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A MULTIPERIODIC EPHEMERIS FOR RZ CEPHEI

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In a recent paper Todoran & Roman (1999) resumed the problem of the period variability of the RRc type star RZ Cephei. The $O-C$ curve displayed therein and covering about 120000 pulsation cycles, has an obvious alternate character. Geyer (1958) proposed for the first time a periodic ephemeris with a period of about 46 yr. This alternate behavior was later discussed by Cester & Todoran (1976) and Firmanyuk (1980, 1982). In what follows, we will present our results concerning the modelling of the run of this $O-C$ curve. They represent a continuation of our preliminary approach (Pop, 1998).

In our study we used 284 individual times of maximum light from the following sources: Florja (1939), Spinrad (1959), Todoran (1974), Cester & Todoran (1975, 1976), Maintz (1992), Seifert (1993) and Todoran & Roman (1999). The timespan of these data is about 102 yr.

We calculated the $O-C$ residuals with elements that are different from those of Todoran & Roman:

$$t_n = \text{HJD } 2430591.499 + 0\overset{\text{d}}{.}30867359\, n. \qquad (1)$$

We took as initial epoch that moment which is the closest to the middle of the data set. Such a choice prevents cycle count errors. Being given the value of this parameter, we determined (through exhaustive search) that value of the pulsation period which minimizes the standard deviation of the $O-C$ residuals.

The next step in our analysis was to establish an adequate ephemeris according to the intricate behavior of the $O-C$ curve:

$$t_n = t_0 + \sum_{k=1}^{K} \tau_k\, n^k + \sum_{l=1}^{L} \sum_{m=1}^{M_l} \tau_{lm} \sin\left(2\pi m f_{0l}\, n + \Phi_{lm}\right), \qquad (2)$$

where t_0 is the initial epoch, the second term describes a polynomial trend, while the last one is a multiperiodic term with $f_{0l} = P_p/P_{sl}$, $P_p \equiv \tau_1$, P_p being the unperturbed pulsation period, and P_{sl} is the period of the l^{th} modulator signal. The fitting methodology of such a complex model to a given $O-C$ curve has been described in our previous paper (Pop (1996), see also Pop et al. (1996)). The preliminary fitting through linear least squares method for fixed values for frequencies, were followed by an improvement of all parameters using the differential correction method. In addition, we used the t statistical criterion of Student in order to keep only significant terms in Eq. (2) (see e.g. López de Coca et al., 1984). Our numerical tests lead us to an ephemeris with $K = 2$, $L = 2$, $M_1 = 2$, and $M_2 = 3$. The values of the computed parameters together with those of the corresponding standard errors are given in Table 1. The run of the observed data as well as that of the computed model are displayed in Figure 1.

Finally, we are able to formulate some conclusions:

1. According to the results listed in Table 1, the $O-C$ curve contains a parabolic trend, caused by a slow, linear decrease of the pulsation period, which may be related to evolutionary structural changes. In the same time, the standard error of τ_2 is quite large. That is why new observations are needed in order to confirm the existence of this trend.
2. The multiperiodic character of the determined ephemeris agrees with the shape of the observed $O-C$ curve, which is typical of a beat phenomenon. Its shape is caused by the interaction of two modulator signals. This result represents a quantitative confirmation of Todoran's (1976) assertion about the multiperiodicity of RZ Cep variability. Future observational and theoretical studies are needed in order to elucidate the nature of the involved physical mechanisms. It is interesting to note here that the longer periodicity (54.03 yr) is very close to the value of the median cycle length (55 yr) established by Hall (1990) for a sample of 21 variables of RR Lyr type, displaying alternate period changes. Could the appearance of the $O-C$ curve be the result of the interaction between pulsation and cyclic magnetic activity (according to the hypothesis of Stothers (1980))?
3. The amplitude of the second harmonic of the shorter periodicity (i.e., $l = 2$, $m = 3$) is below the level of the observational noise, whose standard deviation is about 0.023 d. Its reality has to be verified on the basis of new and more accurate observations.
4. A more precise estimate of the $O-C$ curve amplitude is about 0.51 d. Such a large value is a consequence of more or less rapid, but long-term and alternate cycle-to-cycle changes of the pulsation period.

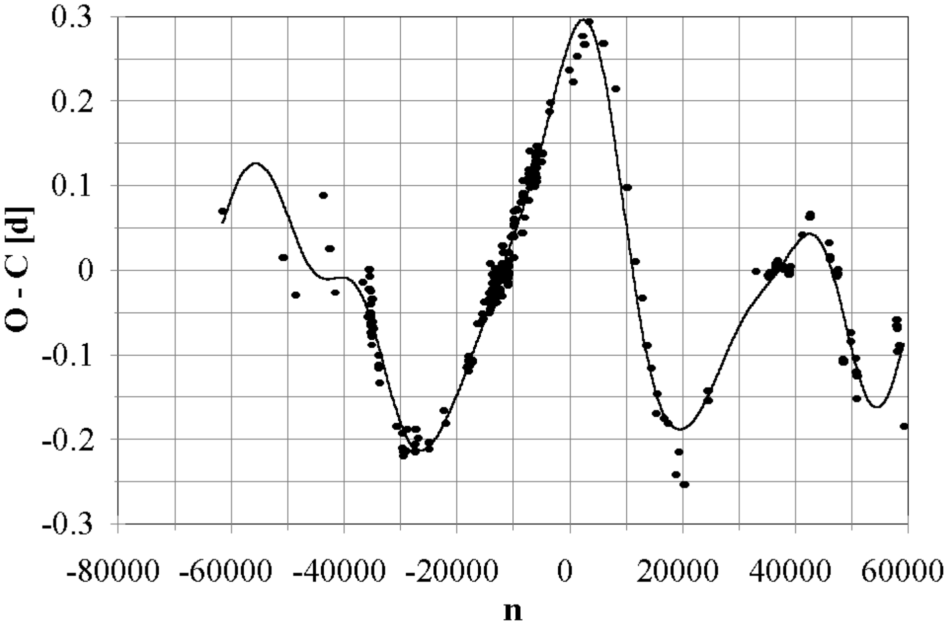

Figure 1.

Table 1

$t_0 = \mathrm{HJD}\ 2430591.2692$ ±0.0043	
$\tau_1 \equiv P_p = 0.308673143$ d ±0.000000081	
$\tau_2 = -9.8 \times 10^{-12}$ d/c $\pm4.4 \times 10^{-12}$	
$f_{01} = 1.564 \times 10^{-5}$ $\pm0.018 \times 10^{-5}$	$P_{s1} = 54.03$ yr ±0.62
$\tau_{11} = 0.1244$ d ±0.0044	$\Phi_{11} = 1.359$ rad ±0.031
$\tau_{12} = 0.0578$ d ±0.0039	$\Phi_{12} = 0.634$ rad ±0.084
$f_{02} = 2.420 \times 10^{-5}$ $\pm0.015 \times 10^{-5}$	$P_{s2} = 34.92$ yr ±0.21
$\tau_{21} = 0.1180$ d ±0.0029	$\Phi_{21} = 2.013$ rad ±0.034
$\tau_{22} = 0.0403$ d ±0.0027	$\Phi_{22} = 0.248$ rad ±0.077
$\tau_{23} = 0.0076$ d ±0.0027	$\Phi_{23} = 5.92$ rad ±0.33

We hope that our attempt to decipher the period variability phenomenon of RZ Cep, together with the previous paper of Todoran & Roman (1999), will stimulate the interest in observing this pulsating star.

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CCD OBSERVATION OF THE 1999 OUTBURST OF TmzV46

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TmzV46 ($15^{\rm h}26^{\rm m}13\overset{\rm s}{.}99$, $+08^\circ18'03\overset{''}{.}8$, J2000.0) is a variable star discovered by Takamizawa (1998), who reported positive detections on JD 2449620, 2449716 and 2450906, and suggested it to be a possible dwarf nova based on the light curve and the USNO color. Schmeer (1999) reported another brightening on his CCD images. The object was caught at 12.6 mag on 1999 October 4.114 UT, while it was still very faint at $\sim$ 17.0 mag on October 2.099 UT. The rapid rise seems to confirm the suggested dwarf nova classification (Schmeer 1999). We performed follow-up CCD observations to clarify the nature of the outburst.

The observations were done using an unfiltered ST-7 camera attached to the Meade 25-cm Schmidt-Cassegrain telescope. The exposure time was 30 s. The images were dark-subtracted, flat-fielded, and analyzed using the Java$^{\rm TM}$-based PSF photometry package developed by one of the authors (TK). The relative magnitudes of the variable were measured against GSC 927.423 (USNO r-magnitude 13.2), whose constancy was confirmed by comparison with GSC 927.464 (USNO r-magnitude 14.3).

The overall light curve is shown in Figure 1. The scale is given in flux unit (relative to GSC 927.423) in order to clearly show the decline on October 20, when the object was below the limit of our detection. Because of the low altitude in the evening twilight and interfering clouds, no further observations were possible. The noticeable features are the initial decline of 0.73 ± 0.20 mag in 7 days between October 5 and 12, and the final decline in subsequent 8 days. The object was reported to be still bright on October 15 (Modic 1999), but no further observations are available. From these observations, the brightening of TmzV46 lasted at least 11 days, but the total duration was shorter than 16 days. The duration of the brightening, and the rapid rise and fade within several days are consistent with the dwarf nova classification. Spectroscopic confirmation is recommended. The observed rate of mean decline (~ 0.1 mag d^{-1}) is neither inconsistent with those of superoutbursts in SU UMa-type dwarf novae nor long outbursts of SS Cyg-type dwarf novae. Time-resolved photometry during the next long outburst is strongly needed.

The authors are grateful to Patrick Schmeer for notifying us of the outburst, and to VSNET observers who contributed important observations. This work is partly supported by the Grant-in-Aid for Scientific Research (10740095) of the Japanese Ministry of Education, Science, Culture.

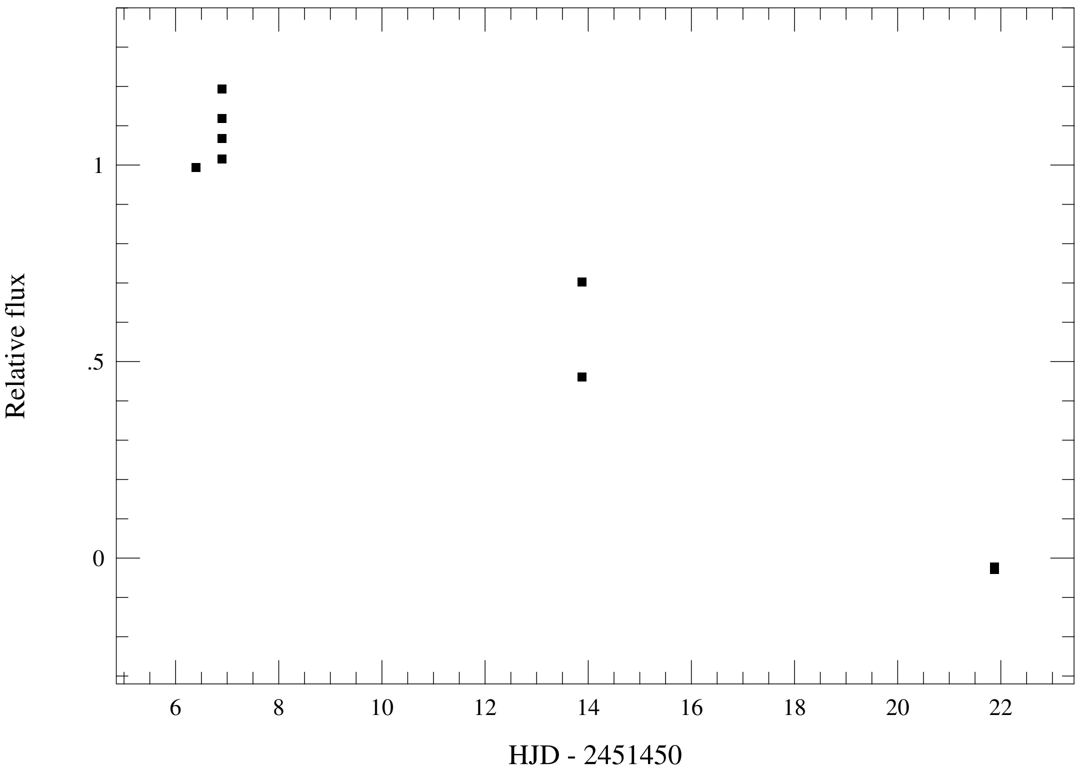

Figure 1. Outburst light curve of TmzV46

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CCD OBSERVATION OF THE 1999 OUTBURST OF Var61 Her

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Var61 Her is a dwarf nova discovered by Antipin (1998), who found seven outbursts from 188 plates taken at Moscow and Crimea. The outburst amplitude larger than 5.8 mag (Antipin 1998) makes Var61 Her a possible candidate of large-amplitude SU UMa-type dwarf nova.

VSNET (Variable Star Network) members started a systematic monitoring of this object in 1998 May. Two further outbursts have been detected up to 1999 November. The first outburst in 1998 November was detected by Kinnunen (1998), which lasted at least 9 days. The second outburst was detected on 1999 October 31 (Jones and Muyllaert 1999). Upon this alert, we started time-resolved CCD photometry in order to check the possible presence of superhumps.

The observations were done using an unfiltered ST-7 camera attached to the Meade 25-cm Schmidt–Cassegrain telescope. The exposure time was 30 s. The images were dark-subtracted, flat-fielded, and analyzed using the Java$^{\mathrm{TM}}$-based PSF photometry package developed by one of the authors (TK). The relative magnitudes of the variable were measured against GSC 2621.958 (USNO r-magnitude 10.5), whose constancy was confirmed by comparison with GSC 2621.990 (USNO r-magnitude 12.8).

The overall outburst light curve is shown in Figure 1. The nightly averages with errors are plotted. The light curve shows a relatively rapid, monotonous decline, which is unlike that of superoutbursts of SU UMa stars. The decline rate of the first three night is 0.46 mag d^{-1}, which is far larger than the typical decline rate of 0.1–0.2 mag d^{-1} in superoutbursts, and is far smaller than that ($\geq$ 1 mag d^{-1}) in normal outbursts. The decline rate suggests that Var61 Her is an SS Cyg-type (UGSS) dwarf nova.

The apparent lack of superhumps in time-resolved CCD photometry also supports the above classification of the dwarf nova. Figure 2 represents our time-resolved photometry, which only shows a monotonous decline. The low outburst frequency ($\sim$ 1 year interval) makes Var61 Her one of rather inactive SS Cyg-type dwarf novae. Being a relatively bright object, further investigation of system parameters is encouraged.

The authors are grateful to VSNET observers who contributed important observations. This work is partly supported by the Grant-in-Aid for Scientific Research (10740095) of the Japanese Ministry of Education, Science, Culture.

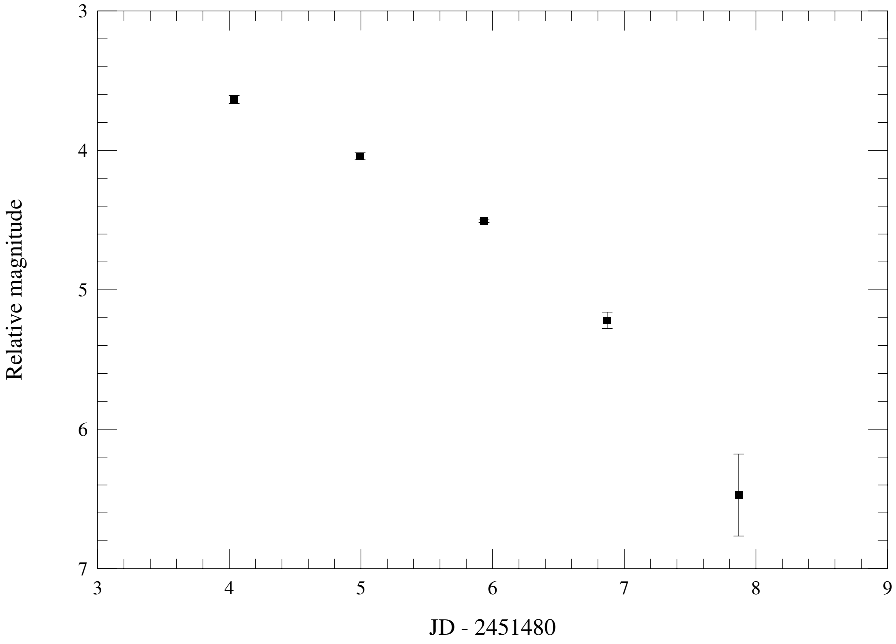

Figure 1. Outburst light curve of Var61 Her

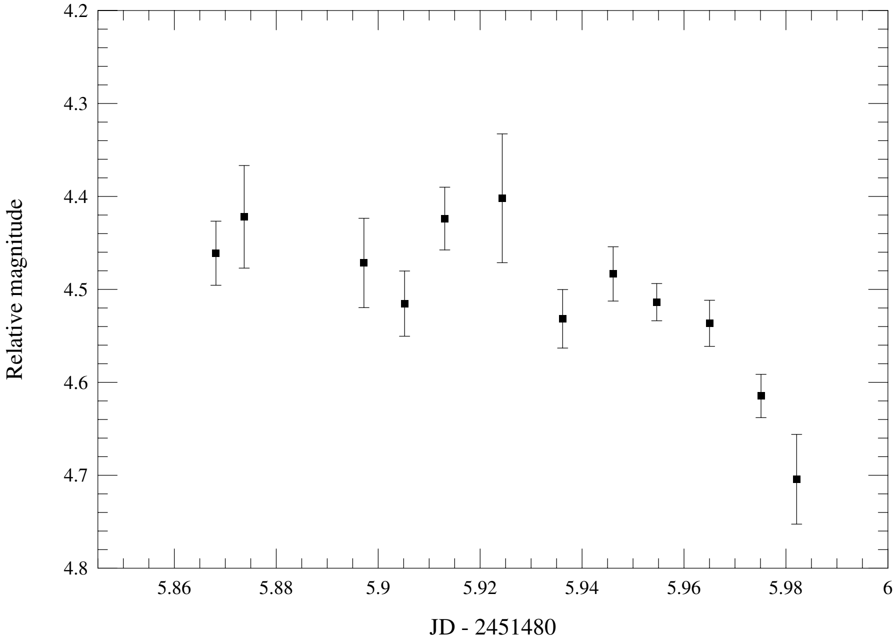

Figure 2. Light curve of Var61 Her on 1999 November 3

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NEW CCD-LIGHTCURVE AND IMPROVED ELEMENTS OF TY Ari

MARTIGNONI, M.

