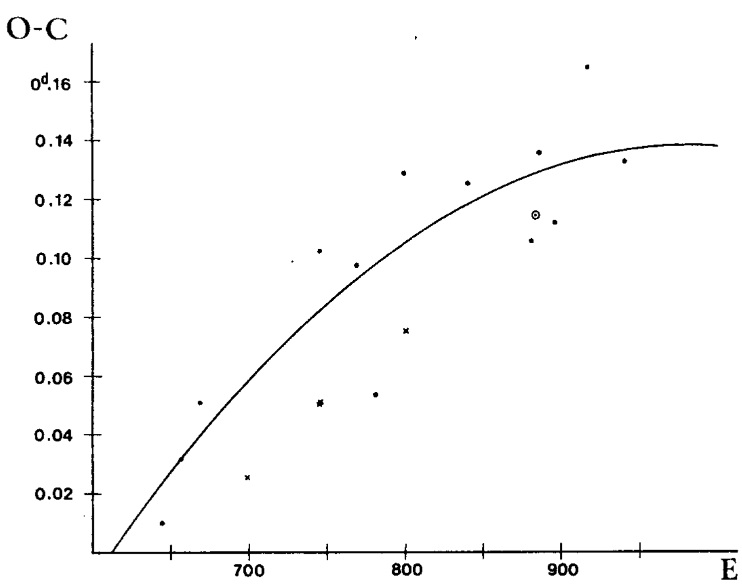

Fig. 2 : (O-C) residuals of Busch's times of minimum

× : values of Hall (1969)

⊙ : value of Hall & Stuhlinger (1975)

A parabolic least squares fit of the (O-C)-values on the other hand yields a linear decrease of the period of $0.66\ 10^{-6} \pm 0.09\ 10^{-6}$ days/cycle in the interval $-1200 < E < 0$, while the same procedure in the interval $0 < E < 800$ gives an increase of $0.72\ 10^{-6} \pm 0.20\ 10^{-6}$ days/cycle.
These values agree with the abovementioned results.

The time interval 1960 - 1972 cannot be divided in subintervals in which a linear regression of the times of minimum reveals significant different values of the period. The (O-C) residuals in this interval, which are plotted in Fig. 2, fit the straight line $\underset{\pm 4}{-0.25} + \underset{\pm 6}{0.00042}\ E$. This indicates that the period was nearly constant between 1960 and 1972. On the other hand the coefficient of the quadratic term of the least squares parabola fitted to Busch's residuals (indicated in Fig. 2) amounts $-0.10\ 10^{-5}$ days/cycle$^2 \pm 0.08\ 10^{-5}$ days/cycle^2.
So we conclude that the results from Busch's data show a tendency towards a decreasing period for the system. New times of minimum are needed to confirm the hypothesis that the period of RW Persei is decreasing again.

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ON THE BLAZHKO EFFECT IN AR Ser

As has already been reported (V.P.Tsessevich, AC, No.885, 1975) AR Ser shows anomalous Blazhko effect. The height of maximum light of this star as well as its time shift (O-C) relative to linear elements vary periodically.

I made observations of this star in the interval JD 2442126-JD 2442994.

For the Blazhko effect the following formula has been obtained by us:

1) $T_{max} = 2442195.5 + 108.4 \times n$

The shift of the moments of maximum light (O-C) has been determined from the elements:

2) Max.hel. JD = 2442126.441 + 0.575092·E.

On the basis of our observations we may conclude that the amplitude of Blazhko effect in AR Ser changes, possibly in cyclic way (see Figures 1,2,3).

The moments of maximum light, the heights of maximum light, E_2, $(O-C)_2$ and phases of Blazhko effect, derived from formula (1) are given in Table below:

Table

Max.hel.JD	m_v	E_2	$(O-C)_2$	ϕ_1
2442 126.441	12.09	0	0.000	0.363
134.504	11.99	14	.012	.437
137.383	11.96	19	.015	.464
187.406	11.63	106	.005	.925
198.338	11.55	125	.010	.026
199.489	11.63	127	.011	.037
206.390	11.68	139	.011	.100
214.432	11.78	153	.002	.175

Table (cont.)

Max.hel.JD.	m_V	E_2	$(O-C)_2$	ϕ_1
242 218.464	11.85	160	0.008	0.212
221.333	11.89	165	.002	.238
225.380	11.91	172	.023	.276
244.342	12.22	205	.007	.451
486.497	12.07	626	.048	.684
490.492	12.02	633	.018	.721
512.390	11.84	671	.062	.923
542.426	12.09	723	.194	.200
546.934:	12.13:	730	.144	.237
576.331	12.16	782	.168	.512
580.360	12.14	789	.172	.550
868.463	12.16	1290	.153	.208
872.474	12.18	1297	.139	.245
918.394	12.18	1377	.051	.669
922.373	12.12	1384	.005	.705
926.401	12.14	1391	.007	.743
934.448	12.05	1405	.003	.817
937.340	12.04	1410	.019	.844
945.372	12.02	1424	.000	.918
949.420	11.87	1431	.022	.955
953.454	12.04	1438	.031	.992
960.355	11.97	1450	.031	.056
979.340	12.15	1483	.038	.231
990.324	12.18	1502	.095	.332
994.349:	12.25:	1509	.094	.369

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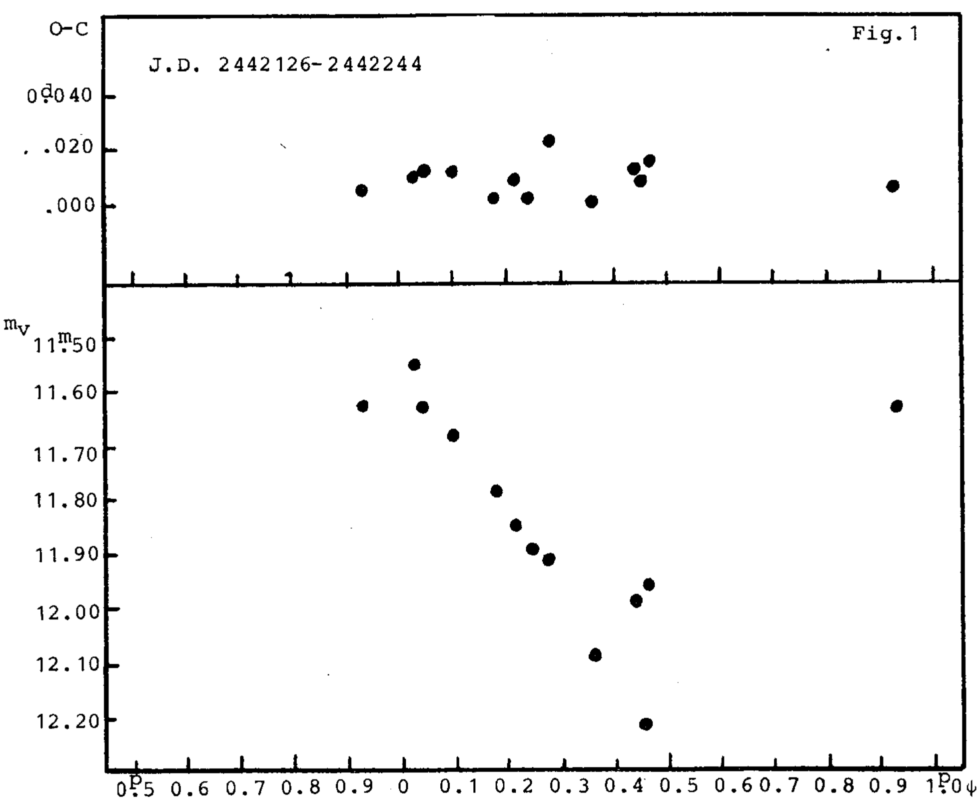
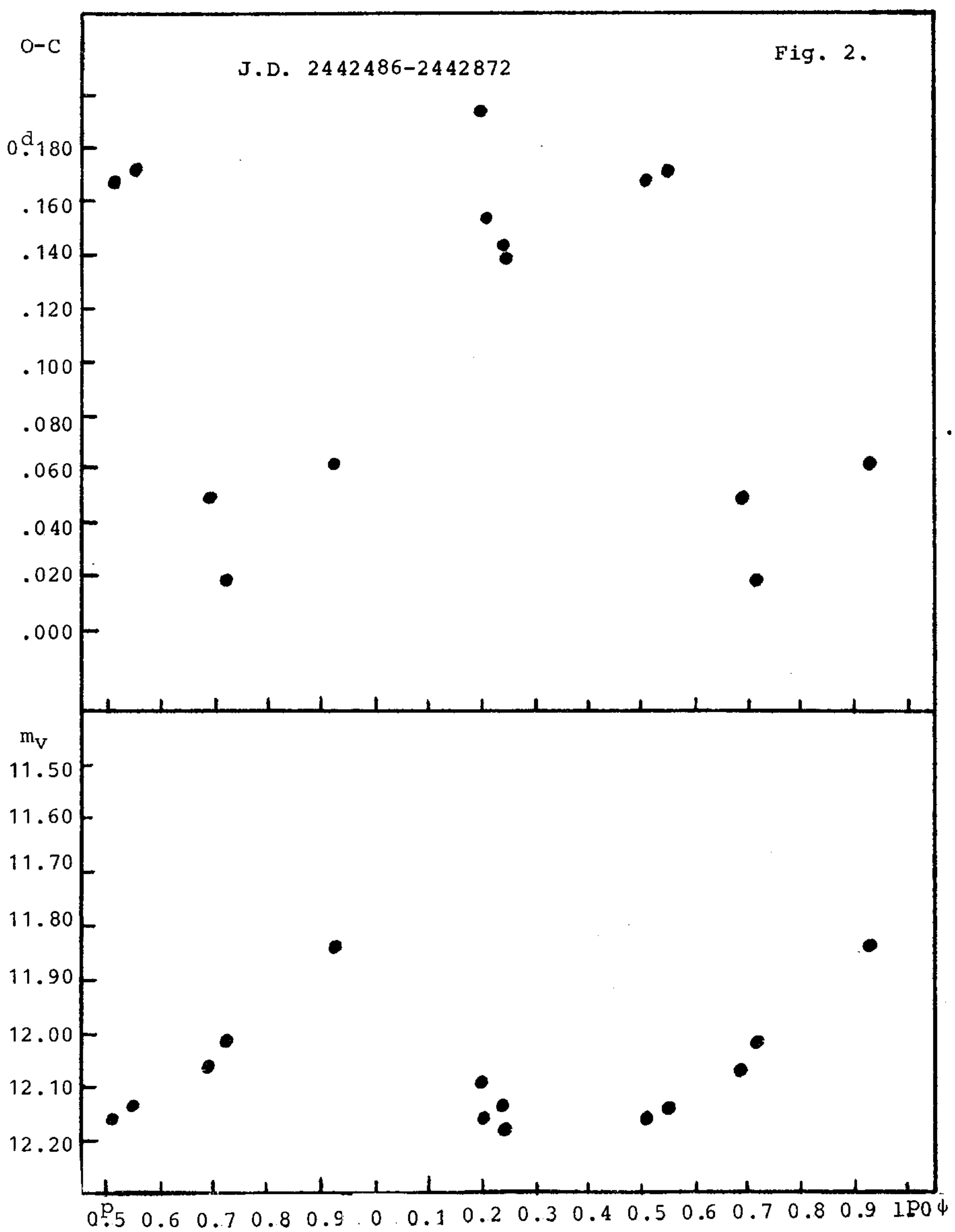


O-C
Fig. 1
J.D. 2442126-2442244
0.040
.020
.000
mv
11.50
11.60
11.70
11.80
11.90
12.00
12.10
12.20
0.5 0.6 0.7 0.8 0.9 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 ψ



O-C
J.D. 2442486-2442872
Fig. 2.
0.d180
.160
.140
.120
.100
.080
.060
.040
.020
.000
mV
11.50
11.60
11.70
11.80
11.90
12.00
12.10
12.20
0.P5 0.6 0.7 0.8 0.9 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.P0 φ

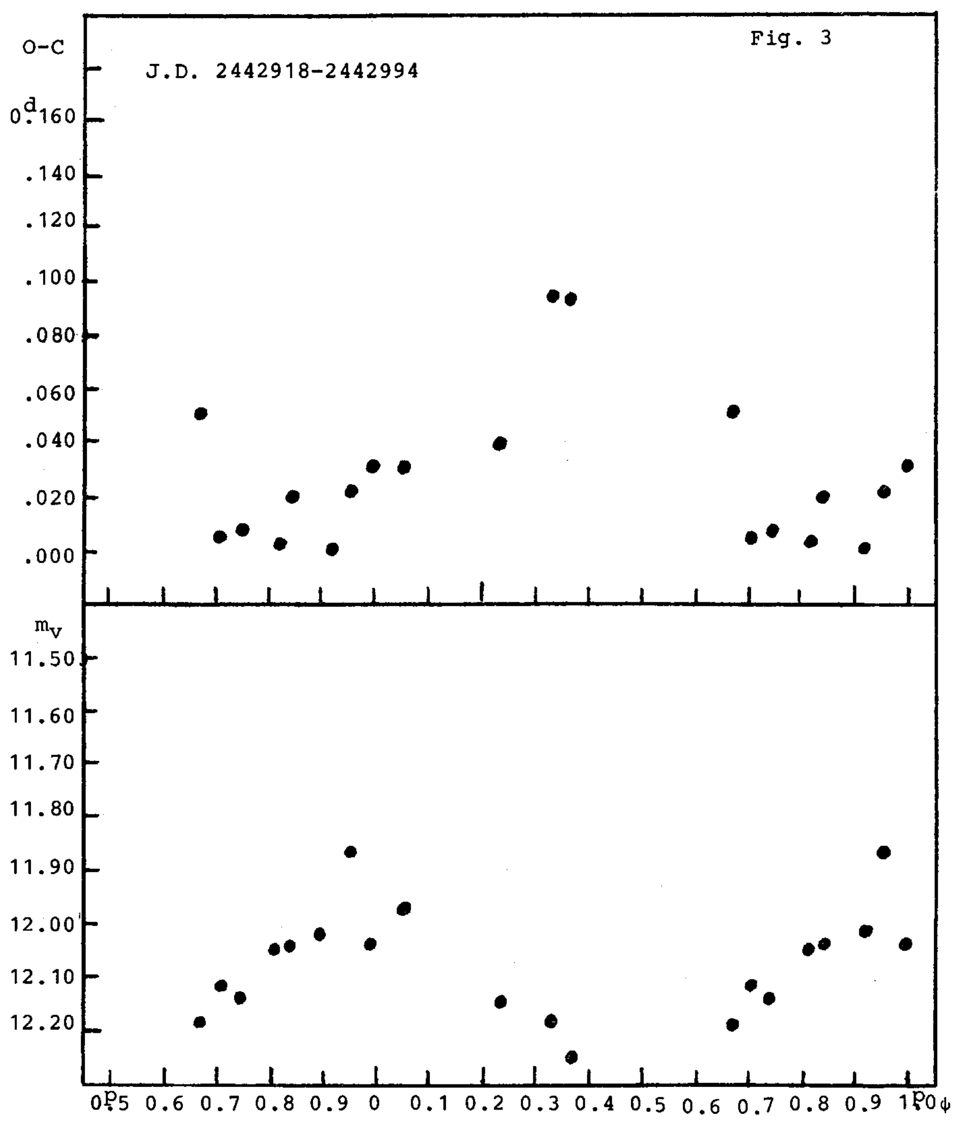


Fig. 3
J.D. 2442918-2442994
O-C
0.d160
.140
.120
.100
.080
.060
.040
.020
.000
m_V
11.50
11.60
11.70
11.80
11.90
12.00
12.10
12.20
0.p5 0.6 0.7 0.8 0.9 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.p0 φ

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
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RADIAL VELOCITIES OF Me-TYPE STARS

The kinematical studies available on Mira Ceti Me-type stars have not yet allowed to obtain a clear idea of the distribution of these objects in our own Galaxy. Furthermore,these studies are not complete enough as to permit deriving the main properties of such stars considered as subsystems: Merrill (1), Merrill and Wilson (2), Kukarkin (3) and Ikaunieks (4). All this is mainly due to the scarcity of data on these peculiar stars. Therefore, it is evidently desirable to contribute with more and better data of these stars.

The method proposed by Stock and Osborn (5) offers the possibility of obtaining approximate radial velocities of numerous stars, with an accuracy of about 20 km/sec. Furthermore, the method is advantageous because it permits to analyse all the stars in a given plate and to detect high radial velocity stars.

A total of five plates covering $5^{\circ} \times 5^{\circ}$ in the sky have been taken in Ara ($\alpha = 17^{h}35^{m}$, $\delta = -53\overset{\circ}{.}0$, 1950) using the 24-in. Curtis Schmidt telescope of the Cerro Tololo Inter-American Observatory (Chile). The telescope-prism combination used yields a dispersion of 225 Å/mm at Hγ. Kodak IIa-O plates were exposed for twenty minutes, widening the spectra to about 0.2 millimeters. The measurement of the positions of 13 Me-type stars found in the plates have been carried out using an Ascorecord Zeiss Jena machine and standard astrometric methods.

In the thirteen Me-type stars only the emission lines Hγ and Hδ are visible. For comparison purposes approximately 100 A and F-type stars were selected and measured in the field of each plate. In addition, radial velocities of the Me-type stars were obtained using the method described by Stock and Osborn (5). It should be pointed out that the method developed by these authors for obtaining radial velocities using pairs of objective prism plates, gives only radial velocities relative to the average velocity of the comparison stars. The discrepancies between these velocities and the heliocentric ones are due mainly to the solar motion toward the Apex. However, this effect is practically zero at the surveyed region. Consequently, radial velocities from slit spectrograms and the present relative velocities may be directly compared.

For each Me-type star an independent radial velocity was derived from the H_γ and H_δ lines, respectively. Finally, an average velocity was obtained for each star. Unfortunately, when determining radial velocities of Me-type stars we must take into account the intrinsic kinematical properties of such stars. In fact, radial velocities of Me stars determined from emission lines are generally different from those obtained from absorption lines, this difference being about 20 km/sec. (6).

Table 1

No	α h	m	s	δ °	′	″	Phot. max.	mag. min.	Radial v. Km/sec.	N
1	17	16	31.21	-53	49	41.2	13.2	16.5	-117	1
2	17	17	14.14	-53	40	46.0	13.0	17.5	-156	4
3	17	19	32.73	-51	37	12.1			+102	4
4	17	21	48.19	-51	56	12.6			-191	2
5	17	22	23.98	-55	14	44.5	13.8	16.5	- 37	1
6	17	24	55.39	-54	6	43.8	12.4	18.	- 22	4
7	17	26	20.52	-50	59	0.8			+ 9	4
8	17	29	58.83	-53	7	34.4			- 47	4
9	17	31	48.32	-55	25	41.1			+ 56	4
10	17	34	16.77	-52	32	1.9	13.5	16.7	- 80	4
11	17	38	8.77	-50	59	51.5	12.0	14.5	+ 21	4
12	17	44	25.59	-52	56	3.8			-108	4
13	17	36	22.74	-51	32	33.4			- 52	1

Results

The results are listed in Table 1, whose successive columns give: Star identification, right ascension and declination for the equinox 1950.0 (the accuracy in these coordinates are: $0\overset{s}{.}05$ and $0\overset{''}{.}2$, respectively), the apparent photographic magnitude for the maximum and minimum, respectively, taken from Kukarkin et al. (7), the radial velocities, and number of measurements used for determining the positions and radial velocities.

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References:

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2 Pup B : A NEW BRIGHT ECLIPSING BINARY

2 Pup B (HR 3009, HD 62863) was found by Andersen and Nordström (1977, A. & A. Suppl., in press) to be a double-lined spectroscopic binary with equal components and fairly diffuse lines.

On J.Andersen's recommendation a search for eclipses was carried out in November 1976 by the author, using the Danish 50 cm telescope at La Silla, Chile, equipped with a four-channel spectrophotometer. Filters of the Strömgren uvby system were employed.

It was found that 2 Pup B is an eclipsing binary. A preliminary period of 1.660 days has been determined from observations of several eclipses. The two minima are almost identical, the depths in y in the instrumental system, which should be very close to the standard system, are about $0^m.40$ and $0^m.41$. The duration of eclipses is about 4 hours 15 minutes. The secondary minimum is displaced at phase 0.48, thus indicating a slightly eccentric orbit.

Strömgren indices for 2 Pup B are given by Grønbech and Olsen (1976, A. & A. Suppl. 25, 213), who find V = 6.894, b-y = = 0.201, m_1 = 0.165, c_1 = 0.634. The MK type (Cowley et al.,1969, A.J. 74, 375) is A8V.

2 Pup B is the secondary component of the visual binary HR 3009-10 (Struve 1138, Aitken 6348), with an angular separation of 16".9.

Further observations of this system are planned.

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Budapest
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62^{nd} NAME – LIST OF VARIABLE STARS

The present 62^{nd} Name – list of variable stars has been compiled in accordance with the rules established in the 56^{th} list. It contains all necessary identifications for 1045 new variables designated in 1976.

The whole number of the designated variable stars is now 26883.

In the square brackets the reference number is given for the work where (not always firstly) the information on discovery of the variable had been published. This reference number accompanies designation or number of the star given for it in the cited work. Name of the discoverer is mentioned only in the cases when it does not coincide with the name of the author of the cited work.

Reference numbers 0001–5216 correspond to the numbers from literature list published in the first volume of the 3^{rd} edition of General Catalogue of Variable Stars (pages A42 – A121). The numbers 5217–5284 correspond to the supplementary list published in the First supplement to the Catalogue (pages 279–289). The numbers 5825–6828 correspond to the supplementary list published in the Second supplement to the Catalogue (pages 361–380). The numbers 6829–7733 correspond to the supplementary list published in the Third supplement to the Catalogue (pages 342–357). At last the numbers 7734–7894 correspond to the list given in the present edition.

We are grateful to *I.E.Filimonova* and *L.E.Khutoryanskaya* for preparation of the Name – list for the print.

B.V.Kukarkin, P.N.Kholopov,
V.P.Fedorovich, N.N.Kireyeva,
N.P.Kukarkina, G.I.Medvedeva,
N.B.Perova

Moscow Bureau of Variable Stars,
Astronomical Council of the
USSR Academy of Sciences,
Sternberg Astronomical Institute

Moscow, December, 1976

HO And = DO 22746 (R) = 29.1919 [6414] = Zi 2171 = КЗП 7.
HP And = 126.1925 [7734] = СПЗ 71 = = Zi 8 = КЗП 34.
HQ And = S 10774 [7434].
HR And = S 10775 [7434].
HS And = S 10776 [7434].
HT And = S 10723 [7735].
HU And = V 4 [7736]. In the M 31 region.
HV And = S 10777 [7434].
HW And = S 10778 [7434].
HX And = S 10779 [7434].
HY And = СПЗ 2133 [7737]. In M 31 region.
HZ And = S 10757 [5952] = *b* [7738, *Herbst, Pritchet*] in M31 region.
II And = S 10781 [7434].
IK And = СПЗ 2134 [7737] = S 10782 [7434].
IL And = S 10783 [7434].
IM And = c [7738, *Herbst, Pritchet*] in M31 region.
IN And = S 10784 [7434].
IO And = S 10785 [7434].
IP And = S 10786 [7434].
IQ And = S 10787 [7434].
IR And = S 10788 [7434].
IS And = S 10789 [7434].
IT And = S 10790 [7434].
IU And = S 10791 [7434].
IV And = BD + 38°160 (9.1) = DO 8598 (M7) = IRC + 40017 = S 9499 [3905].
IW And = S 10792 [7434].
IX And = DO 8612 (M4) = $00^h53^m35^s$ +37°07'.2 (1855) [7739] = S 9500 [3905] = P 2495 = = КЗП 100080.
IY And = S 10793 [7434].
IZ And = S 10794 [7434].
KK And = HR 446 = BD + 36°277 (6.2) = = HD 9531 (B9) [7740] = = SAO 054788.
KL And = DO 25467 (M0) [7741] = = КЗП 199.
KM And = СПЗ 1977 [6976].
KN And = СПЗ 1981 [6976].
KO And = S 9474 [3910].
KP And = СПЗ 740 [4249, *А.Белявская*] = P 5728 = = КЗП 5669.
KQ And = BD + 45° 4246 (8.0) = = SAO 053102 = = Wr 179 [5526].
KR And = BD + 41°4856 (8.7) = = SAO 053335 = IRC +40544 = BV 409 [4654] = = КЗП 8878.
KS And = BD + 46°4154 (8.3) = = DO 43551 (M2) = = Wr 180 [5526].
KT And = BD + 43°4549 (9.3) = = Wr 118 [4336] = = КЗП 8882.
AE Ant = CoD − 31°8038 (9.4) = = CPD − 31°2994 (10.0) = = IRC − 30160 = S 4928 [0085] = КЗП 1573.
LX Aps = S 8887 [3776].
LY Aps = CPD − 70°2005 (9.8) = = HV 2960 [5076] = = 108.1907 [0085] = BV 528 [4381] = Zi 1107 = КЗП 2301.
LZ Aps = S 8923 [3776].
MM Aps = HV 8799 = 276.1933 [4453] = = BV 1110 [5502] = P 1044 = = КЗП 2484.
MN Aps = S 5553 [4001] = КЗП 7258.
MO Aps = S 5354 [4001, 4193] = = КЗП 7280.
MP Aps = S 5595 [4001] = КЗП 7398.
MQ Aps = S 5625 [4001] = КЗП 7563.
MR Aps = CoD − 73°1260 (10.0) = = CPD − 73°1790 (9.2) = = S 5028 [0085, 4001] = = КЗП 2890.
MS Aps = S 5029 [0085, 4001] = = КЗП 2942.
MT Aps = S 5643 [4001] = КЗП 7609.
MU Aps = S 5659 [4001] = КЗП 7649.
MV Aps = S 5365 [4193] = КЗП 7721.
$æ^1$ Aps = HR 5730 [4456, 6311] = = CoD − 72°1139 (5.8) = = CPD − 72°1802 (6.0) = = HD 137387 (B5p) = SAO 257289 = BV 1213 [5557].

EU Aqr = СПЗ 614 [7742] = P 5436 = = КЗП 5239.
EV Aqr = СПЗ 615 [7742] = P 5513 = = КЗП 5342.
EW Aqr = HR 8102 [7489] = BD − 15°5908 (6.3) = HD 201707 (A5) = SAO 164204.
EX Aqr = HV 10663 [1443] = КЗП 5384.
π Aqr [7743] = 52 Aqr = HR 8539 = BD +0°4872 (4.5) = HD 212571 (B1p) = SAO 127520.
V1313 Aql = S 4377 [0085] = КЗП 4463.
V1314 Aql = HV 9595 = 800.1936 [4579] = P 4972 = КЗП 4534.
V1315 Aql = СПЗ 1299 [4261] = = КЗП 8130.
V1316 Aql = DO 5491 (M0) [7744] = СПЗ 1300 [4261] = = КЗП 8133 = КЗП 101815.
V1317 Aql = S 4389 [0085] = КЗП 4605.
V1318 Aql = 419.1934 [4405] = P 5031 = = КЗП 4665.
V1319 Aql = IRC 00446 [6005,6977].
V1320 Aql = S 4440 [0085] = КЗП 4788.
V1321 Aql = S 4443 [0085] = КЗП 4818.
V1322 Aql = S 9995 [3903].
V1323 Aql = S 10001 [3903].
V1324 Aql = СПЗ 2044 [7745].
V1325 Aql = S 4448 [0085] = КЗП 4862.
V1326 Aql = СПЗ 2045 [7745].
V1327 Aql = S 8255 [4341].
V1328 Aql = СПЗ 2046 [7745].
V1329 Aql = S 4466 [0085] = КЗП 5050.
V1330 Aql = BD + 1°4318 (9.3) = = DO 6828 (M6) = IRC 00481 = = 136.1935 [4476] = P 5426 = = КЗП 5204.
V675 Ara = S 5818 [4001] = КЗП 7400.
V676 Ara = S 5838 [4001] = КЗП 7416.
V677 Ara = S 5839 [4001] = КЗП 7418.
V678 Ara = S 5850 [4001] = КЗП 7428.
V679 Ara = S 5845 [4001] = КЗП 7429.
V680 Ara = S 5847 [4001] = КЗП 7430.
V681 Ara = S 5853 [4001] = КЗП 7434.
V682 Ara = S 5861 [4001] = КЗП 7438.
V683 Ara = S 5863 [4001] = КЗП 7441.
V684 Ara = S 5868 [4001] = КЗП 7446.
V685 Ara = S 5870 [4001] = КЗП 7447.
V686 Ara = S 5894 [4001] = КЗП 7467.
V687 Ara = S 5900 [4001] = КЗП 7470.
V688 Ara = S 5898 [4001] = КЗП 7473.
V689 Ara = S 5906 [4001] = КЗП 7477.
V690 Ara = S 5913 [4001] = КЗП 7484.
V691 Ara = S 5938 [4001] = КЗП 7499.
V692 Ara = S 5943 [4001] = КЗП 7502.
V693 Ara = S 5942 [4001] = КЗП 7505.
V694 Ara = S 5946 [4001] = КЗП 7508.
V695 Ara = S 5945 [4001] = КЗП 7509.
V696 Ara = S 5950 [4001] = КЗП 7511.
V697 Ara = S 5952 [4001] = КЗП 7512.
V698 Ara = S 5955 [4001] = КЗП 7515.
V699 Ara = S 5958 [4001] = КЗП 7517.
V700 Ara = S 5960 [4001] = КЗП 7521.
V701 Ara = S 5961 [4001] = КЗП 7522.
V702 Ara = S 5964 [4001] = КЗП 7525.
V703 Ara = S 5970 [4001] = КЗП 7526.
V704 Ara = S 5971 [4001] = КЗП 7528.
V705 Ara = S 5972 [4001] = КЗП 7531.
V706 Ara = S 5976 [4001] = КЗП 7532.
V707 Ara = S 5981 [4001] = КЗП 7537.
V708 Ara = S 5983 [4001] = КЗП 7539.
V709 Ara = S 5986 [4001] = КЗП 7540.
V710 Ara = CoD − 58°6591 (10) = CPD − 58°6952 (9.8) = HD 152788 (Mb) = S 5993 [4001] = = КЗП 7541 = SA196 No.454 [5208].
V711 Ara = S 5998 [4001] = КЗП 7542.
V712 Ara = S 6000 [4001] = КЗП 7544.
V713 Ara = CoD − 61°5697 (8.2) = CPD − 61°5820 (8.8) = SAO 253766 = HD 152982 (Ma) = = HV 2970 [5076] = 118.1907 [4001] = Zi 1280 = КЗП 2858.
V714 Ara = S 6008 [4001] = КЗП 7546.
V715 Ara = S 6011 [4001] = КЗП 7547.
V716 Ara = S 6013 [4001] = КЗП 7549.
V717 Ara = S 6016 [4001] = КЗП 7550.
V718 Ara = S 6024 [4001] = КЗП 7553.
V719 Ara = S 6030 [4001] = КЗП 7556.
V720 Ara = S 6029 [4001] = КЗП 7557.
V721 Ara = S 6032 [4001] = КЗП 7558.
V722 Ara = CoD − 56°6656 (9.8) = CPD − 56°7959 (9.0) = S 6034 [4001] = КЗП 7559.

V723 Ara = S 6042 [4001] = КЗП 7567.
V724 Ara = S 6044 [4001] = КЗП 7568.
V725 Ara = S 6045 [4001] = КЗП 7569.
V726 Ara = S 6046 [4001] = КЗП 7570.
V727 Ara = S 6050 [4001] = КЗП 7572.
V728 Ara = S 6055 [4001] = КЗП 7573.
V729 Ara = CoD −48°11445 (10) = S 5030 [0085] = BV 1391 [5937] = КЗП 2939.
V730 Ara = S 6086 [4001] = КЗП 7588.
V731 Ara = S 6093 [4001] = КЗП 7593.
V732 Ara = S 6111 [4001] = КЗП 7605.
V733 Ara = HV 6929 [4001, 5200] = P 4231 = КЗП 2998.
V734 Ara = S 6113 [4001] = КЗП 7606.
V735 Ara = S 6116 [4001] = КЗП 7608.
V736 Ara = S 6127 [4001] = КЗП 7614.
V737 Ara = S 6132 [4001] = КЗП 7617.
V738 Ara = S 6138 [4001] = КЗП 7619.
V739 Ara = HV 7673 [1021, 4001] = 232.1937 = КЗП 3040.
V740 Ara = HV 7674 [1021] = 233.1937 [4001] = КЗП 3045.
V741 Ara = S 6146 [4001] = КЗП 7625.
V742 Ara = HV 7678 [1021] = 237.1937 [4001] = КЗП 3056.
V743 Ara = S 6154 [4001] = КЗП 7628.
V744 Ara = S 6156 [4001] = КЗП 7630.
V745 Ara = S 6158 [4001] = КЗП 7631.
V746 Ara = S 6160 [4001] = КЗП 7633.
V747 Ara = HV 7686 [1021] = 245.1937 [4001] = КЗП 3093.
V748 Ara = HV 7689 [1021] = 248.1937 [4001] = КЗП 3105.
V749 Ara = HV 7693 [1021] = 252.1937 [4001] = КЗП 3111.
V750 Ara = CoD −46°11530 (7.4) = CPD −46°8655 (7.4) = HD 157832 (B2p) [5945, 6866, 7770] = SAO 227990 = КЗП 7654.
V751 Ara = HV 7723 [1021] = 282.1937 = КЗП 3191.
V752 Ara = HV 7729 [1021] = 288.1937 = КЗП 3201.
V753 Ara = HV 7747 [1021] = 306.1937 = КЗП 3262.
V754 Ara = HV 7748 [1021] = 307.1937 = КЗП 3264.
V755 Ara = HV 9087 [4488] = 526.1933 = BV 1310 [7772] = P 1265 = КЗП 3291.
V756 Ara = HV 7757 [1021] = 316.1937 = КЗП 3292.
V757 Ara = HV 7762 [1021] = 321.1937 = КЗП 3307.
V758 Ara = HV 7763 [1021] = 322.1937 = КЗП 3312.
V759 Ara = HV 7764 [1021] = 323.1937 = КЗП 3314.
V760 Ara = S 7649 [6561] = КЗП 7722.
V761 Ara = S 8728 [3776].
V762 Ara = S 7652 [6561] = КЗП 7733.
V763 Ara = S 7653 [6561] = BV 1442 [6031] = КЗП 7734.
V764 Ara = S 8740 [3776].
V765 Ara = S 8764 [3776].
UY Ari = DO 9054 (M5) = 266.1934 [0196] = P 2532 = КЗП 190.
UZ Ari = IRC +20052 [6977, 7783].
OY Aur = СПЗ 1745 [6306].
OZ Aur = HV 6868 [0607] = P 2665 = КЗП 478.
PP Aur = HV 6871 [0607] = P 2673 = КЗП 484.
PQ Aur = HV 6873 [0607] = P 2679 = КЗП 487.
PR Aur = HV 6878 [0607] = P 2686 = КЗП 494.
PS Aur = $05^h04^m36^s$ +32°10.′8 (1900) [0607] = P 2697 = КЗП 506.
PT Aur = СПЗ 1875 [7789].
PU Aur = HR 1722 [1371] = BD +42°1239 (6.0) = SAO 040214 = HD 34269 (Mb) = DO 29140 (M4) = IRC +40119 [6005] = P 175 = КЗП 524.
PV Aur = 3 [7036] = СПЗ 2136.
PW Aur = HV 6891 [0607] = P 2714 = КЗП 528.
PX Aur = S 9754 [3903].
PY Aur = S 9581 [3905].
PZ Aur = S 9584 [3905].
QQ Aur = S 5417 [7793] = КЗП 6412.
QR Aur = BD +41°1392 (7.3) = SAO 040959 = HD 42616 (A0p) [1435] = Babcock 22 = КЗП 6432.

QS Aur = S 9595 [3905].
QT Aur = S 9597 [3905].
QU Aur = HV 7646 [1941] = P 2826 = = КЗП 750.
QV Aur = 643. 1936 [0122] = SA 50, 1793 [7804] = P 2828 = = КЗП 751.
QW Aur = IRC+30156 = S 5419 [4367] = = КЗП 6465.
QX Aur = DO 31057 (M7) [7741] = IRC +50173 [6977] = КЗП 901.
QY Aur = Ross 986 [2129] = Gliese 268 [6948, 7837] = КЗП 102544.
CF Boo = 13 Boo [1371, 4513] = HR 5300 = BD+50°2047 (5.5) = SAO 044905 = HD 123782 (Ma) = DO 34571 (M5) = IRC +50237 = P 935 = КЗП 2112.
CG Boo = СПЗ 1298 [4172] = КЗП 7115.
CH Boo = HR 5452 [1371] = BD+50° 2095 (5.7) = SAO 045121 = HD 128333 (K5) = IRC+50239 = = P 961 = КЗП 2160.
BD Cam = HR 1105 [1371, 6405] = BD +62°597 (5.0) = SAO 012874 = = HD 22649 (Ma) = IRC +60125 [6005] = P 101 = = КЗП 328.
BE Cam = HR 1155 [1371, 4590, 6405] = = BD+65°369 (4.5) = SAO 012916 = HD 23475 (Ma) = IRC +70046 = P 109 = КЗП 343.
BF Cam = DO 27619 (M5) = IRC+ 60130 [6005] = 689. 1933 [0492] = P 112 = КЗП 350.
BG Cam = SA 3, No. 73 [7780] = SA 3, No. 2 [7853] = КЗП 102436.
BH Cam = IRC+60160 [6005] = BV 17 [4032, *Strohmeier*] = КЗП 6403.
BI Cam = DO 32066 (M5) = IRC+70081 [6005] = S 5408 [4057] = = КЗП 6611.
CT Cnc = BD+31°1790 (9.1) [7784, *Sticker*] = DO 13597 (M1) = = 10 03. 1935 = P 3156 = = КЗП 1272.
CU Cnc = T 12 [7800].
CV Cnc = T 13 [7800].
CW Cnc = BD+13°2045 (9.0) = HD 78420 (Mc) = DO 13805 (M6) = IRC +10203 = BV 132 [2609, *Strohmeier*] = КЗП 6684.
AT CVn = 13 [3950].
AU CVn = СПЗ 1254 [7820] = КЗП 6997.
AV CVn = BD+44°2267 (9.3) [6987] = DO 34351 (M3) = 33. 1933 [0586] = = P 892 = КЗП 2016.
AW CVn = HR 5219 [1371] = BD+35°2496 (5.7) [4513] = SAO 063793 = HD 120933 (Ma) = IRC+30251 = = КЗП 7088.
GK CMa = S 4023 [0085] = КЗП 792.
GL CMa = S 3764 [0085] = КЗП 804.
GM CMa = IRC-20101 [6005] = HV 8064 [4579] = 673. 1936 = P 2892 = = КЗП 836.
GN CMa = IRC-20102 = S 3767 [0085] = = КЗП 842.
GO CMa = S 3769 [0085] = КЗП 857.
GP CMa = 06 46.1-12 00.5 (1855.0) [4694] = КЗП 100778 [7890].
GQ CMa = S 3777 [0085] = КЗП 900.
GR CMa = S 3778 [0085] = КЗП 908.
GS CMa = IRC-20113 = S 3779 [0085] = = КЗП 912.
GT CMa = S 4027 [0085] = КЗП 933.
GU CMa = BD-11°1747 (7.2) = SAO 152255 = HD 52721 (B3) [7824] = ADS 5713 = BV 655 [4665].
GV CMa = S 3783 [0085] = КЗП 973.
GW CMa = CoD-28°3968 (9.2) = CPD -28°1766 (9.4) = SAO 173150 = IRC-30078 [6005] = = S 4872 [0085] = КЗП 983.
GX CMa = S 3784 [0085] = BV 1650 [2009] = КЗП 989.
GY CMa = HR 2734 (6.11) = CoD-27° 3789 (6.8) = CPD-27°1816 (6.6) = SAO 173244 (5.9) = HD 55857 (B3) [6135].
BD CMi = DO 2112 (M3) = 304. 1934 [5175] = P 3015 = КЗП 1021.
BE CMi = BD+2°1715 (9.3) [2943] = HD 60826 (Na) = IRC 00158 = DO 2272 (R) = 073102 [7826] = Zi 644 [0333] = КЗП 1089.

β CMi [7827, 7891] = 3 CMi = HR 2845 = = BD + 8° 1774 (3.0) = SAO 115456 = HD 58715 (B8) = GG 192 [2651] = КЗП 6586.