Via Don Minzoni 26, I-20020 Magnago (Milano), Italy

Name of the object:
TY Ari = GSC 1761.1085

Equatorial coordinates:	**Equinox:**
R.A.= $02^h08^m40^s.28$ **DEC.=** $+25°13'07''.1$	2000.0

Observatory and telescope:
Private Station in Busto Arsizio, 0.21-m Newton (F/5.0)

Detector:	DTA Seti 245C CCD Camera
Filter(s):	None
Comparison star(s):	GSC 1761.0989
Check star(s):	GSC 1761.0901
Transformed to a standard system:	No

Availability of the data:
Through IBVS Web-site as 4804-t1.txt

Type of variability:	RRC

Remarks:

The variability of TY Ari (= S 3543 = 218.1943 = CSV 193) was discovered by Hoffmeister (1944) and first observed by Meinunger (1966) who found a possible RR Lyrae nature and gave an approximate period of variation. First elements and type determination of variability were given by Schmidt and Seth (1996). We observed TY Ari during 1998 and obtained 307 measures on 6 nights from JD 2451134 to JD 2451200. Using the period search algorithm Lancelot (Gaspani, 1995), in agreement with the period found by Schmidt and Seth, we derived the following new elements of variation:

$$\mathrm{Max} = \mathrm{HJD}\ 2451166.333(3) + 0^d.329715(3) \times E.$$

Figure 1 shows data folded with these elements.

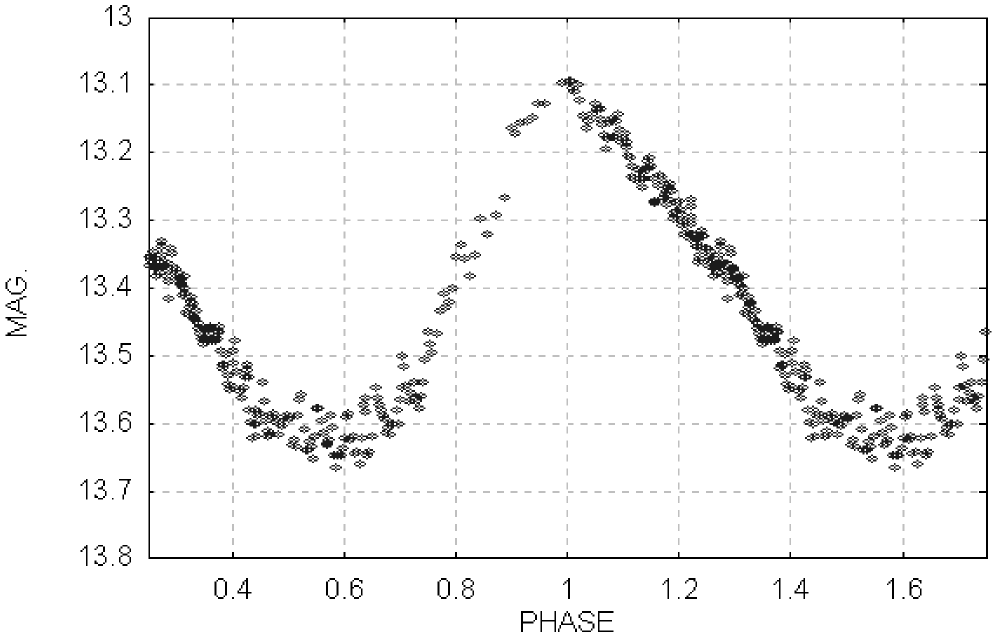

Figure 1. CCD-lightcurve of TY Ari folded with elements given in the text

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A NEWLY DISCOVERED DELTA SCUTI VARIABLE STAR

DU, BAI-TIAN; ZHOU, AI-YING; ZHANG, XIAO-BING; LIU, ZONG-LI; ZHANG, RONG-XIAN; LI, HONG-BING; JINAG, ZHAO-JI; DONG, XIAO-YI; ZHAO, LI-MIN

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We report the discovery of a new short-period variable star (GSC 2683_3076, $RA = 20^{\mathrm{h}}06^{\mathrm{m}}21^{\mathrm{s}}$, $DEC = 35°54'19''$, equinox = 2000.0, 10.7 V). The new variable star was chosen as one of the comparison stars during the observations of the high amplitude Delta Scuti star V1821 Cyg. The brightness of the star was first suspected to be variable in July 1999. Since then the star has been paid a close attention, and we monitored its photometric behaviour in September and October 1999.

The observations were carried out at the Xinglong Station of Beijing Astronomical Observatory (BAO) by using a red-sensitive Thomson TH7882 576 × 384 CCD photometer (Wei Ming-Zhi et al. 1990) attached to the 85-cm Cassegrain telescope. The CCD has a imaging size of 13.25 mm × 8.83 mm which corresponds to a sky field of $12\overset{\prime}{.}3 \times 8\overset{\prime}{.}4$ ($1\overset{\prime\prime}{.}2$/pixel, a pixel size is 23 μm × 23 μm) on the computer screen. Johnson V filter was used. Figure 1 gives the identification chart of the new variable and the comparison stars. The magnitude differences of the new variable star relative to four comparison stars C1, C2, C3 and C4 are calculated as V − (C1 + C2 + C3 + C4)/4. Here,

C1 = GSC 2683_3426 ($RA = 20^{\mathrm{h}}06^{\mathrm{m}}21\overset{\mathrm{s}}{.}42$, $DEC = 35°52'24\overset{\prime\prime}{.}5$, 2000.0, 11.8 V),

C2 = GSC 2683_2994 (= BD +35°3963p, $RA = 20^{\mathrm{h}}06^{\mathrm{m}}29\overset{\mathrm{s}}{.}47$, $DEC = 35°54'42\overset{\prime\prime}{.}0$, 2000.0, 10.6 V, F8),

C3 = GSC 2683_3318 ($RA = 20^{\mathrm{h}}06^{\mathrm{m}}20\overset{\mathrm{s}}{.}46$, $DEC = 35°53'08\overset{\prime\prime}{.}0$, 2000.0, 12.1 V),

C4 = GSC 2683_2232 ($RA = 20^{\mathrm{h}}06^{\mathrm{m}}14\overset{\mathrm{s}}{.}67$, $DEC = 35°51'02\overset{\prime\prime}{.}9$, 2000.0, 10.9 V).

Depending on the change of seeing from night to night, different exposure times (ranging from 10 to 60 seconds) were used, but we have resampled all of the differential magnitudes to the bins of 60 seconds and normalized to zero. The atmospheric extinction was not taken into consideration in view of the closeness of the observed stars. The differential magnitudes of the comparison stars usually show a typical accuracy (standard deviation) of 0.010 mag. For the nights of good seeing a better value of standard deviation about 0.006 mag was obtained.

A preliminary Fourier analysis shows that the new variable star has a simultaneously excited multiperiodic pulsating character. The light curve can be fitted at least with three sine functions. The frequency contents are: $f_1 = 15.6980$, $f_2 = 9.5161$ and $f_3 = 8.0229$ c/d. Two additional frequencies $f_4 = 11.6849$ and $f_5 = 14.0489$ c/d are likely present. The principal period ($1/f_1$) of the new variable is about 90 minutes with a full amplitude of about 0.025 mag if the light curves are fitted with only one frequency content. Figure 2 shows the differential V light curves V − (C1 + C2 + C3 + C4)/4 versus

Heliocentric Julian Day on 9 nights between 11 and 21 October 1999. The solid lines represent a general least-squares sine-waves fitting made by using PERIOD98 (Sperl 1998) and MFA (Hao 1991). To identify the spectral type of the new variable, we obtained a spectrum of the star using the 2.16-m telescope equipped with a middle-dispersion Cassegrain spectrometer at the Xinglong Station of BAO on 19 October 1999. According to the intensities of Hβ, Hγ and other characteristic lines and their ratio values, the spectrum of the new variable is similar to that of A9V or F0V star. In terms of the short-periodicity, low-amplitude multiperiodic light variations and the estimated spectral type of the new variable star, it agrees well with the group feature of Delta Scuti stars (Breger 1979). So the new variable is most probably a new Delta Scuti type star.

We have found convincing evidence for the multi-mode variability of the new Delta Scuti star and analyzed its pulsation frequency contents. However, to reveal the details of the star's pulsational behaviour, further observations are needed. Various photometric indices are to be determined. We hope to publish a thorough investigation on this star after a follow-up observation. By the time, multiperiodicity could be further studied and the multiple modes could be identified. At the same time, its location on the H–R diagram could be well positioned.

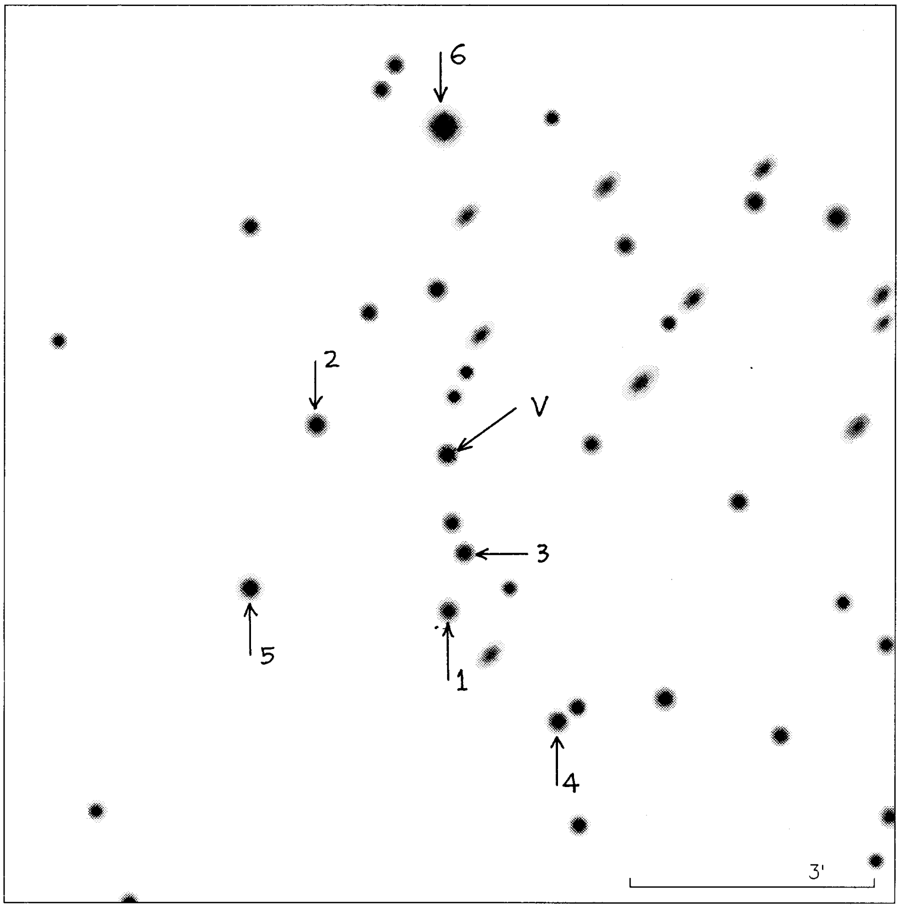

Figure 1. The identification chart of the new variable star (center, covered a cross and labelled V) as well as the comparison stars (labelled 1, 2, 3, 4). The star labelled 5 is the high-amplitude δ Scuti star V1821 Cyg. Star 6 is SAO 69413 (5.5 V, K0). The scale of the field is marked on the right bottom.

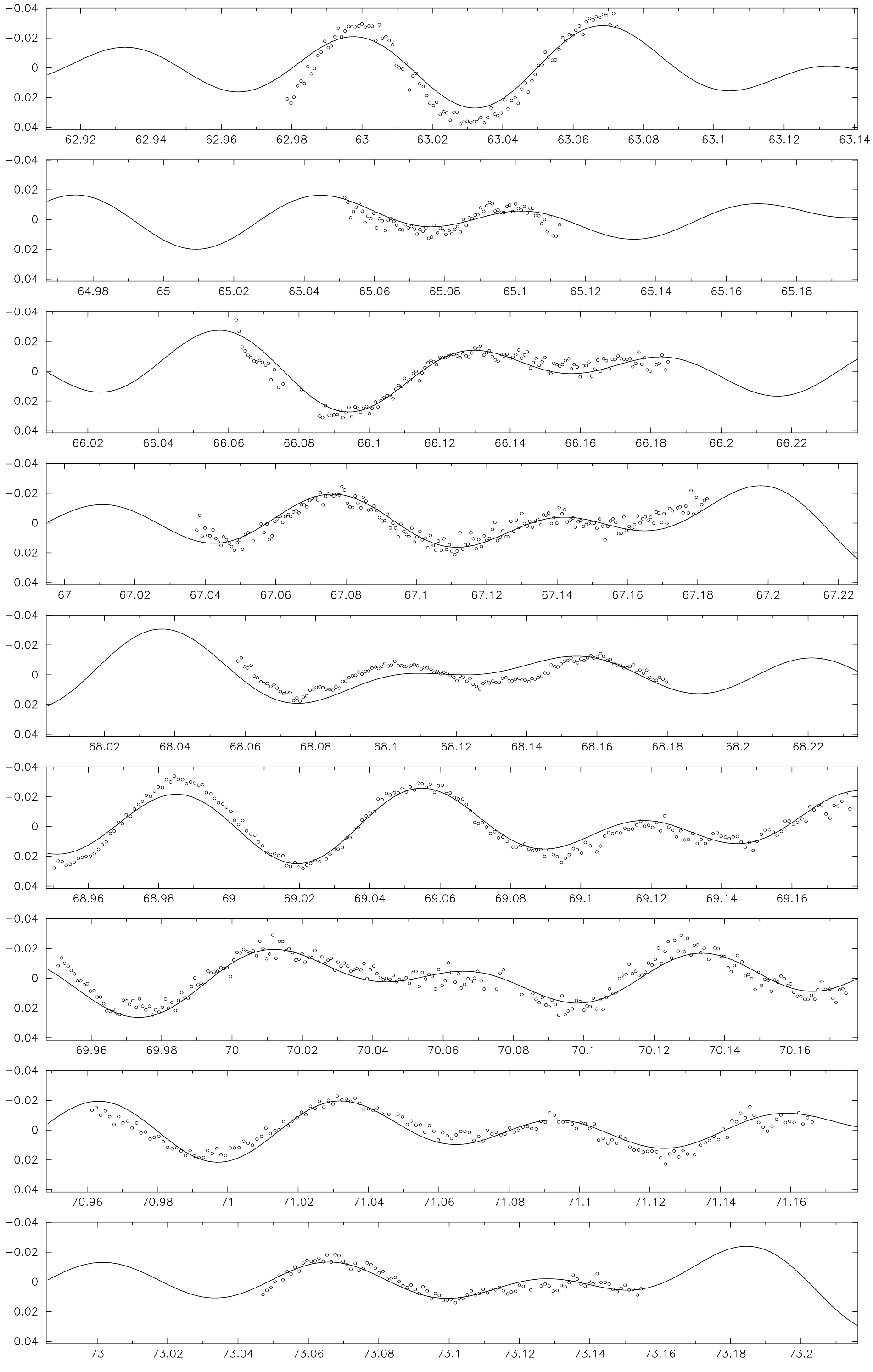

Figure 2. The CCD photometric differential V light curves (dots) of the new variable shown as $\mathrm{V} - (\mathrm{C1} + \mathrm{C2} + \mathrm{C3} + \mathrm{C4})/4$ (mag) together with a 5-frequency sine-waves fitting curves represented in solid lines. Time is shown in HJD 2451400+ days.

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1998 PHOTOMETRY OF UV PISCIUM

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UV Psc (#11 in the catalog of Strassmeier et al. 1993) is a member of the short period group of eclipsing RS CVns. Busso et al. (1986) and Budding et al. (1996) analyze published and archived light curves to study both the spot cycles and stellar parameters of this system. Popper (1991, 1993, and 1997) analyze spectroscopy of UV Psc to determine its fundamental parameters.

I observed UV Psc on the nights of 6, 7, 8, 11, 15, and 16 August 1998 with the San Diego State University 61-cm telescope on Mt. Laguna. I used SAO 109761 as the comparison star. The light curves, with 119 data points in each filter, are plotted in Figure 1. Data are in the standard Johnson–Cousins system. The phases are computed using the ephemeris of Ibanoğlu (1987):

$$\mathrm{Min\,I} = 2444932.2985 + 0.86104771 \times E.$$

I modeled the data using Budding and Zeilik's (1987) Information Limit Optimization Technique (ILOT). Initial guesses for stellar parameters were from the models of Budding and Zeilik (1987) and Popper (1993). I adopted temperatures of 5860 K and 4900 K for the primary and secondary stars. After the initial fit, the ILOT extracts a distortion wave which I then fit for two circular 0 K spots. The fits for each color are performed independently. Figure 3 shows the V band spot fit. The ILOT is designed to fit the various parameters simultaneously and return a solution only if the solution is mathematically determinant. If the solution is not determinant, the operator must then try to fit fewer parameters by holding some of the desired parameters at a fixed value. I was unable to fit the latitude of one spot in the V band simultaneously with the other parameters. I therefore fixed the value at where it seemed to be converging in trial fits. By comparing the R or I data to the 0 K spot solutions at B or V, the ILOT can estimate spot temperatures. Doing so I find an average value of the spot temperature of $T_s = 3842$ K ± 228 K. The reported longitude, latitude and radius of each spot are in degrees. I get:

Spot Fits

	B band	V band	R band	I band
Longitude$_1$	248.8 ± 11.7	259.2 ± 7.2	254.0 ± 11.3	247.9 ± 6.9
Latitude$_1$	61.3 ± 7.3	61.1 (fixed)	53.4 ± 23.9	54.2 ± 15.1
Radius$_1$	22.2 ± 4.6	21.6 ± 1.0	17.8 ± 7.6	17.0 ± 4.2
Longitude$_2$	329.3 ± 9.8	340.5 ± 9.3	344.1 ± 16.4	341.5 ± 9.6
Latitude$_2$	9.9 ± 17.5	4.4 ± 20.1	38.1 ± 24.9	39.8 ± 30.9
Radius$_2$	10.9 ± 1.7	9.4 ± 1.1	11.8 ± 2.4	12.0 ± 3.2
χ^2	269.1	169.1	141.5	93.7

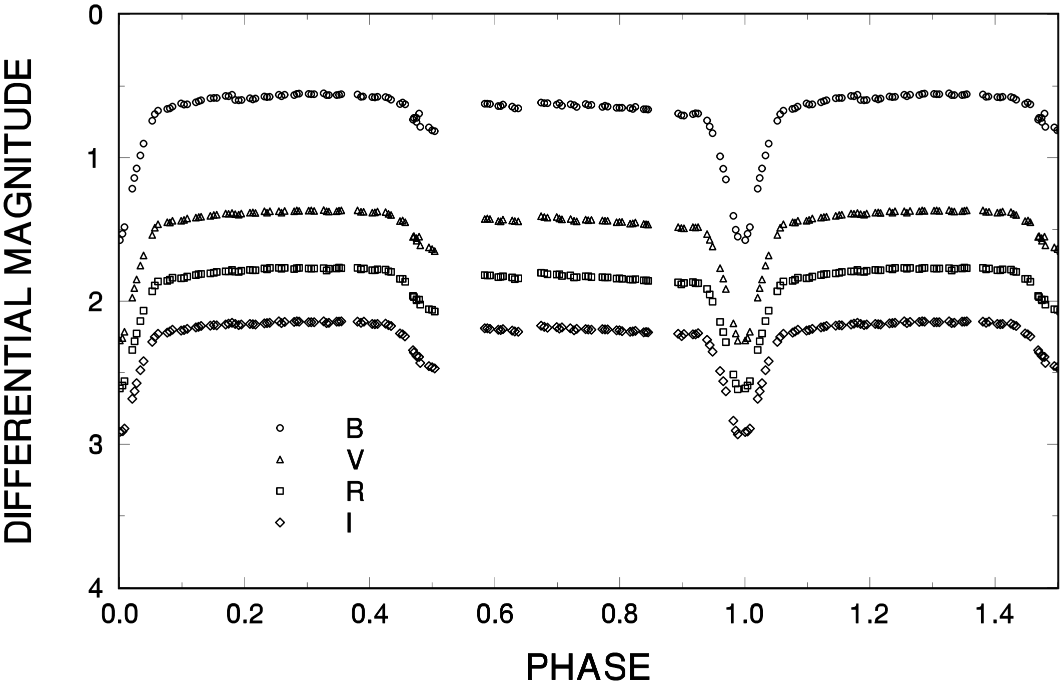

Figure 1.

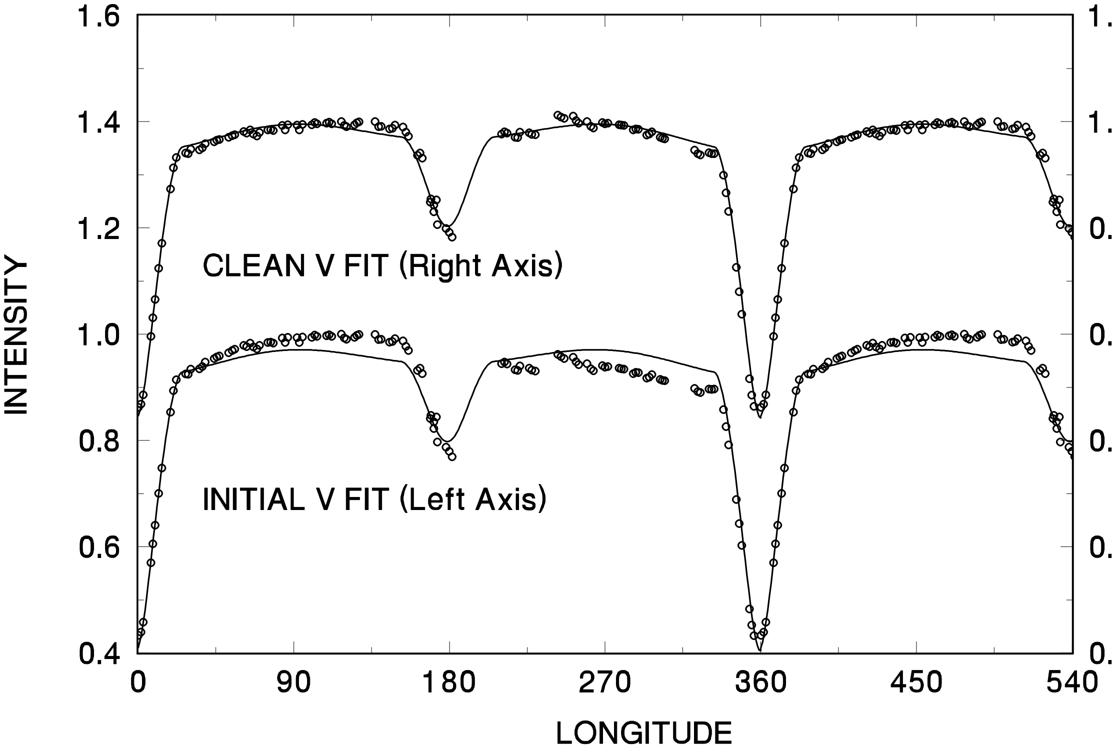

Figure 2.

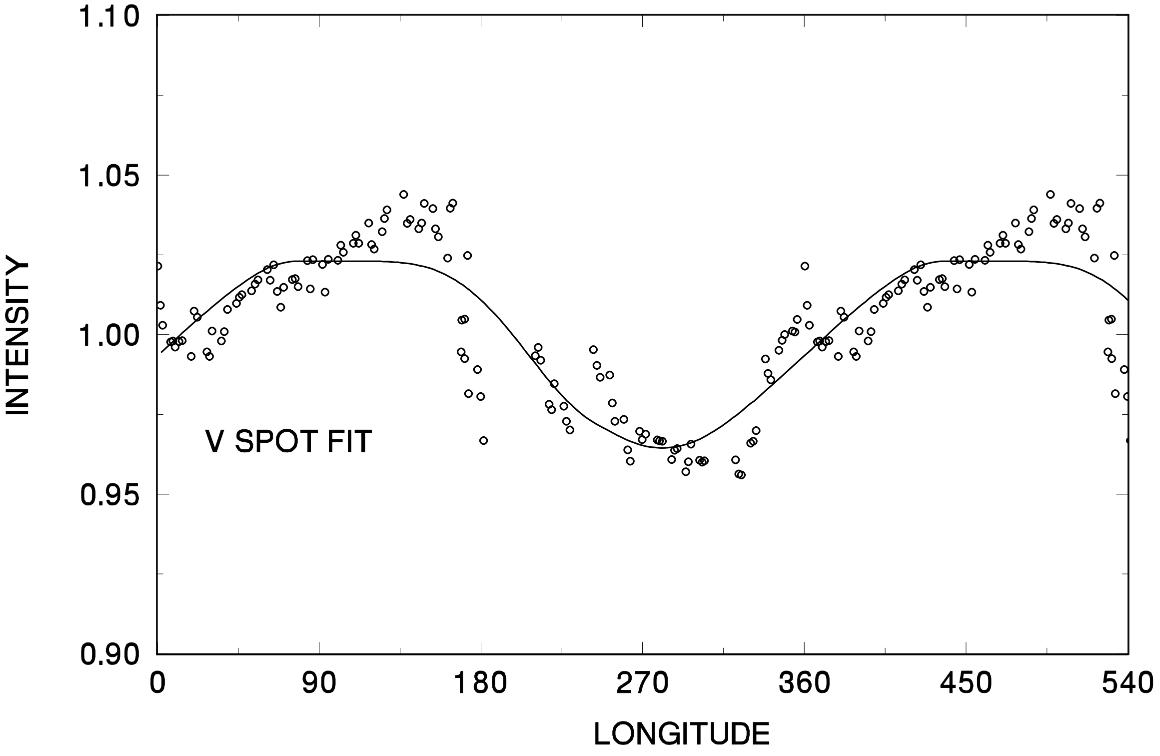

Figure 3.

Both spots are in what could loosely be thought of as the 270° active longitude belt (ALB), however the smaller spot is at the extreme edge of what could be considered the ALB. It seems that the tendency for spots to occur in ALBs at the quadratures is a tendency only, not an absolute requirement. Being more difficult to fit, the latitudes are less reliable. However the two spots include both high and low latitudes.

After the spot fits, I performed clean fits to the light curves removing the effects of the distortion wave from the spot as modeled in that filter. The fits at each wavelength were done independently. Figure 2 shows both the initial and clean fits in the V band. Note that the light curves are missing a portion of the secondary eclipse. They were complete enough to perform clean fits, but these fits would be more reliable without this small gap in the light curves. There is however good agreement between the clean fits at different wavelengths. The color independent parameters generally agree to within the quoted errors. The table below shows values for each filter and the mean for the wavelength independent parameters. I get:

Clean Fits

	B band	V band	R band	I band	Mean
L_1	0.870 ± 0.008	0.834 ± 0.012	0.815 ± 0.012	0.794 ± 0.006	
$k(= r_2/\mathrm{r}_1)$	0.784 ± 0.026	0.790 ± 0.035	0.758 ± 0.034	0.744 ± 0.008	0.769 ± 0.022
$\Delta\theta_0$	0.933 ± 0.097	1.040 ± 0.100	1.053 ± 0.108	0.990 ± 0.108	1.004 ± 0.055
r_1	0.255 ± 0.005	0.251 ± 0.006	0.252 ± 0.005	0.249 ± 0.003	0.252 ± 0.003
i (deg)	85.2 ± 0.6	85.4 ± 0.8	86.4 ± 1.2	88.0 ± 0.9	86.3 ± 1.3
L_2	0.105 ± 0.009	0.147 ± 0.013	0.168 ± 0.013	0.191 ± 0.007	
$q(= m_2/m_1)$	0.647 ± 0.081	0.764 ± 0.113	0.836 ± 0.119	0.811 ± 0.139	0.765 ± 0.084
χ^2	219.8	126.9	105.3	73.6	

The quantities above are as defined by Budding and Zeilik (1987). The fractional luminosities of the primary and secondary components, L_1 and L_2, are normalized to sum to approximately but not exactly 1. The sum can deviate from unity because the normalization is performed before the light curve is corrected for the spot effects, and subtracting the spot causes the out of eclipse intensity to be slightly more or less than 1. These results agree to within the errors with previous work. Both Budding et al. (1996) and Popper (1993) get the mass ratio, $q = 0.77$, which agrees with my value averaged over four filters. My average value for the ratio of the radii, $k = 0.769$, agrees well with 0.75 and 0.76 obtained by Popper (1991), Budding and Zeilik (1987) and Budding et al. (1996). The primary radius r_1 expressed as a fraction of the orbital separation agrees well with Budding and Zeilik's (1987) value of 0.246. The average inclination compares well with Popper's (1993) value of $88^\circ\!.0$.

I thank Ron Angione for scheduling generous amounts of observing time at Mt. Laguna. I also acknowledge support from a Western Carolina University Faculty Research Grant for this work.

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TWO NEW ECLIPSING BINARY SYSTEMS IN CEPHEUS: THE W UMa NSV 14312 AND THE ECCENTRIC EA GSC 3992_0847

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NSV 14312 (WR 30, GSC 3992_0731) is one of the $\mathrm{R_CI_C}$ suspected variables reported by Weber (1958), and listed in the NSV Catalogue (Kholopov, 1982) as a Cepheid with a photographic variation range between $11\overset{\mathrm{m}}{.}8$ and $12\overset{\mathrm{m}}{.}6$.

To study variability of this star, NSV 14312 was included in a collaborative observing program between the US Naval Observatory Flagstaff Station, the Grup d'Estudis Astronomics, and Esteve Duran Observatory. The suspected variable was monitored in the $BVR_\mathrm{C}I_\mathrm{C}$ bands with the 1.0-m Ritchey–Chretien telescope at the USNO Flagstaff Station, and in the V band with the 0.4-m Schmidt–Cassegrain telescope at Piera Observatory.

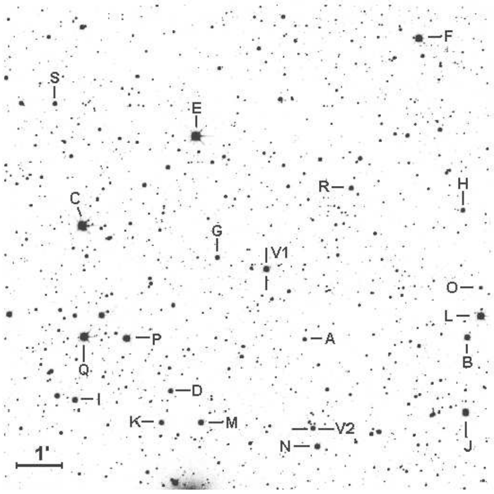

Figure 1. Field of NSV 14312. V1 = NSV 14312 and V2 = GSC 3992_0847. North is up.

Several stars in the field of NSV 14312 were placed in the standard system by using Landolt (1992) standards. GSC 3992_0548 and GSC 3992_0491 were used as primary comparison and check stars respectively. The field of NSV 14312 is shown in Figure 1,

Table 1

Star	GSC	V	$B-V$	$V-R$	$R-I$
A	3992-0033	13.572 ± 0.017	1.452 ± 0.030	0.778 ± 0.022	0.712 ± 0.021
B	3992-0111	12.063 ± 0.013	0.763 ± 0.013	0.413 ± 0.018	0.373 ± 0.022
C	3992-0154	10.256 ± 0.036	0.346 ± 0.018	0.250 ± 0.021	0.290 ± 0.022
D	3992-0316	12.860 ± 0.015	0.677 ± 0.017	0.412 ± 0.022	0.422 ± 0.026
E	3992-0349	10.197 ± 0.041	0.641 ± 0.029	0.366 ± 0.037	0.373 ± 0.042
F	3992-0371	11.134 ± 0.024	0.420 ± 0.018	0.246 ± 0.062	0.219 ± 0.075
G	3992-0393	12.918 ± 0.017	1.261 ± 0.018	0.690 ± 0.016	0.683 ± 0.016
H	3992-0444	13.088 ± 0.010	1.533 ± 0.018	0.815 ± 0.019	0.708 ± 0.038
I	3992-0450	12.277 ± 0.013	0.511 ± 0.017	0.298 ± 0.018	0.322 ± 0.018
J	3992-0491	11.721 ± 0.010	0.596 ± 0.013	0.348 ± 0.020	0.381 ± 0.024
K	3992-0596	12.666 ± 0.016	1.418 ± 0.021	0.785 ± 0.020	0.731 ± 0.020
L	3992-0677	11.161 ± 0.015	0.238 ± 0.019	0.134 ± 0.020	0.168 ± 0.020
M	3992-0750	12.244 ± 0.015	1.356 ± 0.019	0.738 ± 0.018	0.685 ± 0.021
N	3992-0772	12.296 ± 0.013	1.131 ± 0.056	0.642 ± 0.015	0.614 ± 0.018
O	3992-0781	14.174 ± 0.023	0.679 ± 0.031	0.413 ± 0.033	0.417 ± 0.049
P	3992-0850	11.384 ± 0.017	1.088 ± 0.022	0.597 ± 0.020	0.573 ± 0.026
Q	3992-0882	10.556 ± 0.036	1.142 ± 0.031	0.617 ± 0.032	0.576 ± 0.039
R	3992-1035	12.909 ± 0.013	0.768 ± 0.018	0.438 ± 0.022	0.416 ± 0.032
S	3992-1419	13.253 ± 0.020	1.407 ± 0.027	0.753 ± 0.031	0.749 ± 0.033

whereas Table 1 lists the standard V magnitudes and color indices of comparison stars near the variable.

Observations show that NSV 14312 is not a Cepheid but an EW eclipsing binary system with a period of about 19 hours. This object has an amplitude variation of 0.34 ± 0.01 magnitudes at primary minimum and 0.31 ± 0.01 magnitudes at secondary minimum (Figure 2). Standardized photometry gives an average maximum V magnitude of 11.603 ± 0.005 for this star, and also average color indices $B-V = +0.730 \pm 0.015$, $V-R = +0.440 \pm 0.009$, and $R-I = +0.425 \pm 0.015$. Observations spanned a 742 day period between October 1995 and November 1997, with the computed ephemeris:

$$\begin{array}{l} \text{Min. I} = \text{HJD } 2450433.3516 + 0.805074 \times E. \\ \qquad\qquad\qquad\qquad\quad \pm 0.0010 \quad \pm 0.000004 \end{array}$$

While monitoring the light changes of NSV 14312, the variability of GSC 3992_0847 was discovered from CCD frames taken at the Piera Observatory. Photometric data indicates that this object is an EA eclipsing binary system with a period over 6.6 days. The variable fades 0.69 ± 0.02 magnitudes at primary minimum and 0.54 ± 0.02 magnitudes at secondary minimum. Observations also show that the components of this system follow eccentric orbits, since the secondary minimum is at phase 0.423 (Figure 3). The star has an average maximum V magnitude of 12.80 ± 0.02, and average color indices $B-V = 0.482 \pm 0.011$, $V-R = 0.271 \pm 0.017$, and $R-I = 0.302 \pm 0.030$. The computed ephemeris for GSC 3992_0847 is:

$$\begin{array}{l} \text{Min. I} = \text{HJD } 2450421.4411 + 6.61844 \times E. \\ \qquad\qquad\qquad\qquad\quad \pm 0.0010 \quad \pm 0.00002 \end{array}$$

We would like to thank Josep M. Gomez for his work in determining the period of GSC 3992_0847 and computing its ephemeris.

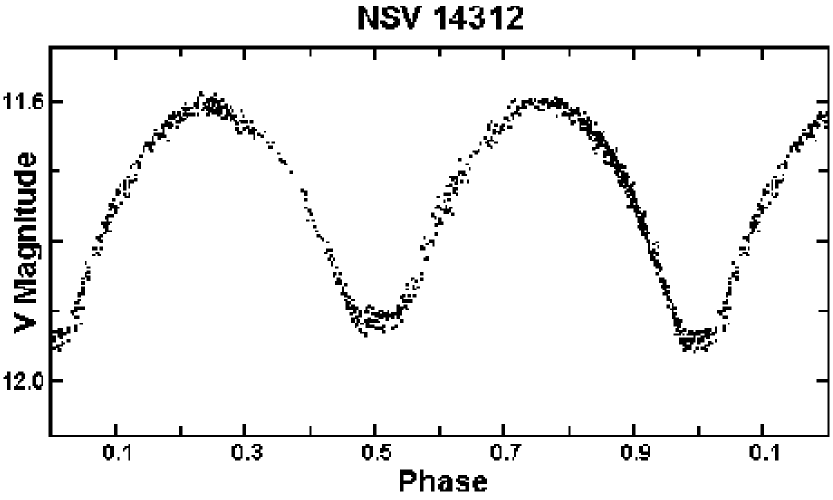

Figure 2.

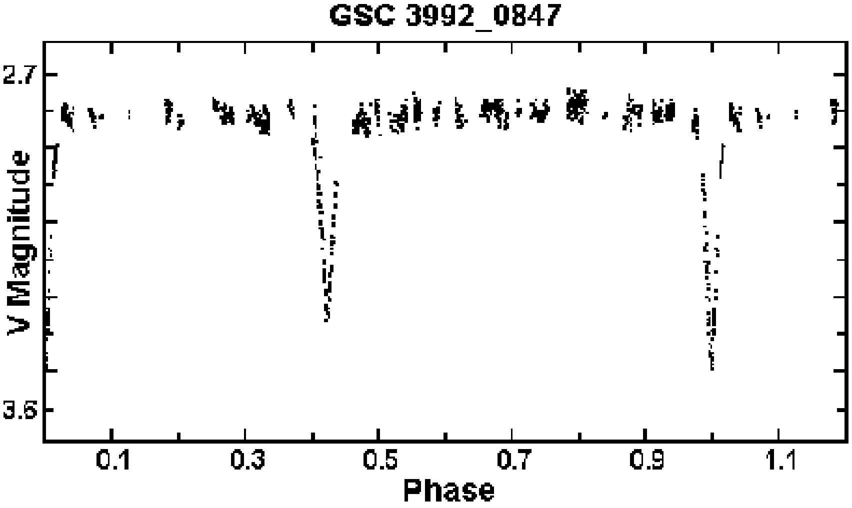

Figure 3.