AI Cap = BV 1640 [7594].
AK Cap = CoD − 23°16334 (8.3) = CPD −23°7796 (8.9) = SAO 189441 = = HD 195797 (Ma) = IRC − 20591 [6005] = 245.1932 [5148] = P 2181 = КЗП 5197.
AL Cap = BV 1641 [7594].
AM Cap = BD − 10°5458 (9.3) = IRC − 10542 = SAO 144654 = BV 201 [2546] = КЗП 8550.
V 355 Car = S 4883 [0085] = КЗП 1076.
V 356 Car = CoD − 60°1961 (8.3) = = CPD − 60°976 (7.5) = = SAO 250040 = HD 65987 (B8) = 15 [7829] = 33 [7830] = КЗП 6609.
V 357 Car = a Car [7832] = HR 3659 [6352] = CoD − 58°2476 (3.5) = CPD − 58°1419 (4.2) = SAO 236693 = = HD 79351 (B3) = = КЗП 6698.
V 358 Car = S 6234 [4001] = КЗП 6709.
V 359 Car = S 6275 [4001] = КЗП 6751.
V 360 Car = S 6277 [4001] = КЗП 6755.
V 361 Car = CoD − 57°3346 (8.3) = CPD − 57°3502 (9.0) [6149, 7892] = = SAO 238228.
V 362 Car = 133.1934 [4618] = HV 8329 = = BV 1065 [5523] = P 3455 = = КЗП 1693.
V 544 Cas = СПЗ 759 [4249, 0832] = = P 2440 = КЗП 28.
V 545 Cas = GR 28 [2786] = КЗП 5849.
V 546 Cas = 16 [7834]. В скоплении NGC 103.
V 547 Cas = BD + 66°34 (9.5) [7835] = = DO 23433 (M5) = Gliese 22 A.
V 548 Cas = S 10148 [3903].
V 549 Cas = S 8453 [4341].
V 550 Cas = S 9488 [3905].
V551 Cas = BD + 59°163 (8.7) = HD 5797 (A0) [7839, 7893] = = SAO 011520.
V552 Cas = S 3873 [0085] = КЗП 114.
V553 Cas = S 9140 [3910].
V554 Cas = BD + 61°219 (9.5) [7843, 7844] = DO 24093 (M4) = = IRC + 60040 = Zi 54 = = КЗП 124.
V555 Cas = BD + 54°252 (9.3) = DO 24176 (M1) = S 3878 [0085] = КЗП 132.
V556 Cas = S 3881 [0085] = КЗП 139.
V557 Cas = 43 Cas = HR 478 = BD + 67°149 (6.1) = SAO 011919 = HD 10221 (A0p) = = Babcock 5 [4170] = = КЗП 5940.
V558 Cas = BD + 64°291 (8.2) = SAO 012137 = HD 12762 (A) [7846] = = BV 377 [4069] = КЗП 5962.
V559 Cas = BD + 60°472 (6.6) = SAO 012277 = HD 14817 (B8) [7295] = ADS 1833 AB.
V560 Cas = S 3518 [1775] = 191.1943 = = КЗП 5673.
V561 Cas = S 3521 [1775] = 194.1943 = = КЗП 5676.
V562 Cas = S 3526 [1775, 4333] = = 199.1943 = КЗП 5688.
V563 Cas = IRC + 60395 [6005, 6977].
V564 Cas = S 10114 [3903].
V565 Cas = S 10126 [3903].
V566 Cas = 6 Cas [7850] = HR 9018 = = BD + 61°2533 (5.9) = SAO 020869 = HD 223385 (A2p) = = ADS 17022 = КЗП 8884.
V567 Cas = HR 9110 = BD + 60° 2667 (6.0) = HD 225289 (B9) [7851] = SAO 010962.
o Cas = 22 Cas = HR 193 [7852] = BD + 47°183 (4.8) = SAO 036620 = HD 4180 (B2) [7855] = ADS 622 = = MWC 8.
V783 Cen = $11^h18^m58^s.7 - 60°19'38''$ (1950.0) [7856].
V784 Cen = 5 [7452].

V785 Cen = CoD − 46°7203 (8.4) = CPD − 46°5428 (8.8) = HD 100785 (Ma) [6323] = КЗП 6848.
V786 Cen = CoD − 62°541 (9.5) = CPD − 62°2135 (9.2) = HD 100879(B9) = 12 [7452].
V787 Cen = 20 [7452].
V788 Cen = HR 4624 [7894] = CoD − 43°7502 (6.0) = CPD − 43°5682 (6.9) = SAO 223241 = HD 105509 (A2). In [7860] erroneously named as HD 105507.
V789 Cen = HR 4938 = CoD − 40°7662 (7.0) = CPD − 40°6020 (7.8) = = SAO 223881 = HD 113523 (Mb) [4456] = КЗП 6987.
V790 Cen = HR 5034 [4619, 4621] = CoD − 60°4639 (6.6) = CPD − 60° 4627 (4.7) = SAO 252283 = = HD 116072 (B3) = КЗП 7024.
V791 Cen = RGO 4789 [7867].
V792 Cen = S 6534 [4001] = КЗП 7103.
V793 Cen = S 6535 [4001] = КЗП 7104.
V794 Cen = S 6537 [4001] = КЗП 7105.
V795 Cen = HR 5316 [6311, 7865] = CoD −56°5370 (5.4) = CPD−56° 6206 (5.4) = SAO 241563 = = HD 124367 (B3p).
V796 Cen = S 7617 [6561] = КЗП 7110.
V797 Cen = S 6560 [4001] = КЗП 7126.
V798 Cen = CoD − 60°5251 (8.2) = CPD − 60°5432 (8.8) = SAO 252800 = HD 127631 (Mb) = = HV 2952 [5076] = BV 519 [4381] = 100.1907 = Zi 1073 = = КЗП 2152.
V799 Cen = HV 11103 [4256] = КЗП 7155.
V800 Cen = CoD − 34°10090 (8.5) = CPD − 34°6282(10.2) = SAO 206172 = S 5002 [0085] = BV 1383 [5937] = КЗП 2227.
η Cen = HR 5440 [4619] = CoD − 41°8917 (2.5) = CPD − 41°6839 (3.9) = = SAO 225044 = HD 127972 /3 (B3p + A2p) = КЗП 7142.
OR Cep = DO 22733 (M4) = IRC + 70003 [6005] = 666.1936 [5177] = = P 5824 = КЗП 3.
OS Cep = 453.1934 [0542] = P 2455 = = КЗП 45.
OT Cep = 454.1934 [0542] = P 2461 = = КЗП 56.
OU Cep = BD + 83°70 (9.3) = SAO 000492 = HD 18472 (Mb) = = BV 13 [0174, *Strohmeier*] = = КЗП 6009.
OV Cep = 51 H Cep [1371, 7877] = HR 2609 = BD + 87°51 (5.0) = = SAO 001168 = HD 51802 (Ma) = P 386 = КЗП 927.
OW Cep = S 7902 [4065, 4290] = КЗП 8526.
OX Cep = S 7925 [4065] = КЗП 8577.
OY Cep = DO 39336 (M3) = IRC + 80043 = 211075 [1464] = = КЗП 5385.
OZ Cep = 17 [7880] = СПЗ 1416 = = КЗП 8684 [7881].
PP Cep = GR 64 [4318] = КЗП 8689.
PQ Cep = DO 40123 (N) = IRC + 70177 [6005] = 391.1933 [4120] = = P 2308 = КЗП 5471.
PR Cep = IRC + 60334 [7841] = = $21^h53^m.1 + 56°02'.5$ (1855.0) [4694] = КЗП 5494.
PS Cep = 4 [7882] near NGC 7380 cluster.
PT Cep = СПЗ 2150 [7883].
PU Cep = BD + 69°1349 (9.3) = DO 43444 (M3) = СПЗ 2151 [7883].
AX Cet = 151.1932 [0190] = P 14 = = КПЗ 44.
AY Cet = 39 Cet = HR 373 [7845, 7884] = = BD − 3°172 (5.7) = SAO 129204 = HD 7672 (G0).
CN Cha = S 6329 [4001] = КЗП 6810.
CO Cha = HV 8456 = 191.1933 [4001, 4453] = P 846 = КЗП 1899.
CP Cha = S 6416 [4001] = КЗП 6948.
CQ Cha = S 6421 [4001] = BV 1073 [5523] = КЗП 6960.
ζ Cha = HR 3860 [4614, 6352] = CoD − 80°340 (5.5) = CPD − 80° 365 (5.2) = SAO 258538 = = HD 83979 (B3) = КЗП 6735.

SZ Col = CoD – 34°2092 (8,2) = CPD
–34°595 (9,4) = HD 33452
(Mc) = HV 3050 [7790] = BV
434 [4670] = 214.1907 [0085] =
= Zi 356 = КЗП 507.
TT Col = IRC –30050 = S 4851 [0085] =
= КЗП 689.
TU Col = S 4852 [0085] = КЗП 691.
GV Com = 1 [3950].
GW Com = 10 [3950].
GX Com = Var 22 [7445, *Hoffleit*].
V672 CrA = HV 11739 [0248] = КЗП 3605.
V673 CrA = HV 7231 [0251] = P 4550 =
= КЗП 3777.
V674 CrA = HV 11855 [0248] = КЗП 3845.
V675 CrA = HV 11866 [0248] = 92
[3513] = КЗП 3879.
V676 CrA = S 8822 [3776].
V677 CrA = HV 7324 [0251] = P 4592 =
= КЗП 3891.
V678 CrA = S 7368 [4001] = КЗП 7835.
V679 CrA = S 7390 [4001] = КЗП 7868.
V680 CrA = S 7398 [4001] = КЗП 7882.
V681 CrA = CoD –43°12674 (8,1) = CPD
–43°8691 (7,6) = HD171577
(A0) = BV 884 [5579].
V682 CrA = S 7405 [4001] = КЗП 7889.
V683 CrA = S 7423 [4001] = КЗП 7922.
V684 CrA = S 7426 [4001] = КЗП 7927.
V685 CrA = HV 9536 = BV 1450 [6031] =
= 942.1935 [2771, 4001] =
= P 4887 = КЗП 4380.
V686 CrA = HR 7129 [7885] = CoD – 37°
12982 (5,0) = CPD –37°
8417 (5,4) = SAO 210734 =
= HD 175362 (B5) [5890,
7794].
V687 CrA = S 7449 [4001] = КЗП 8066.
TX CrB = BD +32°2625 (9,5) = DO
15322 (M3) = BV102 [0819,
Geyer] = КЗП 7230.
SW Crt = СПЗ 2147 [7886].
BK Cru = 1 [7818].
BL Cru = HR 4739 [5840] = CoD –58°
4560 (6,7) = CPD –58°4289
(8,3) = SAO 239960 = HD
108396 (Mb) [5890] = BV
1210 [5557].
BM Cru = 2 [7818].
V1503 Cyg = КЗП 8152 = W [7746].
V1504 Cyg = СПЗ 710 [4249] = P 5043 =
= КЗП 4693.
V1505 Cyg = СПЗ 1532 [7519].
V1506 Cyg = СПЗ 1975 [7520, *Курочкин*].
V1507 Cyg = BD +29°3754 (7,7) = SAO
087754 = HD 187399 (A0)
[7747, *Hill, Hilditch*] =
= MWC 321.
V1508 Cyg = СПЗ 965 [1201, *Фаддеева*] =
= КЗП 4838.
V1509 Cyg = 19 Cyg [1371] = HR 7566 =
= BD +38°3780 (5,5) =
= SAO 068947 = HD 187849
(Ma) = IRC +40364 = ADS
13014 = P 1924 = КЗП 4848.
V1510 Cyg = 2 [7748, *Buratti*].
V1511 Cyg = IRC +40371 [6005, 7841] =
= КЗП 8380 = 18 [1222].
V1512 Cyg = VV248 [7749] = КЗП 8388 =
= 25 [1222].
V1513 Cyg = Wolf 1130 [2799] = Gliese
781 [6936] = КЗП 8421.
V1514 Cyg = S 3819 [0085] = КЗП 5046.
V1515 Cyg = $20^h20^m.3$, +41°53′(1900,0)
[7750, *Herbig*].
V1516 Cyg = S 7899 [4065] = КЗП 8521.
V1517 Cyg = S 10053 [3903].
V1518 Cyg = S 7906 [4065] = КЗП 8534.
V1519 Cyg = СПЗ 2163 = BC 17
[7751].
V1520 Cyg = S 7908 [4065] = КЗП 8538.
V1521 Cyg = Cyg X–3 [7752].
V1522 Cyg = B 16 [7498].
V1523 Cyg = СПЗ 2164 = BC 20 [7751].
V1524 Cyg = S 9080 [3776].
V1525 Cyg = СПЗ 2171 = 2929 [7751].
V1526 Cyg = B6 [7753].
V1527 Cyg = DO 38868 (R) = СПЗ
2172 = 2934 [7751].
V1528 Cyg = B7 [7753].
V1529 Cyg = B11 [7753].
V1530 Cyg = B1 [7753].
V1531 Cyg = LkHα 142 = S 7812
[4771] = КЗП 8585 =
= 3 [7115].

V1532 Cyg = LkHα 143 = S 7812 [4771] = = КЗП 8587 = 3 [7115].
V1533 Cyg = S 9468 [3910].
V1534 Cyg = B4 [7753].
V1535 Cyg = LkHα 179 = S 7815 [4771] = = КЗП 8598 = 29 [7115].
V1536 Cyg = B3 [7753].
V1537 Cyg = B5 [7753].
V1538 Cyg = B8 [7753].
V1539 Cyg = LkHα 185 = S 7816 [4771] = = КЗП 8606 = 30 [7115[= = B12 [7498].
V1540 Cyg = СПЗ 2009 [7754].
V5141 Cyg = СПЗ 2173 = 2952 [7751].
V1542 Cyg = S 10078 [3903] = СПЗ 2154 [7757].
V1543 Cyg = S 9469 [3910].
V1544 Cyg = B15 [7498].
V1545 Cyg = B2 [7753].
V1546 Cyg = LkHα 195 [4771] = UHα 123 [6859] = КЗП 8610.
V1547 Cyg = СПЗ 2174 = 2960 [7751].
V1548 Cyg = СПЗ 2175 = 2974 [7751].
V1549 Cyg = IRC + 50357 [6005,7841].
V1550 Cyg = B13 [7498].
V1551 Cyg = S 8376 [4341]).
V1552 Cyg = S 8378 [4341].
V1553 Cyg = 116.1937 [7760] = P 5552 = = КЗП 5375.
V1554 Cyg = СПЗ 2165 = BC 23 [7751].
V1555 Cyg = КЗП 8637 = 43 [7761] = = WS 643.
V1556 Cyg = S 9123 [3776].
V1557 Cyg = СПЗ 2166 = BC 24 [7751].
V1558 Cyg = СПЗ 2167=BC 25 [7751].
V1559 Cyg = СПЗ 2168 = BC 26 [7751].
V1560 Cyg = СПЗ 2176 = 3027 [7751].
V1561 Cyg = СПЗ 2177 = 3028 [7751].
V1562 Cyg = S 8389 [4341].
V1563 Cyg = СПЗ 2178 = 3029 [7751].
V1564 Cyg = СПЗ 2179 = 3031 [7751].
V1565 Cyg = S 8392 [4341].
V1566 Cyg = СПЗ 2169 = BC 28 [7751].
V1567 Cyg = S 8399 [4341].
V1568 Cyg = СПЗ 2180 = 3052 [7751].
V1569 Cyg = S 8404 [4341].
V1570 Cyg = S 9726 [7764].
V1571 Cyg = СПЗ 2170 = BC 31 [7751].
V1572 Cyg = СПЗ 2182 = 3057 [7751].
V1573 Cyg = S 8408 [4341].
V1574 Cyg = S 8409 [4341].
V1575 Cyg = S 8413 [4341].
V1576 Cyg = S 8415 [4341].
V1577 Cyg = LkHα 235 = Var 1 in IC 5146 [7766] = КЗП 8699.
V1578 Cyg = BD + 46°3471 (9.5) = 6 in IC 5146 [7766] = = КЗП 8703 = AS 477.
KR Del = S 8285 [4341].
KS Del = S 8286 [4341].
KT Del = DO 18976 (M5) = S 8288 [4341].
KU Del = S 8289 [4341].
KV Del = S 8290 [4341].
KW Del = S 10062 [3903].
KX Del = S 8295 [4341].
KY Del = DO 19305 (M5) = S 10068 [3903].
KZ Del = DO 19327 (M2) = S 10069 [3903].
LL Del = S 10070 [3903].
LM Del = S 8306 [4341].
LN Del = S 9693 [3905].
LO Del = СПЗ 658 [0294, *А.Белявская*] = = P 5487 = КЗП 5304.
XY Dor = HR 1250 [4456,5150] = CoD − 51°975 (7.2) = CPD − 51° 480 (7.6) = SAO 233354 = HD 25470 (Ma) = КЗП 6069.
XZ Dor = CoD − 56°1013 (7.2) = CPD − 56°734 (7.8) = SAO 233694 = = HD 31009 (Ma) [4456, 6374] = КЗП 6137.
YY Dor = S 4856 [0085] = КЗП 708.
YZ Dor = S 4863 [0085] = КЗП 735.
CS Dra = IRC + 80023 [6005] = BV 190 [2546] = КЗП 6827 = Gr ph + 75°4454.
CT Dra = BD + 76°431 (9.5) = SAO 007413 = BV 218 [2618,4024] = = КЗП 6854.
CU Dra = i Dra [7771] = 10 Dra [1371] = = HR 5226 = BD + 65°963 (4.8) = SAO 016199 = HD 121130 (Ma) = DO 34487 (M5) = = IRC + 60226 = ADS 9039 A = = Zi 1032 = КЗП 2077.

CV Dra = BD +57°1776 (8.8) = HD 159559 (F5) = BV 341 [4014, *Strohmeier*] = КЗП 7685.

CW Dra = BD +80°562 (9.5) = DO 36032 (M7) = IRC +80034 = = BV 55 [0174, *Strohmeier*] = = КЗП 7795.

CX Dra = HR (BS) 7084 [7773] = BD +52°2280 (6.3) = SAO 031165 = HD 174237 (B5) [7774].

CY Dra = S 3810 [0085] = КЗП 4826.

φ Dra = 43 Dra = HR 6920 = BD +71° 889 (4.7) = SAO 009084 = HD 170000 (A0p) [7775] = ADS 11311 = Zi 1408 [*Gemmill*] = = КЗП 101729.

DR Eri = BD −13°564 (8.3) = SAO 148695 = HD 18583 (Ma) = = 14.1931 [0975] = P 85 = = КЗП 264 [2592, *Strohmeier*].

DS Eri = CoD −42°1258 (9.9) = CPD −42°365 (10.0) = S 4822 [0085] = КЗП 357.

DT Eri = S 4837 [0085] = BV 922 [7776] = КЗП 410.

DU Eri = HR 1423 [6311] = BD −13° 893 (5.8) = SAO 149674 = HD 28497 (B3p).

DV Eri = 47 Eri [1371] = HR 1451 = BD −8°887 (4.6) = SAO 131315 = = HD 29064 (Ma) = IRC −10070 = P 136 = КЗП 421.

DW Eri = 55Eri [7777] = HR 1505 [7489] = BD −9°969 (7.0) = HD 30020 (F5) = ADS 3409 B = SAO 131442 = КЗП 6130.

DX Eri = 56 Eri = HR 1508 [6354, 5150, 6311, 7098] = BD −8°929 (5.8) = = SAO 131451 = HD 30076 (B5) = = КЗП 6131.

γ Eri = 34 Eri = HR 1231 [4614, 6876] = BD −13°781 (3) = SAO 149283 = HD 25025 (K5) = IRC −10055 = ADS 2904 A = КЗП 6066.

TX For = S 4810 [0085] = КЗП 255.

NU Gem = DO 11835 (R) = 1.1905 [7781] = = Zi 502 = КЗП 706.

NV Gem = S 7935 [4065] = КЗП 6449.

NW Gem = BD +23°1377 (9.5) = HD 258252 (M0) = S 7941 [4065] = КЗП 6457.

NX Gem = IRC +20149 = S 7942 [4065] = = КЗП 6460.

NY Gem = HD 47396 (Pec) [7786] = DO 12404 (N) = S 5438 [4101] = = КЗП 798 = КЗП 6468.

NZ Gem = HR 2967 [1371] = BD +14° 1729 (6.0) = SAO 097157 = = HD 61913 (Mb) = DO 13345 (M5) = IRC +10173 = = P 495 = КЗП 1107.

AT Gru = S 7698 [6561] = КЗП 8676.

AU Gru = S 7480 [4001] = КЗП 8744.

AV Gru = S 6480 [4001] = КЗП 8751.

AW Gru = CoD −48°14181 (8.5) = CPD −48°10736 (9.0) = SAO 231077 = HD 211587 (Ma) = = S 6482 [4001] = КЗП 8754.

AX Gru = CoD −55°9176 (7.2) = CPD −55°9907 (7.8) = SAO 247605 = HD 215985 (Ma) [6374] = = BV 1403 [5937] = КЗП 8795.

AY Gru = CoD −50°13866 (9.8) = CPD −50°11775 (10.4) = S 5155 [0085] = КЗП 5642 = $22^h56^m28^s$ −50°37′.5 (1875) [7796, *Turner*].

δ² Gru = HR 8560 [5840] = CoD −44° 14935 (4.4) = CPD −44°10228 (5.6) = SAO 231161 = HD 213080 (Mb) [5945, 6350] = КЗП 8764.

V649 Her = IRC +50249 [6005, 6977].

V650 Her = S 9251 [3910].

V651 Her = S 9618 [3905].

V652 Her = BD +13°3224 (9.5) [7799].

V653 Her = DO 15694 (M2) = 486.1934 [0542] = P 4175 = КЗП 2870 [2609, *Geyer*].

V654 Her = A new flare star near HZ Her [7801].

V655 Her = BD +16°3128 (8.5) [4203] = = SAO 102666 = HD 155924 (A2) = ADS 10407 A.

V656 Her = HR 6452 [1371] = BD+18° 3351 (5.5) = SAO 102757 = HD 157049 (Ma) = IRC +20320 = P 1241 = КЗП 3123.
V657 Her = BD+15°3192 (9.4) = DO 15995 (M7) = IRC+20324 = BV 141 [2609, *Geyer*] = КЗП 7661.
V658 Her = S 8617 [3776].
V659 Her = S 8619 [3776].
V660 Her = СПЗ 2120 [7802].
V661 Her = S 8590 [3776].
V662 Her = СПЗ 2121 [7803].
V663 Her = S 8591 [3776].
V664 Her = S 8600 [3776].
V665 Her = S 10351 [5515].
V666 Her = S 8602 [3776].
V667 Her = S 9306 [3910].
V668 Her = S 9884 [3903].
V 669 Her = 104 Her [1371] = HR 6815 = BD+31°3199 (5.0) = SAO 066737 = HD 167006 (Ma) = DO 16554 (M4) = IRC +30328 = P 1536 = КЗП 3895.
V670 Her = S 8607 [3776].
V671 Her = S 8611 [3776].
V672 Her = S 4352 [0085] = КЗП 4353.
ω Her = 24 Her = HR 6117 = BD+14° 3049 (5.2) = SAO 102153 = HD 148112 (A0p) [7805] = ADS 10054.
TY Hor = S 4804 [0085] = BV 1407 [6031] = КЗП 213.
TZ Hor = HR 722 [4614, 6352] = CoD −67°119 (6.8) = CPD −67° 154 (8.0) = SAO 248556 = HD 15379 (Mb) = КЗП 5989.
UU Hor = CoD−50°993 (10) = BV 992 [5562].
UV Hor = 2 [7806, *Hughes*].
UW Hor = 13 [7806, *Hughes*].
UX Hor = 11 [7806, *Hughes*].
UY Hor = 5 [7806, *Hughes*].
UZ Hor = 10 [7806, *Hughes*].
VV Hor = 9 [7806, *Hughes*].
VW Hor = 6 [7806, *Hughes*].
VX Hor = CoD−44°1444 (9.4) = CPD −44°440 (8.8) = SAO 216684 = HD 26731 (F5) [5945] = КЗП 6094.
IT Hya = BD+0°2271 (8.5) [7810] = SAO 116639 = HD 70052 (K2).
IU Hya = S 9608 [3905].
IV Hya = 207.1932 [0190] = P 613 = КЗП 1440.
IW Hya = IRC−20197 [6262].
IX Hya = CoD−24°8567 (8.9) = CPD −24°4227 (9.4) = SAO 178177 = HD 85993 (Ma) = IRC −30158 [6005] = 80.1931 [0975] = P 647 = КЗП 1531.
IY Hya = IRC−10236 [6005, 6977].
IZ Hya = BD−20°3183 (9.3) = IRC −20212 = 645.1935 [1111] = P 3414 = КЗП 1615.
KK Hya = СПЗ 2161 [7812, *Горанский*].
KL Hya = СПЗ 2153 [7813, *Горанский*].
KM Hya = СПЗ 2160 [7814].
KN Hya = CoD−25°9594 (9.0) = SAO 181378 = HD 113652 (Mb) = IRC−30200 [6005] = 229.1932 [0190] = P 875 = КЗП 1982.
KO Hya = S 6533 [4001] = КЗП 7102.
KP Hya = S 6538 [4001] = КЗП 7107.
KQ Hya = S 6545 [4001] = КЗП 7113.
KR Hya = S 6547 [4001] = КЗП 7114.
KS Hya = S 6580 [4001] = BV 1622 [7594] = КЗП 7139.
BD Hyi = HV 6324 [0193] = BV 1017 [7815] = P 2443 = КЗП 27.
BE Hyi = HV 11906 [0357, 4001] = BV 1023 [7815] = КЗП 257.
BF Hyi = S 4831 [0085] = КЗП 388.
AW Ind = S 6923 [4001] = КЗП 8582.
AX Ind = S 6924 [4001] = КЗП 8596.
AY Ind = CoD −72°1700 (9.8) = CPD −72°2640 (9.6) [7816].
AZ Ind = S 7705 [6561] = BV 1343 [7772] = КЗП 8768.
V351 Lac = S 8427 [4341].
V352 Lac = S 8428 [4341].
V353 Lac СПЗ 1138 [1317, *Федорович*] = КЗП 8762.
V354 Lac = BD+54°2787 (9.4) = SAO 034504 = BV 319 [4015] = КЗП 8767.

V355 Lac = S 5427 [4333] = КЗП 8804.
V356 Lac = S 10103 [3903].
SW Lep = CoD −24°2966 (8.9) = CPD−24° 885 (9.4) = SAO 170271 = = 170.1932 [5148,5028] = P 180 = КЗП 531.
SX Lep = S 4855 [0085] = КЗП 705.
SY Lep = Ross 354 [1873] = BV 1616 [7446] = P 358 = КЗП 717.
μ Lep = 5 Lep = HR 1702 = BD−16° 1072 (3) = SAO 150237 = HD 33904 (A0p) [4170] = КЗП 6156.
GH Lib = BV 1623 [7594].
GI Lib = BV 1625 [7594].
GK Lib = 701.1936 [4579] = HV 8693 = = BV 1627 [7594] = P 3893 = = КЗП 2300.
GL Lib = IRC−20284 = HV 11595 [1869] = КЗП 2318.
GM Lib = S 7495 [4001] = КЗП 7187.
GN Lib = 334.1931 [0747] = СПЗ 249 = = P 1017 = КЗП 2373.
GO Lib = S 7504 [4001] = КЗП 7208.
GP Lib = IRC−10326 = HV 10756 [1870] = КЗП 2494.
GQ Lib = HV 10767 [1870] = КЗП 2509.
GR Lib = IRC−20302 = HV 10769 [1870] = КЗП 2516.
GS Lup = CoD−53°5755 ($10\frac{3}{4}$) = S 5000 [0085] = BV 1382 [5937] = = КЗП 2216.
GT Lup = BV 1628 [7594].
GU Lup = S 7498 [4001] = КЗП 7191.
GV Lup = S 7503 [4001] = КЗП 7206.
GW Lup = LHα 450−6 [7817, *Hoffleit*].
GX Lup = S 7518 [4001] = КЗП 7231.
GY Lup = 279.1933 [4453] = HV 8818 = = BV 1608 [7762] = P 1055 = = КЗП 2528.
UY Lyn = HR 2703 [1371] = BD+51° 1295 (6.0) = SAO 026223 = = HD 54895 (Ma) = IRC + +50175 = P 433 = КЗП 982.
V459 Lyr = СПЗ 866 [0319, *Фаддеева*] = = КЗП 4390.
V460 Lyr = 90.1905 [0524] = Zi 1605 = = КЗП 4524.
V461 Lyr = 1 [7748, *Dexter*].
WW Men = CoD−80°135 (10.0) = CPD−80° 108 (9.7) = HV 11095 [4256] = = BV 629 [5843] = КЗП 6097.
WX Men = HR 1964 [4614, 5840, 6352] = = CoD−73°248 (6.1) = CPD−73° 316 (8.0) = SAO 256208 = HD 37993 (Mb) [6323] = КЗП 6392.
V627 Mon = IRC−10123 [6005] = 34 [7807] = КЗП 756.
V628 Mon = Penn 264 [6868].
V629 Mon = Penn 299 [6868] = LHα 21 [6361].
V630 Mon = Penn 503 [6868] = LHα 74 [2824].
V631 Mon = S 3997 [0085] = КЗП 940.
V632 Mon = IRC−10162 [6005, 6947, 6977].
V633 Mon = IRC 00162 [6005, 6977].
EY Mus = 3 [7818] in the Coalsack region.
PR Nor = 244.1934 [4618] = HV 8783 = BV 1430 [6031] = P 3962 = КЗП 2446.
PS Nor = 755.1935 [2771] = HV 8822 = = №5−27 in LF 15 [7819] = = P 3987 = КЗП 2533.
PT Nor = 769.1935 [2771] = HV 8852 = = № 4−31 in LF 15 [7819] = = P 4014 = КЗП 2598.
PU Nor = S 5710 [4001] = КЗП 7302.
PV Nor = 774.1935 [2771, 4001] = HV 8866 = P 4024 = КЗП 2631.
PW Nor = 775.1935 [2771, 4001] = HV 8868 = P 4026 = КЗП 2632.
PX Nor = CoD−44°10791 (9.8) = CPD− −44°7842 (9.8) = HD 328040 (F0) = S 5023 [0085] = BV 865 [5566] = КЗП 2637.
PY Nor = S 5730 [4001] = КЗП 7322.
PZ Nor = S 5733 [4001] = КЗП 7328.
QQ Nor = 785.1935 [2771, 4001] = HV 8897 = P 4061 = КЗП 2711.
BQ Oct = CoD−89°10 (6.8) = CPD−89° 37 (8.3) = SAO 258660 = HD 110994 (Ma) [7763] = BV 635 [5843] = КЗП 6957.
BR Oct = CoD−77°919 (9.2) = CPD−77° 1292 (9.1) = SAO 257579 = = HD 166329 (Ma) = HV 3298 [1944] = 126.1910 = BV 1475 [6618] = Zi 1372 = КЗП 3824.

BS Oct = S 7000 [4001] = КЗП 8227.
BT Oct = 26.1932 [2830, 4001] = HV 9669 = P 2010 = КЗП 4974.
BU Oct = S 7097 [4001] = КЗП 8578.
BV Oct = S 7099 [4001] = КЗП 8599.
BW Oct = CoD−85°180 (8.9) = CPD−85° 535 (9.1) = *220585* [7821] = SAO 258927 = HD 210548 (Mb) = HV 188 = 65.1901 = Zi 2069 = КЗП 5521.
BX Oct = S 6629 [4001] = КЗП 8891.
BY Oct = S 6632 [4001] = КЗП 8903.
V2058 Oph = СПЗ 1795 [6889].
V2059 Oph = СПЗ 1771 [7791] = HRC 265 [7822].
V2060 Oph = HV 10600 [5202] = 50 [3625] = КЗП 2709.
V2061 Oph = СПЗ 1347 [4403, *Курочкин*].
V2062 Oph = СПЗ 2114 [7823].
V2063 Oph = 888.1936 [4579] = HV 8914 = P 4089 = КЗП 2748.
V2064 Oph = 729.1936 [4579] = HV 8936 = P 4107 = КЗП 2782.
V2065 Oph = BD−3°3981 (9.5) = IRC 00290 = 651.1936 [5177] = = P 4121 = КЗП 2794.
V2066 Oph = IRC+10313 [6977, 7783] = = S 9621 [3905].
V2067 Oph = 754.1933 [5155] = P 1143 = = КЗП 2880.
V2068 Oph = IRC−20346 = СПЗ 420 [4931] = P 4209 = КЗП 2953.
V2069 Oph = IRC 00297 [6005, 6977].
V2070 Oph = 765.1933 [5155] = P 1220 = = КЗП 3051.
V2071 Oph = 677 [5570].
V2072 Oph = 767.1933 [5155] = P 1227 = = КЗП 3070.
V2073 Oph = S 8614 [3776].
V2074 Oph = S 9805 [3903].
V2075 Oph = IRC−20374 = 745.1936 [4579] = HV 9089 = P 4377 = КЗП 3315.
V2076 Oph = BD−17°4890 (9.5) = HD 160641 (B) [7799, 7825].
V2077 Oph = S 9839 [3903].
V2078 Oph = IRC+10338 = 343.1930 [4039] = P 1323 = КЗП 3547.
V2079 Oph = S 9266 [3910].
V2080 Oph = 344.1930 [4039] = P 1352 = = КЗП 3597.
V2081 Oph = DO 4507 (M3) = 345.1930 [4039] = P 1366 = КЗП 3614.
V2082 Oph = S 9848 [3903].
V2083 Oph = S 9274 [3910].
V2084 Oph = S 9856 [3903].
V2085 Oph = S 9293 [3910].
V2086 Oph = S 9296 [3910].
V2087 Oph = S 9297 [3910].
V2088 Oph = 355.1930 [4039] = P 1579 = = КЗП 4005.
V2089 Oph = СПЗ 1208 [6887] = = КЗП 7824.
V2090 Oph = IRC 00349 [6005] = Ross 44 [4436] = P 1604 = КЗП 4075.
V2091 Oph = S 4323 [0085] = КЗП 4197.
V2092 Oph = S 9907 [3903].
V2093 Oph = S 9908 [3903].
V2094 Oph = S 4333 [0085] = КЗП 4265.
V1008 Ori = 429.1934 [4405, 4481] = P 2661 = КЗП 468.
V1009 Ori = 430.1934 [1217, 1375] = P 2685 = КЗП 491.
V1010 Ori = 222.1943 [1375] = S 3547 = = КЗП 496.
V1011 Ori = 223.1943 [1375] = S 3548 = = КЗП 509.
V1012 Ori = 434.1934 [1217, 1375] = = P 2702 = КЗП 511.
V1013 Ori = S 3913 [0085] = КЗП 529.
V1014 Ori = 226.1943 [1375] = S 3551 = = КЗП 556.
V1015 Ori = S 9559 [3905].
V1016 Ori = ϑ^1Ori A [7828] = 41 Ori A = = HR 1893 = BD−5°1315 A = = HD 37020 (Oe5) = ADS 4186 A = П 1865 = Zi 429 (A) = = КЗП 100581 (A).
V1017 Ori = E 26 [4073] = КЗП 6271.
V1018 Ori = 69 [2849] = П 2215 [7831] = = КЗП 6300.
V1019 Ori = 31 [5603].
V1020 Ori = 185 [2849] = П 2487 = = КЗП 6340.
V1021 Ori = S 9566 [3905].

V1022 Ori = S 3724 [0085,4953] = КЗП 672.
V1023 Ori = S 9572 [3905].
V1024 Ori = DO 1404 (M4) = 287.1934 [4143] = P 2803 = КЗП 712.
V1025 Ori = S 7926 [4065] = КЗП 6423.
V1026 Ori = 269.1928 [1791] = P 364 = = КЗП 728.
ε Ori = 46 Ori = HR 1903 [4590, 4614,5423,7836,7838] = = BD−1°969 (2.0) = SAO 132346 = HD 37128 (B0) = = IRC 00079 = КЗП 6305.
OP Pav = HV 7769 [1021, *Boyd*] = 328.1937 = КЗП 3338.
OQ Pav = HV 7786 [1021, *Boyd*] = 345.1937 = КЗП 3399.
OR Pav = HV 7790 [1021, *Boyd*] = = 349.1937 = КЗП 3419.
OS Pav = HV 7801 [1021, *Boyd*] = = 360.1937 = КЗП 3444.
OT Pav = HV 7807 [1021, *Boyd*] = = 366.1937 = КЗП 3465.
OU Pav = HV 7809 [1021, *Boyd*] = = 368.1937 = КЗП 3467.
OV Pav = HV 7810 [1021, *Boyd*] = = 369.1937 = КЗП 3468.
OW Pav = CoD−63°1310 (8.5) = CPD−63° 4194 (8.6) = SAO 254090 = = HD 162933 (Ma) = HV 3295 [1944] = 123.1910 = BV 782 [5599] = Zi 1352 = КЗП 3543.
OX Pav = HV 7838 [1021, *Boyd*] = = 397.1937 = КЗП 3546.
OY Pav = HV 7843 [1021, *Boyd*] = = 402.1937 = КЗП 3576.
OZ Pav = HV 7856 [1021, *Boyd*] = = 415.1937 = КЗП 3662.
PP Pav = HV 9866 [0629, *Boyd*; 4001] = = КЗП 3990.
PQ Pav = 544.1935 [2935] = HV 9409 = P 4634 = КЗП 4044.
PR Pav = 320.1933 [4001,4453] = HV 9438 = BV 1291 [5834] = P 1609 = = КЗП 4090.
PS Pav = HV 9978 [0629, *Boyce*] = = КЗП 4183.
PT Pav = S 5049 [0085] = КЗП 4251.
PU Pav = 325.1933 [7219,4001] = HV 9502 = P 1649 = КЗП 4285.
PV Pav = S 5370 [2554] = BV 1129 [5502] = КЗП 7915.
PW Pav = 125.1932 [2591,4001] = HV 9544 = P 1677 = КЗП 4403.
PX Pav = S 6964 [4001] = КЗП 8140.
PY Pav = CoD−58°7413 (10) = S 5066 [0085] = КЗП 4617.
PZ Pav = S 6963 [4001] = КЗП 8144.
QQ Pav = S 6966 [4001] = КЗП 8145.
QR Pav = S 7681 [6561] = КЗП 8189.
QS Pav = S 6990 [4001] = КЗП 8205.
QT Pav = S 6992 [4001] = КЗП 8210.
QU Pav = S 6998 [4001] = КЗП 8216.
QV Pav = S 7008 [4001] = КЗП 8252.
QW Pav = S 7011 [4001] = КЗП 8269.
QX Pav = S 7014 [4001] = КЗП 8286.
QY Pav = S 6829 [4001] = КЗП 8308.
QZ Pav = S 7028 [4001] = КЗП 8333.
V335 Pav = S 7082 [4001] = КЗП 8548.
V336 Pav = S 7098 [4001] = КЗП 8558.
V337 Pav = S 7693 [6561] = BV 1326 [7772] = КЗП 8566.
V338 Pav = S 7694 [6561] = BV 1329 [7772] = КЗП 8615.
HK Peg = СПЗ 661 [4386] = P 5533 = = КЗП 5364.
HL Peg = IRC+20508 [6005] = $21^h16^m.9$ +22°38′ (1855) [4303] = = КЗП 8654.
HM Peg = 147.1935 [0470] = P 5607 = = КЗП 5446.
HN Peg = HR 8314 = BD+14°4668 (6.5) = = SAO 107364 = HD 206860 (G0) [7854].
HO Peg = HR 8350 = BD+20°5027 (6.3) = = SAO 090059 = HD 207932 (Mb) = IRC+20521 = BV 404 [4654] = КЗП 8696.
HP Peg = BD+20°5071 (8.7) = HD 209621 (R3) [7808] = DO 21131 (R) = = КЗП 5508 [2406].
HQ Peg = BD+28°4334 (8.8) = SAO 090363 = DO 21321 (M5) = 92.1931 [0975] = P 2325 [7857] = КЗП 5532.
HR Peg = HR 8714 [5841,6059] = BD+16° 4833 (7.0) = SAO 108246 = HD 216672 (Mb) = DO 21868 (M5) = IRC+20539.
HS Peg = DO 22364 (M5) = IRC+30515 [6977] = BV 325 [4015] = = КЗП 8872.

HT Peg = 82 Peg [5859, 6985] = HR 9039 = BD+10°5004 (6.0) = = SAO 108879 = HD 223781 (A3) = Zi 2160 = КЗП 102287.

HU Peg = GR 25 [2587] = КЗП 8902.

V401 Per = BD+51°471 (9.3) [1570] = = DO 25181 (M6) = СПЗ 783 [4650, *А.Паренаго*] = 425.1937 = КЗП 188 = КЗП 5958.

V402 Per = BD+51°504 (9.3) = DO 25330 (M7) = IRC+50054 = BV 77 [0819, *Strohmeier*] = = КЗП 5963.

V403 Per = BD+56°597 (8.6) = SAO 023274 = HD 14580 (K5) = DO 25645 (M0) = IRC+60089 = = 89.1914 [7755, *Цераская*] = Zi 124 = КЗП 211.

V404 Per = СПЗ 1983 [6976].

V405 Per = СПЗ 1984 [6976].

V406 Per = GR 271 [7756].

V407 Per = GR 272 [7756].

V408 Per = 15.1936 [0796] = P 2557 = = КЗП 273.

V409 Per = СПЗ 1894 [7501].

V410 Per = BD+47°783 (9.0) = HD 19881 (Np) = DO 26825 (R) = IRC + 50088 = 18.1917 [7758] = Zi 179 = КЗП 100262.

V411 Per = BD+54°655 (9.3) = DO 26849 (M5) = IRC+50089 = Wr 27 [4067] = КЗП 6015.

V412 Per = 22.1936 [0796] = P 2570 = = КЗП 304.

V413 Per = Ross 183 [2874] = P 103 = = КЗП 327 [7840].

V414 Per = IRC+40070 [6005, 6977, 7841].

V415 Per = S 8544 [3776].

V416 Per = S 8547 [3776].

V417 Per = S 8555 [3776].

V418 Per = S 8556 [3776].

V419 Per = СПЗ 312 [0317] = P 128 = = КЗП 401.

V420 Per = BD+48°1136 (9.5) = DO 28551 (M3) = IRC+50125 = = СПЗ 851 [4394, *Фаддеева*] = = КЗП 431.

V421 Per = 83.1943 [4826] = S 3410 = = КЗП 435.

V422 Per = BD+44°1017 (9.5) [7315] = = BSD 24,557 (F5) [7847] = = DO 28593 (M1) = КЗП 100404.

AV Phe = S 7146 [4001] = КЗП 5900.

AW Phe = HR 435 [5840] = CoD−47°440 (6.6) = CPD−47°169 (7.2) = = SAO 215525 = HD 9184 (Mb) [5945] = КЗП 5928.