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ERRATUM FOR IBVS 4807

The original title of IBVS 4807 contained an error:
"Two New Eclipsing Binary Systems in Cepheus: the W UMa NSV 14312 and the Eccentric EA GSC 3992_30847"
The correct GSC number is, as used in the body of the paper: 3992_0847 .

The Editors

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ON THE VARIABILITY OF 19 AURIGAE AS OBSERVED BY THE HIPPARCOS SATELLITE

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An important aspect of the differential photometry is to use non-variable comparison and check stars. Many stars used for this purpose have not been checked for constancy. Fortunately, the high quality photometric data from the Hipparcos and Tycho Catalogues (ESA 1997) now permits one to make variability tests for stars down to at least 8th magnitude. If this is done before the observations, it should reduce the chances of selecting variable comparison and check stars. Recently, Adelman (1998a) has used the photometry from the Hipparcos catalogue in order to verify the constancy of four magnetic CP stars, the comparison and check stars used for variability studies with the 0.75-m Four College Automated Photometric Telescope. He found a few comparison and check stars to be variable. The conclusion about variability is based on the large standard errors and the amplitudes of these stars as determined by Hipparcos. However, it is debatable that a star is constant within standard error and amplitude similar to those of "normal" B and A non-variable stars. In this note we will show that selecting comparison and check stars using the standard error and amplitude taken from Hipparcos Catalogue are not enough to draw a conclusion about constancy of these stars.

To investigate the photometric variability of a double lined eclipsing binary star AR Aurigae, Adelman (1998b) has used 18 Aurigae (HR 1734, Sp: A7 V, $m_{\rm v} = 6\overset{\rm m}{.}49$) as comparison star and 19 Aurigae (HR 1740 = NSV 1925, Sp: A5 II, $m_{\rm v} = 5\overset{\rm m}{.}03$) as check star. According to investigation of Adelman (1998a), 18 Aur and 19 Aur are non-variable stars, because the standard error and amplitude taken from Hipparcos Catalogue for both stars is equal to $0\overset{\rm m}{.}0010$ and $0\overset{\rm m}{.}02$, respectively. However, 19 Aur is marked in SIMBAD data base as variable, because this star was included in the New Catalogue of Suspected Variable Stars (Kukarkin et al. 1982). On the other hand, 18 Aur is not marked in SIMBAD data base as variable. We decided to investigate 19 Aur for variability, before starting the program of the differential photometry of AR Aur. Therefore, the Hipparcos Variability Annex was used, which is available on the world-wide web under http://astro.estec.esa.hl/Hipparcos/. The Hipparcos Catalogue contains 75 observations of this star made on 21 separate days. It should be mentioned that the Hipparcos magnitude (Hp) system is close to but somewhat different from *V* magnitudes (Van Leeuwen et al. 1997). The upper panel of Fig. 1 shows the Hipparcos photometry of 19 Aur as a function of time. As one can see from Fig. 1, the Hp magnitude of the star is variable. There is a clear maximum around JD 2 448 390. In between, two minima are indicated

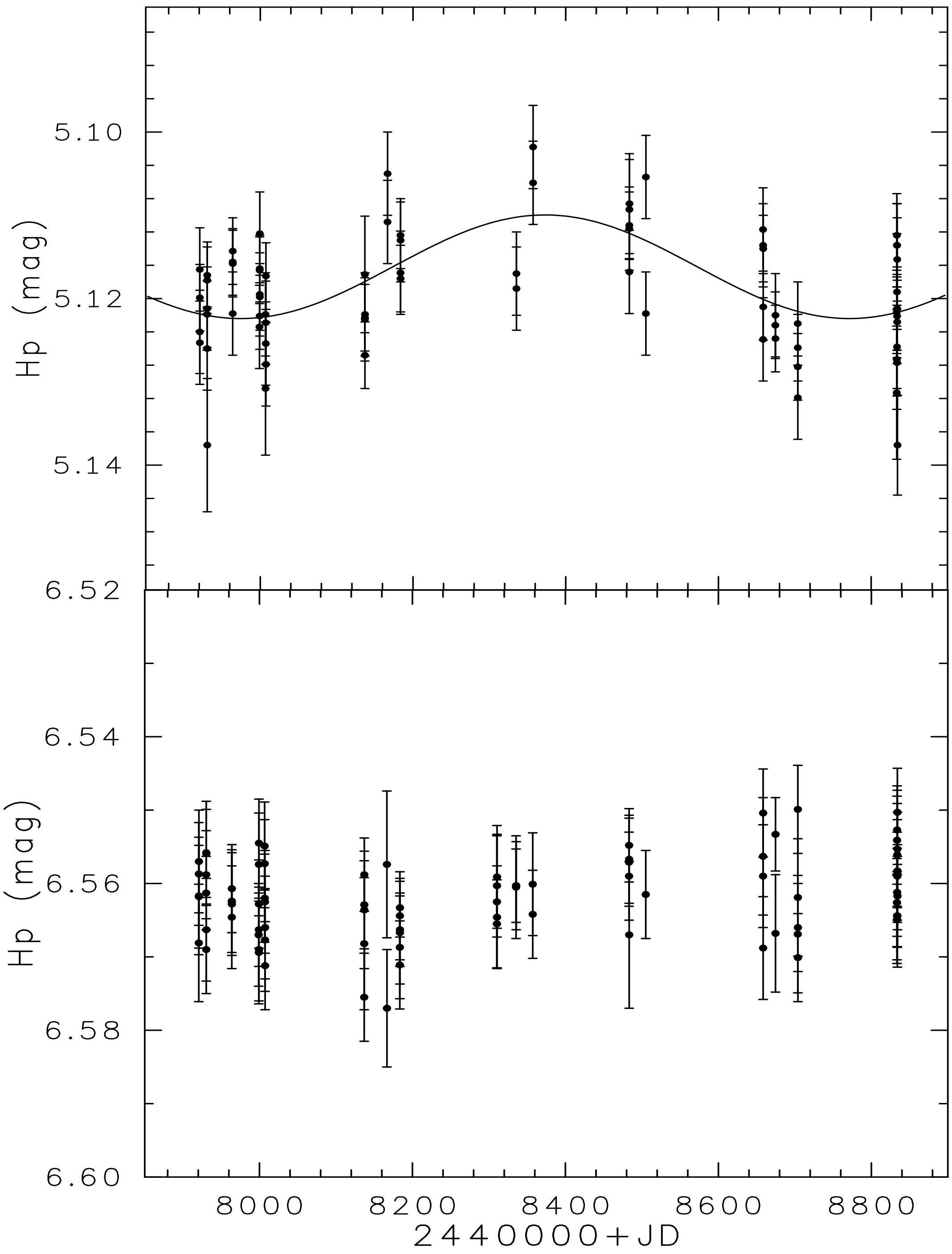

Figure 1. The Hipparcos photometry of 19 Aur (upper panel) and 18 Aur (lower panel) as a function of time. The solid line is the least square fit.

around JD 2 447 980 and JD 2 448 770. To check the observed variation of Hp magnitude of 19 Aur, the star 18 Aur was used. The Hipparcos Catalogue contains 83 observations of this star. It should be noted that 18 Aur was observed by Hipparcos satellite simultaneously with 19 Aur. The Hp magnitudes of 18 Aur as a function of time are shown in the lower panel of Fig. 1. The star is non-variable on the span of the observations and it supports the reliability of the obtained variability of 19 Aur. The periodogram analysis (Scargle 1982) of the Hp magnitudes of 19 Aur showed that the following preliminary ephemeris can be derived:

$$\mathrm{JD(Hp\ min)} = 2447972 + 797 \times E. \tag{1}$$

In order to estimate the amplitude of the Hp magnitude variation a linearized least-squares method was used, which was described by North (1987). A least-squares fit by one-frequency cosine curve was applied to the Hp magnitudes of 19 Aur. The fitted cosine curve was computed from Eq. (1) and it was plotted as the solid line on the upper panel of Fig. 1. The computations give the following results: the minimum and the maximum values of the Hp magnitude are equal to $5\overset{\mathrm{m}}{.}1224$ and $5\overset{\mathrm{m}}{.}1100$, respectively. The amplitude is close to the standard error taken from Hipparcos Catalogue. According to the SIMBAD data base, the minimum and the maximum values in the V magnitude is equal to 5.03 and 5.09, respectively. Nevertheless, the span of the observations covers just over one cycle of the proposed period. Since no single cycle has been observed over a sufficient fraction of the light curve, the amplitude and period may be quite spurious. Evidently 19 Aur must be observed in the future in order to make final conclusion about the amplitude and period of its brightness variation.

Finally, the analysis performed in this note has shown that selecting comparison and check stars using the standard error and amplitude taken from Hipparcos Catalogue is not without problems. Fortunately, the star 19 Aur was used as the check star by Adelman (1988b), but it should be replaced in future studies of AR Aurigae.

This work is partly supported by the Russian National Foundation for Astronomy (project No. 1.4.1.2). The research has been made use of the SIMBAD data base, operated by the CDS at Strasbourg, France.

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THE NATURE OF THE BRIGHT EARLY-TYPE ECLIPSING BINARY THETA 1 Ori A = V1016 ORIONIS

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The bright ($V = 6.7$) westernmost member of the Trapezium, θ^1 Ori A (41 Ori A, HR 1893, HD 37020, V1016 Ori) is a long-period eclipsing binary with magnitude-deep declines (Lohsen 1975). Despite the brightness of the system, uncertainty surrounds the nature of the secondary component, which is most probably a pre-main-sequence star (Stickland & Lloyd 2000). The purpose of this note is to highlight some new observations that could clarify the issue. Most of the observational difficulty with this system stems from the unusually long period for an eclipsing system of 65.43 days, resolved by Baldwin (1976). The primary eclipse is too long to observe continuously in one night (FWHM $\sim$ 10 hours), but it occupies barely one per cent of the cycle, and in an observing season there may be only three cycles. As a consequence, the light curve of the primary eclipse is composed of a series of sections covering only parts of the eclipse, ingress, egress or the central part of the minimum. The most complete eclipses are those of Lohsen (1976) and more recently, Vitrichenko (1998), and visually by the AAVSO (Mattei 1977). Multi-colour photometry shows very little change in colour during the primary eclipse.

Spectroscopically the system is well, if not particularly accurately, observed and several orbital solutions have been published, most recently by Stickland & Lloyd (2000), who provide a detailed review of all the radial velocity data. The system is quite eccentric, with $e = 0.624$ and the secondary eclipse occurs at photometric phase 0.130 ± 0.015. The uncertainty on the time of secondary eclipse corresponds to ± 1.0 days. It is likely that none of the published spectroscopic or photometric observations, even the visual ones, have been made during the secondary eclipse.

A range of spectral types from O8 – B3 have been given for the primary with the majority around very early B type. Stickland & Lloyd (2000) give B1V from the cross correlation of ultraviolet spectra while Vitrichenko et al. (1998) give B0V on the basis of an adopted temperature of $T_1 = 30\,000$ K derived from the photometry. There is no convincing spectroscopic signature of the secondary component, even at primary minimum (Vitrichenko et al. 1998), which implies that the secondary component is at least 2–3 magnitudes fainter than the primary. However, observations in the near infrared show an excess over and above what is expected for an early B-type star Vitrichenko (1999). Attempts to model the system have not led to any clear consensus. Bossi et al. (1989) could not model the system with main-sequence stars and suggested a B3III–IV primary component with a pre-main-sequence secondary. Vitrichenko (1998, 1999) used a star-dust model to fit the light curve and the optical-to-infrared colours, with components of B0–0.5V and B8–A0V, a dust shell at a temperature of T_D = 1600 K and a separate infrared source. A recurring theme in many of the analyses is the pre-main-sequence nature of the secondary component.

Table 1. Times of primary minimum of θ^1 Ori A

JD	$O-C$ (days)	Note	Reference
2436863.073	0.003	1	Strand 1975
2441966.813	−0.015	2, 11	Lohsen 1975
2441966.827	−0.001	3	Lohsen 1976
2442359.421	−0.004	3	Lohsen 1976
2442751.946	−0.076	4, 11	Walker 1976
2442752.015	−0.007	3	Lohsen 1976
2442752.010	−0.012	5	Caton et al. 1977
2442817.545	0.090	6, 11	Baldwin 1976
2443144.613	−0.006	2, 7	Mattei 1977
2443144.639	0.020	8	Walker 1977
2443210.033	−0.019	9	Franz 1977
2443537.235	0.019	2	Zakirov 1979
2444191.552	0.008	10	Sowell & Hall 1982
2450080.494	−0.002	2	Agerer & Huebscher 1997

Notes: 1. Mean of timings from two photographic magnitudes $\sigma \sim 0.04$ days. 2. Observed minimum. 3. Observations from three minima used to construct a complete minimum. The times of minima are derived from Lohsen's ephemeris. 4. Two isolated observations very close to minimum. 5. Timing derived from a major part of an ingress, $\sigma \sim 0.01$ days. 6. Isolated visual observation during the eclipse. 7. Timing derived from the faintest visual observations of six consecutive minima. 8. Timing derived from a major part of an egress, $\sigma \sim 0.01$ days. 9. Timing derived from part of an egress, $\sigma \sim 0.01$ days. 10. Time of minimum derived by Sowell & Hall from a major part of an egress. 11. Not used in the solution.

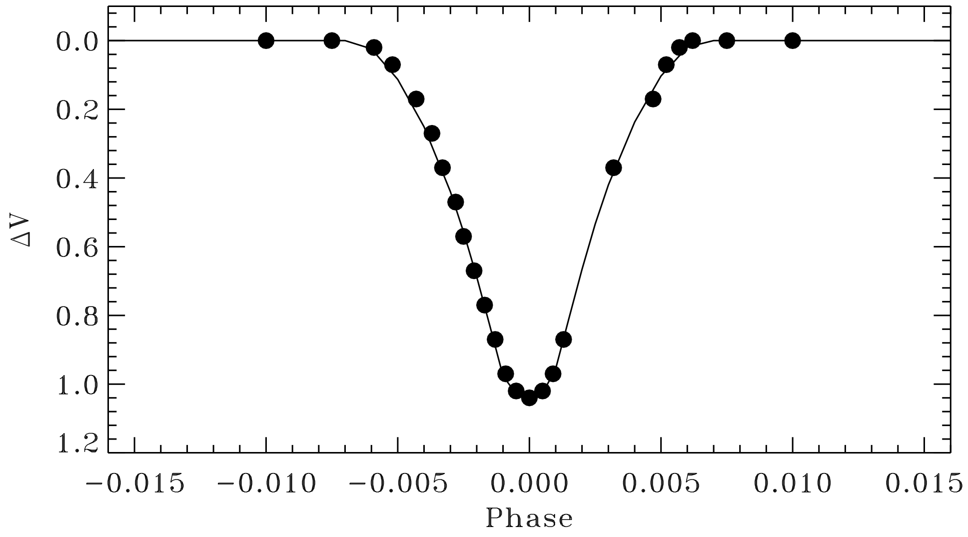

Figure 1. The light curve of θ^1 Ori A around primary minimum showing the normal points derived from Lohsen (1976) and the solution with $T_2 = 9\,000$ K from Table 2 over plotted.

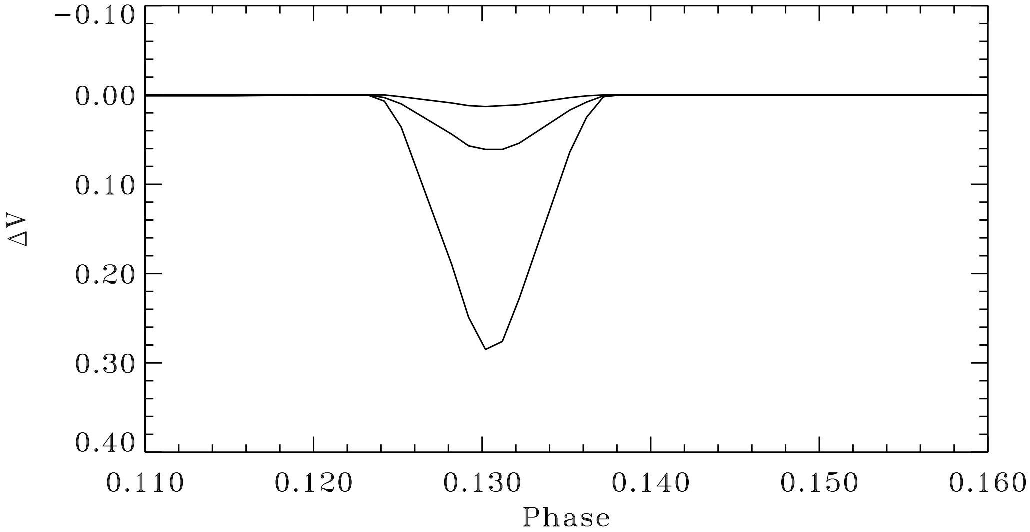

Figure 2. The modelled light curve around secondary minimum showing the decreasing visibility of the eclipse with decreasing temperature of the secondary component.

To determine an accurate ephemeris the times of minimum have been derived from all the published eclipse observations but in practice this is not simple as the eclipse is composed of fragments. Observations around the deepest part of minimum do not necessarily provide the best timing as the light curve is rather flat, with $\Delta V < 0.1$ mag over 4 hours, and the observations are invariably noisier than at other times. Only Lohsen (1976) and Vitrichenko (1998) have sufficient observations to claim complete coverage of the eclipse and even these have some significant gaps. The fragments of light curve have been phased with respect to the adopted shape of the minimum from Lohsen (1976) and the times of primary minimum are given in Table 1. The derived ephemeris is

$$\mathrm{JD}_{\mathrm{MinI}} = 2442752.022\ (\pm\ 0.004) + 65.43280\ (\pm\ 0.00008) \times E.$$

The LIGHT2 code (Hill et al. 1989) has been used to model the system with a series of evenly sampled normal points, where there are sufficient observations, derived from the light curve of Lohsen (1976) (see Figure 1). In the LIGHT2 solutions the temperature of the primary has been fixed at 26 000 K, which is appropriate for a B1V star. Not surprisingly, given the lack of a secondary eclipse, the temperature of the secondary component is essentially undefined and its radius is also poorly determined (see Table 2). However, this result conceals two types of solution. At lower temperatures, $T_2 < 12\,000$ K, the radius of the primary is larger than the secondary but at higher temperatures the relative sizes of the components is reversed. The details are given in Table 2. Two solutions with the temperature of the secondary fixed at $T_2 = 6\,000$ K and 9 000 K are essentially identical.

Assuming a mass appropriate for a B1V star, $M_1 = 12\,\mathrm{M}_\odot$, and taking $K = 33$ km s^{-1} from the orbital solution, gives $R_1 = 6.6\,\mathrm{R}_\odot$, $M_2 = 3.0\,\mathrm{M}_\odot$, and $R_2 = 5.2\,\mathrm{R}_\odot$. The radius of the primary is consistent with the radius of a B1V star, and, by definition, so are the mass and temperature. However, the secondary mass of $3.0\,\mathrm{M}_\odot$ corresponds to a main-sequence star of spectral type near A0, but the radius of $5.2\,\mathrm{R}_\odot$ is more appropriate for an early–mid B-type star. Clearly the secondary is not a main-sequence star and from evolutionary arguments Stickland & Lloyd conclude that it is most likely a pre-main-sequence star. For the solutions with a higher temperature secondary, the radius of the primary is too small for a B1V star, implying that it is either of later spectral type, so cooler and less massive, or some physically unrealistic object. The radius of the secondary is too large, by a factor of two, for a mid B-type star, so this component must either be of earlier spectral type, so hotter and more massive, or evolved. Therefore, it does not seem possible to construct a realistic model with the hotter, $T_2 = 15\,000$ K, secondary.

Table 2. Solutions to the light curve with $T_1 = 26\,000$ K.

T_2 (K)	R_1/a	R_2/a	i (deg)	R_1 ($R_\odot$)	R_2 ($R_\odot$)
$7\,300 \pm 14\,500$	0.0307 ± 0.0005	0.0240 ± 0.0035	89.6 ± 0.3	6.6	5.2
6 000	0.0308 ± 0.0003	0.0239 ± 0.0011	89.6 ± 0.3	6.7	5.2
9 000	0.0307 ± 0.0003	0.0244 ± 0.0008	89.7 ± 0.3	6.6	5.3
15 000	0.0244 ± 0.0006	0.0302 ± 0.0014	89.6 ± 0.2	5.3	6.5

The light curves around secondary eclipse for the three fixed-temperature solutions in Table 2 are shown in Figure 2 and it is clear that observations of this eclipse would largely resolve the issue. The high-temperature secondary solution could easily be eliminated and with careful observation it should at least be possible to place a reliable upper limit on the depth of the eclipse, and with it, the temperature of the secondary. An ephemeris for the current observing season is given in Table 3 and observations of both primary and secondary minimum, covering the period of uncertainty, are encouraged.

Table 3. Ephemeris of θ^1 Ori A for the current observing season.

JD	Date UT			
2451520.017	1999	12	7.517	MinI
2451528.6 ± 1.0	1999	12	16.1	MinII
2451585.450	2000	2	10.950	MinI
2451594.0 ± 1.0	2000	2	19.5	MinII
2451650.883	2000	4	16.383	MinI
2451659.4 ± 1.0	2000	4	24.9	MinII

References:

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Baldwin M., 1976 *IAU Circ.*, No. 3004
Bossi M., et al., 1989, *A&A*, **222**, 117
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Franz O.G., 1977, *IBVS*, No. 1274
Hill G., Fisher W.A., Holmgren D., 1989, *A&A*, **211**, 81
Lohsen E., 1975, *IBVS*, No. 988
Lohsen E., 1976, *IBVS*, No. 1129
Mattei J.A., 1977, *JRAS Can.*, **71**, 475
Sowell J.R., Hall D.S., 1982, *IBVS*, No. 2076
Stickland D.J., Lloyd C., 2000, *The Observatory*, **200**, in press
Strand K.Aa., 1975, *IBVS*, No. 1025
Vitrichenko E.A., 1998, *Astr. Lett.*, **24**, 611
Vitrichenko E.A., 1999, *Astr. Lett.*, **25**, 179
Vitrichenko E.A., Klochkova V.G., Plachinda S.I., 1998, *Astr. Lett.*, **24**, 296
Walker M.F., 1976, *IBVS*, No. 1148
Walker M.F., 1977, *IBVS*, No. 1238
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THE NEW SHORT PERIOD EB ECLIPSING BINARY SYSTEM NSV 05339

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Name of the object:
NSV 05339, BD +36°2217, CSV 006866, Wr 007, GSC 2526_1034

Equatorial coordinates:	**Equinox:**
R.A.= $11^{\mathrm{h}}47^{\mathrm{m}}50^{\mathrm{s}}$ **DEC.**= $+35°13'43''$	2000.0

Observatory and telescope:
Mollerusa Private Observatory, 0.26-m Schmidt–Cassegrain telescope; Esteve Duran Observatory, 0.2-m Schmidt–Cassegrain telescope

Detector:	CCD
Filter(s):	*V*
Comparison star(s):	SAO 62705, PPM 76080, GSC 2526_2379
Check star(s):	GSC 2526_781
Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	EB

Remarks:

NSV 05339 was announced to be a variable star by Weber (1955). In the NSV catalogue (Kholopov, 1982) this star is listed as an EA: with a G5 spectral type and a photographic brightness variation between $11\overset{\mathrm{m}}{.}0$ and $11\overset{\mathrm{m}}{.}6$. Observations performed between March 1998 and April 1999 show that it is a short period EB eclipsing binary system (Figure 1). About 20′ to the east of NSV 05339 is GSC 2506_775, a star which according to GSC has a photovisual magnitude of 13.34. This object was included in the synthetic aperture photometric measurements. Taking this into account, a maximum V amplitude of 0.56 between minimum I and phase 0.25 was obtained. During the secondary minimum the variable fades 0.15 magnitudes, and it also presents an O'Connell effect of $0\overset{\mathrm{m}}{.}06$. The computed ephemeris is:

$$\begin{array}{ll}\text{Min. I} = \text{HJD } 2451220.4869 + 0\overset{\mathrm{d}}{.}351862 \times E. \\ \qquad\qquad\qquad\qquad \pm 0.0002 \ \ \pm 0.000003\end{array}$$

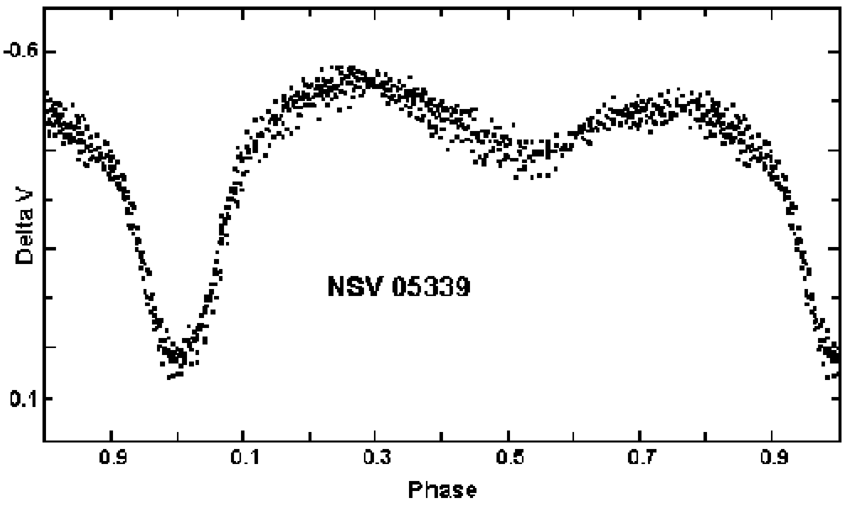

Figure 1.

References:

Kholopov, P. N., ed., 1982, New General Catalogue of Suspected Variable Stars, Moscow
Weber, R., 1955, BSAF, 69, 440

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UBV OBSERVATIONS OF THE TYCHO VARIABLE, EF BOOTIS AND THE DISCOVERY OF A PULSATING VARIABLE, GSC 3479_230

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EF Boo [BD +51°1929, GSC 3479_1127, PPM 34572, SAO 29189, RA(2000) = $14^{\mathrm{h}}32^{\mathrm{m}}30\overset{\mathrm{s}}{.}57$, DEC (2000) = $50°49'41\overset{''}{.}0$)] was first reported in the Tycho catalog (Hog et al. 1997) and was discovered as a part of the Hipparcos program (Perryman et al. 1997).

The catalog gives a spectral type of G5, a mag range 9.427–9.994 in V, and a light curve of type EB. The following light elements are given:

$$\text{J.D. Hel Min I} = 2448500.3018 + 0\overset{\mathrm{d}}{.}420512 \times E. \qquad (1)$$

Our present observations were taken with the Lowell 0.79-m reflecting telescope in conjunction with a cooled S-13 type PMT on April 14–16, 1999. Standard U, B, and V filters were used. The finding chart in Figure 1 shows the comparison stars [HIP#71043, GSC 3479_316, SAO 29183, RA(2000) = $14^{\mathrm{h}}31^{\mathrm{m}}46\overset{\mathrm{s}}{.}4$, DEC(2000) = $50°55'43''$, spectral type G5], and [GSC 3479_230, SAO 29195, RA(2000) = $14^{\mathrm{h}}33^{\mathrm{m}}32\overset{\mathrm{s}}{.}1$, DEC(2000) = $50°45'11''$] as C and C′, respectively, along with the variable, V. Over 1200 observations were taken in each pass band. The curves are of typical W UMa type (EW) with spot activity. The maximum at phase 0.25 has a 3% increased flux over that at phase 0.75 in B. The difference in eclipse depths is less than 0.03 mag in all passbands. Five mean epochs of minimum light were determined from three primary, and two secondary eclipses using the bisection of chords method. The only other epoch of minimum light available is given in Equation 1. The precision epochs of minimum light are given in Table 1 along with their standard error of the last digit in parentheses. The following ephemeris improves upon that given by Tycho:

$$\text{J.D. Hel Min I} = 2451283.6774(1) + 0\overset{\mathrm{d}}{.}42060833(7) \times E. \qquad (2)$$

Equation 2 was used to calculate the $O - C$ residual in Table 1.

The UBV light curves are shown in Figure 2 as differential standard magnitudes (variable − comparison) versus phase. The probable error of a single observation was 5 mmag in B and V, and 6 mmag in U. A good fit to the light curves was found with Binary Maker as shown in Figure 3. We obtained a component temperature difference of ~ 100 K, a mass ratio of 1.75 and a fill-out of 25%. A cool spot of radius 14 degrees with a temperature factor of 0.76 was modeled on the cooler, more massive component.

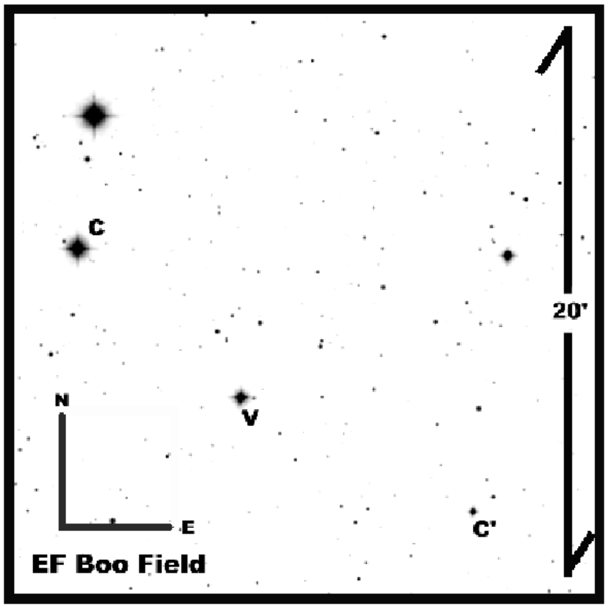

Figure 1. Finding chart made from Real Sky of the Variable, EF Boo, V, the comparison stars, C and C'.

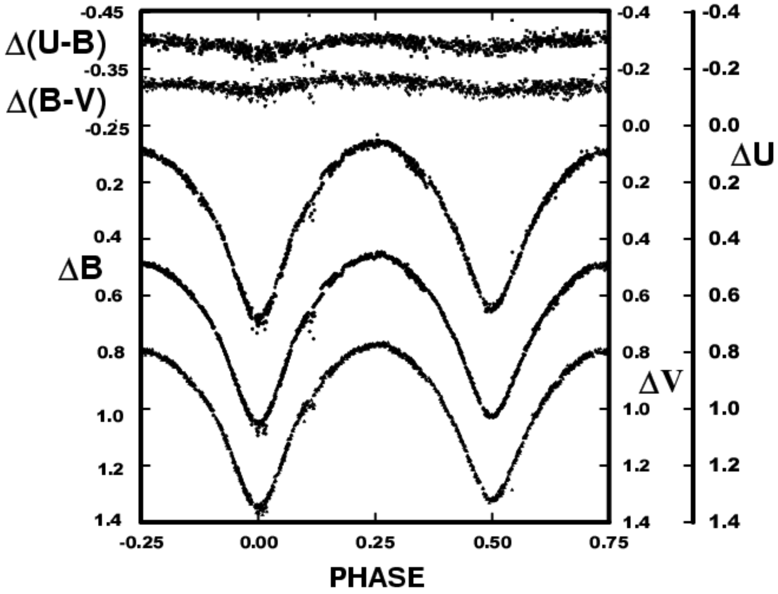

Figure 2. U, B, V light curves and U–B, B–V color curves for EF Boo as magnitude differences, variable minus comparison star.

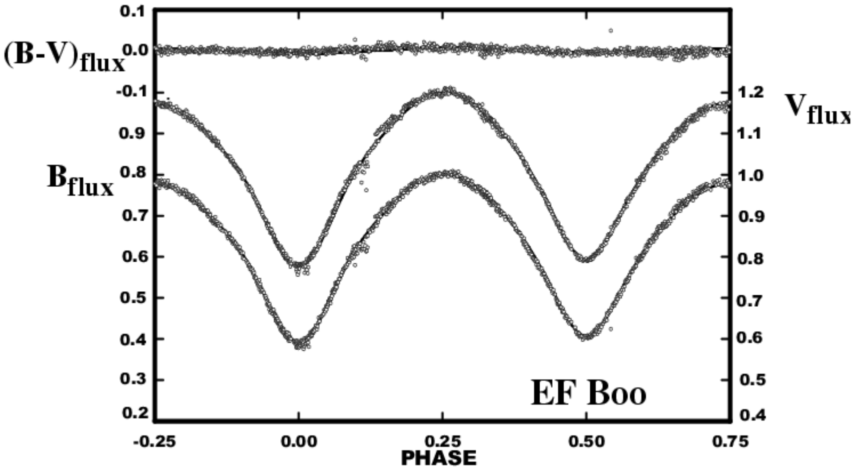

Figure 3. Binary Maker fit of the light curve in B and V.

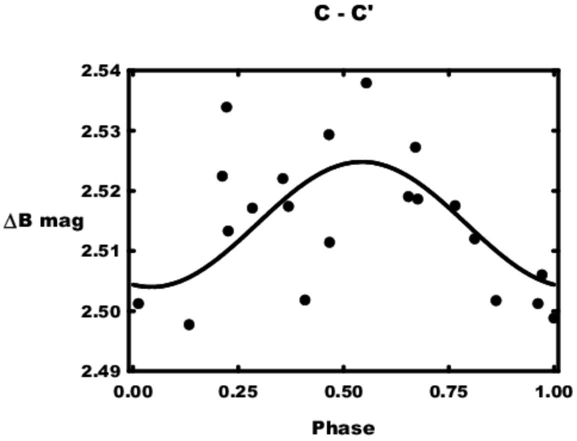

Figure 4. V observations of GSC 3479 230 phased with an 87.3minute period.

Table 1: New Epochs of Minimum Light, EF Boo

JD Hel. 2400000 +	Min	Cycles	$O-C$
48500.30180	II	−6617.5	−0.0026
51282.8356(6)	I	−2.0	−0.0006
51283.6776(1)	I	0.0	0.0001
51283.8889(11)	II	0.5	0.0011
51284.7290(1)	II	2.5	0.0000
51284.9386(6)	I	3.0	−0.0006

GSC 3479 230 (star C′) was used as the comparison star on April 14–15. Plots of $C' - C$ reveal that it is a possible pulsating variable. SAO gives a spectral type of F8 for this star, designated SAO 29195. We performed an FFT on the data and found a peak at 17.9/d or a period of 80.4 min. Starting with this period we fit a least-squares sinusoid to the data and obtained a period of ~ 87.3 min. The amplitude was 0.02–0.03 mags in U, B, V. This curve is shown in Figure 4 overlaying the phased data.

Further observations and analyses are needed to disclose the nature of this variable.

This research was partially supported by a grant from NASA administered by the American Astronomical Society.

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Hog E., Baessgen G., Bastian U., Egret D., Fabricius C., Grossmann V., Halbwachs J.L., Makarov V.V., Perryman M.A.C., Schwekendiek P., Wagner K., Wicenec A., 1997, *A&A*, **323**, L57

Perryman M.A.C., Lindegren L., Kovalevsky J., Hog E., Bastian U., Bernacca P.L., Creze M., Donati F., Grenon M., Grewing M., Van Leeuwen F., Van Der Marel H., Mignard F., Murray C.A., Le Poole R.S., Schrijver H., Turon C., Arenou F., Froeschle, M., Petersen C.S., 1997, *A&A*, **323**, L49

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NEW VARIABLE STARS DISCOVERED IN THE MISAO PROJECT VI: MisV0301–MisV0350

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This report describes 50 new variable stars (MisV0301–MisV0350) discovered in the course of the MISAO Project.

These objects are detected automatically by the PIXY system as candidates of variable stars from unfiltered CCD images taken by Kadota between 1999 April and August, then confirmed by Yoshida and Kadota. Further details are the same as described in Yoshida and Kadota (1999).

Table 1 lists the 50 new variable stars. The position and magnitude are measured using the USNO-A1.0 catalog. The magnitude is based on a preliminary V magnitude calculated from R and it magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

The finding charts are available electronically as 4812-f[*nnn*].eps where [*nnn*] refers to the serial number assigned to the star in the first column of Table 1.

V1191 Oph is 1.2 arcmin from MisV0314, that was detected on Kadota's unfiltered CCD images as a 13 mag star. MisV0314 is thus a new variable star.

V1002 Sgr is 1.7 arcmin from MisV0348, that was detected as a 12.5 mag star. MisV0348 is thus another new variable star.