AA Psc = IRC 00028 [6005, 6977].

AB Psc = DO 7927 (K5) = IRC 00525 [6005, 6977] = BV 177 [2592, *Strohmeier*] = КЗП 8811.

AC Psc = GR 263 [7474].

AD Psc = IRC 00531 = 407.1934 [6845, *Barrett*] = P 5782 = = КЗП 5784.

NU Pup = S 4867 [0085] = КЗП 780.

NV Pup = v^1 Pup = HR 2787 [3712, 4588, 6311, 7845] = CoD −36°3512 (5.3) = CPD−36° 1225 (5.0) = SAO 197824 = = HD 57150 (B3) [7765].

NW Pup = v^2 Pup = HR 2790 = CoD −36°3519 (5.4) = CPD−36° 1230 (5.6) = SAO 197837 = = HD 57219 (B3) [6840].

NX Pup = CoD−44°3318 (9.7) = CPD −44°1442 (9.3) = S 4878 [0085] = BV 464 [4362] = = КЗП 1025.

NY Pup = S 4880 [0085] = КЗП 1038.

NZ Pup = S 4070 [0085] = КЗП 1063.

OO Pup = S 3449 [4826] = 122.1943 = = КЗП 1080.

OP Pup = 185.1932 [0190] = BV 1591 [7762] = P 493 = КЗП 1101.

OQ Pup = CoD−45°3332 (10) = CPD−45° 1648 (10.0) = S 4886 [0085] = = BV 663 [4665] = КЗП 1104.

OR Pup = CoD−26°5161 (7.1) = CPD−26° 2739 (8.6) = HD 64657 (Mb) [7763, 7858] = IRC−30103 = = КЗП 6601.

OS Pup = HR 3240 [4619] = CoD−35°4358 (5,9) = CPD−35°2070 (6,8) = = SAO 198969 = HD 69081 (B3) = = КЗП 6624.

OT Pup = CoD−25°5968 (8,4) = CPD−25° 3557 (9,0) = SAO 175689 = HD 70654 (Mb) = IRC−30124 = = 271.1930 [0085, 0464, 1111] = = BV 809 [5196] = P 539 = = КЗП 1289.

UX Pyx = CoD−27°6308 (9,1) = CPD−27° 3659 (9,9) = IRC−30144 [6005] = = 75.1931 [0975] = BV 1658 [2009] = P 602 = КЗП 1419.

UY Pyx = CoD−26°6822 (8,2) = CPD−25° 4105 (9,2) = HD 79310 (Ma) = = IRC−30145 [6005] = 206.1932 [0190] = P 604 = КЗП 1424.

SZ Ret = CoD−53°808 (10½) = S 4826 [0085] = КЗП 369.

HK Sge = DO 17634 (M3) = IRC+20395 = = 418.1934 [1217] = P 5009 = = КЗП 4614.

HL Sge = СПЗ 1303 [4261] = КЗП 8213.

HM Sge = СПЗ 2183 [7859].

HN Sge = DO 18065 (M0) = 423.1934 [1217] = P 5079 = КЗП 4786.

HO Sge = S 9959 [3903].

HP Sge = S 9962 [3903].

HQ Sge = S 9964 [3903].

HR Sge = BD+17°4193 (8,8) = SAO 105551 = HD 351219 (M2) = = DO 18440 (M3) = IRC +20447 = Wr 42 [4067] = = КЗП 8377.

δ Sge = 7 Sge = HR 7536 [1371, 5903] = BD+18°4240 (4,0) = = SAO 105259 = HD 187 076/7 (Ma+A0) = IRC+20433 = P5104 = = КЗП 101889.

V3892 Sgr = CoD−27°11872 (8,0) = CPD −27°5738 (8,4) = SAO 185681 = HD 161103 (B0) [7767] = КЗП 7703.

V3893 Sgr = GX3+1 [7768] = Sgr X−1 [7864].

V3894 Sgr = HR 6621 = CoD−26°12367 (6,7) = CPD−26°5987 (7,0) = = SAO 185779 = HD 161756 (B3) [6866].

V3895 Sgr = CoD−29°14267 (9,0) = CPD −29°5065 (8,5) = SAO 186016 = HD 163632 (A0) = = 157 [2448] = BV 583 [4181] = = КЗП 7735.

V3896 Sgr = Baade 145 [1680, *Baade*] = = КЗП 7746.

V3897 Sgr = Baade 137 [1680, *Baade*] = = КЗП 7751.

V3898 Sgr = Baade 255 [1680, *Baade*] = = КЗП 7753.

V3899 Sgr = 3 [6378, 4407].

V3900 Sgr = Baade 172 [1680, *Baade*] = = КЗП 7763.

V3901 Sgr = Baade 90 [1680, *Baade*] = = КЗП 7783.

V3902 Sgr = IRC−30361 [6005] = = 604.1933 [2926] = HV 9263 = P 1479 = КЗП 3774.

V3903 Sgr = CoD−24°13962 (7,8) [7778] = = CPD−24°6247 (7,4) = SAO 186366 = HD 165921 (B0) [6866].

V3904 Sgr = M 89 [7779].

V3905 Sgr = M 162 [7779].

V3906 Sgr = 128 [5869].

V3907 Sgr = 1 [3909].

V3908 Sgr = 755.1936 [2936] = HV 9319 = = P 4588 = КЗП 3890 = M 16 [7779].

V3909 Sgr = 6 [3909].

V3910 Sgr = 7 [3909].

V3911 Sgr = 12 [3909].

V3912 Sgr = 15 [3909].

V3913 Sgr = 18 [3909].

V3914 Sgr = Var 7 [1634] = КЗП 7806.

V3915 Sgr = 162.1937 [6382] = HV 9322 = = КЗП 3899.

V3916 Sgr = 39 [3909].

V3917 Sgr = M 12 [7779].

V3918 Sgr = M 86 [7779].

V3919 Sgr = 389 [5869].

V3920 Sgr = M 88 [7779].

V3921 Sgr = M 29 [7779].

V3922 Sgr = 442 [5869].
V3923 Sgr = M 36 [7779].
V3924 Sgr = M 96 [7779].
V3925 Sgr = M 37 [7779].
V3926 Sgr = M 168 [7779].
V3927 Sgr = M 97 [7779].
V3928 Sgr = 600 [5869]. In [5869] erroneously designated as V1597 Sgr.
V3929 Sgr = 68.1937 [1356] = HV 9397 = P 4629 = КЗП 4026.
V3930 Sgr = M 108 [7779].
V3931 Sgr = M 48 [7779].
V3932 Sgr = M 47 [7779].
V3933 Sgr = 697 [5869].
V3934 Sgr = M 109 [7779].
V3935 Sgr = M 52 [7779].
V3936 Sgr = M 112 [7779].
V3937 Sgr = M 119 [7779].
V3938 Sgr = M 54 [7779].
V3939 Sgr = M 185 [7779].
V3940 Sgr = M 57 [7779].
V3941 Sgr = $18^h19^m36^s - 29°28'.8$ (1900) [7782].
V3942 Sgr = M 120 [7779].
V3943 Sgr = M 123 [7779].
V3944 Sgr = M 58 [7779].
V3945 Sgr = M 23 [7779].
V3946 Sgr = M 59 [7779].
V3947 Sgr = M 60 [7779].
V3948 Sgr = M 124 [7779].
V3949 Sgr = M 126 [7779].
V3950 Sgr = M 127 [7779].
V3951 Sgr = 568.1935 [2935] = HV 9498 = = P 4811 = КЗП 4277 [7785].
V3952 Sgr = IRC−20514 = 139.1904 [1383, 2936] = HV 9522 = Zi 1503 = КЗП 4350.
V3953 Sgr = IRC−30398 [6005] = Innes 81 [1613] = Zi 1562 = КЗП 4465.
V3954 Sgr = BD−15°5259 (7.5) [7787] = = SAO 162278 = HD 178882 (Mb) = IRC−20543 = КЗП 8116.
V3955 Sgr = CoD−31°16600 (9.8) = S 5064 [0085] = BV 814 [5196] = = КЗП 4610.
V3956 Sgr = BV 1636 [7594].
V3957 Sgr = BV 1637 [7594].
V3958 Sgr = CoD−45°13251 (10) = S 5068 [0085] = BV 1398 [5937] = = КЗП 4672.
V3959 Sgr = CoD−37°13262 (9.5) = CPD −37°8554 (9.8) = S 5077 [0085] = КЗП 4723.
V3960 Sgr = CoD−41°13684 (9.3) = CPD −41°9189 (9.8) = HD 186669 (Mb) = 63.1901 [7788] = HV 182 = *194041* [7788] = Zi 1781 = КЗП 4800.
V3961 Sgr = HR 7552 [4170] = CoD−40° 13514 (5.6) = CPD−40°9120 (5.8) = SAO 229903 (5.4) = = HD 187474 (A0p) = КЗП 8306.
V3962 Sgr = S 7305 [4001] = КЗП 8417.
V3963 Sgr = S 7319 [4001] = КЗП 8441.
V890 Sco = CoD−32°11512 (9.7) = IRC −30257 = HV 3055 [7790] = = 219.1907 = Zi 1219 = = КЗП 2612.
V891 Sco = СПЗ 1773 [7791].
V892 Sco = СПЗ 1787 [6889].
V893 Sco = СПЗ 1772 [7791].
V894 Sco = BD−15°4276 (9.5) = BV 1630 [7594].
V895 Sco = СПЗ 1685 [5919].
V896 Sco = СПЗ 1684 [5919].
V897 Sco = S 7548 [4001] = КЗП 7369.
V898 Sco = СПЗ 1688 [5919] = СПЗ 1786 [6889].
V899 Sco = S 7551 [4001] = КЗП 7389.
V900 Sco = HR 6261 = CoD−41°11021 (7.2) = CPD−41°7709 (7.0) = = SAO 227374 = HD 152235 (B0) [7794].
V901 Sco = IRC−30277 [6005] = 507.1933 [2926, 4001] = HV 9001 = P 1157 = КЗП 2899.
V902 Sco = Nova Sco 1949 ? [7795] = = КЗП 7652.
V903 Sco = IRC−30298 = 96 [2448] = = КЗП 7655.
V904 Sco = CoD−40°11518 (9.5) = CPD −40°7862 (9.4) = S 7642 [6561] = = BV 1159 [5835] = КЗП 7657.

V 905 Sco = CoD−33°12361 (6.9) = CPD −33°5438 (7.8) = SAO 209151 (6.7) = HD 160529 (Oe5) [7887, ***Sterken***].

V 906 Sco = HR 6662 = CoD−34°12226 (7.5) = CPD−34°7306 (7.0) = = SAO 209428 = HD 162724 (B9) [7798, 7888] = КЗП 7728.

V 907 Sco = CoD−34°12293 (9.0) = CPD −34°7408 (8.4) = SAO 209504 = = HD 163302 (A0) = BV 549 [4381].

ζ^1 Sco = HR (BS) 6262 [5890] = CoD−42° 11633 (5.8) [4971] = CPD−42° 7545 (5.7) = SAO 227375 = HD 152236 (B1p) [7889, *Sterken*] = = КЗП 7518.

AK Scl = S 7713 [6561] = КЗП 8869.

V374 Sct = M 203 [7779].

V375 Sct = M 147 [7779].

V376 Sct = M 149 [7779].

V377 Sct = M 71 [7779].

V378 Sct = M 187 [7779].

V379 Sct = M 10 [7779].

V380 Sct = M 138 [7779].

V381 Sct = M 188 [7779].

V 382 Sct = M 69 [7779].

V383 Sct = M 61 [7779].

V384 Sct = M 128 [7779].

V385 Sct = M 72 [7779] = $18^h24^m.1$ −14°42′ [7°09, ***Kuwano***].

V386 Sct = M 26 [7779].

V387 Sct = M 63 [7779].

V388 Sct = M 204 [7779].

V389 Sct = СПЗ 590 [0552] = P 4671 = = КЗП 4115.

V390 Sct = M 73 [7779].

V391 Sct = M 64 [7779].

V392 Sct = M 193 [7779].

V393 Sct = M 146 [7779].

V394 Sct = M 66 [7779].

V395 Sct = M 74 [7779].

V396 Sct = M 192 [7779].

V397 Sct = M68 [7779].

V398 Sct = M 145 [7779].

V399 Sct = M 75 [7779].

V400 Sct = M 67 [7779].

V401 Sct = M 80 [7779].

V402 Sct = M 79 [7779].

V403 Sct = M 198 [7779].

V404 Sct = M 65 [7779].

V405 Sct = M 15 [7779].

V406 Sct = M 134 [7779].

V407 Sct = M 135 [7779].

V408 Sct = M 201 [7779].

V409 Sct = M 151 [7779].

V410 Sct = M 199 [7779].

V411 Sct = M 208 [7779].

V412 Sct = M 152 [7779].

V413 Sct = M 136 [7779].

V414 Sct = M 137 [7779].

V415 Sct = M 84 [7779].

V416 Sct = M 205 [7779].

V417 Sct = M 202 [7779].

V418 Sct = M 154 [7779].

V419 Sct = M 153]7779].

V420 Sct M 85 [7779].

V421 Sct = M 76 [7779].

V422 Sct = M 78 [7779].

V423 Sct = M 206 [7779].

V424 Sct = M 77 [7779].

V425 Sct = M 200 [7779].

V426 Sct = HV 3974 [2932, 2936] = P 1632 = MMO 19 [4231, *Heath*] = КЗП 4237.

V427 Sct = N Sct ? [7811] = КЗП 7917.

V428 Sct = BD−5°4748 (9.6) = IRC −10460 = СПЗ 592 [0552] = = P 4865 = КЗП 4355.

V429 Sct = Ross 237 [2601] = P 1678 = = КЗП 4417.

FS Ser = 47 Ser [1371] = HR 6010 [4621] = = BD+8°3141 (6.4) = SAO 121383 = = HD 145002 (Mb) = DO 3958 (M6) = IRC+10302 = P 1065 = = КЗП 2581.

FT Ser = BD−14°4618 (9.8) = IRC −10365 = Ross 373 [0551, 6386] = P 1240 = КЗП 3125.

FU Ser = IRC−10372 = СПЗ 462 [0551] = = P 4363 = КЗП 3285.

FV Ser = IRC−10385 = Ross 37 [0552, 5905] = Zi 1355 = КЗП 3567.

FW Ser = BV 1632 [7594].

FX Ser = IRC−10396 [6005, 6977].

FY Ser = M 102 [7779].

FZ Ser = M 173 [7779].
GG Ser = M 101 [7779].
GH Ser = M 30 [7779].
GI Ser = M 90 [7779].
GK Ser = M 103 [7779].
GL Ser = M 31 [7779].
GM Ser = M 92 [7779].
GN Ser = M 32 [7779].
GO Ser = M 3 [7779].
GP Ser = M 163 [7779].
GQ Ser = M 100 [7779].
GR Ser = M 164 [7779].
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KS Ser = M 142 [7779].
KT Ser = M 122 [7779].
KU Ser = M 9 [7779].
KV Ser = M 143 [7779].
KW Ser = M 121 [7779].
KX Ser = M 144 [7779].
KY Ser = M 81 [7779].
KZ Ser = M 140 [7779].
LL Ser = M 14 [7779].
LM Ser = M 139 [7779].
LN Ser = M 190 [7779].
LO Ser = M 82 [7779].
LP Ser = M 148 [7779].
LQ Ser = M 197 [7779].
LR Ser = M 118 [7779].
LS Ser = СПЗ 1157 [0494] = КЗП 7831.
LT Ser = СПЗ 1211 [6887] = КЗП 7875.
RZ Sex = IRC–10246 = HV 8306 = BV 1171 [7842] = 682.1936 [2936] = P 3435 = КЗП 1653.
V711 Tau = HR 1099 = BD+0°616 (6.9) = SAO 111291 = HD 22468 (G0) [6354, 7845] = ADS 2644 A = КЗП 6039.
V712 Tau = 143 [6891].
V713 Tau = Plf 251 [7222] = СПЗ 1936.
V714 Tau = Plf 252 [7222] = СПЗ 1937.
V715 Tau = 94 [6819] = Plf 304.
V716 Tau = K 31 [7848].
V717 Tau = K 32 [7848].
V718 Tau = СПЗ 1080 [0598] = КЗП 6110 = MHα 257–3 [7849].
V719 Tau = Ross 348 [1873] = P 142 = КЗП 442.

V720 Tau = IRC+30099 [6005, 6977] = HV 6861 [0607] = P 2647 = КЗП 445.
V721 Tau = HV 6864 [0607] = P 2654 = = КЗП 460.
V722 Tau = СПЗ 1090 [0598] = КЗП 6141 = = MHα 259–21.
V723 Tau = HV 6876 [0607] = P 2682 = = КЗП 490.
OO Tel = HV 9851 [0629, *Boyd*] = КЗП 3960.
OP Tel = S 7357 [4001] = КЗП 7816.
OQ Tel = HV 9903 [0629, *Boyd*] = КЗП 4066.
OR Tel = HV 9942 [0629, *Boyd*] = КЗП 4119.
OS Tel = S 7384 [4001] = КЗП 7860.
OT Tel = HV 10019 [0629, *Boyd*] = КЗП 4261.
OU Tel = S 7669 [6561] = КЗП 7916.
OV Tel = S 7424 [4001] = КЗП 7924.
OW Tel = S 5055 [0085] = BV 1451 [6031] = КЗП 4421.
OX Tel = HV 9601 = 584.1935 [2935] = = P 4983 = КЗП 4557.
OY Tel = CoD–53°8226 (10) = CPD–53° 9621 (10.0) = HD 184956 (Mc) = = S 5080 [0085] = BV 611 [4350] = КЗП 4744.
OZ Tel = S 6849 [4001] = КЗП 8393.
PP Tel = S 7690 [6561] = BV 1258 [5829] = КЗП 8464.
SW Tri = СПЗ 1978 [6976].
SX Tri = СПЗ 1979 [6976].
SY Tri = СПЗ 1980 [6976].
SZ Tri = СПЗ 1982 [6976].
IX TrA = S 8914 [3776].
IY TrA = S 5350 [2736] = КЗП 7205.
IZ TrA = CoD–65°1989 (9.2) = CPD–65° 3122 (9.2) = HD 139535 (Mb) = = HV 2962 [5076] = BV 777 [5599] = 110.1907 = Zi 1141 = = КЗП 2400.
KK TrA = CoD–65°2004 (9.8) = S 5015 [0085] = КЗП 2430.
KL TrA = S 5743 [4001] = КЗП 7335.
KM TrA = S 5355 [2736] = BV 1244 [5829] = КЗП 7364.
KN TrA = S 5782 [4001] = КЗП 7371.
KO TrA = S 5801 [4001] = КЗП 7384.
KP TrA = S 5836 [4001] = КЗП 7419.
KQ TrA = S 5846 [4001] = КЗП 7431.
KR TrA = S 5876 [4001] = КЗП 7452.
BU Tuc = 15 [7861]. In SMC region.
BV Tuc = 58 [7861]. In SMC region.
BW Tuc = 67 [7861]. In SMC region.
BX Tuc = 82 [7861]. In SMC region.
BY Tuc = 86 [7861]. In SMC region.
BZ Tuc = S 4792 [0085, 4001] = КЗП 80.
CC Tuc = HR 304 [4614, 5840] = CoD–66° 53 (6.7) = CPD–66°80 (7.8) = = SAO 248308 = HD 6311 (Mb) = = КЗП 5889.
CD Tuc = S 6621 [4001] = КЗП 8868.
CS UMa = HR 3870 [1371] = BD+57°1231 (5.0) = SAO 027377 = HD 84335 (Ma) = DO 32982 (M6) = IRC +60197 = P 634 = КЗП 1495.
CT UMa = BD+70°618 (9.5) = IRC+70095 [6005] = S 5384 [7863] = = КЗП 6789.
CU UMa = СПЗ 1874 [7418, *Самусь*].
CV UMa = BD+49°2018 (8.4) = SAO 043616 = HD 96453 (K5) = DO 33583 (M7) = IRC+50208 = СПЗ 311 [4729, *Л.Цераская*] = = P 712 = КЗП 1704.
CW UMa = СПЗ 314 [0317] = P 719 = КЗП 1710.
CX UMa = BD+38°2234 (6.8) = HD 99002 (F0) [7866] = SAO 062533.
RY UMi = BD+76°494 (9.2) [4353] = SAO 007860 = DO 34454 (M4) = = 429.1928 [4741] = BV 43 [0174, *Geyer, Kippenhahn*] = P 912 = КЗП 2054 [7867].
GU Vel = HR 3350 [7489] = CoD–52°2388 (5.1) = CPD–52°1484 (6.3) = = SAO 236002 = HD 71935 (F0).
GV Vel = The Carbon Star in NGC 2660 [7868].
GW Vel = CoD–45°4615 (9.8) = CPD–45° 3145 (9.2) [4456, 4457] = КЗП 6670.

GX Vel = HR (BS) 3654 [4457, 4613, 5909, 7869, 7870] = CoD−44° 5206 (5.6) = CPD−44°3495 (6.2) = SAO 220928 = HD 79186 (B5) [6350] = КЗП 6696.

GY Vel = HR 4045 [4456, 4613, 6324, 6352] = CoD−50°4990 (6.9) = CPD−50°3268 (8.2) = SAO 237858 = HD 89273 (Mb) = КЗП 6776.

GZ Vel = HR 4063 [4456, 6352, 7869] = CoD−54°3415 (4.5) = CPD −54°3474 (7.2) = SAO 237916 = HD 89682 (K0) [4619] = КЗП 6779.

HH Vel = CoD−53°3650 (9.5) = CPD−53° 4068 (9.8) = HD 92834 (Mb) [7871].

HI Vel = CoD−52°3949 (8.9) = CPD−52° 3863 (9.2) = HD 93109 (Mb) [7871].

HK Vel = CoD−54°3742 (9.4) = CPD−54° 4020 (9.6) = HD 93368 (Mb) [7871].

HL Vel = CoD−55°3649 (10) = CPD−55° 3855 (10.0) = HD 93679 (Mb) [7871].

HM Vel = CoD−55°3665 (9.0) = CPD−55° 3876 (9.6) = HD 93856 (Mb) [7871].

γ^2 Vel [7832] = HR 3207 = CoD−46° 3847 (3.0) [4696] = CPD −46° 2202 (3.5) = SAO 219504 = HD 68273 (Oap) = КЗП 6619.

FW Vir = HR 4807 [1371, 5195, 6994, 7873] = BD+2°2560 (6.0) = SAO 119508 = IRC 00221 = HD 109896 (Ma) = Zi 950 = КЗП 101306.

FX Vir = IRC−20263 = СПЗ 374 [0486] = BV 1667 [2009] = P 931 = КЗП 2104.

UW Vol = 17.1932 [0085, 4663] = HV 8065 = BV 462 [4362] = P 400 = КЗП 858.

UX Vol = Henize 244 [6059].

NQ Vul = Nova Vul 1976 [7874].

NR Vul = BD+24°3902 (9.2) [4705, 7315] = IRC+20438 = HD 339034 (K7) = DO 18219 (M1) = Zi 1806 = КЗП 101897.

NS Vul = BD+22°3840 (8.0) [7875, 7876] = SAO 087856 = IRC+20439 = HD 188037 (A) = DO 18264 (M4) = ADS 13055 = 124.1935 [0470] = Zi 1816 = КЗП 4865.

NT Vul = 15 Vul [7878] = HR 7653 = BD +27°3587 (5.0) = SAO 088071 = HD 189849 (A5).

NU Vul = 21 Vul [7221] = HR 7731 = BD +28°3675 (6.0) = SAO 088391 = HD 192518 (A3) [7879].

NV Vul = 386.1943 [1375] = S 3711 = КЗП 5122.

NW Vul = S 9060 [3776].

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Supplement to the List of Abbreviations

Алма-Ата изв – Известия Астрофизического института АН Казахской ССР, Алма-Ата.
Dearborn Ann – Annals of the Dearborn Observatory.
Heidelberg Ver – Veröffentlichungen der Badischen Landessternwarte zu Heidelberg (Königstuhl)
ROA – Royal Observatory Annals, Joint Publications of the Royal Greenwich and Cape Observatories.

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MINIMA OF ECLIPSING VARIABLES

We report below the times of minimum light for eclipsing variable stars.

Table 1

Star	JD hel. 2440000+	Er (d)	n	f	ap	comp.	Δm min.	Notes	Obs.
SV Cam	2836.5905	.001	26	v	90	001047	1.25	1)2)	DRS/ADM
SV Cam	2852.601	.002	19	none	30	001047	1.01	1)	ADM
SV Cam	2855.5658	.001	27	v	30	001047	1.25	1)3)	ADM
R CMa	2820.5936	.001	10	v	90	152834	0.98		DRS/ADM
YY Gem	2829.634	.002	28	v	90	060198	8.22:		DRS/ADM
U Peg	3021.6134	.001	17	v	90	-	-		DRS
β Per	3066.6630	.001	20	v	30	056047	-1.47	5)	ADM
β Per	3066.6622	.001	20	B	30	056047	-1.49	5)	ADM
β Per	3089.6003	.001	20	V	30	056047	-1.46	5)	ADM
β Per	3089.6008	.001	22	B	30	056047	-1.49	5)	ADM
λ Tau	3113.6874	.005	24	V	30	111696	-0.39	5)6)	ADM
λ Tau	3113.6909	.005	24	B	30	111696	-0.41	5)6)	ADM
W UMa	2829.7280	.001	19	v	90	027340	-		DRS/ADM
W UMa	2863.5915	.001	22	v	30	027340	1.93:		ADM
TX UMa	2844.694	.002	16	v	30	-	-		ADM
AG Vir	2892.6620	.001	27	v	30	099924	1.39	4)	DRS/ADM

Table 1, Photoelectric Minima. The observations were made with a UBV photometer, containing a 1P21 phototube, attached to reflecting telescopes of 30 and 90 cm aperture. The time of minimum was calculated by the tracing paper method. Er=the maximum error for the time of minimum; n=number of observations; f=filter; ap=aperture of the telescope in cm; comp=SAO catalog number of the comparison star; Δm min.=m (variable) minus m (comparison) at mid-eclipse in the instrumental magnitude system, except where noted.

Notes: 1) Ascending branch steeper than descending branch. 2) Duration of constant light = 28 minutes. 3) Duration of constant light = 35 minutes. 4) Duration of constant light = 52 minutes. 5) Observations transformed to the standard system. 6) Observations obtained on JD2443113 and 2443117.

Table 2

JD hel. 2,440,000+	n	m	Epoch	O-C	Observer
WZ Andromedae, $\sigma = {}^{d}.006$					
3024.654	16	1	11427	$-{}^{d}.018$	Krobusek
XZ Andromedae, $\sigma = {}^{d}.003$					
2665.550	6	1	2586	-.021	Mallama
2684.550	8	1	2600	-.024	Mallama
2707.626	14	1	2617	-.022	Mallama
2722.558	11	1	2628	-.020	Mallama
AB Andromedae, $\sigma = {}^{d}.006$					
2709.588	11	1	19886	+.021	Krobusek
3044.623	7	1	20895.5	+.012	Krobusek
CX Aquarii, $\sigma = {}^{d}.004$					
2665.589	8	1	11173	+.010	Mallama
OO Aquilae, $\sigma = {}^{d}.006$					
2601.654	7	1	17120	-.028	Krobusek
2602.659	8	1	17122	-.037	Krobusek
2603.670	8	1	17124	-.040	Krobusek
2709.600	7	1	17333	-.029	Krobusek
3008.598	9	1	17923	-.040	Krobusek
3010.629	8	1	17927	-.036	Krobusek
HP Aurigae, σ = ------					
2683.78	5	1	-----	----	Mallama
RX Cassiopeiae, $\sigma = {}^{d}.5$					
2706.5	6	2	578.5	+3.0	Mallama
2883.7	5	2	584	+2.4	Mallama
RZ Cassopeiae, $\sigma = {}^{d}.004$					
2412.644	15	1	4408	+.006	Mallama
2412.650	18	1	4408	+.011	Krobusek
2510.655	13	1	4490	+.006	Krobusek
SX Cassiopeiae, $\sigma = {}^{d}.03$					
2739.2:	5	1	240	-0.2:	Mallama
U Cephei, $\sigma = {}^{d}.002$					
2392.583	19	1	1645	+.027	Krobusek
2741.617	11	2	1785	+.037	Mallama

JD hel. 2,440,000+	n	m	Epoch	O-C	Observer
EG Cephei, σ = $^{d}.003$					
2598.739	12	1	28771	$+^{d}.013$	Krobusek
2664.641	15	1	28892	+.016	Mallama
EK Cephei, σ = $^{d}.006$					
2447.545	14	1	778	+.002	Krobusek
TW Ceti, σ = $^{d}.004$					
2392.545	9	1	37039	-.021	Krobusek
RW Comae Berenices, σ = $^{d}.004$					
2860.716	12	1	41375.5	-.043	Krobusek
2861.676	9	1	41379.5	-.032	Krobusek
2920.643	13	1	41628	-.046	Krobusek
2922.665	15	1	41636.5	-.041	Krobusek
2925.638	10	1	41649	-.035	Krobusek
W Corvi, σ = $^{d}.01$					
2510.637	8	1	37748	-.005	Krobusek
2860.683	10	1	38650	-.008	Krobusek
2861.662	9	1	38652.5	+.001	Krobusek
V Crateris, σ = $^{d}.005$					
2489.690	19	1	21408	+.021	Krobusek
2861.765	8	2	21938	+.018	Krobusek
ZZ Cygni, σ = $^{d}.003$					
2599.672	10	1	34142	-.029	Krobusek
2699.617	8	1	34301	-.034	Mallama
2968.666	9	1	34729	-.034	Krobusek
2985.642	10	1	34756	-.031	Krobusek
2990.669	10	1	34764	-.033	Krobusek
TT Delphini, σ = $^{d}.005$					
2665.645	11	1	1535	+.048	Mallama
TY Delphini, σ = $^{d}.006$					
2985.650	11	1	12564	+.007	Krobusek
3010.661	15	1	12585	+.004	Krobusek
Z Draconis, σ = $^{d}.002$					
2576.674	11	1	6857	.000	Krobusek
2595.678	12	1	6870	.000	Krobusek

JD hel. 2,440,000+	n	m	Epoch	O-C	Observer
RZ Draconis, σ = $^{d}.005$					
2412.553	8	1	23533	$-^{d}.015$	Krobusek
2412.556	9	1	23533	-.012	Mallama
2576.715	6	1	23831	-.014	Krobusek
2608.670	9	1	23889	-.010	Krobusek
2922.662	13	1	24459	-.018	Krobusek
3008.599	10	1	24615	-.017	Krobusek
TW Draconis, σ = $^{d}.003$					
2707.600	14	1	3142	-.038	Mallama
AI Draconis, σ = $^{d}.005$					
2598.704	13	1	2954	-.003	Krobusek
2664.651	16	1	3009	+.009	Mallama
3020.692	19	1	3306	+.002	Krobusek
SZ Herculis, σ = $^{d}.003$					
2577.686	11	1	9278	+.027	Krobusek
2964.644	11	1	9751	+.026	Krobusek
VX Lacertae, σ = $^{d}.005$					
2664.634	17	1	7855	-.060	Mallama
2707.617	14	1	7895	-.057	Mallama
CM Lacertae, σ = $^{d}.003$					
2665.632	13	1	9746	-.008	Mallama
TZ Lyrae, σ = $^{d}.005$					
2596.651	13	1	41464	+.021	Krobusek
2696.588	6	1	41653	+.010	Krobusek
2964.715	11	1	42160	+.024	Krobusek
2990.637	15	1	42209	+.033	Krobusek
3008.609	10	1	42243	+.025	Krobusek
3044.562	10	1	42311	+.018	Krobusek
U Ophiuchi, σ = $^{d}.01$					
2990.641	12	1	20694	+.002	Krobusek
ER Orionis, σ = $^{d}.007$					
2433.625	10	1	13993.5	-.021	Krobusek
2446.540	9	1	14024	-.019	Krobusek
2751.593	8	1	14744.5	-.027	Krobusek

JD hel. 2,440,000+	n	m	Epoch	O-C	Observer
U Pegasi, $\sigma = .^{d}004$					
3020.679	13	1	17367.5	$-.^{d}015$	Krobusek
3024.612	10	2	17378	-.017	Krobusek
RT Persei, $\sigma = .^{d}003$					
2684.634	7	1	21346	-.060	Mallama
2842.625	7	1	21532	-.059	Krobusek
IZ Persei, $\sigma = .^{d}01$					
2722.682	14	1	4651	+.011	Mallama
β Persei, $\sigma = .^{d}01$					
2699.638	12	1	1123	-.088	Mallama
2722.590	10	1	1131	-.075	Mallama
2765.600	10	1	1146	-.076	Mallama
3089.597	18	1	1259	-.094	Krobusek
RZ Scuti, $\sigma = .^{d}07$					
2684.61:	4	3	372	+.14:	Mallama
BS Scuti, $\sigma = .^{d}003$					
2689.594	12	2	4692	-.046	Mallama
RZ Tauri, $\sigma = .^{d}01$					
2844.643	6	1	12433	+.003	Krobusek
HU Tauri, $\sigma = .^{d}01$					
2786.715	20	1	8338	+.026	Krobusek
X Trianguli, $\sigma = .^{d}003$					
2745.606	11	1	5325	-.036	Mallama
3052.608	11	1	5641	-.038	Krobusek
XZ Ursae Majoris, $\sigma = .^{d}005$					
2925.625	14	1	13532	-.072	Krobusek
W Ursae Minoris, $\sigma = .^{d}01$					
2412.649	12	1	5264	-.006	Krobusek
RU Ursae Minoris, $\sigma = .^{d}007$					
2844.612	18	1	31220	-.008	Krobusek

JD hel. 2,440,000+	n	m	Epoch	O-C	Observer
AZ Virginis, $\sigma = 0^{d}.005$					
2489.750	8	1	47686	$-^{d}.038$	Krobusek
2540.624	9	1	47857	-.036	Krobusek
Z Vulpeculae, $\sigma = 0^{d}.01$					
2716.718	14	2	7031	+.016	Mallama

Table 2, Visual Minima. For each minimum, both the descending and ascending branch of the light curve was observed.The time of minimum was measured by the tracing paper method. After the star name, the standard deviation, σ, expected for a single primary minimum was obtained visually for a star of that light curve is given.These standard deviations are calculated from studies by Mallama, (1974a, 1974b). JD hel=heliocentric Julian date of minimum light; n = number of visual estimates contributing to the light curve; m = number of different minima used in the light curve. Epoch and O-C refer to the linear elements in GCVS 1969.

Table 3

JD 2414512.59	JD 2416595.67
JD 2415902.59	JD 2418524.45
JD 2416242.68	

Table 3, Photographic Minima of BF Virginis. One of us (P.A.P.) searched 200 photographic plates in the Harvard collection to identify times when the variable was faint between 1891 and 1937. The results tend to support the suggestion by Mallama and Witt (1976) that a large period change may have occurred before 1930, but more data are needed to verify this.

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18-CM FLUX MEASUREMENTS OF BL LACERTAE

Presented here is a small sample of 18-cm flux measurements of BL Lacertae (VRO 42.22.01) made from October 1971 to January 1972 with the University of Illinois' 37-m (120-ft) radio telescope. These observations are meant to supplement data given by Webber et al. (1976,A.J. 81, 1069).Each flux measurement represents the average of six scans in right ascension,six scans in declination,and three 5 K calibrations.Two standard sources (observed in the same manner)were used: 3C 48 and 3C 147,with assumed fluxes of 15.2 and 10.5 Jy,respectively.The sensitivity of the instrument was 5.0 Jy/K.The maximum and minimum fluxes observed during the time span indicate a statistically significant variation, and the observed maximum is greater than that observed by Webber et al. (1976), but the sample as a whole indicates that the 18-cm flux of BL Lacertae was approximately constant. A small sample of photographic photometry data over the same time span (Deming et al. 1973, IBVS No.821) indicates that the optical light output was also roughly constant.

JD	18-cm Flux (Jy) of BL Lac
2441233.7	7.1 ± 1.0
1241.7	5.9 0.5
1248.7	6.5 0.5
1255.6	6.3 0.5
1268.6	6.8 0.5
1275.5	6.5 0.5
1324.5	7.6 0.5

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PHOTOMETRY OF RW Tri SIMULTANEOUSLY IN TWO COLORS

Photoelectric observations of RW Tri were made on the night of November 16, 1976 with the Pennsylvania State University 60 inch reflector, simultaneously with Johnson and Morgan yellow and blue filters. The apparent magnitude of the system in yellow and the difference in blue and yellow are given in the Figure for about 1.15 cycles. From observations of Walker (1963) the system is judged to be in its faint,quiescent state.

Noteworthy features include a total eclipse with duration of about nine minutes and a system reddening at primary of about $0^{m}_{.}8$. This property has not been observed before in RW Tri or other nova associated systems such as DQ Her and UX UMa.

From observations of RW Tri on November 15 and 16, 1976 the period was found to be $5^{h}33^{m}_{.}5$, the same as determined by Walker. Since the system may not eclipse centrally, consideration of external and internal contact times indicate k is near the value of but more than 0.62. This is also consistent with the results obtained from analyzing the more normal, descending branch with the ϕ^{oc} functions of Merrill (1950) for 0.6 limb darkening.

No readily recognizable secondary minimum has been observed yet for RW Tri. The decrease in brightness around phase 0.5 in the displayed light curve requires qualification before it can be designated as a secondary.

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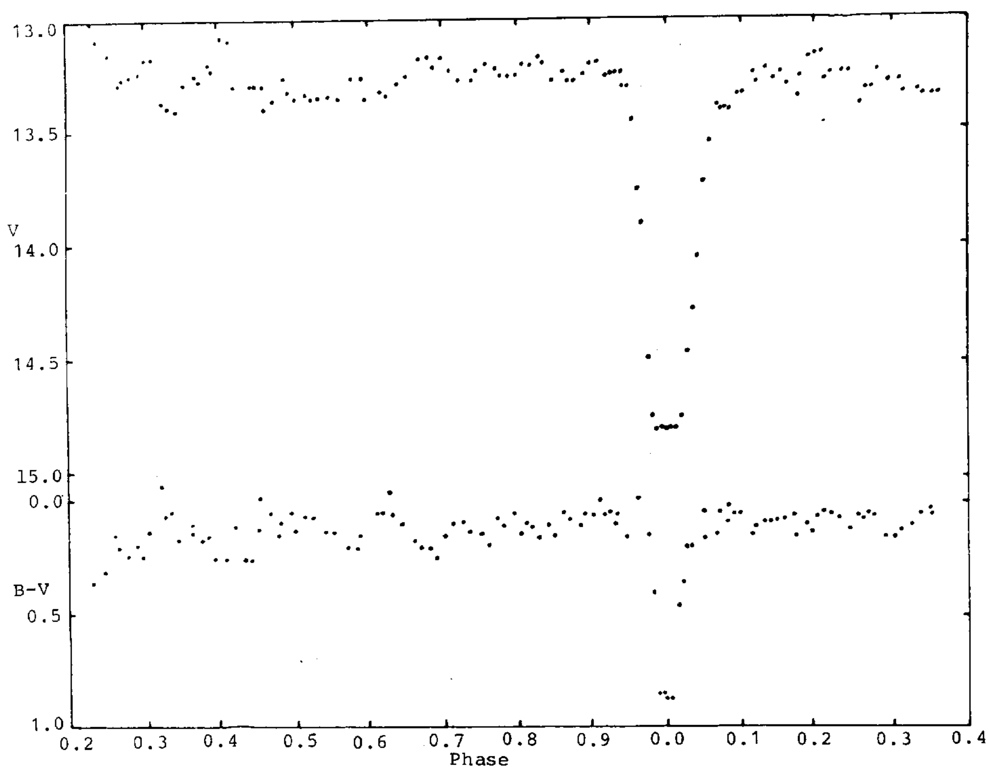
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A NEW ECLIPSING BINARY IN CYGNUS

In the summer of 1970 Martha Clark, a student then working at the Maria Mitchell Observatory, discovered a new variable star at $19^h41^m04^s$ $+45^\circ13'.0$ (1900). I have now examined this star on more than 1000 plates taken at Nantucket between 1926 and 1976. It is of the Algol type varying from about 14.0 to 15.3 pg. The best constant period I was able to derive to represent the times of observed minima is $1^d.811443$. However, as the upper part of the Figure indicates, the scattering of the observations at and near minimum is not satisfactory. These phases were computed with the reciprocal period on the basis of the relation, $\Phi = 0.552046$ (JD - 2400000) - E. Somewhat better results (lower plot) are obtained by adding a cyclical correction term to the phases, namely $\Delta\Phi = 0.015 \sin 0^\circ.045$ (JD - 2439000). The corresponding ephemeris then becomes,

Min = 2442653.610+1.811443E-0.027 sin $0^\circ.045$ (JD - 2439000).

The finder chart represents an area of approximately 15′ x 15′. Star A is BD $+44^\circ3222$ and B is $+45^\circ2965$.

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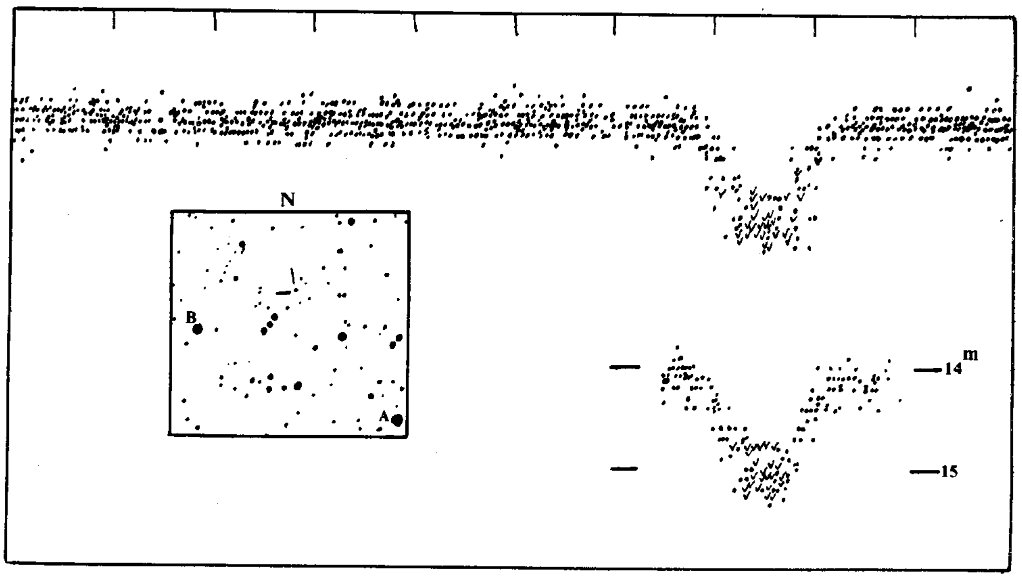

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UBVR PHOTOMETRY OF SU TAURI

The variable star SU Tauri ($\alpha = 5^h43^m12^s$, $\delta = +19^{\circ}02'.0$, $\Delta\alpha = +3^s.53$, $\Delta\delta = +0'.024$; 1900) belongs to the R Cr B class of variable star. According to the General Catalogue of Variable Stars, it has a range in brightness 9.5 < V < 16.0. The same source lists a spectral type of GO ep. The R Cr B stars as a class spend much of their time at maximum brightness. Feast (1975) gives a thorough discussion of the characteristics of the R Cr B class of variable star.

SU Tauri was entering minimum brightness during late 1976 (see American Association of Variable Star Observers Circulars). Since few such stars are observed near minimum, a short series of photoelectric observations was made at the Kitt Peak National Observatory's 2.1-meter telescope on 26 November 1976 U.T. A dry ice cooled ITT FW 129 photomultiplier was used together with standard UBVR filters. Standard stars were chosen from Landolt (1973). Standards for the R filter were from faint standards by Kunkel (1976), tied into the Johnson UBVRI photometric system.

The results are presented in Table I. The heliocentric Julian Days are known to within 10 seconds. The data consists of 5 separate sets of measures. The average magnitude and color-index values together with their corresponding r.m.s. errors (of a single observation) are V = 16.86 ± 0.05, (B-V) = +1.08 ±0.11, (U-B) = +0.30 ± 0.15, and (V-R) = +0.5 ± 0.6. The (V-R) value is especially poor since the sensitivity of the FW 129 is very low near the R passband. SU Tauri appears to be at one of its faintest minima.

The spectra and colors of R Cr B stars can change significantly as the star waxes and wanes. In particular, color indices at minimum can be bluer than those at maximum brightness due to the effects of emission lines (Feast 1975). Fernie, Sherwood and DuPuy (1972) found (B-V) $\simeq$ +1.08 and (U-B) $\simeq$ +0.41 for SU Tau near maximum. As one can see, the (B-V) color index is unchanged, but the (U-B) color index at this minimum is slightly bluer.

The author thanks the Director of the KPNO for the telescope time, and the staff for their aid at the telescope. This work was supported in part by the NSF grant no. AST 75-01890.

Table I

UBVR Photometry of SU Tauri

$JD_{\odot}$ 2443000.0+	V	B-V	U-B	V-R
108.9893	16.82	+1.16	+0.13	+0.4
.9914	16.89	0.95	0.49	-0.4
.9943	16.82	1.20	0.37	+0.4
.9965	16.83	1.09	0.18	+1.0
.9987	16.92	1.00	0.33	+1.0

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 1254

Konkoly Observatory
Budapest
1977 March 24

PHOTOELECTRIC MINIMA OF AB And AND X Tri

I have observed AB And on seven nights, and X Tri on three nights during the fall of 1976. A 30 cm Maksutov telescope was used with an EMI 6256S photomultiplier tube and standard B,V filters.

Three primary and three secondary minima were obtained for AB And, and two primary for X Tri. They are given in the following:

<u>AB And</u>

Hel.Min.J.D.	Min.	O-C
2442043.3047	II	+.0006
043.4649	I	-.0007
045.2941	II	-.0014
049.4433	I	-.0008
053.4262	I	-.0005
128.2694	II	+.0009

Quester's formula Min.I.= J.D. $2436109.57928+0\overset{d}{.}33189215\cdot E$ (IBVS 190) was used in the calculation of O-C's.

A detailed analysis of this system will be published in the "Communications de la Faculté des Science de L'Université d'Ankara, Série A3 : Astronomie, Année 1977".

<u>X Tri</u>

Hel.Min.J.D.	Min.	O-C
2443131.2753	I	-.0214
32.2466	I	-.0215

SAC 1977 formula Min.I.= J.D. $2440984.2205+0\overset{d}{.}9715277$ was used in the calculation of O-C's.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 March 25

MINIMA OF ECLIPSING VARIABLES

The list below contains 28 heliocentric minima observed visually by one of the writers (M.Winiarski) at the Astronomical Observatory Fort Skala in the years 1964-1967. The times of minima and the so-called "limits of error" were obtained by the tracing-paper method. The O-C values were computed from the linear elements given in the General Catalogue of Variable Stars, 3rd ed., Moscow, 1969; "n" denotes the number of observations used in the determination of minimum.

	J.D. hel.	limits of error	period of observations	O-C	n
RT And	2439054.481	±.004	1965,Oct. 2 - Oct. 27	+.006	11
TW And	9053.385:	.005	1965,Sept.24 - Nov. 17	+.001	24
TW And	9791.366	.002	1967,Oct. 23 - Oct. 27	+.009	25
XZ And	9819.330	.004	1967,Aug. 29 - Dec. 28	+.008	22
CO And	9821.193	.004	1967,Nov. 26 - Dec. 27	+.006	19
FK Aql	9673.522	.010	1967,July 1 - Oct. 26	-.006	8
V 343 Aql	9673.376	.005	1967,June 29 - July 13	+.016	37
V 343 Aql	9732.397	.005	1967,Aug. 29 - Oct. 27	+.010	21
BZ Cas	9791.403	.005	1965,Oct. 19 -1967 Oct.27	+.031	9
TX Cet	9821.455	.004	1967,Oct. 26 - Dec. 31	+.006	20
BR Cyg	9027.575	.005	1965,Sept.23 - Nov. 17	+.001	22
BR Cyg	9648.556	.006	1967,May, 29 - Nov. 24	+.008	59
V 687 Cyg	9052.361	.002	1965,Oct. 1 - Oct. 18	+.012	18
V 687 Cyg	9622.603:	.005	1967,May, 11 - June,23	+.039	9
V 728 Cyg	9738.441	.003	1967,Sept. 4	+.014	11
GL Her	9640.475	.003	1967,May, 29 - July, 1	+.042	19
VX Lac	8623.466	.002	1964,Aug. 15	-.018	20
VX Lac	9027.470	.003	1965,Sept.21 - Oct. 19	-.028	31
TT Lyr	9056.222	.003	1965,Oct. 1 - Nov. 17	+.003	46
TT Lyr	9622.588	.008	1967,May, 11 - Oct. 26	+.046	25
UZ Lyr	9056.331	.003	1965,Oct. 1 - Oct. 24	+.020	37
V 501 Oph	9640.391:	.003	1967,May, 29 - June,24	+.019	29
SX Psc	9821.307:	.003	1967,Nov. 26	-.026	12
SV Tau	9054.384	.006	1965,Oct. 20 - Oct. 22	-.059	24
SV Tau	9821.532	.010	1967,Nov. 26	+.003	9
XY UMa	9622.309	.004	1967,May, 11 - Nov. 26	+.004	15
BE Vul	8635.369	.003	1964,Aug. 27	-.001	16
BE Vul	9622.488	.004	1967,May, 11 - Nov. 26	+.016	19

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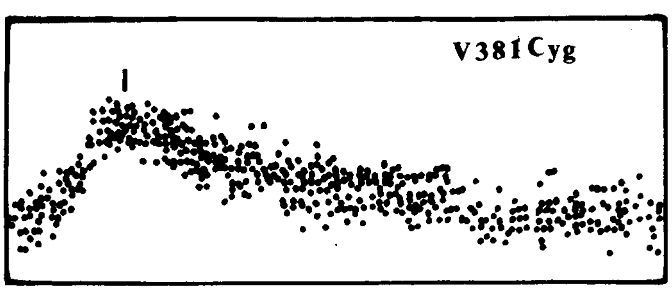
Number 1256

Konkoly Observatory
Budapest
1977 March 25

V381 CYGNI AN RR LYRAE TYPE STAR

V381 Cygni is listed in the General Catalogue of Variable Stars as a Cepheid with a period of $4^{d}.88$. On the basis of 650 plates at the Maria Mitchell Observatory examined by a student, Beverly Kehoe, we have been unable to confirm this period. I have therefore independently analyzed the observations and find they are well represented by a reciprocal period of $\bar{1}^{d}.639305$ (Figure, where magnitudes are on an arbitrary scale). The resulting ephemeris is

$$\text{Max.} = 2439005.667 + 0^{d}.6100146 \cdot E.$$



This period turns out to be just one eighth of the one originally published by Beljawsky (1936). His indicated epoch of maximum (represented by the small vertical bar in the Figure) is also satisfied by the above relation.

The Nantucket observations span the years 1926 through 1976.

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Reference:

Beljawsky, S. 1936, Russian Variable Stars, Vol.5, p.36

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1257

Konkoly Observatory
Budapest
1977 March 29

HD 153747 : A DELTA SCUTI VARIABLE

HD 153747 (HD spectral type B9) was discovered to show light variations when observed by McKay at Mount John University Observatory on April 2, 1973. The star was found to show periodic variations of close to $0^m.04$ and had a period of about 70 minutes. The amplitude was found to be variable.

The star has been observed photoelectrically during 1976 in the B and V bands of the UBV system with the 60 cm telescope at Mount John University Observatory. A thermoelectrically cooled EMI 6094B photomultiplier tube was used for the observations. Extinction was determined nightly and the observations have been reduced to the UBV system. The comparison stars used were HD 153426 and HD 153767. Each observation consists of four 10 second integrations.

Observations obtained during 1976 have not shown evidence of large amplitude changes. However, observations obtained at Mount John University Observatory prior to 1976 have shown a range of amplitude variation from less than $0^m.02$ to $0^m.10$.

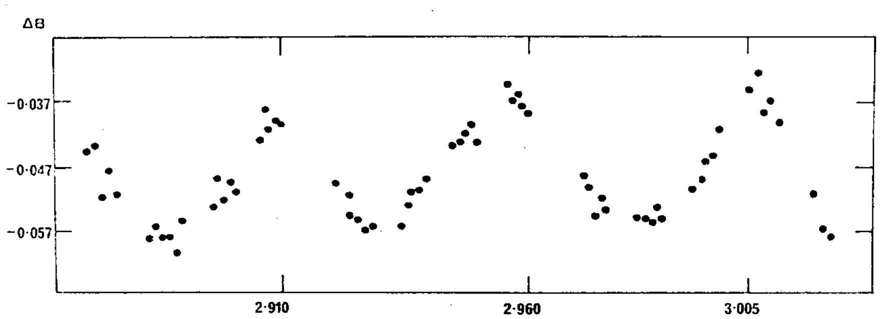
A section of the observations obtained on 13th June, 1976 are given. The comparison star used was HD 153426. From Fourier analysis by the method of Valtier (1972), P=0.0496 days and Amp.= $0^m.016$ from the observations for the whole night of 13th June.

It is felt that the HD spectral type may be too early for this star. A median (B-V) =$0^m.11$, V=7.41 has been obtained from observations including the E region standards. This value is uncorrected for reddening.

The period and colour of HD 153747 is suggestive of it being a hot δ Scuti star and it fits the definition of these variables given by Baglin et al. (1973). Using the period-luminosity relationship of Dworak and Zieba (1975) for bright δ Scuti stars, an absolute visual magnitude of $+0\overset{m}{.}5$ was derived implying a distance modulus of $6\overset{m}{.}9$. Using the galactic reddening data of Fitzgerald (1968) for a star of distance 240pc and $l^{II}=347^{\circ}08'$, $b^{II}=1^{\circ}57'$ a reddening of $0\overset{m}{.}08$ is obtained. The unreddened median (B-V) would then be $0\overset{m}{.}03$ corresponding to a mean spectral type of about A1. The HD spectral type of B9 would require a B-V of about $-0\overset{m}{.}06$ and this classification may therefore be too early.

A spectrum obtained on 103a0 emulsion at 60Å/mm at Mount John University Observatory on the 14th August, 1976, showed an early A type spectrum compatible with (B-V) = $+0\overset{m}{.}03$, and not of late B type.

Further analysis of the light variations is to be carried out and will be published elsewhere.



The light curve of HD 153747. Each point represents a single magnitude difference in the sense variable minus comparison.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1258

Konkoly Observatory
Budapest
1977 March 31

ON THE NON-VARIABILITY OF BD +74°877

Since Archer's (1959) observations in 1958, BD +74°877 (HD197617) was thought to be the brightest (m_{pv}=8.5), ultrashort period eclipsing binary known. In the Finding List by Koch et al. (1963) it is assigned a period of $0^d.1846$, a spectral type of A2, and primary and secondary depths of $0^m.3$ and $0^m.2$, respectively. Koch (1963), van Agt and van Genderen (1963), and Hall (1967) observed BD +74°877 photoelectrically but were unable to find any significant variability. Although these negative results are moderately convincing, interest in the star has been renewed because of the superficial resemblance to some post nova or neutron star systems. Further, the light curve observed by Archer (1959), shown in Figure 1, is compelling. The purpose of this note is to exhibit the most convincing set of observations, showing BD+74°877 to be nonvariable, and to develop an argument that Archer's observations were spurious.

This writer obtained simultaneous yellow and blue photoelectric observations of the system on October 4-5, 1976 with the Pennsylvania State University 60-inch reflector. Measurements were made with a 1 second time constant for a duration ($0^d.20$) somewhat longer than the listed period of the system, and alternated between BD +74°877 and the comparison star BD +74°878.The 56 observations of BD +74°877, shown in Figure 2, and BD +74°878 exhibit no variations greater than $0^m.02$.

A detailed examination of Archer's observations (Figure 3) reveals that almost all the observational weight is in the data for March 16-17, 1958. The remaining two nights show no convincing variations, and if it were not for six observations, minima would not be describe at all.

It is interesting to reconsider the evidence which caused BD +74°877 to be described as a variable in the first place. Archer (1958,1959) had been observing several short period variable stars around the time of his observations of BD +74°877, namely VW Cep (P = $0\overset{d}{.}2783$) and VY Leo (P = $0\overset{d}{.}1288$). The data for March 16-17 show an unusual circumstance. On March 14-15 and March 19-20 observations of BD +74°877 were interlaced with VW Cep and their common nearby comparison star, BD +75°7553. However, on March 16-17 no observations were published for VW Cep but yet there time slots interlaced for it. It is suggested that there may have been something unsuitable about the VW Cep data caused by instrumentation or sky problems, and that this also produced the largest scatter in the March 16-17 data of BD+74°877.

In view of all the evidence it seems certain that BD+74°877 should be relegated to the class of a normal, single A2 star.

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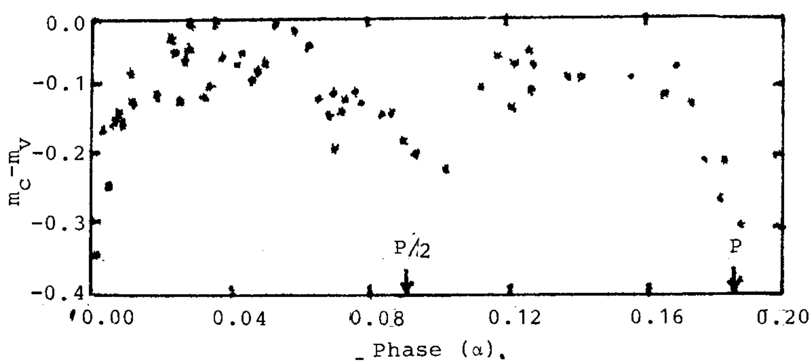

Figure 1: Archer's light curve of 1958

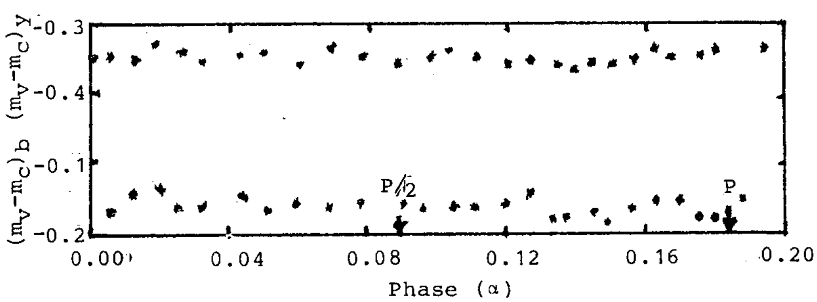

Figure 2 : Observations in 1976

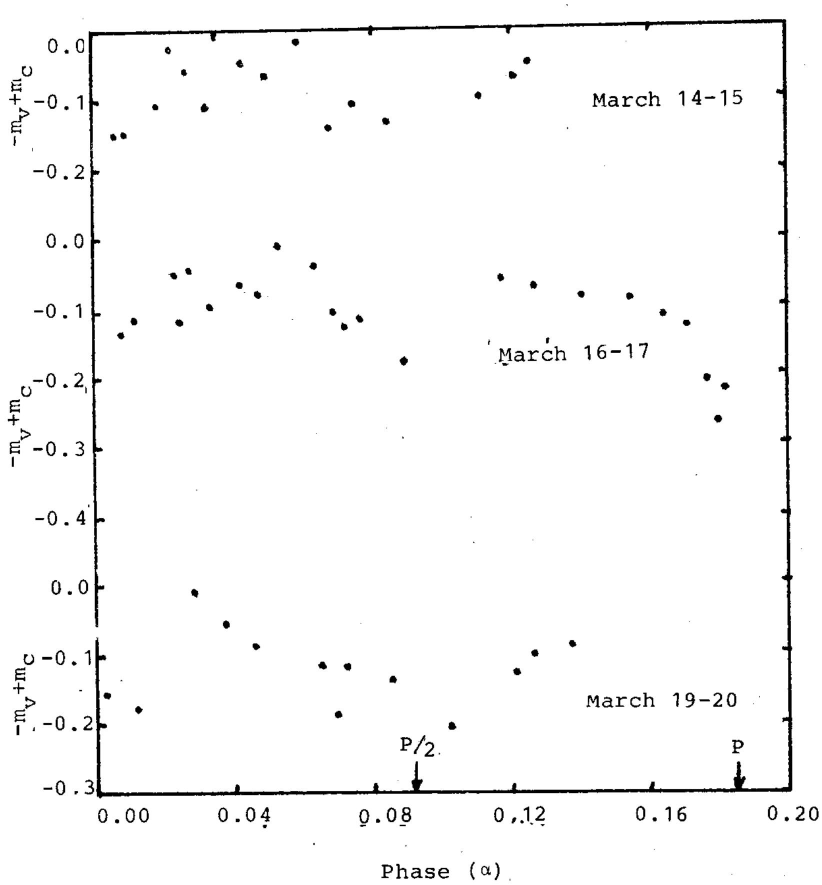

Figure 3; Archer's individual nights

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Number 1259

Konkoly Observatory
Budapest
1977 April 5

PHOTOELECTRIC OBSERVATIONS OF DELTA CETI

Delta Ceti, a β CMa variable, was observed photoelectrically in colours (B) and (V) for a total of seven nights at Ege University Observatory in December 1974, January 1975 and November 1976. The observations made in December 1974, January 1975 and their results were published by Tunca (1975).

The observations were carried out with the 48 cm Cassegrain telescope with an unrefrigerated 1P21 photomultiplier. The properties of the filters used are given in Table 1.

Table 1

Colour	Wavelength (A)	Max. Per. (%)	HW (A)	Thickness (mm)
B	4350	64	920	8
V	5550	53	860	7

BD -0° 378 was again used as the comparison star.

In this work all observations made in November 1976 and the previous ones, Tunca (1975), were again plotted and max. times calculated for each light curve.

The necessary reduction and corrections were made in all observed values. Moreover the systematic errors made in previous observational results were also removed.

The calculated average amplitudes and the (UBV) magnitudes measured on December 11, 1974 were found to be the same as those given by Tunca (1975) and are as follows:

$$\bar{A}(B) = 0\overset{m}{.}034 \pm 2 \qquad \bar{m}(B) = 3\overset{m}{.}939$$
$$\bar{m}(V) = 4\overset{m}{.}144$$
$$\bar{A}(V) = 0.032 \pm 2 \qquad \overline{(B-V)} = -0\overset{m}{.}205$$

Jerzykiewicz (1970) has given the light element for this star as:

Max.Blue Light JD Hel.=2438 385.6860+0.16113800·E.
± 8 ± 25

The calculated max. times due to Jerzykiewicz (1970), our observed max. times and the $(O-C)_{max.t.}$ values in colour (B) are given in Table 2.

Table 2

Obs.max.times	Calc.max.times	$(O-C)_{max.t.}$
2442 393.3472	2442 393.3492	+ $0^d.0021$
419.2921	419.2924	- .0003
428.3146	428.3161	- .0015
430.2497	430.2498	- .0001
431.2182	431.2166	+ .0016
2443 101.3885	2443 101.3897	- .0012
113.3121	113.3139	- .0018

We found no regular variation in the (O-C) values, because there were no sufficient observations available. However, it can be seen that the (O-C) values scatter irregularly about calculated max.times given by Jerzykiewicz (1970) with an approximate amplitude of 0.0025 day.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 April 7

ON THE VISIBLE-BAND POLARIZATION OF HR 1099A

HR 1099 (HD 22468) is also ADS 2644. The bright member of this visual pair has been studied as a double-line spectroscopic binary by Bopp and Fekel (1976) who identify it as the brightest member of the class of RS CVn-type systems (Hall 1977). From the small mass functions, it is clear that eclipses do not occur, but small amplitude light variations observed by Landis and Hall (1976) repeat in a period somewhat shorter than the spectroscopic one. Owen (1976) has shown HR 1099 to be a radio variable at two frequencies.

Since Pfeiffer and Koch (1973) had already shown RS CVn itself to be a polarization variable and since HR 1099 was to be the subject of an intensive observing campaign in the fall and winter of 1976, we decided to add the latter star to the Pennsylvania polarization program. For present purposes the instrument is adequately described in Koch and Pfeiffer (1976), which reference also gives the notation for the journal of observations in Table I. It was never possible to isolate ADS 2644A in the focal plane diaphragm. The effective wavelengths, given in Table I and developed by the procedure expressed in Koch and Pfeiffer, refer, however, to this component. It is not known how much ADS 2644B, which is about 3 magnitudes fainter than ADS 2644A, would alter these effective wavelengths or the polarization parameters. Although it must be admitted that the evidence for the orbital eccentricity is not strong, phases have been computed from the spectroscopic ephemeris:

$$T_o = 2442763.909 + 2.83782E$$

Because the polarization entries of Table I are small and typically less than three times their probable errors, values of Θ_E are not listed in the table.

Within the precision of the measures, no variability exists for the present red, green and blue measures. The only indication of variability occurs for the U-parameter of the ultraviolet observations, and only one night showed a non-zero result.

Since HR 1099 is within 50 parsecs of the sun and near a galactic latitude of -45°, there is likely to be no significant interstellar component of polarization. This is borne out by the summary of Mathewson and Ford (1970). The present observations, therefore, lead to the conclusion that HR 1099 commonly has an intrinsic visible-band polarization no greater than about 0.02%. If one accepts the radii of Bopp and Fekel, the surface-to-surface separation of the component stars is of the order 5 $R_{\odot}$, and an unpolarized condition is consistent with the generality developed by Pfeiffer and Koch (1977).

It is interesting to note that another RS CVn-type binary, AR Lac, (Popper 1976) has also shown no intrinsic visible-band polarization (Pfeiffer and Koch 1977). Of the three members of the RS CVn-type studied thus far, only the prototype has shown intrinsic polarization.

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TABLE I. Linear Polarization Measures for HR 1099.

J.D. (hel.) -2443000	Phase	Q(%)	U(%)	P(%)
λ(eff.) = 7470 Å, FWHM = 210 Å, t = 480 sec., T = 1020 sec.				
64.826	0.040	-0.20(.10)	+0.04(.10)	0.20(.09)
102.655	0.371	-0.16(.13)	-0.39(.13)	0.41(.13)
λ(eff.) = 6570 Å, FWHM = 910 Å, t = 480 sec., T = 1020 sec.				
62.835	0.338	-0.02(.03)	+0.05(.03)	0.05(.03)
102.579	0.344	-0.04(.04)	-0.04(.04)	0.06(.04)
110.569	0.159	+0.00(.02)	+0.03(.02)	0.03(.02)
λ(eff.) = 5390 Å, FWHM = 830 Å, t = 480 sec., T = 1020 sec.				
62.780	0.318	+0.06(.04)	+0.06(.04)	0.08(.04)
102.603	0.352	-0.03(.03)	-0.02(.03)	0.04(.03)
λ(eff.) = 4370 Å, FWHM = 830 Å, t = 480 sec., T = 1020 sec.				
62.808	0.328	-0.08(.04)	-0.03(.04)	0.09(.04)
64.804	0.032	+0.09(.04)	+0.05(.04)	0.10(.04)
66.783	0.729	-0.06(.04)	+0.09(.04)	0.11(.04)
78.713	0.933	-0.01(.04)	+0.10(.04)	0.10(.04)
88.686	0.448	-0.06(.06)	-0.02(.06)	0.06(.06)
99.742	0.344	+0.03(.04)	-0.04(.04)	0.05(.04)
102.627	0.360	-0.00(.04)	+0.04(.04)	0.03(.04)
117.706	0.674	-0.01(.04)	+0.04(.04)	0.04(.04)
λ(eff.) = 3710 Å, FWHM = 290 Å, t = 1920 sec., T = 2800 sec.				
102.687	0.380	+0.17(.20)	-0.18(.20)	0.25(.20)
117.749	0.688	-0.33(.17)	-0.91(.17)	0.97(.17)
200.533	0.859	+0.03(.10)	+0.09(.10)	0.10(.10)

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INFORMATION BULLETIN ON VARIABLE STARS
Number 1261

Konkoly Observatory
Budapest
1977 April 8

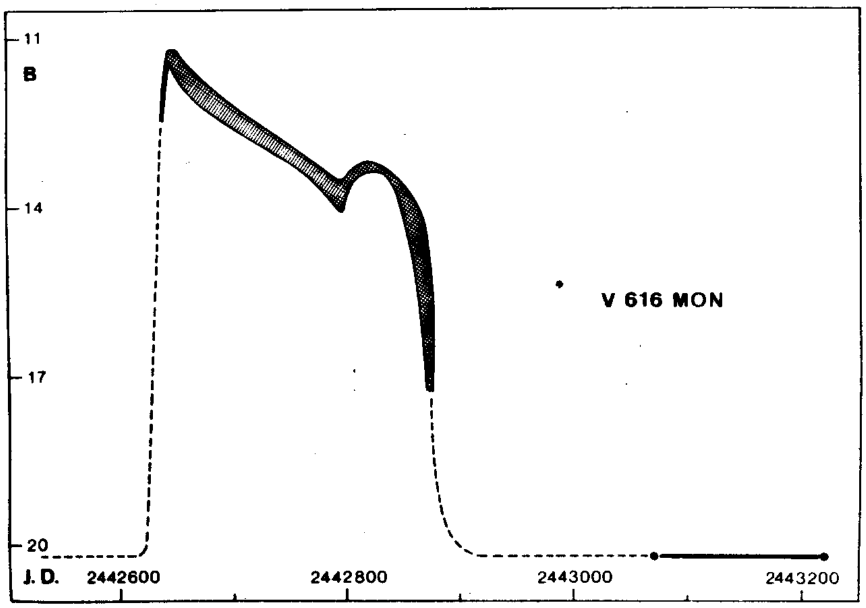
THE OPTICAL COUNTERPART OF A06.20-00 AT MINIMUM

The transient X-ray source A06.20-00 has been identified with a variable star, then named V 616 Monocerotis. The peculiarity of this object is due to its simultaneous X-ray and optical brightening (see e.g. Ciatti et al.,1977). Only another similar case has been recently reported by Murdin et al.(1977).

We recall that the observed properties of V 616 Mon, following the X-ray event, excluded its previous designation as Nova Mon 1975. The most widely accepted model requires a late-type star in binary system, where the increase of about 8 mag is due to optical reverberation of the X radiation originated in a compact companion.

From October 1976 to March 1977 we have obtained a new series of blue, yellow and red photographs of the variable with the 182cm and 122cm telescopes of the Asiago Astrophysical Observatory. On these plates V 616 Mon appears as a star of faint magnitude being again at minimum, as before the outburst. On the Palomar Sky Survey prints (1955) it shows almost the same brightness when compared with nearby stars. We have thought of interest to measure its magnitude and color in this phase, to have a better picture of its normal characteristics , lacking spectroscopic observations at this low luminosity.

We have used as comparison stars those in the clusters NGC 2158 (B and V) and NGC 2236 (R), for which photometric data are published by Arp and Cuffey (1962)



and Rahim (1970). The following magnitudes have been derived with the Becker iris photometer :

$$B = 20.20 \quad , \quad V = 18.25 \quad , \quad R = 17.00$$

At this magnitude level, the estimated error of our measurements is ±0.20 mag, but for the visual (±0.35 mag) for which we have only one plate.

The given values are to be compared with those reported for the star before maximum, as follows :

$B \sim 20.5$, $B-R \sim 3.6$	eye estimate(±0.5 mag)	Ward et al.	(1975)
$R \sim 17.5$	eye estimate	Boley et al.	(1976)
$B = 20.2 \pm 0.3$	compar.with NGC 2158	Eachus et al.	(1976)

With the present data we can improve our previous estimate on the nature of V 616 Mon. If we assume an interstellar extinction of E_{B-V}=0.4 mag (Wu et al., 1976), the corrected color index results indeed $(B-R)_0 = +2.5$ corresponding to that of a normal main sequence star of spectral class K 8 at the distance of 620 pc. Although of lower weight, the color (B-V) is within the errors consistent with this statement. The hypothesis of a giant star, with a much larger distance outside our galaxy, is to be excluded.

In the Figure we show the blue light curve of the variable (1975-1977), as obtained collecting all the data available in the literature and our minimum observations.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1262

Konkoly Observatory
Budapest
1977 April 8

HV 1707: A VARIABLE CARBON STAR IN THE SMALL MAGELLANIC CLOUD

On deep blue and red-sensitive objective-prism plates of the Small Magellanic Cloud, taken with the Curtis Schmidt telescope at the Cerro Tololo Inter-American Observatory, we recetly noted a 16th magnitude carbon star showing very strong Hα emission. This object appears as SMC nebula N60 in the catalog of Henize (Ap.J. Suppl.2, 315, 1956) and corresponds to no.323 in the catalog of Lindsay (A.J. 66, 169, 1961) where it is considered to be a probable planetary nebula. The Harvard X and Y coordinates given by these authors indicate that this star, undoubtedly, is HV 1707 and might be expected to be a long-period variable. It may have been near minimum light when observed by both Henize and Lindsay and thus the apparent lack of a continuum gave it a nebular appearance. We have provided an identification chart for this interesting object which has an appropriate apparent magnitude to be considered as a highly probable SMC member.

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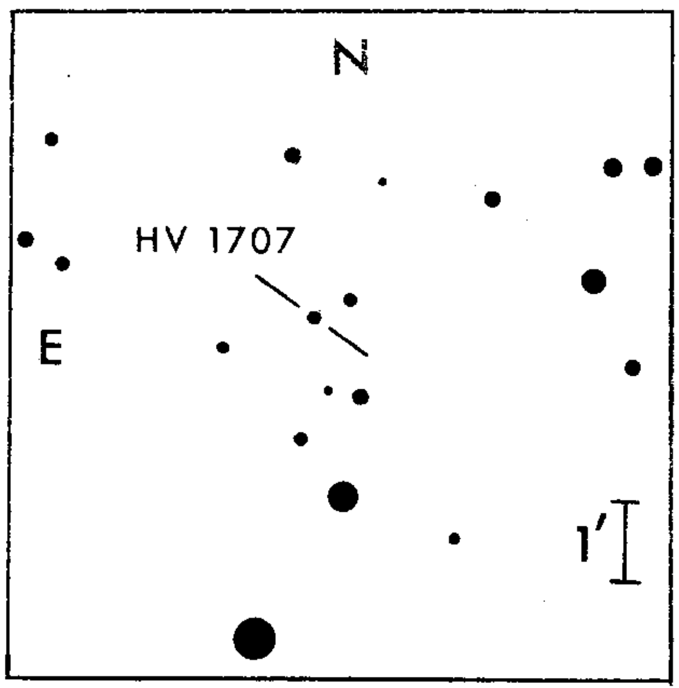
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COMMISSION 27 OF THE I. A. U.
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Number 1263

Konkoly Observatory
Budapest
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STATISTICS ON FLARE OBSERVATIONS OF UV Cet, YZ CMi AND AD Leo AT THE UTTAR PRADESH STATE OBSERVATORY

The flare stars UV Ceti, YZ CMi and AD Leo were photoelectrically monitored between 27 Dec. 1970 and 10 Dec. 1975. The instrumental details, the individual flare characteristics along with the light curves and actual monitoring intervals have been published variously (Ref.1-11). A consolidated summary of the results obtained so far is given in Table I.

The observed flare events show a large range in total energy, flare magnitude, rise and decay rates, duration etc. But the following significant conclusions can be drawn:

I. The mean energy per flare increases with increasing intrinsic quiescent luminosity of the parent star.

II. Intrinsically brighter flare stars have more energetic but less frequent flares.

III. The rise times become more rapid as the quiscent energy of the parent star decreases.

IV. Most of the flare light curves are either combinations of spike and slow flares or else successive flare events are overlapped, supporting the view that energy can be added at various times during the development and decay of a flare event rather than its just being an abrupt rise to a maximum followed by slow and exponential decay.

V. Flares with greater energy release occasionally last longer. It is not clear whether all of the energy lost during an event is lost by a few strong events or numerous weaker events. Observations with better time resolution can perhaps answer this question.

In addition to the above stars EV Lac (dM4.5e; m_V=10.25)

Table I

Star	Spectral type	m_v	Filter	Total nights of observing	Total monitoring interval (hours)	No. of flares detected	Mean interval between flares (hours)	Energy range of flare events 10^{30} ergs	Quiescent energy 10^{28} ergs/sec	Mean energy per flare 10^{30} ergs	Mean flare duration (min)	Mean rise time (min)
UV Ceti	dM5.5e	12.95	B	5	11.6	17	0.7	1.2-.07	0.73	0.26	5.6	0.5
YZ CMi	dM4.5e	11.24	B	36	103.8	20	5.2	22.0-0.8	20.6	8.2	9.5	0.8
AD Leo	dM3.5e	9.43	B	39	90.2	13	6.9	70.6-1.0	82.0	14.0	10.6	1.9
	Total:			80	205.6	50						

too was monitored for a total of 16.6 hours, during which only two flares were recorded. Due to the paucity of flares of this star it would not be correct to base any conclusions on statistics pertaining to this star.

Part of this work was carried out under Smithsonian Institution Project No. SFG-0-6425, which project now stands completed.

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THE ACCELERATION OF THE ROTATION OF DQ Her

In addition to irregular intensity variations on timescales of minutes, DQ Her shows fluctuations of its 71-s-phase from night to night and from month to month which make it difficult to count the number of elapsed periods if the observing seasons are shorter than the gaps between them. The published data as well as observations made at the 60-cm-refractor and (1977 only) the 1-m-reflector at Hamburg-Bergedorf lack the continuity which would be necessary to evaluate the basic properties of this long-term phase noise, they are, however, sufficient to establish a consistent period count from 1967 to 1977.

Fig. 1 shows the residuals

$$O-C= \varphi_o + (t-t_o)\nu_o + (t-t_o)^2\dot{\nu}_o/2 + (t-t_o)^3\ddot{\nu}_o/6 - N,$$

where t is the heliocentric ephemeris time of the light maximum, φ_o the phase constant, ν_o the frequency, $\dot{\nu}_o$ ($\ddot{\nu}_o$) its first (second) timederivative at $t=t_o$, and N the integer number of elapsed periods. The elements used for plotting the observations are given in Table 1, column "initial".

Three least-squares fits to the residuals are shown in Fig.1 and Table 1:

"Q 67-77" (short dashes): second order polynomial for 1967-1977,

"C 56-77" (long dashes) : thirs order polyn.for 1956-1977,

"Q 56-77" (dash-dots) : second order polyn. for 1956-1977.

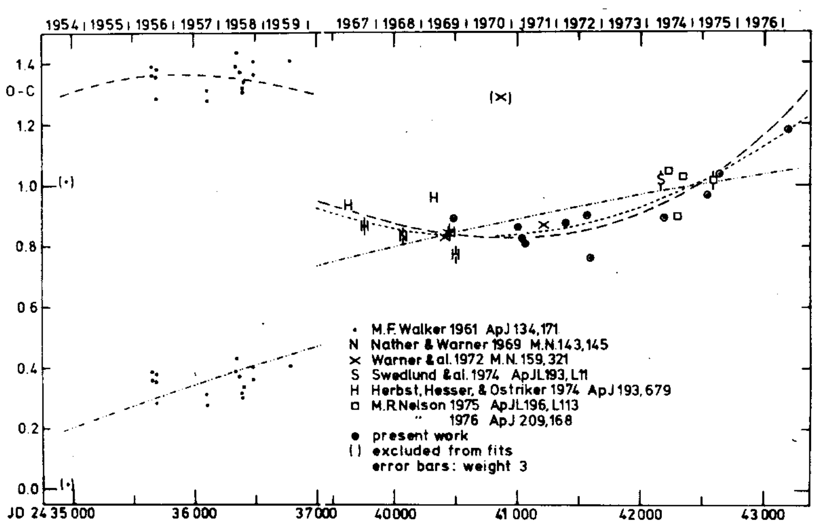
Weight 1.0 has been assigned to observations of about two hours, weight 3.0 to observations of six hours or more. For both second order solutions adding a $\ddot{\nu}$-term did not reduce the residuals significantly. Both the smaller standard deviation of C 56-77 and the agreement with Q 67-77 within the internal error limits indicate that C 56-77 should be preferred to Q 56-77, but we cannot rule out Q 56-77 completely. Only another five years of continued observation or data between 1959 and 1967 can remove the ambiguity.

The short timescale $\dot{\nu}_o/\ddot{\nu}_o \approx -50$ years of C 56-77 compares well with the time since the nova outburst (1934-1969=-35y) and suggests that the acceleration of the rotation is a shortlived phenomenon associated with this outburst.

Table 1: Elements

t_o=2440 322.87022 $JED_{\odot}$ (Herbst, Hesser, and Ostriker 1974, ApJ 193, 679)

	initial	Q 67-77	C 56-77	Q 56-77	
φ_o	0.0	-0.839±11	-0.849±11	-0.829±15	(periods)
ν_o	1215.779	.779039 ±20	.779068 ±11	.778909 ± 7	(d^{-1})
$\dot{\nu}_o/2$	0.500	0.445±10	0.453± 3	0.505± 2	($10^{-6}d^{-2}$)
$\ddot{\nu}_o/6$	0	0	-8.3 ± 1.1	0	($10^{-12}d^{-3}$)
standard deviation		0.049 3.5	0.053 3.7	0.069 4.9	(periods) (s)



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INTERMEDIATE BAND LIGHT CURVES FOR FIVE SOUTHERN HD STARS

Introduction:

In the course of obtaining intermediate band photoelectric light curves for 16 southern Wolf-Rayet stars during a run in Feb/March 1975, seven of the 26 comparison stars used were found to be low amplitude variable stars. A search of the literature at the end of 1975 revealed that only one of these seven stars was previously known to be variable (HD 93206=Var.No.6797 in Carina). Two of the seven stars have been discussed elsewhere (HD 58360 = ηCMa: Moffat, 1977; HD 114911 = ηMus: Moffat and Seggewiss, 1977). This communication presents the photometric results for the remaining five stars (listed in Table 1) along with their respective comparison stars. These comparison stars are of constant magnitude within the attained observational accuracy, as verified by intercomparison of magnitudes obtained during the same nights.

The Observations

Measurements were obtained, normally one per night, over an interval of 37 days. A diaphragm of diameter 18" was normally used in the one channel dry-ice cooled photometer attached to the 61 cm Bochum telescope located on La Silla, Chile. The filters used are listed in Table 2: they were chosen to isolate certain features (emission line or continuum) in the spectra of Wolf-Rayet stars. Integration times ranged from 30 to 60 sec per filter depending on the magnitude. The air mass was always <1.5 but normally $\lesssim$1.2 for all observations. The internal r.m.s. deviation of one observation was normally $\pm 0\overset{m}{.}003$ increasing to $\pm 0\overset{m}{.}006$

for the fainter stars. The r.m.s. scatter after systematic correction for the light curve was usually $\pm 0\overset{m}{.}007$ for one data point, which comprises the difference in magnitude or colour between 2 stars. This value increased to $\pm 0\overset{m}{.}015$ for the faintest magnitudes. UBV photometry (one observation for each star) obtained with the same telescope is also listed in Table 1. These data are subject to variability but still give a good indication and check on the spectral type. A journal of magnitudes (in F3 or F4) is given in Table 3 for 4 of the 5 variable stars; data for HD 96829 are excluded from the Table because no period was found for this low amplitude variable. Using all the magnitude information in turn, periods were searched for the remaining 4 periodic variables using the method of Lafler and Kinman (1965). The light curves resulting from the most likely periods so obtained are plotted for these 4 stars along with HD 96829 in Figs. 1-5. In Table 4 is presented a résumé of some parameters for each of the 5 variable stars.