References:

Yoshida, S., Kadota, K., 1999, *IBVS*, No. 4746
Kato, T., 1998,
`http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-chat/msg00700.html`

Table 1: List of New Variable Stars

Code	R.A. (J2000.0)	Decl.	Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0301	$19^{h}01^{m}27\overset{s}{.}60$	$+20^{\circ}57'28\overset{''}{.}4$	13.7	15.0	?	USNO-A2.0 1050.12612555 IRAS 18592+2053
MisV0302	19 01 32.46	+21 06 20.9	11.8	12.8	?	USNO-A2.0 1050.12617932 IRAS 18593+2101
MisV0303	18 57 17.29	+21 40 16.1	10.9	12.4	?	USNO-A2.0 1050.12343864 IRAS 18551+2136
MisV0304	18 59 05.64	+23 29 20.3	13.6	14.7	?	USNO-A2.0 1125.10964269 IRAS 18570+2325
MisV0305	18 58 34.35	+28 11 08.7	12.8	13.6	?	IRAS 18565+2806
MisV0306	19 57 05.03	+40 18 54.5	11.3	13.2	?	USNO-A2.0 1275.12857573 IRAS 19553+4010
MisV0307	17 01 04.11	−28 11 34.0	12.3	13.2	?	USNO-A2.0 0600.23044921
MisV0308	17 01 34.05	−15 21 49.1	12.9	13.7	?	USNO-A2.0 0675.17476463
MisV0309	17 01 01.00	−25 42 05.8	10.2	12.3	?	
MisV0310	16 59 13.10	−11 20 22.0	11.8	13.9	SR?	GSC 5651.1814 USNO-A2.0 0750.10233850
MisV0311	17 02 19.47	−15 23 55.9	12.8	14.2	?	USNO-A2.0 0675.17537697
MisV0312	17 01 01.03	−25 09 09.1	11.1	13.1	?	USNO-A2.0 0600.23037784
MisV0313	16 59 17.30	−29 59 45.6	12.5	13.5	?	USNO-A2.0 0600.22793433
MisV0314	17 00 14.94	−21 01 28.2	12.2	13.4	?	USNO-A2.0 0675.17367497
MisV0315	17 02 39.49	−29 09 32.5	11.3	13.0	?	GSC 6823.2445 USNO-A2.0 0600.23282055
MisV0316	16 57 54.50	−28 03 09.8	10.8	11.6	?	USNO-A2.0 0600.22607149
MisV0317	17 02 02.34	−28 38 26.1	10.9	13.7	?	USNO-A2.0 0600.23185862 IRAS 16588-2833
MisV0318	16 59 25.50	−28 23 18.1	10.3	11.0	?	GSC 6822.1664 USNO-A2.0 0600.22813502
MisV0319	17 01 18.52	−27 04 28.5	12.1	12.9	?	USNO-A2.0 0600.23079555
MisV0320	16 58 35.95	−24 18 41.7	11.9	12.9	?	USNO-A2.0 0600.22700018 IRAS 16555-2415
MisV0321	16 57 44.31	−28 35 41.5	11.0	12.0	?	USNO-A2.0 0600.22586403
MisV0322	17 00 43.36	−26 32 29.0	11.4	13.4	?	IRAS 16575-2628
MisV0323	16 57 36.27	−29 55 05.2	11.2	11.9	?	GSC 6822.0431 USNO-A2.0 0600.22570311
MisV0324	17 00 37.25	−26 17 56.5	11.6	13.9	?	USNO-A2.0 0600.22980117
MisV0325	16 57 26.70	−28 53 21.9	12.4	13.8	?	
MisV0326	17 03 00.70	−24 45 15.8	11.2	13.8	?	USNO-A2.0 0600.23337456
MisV0327	19 00 11.58	+20 03 54.1	12.4	13.1	SR?	USNO-A2.0 1050.12531348
MisV0328	19 00 17.93	+19 35 40.3	12.1	13.6	SR?	USNO-A2.0 1050.12537869
MisV0329	17 00 16.99	−29 15 56.2	11.6	14.9	?	USNO-A2.0 0600.22933360
MisV0330	17 02 48.05	−23 43 19.2	11.8	14.2	?	USNO-A2.0 0600.23304065

Table 1: cont.

Code	R.A. (J2000.0)	Decl.	Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0331	$18^{h}00^{m}36^{s}.72$	$-03^{\circ}08'10''.3$	12.8	14.8	?	USNO-A2.0 0825.11714880
MisV0332	19 01 43.02	+28 57 55.4	13.1	14.2	?	USNO-A2.0 1125.11105329
MisV0333	17 02 36.42	−29 07 00.9	12.5	13.6	?	USNO-A2.0 0600.23274298 IRAS 16594-2902
MisV0334	16 58 39.32	−25 35 17.1	12.9	15.5	?	USNO-A2.0 0600.22707828
MisV0335	17 01 45.72	−30 26 03.4	12.2	15.5	?	USNO-A2.0 0525.25748271
MisV0336	17 02 57.01	−29 50 36.1	12.4	13.5	?	USNO-A2.0 0600.23328027
MisV0337	18 57 22.09	+11 48 33.9	14.0	15.1	?	USNO-A2.0 0975.13701008 IRAS 18550+1144
MisV0338	18 57 57.66	−04 03 16.7	12.1	15.0	?	IRAS 18553-0407
MisV0339	18 58 39.54	−00 54 17.7	13.4	14.7	?	USNO-A2.0 0825.13847347 IRAS 18560-0058
MisV0340	18 59 01.27	−03 23 07.3	12.5	13.8	SR?	IRAS 18563-0327
MisV0341	19 01 00.05	−08 25 18.1	12.8	14.0	?	IRAS 18582-0829
MisV0342	19 59 05.34	+17 11 04.9	10.3	11.1	?	USNO-A2.0 1050.15913562 IRAS 19568+1702
MisV0343	19 59 43.20	+36 52 22.4	13.0	14.0	SR?	USNO-A2.0 1200.14093454 IRAS 19578+3644
MisV0344	20 01 16.55	+31 09 52.6	13.3	14.5	SR?	USNO-A2.0 1200.14185091 IRAS 19592+3101
MisV0345	21 00 14.22	+39 40 22.9	13.0	15.3	SR?	IRAS 20583+3928
MisV0346	21 02 00.12	+32 48 26.5	9.2	10.1	?	IRAS 20599+3236
MisV0347	17 59 29.52	−09 44 15.6	13.2	14.3	SR?	USNO-A2.0 0750.12459691 IRAS 17566-0944
MisV0348	18 00 52.25	−28 10 51.4	13.1	14.1	?	USNO-A2.0 0600.29966820
MisV0349	18 59 56.80	−03 44 33.6	13.1	14.7	?	USNO-A2.0 0825.13959527
MisV0350	19 00 31.29	+10 20 29.2	12.5	13.5	?	USNO-A2.0 0975.13849907 IRAS 18581+1016

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REVISED ASTROMETRY OF 33 VARIABLE STARS

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This report describes the revised astrometry and identifications of 33 variable stars discovered in the course of variable star survey based on the MISAO Project observations.

These objects are detected automatically by the PIXY system as candidates of new variable stars from unfiltered CCD images taken by Kadota between 1999 April and August. Further details are the same as described in Yoshida and Kadota (1999). The system searched the GCVS catalog, NSV catalog, etc., and no identified object were found within 5 arcsecs. But within a larger search area, the following known variable stars are found in the catalogs. We could not find any other variable objects on our images to be identified with the known variable stars at and around the positions. Therefore we judged the positions in the catalogs are inaccurate and our objects must be identified with them.

Table 1 shows the astrometry, photometry and identifications. The positions and magnitudes are measured using USNO-A1.0 catalog. The magnitude is based on a preliminary V magnitude calculated from R and B magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

In the revision of the GCVS, AF Aql is identified with USNO-A1.0 0750.16045701. However, USNO-A1.0 0750.16045701 is not detected from our images. In addition, the variable object we found is closer to the position given in the original GCVS. Therefore, we determined our object is true AF Aql.

VX Aql is identified with HS 1466, one of the variable stars discovered by FASTT, Flagstaff Astrometric Scanning Transit Telescope (cf. Henden et al. 1998). V886 Aql is also identified with HS 1463, one of the variable stars discovered by FASTT.

We identified USNO-A1.0 0750.16136750 with HS Aql. But this star is closer to HT Aql. HS Aql is Mira type and HT Aql is probably RR Lyrae type. USNO-A1.0 0750.16136750 is identified with IRAS 18577-0844, therefore, we determined it is proper for Mira-type object.

Table 1: Revised Astrometry and Identifications

Star	R.A. (J2000.0) Decl.		Unfiltered CCD Mag.		Identified with
			Max	Min	
AF Aql	$18^{\rm h}59^{\rm m}32^{\rm s}\!.17$	$-09^\circ06'58''\!.5$	11.2	12.6	
AG Aql	18 59 32.748	−06 08 51.14	10.7	11.9	USNO-A1.0 0825.13965291
AN Aql	19 02 37.897	−09 32 21.03	10.8	12.7	GSC 5711.0895 USNO-A1.0 0750.16330736
AO Aql	19 02 44.043	−06 11 11.51	9.9	12.0	GSC 5140.1058 USNO-A1.0 0825.14217142
EU Aql	18 58 23.761	+16 46 54.84	9.1	10.0	GSC 1585.0882 USNO-A1.0 1050.12635261
HS Aql	19 00 27.795	−08 40 26.07	10.8	12.5	USNO-A1.0 0750.16136750
QQ Aql	19 02 08.451	−09 04 11.18	10.9	11.8	USNO-A1.0 0750.16289091
UX Aql	19 00 25.162	−11 29 22.69	11.7	12.9	USNO-A1.0 0750.16132360
V431 Aql	20 00 28.283	+10 47 21.43	10.7	12.1	GSC 1075.1268 USNO-A1.0 0975.17767279
V757 Aql	20 00 19.649	+09 54 25.11	11.5	12.5	GSC 1075.1971 USNO-A1.0 0975.17756839
V759 Aql	20 00 14.785	+13 54 58.13	10.3	12.4	USNO-A1.0 0975.17750986
V886 Aql	18 59 11.277	−01 19 09.83	10.0	11.7	USNO-A1.0 0825.13934521
V938 Aql	19 00 32.257	−07 27 54.23	10.0	12.3	USNO-A1.0 0825.14049433
VX Aql	19 00 09.508	−01 34 56.99	8.3	9.2	GSC 5128.0947 USNO-A1.0 0825.14018550
DI Cyg	21 02 26.024	+30 55 23.05	9.2	10.8	GSC 2701.1892 USNO-A1.0 1200.17132208
DN Cyg	21 58 15.41	+52 02 12.5	11.6	12.4	
KM Cyg	20 00 13.42	+36 08 45.8	10.3	11.5	
V419 Cyg	20 02 29.75	+38 35 18.6	11.8	14.1	
V739 Cyg	19 58 23.811	+37 15 52.19	13.5	14.9	USNO-A2.0 1200.14007663
V1463 Cyg	19 57 43.163	+36 05 44.16	12.7	13.8	USNO-A1.0 1200.14176810
V1511 Cyg	20 00 29.538	+36 46 10.72	10.3	11.3	USNO-A2.0 1200.14138751
V1893 Cyg	20 59 47.910	+34 20 06.91	12.4	13.3	USNO-A1.0 1200.16985829
V1897 Cyg	21 02 27.084	+35 09 59.29	12.7	13.5	USNO-A1.0 1200.17133164
DM Lac	22 04 35.703	+52 53 59.36	9.1	10.1	USNO-A1.0 1425.12892254
YY Lyr	19 02 11.799	+29 35 49.91	10.8	12.3	USNO-A1.0 1125.11278836
DQ Oph	16 57 46.743	−30 04 39.33	11.5	12.6	USNO-A2.0 0525.25122865
DX Oph	16 58 18.348	−25 34 09.66	10.6	12.1	GSC 6814.1391 USNO-A2.0 0600.22660252
EG Oph	16 59 00.39	−26 01 52.0	9.3	10.2	
ES Oph	17 01 16.57	−29 54 51.4	11.6	12.9	
MO Oph	16 57 36.651	−29 52 28.31	11.3	13.2	USNO-A2.0 0600.22571075
NT Oph	16 59 06.979	−25 44 22.27	11.8	13.9	USNO-A2.0 0600.22770013
NV Oph	16 59 30.735	−27 57 43.75	9.7	12.5	USNO-A2.0 0600.22826044
OW Oph	17 00 35.835	−30 09 24.08	10.8	13.3	USNO-A2.0 0525.25560998

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ASTROMETRY AND CONFIRMATION OF VARIABILITY OF 21 NSV OBJECTS

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This report describes the astrometry and confirmation of variability of 21 suspected variable stars in the NSV catalog (New Catalogue of Suspected Variable Stars) discovered in the course of variable star survey based on the MISAO Project observations.

The astrometry and photometry of these objects were obtained automatically by the PIXY system from unfiltered CCD images taken by Kadota between 1999 April and August. Further details are the same as described in Yoshida and Kadota (1999).

Table 1 shows the astrometry, photometry and identifications. The positions and magnitudes are measured using USNO-A1.0 catalog. The magnitude is based on a preliminary V magnitude calculated from R and B magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

No other variable stars were found on our CCD images within 5 arcmin of the catalog positions of NSV 08100, NSV 09883, NSV 09955, NSV 11617, NSV 12626, NSV 12708, and NSV 12736, except for the stars in Table 1. Therefore, we concluded that our objects are identified with these NSV objects.

At the catalog position of NSV 12621, there is a star USNO-A2.0 1200.13947075. But it was nonvariable at 12.5 mag on our images. Our variable star at R.A. $19^{\mathrm{h}}57^{\mathrm{m}}29\overset{\mathrm{s}}{.}99$, Decl. $+36^\circ00'38\overset{''}{.}0$ (2000.0) is only 23 arcsec from USNO-A2.0 1200.13947075. Therefore, we concluded that our variable object is the true NSV 12621.

The variable star at R.A. $17^{\mathrm{h}}59^{\mathrm{m}}00\overset{\mathrm{s}}{.}73$, Decl. $-11^\circ33'23\overset{''}{.}0$ (2000.0) is 4.0 arcmin from the catalog position of NSV 09938. No other variable stars were found on our CCD images within 5 arcmin of the catalog position. Our object is identified with an S-type star GCSS 1011 (Stephenson 1984). The spectral type S given for NSV 09938 indicates this star is indeed NSV 09938.

V1462 Cyg is within 2 arcmin from NSV 12600. No other variable stars were found on our CCD images within 5 arcmin of the catalog position of NSV 12600. Therefore, we concluded that NSV 12600 is identified with V1462 Cyg.

NSV 24955 is identified with LD 11 (Dahlmark 1982).

Table 1: Astrometry and Identifications

Star	R.A. (J2000.0) Decl.		Unfiltered CCD Mag.		Identified with
			Max	Min	
NSV 08100	$17^{h}00^{m}41^{s}.19$	$-24^\circ20'05''.3$	10.2	11.4	
NSV 08134	17 03 11.389	−26 00 42.17	11.8	13.1	USNO-A2.0 0600.23365400
NSV 09883	17 56 59.097	−17 28 35.84	12.6	13.5	USNO-A2.0 0675.23531725
NSV 09938	17 59 00.73	−11 33 23.0	11.2	12.6	GCSS 1011
NSV 09955	18 00 06.57	−16 01 26.1	12.0	13.7	
NSV 09956	17 59 59.759	−10 40 21.96	11.5	12.3	GSC 5678.0922 USNO-A2.0 0750.12477306
NSV 09966	18 00 09.828	+01 44 40.89	11.6	12.6	GSC 0430.0454 USNO-A2.0 0900.11191505
NSV 11594	18 58 03.436	−08 17 11.10	10.8	11.6	USNO-A1.0 0750.15900167
NSV 11612	18 59 12.08	−05 36 27.6	11.5	[14.7	
NSV 11617	18 59 09.171	+10 23 39.55	11.2	12.0	USNO-A2.0 0975.13787358
NSV 12600	19 56 45.987	+36 42 52.52	11.3	12.5	USNO-A2.0 1200.13896449
NSV 12621	19 57 29.99	+36 00 38.0	13.7	[15.1	
NSV 12626	19 57 41.076	+35 47 09.14	11.7	14.0	USNO-A2.0 1200.13959781
NSV 12669	19 59 46.62	+37 02 02.1	11.8	14.1	
NSV 12708	20 01 18.002	+36 47 42.80	13.1	[15.5	USNO-A2.0 1200.14186977
NSV 12730	20 02 08.46	+37 16 34.4	11.2	12.0	GSC 2682.2437
NSV 12736	20 02 41.160	+36 03 30.00	13.3	14.7	USNO-A2.0 1200.14267998
NSV 14012	22 03 31.385	+60 09 33.97	12.3	13.3	USNO-A2.0 1500.08723858
NSV 24955	19 58 28.24	+47 06 11.0	11.3	13.2	LD 11
NSV 24959	19 59 29.77	+22 45 13.7	13.1	15.1	
NSV 25407	20 57 21.47	+37 55 19.3	12.7	14.7	

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NSV 5028: A NEW RR LYRAE TYPE VARIABLE IN UMa

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NSV 5028 (BV 37 ≡ GSC 3827_104; $10^{\rm h}58^{\rm m}08^{\rm s}$, $+56°06'56''$; 2000.0) was discovered to be a variable star by Geyer et al. (1955), who reported rapid variations from $11^{\rm m}_{.}1$ to $11^{\rm m}_{.}7$ (photographic plates). Its spectrum is A4, suggesting a pulsating variable or an eclipsing system.

In 1994 the GEOS could establish an apparent period of $0^{\rm d}_{.}627$, from visual estimates only. Therefore, photoelectric measurements were performed at the Jungfraujoch Observatory, on the basis of a collaboration between GEOS and Geneva Observatory. Variability was confirmed and 27 BV measurements collected during eight nights in three different observing runs allowed us to cover the descending branch of the light curve (Fig. 1). The observed ranges are from 11.07 to 11.57 in V filter and from -0.60 to -0.42 in the $(B-V)_G$ colour index. The latter value can be transformed into 0.29–0.44 in the UBV system assuming a luminosity class III. Unfortunately, the photometer of the Jungfraujoch Observatory was removed before we could complete the observation of the whole light curve; however, a pulsating nature was strongly suggested by the observed part of the curve.

New CCD measurements were planned and obtained at the Chateâu-Renard Observatory, with the CCD HISIS-22 16 bits camera of the Astroqueyras association attached to the 62-cm Cassegrain telescope. Images taken in white light on two nights in April 1999 allowed us to cover the ascending branch of the light curve (Fig. 2), confirming the RRab nature of NSV 5028. Unfortunately, it was not possible to transform differential magnitudes (with respect to GSC 3827_188) into the standard system. The observed amplitude was 0.44 mag. As expected, this value is smaller than the V one since the CCD has its best efficiency toward longer wavelengths, where the amplitude of the pulsation decreases.

From the light curves, it is evident that NSV 5028 is a new RRab star. An ephemeris was calculated on the basis of 50 times of maxima supplied by GEOS visual observers and from the moment of maximum obtained from CCD observations (which was assigned a triple weight):

$$\begin{array}{rl} \text{Max} = \text{HJD } 2449065.910 & + \; 0^{\rm d}_{.}627300 \times E. \\ \pm 0.012 & \;\; \pm 0.000014 \end{array}$$

Since the photoelectric and CCD measurements taken on different nights do not show any systematic differences, no appreciable Blazhko effect can be detected. The light

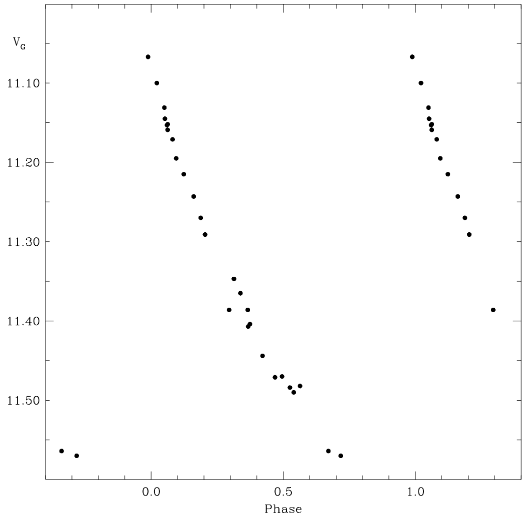

Figure 1. The photoelectric V magnitudes obtained in the Geneva photometric system cover only the descending branch of the light curve.

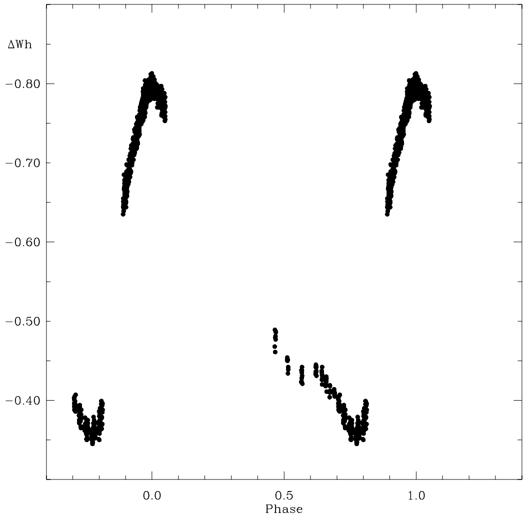

Figure 2. The unfiltered CCD measurements are better distributed along the pulsation cycle of NSV 5028

curve is very asymmetric ($M - m = 0.23$) and the mean magnitude is 11.34 in V light. Assuming $M_V = 0.71$ for RR Lyr stars (Layden et al. 1996), NSV 5028 is at a distance of 1340 pc. Following the relationship proposed by Bono et al. (1997), the relatively small amplitude suggests that NSV 5028 is a metal-rich star. Hence, NSV 5028 is probably a disk population star.

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POSSIBLE DETECTION OF THE PLANET TRANSITS OF HD 209458 IN THE HIPPARCOS PHOTOMETRY

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Recently, the spectroscopically detected 3.52 day planet to HD 209458 has been observed by photometric transits (Charbonneau et al. 1999, Henry et al. 1999). The star (= HIP 108859) is bright ($V = 7.65$), and the Hipparcos epoch photometry (ESA, 1997) lists 89 observations with median Hp = 7.772 and typical 0.014 magnitude scatter. This is only marginally sufficient to discern 0.02 magnitude minima (covering 3.4% of the orbit), but by a lucky distribution of the observations, data may have been obtained at five epochs near minimum light.

What I have done is basically just to check the χ^2 fit of the Hipparcos observations to the Charbonneau et al. light-curve, by starting at the well-observed transit epoch 2451430.823 and varying the as yet imperfectly known period. The χ^2 sum $[(O-C)/\sigma$ squared] for constant light is about 148, but at around $P = 3.52473 \pm 0.00005$, the χ^2 is down to 118, the lowest minimum for any period 3.25–3.75 days. It also fits very well with the spectroscopic period 3.5245 ± 0.0003. (Checking the whole 2–5 day range, there are only two other equally good fits, at the spurious periods 2.9542 and 3.7904 days). Charbonneau et al. predict a deeper minimum than their 0.018 mag R value in B or V, and repeating the fit with a 50% deeper minimum gives minimum χ^2 around 116, at the same period(s). One may also test excluding some presumably poor observations, but the results remain basically unchanged.

As stated above, the 'detection' is in the following five observations, as listed (on CD-ROM) in the epoch photometry Annex (ESA, 1997):

JD − 2400000	phase (P)	Hp	σ
48364.301	−0.002	7.798	0.012
48364.316	+0.002	7.787	0.010
48413.623	−0.009	7.791	0.008
48565.209	−0.002	7.809	0.012
48565.223	+0.002	7.798	0.007

The full phase-plot with all observations is not very convincing (Fig. 1.), and the main evidence remains the above tests of all possible periods. It will not be too long until repeated photometric observations will have determined the true period, but until then there is a small probability that Hipparcos may have contributed to give the best value to date.

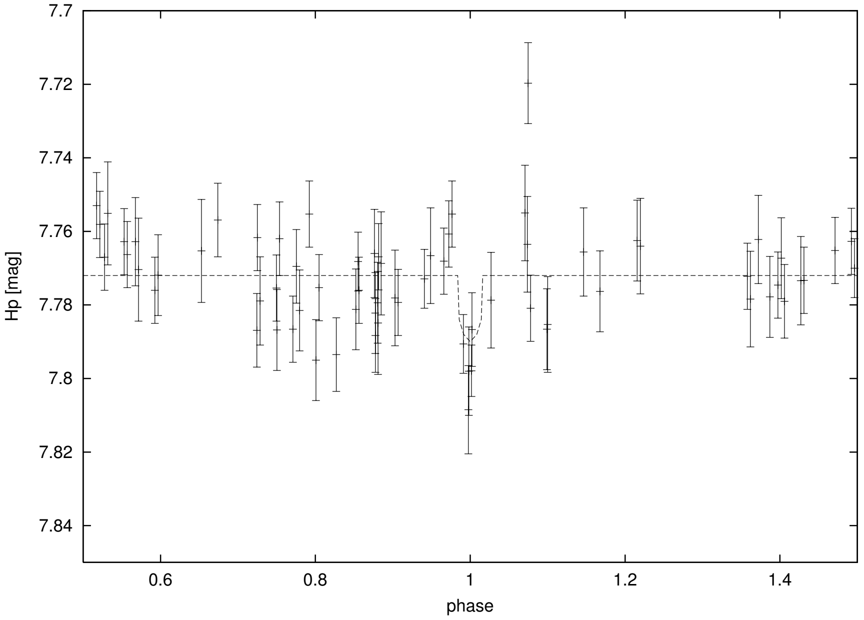

Figure 1.

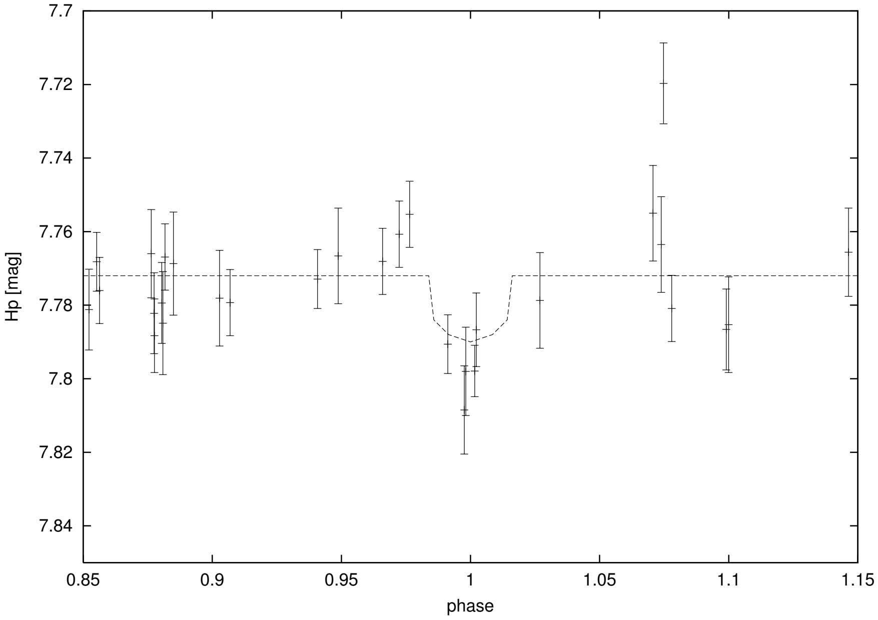

Figure 2.

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NEW uvbyβ PHOTOMETRY OF STARS OF "ASTROPHYSICAL INTEREST"

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This note reports the continuation of a project designed to acquire Strömgren–Crawford indices for stars of "astrophysical interest", mostly variable or candidate variable stars in the lower instability strip, for which this information was missing so far. The first part of the measurements was published by Handler (1995).

Since this program is being carried out during "leftover" observing time, progress is rather slow. Consequently, we consider it most useful to release the data for use of the community as soon as a reasonable amount has been collected, as opposed to waiting for the completion of the whole project (which could never happen).

The bulk of our observations (including *all uvby* measurements) was acquired with the 50-cm telescope at the South African Astronomical Observatory (SAAO) in July and November, 1999. A few additional Hβ measurements were taken with the McDonald Observatory 91-cm telescope in March 1996 and with the SAAO 75-cm telescope in October, 1999. We took care that also for fainter stars a sufficient number of counts ($\geq 100\,000$) was collected in each filter.

Transformations were calculated for each observing run separately by using a sufficient number of standard stars (10–30, depending on the observing run). A colour term was included in the equations. Care was taken that the standard stars spanned a larger range in color indices than the program stars did. Average zeropoints were applied for each observing run as well, with the exception of the November 1999 run which was spread out over several nights so that nightly zeropoint corrections for the V magnitude were found necessary; the transformation equation was recalculated thereafter. The rms residuals of a single standard star measurement were typically around 6 mmag for V and β, 3 mmag for $(b-y)$ and 12 mmag for m_1 and c_1, respectively. We are careful to note that these values may not always apply to the program stars, which are often fainter than the standards and which are mostly variable stars.

Our results are summarized in Table 1, where the program stars are ordered by increasing HD number. Objects without a HD identification can be found at the end of Table 1 in alphabetical order. We would now like to describe a few interesting findings from our results:

Table 1: *uvbyβ* photometry of program stars

Star	V	$b-y$	m_1	c_1	β
HD 984					2.636
HD 4494	9.45	0.177	0.171	0.779	2.762
HD 12389					2.861
HD 12901					2.719
HD 13755					2.723
HD 14147					2.747
HD 14940					2.737
HD 16723					2.769
HD 17978	9.60	0.177	0.163	0.838	2.745
HD 21438					2.805
HD 22625	9.27	0.224	0.175	0.664	
HD 27093	7.45	0.126	0.164	1.021	2.801
HD 29870					2.712
HD 32195					2.625
HD 33957					2.879
HD 34025	7.85	0.261	0.155	0.608	2.688
HD 34409					2.727
HD 38643					2.768
HD 41448	7.62	0.189	0.184	0.693	2.747
HD 42304					2.749
HD 42503	7.46	0.130	0.139	1.057	2.779
HD 58453					2.742
HD 59594	7.33	0.126	0.167	0.832	2.803
HD 63176					2.727
HD 65526	6.98	0.188	0.151	0.662	2.734
HD 66829	9.22	0.242	0.152	0.559	2.713
HD 77347					2.766
HD 79766	8.87	0.148	0.172	0.814	2.800
HD 81421	6.97	0.173	0.169	0.754	2.751
HD 87271	7.10	0.151	0.094	0.939	2.775
HD 99267					2.724
HD 108100					2.705
HD 173173					2.673
HD 177120	6.74	0.157	0.118	1.091	2.813
HD 184190	9.76	0.232	0.113	0.693	
HD 187615	7.98	0.207	0.153	0.692	
HD 192871					2.741
HD 193084	7.61	−0.029	0.121	0.561	2.764
HD 199434	8.71	0.271	0.205	0.690	
HD 207651					2.834
HD 209295	7.29	0.139	0.185	0.840	2.821
HD 213669	7.40	0.155	0.113	0.835	2.758
HD 214291					2.627
HD 218225	8.71	0.235	0.182	0.649	2.705
HD 221866	7.44	0.151	0.207	0.766	2.791
HD 230990					2.781
HD 261331	9.73	0.136	0.187	0.992	2.784

Table 1 (continued)

Star	V	$b-y$	m_1	c_1	β
HD 261446	10.32	0.243	0.225	0.719	2.706
HD 290764	9.92	0.208	0.170	0.859	2.720
AI Hya					2.764
BD +21°1613	9.34	0.309	0.125	0.358	2.639
BD +21°1616	9.28	0.222	0.150	0.586	2.694
CD −41°15264	10.31	0.378	0.170	0.344	
GSC 4778-00324	10.26	0.202	0.168	0.894	2.797
V829 Aql	10.28	0.390	0.135	0.748	2.675

HD 42503, HD 87271, HD 213669: These are all suspected δ Scuti stars from HIPPARCOS photometry, but they also turned out to be quite metal-poor. It is suspected that they could be λ Bootis stars or even Pop. II objects.

HD 193084: This star was found to be a short-period variable by Paunzen (1997), who noted that its spectral classification (B8 V) makes it a very interesting object if it turned out not to be a binary. Our photometry corroborates this spectral classification. A detailed study of HD 193084 is recommended.

HD 209295: This is the hottest γ Doradus star known to date. Handler (1999a) did not consider it for his outline of the γ Doradus star domain in the HR diagram, since he was suspicious of the published $(b-y)$ (Twarog 1980). Our new measurement confirms this value, however. On the other hand, evidence for binarity of HD 209295 has recently been discovered (Balona 1999).

BD +21° 1613, BD +21° 1616: Handler (1999b) suspected that one of these stars is variable, but he was unable to determine which one. The Strömgren–Crawford indices of BD +21°1616 are typical for a γ Doradus star (Handler 1999a). We also note that BD +21°1613 seems quite metal-poor.

HD 261446: This is a pre-main sequence δ Scuti star (Breger 1972) in the open cluster NGC 2264. It has a rather high m_1 compared to the second δ Scuti star (HD 261331) in this cluster. Since the astrophysical interpretation of this result is not straightforward, we solicit an investigation of this star's spectrum.

V 829 Aql: This is one of only three radial triple-mode pulsators among δ Scuti stars (Handler, Pikall & Diethelm 1998). Our photometry puts the star somewhat outside the cool luminous border of the δ Scuti instability strip (Breger 1979); requiring $Q = 0.033$ for the longest period mode moves it even further out.

Acknowledgements: This work was partially supported by the Austrian Fonds zur Förderung der wissenschaftlichen Forschung under grant No. S7304-AST. The author thanks Michel Breger and Don Kurtz for helpful discussions about the nature of HD 261446.

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GSC 2684_1255: A NEW VARIABLE IN THE FIELD OF V454 CYGNI

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Name of the object:
GSC 2684_1255

Equatorial coordinates:	**Equinox:**
R.A.= $20^{h}15^{m}55^{s}\!.995$ **DEC.=** $+37^{\circ}27'15''\!.62$	2000.0

Observatory and telescope:
N. Copernicus Observatory and Planetarium, 0.4-m Newton telescope

Detector:	CCD, SBIG ST7
Filter(s):	Without filter
Comparison star(s):	GSC 3151_2212
Check star(s):	GSC 2684_0631, GSC 3151_2170
Transformed to a standard system:	No
Type of variability:	EW

Remarks:

The variability of GSC 2684_1255 was found while being used as comparison star for variable V454 Cygni. CCD observations show that the star exhibits light variations with an amplitude of 0.26 magnitude in the instrumental band (primary minimum), the secondary minimum is $0^{m}\!.21$ deep. Range of variability GSC 2684_1255 is between 12.03 to 12.29 magnitude.
A period was computed by neural network software LANCELOT (Gaspani 1999). The ephemeris is as follows:

$$\begin{array}{l} \text{Min JD}_{\text{hel}} = 2451375.4528 + 0^{d}\!.404194 \times E. \\ \qquad\qquad\qquad\quad \pm 0.0016 \quad \pm 0.000068 \end{array}$$

The shape of the observed light curve corresponds to those of W UMa type stars. Figure 1 shows the light curve of GSC 2684_1255. Data were obtained from 18 Aug. 1999 to 31 Oct. 1999. The moments of light minima of the new variable star GSC 2684_1255 are presented in Table 1.

Table 1

Min JD hel 2400000 +	Uncertainty	E	$O-C$	Observer
51375.4528	±0.0016	0.0	0.0000	J. Šafář
51392.4321	±0.0020	42.0	−0.0032	J. Šafář
51427.3936	±0.0016	128.5	−0.0019	J. Šafář
51433.4575	±0.0025	143.5	−0.0029	J. Šafář
51435.4751	±0.0018	148.5	0.0004	M. Zejda
51449.4213	±0.0029	183.0	−0.0011	J. Šafář

Acknowledgements:

Special thanks are due to Miloslav Zejda who observed this object on my request.

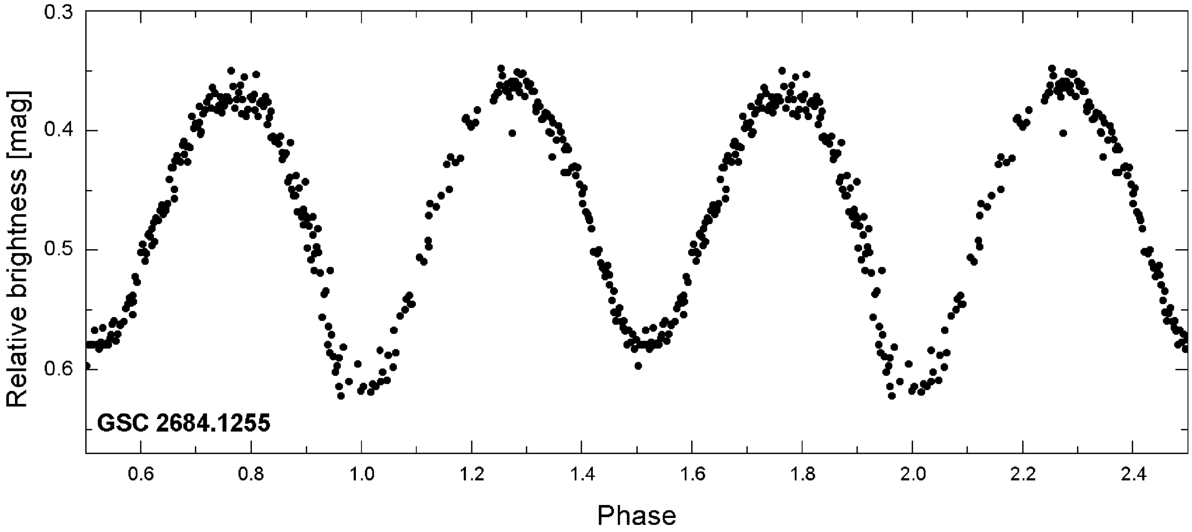

Figure 1.