Brief Description of Individual Stars

(1) HD 86441

This star was always measured with a near, faint, visual companion in a diaphragm of diameter 28". Being 5 magnitudes fainter than HD 86441, the companion is not likely to be responsible for the magnitude variation. The best period is P = 5.73 days; the light curve with period 2P also shows 2 minima but has other bumps making it unnecessarily complicated. Other alias periods shorter than that corresponding to the Nyquist frequency ($\sim$0.5 day^{-1}) produce even less plausible looking light curves. It appears that HD 86441 is an eclipsing binary with distortion, implying that the radii of the stars may be larger than that estimated for normal dwarfs in Table 4.

(2) HD 93206

At the time of observation, the author was unaware of the eclipsing nature of this star as noted by Walker & Marino (1972) who derived a period of 6.000 ± .007 days from 51 observations spread over 10 months. The present data (34 observations spread over 37 nights) yield the best median period of 5.98 days which is so close to an integral number of days, that the light curve is rather ill determined. However, since colour variations appear to be negligible we can combine the previous V data with the present F3 data. On this basis we were able to sketch in the light curve with some confidence in Fig.2. All data together yield an improved period of 5.986 ± .001 days. The only other possible period, 6.011 days, although compatible with the previous observations, appears to be inferior for the present observations.

(3) HD 96829

Only a slow variation of $\Delta m{\sim}0^{m}_{\cdot}02$ over 36 days has been observed for this star with no indication of a period.

(4) HD 115599

Any other periods besides 0.6755 days (e.g. its aliases) produce more complex, implausible light curves. With amplitude increasing from $0^{m}_{\cdot}07$ in the red (F3) to $0^{m}_{\cdot}14$ in the blue (F1), this star appears to be a pulsating variable, probably of the short period Cepheid type or, if population II, of the RR Lyrae type.

(5) HD 152235

Both this star and its comparison star HD 152003 are likely members of the O type cluster in Scorpius NGC 6231 or of its surrounding association Sco OB1. Neither of them is mentioned in the work on spectroscopic orbits of luminous stars in NGC 6231 by Hill et al. (1974). The best period given here ($2^{d}_{\cdot}63$) is only marginally better than the period 6.20 or 6.85 days which also yield simple, single-minimum light curves. It is also not possible to exclude periods of double these lengths, having 2 minima per cycle. The period $2^{d}_{\cdot}63$ is close to the critical period for contact (cf. Table 4), assuming both stars to be moderate supergiants. The relatively large residual scatter in the light curve may be a consequence of this.

Final Remarks

From the 36 originally chosen comparison stars, all the 7 variable stars detected have small amplitudes - less than $\sim 0^{m}_{\cdot}1$, which is small enough to have escaped previous discovery by photographic techniques. This high yield of variables in interesting in itself since the 26 stars were chosen without bias. Four of the seven variables appear to show low-inclination eclipses (or ellipsoidal variations) in the light curves. Since most binaries will have inclined orbital planes which are non conducive to yielding eclipses, this lends support to the commonly accepted hypothesis that a large fraction of all stars are binaries.

Acknowledgements

This work was carried out while I was at the Ruhr University, Bochum, F.R. Germany. I wish to express my gratitude to the director, Th. Schmidt-Kaler, for generous allotment of observing time and to the Deutsche Forschungsgemeinschaft for its grant of the telescope and equipment.

Table 1: Stars observed

HD		Sp.(HD)	V	B-V	U-B	Sp.(UBV)
86441**	variable	B9	7.49	-0.02	-0.55	B4(V),B8(Ib)
86199	comparison	B9	6.76	-0.14	-0.48	B6(V)
93206	variable	B0 Ib:*	6.32	0.14	-0.83	OB
93222	comparison	O7*	8.10	0.05	-0,90	OB
96829	variable	B3III*	7.32	0.24	-0.66	B1(III)
96970	comparison	A0	8.20	0.19	0.18	A
115599	variable	A2	9.00	0.21	-0.18	B7 (V)
115496	comparison	G5	8.61	0.66	0.15	G
152235	variable	B0.5 Ia*	6.34	0.54	-0.48	OB
152003	comparison	B0 I*	7.05	0.39	-0.63	OB

*Sp from LSS catalogue (Stephenson and Sanduleak, 1971).

**observed with a near faint companion star (V=12.55,B-V=0.46, U-B=0.33).

Table 2: Filters

Designation	<λ>	Half-width	mean terr. extinction coeff.
F1	3635 Å	70 Å	0.485 mag/air mass
F2	4680	130	0.183
F3	5170	190	0.139
F4	5640	110	0.115

Table 3: Magnitudes [m(var) - m(comp)] and times of four variable stars

(1) HD 86441		(2) HD 93206		(3) HD 115599		(4) HD 152235	
J.D. -2 442 400	m(F4)	J.D. -2 442 400	m(F3)	J.D. -2 442 400	m(F3)	J.D. -2 442 400	m(F3)
47.6906	0.737	47.8087	-1.817	48.7842	0.305	48.8680	-0.617
48.6072	0.755	48.6955	-1.616	49.8589	0.263	52.8451	-0.647
49.6708	0.753	49.7560	-1.821	53.8254	0.259	53.8662	-0.637
51.6420	0.839	51.7198	-1.668	54.8536	0.332	54.8805	-0.637
52.6807	0.782	52.7250	-1.834	55.8355	0.260	55.8845	-0.667
53.6559	0.749	53.7069	-1.820	56.8256	0.326	56.8855	-0.623
54.6859	0.776	54.7713	-1.605	57.8514	0.274	57.8796	-0.684
55.7063	0.751	55.7755	-1.838	58.8324	0.335	58.8592	-0.710
57.7380	0.837	56.7589	-1.848	59.8556	0.289	59.8819	-0.656
58.7275	0.735	57.7805	-1.657	60.8345	0.346	60.8872	-0.637
59.7537	0.771	58.7669	-1.826	62.8594	0.330	61.8852	-0.642
60.7244	0.773	59.7931	-1.811	63.7785	0.318	62.8909	-0.674
61.7166	0.767	60.7655	-1.621	66.8004	0.284	63.8775	-0.636
62.6245	0.834	61.7327	-1.820	68.8753	0.332	64.8882	-0.637
63.5962	0.824	62.6676	-1.837	70.8584	0.300	65.8792	-0.682
64.5827	0.739	63.6442	-1.656	71.8456	0.313	66.8920	-0.645
65.5577	0.767	64.6271	-1.837	79.8127	0.321	67.8944	-0.638
66.5998	0.778	65.6346	-1.827	84.8034	0.295	68.8947	-0.667
67.7167	0.794	66.7306	-1.638			69.8758	-0.614
68.7558	0.841	67.7629	-1.837			70.8993	-0.664
69.7490	0.781	68.7984	-1.851			71.8840	-0.658
70.6335	0.741	69.7645	-1.683			72.8986	-0.651
71.5521	0.776	70.7654	-1.840			73.8947	-0.642
72.6254	0.764	71.5971	-1.827			74.8965	-0.597
73.5948	0.780	72.6416	-1.613			75.8927	-0.577
74.6367	0.831	73.6116	-1.806			78.8912	-0.668
75.6747	0.777	74.6768	-1.850			83.9057	-0.647
77.5864	0.843	75.6886	-1.657				
78.6825	0.729	77.6558	-1.830				
80.7531	0.811	78.6982	-1.619				
81.6655	0.746	80.7690	-1.836				
82.6576	0.782	81.7655	-1.680				
83.6703	0.790	82.7046	-1.845				
84.6526	0.755	84.6981	-1.617				

Table 4: Parameters of the Variable Stars

HD	Periods Searched	R_1+R_2	m_1+m_2	P_{min}*	P*	J.D.-2 442 400 T_o*	Depth prim.	Depth sec.	Type
86441	$0^d_.8-25^d$	$7R_\odot$	$10M_\odot$	$0^d_.7$	$5^d_.73\pm 0^d_.04$	68.79±0.05	$0^m_.10$	$0^m_.05$	eclipsing
93206	1.8-15	30	60	2.4	5.98±(0.10)	72.64±0.10	0.09	0.07	eclipsing
96829	-	-	-	-	-	-	$\Delta m \simeq 0^m_.02$ in 36^d		?
115599	0.4-15	5	6	0.5	0.6755±0.0005	60.84±0.03	$0^m_.07$	-	Cepheid?
152235	0.4-20	30	60	2.4	2.63±0.05	69.86±0.10	$0^m_.05$	-	eclipsing?

* P_{min}= minimum period of a binary with estimated sum of radii (R_1+R_2) and masses (m_1+m_2) using Kepler's third law.

P = most likely period based on the present data

T_o= epoch of primary minimum (phase zero).

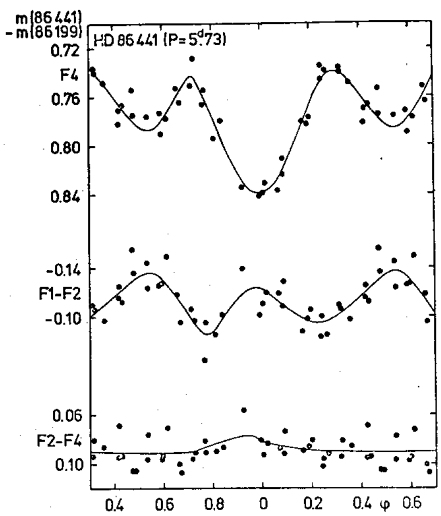

Fig. 1 Light curve of HD 86441

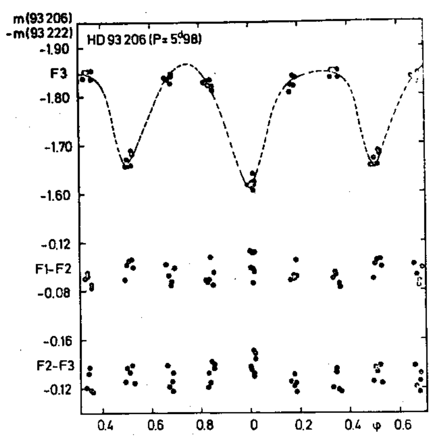

Fig. 2 Light curve of HD 93206

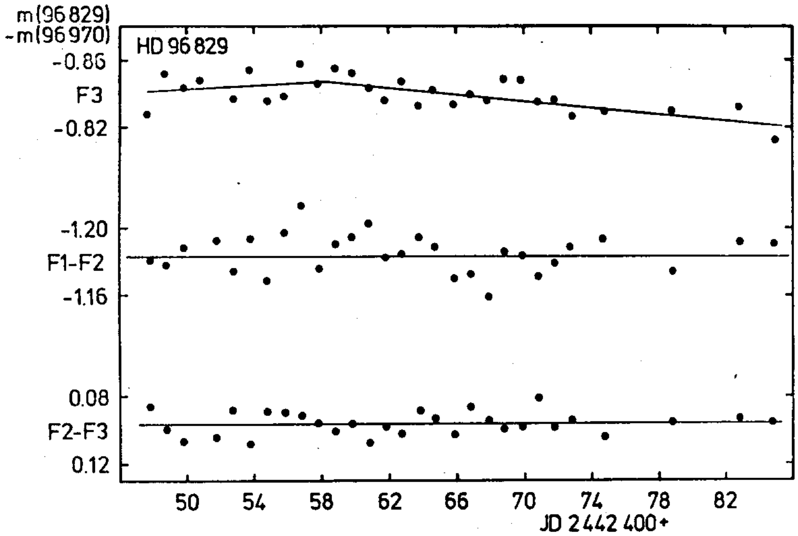

Fig. 3 Light curve of HD 96829

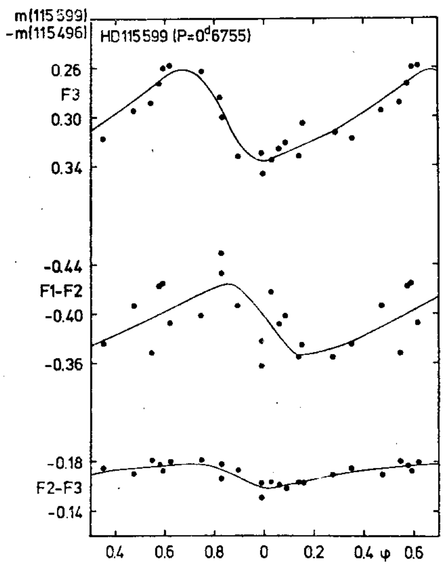

Fig. 4 Light curve of HD 115599

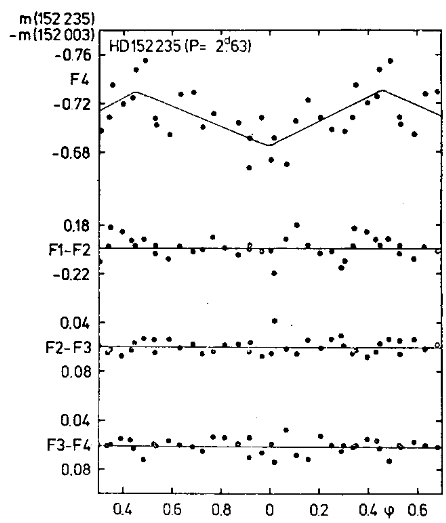

Fig. 5 Light curve of HD 152235

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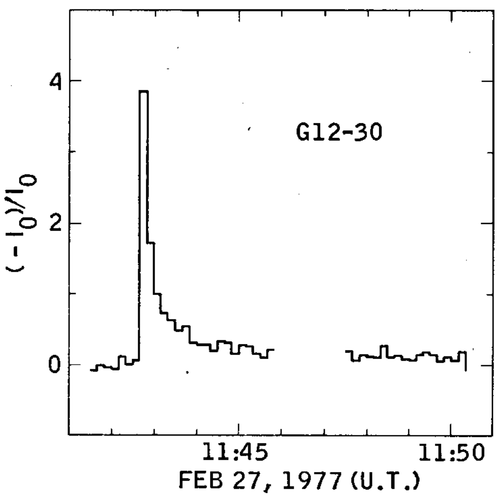
FLARE ACTIVITY ON G12-30

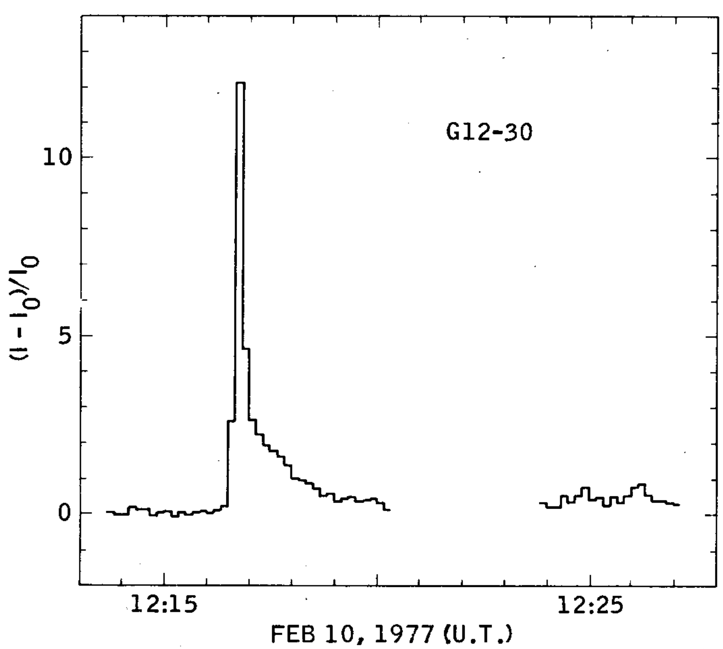
We have observed two prominent flares on the star G12-30 ($\alpha = 12^h16^m31^s$ $\delta = 11^o24.0'$,1950) during seven nights of monitoring it as part of a survey of nearby late M dwarfs.Photometric observations were made in the B-band of the UBV system using the 60-inch (1.5 m) telescope of the Hale Observatories at Mt. Wilson. Time resolution was limited to ten-second integrations. The sky background was measured at three minute intervals. After subtracting the sky background, the signal was ratioed to the quiescent state of the object. A total time of 14.6 hours was spent intergrating on the object itself during the periods February 9-11 and February 26 - March 1, 1977 (UT).
Harrington et al. (1975) list the following data for G12-30:

$$m_V = 13.79$$
$$B-V = 1.83$$
$$\pi = 0.151''$$

which implies that the object is a late M dwarf. Image tube spectra previously obtained by Veeder (unpublished) indicate a late M type with strong Hα in emission. Thus, G12-30 is probably a UV Ceti type flare star.

This paper presents the results of one phase of research carried out at the Jet Propulsion Laboratory, California Institute of Technology, under contract NAS 7-100, sponsored by the National Aeronautics and Space Administration.





GLENN J. VEEDER*

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1267

Konkoly Observatory
Budapest
1977 April 18

ETOILES VARIABLES PROCHES

Le "Catalogue of nearby stars" de Gliese (1969) contient de nombreuses étoiles dont la variabilité est reconnue ou suspectée. J'ai publié récemment (Petit 1976,1977) deux listes de variables suspectes ayant une parallaxe supérieure à 0"045.

Voici une nouvelle liste de 32 étoiles proches, dont la variabilité est probable. La première colonne donne la numérotation du catalogue de Gliese, d'où sont extraits aussi la position (1950) et les renseignements concernant V, B-V et le type spectral.

Parmi ces étoiles, il y a 6 géantes K ou M (Gl 31,53.3,84.3, 470, 511.2 et 639.1) qui sont probablement des variables semi-régulières ou irrégulières de faible amplitude; il y a aussi plusieurs étoiles de spectre dG ou dK présentant un spectre d'émission. Enfin, 11 étoiles (Gl 82, 157, 205, 268, 469, 611.3, 617, 766, 802, 831 et 887) sont du type dMe; elles n'ont pas encore été observées photoélectriquement, mais dans la plupart des cas leur variabilité n'est guère douteuse; elles appartiennent probablement aux types UV et BY.

MICHEL PETIT

Gl	Designation	A.R.	Dec.	V	B-V	Sp
31	β Cet	$0^h41^m05^s$	-18°15'6	2.02	1.01	K1 IIIe
36	-23°515	0 46 57	-23 29 2	7.15	0.79	dG7
53.3	β And	1 06 55	+35 21 4	2.05	1.57	MOIIIe
82	AC+58°13565	1 55 54	+58 16 9	12.1		dM4e
84.3	α Ari	2 04 21	+23 13 6	2.00	1.15	K2IIIe
90	+67°191	2 11 35	+67 26 6	7.22	0.92	K3V
137	ϰ Cet	3 16 44	+ 3 11 3	4.84	0.68	G5V
157	-1°565 B	3 54 57	- 1 18 0	11.48	1.52	dM3e
194	α Aur AB	5 12 59	+45 57 0	0.08	0.80	G5IIIe
205	-3°1123	5 28 55	- 3 41 1	7.97	1.47	MIVe
227	+15°1065	6 03 49	+15 33 0	7.23	0.81	dKO
268	AC+38°23616	7 06 39	+38 37 5	11.48	1.71	dM5e
404.1	-58°3625	10 51 27	-58 35 2	3.78	0.95	KOIII-IV
423	ξ UMa AB	11 15 31	+31 48 6	3.79	0.59	GOV
434	+35°2270	11 38 25	+34 29 0	5.34	0.74	G8V
469	Wolf 414	12 26 27	+ 8 42 4	12.00		dM5e
470	γ Cru	12 28 53	-56 50 0	1.63	1.59	M3III
511.2	-15°3668	13 24 47	-15 42 9	4.75	1.10	K1 III
611.3	L 1130-30	16 04 18	+ 8 31 2	11.6		dM3e
615.1	-13°3091 AB	16 10 58	+13 09 6	6.68	0.77	dKO
617	+67°935 A	16 16 37	+67 21 5	8.62	1.41	MOVe
620.1	-38°10983	16 20 38	-39 04 7	5.39	0.64	dG5
639.1	ε Sco	16 46 55	-34 12 3	2.28	1.16	K2III-IV
672	+32°2896	17 18 46	+32 31 9	5.39	0.62	G2V
703	+15°3364	18 05 08	+15 56 6	8.66	0.66	G6
766	Ross 165 AB	19 43 03	+27 01 2	12.6		dM4.5e
780	δ Pav	20 03 50	-66 18 7	3.55	0.76	G8V
802	Wolf 1084	20 41 53	+55 08 8	15.1		dM5e
831	Wolf 922	21 28 34	-10 00 6	11.95	1.64	dM4.5e
887	-36°15693	23 02 39	-36 08 5	7.36	1.46	M2Ve
892	+56°2966	23 10 52	+56 53 5	5.57	1.00	K3V
903	γ Cep	23 37 17	+77 21 2	3.21	1.03	K1 IV

Remarques

31 CSV 100058
36 V varie de 0.10 m; B-V de 0.74 à 0.90; type inconnu
53.3 CSV 100088
82 Ross 15= CSV 102364 type BY possible
84.3 CSV 100163
90 semble varier de 0.07 V
137 CSV 6022; variation dans le rouge et l'infrarouge (0.10m) spectre d'émission; peut être du type RW Aur
157 suspectée par Slee et Higgins (1963)
194 CSV 100460; variation suspectée antérieurement (Zinner 1929) réobservee par Jackisch (1963); ΔV=0.03
205 CSV 6182; type BY possible (Petit)
227 semble varier de 0.5v; spectre avec émission de CaII
268 Ross 986= CSV 102544; binaire spectroscopique; variations d'intensité des raies brillantes; type BY probable (Petit 1971)
404.1 CSV 6804; varie de 3.76 à 3.80 V (Stoy 1959); type inconnu
423 Le couple varie de 0.03 V (Jackisch 1963); spectre d'emission
434 CSV 101212; spectre d'émission
469 soupçonnée par Petit (1968); me parait visuellement variable; type UV possible
470 CSV 101285; suspectée antérieurement (Zinner 1929); redécouverte par Strohmeier (1966); Δpg 0.30; probablement irrégulière

516.2 CSV 101385
611.3 suspectée par Petit (1970)
615.1 CSV 102788; varie de 0.09m (Hill et Schilt 1952)
617 CSV 102797; variations de spectre; pourrait être du type BY (Petit 1971)
620.1 semble varier de 0.07 V
639.1 CSV 101607
672 CSV 101646; varie de 0.4m, type inconnu
703 semble varier de 0.10 V
766 variation du couple signalée par Baize (1966), confirmée par des observations visuelles (Petit); amplitude 0.5m; type UV possible
780 CSV 8399 découverte par Eggen (1955), confirmée par Evans Menzies et Stoy (1957); varie de 3.52 à 3.65 V; type inconnu
802 suspectée par Petit (1970) Δpg 0.6; type UV possible
831 variations de faible amplitude (0.2m) peut être periodique; type BY possible (Petit 1971)
887 CSV 8819 soupçonnée par Cousins (1961) ΔB=0.08; type BY probable
892 CSV 8823 variation faible (0.02B) mais confirmée par divers auteurs (Hiltner 1954, Yates 1954, Oke 1957); spectre avec CaII en émission; type inconnu.
903 CSV 102274; spectre d'émission

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1268

Konkoly Observatory
Budapest
1977 April 19

PHOTOELECTRIC PHOTOMETRY OF FG SAGITTAE

The variable was observed on 12 nights with the 40 cm. reflector of the Harvard College Observatory (Agassiz Station) differentially with respect to HDE 351698 and reduced to the (U,B,V) system. Measures of HDE 351698 on five nights gave V = 8.93, B-V = +0.97, and these values were used to reduce the measures of FG Sge. The results are given in the following table.

Observations of FG Sge

1976 Date (UT)	V	B-V	1976 Date (UT)	V	B-V
Nov. 9.07	9.33	+1.46	Nov. 21.01	9.17	+1.57
11.03	9.22	1.54	28.00	9.10	1.41
12.05	9.27	1.54	Dec. 1.02	9.13	1.43
14.05	9.21	1.56	1.93	9.00	1.43
14.98	9.22	1.46	3.98	9.04	1.43
17.02	9.21	1.53	5.98	9.05	1.36

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 April 19

REQUEST FOR PHOTOMETRIC OBSERVATIONS OF U CEPHEI

From summer, 1974 to late 1976, U Cep has undergone a series of transient mass-transfer event. These were accompanied by major photometric anomalies inside and outside primary eclipse (Olson, 1976, 1977a). Evidence has been found for an H^- emission shell around the cool component (Olson, 1977b). Large brightness variations on time scales of hours to months were observed during much of this interval. In an attempt to fill in large gaps in the observations, I am soliciting all photoelectric filter photometry made during the above interval. Experience suggests that even fragmentary observations, at any orbital phase, maybe of assistance.

Please identify comparison stars and include magnitudes (if available, and if HD 6006 was not used). If photometry is non-standardized, include effective wavelengths of filter-photomultiplier combination. Indicate also if the nearby visual companions were excluded from the observations. Any observations received will be properly acknowledged.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1270

Konkoly Observatory
Budapest
1977 April 21

PHOTOMETRY OF HD 153747

HD 153747 was found to be variable by McKay (1973) and tentatively identified as a δ Sct star by McInally and McKay (1977).

We observed the star for five hours on the night of 1976 August 23 on the 60 cm telescope at the Mt John University Observatory. Observations were made using the multicolor photometer described elsewhere (Bringans, Sullivan and Trodahl 1974), modified to include three discrete filters admitting 100 Å wide bands centered on 3400 Å, 3500 Å and 3600 Å. The comparison star was HD 153767.

Because the amplitude of the light curve is relatively small we have averaged our data over a number of bands, resulting in three approximately square effective transfer functions covering the wavelength ranges of 3350 - 3650 Å, 3900 - 4400 Å and 4550 - 5050 Å. In order to minimize differential extinction the averaging over adjacent passbands was done after making extinction corrections.

The results are shown graphically in Figure 1. The amplitude in the blue band varied from about 0.01 magnitudes early in the night to almost 0.04 magnitudes shortly before the star set. The colour indices show little variation, though there is a suggestion the star is bluer at maximum light than at minimum.

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Bringans, R.D., Sullivan, D.J., and Trodahl, H.J., 1974, Publ.Astr.Soc. Pacific, 86, 693
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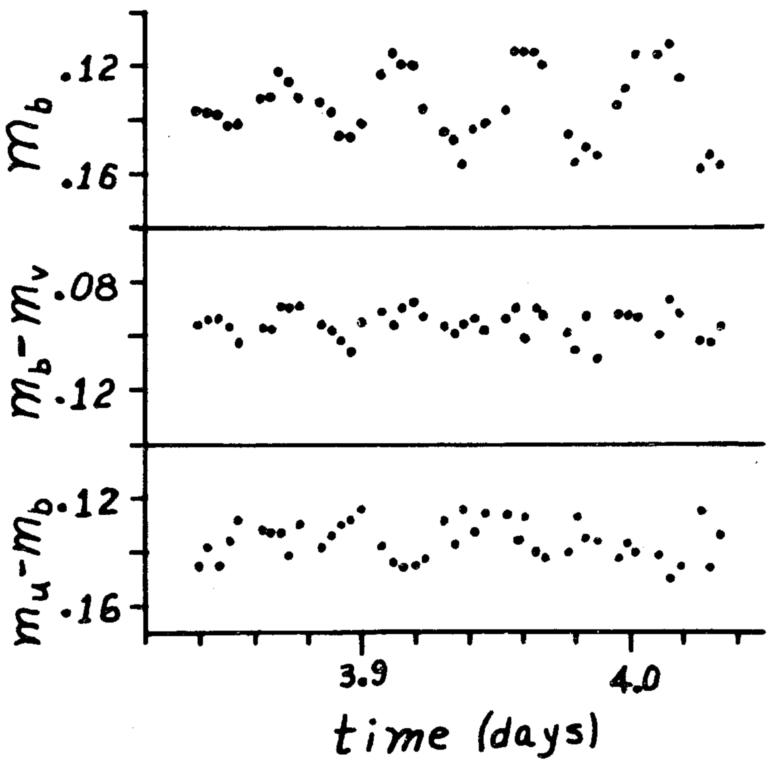

Fig.1 Magnitude and colour variations.

m_u, m_b, m_v refer to the magnitudes in the ultraviolet (3350 - 3650 Å), blue (3900 - 4400 Å) and visual (4550 - 5050 Å) mentioned in the text.

The time is given relative to JD 2443010. All magnitudes given are relative to the standard star,

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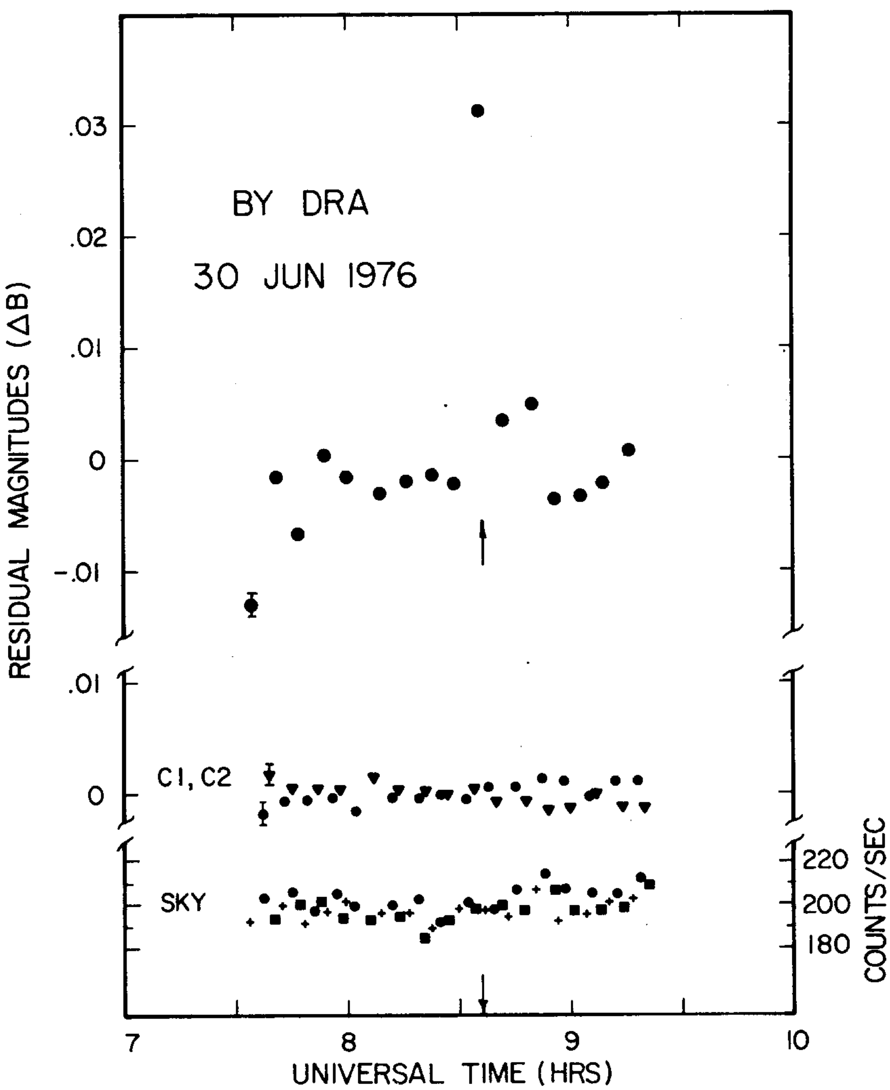
Number 1271

Konkoly Observatory
Budapest
1977 April 25

A FLARE EVENT ON THE dM0e VARIABLE BY DRACONIS

As part on an ongoing program to obtain a body of high quality photometric data on the flare star BY Draconis, a series of observations was undertaken during the past year (1976) in order to time-resolve the reported light variations. The behavior of BY Dra has been interpreted in terms of a binary system (non-eclipsing) wherein an apparent rotational modulation of the integrated luminosity has been attributed to the existence of starspots on one of the components, after Vogt (1975). Thus, it is of considerable interest to determine whether further observations support such a hypothesis and indeed verify the existence of starspots. During the course of obtaining additional observations, a prominent flare was observed on BY Dra, the characteristics of which are described below.

The flare was observed while using the 91-cm telescope of the McDonald Observatory in conjunction with an uncooled 56 DVP photomultiplier operating in a pulse counting mode. Using the B filter of the standard Johnson UBV system, the method of collecting the data followed the conventions suggested by Andrews et al. (1969). Residual magnitudes (ΔB) were determined with respect to the mean of two established comparison stars (C1 = BD +51^{o}2410 ; C2 = BD +51^{o}2408) with consecutive measures being taken on each star and then the sky background. The observations, corrected for extinction, are shown in Figure 1, where the flare data is displaced above that of the two comparison stars for clarity of illustration. The sky backgrounds (in counts per sec) are also shown beneath the comparison stars. Each data point represents an average of three



BY DRA
30 JUN 1976
RESIDUAL MAGNITUDES (ΔB)
.03
.02
.01
0
-.01
.01
C1, C2
0
SKY
220
200
180
COUNTS/SEC
7
8
9
10
UNIVERSAL TIME (HRS)

15-sec integrations which was formed upon removing the appropriate sky background measure and the dark current of the photometer. The accuracy per data point is determined to be .002 mag. as estimated from the scatter in the residuals of the two comparison stars. A slight increase in the mean light of BY Dra is evident in the Figure as it was observed on the rising portion of its light curve. Other relevant data pertaining to the flare event is collected in Table I.

Table I

Summary of Flare Characteristics

Quantity (1)	Value (2)	Comments (3)
Date (1976)	June 30	
U.T. (max.)	$08^h36^m.0$	Flare maximum
Duration (minutes)	~23	
P† (minutes)	0.285	
Δm§ (mag.)	0.031	Maximum amplitude
σ (mag.)	0.002	
Airmass, X	1.13	At flare maximum
Notes: †$P = \int \Delta m d\tau$		Andrews et al. (1969)

§Δm is the instrumental b magnitude

Although the time resolution of the flare is rather coarse, evidence for multiple structure can be seen in examining Figure 1. It is also of interest to note the possible precursor to the main flare which occurred some 51 minutes earlier and attained an amplitude of ∿0.007 mag. above the quiescent level.

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References:

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1272

Konkoly Observatory
Budapest
1977 May 4

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen-Nürnberg
Band XII, Nr. 124, 1977

ELEMENTS OF RV CRATERIS = BV 442

The eclipsing binary RV Crt = BV 442 = HD 98412 ($9\overset{m}{.}3/10\overset{m}{.}3$; F8) was discovered by Strohmeier et al. (IBVS 62, 1964). Strohmeier also published light elements (IBVS 217, 1967).

The star has been observed photoelectrically in UBV filters with the 50 cm photometric telescope at the European Southern Observatory in La Silla/Chile in May 1975. Due to bad observing conditions only primary minimum and part of the maximum could be observed.

The photoelectric measurements are in good agreement with the light elements given by Strohmeier. Best fit of the photographic times of minima published by him and the photoelectric data yield the new light elements

$$\text{Min} = \text{JD } 244\ 2537.7087 + 1\overset{d}{.}170494 \cdot E \ .$$

Although only primary minimum was observed a solution of the photoelectric light curve is possible since the observed minimum is a total occultation.

No rectification was carried out because of the lack of sufficient coverage of the maximum light phase. The data suggest only little light variation outside eclipses indicating an Algol type light curve.

The following (tentative) elements were derived:

	V	B	UV
i	90°(ass.)	90°(ass.)	90°(ass.)
r_g	0.301	0.302	0.301
r_s	0.226	0.228	0.223
L_g	0.556	0.528	0.510
L_k	0.444	0.472	0.490

The limb darkening coefficients were assumed as $x_g = x_s = 0.6$.
It should be noted that the surface brightness of the smaller star is larger than for the greater component by a factor of about 1.7 in B. The colour indices, however, of the smaller star ($(B-V)_s = 0\overset{m}{.}59$, $(U-B)_s = 0\overset{m}{.}09$) indicate a later spectral type of this component than of the larger star ($(B-V)_g = 0\overset{m}{.}51$, $(U-B)_g = -0\overset{m}{.}04$).

Gratefully acknowledged is the allocation of observing time to one of us (J.R.) by the European Southern Observatory (ESO).

E. SCHOEFFEL
J. RAHE

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1273

Konkoly Observatory
Budapest
1977 May 5

TWO DELTA SCUTI STARS IN THE PLEIADES

Observations of two Delta Scuti suspects in the Pleiades cluster were obtained using the 40-cm reflector and a dry ice cooled 1P21 at the Grundy Observatory. An OG-4 (4mm) filter approximates the V magnitude. Observations were made differentially between variable and comparison, and extinction was removed. Light curves were analyzed using a periodogram technique after Gray and Desikachary (1973, Ap.J.181, 523). Stars are identified by TR numbers (Trumpler 1921, Lick Obs.Bull.10,110).

Breger (1972,Ap.J.176,367) reported TR 51 a possible Delta Scuti star with a period of about 0.024±0.002 days and an amplitude of about 0.01 magnitudes. TR 51 was observed on one night with TR 121 as a comparison star. Periodogram analysis of the data gives a period of 0.0205 days with an amplitude of 0.01 magnitudes peak to peak. Subtraction of this peak and its side lobes reveals a second maximum at a period of 0.017 days with an amplitude of about 0.007 magnitudes peak to peak.

Breger also reported TR 390 as a possible Delta Scuti star with a period of 0.049±0.004 days and an amplitude of 0.01 magnitudes. Observations of TR 390 were obtained on one night using TR 365 as a comparison star. Periodogram analysis of the data reveals a period of 0.047 days and an amplitude of 0.011 magnitudes peak to peak, in good agreement with Breger. Removal of this variation from the periodogram reveals a second peak at 0.070 days with a peak to peak amplitude of about 0.006 magnitudes.

Beat phenomenon is likely in both TR 51 and TR 390. Further observations are needed to confirm periods and amplitudes.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1274

Konkoly Observatory
Budapest
1977 May 9

UBV OBSERVATIONS OF A PRIMARY ECLIPSE OF Θ^1 Ori A

Photoelectric UBV photometry of Θ^1 Ori A = ADS 4186A relative to component C was carried out on the night of 1977, March 6/7 with an area-scanning photometer (Franz 1970) on the 72-inch (1.8-m) Perkins telescope at the Lowell Observatory. A refrigerated EMI 9526 photomultiplier was used in conjunction with standard UBV filters. The scanning aperture was a slit of 5-mm (32-arcsec) length and 100-μ (0.64-arcsec) width. Proper choice of the effective scan length (25 arcsec), scan direction (approximately N to S), and placement of the slit permitted simultaneous, separate measurement of components A, B, C, and E, while excluding stars D and F from the record.

The observations, consisting of 10-scan integrations in each color made at a sweep-speed of one scan per second, yielded one set of UBV data every three minutes. Three-point averages of the resulting UBV magnitude differences for Θ^1 Ori (A-C) and the corresponding times of observation (U.T.) are listed in Table 1 and plotted in Figure 1. Since Θ^1 Ori A was still at full light when observation began, these measures cover a portion of the light curve, including the point of first contact which appears to have occurred at $3^h25^m \pm 3^m$ (s.e.) U.T., that had not been previously defined by (published) photoelectric data. By folding these new observations onto the mean light curve published by Lohsen (1976), one finds a period P = 65.4325 ± 0.0002 days, in excellent agreement with the 65.43-day period recently determined by Baldwin (1976).

Interestingly enough, while Θ^1 Ori A was entering eclipse, Θ^1 Ori B = BM Ori was exiting from eclipse, undergoing a brightness increase of 0.6 and 0.7 mag in V and B, respectively, during the 3.8-hour interval of observation. The photometric data for BM Ori will be published separately in the near future.

This work was carried out with the support of grants from the National Science Foundation.

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References:

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Franz, O. G. 1970, Lowell Obs. Bull. No. 154

Lohsen, E. 1976, IBVS No. 1129

Table 1.

UBV Magnitude Differences θ^1 Ori (A-C)

1977, March 13

U.T.	ΔV	ΔB	ΔU
02^h31^m	1.637	1.626	1.725
39	1.637	1.631	1.701
47	1.628	1.637	1.710
55	1.646	1.636	1.712
03 04	1.629	1.632	1.722
11	1.640	1.630	1.735
18	1.641	1.639	1.708
26	1.636	1.647	1.708
36	1.652	1.638	1.721
43	1.646	1.636	1.727
49	1.661	1.650	1.725
57	1.646	1.645	1.719
04 06	1.656	1.644	1.739
14	1.658	1.657	1.739
22	1.684	1.666	1.750
30	1.682	1.678	1.760
40	1.697	1.686	1.788
49	1.702	1.701	1.784
57	1.718	1.708	1.785

U.T.	ΔV	ΔB	ΔU
05^h05^m	1.704	1.725	1.799
13	1.731	1.723	1.822
21	1.738	1.758	1.827
29	1.746	1.772	1.852
39	1.774	1.772	1.855
48	1.766	1.770	1.898
56	1.804	1.801	1.862
06 05	1.810	1.814	1.921
13	1.836	1.823	1.989

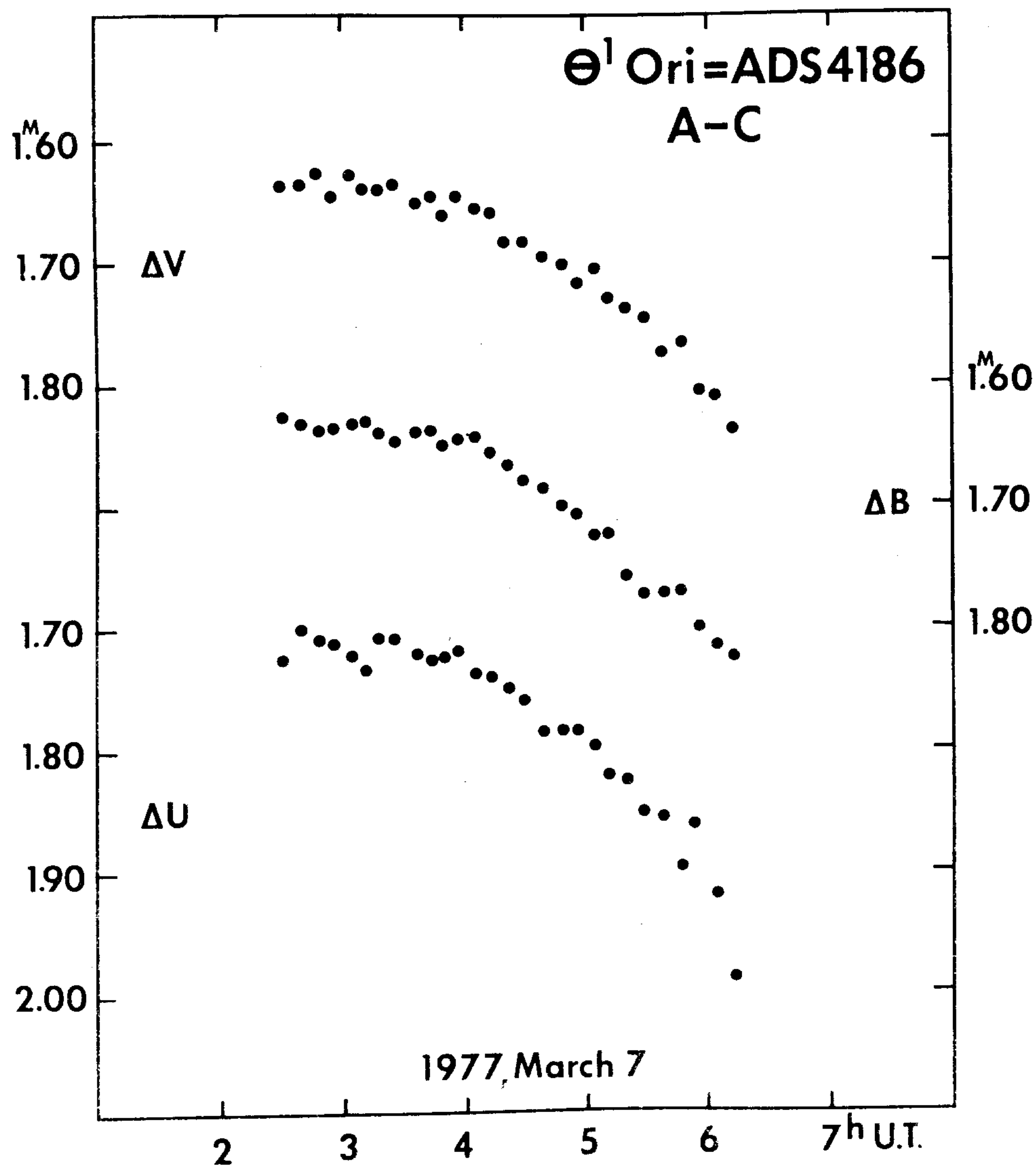

Figure 1. UBV magnitude differences Θ^1 Ori (A-C).

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1275

Konkoly Observatory
Budapest
1977 May 11

CSV 2851 - A RED DWARF VARIABLE

CSV 2851 = HV 10814 = BPM 61550 = CoD-38°11343 was introduced in 1973 in the research program on red dwarf variables of the I.T.A. Astronomical Observatory (Ferraz Mello,S. and Torres, C.A.O., 1971 I.B.V.S. 577) after a notes of Sanduleak, N. and Stephenson, C.B. (1973 I.B.V.S. 770) showing that this suspected irregular variable was actually a dM3e star.

The star was observed on 9 different nights against the comparison stars CoD-38°11352 and CoD-38°11353. The last one was not very stable, probably due to a nearby faint star that may have been included inadvertently in the diaphragm on some nights. But the observed variation is certainly due to CSV 2851.Although the paucity of the data doesn't permit to obtain unambiguously the period, we represent in Fig.1 the light curve obtained with the period that best fits the data, $P=2\overset{d}{.}69$. The ordinates are magnitude differences CSV 2851 minus CoD-38°11352 and the individual values are given in Table I.

We obtained for the first comparison star a magnitude V=9.40 and a color index B-V=1.23. A B-V=1.54 for CSV 2851 is consistent with a dM3e spectral classification, and if we suppose it to be a normal main sequence star, the visual magnitude of 11.2 would imply a parallax of the order of $0\overset{''}{.}09$. (It is important to confirm this, and we note that the star is less than 1° from Gl 646)

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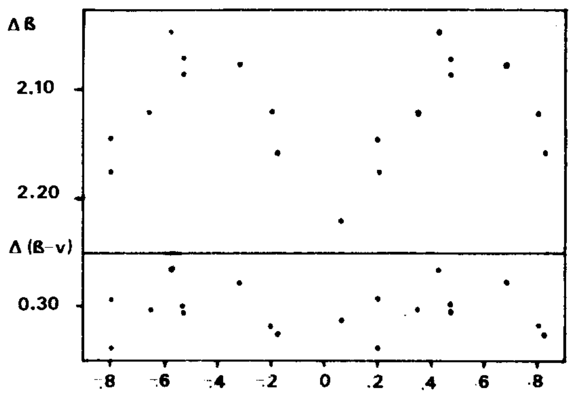

fig.1 light curve of csv 2851.

Table I

JD 2441000+	ΔB	Δ(B-V)
831.670	2.068	0.298
831.677	2.086	0.305
838.635	2.220	0.313
839.617	2.046	0.265
840.621	2.118	0.317
841.695	2.147	0.292
863.612	2.122	0.305
872.586	2.074	0.278
894.489	2.157	0.325
895.507	2.176	0.338

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PERIOD CHANGE OF THE RADIO BINARY RY SCUTI

In a recent paper Cowley and Hutchings gave an analysis of tentative radial velocity and spectrophotometry data of this high-mass eclipsing radio binary (Publ.Astr.Soc.Pac.88,p.456 ff). In their paper they raised the question about the reliability or constancy of the orbital period given by Gaposchkin (Harvard Ann. 105,p.511). Strange enough, this peculiar system has largely been overlooked by observers of photoelectric light curves.

In order to render possible a modern ephemeris the object was estimated on Sonneberg sky patrol plates of the years 1970 to 1976. The result is shown by the accompanying mean light curve, which was computed with the help of Gaposchkin's elements.

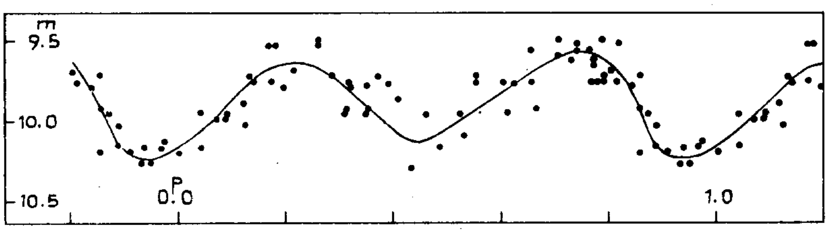
$$\text{Min. I} = 242\ 7979.34 + 11\overset{d}{.}124939 \cdot E = C$$

and which rests in the photometric system of O'Connell (Harvard Circ. 452,p.9). A phase shift of about $-0\overset{P}{.}06 = -0\overset{d}{.}66$ is clearly present. Doubtless this arises from a period change, but not even the search for further faint observations on plates from 1935 to 1969 enabled us to make certain the date or mode of this change. For the purpose of discussing mass transfer and mass loss it would be highly desirable that the owners of other plate collections contribute to this problem.

In the table we give (0) the deepest observations of ours for 1935 to 1969 ($E \leq +1120.5$), our normal minimum ($E=+1247$) from the above mentioned estimates of the seventies, normal minima from Gaposchkin's (l.c.), Tsesevich's (Odessa Izv. 4,2,p.356), Filin's (Stalinabad Tsirk.67-68), and O'Connell's (l.c.) data, and a faint photoelectric observation by Hilditch and Hill

(Victoria Contr. 268, p.122).

Especially noteworthy is also the variability of the form of the light curve: Compare Gaposchkin's, O'Connell's and our curve.



O J.D. 24...	E	O-C		
1 5519.41	-1120	$-0^d.19$	N	Gaposchkin
2 6599.85	- 124	-0.08	N	Gaposchkin
2 7823.58	- 14	-0.01	N	O'Connell
3 0582.39	+ 234	-0.19	S	
3 0849.53	+ 258	-0.05	S	
3 0938.71	+ 266	+0.14	N	Tsesevich
3 1238.95	+ 293	0.00	N	Filin
3 4653.30	+ 603.5	+0.05	S	
3 5933.62	+ 715	-0.05	S	
3 7079.52	+ 818	-0.02	S	
3 7190.31	+ 828	-0.48	S	
3 9293.47	+1017	+0.07	S	
3 9671.44	+1051	-0.22	S	
4 0444.36	+1120.5	-0.47	S	
4 1806.92:	+1243	-0.72:	S	Hilditch,Hill
4 1851.48	+1247	-0.66	N	from lightcurve

(N= normal minima, S= single faint observations)

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ON THE CONNECTION BETWEEN PULSATIONS OF RY Sgr AND THE TOTAL LIGHT DECLINES

1. The analysis of 1926-1974 visual observations of RY Sgr (1,2,3,4) resulted in conclusion that the period of pulsations seemed to vary. Averaged of 182 cycles the mean value of period $\bar{P}$ equals $38^{d}.874$. Figure 1 shows the residuals $(O-C)^{d}$ calculated with $\bar{P}=38^{d}.874$ and E_{o}= J.D. 2424615. The current periods P_i and corresponding Julian days are given in Table I.

2. The nine deep minima which occurred in the course of observations, did not affect either the phase of pulsations or the value of period. The beginnings of total light declines are indicated by vertical arrows in Fig. 1.

3. The moments of beginnings of total light declines T_i seemed to be connected with the phase φ of pulsations and arranged within $0.24 \leq \varphi \leq 0.37$. The initial parts of seven reliable declines of RY Sgr are shown in Fig. 2. φ_o corresponds to the light minimum of pulsations. These fragments are shifted along time-axis by integral number of cycles. In Fig.2 observed (ob) and calculated (cal) minima of pulsations are given.

The results obtained are as follows:

a. Pulsation period of RY Sgr varies.
b. Cyclic process of pulsations is principal one and does not depend on the total light fading.
c. The moments of T_i are synchronized by phase of pulsations and consequently are not distributed by "pure chance". A serial number of cycles when declines occur is probably accidental.

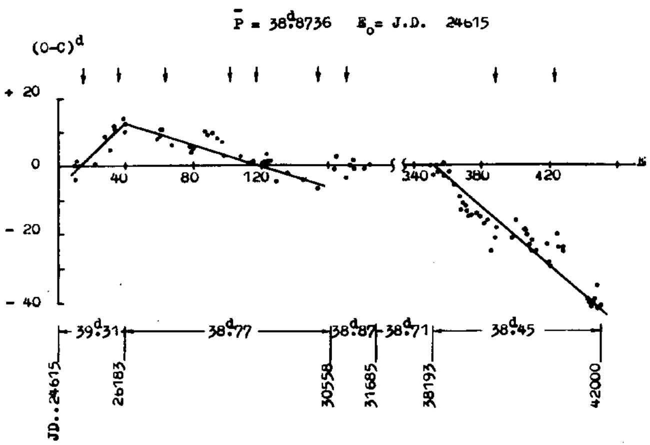

Figure 1

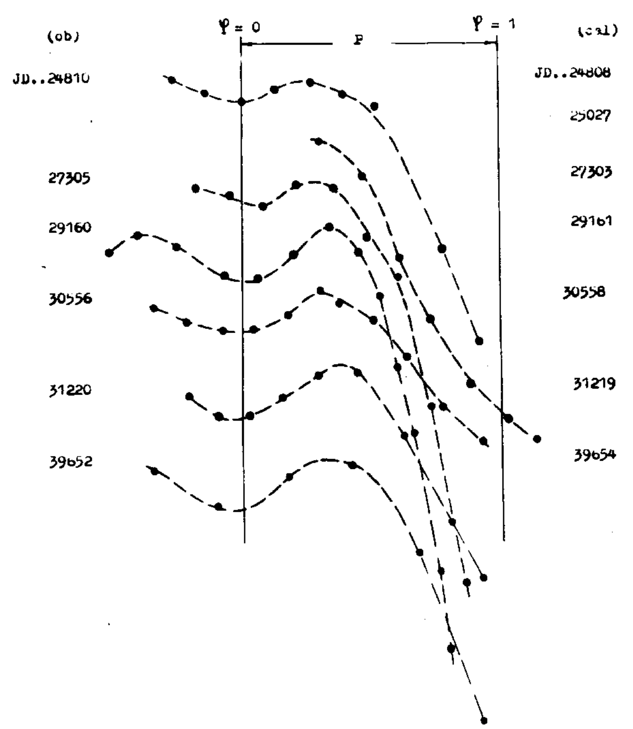

Figure 2

Table I

epoch number and Julian days	P_i
E_0=JD..24615 - E_{40} = JD..26183	$39\overset{d}{.}307$
E_{40}= 26183 - E_{153}= 30558	38.777
E_{153}= 30558 - E_{182}= 31685	38.874
(168 ±1) cycles are omitted for lack of observations	38.708±0.232
E_{350}= 38193 - E_{449}= 42000	38.454

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UBV PHOTOMETRY OF THE ECLIPSING BINARY SX AURIGAE

The variability of SX Aurigae (HD 33357) was discovered by Leavitt, and its period was first correctly determined by Hertzsprung. The first precise light curve of SX Aurigae was obtained by Oosterhoff (1933), who acquired 1191 photographic observations of the system. More recently Bondarenko (1974) obtained 215 photoelectric observations in blue light and 212 observations in yellow light.

This investigator began his observations of SX Aurigae in January, 1976. Using the 40-cm telescope no. 4 of Kitt Peak National Observatory, observations of this star were made in UBV. These observations were supplemented by later ones made with the 46-cm reflector of the Kutztown State College Observatory. Totals of 508 observations in V, 512 in B, and 481 in U have been obtained with coverage of all phases.

A new ephemeris for SX Aurigae has been obtained using all available photoelectric times of minimum light. In the least-squares solution all times were given equal weight. The times of minimum and their residuals are as follows:

JD Hel.	E	O-C	Ref.
2440162.3358	0	$-0^d.0004$	IBVS No.456
271.241	90	-0.0024	Bondarenko
289.396	105	+0.0014	IBVS No.456
491.478	272	+0.0001	"
683.277	430.5	+0.0015	Bondarenko
1677.3552	1252	-0.0009	IBVS No.937
1691.271	1263.5	-0.0010	"
1692.4819	1264.5	-0.0002	"
1763.275	1323	+0.0033	"
1769.3242	1328	+0.0021	"
1775.372	1333	-0.0005	"
1957.4886	1483.5	-0.0009	"

2132.3431	1628	-0.0030	IBVS No.1053
2403.4045	1852	+0.0006	"
2790.6298	2172	+0.0004	Chambliss
2793.6549	2174.5	+0.0003	"
3099.8040	2427.5	-0.0008	"
3113.7212	2439	+0.0005	"

The times previously published in the IBVS were obtained by Kizilirmak and Pohl from observations made at the Ege University Observatory in Izmir, Turkey. Two of the other times were obtained by myself using observations published by Bondarenko, while the last four were obtained from my own observations. The resultant ephemeris is:

$$\text{Min.I} = \text{JD } 2440162.3362 + 1^{\text{d}}.2100797 \cdot E.$$
$$\pm 5 \quad \pm 3 \text{ p.e.}$$

This period is almost identical to that originally published by Hertzsprung ($P=1^{\text{d}}.2100795$), and it differs only $0^{\text{s}}.2$ from that obtained by Oosterhoff. Thus it does not appear that the period of SX Aurigae has varied significantly over the past 50 years.

As a comparison the star HD 33411 was used, and for checks the stars HD 33324 and HD 33412 were observed. The magnitudes and colors which I determined for these stars are as follows:

HD 33411	V=8.182	B-V=+0.058	U-B=-0.595
HD 33324	8.284	+0.011	-0.292
HD 33412	8.528	+0.090	-0.268

The spectral types listed in the Henry Draper Catalogue for these stars are B8, B8 and B9, respectively, but the spectral type of HD 33411 is certainly much earlier than this. For SX Aurigae a spectral type of A3 is given, but Popper (1943) estimated the spectral types of both components as B3.5 on the basis of the strengths of their hydrogen and helium lines.

SX Aurigae is a Beta Lyrae-type eclipsing binary with continuous variation in its light curve at all phases. The eclipses are not complete. The following magnitudes as colors were obtained for this system.

max.	V=8.382	B-V=+0.015	U-B=-0.695
pri.	9.140	+0.022	-0.631
sec.	8.867	-0.004	-0.714

The corresponding depths of the eclipses are:

	V	B	U
pri.	$0^{\text{m}}.758$	$0^{\text{m}}.765$	$0^{\text{m}}.829$
sec.	0.485	0.466	0.447

Thus SX Aurigae follows the usual rule for eclipsing binaries, i.e., the system is reddest at primary minimum and bluest at secondary minimum. The change in color at secondary minimum is not so pronounced as Bondarenko indicates, however, and the asymmetry in the primary minimum reported by him also appears to be spurious, as the observations of this investigator as well as those of Oosterhoff do not indicate any significant asymmetries in the light curves of SX Aurigae.

The colors listed above for SX Aurigae indicate that the system is strongly reddened. The color excess E(B-V) is about $0^m.24$, while E(U-B) is about $0^m.17$. These results are to be expected, since SX Aurigae lies almost exactly on the galactic equator. Although Popper found that both components of SX Aurigae, a double-lined spectroscopic binary, had similar spectra, the difference in depths of the minima led him to assign spectral types of B2.5 and B5 to the respective components.

Least-squares solutions were made for the observations outside eclipses expressed as a Fourier series with terms through 20. Observations with phase angles between 40° and 140° and between 220° and 320° were used, and these were normalized to unity at maximum light. The coefficients which were obtained together with their probable errors are as follows:

	A_o	A_1	A_2	B_1	B_2
A)	+0.9188	-0.0074	-0.0838	-0.0048	-0.0027
	24	27	36	14	17
B)	+0.9051	-0.0439	-0.0865	+0.0136	+0.0244
	28	32	38	15	21
C)	+0.8919	-0.0492	-0.0956	+0.0118	+0.0213
	24	28	33	13	17
D)	+0.9034	-0.0176	-0.0963	-0.0007	-0.0013
	4	4	6	2	3
E)	+0.9072	-0.0181	-0.0923	-0.0012	-0.0018
	4	5	6	2	3
F)	+0.8980	-0.0249	-0.1001	-0.0008	-0.0016
	5	6	8	3	4

Notes: A: 24 photographic normal points of Oosterhoff, phases used are those given by him

B: 74 p.e.obs. of Bondarenko in yellow light, phases calculated with ephemeris given in this bulletin

C: 82 p.e.obs. of Bondarenko in blue light

D: 251 obs. of Chambliss in V

E: 253 obs. of Chambliss in B

F: 253 obs. of Chambliss in U

The coefficients obtained using the observations of this investigator are clearly more precise than are those of the earlier observers. Although the observations of Bondarenko indicate substantial values for the asymmetry coefficients, B_1 and B_2, my own observations do not support this.

The coefficient A_2 arises largely from the ellipticity effect, and the values listed above indicate that the components of SX Aurigae are significantly distorted from spherical shape. However, the values of A_2 are not as large as those normally encountered in W Ursae Majoris systems, which usually have A_2 coefficients in the range -0.11 to -0.15. The coefficient A_1 arises largely from the reflection effect, and in SX Aurigae this effect appears to be significant. In view of the fact that the two minima differ substantially in depth, this is to be expected.

Thus far two solutions for the photometric orbital elements of SX Aurigae have been published. These are by Oosterhoff and by Wyse (1934). Oosterhoff considered the two components to be spherical, but nearly in contact. Wyse indicated that this was unsatisfactory, but in the solutions which he obtained, the sums of the semimajor axes of the components, a_1+a_2, total about 0.87. For a system in which both components fill their Roche lobes, this sum should not exceed a value of about 0.77. This is the value which is often encountered with W Ursae Majoris stars, but in SX Aurigae the value of A_2 is somewhat less than that encountered in the W Ursae Majoris stars, and consequently we should expect the sum of the semimajor axes of the components also to be somewhat less. Thus a value of 0.87 for this sum in SX Aurigae is quite unrealistic.

This investigator is presently working on new solutions for the photometric orbital elements of SX Aurigae based on his own light curves.

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A SMALL AMPLITUDE VARIABLE STAR, HD 164615

HD 164615 = BD + 11° 3315 was chosen as a comparison star in a UBV photometric study of the Ap star, HD 165474 = BD + 12° 3383. It was observed for 17 nights in May and June 1975 at Kitt Peak National Observatory using the two 41-cm. telescopes and shows a variation of $0^m.04$ in V with a probable period of 4.4 days. The amplitude variation in the other colors is approximately $0^m.05$. Each point represents the mean of 5 measures taken within a 30 minute period on that night. Standard deviations are smaller than $^m.005$.

The amplitude of the variation and shape of the light curve suggest that variablility is caused by the same mechanism which causes variation of an Ap star. The spectral classification is approximately F_2. One spectrogram was obtained in June of 1976 by Dr. Nancy Morrison, of the Joint Institute for Laboratory Astrophysics in Boulder, Colorado, but peculiarity is not apparent. The magnitude differences HD 165910 - HD 164615 versus phase are plotted in the Figure from the ephemeris for maximum brightness in V:

$$JD_{\odot} = 2442564.876 + 4^d.4 \cdot E$$

Observation of this star is continuing.

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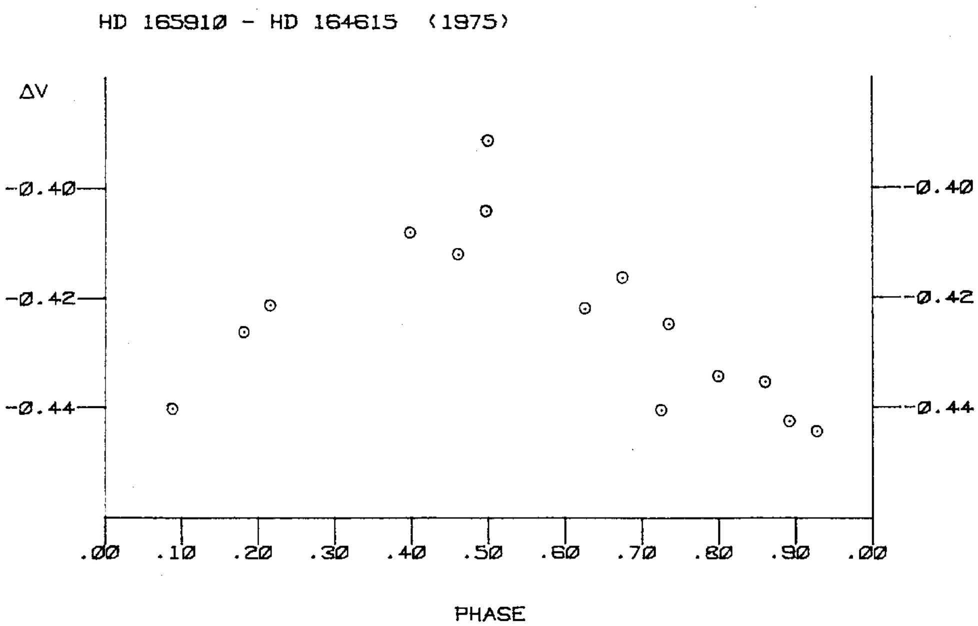
HD 165910 - HD 164615 (1975)
ΔV
-0.40
-0.42
-0.44
-0.40
-0.42
-0.44
.00
.10
.20
.30
.40
.50
.60
.70
.80
.90
.00
PHASE

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PERIODICITE D'ETOILES Ap AUSTRALES

Des observations d'étoiles Ap faites récemment à l'aide du photomètre uvby du télescope danois de l'ESO conduisent aux résultats suivants.

Etoile	type spectral	grandeur de la variation en magnitudes	période trouvée
HD 59256=HR 2863	B9pSi	trés faible	incertaine
HD 66255=HR 3151	AOpSi	un peu plus de 0.04 en y,b,v et 0.08 en u	6.8j
HD 66605	AOpSi	de près de 0.06 en y à près de 0.08 en u	2.23j
HD 73340=HD 3413	B9pSi	de moins de 0.025 en y à plus de 0.045 en u	2.67j
HD 83368=HR 3831	A8pSrSi	de 0.02 en y à 0.05 en v (0.04 en u)	1.43j
HD 83625	AOpSiSr	de l'ordre de 0.05, sauf en y (env. 0.034)	
HD 94660=HR 4263	AOpSi	~0	-
HD 96616=HR 4327	A4pSr	entre 0.03 et 0.04 pour y et b, plus de 0.02 en v et moins de 0.08 en u	2.45j

Le fait que la variation de HR 4263 est inférieure aux erreurs de mesure n'a été vérifié que durant un intervalle de 9 jours; il s'agit probablement d'une Ap de période longue.

L'une des étoiles qui avait été choisie comme comparaison, à savoir HD 65270 (B5), est légèrement variable, ce qui n'était pas connu jusqu'à présent. Cette variation est de l'ordre de 0.03 mag. en y, b et v et d'un peu moins de 0.04 mag. en u. La période est

$$P = 0.85j.$$

Des détails sur ces observations et les graphiques seront donnés ailleurs.

P. RENSON
(Observations faites par J.MANFROID a l'"European Southern Observatory", La Silla, Chili).

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Veröffentlichungen der Remeis-Sternwarte Bamberg

Astronomisches Institut der Universität Erlangen - Nürnberg

Band XII, Nr. 126

THE VARIABILITY OF PQ NORMAE = BV 1556 = HD 148013

The variability of PQ Nor = BV 1556 has been discovered by Strohmeier and Knigge (1973). They claimed a period of 0.931 days and EW light curve with amplitude of $0^m.3$ in the photographic region.

The star has been observed photoelectrically in UBV with the 50 cm photometric telescope at the European Southern Observatory (ESO) on La Silla/Chile in May-June 1974. The results are given in the Table. Corrections for extinction have been applied.

The primary comparison star was HD 147670 (V = $7^m.84$, B-V = $^m.00$, U-B = $-^m.44$; B5), check star was HD 148028 (V = $8^m.76$, B-V = $-^m.09$, U-B = $-^m.26$; B5). No variability of these two stars larger than the observing errors was found.

The period and the type of variability given by Strohmeier and Knigge could not be confirmed, and the amplitude was found considerably smaller than $0^m.3$. Best fit of the data is obtained with a period of 5.58 days. The light curve is shown in the Figure, JD 2442180.0000 was chosen arbitrarily as starting epoch. The amplitude in V is found as $0^m.045$, the amplitude in B is about $0^m.065$. The light curve seems slightly asymmetric with a steeper increasing branch.

J.M.Vreux very kindly has taken a spectrogram of the star with dispersion 12.3 A/mm at the 1.5 m spectrographic telescope of the European Southern Observatory. The spectrogram shows only strong Balmer lines and a sharp but weak Calcium K line. The latter very probably is of interstellar origin since its radial velocity differs by about 35 km/s from the radial velocities derived from the Balmer lines. From the appearence of the spectrum the star is classified as AO. No metal lines are discernible.

The colour index $B-V = +.^{m}26$ for mean light is considerably redder than for normal AO stars, indicating an interstellar reddening of about $E_{B-V} = 0.^{m}25$. Since $E_{U-B} = E_{B-V}\cdot(.72+.05\cdot E_{B-V})$ the unreddened U-B colour index must be close to $(U-B)_o = -.^{m}35$. The reddening is in agreement with the galactic position at (1950) $l = 329.^{\circ}13$, $b = -5.^{\circ}83$. Since the total interstellar absorption A_V in visual is about three times as large as the selective reddening in B-V we have $A_V = 0.^{m}8$. The corrected visual appearent brightness is therefore $m_o = 6.^{m}9$.

Since the spectrum shows no metal lines the variability probably is not connected with the observed AO star. The simplest explanation is the assumption of a possibly physical companion which exhibits a normal Cepheid light curve of period 5.58 days. Assuming a visual amplitude of about $0.^{m}8$ this Cepheid must be fainter than the AO star by about $2.^{m}8$. The period-luminosity relation of Cepheids gives an absolute visual magnitude of $M_{CV} = -3.^{m}6$. If the two stars are at the same distance the absolute visual magnitude of the AO star is $M_{AV} = -6.^{m}4$ according to luminosity class I_{ab} which also would be in good agreement with the unreddened ultraviolet colour index $(U-B)_o = -.^{m}35$. The distance of the two stars is then about 4.5 kpc.

Further observations of the object, especially the determination of radial velocities, are needed to confirm the proposed nature of the variability of PQ Nor = BV 1556.

The author wishes to express his sincere thanks to J.M.Vreux who very kindly took the spectrogram of PQ Nor. Gratefully acknowledged is the allocation of observing time by the European Southern Observatory.

EBERHARD SCHOEFFEL

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Landoldt-Börnstein, Neue Serie Bd I, Astronomie und Astrophysik (ed. H.H.Voigt), Springer Berlin (1965)

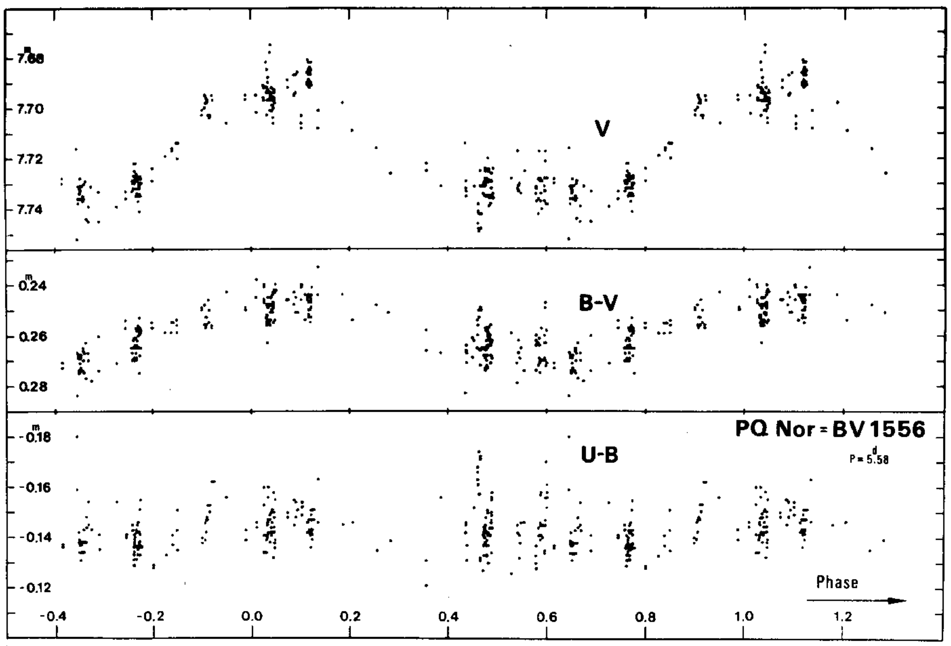
Photoelectric observations of BV 1556 = PQ Normae

Jul.date	V	B-V	U-B	Jul.date	V	B-V	U-B
2442000+				2442000+			
185.7541	7.682	.253	-.134	188.9229	7.738	.258	-.161
185.7568	7.685	.256	-.139	188.9257	7.728	.271	-.158
185.7594	7.692	.255	-.140	189.8052	7.729	.270	-.145
185.7618	7.694	.252	-.141	189.8085	7.733	.267	-.143
185.7652	7.703	.248	-.146	189.8127	7.730	.265	-.136
185.7677	7.697	.254	-.145	189.8154	7.732	.262	-.129
185.7702	7.693	.263	-.147	189.8175	7.730	.265	-.137
185.7729	7.688	.249	-.160	189.8206	7.729	.265	-.141
185.7754	7.690	.245	-.156	189.8238	7.727	.261	-.131
185.7782	7.694	.248	-.142	189.8261	7.722	.270	-.133
185.7837	7.697	.248	-.147	189.8300	7.725	.269	-.134
185.7860	7.694	.255	-.149	189.8323	7.722	.270	-.138
185.7953	7.701	.248	-.143	189.8396	7.732	.264	-.139
185.7982	7.678	.256	-.138	189.8423	7.728	.261	-.136
185.8009	7.675	.254	-.141	189.8445	7.735	.257	-.140
185.8037	7.696	.245	-.142	189.8485	7.728	.265	-.136
185.8037	7.696	.245	-.142	189.8512	7.726	.267	-.131
185.8062	7.695	.251	-.150	189.8544	7.728	.269	-.143
185.8087	7.697	.248	-.144	189.8577	7.734	.264	-.142
185.8145	7.701	.244	-.146	189.8615	7.727	.265	-.133
185.8196	7.696	.250	-.151	189.8649	7.728	.262	-.145
185.8221	7.692	.251	-.142	189.8713	7.732	.258	-.135
185.8247	7.699	.247	-.148	189.8753	7.735	.258	-.136
185.8309	7.704	.243	-.144	189.8780	7.737	.256	-.137
185.8333	7.706	.249	-.150	189.8832	7.732	.257	-.146
185.8361	7.700	.255	-.158	189.8866	7.731	.260	-.143
185.8422	7.693	.243	-.132	189.8902	7.741	.253	-.138
185.8448	7.694	.242	-.136	189.8949	7.734	.257	-.136
185.8474	7.696	.240	-.138	189.8984	7.735	.259	-.141
185.8501	7.697	.243	-.139	189.9019	7.727	.268	-.155
185.8527	7.698	.254	-.155	189.9073	7.728	.258	-.136
188.7973	7.731	.262	-.130	191.7951	7.686	.254	-.146
188.8010	7.731	.264	-.133	191.7972	7.690	.244	-.142
188.8044	7.734	.274	-.137	191.8007	7.691	.246	-.142
188.8258	7.728	.272	-.141	191.8028	7.686	.245	-.143
188.8304	7.742	.263	-.144	191.8063	7.686	.245	-.143
188.8331	7.736	.261	-.139	191.8104	7.685	.250	-.147
188.8358	7.728	.268	-.141	191.8125	7.682	.253	-.149
188.8385	7.717	.275	-.146	191.8146	7.689	.247	-.151
188.8413	7.729	.271	-.157	191.8198	7.687	.244	-.136
188.8441	7.729	.264	-.158	191.8219	7.692	.245	-.141
188.8565	7.737	.270	-.145	191.8260	7.684	.250	-.143
188.8608	7.734	.270	-.145	191.8285	7.686	.255	-.151
188.8658	7.740	.257	-.140	191.8305	7.691	.244	-.147
188.9028	7.737	.263	-.145	191.8330	7.690	.241	-.139
188.9069	7.728	.260	-.147	191.8349	7.690	.244	-.141
188.9094	7.733	.249	-.156	191.8372	7.687	.247	-.151
188.9151	7.721	.263	-.156	191.8410	7.685	.253	-.147
188.9176	7.717	.272	-.170	191.8438	7.691	.249	-.147
188.9203	7.738	.247	-.152	191.8460	7.682	.246	-.142

Jul.date	V	B-V	U-B	Jul.date	V	B-V	U-B
2442000+				2442000+			
193.5895	7.714	.283	-.142	194.8443	7.736	.267	-.138
193.6005	7.732	.267	-.137	194.8574	7.744	.263	-.144
193.6029	7.729	.271	-.131	194.8612	7.729	.277	-.148
193.7811	7.734	.261	-.127	195.4755	7.730	.275	-.151
193.7833	7.731	.269	-.141	195.4792	7.730	.265	-.133
193.7854	7.731	.265	-.137	195.6258	7.724	.257	-.128
193.7895	7.731	.265	-.142	195.6281	7.729	.255	-.129
193.7917	7.730	.265	-.133	195.7682	7.719	.259	-.133
193.7944	7.730	.268	-.144	195.8391	7.717	.256	-.141
193.7968	7.729	.265	-.143	195.8414	7.716	.256	-.137
193.8005	7.724	.272	-.140	195.9017	7.720	.256	-.151
193.8038	7.728	.274	-.138	196.4615	7.706	.243	-.156
193.8059	7.729	.269	-.145	196.6777	7.697	.249	-.139
193.8083	7.725	.273	-.148	196.6799	7.695	.250	-.143
193.8125	7.730	.265	-.133	196.7988	7.695	.245	-.136
193.8149	7.735	.257	-.133	196.8010	7.702	.238	-.144
193.8173	7.735	.258	-.142	196.8823	7.696	.241	-.160
193.8248	7.728	.262	-.137	196.8848	7.691	.246	-.153
193.8270	7.724	.270	-.139	197.4958	7.708	.233	-.146
193.8295	7.734	.258	-.142	197.4986	7.701	.244	-.163
193.8317	7.738	.268	-.151	197.7766	7.698	.244	-.145
193.8343	7.720	.273	-.137	198.7273	7.725	.266	-.121
193.8372	7.725	.264	-.130	198.7297	7.722	.258	-.131
193.8396	7.729	.260	-.141	199.6790	7.728	.259	-.126
193.8438	7.735	.259	-.150	199.7550	7.732	.272	-.145
193.8461	7.735	.261	-.144	199.7595	7.717	.279	-.142
193.8483	7.739	.257	-.141	199.7618	7.731	.267	-.132
193.8577	7.735	.260	-.146	199.7640	7.733	.262	-.141
193.8603	7.738	.262	-.147	199.7775	7.730	.269	-.138
193.8644	7.735	.256	-.134	199.7953	7.734	.265	-.146
193.8668	7.729	.264	-.142	199.8325	7.725	.274	-.146
193.8697	7.732	.263	-.149	200.4681	7.739	.267	-.145
193.8722	7.726	.271	-.150	200.4705	7.745	.270	-.154
193.8832	7.736	.263	-.155	200.4997	7.731	.278	-.143
193.8870	7.734	.268	-.156	200.5836	7.745	.260	-.135
193.9020	7.724	.269	-.158	200.5864	7.733	.274	-.141
194.7730	7.736	.269	-.134	200.7889	7.739	.271	-.154
194.7754	7.738	.268	-.139	201.4772	7.714	.259	-.143
194.7792	7.731	.274	-.138	201.4798	7.714	.254	-.135
194.7816	7.732	.275	-.142	201.7555	7.703	.249	-.140
194.7868	7.731	.274	-.137	201.7578	7.701	.250	-.138
194.7900	7.734	.271	-.134	201.7948	7.695	.256	-.146
194.7923	7.736	.269	-.131	201.7970	7.700	.248	-.139
194.7950	7.728	.274	-.134	201.7994	7.698	.253	-.142
194.7976	7.731	.273	-.137	201.8031	7.696	.257	-.147
194.8007	7.733	.268	-.134	201.8052	7.698	.253	-.147
194.8254	7.737	.265	-.134	201.8078	7.697	.256	-.148
194.8287	7.735	.266	-.138	201.8308	7.703	.246	-.153
194.8376	7.737	.270	-.143	201.8480	7.704	.250	-.150
194.8408	7.730	.275	-.138	201.8503	7.703	.255	-.153

Jul.date	V	B-V	U-B
2442000+			
201.8815	7.695	.257	-.162
201.8838	7.697	.256	-.162
202.4652	7.697	.240	-.134
202.4675	7.692	.247	-.141
202.7384	7.692	.246	-.148
202.7409	7.689	.246	-.150
202.8036	7.695	.243	-.155
202.8058	7.687	.248	-.145
202.8270	7.687	.251	-.154
202.8295	7.693	.245	-.148
202.8429	7.686	.251	-.151
203.4707	7.709	.254	-.146
203.7388	7.716	.248	-.135
204.4707	7.731	.267	-.156
204.7526	7.735	.264	-.145
204.7550	7.733	.266	-.146
204.8471	7.731	.262	-.152
204.8879	7.746	.254	-.168
204.8908	7.738	.265	-.166
204.8935	7.741	.260	-.163

Jul.date	V	B-V	U-B
2442000+			
204.8956	7.742	.256	-.161
204.8999	7.749	.250	-.158
204.9028	7.748	.253	-.174
204.9072	7.748	.250	-.172
204.9096	7.742	.249	-.171
205.5386	7.737	.260	-.128
205.6326	7.731	.269	-.134
205.6349	7.733	.270	-.135
205.7449	7.730	.271	-.136
205.7472	7.728	.273	-.137
205.9161	7.752	.267	-.180
205.9183	7.716	.284	-.159
206.4643	7.733	.257	-.140
206.4765	7.736	.254	-.141
208.4727	7.708	.241	-.152
208.4742	7.706	.246	-.154
208.4764	7.703	.240	-.148
209.4758	7.726	.251	-.139
210.4927	7.731	.266	-.131
210.4950	7.725	.272	-.132



V
B-V
U-B
PQ Nor = BV 1556
P = 5.58d
Phase
7.68
7.70
7.72
7.74
0.24
0.26
0.28
-0.18
-0.16
-0.14
-0.12
-0.4
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1282
Konkoly Observatory
Budapest
1977 May 25

V1068 CYGNI, A LONG-PERIOD ECLIPSING BINARY

In the GCVS there conflicting periods had been reported for V 1068 Cygni, $0^{d}.517588$, $1^{d}.999985$ and $0^{d}.6654481$. In order to resolve this quandary I examined the star on Harvard and Nantucket plates, but was unable to confirm any one of these periods. Among 237 plates the star was found at minimum on 38. These yielded

$$\text{Minimum} = 2437876.1 + 42^{d}.68 \cdot E.$$

This new period, however, satisfies only about half of the minima published by Weber in IBVS 39, 1963. I therefore solicited the kind assistance of Professor B.V.Kukarkin, who asked Mr.S.Shugarov to examine the star on the Moscow plates. His 420 observations, spanning 1898-1976, Kukarkin reports, completely confirm my $42^{d}.68$ period. Totality lasts about three days, with abrupt ascending and descending branches of the light curve.

Dr. Bruce Stephenson searched the objective prism plates of the Warner and Swasey Observatory. One extremely low dispersion plate (1100A/mm) taken on July 21, 1966, indicates a spectral class in the neighborhood of G8II and is not composite. Dr. Stephenson then obtained a better quality spectrum on August 17, 1976, with a dispersion of 580 A/mm. Here the spectrum is composite, B8 to AO + G to K. The new spectrum was obtained at a phase about 15 days past minimum, whereas the early one corresponds to minimum phase.

The Table gives the dates of observed minima and of the maxima closest in phase before and after minimum. These data indicate that the duration of minimum is at least $2^{d}.9$ and at most $3^{d}.5$.

It is a pleasure to acknowledge the gracious response of Drs. Stephenson and Kukarkin to my requests for information; to thank Mr.Shugarov for his work on the Moscow plates, the Harvard College Observatory for my use of the Harvard plate collection, and Dr. Martha Liller for checking the discordant Julian Dates.

V1068 Cygni: Dates and Phases of Minima and Nearest Phase Maxima

M/m*	J.D.	Phase	M/m	J.D.	Phase
M	2427207.792	$+1^{d}.7$	m	2431644.686	$-0^{d}.1$
m	28016.710	-0.3		31645.612	+0.8
	29466.737	-1.4	M	31685.576	-1.9
	29509.640	-1.2	m	31686.721	-0.8
M	29807.817	-1.8		.733	-0.8
m	30279.501	+0.4		31687.721	+0.2
	30663.554	-0.4		.733	+0.2
	31303.707	+0.3		31729.560	-0.6
	.717	+0.3		.572	-0.6
	.742	+0.4		31731.599	+1.4
	.756	+0.4		.608	+1.4
	.770	+0.4		.621	+1.4
	.783	+0.4		32798.697	-1.5
	31344.560	-1.5	or	37874.648 } ◊	-1.5 }
	.577	-1.5		5.645	-0.5
	31643.610	-1.2		37876.697	+0.5
	.623	-1.2		37877.468**	+1.4
	.651	-1.2		39327.82 ◊◊	+0.6
	.668	-1.1		42656.522	+0.2
	.743	-1.1		.535	+0.3
	.760	-1.0		42657.606	+1.4
	31644.628	-0.2		.623	+1.4

* Unless indicated M all the observations are minima.
◊ Ambiguity in Harvard records as to which of the two dates the plate was taken.
**This is the $JD_{\odot}$ given in the GCVS
◊◊The date of the spectrum at minimum furnished by C.B.Stephenson.

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COMMISSION 27 OF THE I. A. U.
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Konkoly Observatory
Budapest
1977 May 25

WANTED: PHOTOELECTRIC AND SPECTROSCOPIC OBSERVATIONS OF THE UNUSUAL SYSTEM, V389 CYGNI

Between 1936 and 1942 Paul Guthnick published a series of papers on V389 Cygni, assumed to be the $3^{d}.3$ spectroscopic binary component A of ADS 14682. His conclusions are briefly summarized in the Remarks in the GCVS.

Guthnick found two Cepheid-like periods, apparently unrelated to the SB period, of $1^{d}.12912$ and $1^{d}.19328$. These two periods alternated with one another at intervals of one to three weeks, being separated by intervals or random or non-variability. As each period recurred it did so at precisely the phase it would have had if there had been no interruptions. Guthnick interpreted the system as consisting of two Cepheids whose pulsations account for the deviations of the observed radial velocities from their mean curve.

These remarkable conclusions have never been verified. The spectroscopic binary orbit has been questioned by Luyten and by Batten. Testing the published radial velocities for spurious periods, I find that they can be almost as well represented by a period of $0^{d}.7665126$ as by Guthnick's $3^{d}.31322$. The two light periods are related by $1/P_1 - 1/P_2 = 1/21.0000$. A beat period of 21 days is not obvious from the plot of the photoelectric observations. An examination of these data reveals no better period than those published.

After a lapse of more than 35 years, extensive photoelectric and spectroscopic observations are warranted to verify and update Guthnick's conclusions, or to arrive at an alternative plausible interpretation.

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References:

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INFORMATION BULLETIN ON VARIABLE STARS
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Konkoly Observatory
Budapest
1977 May 26

BD $-3^{\circ}5357$ AN UNUSUAL ECLIPSING BINARY

We have found that the star BD $-3^{\circ}5357$ ($\alpha_{1950}=21^{h}58^{m}01^{s}$; $\delta_{1950}=-2^{\circ}59'$; $m_V=9.4$; type K0 in the SAO catalogue) is a unique eclipsing binary containing a red giant (~G8 III) and what is probably a hot subdwarf. This remarkable system was initially noted as an ultraviolet source during analysis of data from the S2/68 sky survey experiment on the TD-1 satellite. Subsequent photometric and spectroscopic observations made at Mount Wilson, Palomar, and Mount Laguna observatories in 1975 and 1976 have since revealed a clearer picture of the system.

The hot secondary is extremely blue; the satellite ultraviolet continuum is consistent with a 38000 K black body. The eclipses in U are $1\overset{m}{.}2$ deep, yet they are barely visible in V. The UV continuum is clearly visible on our spectrograms. The spectrum has strong Ca II H and K in emission and a very strong H_{α} emission. We note the presence of a very strong "reflection effect" in the system.

Ingress and egress take only 24 minutes although the period is 9.2 days. The U light curve is shown in Figure 1. The heliocentric times of mid-eclipse have been found to be

$$JD_{\odot} = \underset{\pm .0005}{2442752.9577} + \underset{\pm .000010.}{9\overset{d}{.}207755} \cdot E$$

The 17 radial velocities obtained in 1975 and 1976 give a preliminary value of $K_1=27\pm3$ km s^{-1} for the G8 star, but we have not yet been able to detect lines of secondary. Therefore, we can only state that the data are consistent with $M_{sd} \sim 0.5\ M_{\odot}$, $R_{sd} \sim 0.1\ R_{\odot}$, $M_{G8} \sim 2M_{\odot}$, $R_{G8} \sim 6R_{\odot}$. A wider range of masses and radii are possible but all plausible models conform to the hot subdwarf-G

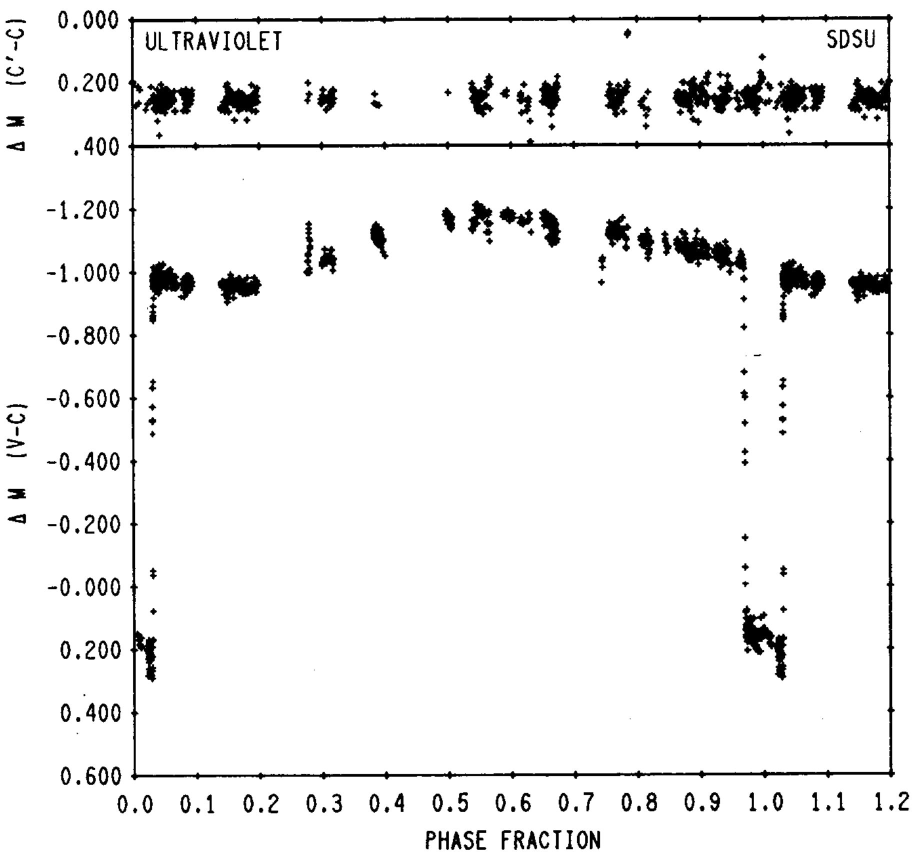

Figure 1. The U light curve.

subgiant model. The radius of the G star is about one-half the Roche radius.

A brief description of the eclipses is given in Tables 1 and 2.

Table 1

Light Curve Description

Filter	Eclipse Depth	Outside Variation	Phase of Maximum
U	$1^{m}_{.}2$	$0^{m}_{.}22$	$0^{p}_{.}53$
B	0.4	0.33	0.55
V	0.15	0.35	0.66

Table 2

Eclipse Description

Eclipse Portion	Phase Fraction	Hours:Minutes
Ingress/ Egress	$0^{p}.00175$	00:24
Eclipse Duration	0.0625	13:48
Totality	0.0590	13:02

Table 3 is a summary of UBV photometry of nearby field stars obtained in 1976 at Palomar Observatory with the 20-inch (50-cm) telescope on moderately good photometric nights. BD $-3^{o}5358$, the comparison star, has a close (~20 arc-sec) companion which was excluded from the photometer diaphragm. BD $-3^{o}5362$ was the check star.

Table 3

Nearby Field Stars

Star	V	B-V	U-B	n
$-3^{o}5353$	9.07	+0.42	-0.03	3
$-3^{o}5355$	10.91	+0.62	+0.08	3
$-3^{o}5358$	10.39	+0.64	+0.12	1
$-3^{o}5359$	10.38	+0.50	+0.01	3
$-3^{o}5361$	9.39	+1.29	+1.27	3
$-3^{o}5362$	9.58	+1.12	+0.79	2

A more detailed analysis of the light curve and spectroscopic orbit will be published elsewhere.

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Konkoly Observatory
Budapest
1977 May 27

ON THE PERIOD OF SW Lac

SW Lac is one of the well observed W UMa-type stars. The average lengths of period of this star were given by Purgathofer and Prohazka (1966):

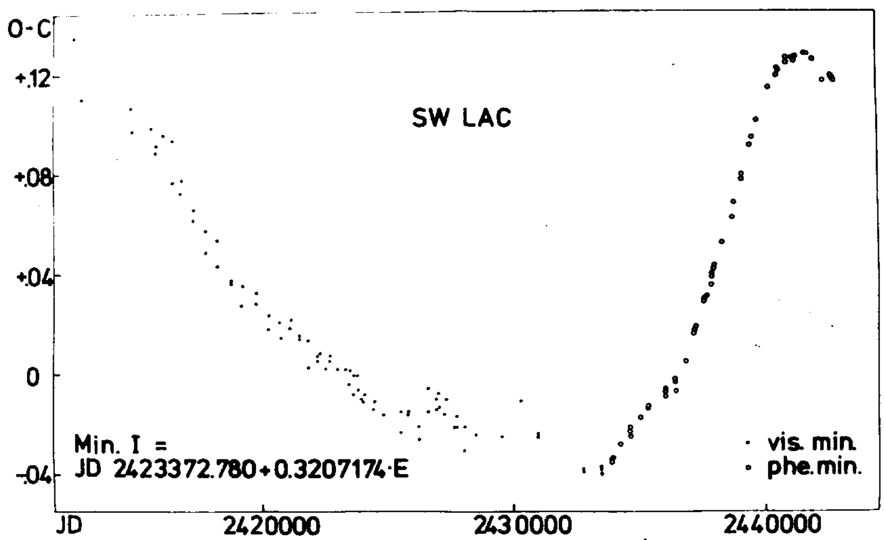
Table 1

Years	Period	Change of period	ΔP
1893-1914	$0^d.3207124$		
1914-1928	0.3207151	JD 2419990	$+0^s.23$
1928-1951	0.3207166	2425210	+0.13
1951-1960	0.3207213	2433690	+0.41
1960-1968	0.3207282	2436755	+0.60
1973-	0.3207144		-1.19

It can be seen from Table 1 and from the O-C curve (Fig.1) that the period was increasing in the years 1893-1968.The analysis of the photoelectric times of minima from the years 1969-1976 leeds to the conclusion that the period of SW Lac decreased 1.2 sec in the years 1969-1973.

The possible reason of this decrease of the period may be:
1. The O-C curve has a periodical nature with a period of about 80 years and the changes in the period of SW Lac might be due to the existence of a third component, as it was mentioned by Schilt (1923) - but there is no evidence for a third body in this system.
2. The changes of period are attributed to the instrinsic variability of SW Lac, mainly to the active mass exchange processes in the system.

Further photoelectric observations of this interesting system and determinations of times of minima would be highly desirable.



Predictions of times of minima for the near future are given by the formula:

$$\text{Min.I} = \text{JD } 244\ 2697.404 + 0^{d}.3207144 \cdot E.$$

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1977 May 30

UBV PHOTOMETRY OF VV CEPHEI NEAR INGRESS

UBV photoelectric photometry was obtained of the eclipsing binary star VV Cephei near the time of the beginning of primary eclipse (Wright 1975; Spear 1976). The data were obtained at the No.4 0.4-m telescope of the Kitt Peak National Observatory (KPNO). A pulse counting photometer, including a 1P21 photomultiplier and standard UBV filters (KPNO Nos: V,no.232; B,no.233; U, no.315; plus red leak sandwich), together with UBV standards chosen from Johnson (1963) were used to place the observations on the UBV photometric system.

Data were acquired on four nights. The sixteen differential observations are tabulated in Table I. The heliocentric Julian Days are accurate to ±0.00005 day. The star 20 Cephei was used as the comparison star. Its average magnitude and color indices, from eight observations, were:
V= 5.268 ± 0.009; (B-V)= +1.420 ± 0.006; and (U-B)= +1.785 ± 0.006. The errors are probable errors of a single observation.

The data in Table I indicate no change in V over the four day interval. Little change occurred in (B-V) too.The (U-B) color though was steadily becoming more red as the days passed.

The author acknowledges with thanks the telescope time at KPNO. This work was supported in part by National Science Foundation grant MPS 75-01890.

Table I

UBV Observations of VV Cephei

$JD_{\odot}$	ΔV	$\Delta(B-V)$	$\Delta(U-B)$
2443000.0+			
113.60080	−0.164	+0.532	−0.363
113.60874	−0.163	0.535	−0.368
113.66399	−0.161	0.542	−0.353
113.67065	−0.168	0.559	−0.364
113.73245	−0.165	0.544	−0.341
113.73937	−0.174	0.549	−0.342
114.59460	−0.156	0.561	−0.301
114.60221	−0.159	0.580	−0.293
115.59477	−0.162	0.564	−0.254
115.60086	−0.164	0.564	−0.252
115.65021	−0.164	0.557	−0.240
115.65595	−0.166	0.565	−0.257
115.73958	−0.166	0.552	−0.213
115.74613	−0.160	0.559	−0.234
116.58975	−0.170	0.563	−0.266
116.59551	−0.165	0.562	−0.263

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1287

Konkoly Observatory
Budapest
1977 May 31

SEVEN-COLOUR PHOTOMETRY OF THE VARIABLE HD 25539

HD 25539 ($\alpha_{1900} = 03^h58^m.3$, $\delta_{1900} = 32°18'$, B3V, V = 6.86) was observed photoelectrically with the Geneva seven-colour photometer mounted at the 1m telescope of Observatoire de Lyon, at Gornergrat Observatory, Switzerland, during 2 nights in February 1977. The star was used as a comparison star for X Persei (HD 24534). The other comparison star was HD 21856 (HR 1074, B1V, V = 5.9).

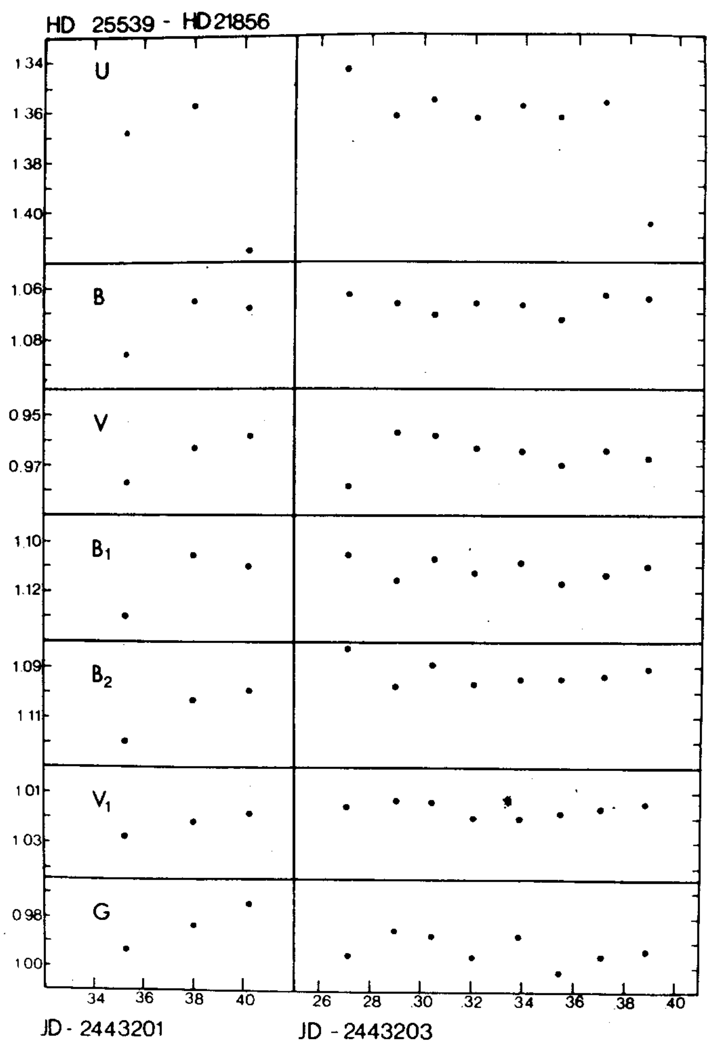
From the high dispersions of the differential measurements (Table 1) we conclude that one of both comparison stars is variable on a timescale of several hours.

JD Hel.-2440000	n	U	B	V	B_1	B_2	V_1	G
201.39	3	0.030	0.011	0.010	0.013	0.010	0.005	0.009
203.33	8	0.018	0.004	0.007	0.004	0.005	0.003	0.005

Table 1. Standard deviations for the differential measurements HD 25539-HD 21856 for both nights. n denotes the number of measurements. The time indicated is a mean value for the whole night.

From the standard deviations of the non-differential measurements in Table 2 we clearly see that HD 25539 is the variable.

Figure 1 gives the lightcurves resulting from the differential measurements in the sense HD 25539-HD 21856 for both nights. The differences are in the standard system of the photometer.



	HD 25539		HD 21856 (comparison star)	
	JD 244 3201.39	JD 244 3203.33	JD 244 3201.39	JD 244 3203.33
U	0.031	0.020	0.002	0.003
B	0.010	0.003	0.002	0.003
V	0.010	0.006	0.001	0.003
B_1	0.011	0.004	0.004	0.004
B_2	0.010	0.004	0.002	0.003
V_1	0.005	0.002	0.001	0.002
G	0.010	0.004	0.002	0.003

Table 2. Standard deviations of the non-differential measurements of HD 25539 and HD 21856 for both nights.

Acknowledgement

The authors wish to express their thanks to the Geneva and Lyon observatories for the permission to use their equipment.

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Correction to I.B.V.S. No.1269

The third sentence ("Evidence has been found...") should be omitted.

E.C. OLSON

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1288

Konkoly Observatory
Budapest
1977 June 6

THREE NEWLY DISCOVERED VARIABLE Ap STARS

UBV photometric study of a number of Ap stars indicates that three show variations. They were observed during a thirty day period in June and July of 1976 at Kitt Peak National Observatory using the number three 41-cm telescope, and at Lowell Observatory with the 54-cm telescope. Each Ap star was observed with two comparison stars for which a constant brightness ratio was required to establish variation of the Ap star.

Period cannot be established firmly for them because the length of observing period was less than, or close to, the period of variation of the stars.

Star	ΔV	ΔB	ΔU	Estimated Period
HD 89069	-	$0^m.015$	$0^m.04$	$18^d.$
HD 191980	$0^m.036$	$0^m.038$	$0^m.047$	$21^d.$
HD 199180	$0^m.039$	$0^m.038$	$0^m.045$	$26^d.$

Figure 1 shows ΔU for the difference BD +79°328 - HD 89069, assuming a period of 18 days. The observing period was too short for an accurate determination of the period of HD 89069, if the period is as long as it appears to be. Figure 2 shows ΔV for the difference HD 192425 - HD 191980 versus phase for an assumed period of 21 days for HD 191980. That period is a rough estimate. Figure 3 shows ΔV for the difference HD 199480 - HD 199180 with a period of 26 days for HD 199180. That period is nothing but a guess, but the variation is obvious.

Observations of these stars is continuing.

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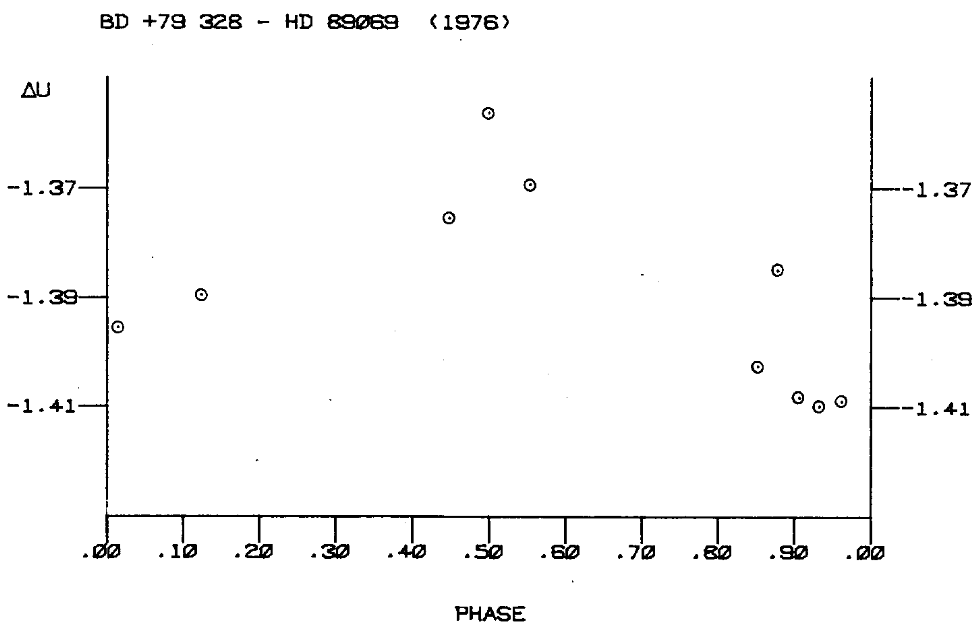
BD +79 328 - HD 89069 (1976)
ΔU
-1.37
-1.39
-1.41
.00
.10
.20
.30
.40
.50
.60
.70
.80
.90
.00
PHASE

FIG 1

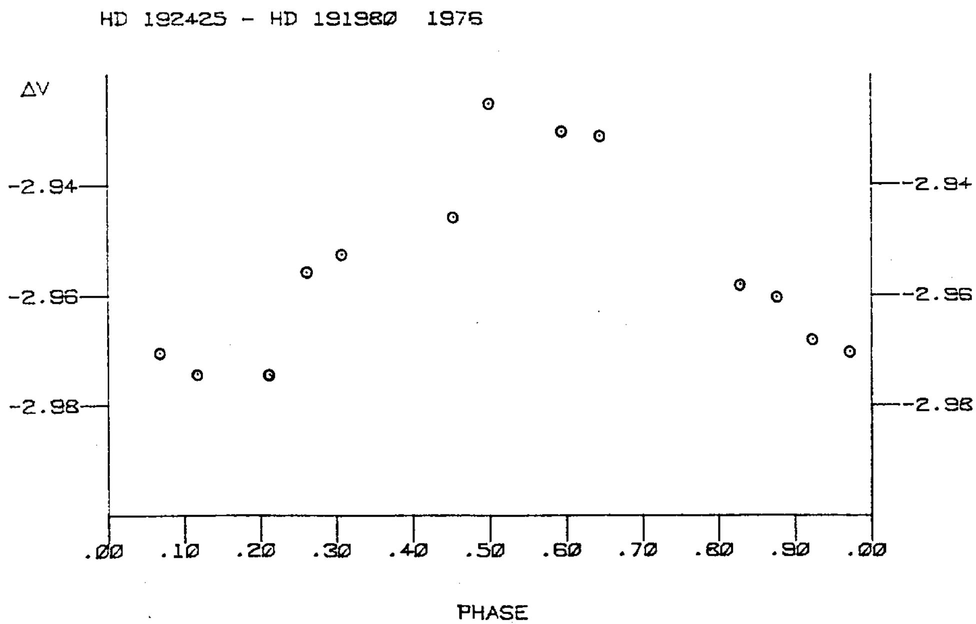
HD 192425 - HD 191980 1976
ΔV
-2.94
-2.96
-2.98
.00 .10 .20 .30 .40 .50 .60 .70 .80 .90 .00
PHASE

FIG 2

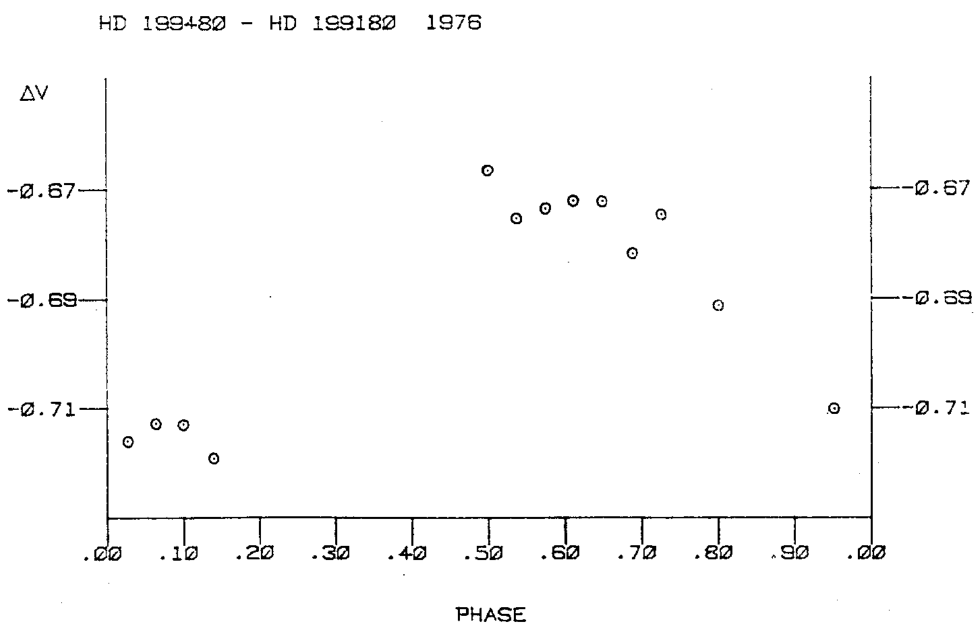
HD 199480 - HD 199180 1976
ΔV
-0.67
-0.69
-0.71
.00
.10
.20
.30
.40
.50
.60
.70
.80
.90
.00
PHASE

FIG 3

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Konkoly Observatory
Budapest
1977 June 6

OBSERVATIONS OF ECLIPSING BINARIES AT THE NEW NATIONAL OBSERVATORY OF ATHENS, KRYONERION, GREECE

The 48 inch Cassegrain reflector of the above named observatory (G. Contopoulos and C. Banos, Sky and Telescope, 1976, 51, 154) was recently used together with a two beam multi-mode photometer (C. Goudis and J. Meaburn, Astrophys. and Space Sci., 1973, 20, 149) in a program of four colour observations of eclipsing binaries. Work was started during a three-week period in March-April of this this year.

The four intermediate pass-band filters used were selected to be in close accordance with the standard colour system. Automatized procedures have been developed to carry out reductions along the lines described by Hardie ("Astronomical Techniques", University of Chicago Press, Chicago and London, 1962, 178) and calibrations have been made on the basis of observations of standard stars given in the catalog of Iriarte et al. (Sky and Telescope, 1965, 30, 21).

Times of minima have been deduced by essentially visual inspection of adequately covered regions of the light curves.

The following preliminary data are presented

Star	HJD (min) 2440000.+	Type of Min.	V	B-V	U-B	V-R	Phase Region
SV Cam	3222.384	s	8.40	0.72	0.48	0.63	(mean out-of-eclipse value)
WW Dra	3221.544	s	8.71	-	-	-	(at secondary minimum)
AH Vir	3224.555	p	8.89	0.78	0.57	0.91	0.75
*DM Per	3224.314	p	8.59	-0.05	-0.09	-0.04	(at primary minimum)

The program is continuing and it is hoped that further results will be announced in due course.

E. BUDDING
A.R. SADIK
P. NIARCHOS
D.H. JASSUR

*A secondary minimum of this star was observed photoelectrically at the Royal Greenwich Observatory, Herstmonceux, Sussex, England using the 36 inch Yapp reflector. The time of minimum was HJD 2443105.657.

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INFORMATION BULLETIN ON VARIABLE STARS
Number 1290

Konkoly Observatory
Budapest
1977 June 7

V1705 AND V1706 Sgr

Finder charts have not previously been published for the faint variable stars, V1705 and V1706 Sgr. Discovered by Hoffleit, their periods were determined by Jean Hales from her observations on Harvard plates taken between 1924 and 1953 (Hoffleit 1957). These stars have now been examined on Nantucket plates for the years 1957 through 1976. Both are about 14.9 pg at maximum, while the plate limit on the Nantucket plates for a star some 7^{o} from the plate center is seldom better than 15.5. The revised ephemerides representing the observed maxima are

V1705 Sgr	Max =	24 42250+142^{d}E	SR
V1706 "	Max =	38615+205 E	M

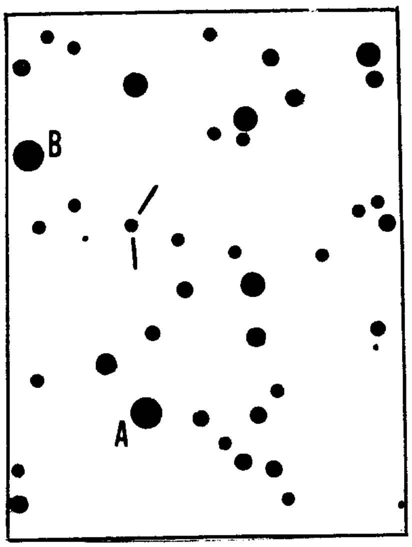
The period for the semi-regular variable, V1705 Sgr,is the same as the one previously published; however, there appears to have been a shift in phase. The new period for V1706 Sgr (revised from $210^{d}_{.}5$:) satisfies both the old Harvard and the new Nantucket observations.

The letters on the finder charts represent BD stars in the -19^{o} zone: A=5123, B=5121, C=5124 and D=5128. The charts cover approximately 10′ x 14′ and South is at the top.

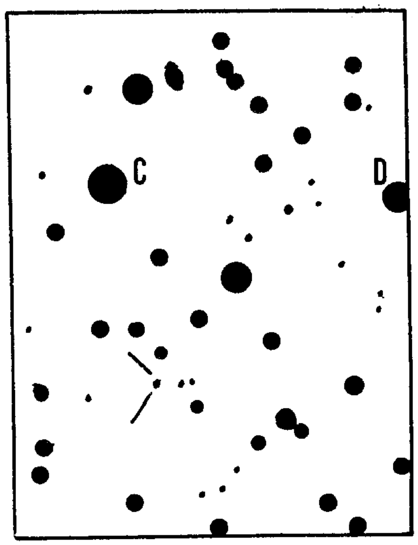
DORRIT HOFFLEIT
Maria Mitchell Observatory
Nantucket, Mass., U.S.A.

Reference:

Hoffleit, D. 1957 Astron. Jour. 62, 120



V1706 Sgr



V1705 Sgr

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1291

Konkoly Observatory
Budapest
1977 June 13

PHOTOELECTRIC OBSERVATIONS OF THE SYMBIOTIC VARIABLE STAR EG ANDROMEDAE

The symbiotic star EG And (HD 4174), already known as magnetic variable (Babcock, 1958), was recognized as photometric variable by Jarzebowski (1964) who from photoelectric observations performed in 1961-63 found semiregular light variations having the amplitude $0^{m}.21$ in a system not far from the visual one and the mean period $40^{d}.5$ with significant deviations.

The photoelectric observations here reported have been made with the 40-cm refractor of the Teramo Observatory from November 1968 to November 1970. BD +39° 158 was used as comparison star; its constancy, already resulting from the observations of Jarzebowski, has been confirmed by the check star BD 40° 158 and the photometric values, obtained by means of several comparisons with Johnson's standard stars, are given in Table 2.

The V magnitudes listed in Table 1, where n is the number of measures, have the mean error $\pm 0^{m}.01$.The light curve shows semiregular fluctuations which were particularly evident from JD 40500 to 40640 when the amplitude reached $0^{m}.27$, whereas at other times the oscillations appear noticeably damped. The 40-days wave is recognizable in spite of remarkable irregularities both in length and shape, but the whole of the observations is better fitted by a period of the order of 80 days with brighter and fainter maxima alternating in each cycle.

The mean V magnitude results 7.20; a comparison with the mean brightness observed in 1961-63 required the reduction of the magnitude differences given by Jarzebowski in his instru-

Table 1

Photoelectric Observations of EG And

J.D. 2440	V	n	J.D. 2440	V	N	J.D. 2440	V	n	J.D. 2440	V	n
181.35	7.155	2	504.36	7.175	5	559.26	7.355	8	811.55	7.245	2
189.47	7.140	2	505.42	7.180	4	560.45	7.355	4	824.42	7.195	3
208.41	7.135	3	506.38	7.175	4	562.27	7.31	1	826.44	7.185	5
220.27	7.180	3	507.38	7.200	3	568.25	7.205	5	832.38	7.195	5
232.43	7.180	3	510.43	7.200	3	570.31	7.180	5	834.42	7.200	4
233.24	7.170	5	514.39	7.220	4	573.24	7.190	5	835.50	7.205	4
244.25	7.155	4	515.50	7.225	3	577.46	7.215	4	836.45	7.215	2
246.30	7.160	3	523.40	7.285	3	578.21	7.19	1	837.40	7.200	4
264.29	7.205	2	524.25	7.285	6	586.25	7.255	2	841.40	7.195	4
416.57	7.110	2	525.26	7.280	3	589.24	7.205	5	850.33	7.170	2
420.58	7.110	2	526.26	7.290	6	590.24	7.225	5	851.33	7.170	3
430.57	7.160	2	527.32	7.295	6	605.24	7.250	6	855.37	7.190	2
453.50	7.105	2	528.24	7.290	2	606.22	7.250	9	859.43	7.225	2
454.40	7.110	3	529.28	7.290	5	610.31	7.255	3	863.66	7.270	4
473.43	7.200	3	530.58	7.290	2	614.23	7.245	8	879.46	7.180	4
474.51	7.205	4	536.33	7.165	7	622.27	7.170	4	883.37	7.195	4
477.49	7.175	4	537.24	7.150	5	626.24	7.140	6	885.33	7.215	3
478.51	7.165	2	538.24	7.140	6	630.28	7.135	3	887.43	7.220	3
479.37	7.170	2	541.24	7.095	6	631.24	7.150	5	890.27	7.225	5
480.49	7.180	3	542.30	7.090	3	635.24	7.215	5	900.26	7.165	6
485.49	7.170	3	543.28	7.085	2	639.26	7.280	6	902.24	7.155	3
486.44	7.170	2	.46	7.080	4	.27	7.265	6	903.25	7.140	3
498.47	7.225	3	545.29	7.100	5	640.26	7.305	3	911.28	7.170	5
499.42	7.205	2	550.22	7.180	8	782.58	7.145	3	916.26	7.225	2
.64	7.215	3	553.29	7.265	4	805.59	7.250	3	918.28	7.240	5
500.44	7.200	3									

Table 2

Photometric Values for EG And, Comparison Star and Check Star.

EG And:		BD +39°158 :	
Brighter V magnitude	7.08	V	7.00 ± 0.006
Fainter " "	7.35	B-V	+0.44 ± 0.01
Mean " "	7.20	BD +40°158 :	
B-V	+1.69 ± 0.01		
Mean period	~40 days (~80 days?)	V	7.55 ± 0.010
		B-V	+0.47 ± 0.01

mental system ($\lambda_{eff} \sim 5000$ Å) to the V system. With the here obtained magnitudes for the comparison stars, the mean Jarzebowski's instrumental magnitude results 7.54; assuming the spectral class M2III for EG And and F5 for both BD +39°158 and BD +40°158, the mean V magnitude in 1961-63 may be retained 7.24: no remarkable variation in the mean brightness has therefore occurred between 1961-63 and 1968-70. The "explicity smaller luminosity" found by Jarzebowski in 1961 (V as faint as 7.36) and considered by him as an indication of a long term variation, appears now to correspond to the brightness of a deep minimum in the 40-days wave. Furthermore 21 visual magnitude determinations made with the Pickering's meridian photometer from 1880 to 1896 have been found in the catalogues assembled for the Revised Harvard Photometry: the magnitudes range from 7.3 to 7.6 and therefore the amplitude has not undergone noticeable change in the course of 90 years. The statement of a slight increasing of the mean brightness of the star from $7^m.4$ to $7^m.2$ in the same lapse of time would require a careful study of the zero point of the Harvard system.

The B-V colour, measured in 27 nights spread along the two years covered by the present observations, shows no appreciable variation. All the obtained photometric data are collected in Table 2.

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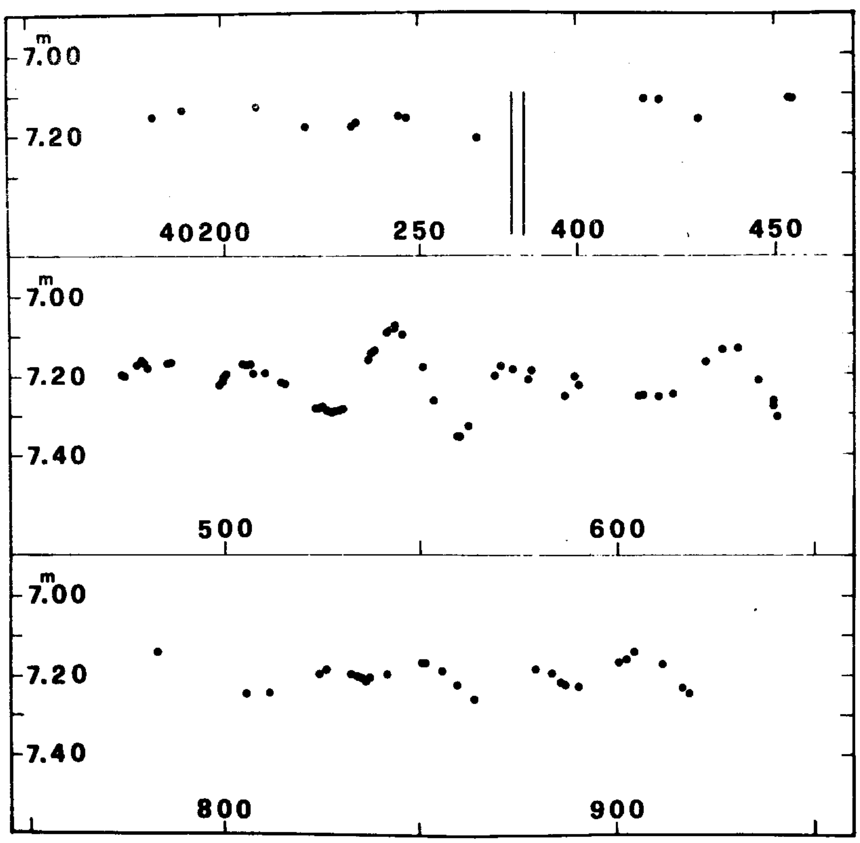

The V light curve of EG And from November 1968 to November 1970.

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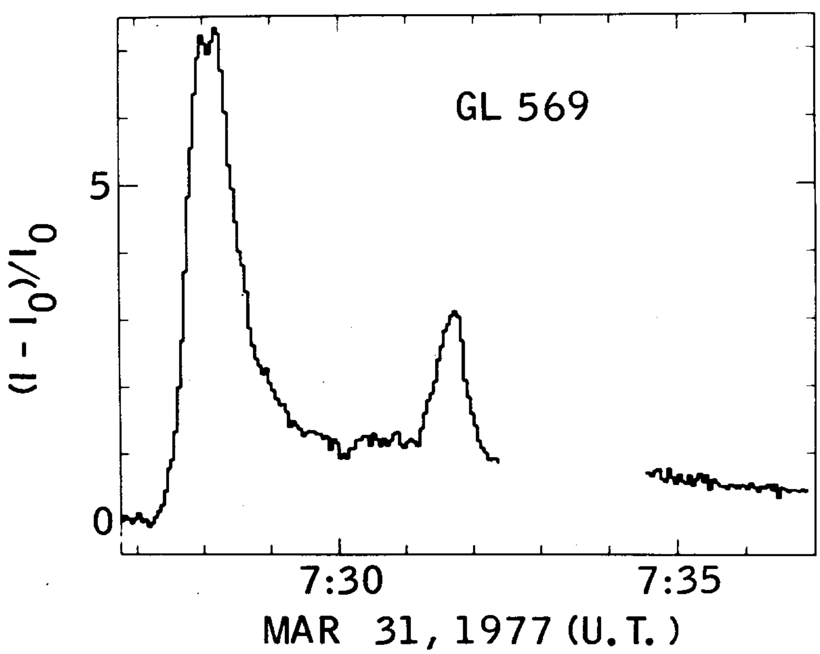
FLARE ACTIVITY ON GL 569

We have observed a prominent double flare followed by extended lowlevel activity on GL 569 ($\alpha=14^h52^m08^s$, $\delta=+16^\circ18'18''$; 1950) during a survey of nearby M dwarfs. Photometric observations with a time resolution of 3 seconds were made in the U-band on the UBV system using the 1.5 m Hale Observatory telescope at Mt. Wilson on March 30 and 31, 1977 (UT). The sky background was measured at 3 minute intervals. The total integration time was 5.0 hours on the object and 0.8 on the sky. The net signal was ratioed to its preflare value and plotted in Fig.1. The double flare was remarkable in that an hour after the flare, the signal was still 20% higher that its preflare level.

Eggen (1968) has previously reported a 0.5 mag flare at 1.02 μm for GL 569. Subsequently, Asteriadis and Mavridis (1972) observed a 20% flare in the B-band. The flare reported here,aside from being more prominent and extended, was double. Mullan (1976) interprets sympathetic flares with spacing of 2 to 4 minutes as due to a Moreton wave propagating from a flare at a star spot near one rotation pole to the other pole where it triggers a second flare.

We thank Mr. Howard Lanning of the Hale Observatories for assisting with the observations. This paper presents the results of one phase of research carried out at Jet Propulsion Laboratory, California Institute of Technology, under contract NAS 7-100, sponsored by the National Aeronautics and Space Administration.



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Eggen, O.J. (1968) Astrophys.J.Suppl., 16, 49-96
Mullan, D.J. (1976) Astrophys.J. 204, 530-538

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+National Research Council
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 1293

Konkoly Observatory
Budapest
1977 June 15

A PHOTOELECTRIC SEARCH FOR OPTICAL VARIABILITY IN BLUE STRAGGLERS

In several of the oldest galactic clusters, a few members lie above and to the left of the main sequence turn-off on the color-magnitude diagram. One hypothesis interprets these "blue stragglers" as the result of mass exchange in a close binary system in which the original secondary has received mass from the evolving primary and now lies beyond the turn-off (McCrea 1964), while the original primary has become a cool giant or sub-giant or a white dwarf. Strom and Strom (1970) have found support for this hypothesis in their photometric and radial velocity observations of blue stragglers in NGC 7789, from which they conclude that "all blue stragglers studied are probably spectroscopic binaries."

In order to test the binary hypothesis we initiated a photometric program to search for periodic low-amplitude light variability of blue stragglers. Candidates were chosen by searching published color-magnitude diagrams, principally compilations by Hoag et al. (1961) and Hagan (1970). Proper motion data indicating cluster membership were available for all objects observed except NGC 6633-H159, NGC 6834-F121 and NGC 559-L85.

Sixteen objects were monitored between June 1976 and April 1977, and are listed in Table I. The 38-cm siderostat refractor equipped with the Pierce-Blitzstein simultaneous dual channel, pulse-counting photometer and the 72-cm reflector of the Flower and Cook Observatory were used. Each comparison star was checked nightly against a third star to assure its constancy. The fainter objects were observed without color filtering.

Table I includes results of our observations. Each object is listed according to its familiar designation within the cluster, along with other identifications. The values of V, B-V, and spectral type are taken from Mermilliod (1976), Fünfschilling (1967) and Cudworth (1976). The ninth, tenth, and eleventh columns contain the number of nights, filters used, and the total number of filtered or unfiltered observations. The standard deviation of an individual magnitude difference from the mean (σ), and the standard deviation of an individual magnitude difference calculated from Poisson statistics (σ_1) are listed for each object in the last two columns. The value of σ_1 depends in part on the integration time and the telescope aperture, and shows consistency when reduced to a common scale.

No periodic variations have been identified in any of these objects. The following stars have, however, shown some variability.

Coma-T146 (HR 4752, AI Com, 17 Com) has been found by Preston, Stepien, and Wolff (1969) to show periodic magnetic and light variations. A similarly low-amplitude variation is observed in our data, but it would require a shift in phase to be consistent with their value for the period. NGC 752-Hm209 may be an object similar to AI Com, and variations of $0\overset{m}{.}05$ in B have been observed.

A secular variation was observed in the magnitude difference between NGC 6633-H66 and its comparison star. Over about 80 days, H66 decreased $0\overset{m}{.}08$ and $0\overset{m}{.}05$ in B and V, respectively.

The observations of NGC 6834-F121 show four mimima of $0\overset{m}{.}15$ depth in B. Two minima and one maximum, with a light variation of about $0\overset{m}{.}1$ appear to be present in the data for NGC 7062-J155.

M67-F190 deserves special note. Deutsch (1968) found it to be a spectroscopic binary with a period of 4.198 days. We were unable to find a light variation corresponding to this period. From its position in the color-magnitude diagram, Eggen (1971) indicated that it might be a δ Sct-type star. Our observations rule out any magnitude variation greater than $0\overset{m}{.}02$ during this interval.

NGC 6633-H159 was observed by Hintzen, Scott, and Whelan (1974) and noted as a possible velocity variable. Our limited coverage indicates some variation. Perhaps further observations might show it to be both a velocity and light variable. However, the cluster membership of this star is uncertain.

Although not ruling out the binary mass exchange hypothesis, the absence of periodic light variations in these observations does set restrictions on the values of the periods and inclinations possible for these systems. We intend to continue monitoring some of these objects.

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TABLE I

Summary of Blue Straggler Monitoring Program

Cluster	Object	HD	BD	V	B−V	Sp	N	Filter	n	σ	σ_1
NGC 559	L85			+10.60	+.36		9	none	113	±.055	±.011
NGC 752	Hm209		$+36^{\circ}0367$	9.70	+.05	B9.5(p?)	8	V	108	.012	.006
								B	110	.024	.005
M 67	F81			10.03	−.073	B8 V	7	none	37	.017	.005
	F124			12.14	+.45		4	none	11	.061	.011
	F131			11.22	+.415	F0 IV	5	none	29	.028	.007
	F136			11.31	+.63	G3 III-IV	5	none	23	.020	.007
	F153			11.31	+.13	Am	6	none	30	.022	.008
	F156			10.99	+.11	A2 V	5	none	25	.018	.006
	F190			10.98	+.245	A8 IV-V	15	none	79	.013	.006
	III-12			12.27	+.27		5	none	22	.137	.012
Coma	T146		$+26^{\circ}2354$	5.23	−.049	A0p	4	V	188	.011	.005
								B	203	.011	.004
NGC 6633	H32	169959	$+6^{\circ}3762$	7.57	+.09		20	V	351	.023	.008
								B	360	.026	.007
	H66	170054	$+6^{\circ}3772$	8.18	+.03		19	V	280	.033	.008
								B	270	.040	.007
	H153	170563	$+6^{\circ}3816$	8.15	−.15		6	V	64	.024	.010
								B	67	.037	.009
NGC 6834	F121			11.14	+.48		20	V	171	.074	.015
								B	180	.077	.013
NGC 7062	J155			+11.87	+.50		16	none	200	±.062	±.016

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Budapest
1977 June 20

SEVEN COLOUR PHOTOMETRY OF THE DELTA SCUTI STAR 27 Vir

27 Vir (HR 4824, A5, V=6.30) was observed during 5 hours in 1975 by Bartolini et al. (1975). They suggested that the star is a Delta Scuti variable with a period of $0^{d}.05$.

We planned to monitor this star during a two week observing run in the second part of February 1977, but due to bad weather good measurements could only be obtained during the nights of February 26/27 and 27/28. The star was observed differentially using the Geneva U B V $B_1B_2V_1G$ photometer attached to the 1-meter telescope of Observatoire de Lyon at Gornergrat Observatory. Comparison stars were HR 4861 (AOV, V=6.4) and HR 4855 (A3, V=6.05).

During the night of February 26 ten measurements in the sense first comparison star, program star, second comparison star were made in each colour. From the magnitude differences between HR 4861 and HR 4855 we infer that the mean error on one measurement amounts to $0^{m}.005$ magnitudes in all colours.

The measurements were made during a time span of almost 6 hours, which, according to the period of Bartolini et al. covers five periods. Using the method of least squares we approximated the magnitude differences 27 Vir - HR 4861 by a trigonometric polynomial with unknown frequencies and coefficients. The mean value of the location of the well-defined maxima in the frequency spectrum in every colour yielded a period $P= 0^{d}.042 \pm 0^{d}.0015$ with regression coefficients lying between 0.7 and 0.9. Figure 1 shows the resulting phase-diagrams for $P=0^{d}.042$.

During the following night (Feb. 27/28) 11 measurements in the

B_2 filter were obtained during a time span of 1^h30^m. The mean error on one measurement as derived from the differences between the comparison stars is $0\overset{m}{.}004$. The resulting light curve is shown in Figure 2.

It is evident that a period of $0\overset{d}{.}042$ cannot fit the observations. A least squares fit yields an optimal representation by a sine curve for $P=0\overset{d}{.}056$. The fitted curve with amplitude (half-range) of $0\overset{m}{.}013$ is shown in Figure 2.

These two discrete P-values, and also the shape of the light-curves obtained by Bartolini et al. indicate that this Delta Scuti star too exhibits multiple periodic light variations. Continuous monitoring is needed in order to extract two or more periods from the measurements.

Acknowledgement

The author is indebted to the Geneva and Lyon Observatories for the permission to use the 1-meter telescope and photometric equipment.

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Bartolini, C., Piccioni, A., Silveri, P.: I.B.V.S. No.981, 1975

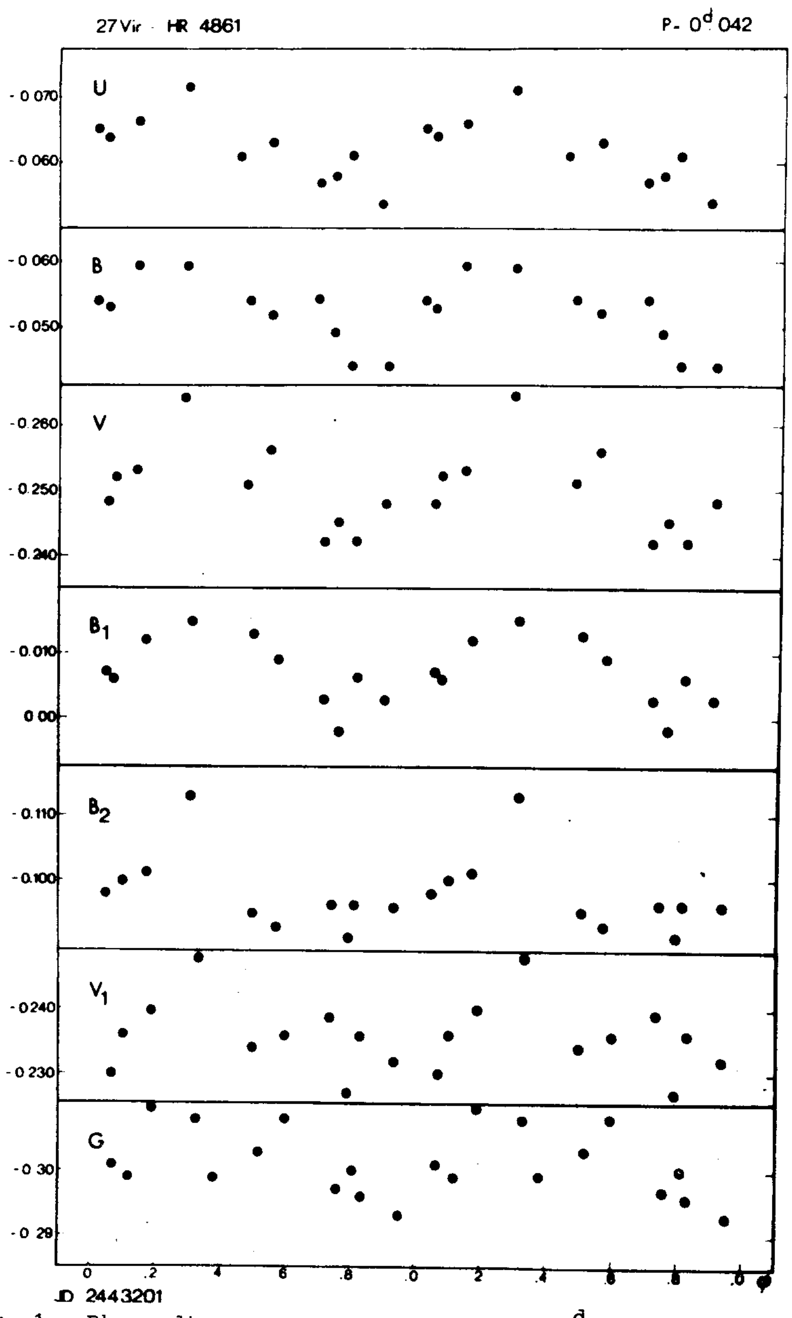

Fig. 1 : Phase diagrams constructed with $P=0^d.042$ for the differential measurements 27 Vir - HR 4861 on JD 2443201.

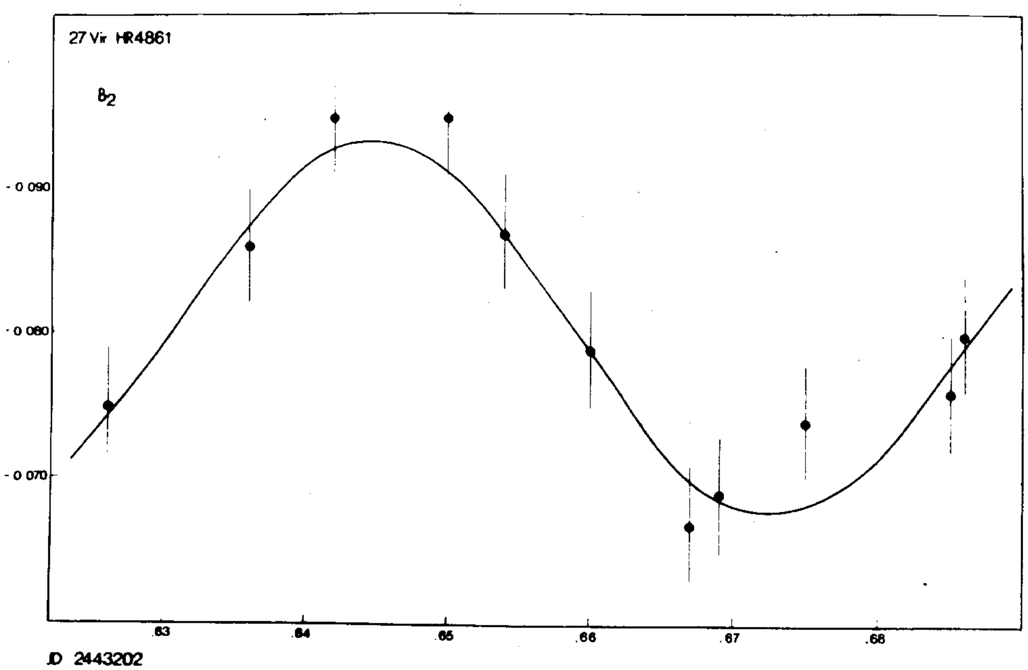

Fig. 2: B_2 measurements on JD 2443202 and the fitted sine-curve.

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HR 4668 : A NEW BRIGHT VARIABLE STAR

Between April 18 and April 27, 1977 photometric measurements of the Delta Scuti star HR 4684 were made with the 60 cm telescope at Haute Provence Observatory.
As comparison stars HR 4668 and HR 4694 were used. These stars were used earlier by Elliott (1974) as comparison stars for HR 4684.
Due to the relatively poor weather conditions, good measurements could be obtained only on April 19, 23, 24 and 25.
In order to eliminate the influence of variable extinction, we increased the observing speed by using the Johnson B filter only.
Figure 1 shows the magnitude differences HR 4668 - HR 4694 during the four observing nights of acceptable quality.
The error bars indicate the dispersion of the magnitude differences between the other comparison star HR 4694 and the small-amplitude variable HR 4684. In this way the mean error indicated is an overestimation of the real mean error.
The diagrams show that HR 4668 is variable on a time scale of several hours. The nightly mean values in table 1 however do not reveal night-to-night variability.

JD 244	n	Δm
3253.5	7	-0.395
3257.5	5	-0.388
3258.5	5	-0.377
3259.5	23	-0.388

Table 1. The nightly mean values of the magnitude differences HR 4668 - HR 4694. n denotes the number of measurements.

Acknowledgements

The authors are indebted to the "Centre National de Recherche Scientifique" and to the staff of Observatoire de Haute Provence for the permission to use the 60 cm telescope and photometric equipment.

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Elliott, J.E. : Astronomical Journal 79, 1082, 1974.

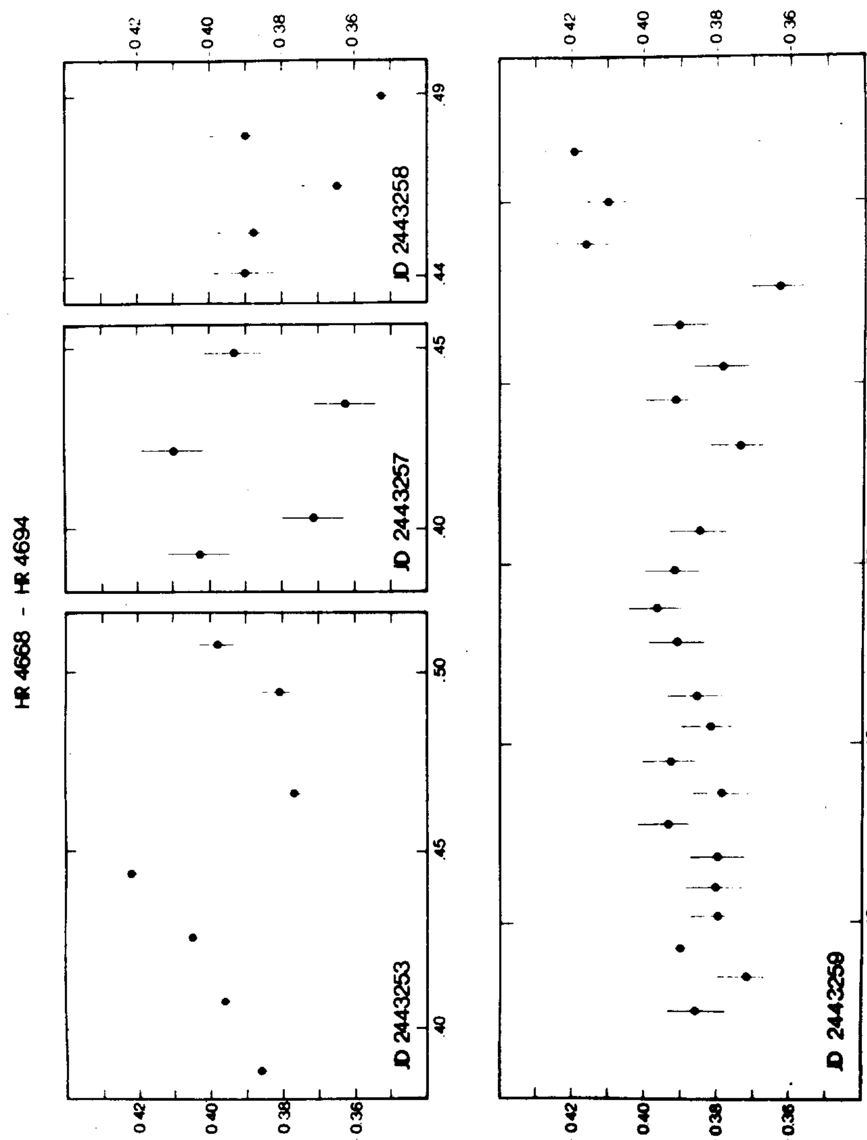

Fig. 1. Differential B measurements of HR 4668 during the four observing nights.

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Konkoly Observatory
Budapest
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o ANDROMEDAE: NO CONSPICUOUS RADIAL-VELOCITY VARIATIONS

Recently, Fracassini, Pasinetti and Pastori (1977) published an analysis of the radial-velocity behaviour of o And based on prism spectrograms (dispersion 35 Å/mm at Hγ) obtained at the Merate Observatory in the years 1967-76. In particular, they announced a steep decrease of the hydrogen radial velocity in November 1975. While almost all radial velocities of o And published since 1900 by several authors fall into a range from 0 to -30 km/s, some of the velocities published by Fracassini et al. are as low as -100 km/s. The above authors conclude from it that there is a 23.5-year periodicity in radial velocities of o And, possibly connected with appearance and disappearance of shell lines in the spectrum of this star.

Since Koubský's (1975) discovery of the hydrogen shell lines in the spectrum of o And, a large collection of grating spectrograms of the star (dispersion 8.5 Å/mm, range 3550-4900 Å) has been secured at the coudé focus of the Ondrejov 2-m telescope. Some of them were obtained on the same nights as the spectrograms used by Fracassini et al. We measured radial velocities of these spectrograms using the Zeiss Abbe Comparator equipped with a small projection screen. The settings were done on the cores of sharp hydrogen lines. As it is not quite clear to which part of the hydrogen profiles refer the data published by Fracassini et al., we also obtained rectified intensity profiles of the Hγ line (most of the analyses by Fracassini et al. are based just on the Hγ velocities) and measured radial velocity of the Hγ wings relative to the shell core. The accuracy of this quantity is somewhat lower than the accuracy of the shell velocities measured with the comparator. As it can be seen in Fig.1, we were not able to confirm large negative velocities found by Fracassini et al. Radial velocity of the Hγ line of o And was close to -25 km/s for the cores, and to -24 km/s for the wings of the line (very probably this difference is unsignificant), with possible variations ± 10 km/s around these values. According to our data, this was true not only in autumn 1975 but also during 1976; invariably for all the shell hydrogen lines. Consequently, the conclusions presented by Fracassini et al. (1977) should be critically re-examined. We appeal to observers from other observatories who obtained some high-dispersion spectrograms of o And during the critical period (October-December 1975) to publish their radial velocities soon.

As a by-product of our study we have found definite variations of the central intensity of the Hγ line between two subsequent nights (see Fig.2). Notably, Bolton and Gulliver (1976) reported intensity variations of metallic lines of o And on the same time scale. There is some indication that the Hγ central intensity may vary regularly, with a period of 3.66 days. Presently, we are analyzing more Hγ profiles to check on this point. A more detailed analysis of our about eighty coudé spectrograms of o And will be published later in Bull.astr.Inst.Czechoslovakia.

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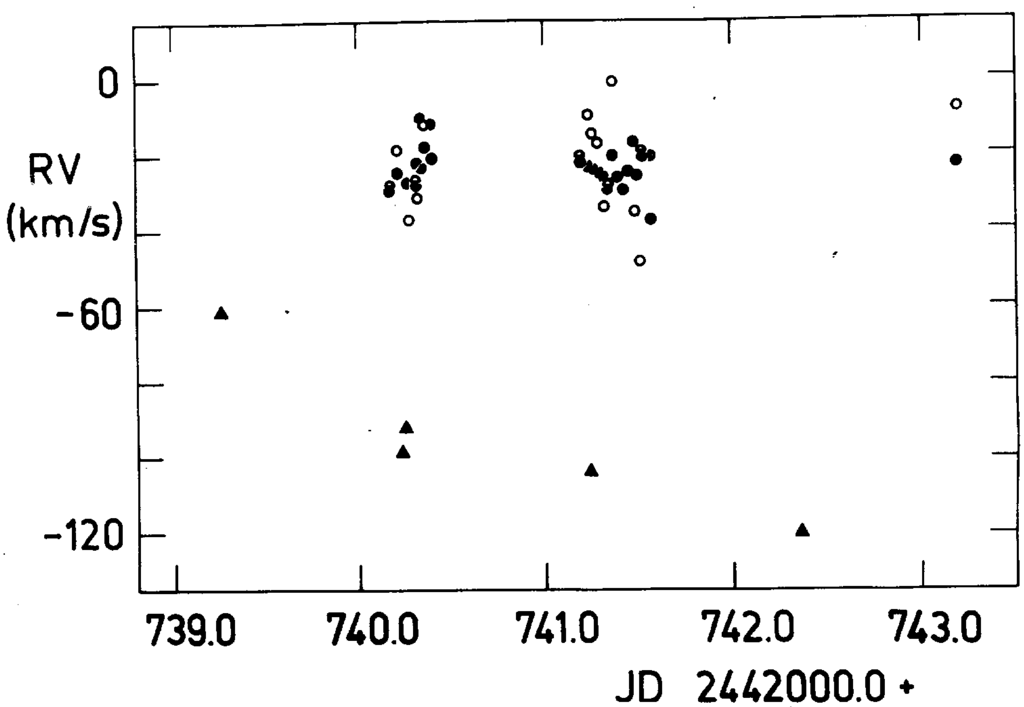

Fig. 1 : Comparison of Hγ radial velocities of o And obtained at Ondřejov and Merate Observatories at the end of November 1975. Following symbols are used:

• - Ondřejov, core of the line (Abbe)
o - Ondřejov, wings of the line (rectified intensity tracings)
▲ - Merate

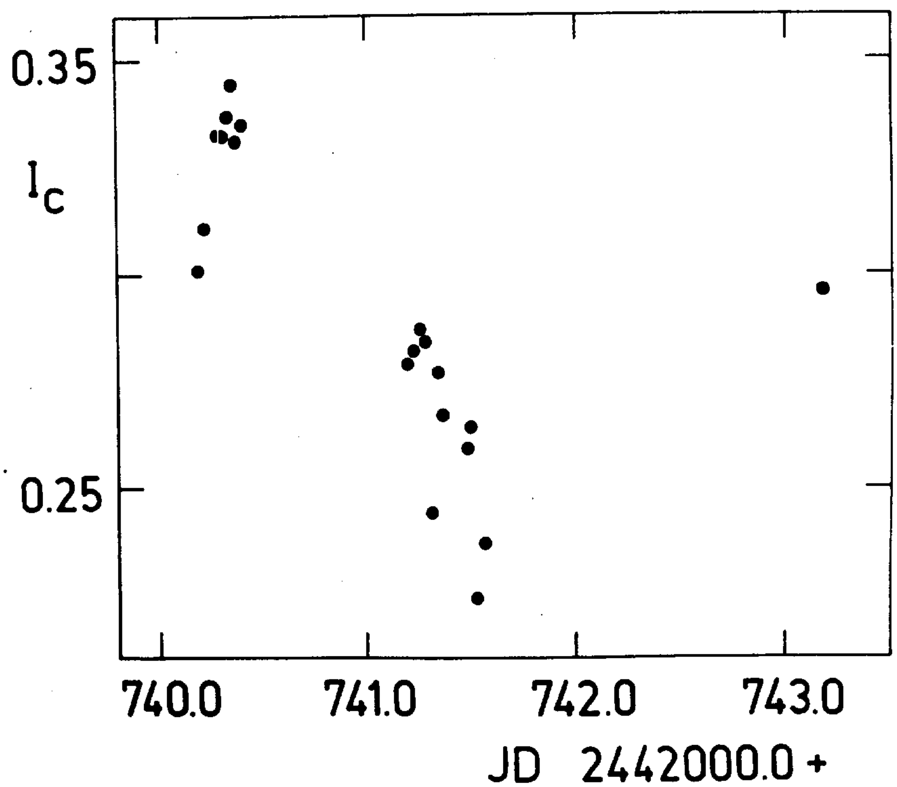

Fig. 2 : Central intensities of the Hγ line of o And during November 23-26, 1975.

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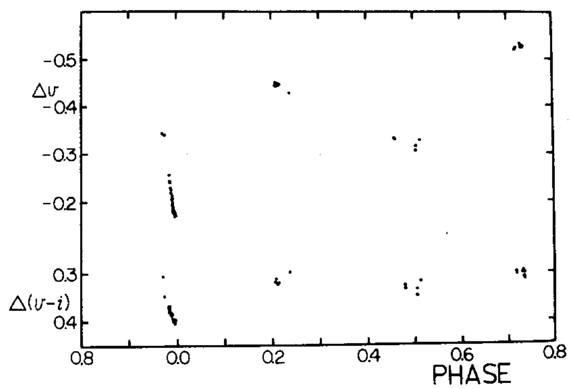
FURTHER LIGHT CURVE VARIATIONS OF SZ PISCIUM

The eclipsing variable SZ Psc (HD 219113), which is a member of the RS CVn class (Hall 1976), recently has been studied by Jakate et al. (1976). In that study photometry from two epochs was presented which indicated that the light curve is highly variable. Data obtained by Bakos in 1957 exhibited a pronounced sinusoidal wave (0.2 mag amplitude, maximum near phase 0.7) while data obtained in 1974 showed this feature to be absent. A few observations made in intermediate years indicated that the wave was present at close to the 1957 amplitude but that it was not migrating in phase. Since continuing observation will be useful in studying the variation of the wave, the brightness of SZ Psc was measured at times of opportunity on nine nights during December 1976 using the 42-inch (107 cm) telescope at Lowell Observatory. The accompanying Table gives the observations which consist of magnitude differences, SZ Psc minus HD 219018, corresponding to passbands chosen to approximate the _V_ and _I_ bands of the _UBVRI_ system. The photometric system used was similar to that described by Fernie (1974), differing only in the substitution of an ITT F4085 photomultiplier. It will be noted that the comparison star is that used by Jakate et al.; the time of mid-eclipse, however, occurred about an hour later than predicted by the non-linear elements of that study. Therefore, the phases listed have been computed using the formula $JD_{\odot} = 2442308.7671 + 3.965552E$ which Jakate et al. determined from the times of their photoelectric primary minima.

The accompanying figure illustrates the 1976.9 light variation. Although the period is almost exactly four days, the phasing was such that it was possible to obtain observations at the



quadratures and during both eclipses. The wave clearly has been reestablished with an amplitude of at least 0.075 mag. Further, the depth of secondary eclipse seems to have increased significantly while the level of mid-primary eclipse is higher that at former epochs. This suggests that the wave maximum has shifted

Table

JD⊙ 2443000+	Phase	Δv	$\Delta(v-i)$	JD⊙ 2443000+	Phase	Δv	$\Delta(v-i)$
117.6683	0.9820	-0.258	0.369	117.7169	0.9942	-0.170	0.403
117.6750	0.9837	-0.245	0.375	117.7203	0.9951	-0.171	0.399
117.6757	0.9839	-0.243	0.373	117.7212	0.9953	-0.178	0.396
117.6766	0.9841	-0.243	0.366	118.5563	0.2059	-0.446	0.317
117.6798	0.9849	-0.237	0.378	118.5595	0.2067	-0.452	0.309
117.6807	0.9851	-0.234	0.380	119.5626	0.4597	-0.333	0.324
117.6816	0.9853	-0.232	0.378	119.5655	0.4604	-0.331	0.329
117.6845	0.9861	-0.227	0.378	119.7394	0.5043	-0.318	0.331
117.6866	0.9866	-0.222	0.382	119.7431	0.5052	-0.307	0.345
117.6876	0.9869	-0.219	0.384	121.5875	0.9703	-0.344	0.304
117.6913	0.9878	-0.211	0.385	121.5996	0.9732	-0.343	0.346
117.6923	0.9880	-0.213	0.387	122.5474	0.2124	-0.445	0.322
117.6932	0.9883	-0.214	0.382	122.5503	0.2131	-0.451	0.317
117.6965	0.9891	-0.207	0.385	122.5535	0.2139	-0.447	0.319
117.6875	0.9894	-0.208	0.385	123.7341	0.5116	-0.329	0.316
117.6985	0.9896	-0.202	0.385	124.5489	0.7171	-0.522	0.297
117.7017	0.9904	-0.201	0.387	124.5524	0.7180	-0.525	0.302
117.7025	0.9906	-0.194	0.394	126.6121	0.2374	-0.430	0.296
117.7056	0.9914	-0.192	0.392	128.5659	0.7301	-0.534	0.299
117.7065	0.9916	-0.190	0.397	128.5694	0.7309	-0.533	0.294
117.7074	0.9919	-0.190	0.399	128.5773	0.7329	-0.526	0.299
117.7106	0.9927	-0.184	0.397	128.5803	0.7337	-0.525	0.308
117.7116	0.9929	-0.184	0.393	128.5834	0.7345	-0.527	0.312
117.7126	0.9932	-0.177	0.402				
117.7158	0.9940	-0.180	0.397				

toward increasing phase. The present (*v*-*i*) color curve provides the first measurement of the color of the wave in this system. The wave is slightly bluer than the system as a whole. Since the secondary contributes significantly more light at longer wavelengths, the contrast between bright and dark hemispheres is lower in the infrared than in the visual. Finally, one notes that on the average the system has become brighter and bluer since 1974.

I wish to thank the staff of Lowell Observatory, especially Robert Millis, for the most pleasant and productive observing session which lead to these results.

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HD 56429: A DOUBLE-LINED Am ECLIPSING BINARY

In 1974 Markworth (IBVS No.921) recorded two photographic minima of HD 56429 (BV 1621 CMa), with the comment that it is probably an eclipsing variable. Spectrograms obtained at the Lick Observatory show this 8th magnitude A star to be a double-lined spectroscopic binary with slightly unequal components of early Am type. A period of approximately 4.80 days was estimated from the spectrograms.

Photoelectric uvby photometry with the Danish 50 cm telescope at Cerro La Silla, Chile, confirms the presence of eclipses at the predicted times. The eclipses are approximately 0.5 and 0.4 mag deep in all four colours, equally spaced, and of $0^{d}.35$ duration. The period is close to $4^{d}.801$.

Spectrographic and photometric observations are continuing for determination of orbital elements and absolute dimensions.

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A SEARCH FOR LONG PERIOD CEPHEIDS IN NORMA

According to radioastronomical data (e.g. Kerr, 1969) a spiral arm may be running tangentially along the line of sight near l = 328°, in the Norma section of the Milky Way. Thus, one would expect to find several long period cepheids belonging to this arm but, in fact, few are known at present. The lack of cepheids might be an observational effect, however, (see McCarthy and Havlen, 1975) so that it is important to extend to fainter magnitudes the search for variable stars near l = 328°.

We undertook a search for variable stars in a 2°x 2° region centered at R.A. (1950) = $15^h51^m.3$, Decl. (1950) = -54°19′ (l = 327°.62, b = -0°.65), using B and V plates obtained with the Yale-Columbia astrograph at El Leoncito (San Juan, Argentina) and with the Curtis Schmidt-telescope at Cerro Tololo Inter-American Observatory (CTIO). Ten pairs of B plates from El Leoncito and two pairs of B plates from CTIO were used for the search with the blink microscope of La Plata Observatory. Eight new variables were discovered together with the two previously known variables GN Normae and SY Normae and the suspected variable 2515 = HV 8812 (Kukarkin et al., 1951, Luyten, 1934, 1938).

Table I

Positions and magnitude ranges of the variable stars found.

Star	R.A. (1950)	Decl. (1950)	B range
1	$15^h46^m00^s.4$	-54°07′18"	$16^m.7$ - >$18^m.0$
2	15 46 44.2	-53 36 45	14.2 - 15.3
3	15 51 48.7	-54 43 11	16.2 - 17.5
4	15 48 38.8	-55 08 37	13.9 - 14.4
5	15 48 07.0	-53 46 27	15.6 - 16.6
6	15 49 17.6	-53 26 37	15.2 - 16.5
7	15 55 54.0	-54 02 22	15.2 - 16.0
8	15 53 25.0	-55 08 29	16.3 - >18.0

Finding charts

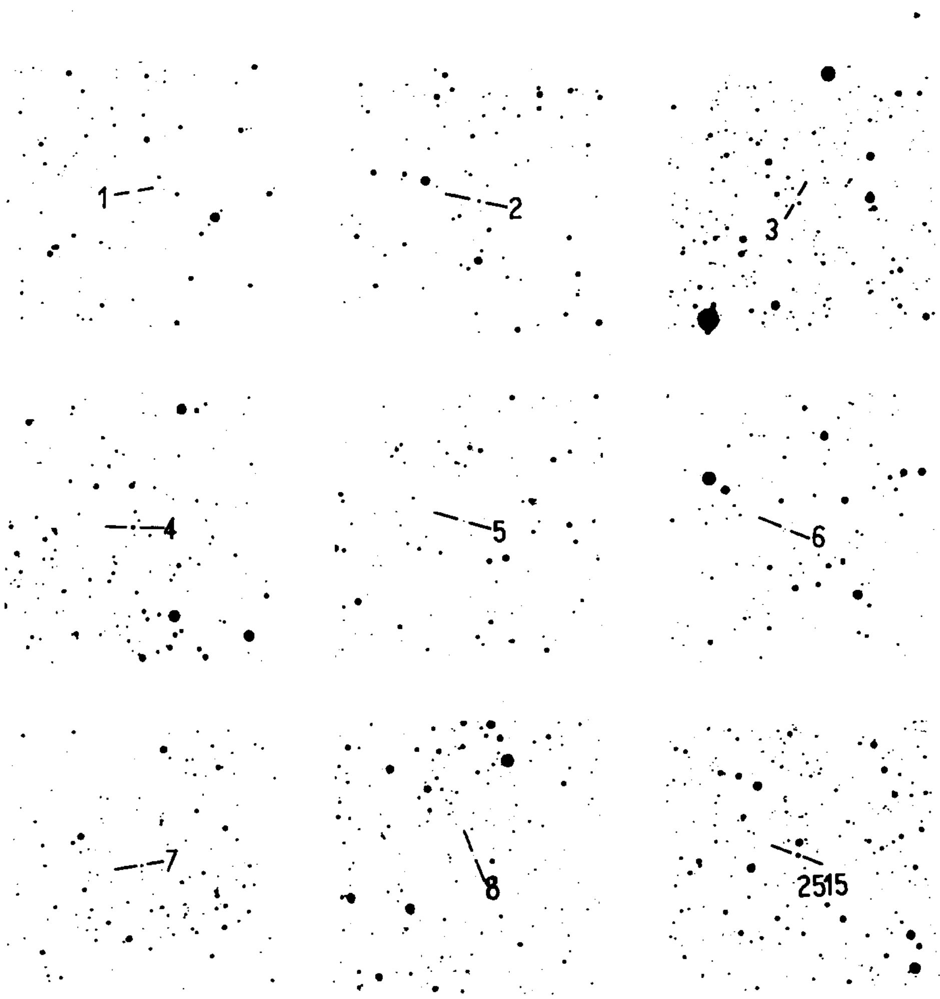

Table I gives 1950 positions and estimated magnitude ranges for the new variables; charts for the new variables and also for the suspected variable 2515, for which no published chart is known to us, are also provided. Chart size is about 10′ x 10′; North is up, East to the left.

A study of these variables by means of photographic BV photometry is under way at present at La Plata Observatory to decide what kind of variables they are.

We are very grateful to the authorities of the CTIO and the Observatorio Astronómico "Félix Aguilar" for the use of the telescopes. Travel expenses to CTIO were covered by a grant from the Consejo Nacional de Investigaciones Científicas y Técnicas de la República Argentina to JCM. Special thanks are due to Lic.R.B. Orellana for the computation of the positions.

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IDENTIFICATION OF HV 5824 AND HV 5967 WITH PLANETARY NEBULAE

We recently noted that two Harvard variable stars in the Large Magellanic Cloud appear to be identical with confirmed planetary nebulae. HV 5824 and HV 5967 are listed in the Hodge-Wright atlas of the LMC (Smithsonian Press, 1967) as irregular variables, having a range, in each case, of 0.9 magnitudes. They are identified on charts provided in that atlas. By comparing the Hodge-Wright charts with the identification charts of confirmed planetary nebulae provided by Westerlund and Smith (M.N.R.A.S. 127, 449, 1963), one observes that HV 5824 = WS 26 = N 141 and HV 5967= WS 35 = N 66. The N designations are those of Henize (Ap.J.Suppl. 2, 315, 1956). Presumably, such variations could arise in the central stars, a phenomenon also observed in a small number of galactic planetaries. Clearly, it would be of considerable interest if southern hemisphere observers could verify and specify the exact nature of these light variations.

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Corrigenda

I.B.V.S. No. 1254

Z. Tüfekcioglu : Photoelectric Minima of AB And and X Tri

The table for AB And should read:

Hel. Min. J.D.	m.e.	Min.	O - C
2443044.3047	± .0006	II	+ .0049
044.4694	.0004	I	.0036
046.2941	.0008	II	.0029
050.4433	.0015	I	.0035
054.4262	.0004	I	.0038
129.2694	± .0007	II	+ .0052

The table for X Tri should read:

Hel. Min. J.D.	m.e.	Min.	O - C
2443132.2753	± .0004	I	+ .0071
33.2466	± .0002	I	+ .0076

I.B.V.S. No. 1280

In the note "Periodicite d'etoiles Ap Australes" of P. Renson the period of HD 83625 was, by mistake, omitted. The period of this star is 1.08 days.