Reference:

Gaspani, A., 1999, LANCELOT software, private communication

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GSC 3151_2126: A NEW VARIABLE

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Name of the object:
GSC 3151_2126

Equatorial coordinates:	**Equinox:**
R.A.= $20^h15^m17^s.577$ **DEC.=** $+37°31'43''.40$	2000.0

Observatory and telescope:
N. Copernicus Observatory and Planetarium, 0.4-m Newton telescope

Detector:	CCD, SBIG ST7
Filter(s):	Without filter
Comparison star(s):	GSC 3151_2212
Check star(s):	GSC 2684_0631, GSC 3151_2170
Transformed to a standard system:	No
Type of variability:	EA

Remarks:

The variability of GSC 3151_2126 was found while being used as comparison star for new variable GSC 2684_1255. CCD observations show that this star has light variations with an amplitude of 0.78 magnitude in the instrumental band. The range of light variations GSC 3151_2126 is between 11.73 to 12.51 magnitude.
A period was computed by neural network software LANCELOT (Gaspani 1999). The ephemeris is as follows:

$$\begin{array}{rl} \text{Min JD}_{\text{hel}} = & 2451427.4063 + 0^{\text{d}}.610510 \times E. \\ & \pm 0.0013 \quad \pm 0.000035 \end{array}$$

The shape of the observed light curve corresponds to those of Algol type eclipsing binaries. During observation (from 15 Aug. to 31 Oct. 1999) four times of minima were recorded. Secondary minimum was not detected. Resulting times of light minima of the variable star GSC 3151_2126 are presented in Table 1. Figure 1 shows the light curve of GSC 3151_2126.

Table 1

Min JD hel 2400000 +	Uncertainty	E	$O-C$	Observer
51427.4094	±0.0013	0.0	0.0000	J. Šafář
51435.3488	±0.0013	26.0	−0.0020	M. Zejda
51449.3887	±0.0023	72.0	0.0012	J. Šafář

Acknowledgements:

Special thanks are due to Miloslav Zejda, who observed this object on my request.

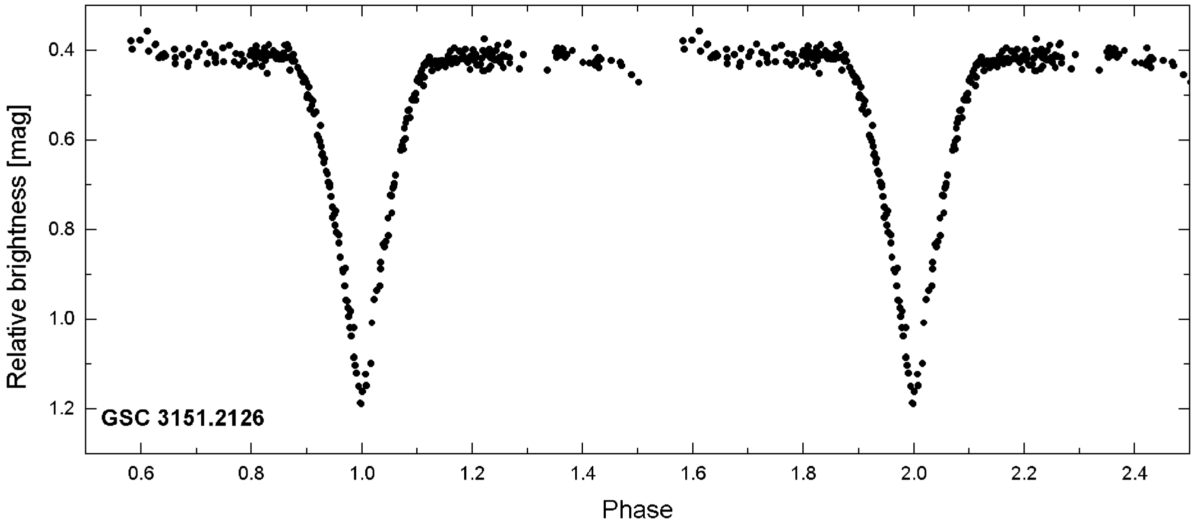

Figure 1.

Reference:

Gaspani, A., 1999, LANCELOT software, private communications

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PHOTOMETRY OF THE HD 187123 FIELD

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[1] Guest User, Canadian Astronomy Data Centre, which is operated by the Herzberg Institute of Astrophysics, National Research Council of Canada

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The star HD 187123 = GSC 2664_550 was found to have an orbiting planet with a period of $3\overset{d}{.}097$ and a semi-amplitude of 72 m/s (Butler et al. 1998). Anticipating that the star might experience transits of the planet we began photometric observations. The star IRAS 19450+3416 (Beichman et al. 1988) = USNO 1200–13176787 (Monet et al. 1996) was also in the field.

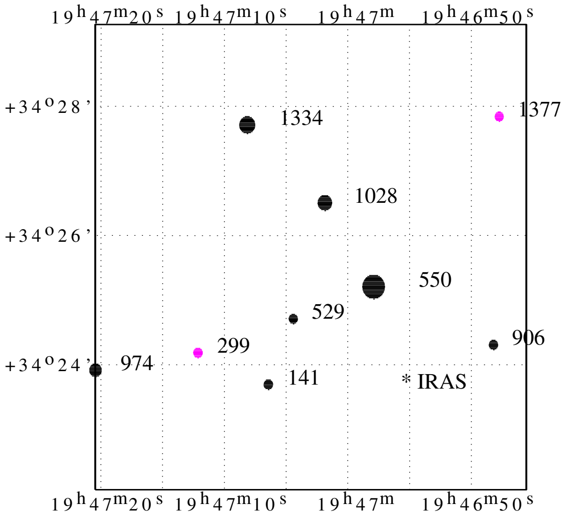

Figure 1. Finder chart labeled with the GSC numbers and an '$*$' for IRAS19450+3416

Plotted in Figure 1 is the field of stars observed with the automated 0.5-m telescope and reduced in a fashion nearly identical to that described in Robb and Greimel (1999). Due to the brightness of HD 187123 the telescope was left slightly out of focus and 8 arc second star apertures were used. During the 47 nights a total of 8323 frames were observed each with an exposure time of 42 seconds.

Tabulated in Table 1 are the stars' identification numbers, coordinates (J2000) and magnitudes from the Hubble Space Telescope Guide Star Catalog (GSC) (Jenkner et al. 1990). The most precise photometry requires that all parameters be kept constant during a night, from night to night, from run to run and from year to year. Our data divide

Table 1: Stars observed in the field of HD 187123 in 1998

GSC No.	R.A. J2000	Dec. J2000	GSC Mag.	ΔR Mag.	Std Dev Between	Std Dev Within
2664_550	$19^{\rm h}46^{\rm m}58^{\rm s}$	$+34^\circ25'12''$	7.5	-2.137	0.001	0.002
2664_1334	$19^{\rm h}47^{\rm m}08^{\rm s}$	$+34^\circ27'43''$	9.6	—	—	—
2664_1028	$19^{\rm h}47^{\rm m}02^{\rm s}$	$+34^\circ26'30''$	10.1	0.415	0.003	0.003
2664_974	$19^{\rm h}47^{\rm m}20^{\rm s}$	$+34^\circ23'55''$	10.8	0.947	0.002	0.004
2664_299	$19^{\rm h}47^{\rm m}12^{\rm s}$	$+34^\circ24'11''$	11.8	2.488	0.002	0.008
2664_529	$19^{\rm h}47^{\rm m}04^{\rm s}$	$+34^\circ24'43''$	11.9	2.070	0.003	0.008
2664_141	$19^{\rm h}47^{\rm m}06^{\rm s}$	$+34^\circ23'42''$	11.8	2.506	0.003	0.010
IRAS 19450+3416	$19^{\rm h}46^{\rm m}55^{\rm s}$	$+34^\circ23'35''$	12.7	2.209	0.052	0.008
2664_906	$19^{\rm h}46^{\rm m}48^{\rm s}$	$+34^\circ24'18''$	11.9	2.335	0.004	0.009

naturally into three runs, fall 1998, summer 1999 and fall 1999. A different flat field was used for each run and it was found that there were constant offsets from run to run of about 0.01 magnitudes. Due to this offset we present in Table 1 the results for the fall 1998 data, which had a smaller standard deviation from night to night but a larger standard deviation during each night. Our differential ΔR magnitudes are calculated in the sense of the star minus GSC 2664_1334. Brightness variations during a night were measured by the standard deviation of the differential magnitudes during a night. The best night is tabulated in Table 1 as "Std Dev Within". For each star the mean of the nightly means is shown as ΔR in Table 1. The standard deviation of the nightly means is a measure of the night to night variations and is called "Std Dev Between" in Table 1. The star IRAS 19450+3416 had obvious variations from night to night and is therefore a new variable star.

Since star spots or pulsations could cause the observed velocity variations, we initially observed HD 187123 at all orbital phases. From Table 1 and the 1999 data we can see that any such variations must be less than a millimagnitude and are not likely to be significant.

During some of the nights there remained a trend of about 0.01 magnitudes from sunset to sunrise, which we attribute to the telescope focus changing as a function of hour angle. The trend was removed by subtracting a straight line fit from that night's data. To increase clarity of the light curve, nine points were then averaged to make a normal point. In Figure 2 we have plotted the normal points near the expected phase of transit with their errors in the mean and the phases calculated from the period $3\overset{\rm d}{.}096571$ and and epoch of Julian Date 2451268.76416 (Marcy 1999). A line has been added to show the approximate phase, depth and duration of a transit of a planet of the expected radius. From this plot we can see that there is no transit of a depth greater than about 0.002 magnitudes, depending on the assumed duration and phase of the transit. Thus the orbital inclination must be less than 84°, which does not significantly restrict the estimate of the planet's mass.

The variations of the star IRAS 19450+3416 were not evident during a night so the data were combined into nightly means. Since we observed only three maxima, there is a little ambiguity in the determination of a photometric period of IRAS 19450+3416, but the best light curve as estimated by eye was found using the ephemeris:

$$\mathrm{HJD\ of\ Maxima} = 2451006\overset{\rm d}{.}(5) + 118\overset{\rm d}{.}(5) \times E.$$

An estimate of the uncertainties in the final digit are given in brackets.

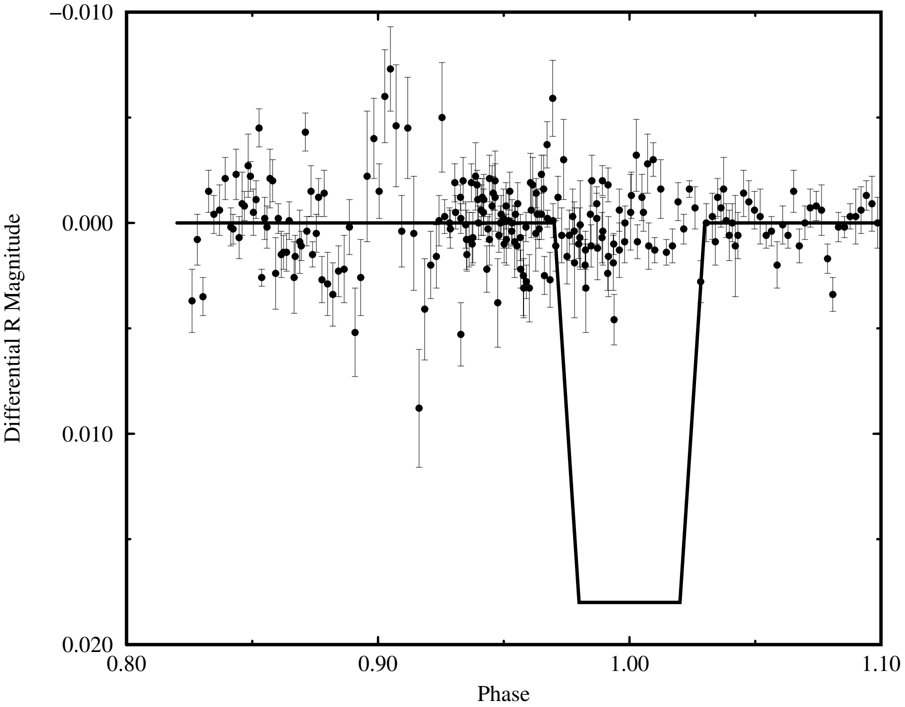

Figure 2. *R* band normal points of HD 187123 showing a prediction of a planetary transit

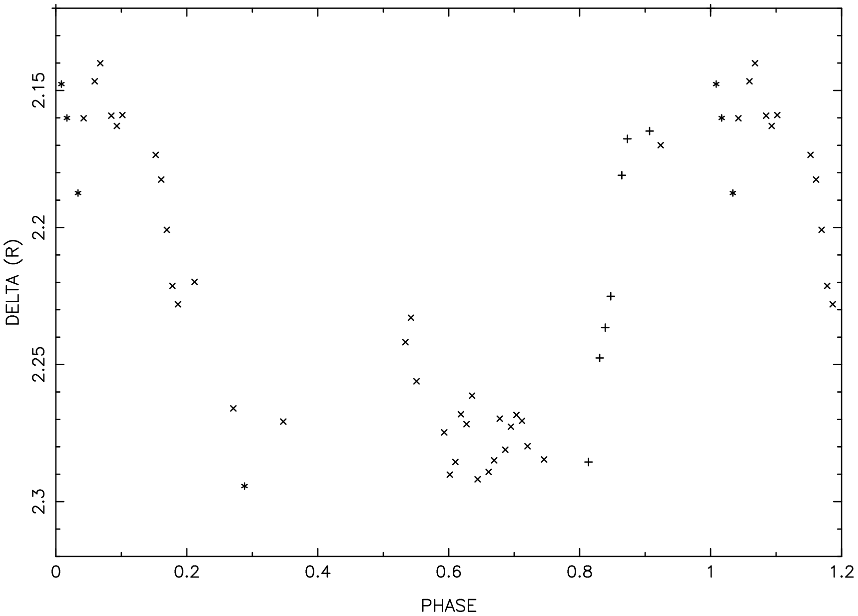

Figure 3. Nightly means of *R* band differential magnitudes of star IRAS 19450+3416

The differential (IRAS 19450+3416 − GSC 2664_1334) R magnitudes phased at this period are plotted in Figure 3 with +'s and $*$'s for 1998 and ×'s for the 1999 data. The small run offsets have been ignored for this plot.

The USNO Catalog (Monet et al. 1996) gives a $(b - r) = 2.3$ for IRAS 19450+3416 suggesting that this is a very cool star. On one night a few frames of this field were observed through the V and I filters. Assuming that HD 187123 has $V = 7.925$ and $V - I = 0.72$ (ESA 1997), the star IRAS 19450+3416 has a $V = 14.3$, $(V - R)_c = 2.3$ and a $(V - I)_c = 4.5$ with an uncertainty of 0.1 from photon counting errors and as a consequence of the star's extreme redness at least 0.5 magnitudes for transformation errors. Ignoring reddening these colors do not match a dwarf star but are correct for an M8 giant (Thé et al. 1990) at a distance of 3600 pc. Garnavich et al. (1994) find $M_I \simeq -2.7$ for M giants of about solar metallicity, giving a distance of 3100 ± 1000 pc.

The star HD 187123 is a star constant in brightness. IRAS 19450+3416 is a late-type variable star with a period of 118 days and an amplitude of 0.13 magnitudes. Its very red color, small amplitude, short period and low galactic latitude hint that it could be a very interesting star. Spectroscopic classification and photometric observations would be valuable to learn the temperature and to look for variations in the period and morphology of the light curve.

NSERC grants to Ann Gower, David Hartwick and Don VandenBerg provided partial support for this work.

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HD 205798: A NEW LOW-AMPLITUDE VARIABLE STAR IN CYGNUS

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The star HD 205798 (also HIP 106708; BD+33°4307; $\alpha = 21^{\rm h}36^{\rm m}53\overset{\rm s}{.}8$, $\delta = +33°43'06''$, J2000; Sp. type F0; $V = 8.04$) is one of nearly 700 objects in a large spectroscopic survey of F stars carried out at the Center for Astrophysics. The purpose of this survey is to determine their kinematical properties and investigate various issues related to the formation and evolution of the galactic disk (Nordström et al. 1997). We have continued to observe the velocity variables in the sample in order to study the frequency and orbital characteristics of spectroscopic binaries among the early F stars.

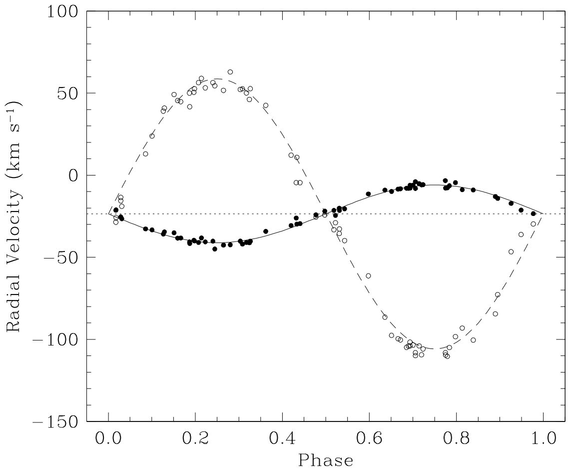

Figure 1. Spectroscopic orbital solution for HD 205798.

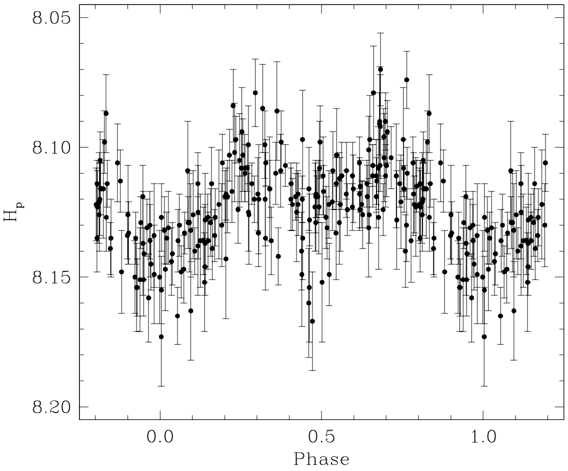

Figure 2. HIPPARCOS photometry for HD 205798 phased with the ephemeris above.

Early in the course of this work HD 205798 was found to be double-lined, and a preliminary mass ratio and center-of-mass velocity were reported by Nordström et al. (1997). Only recently with many more observations have we been able to determine the period, which is 0.6563 days. The radial velocity measurements and our orbital solution are shown in Figure 1, and the preliminary elements are listed in Table 1. The small minimum masses $M \sin^3 i$ indicate that the inclination angle is fairly low if we assume that the primary component has a mass typical for an F star. Thus light variations, if any, are expected to be small.

Table 1: Spectroscopic orbital solution for HD 205798.

Parameter	Value
P (days)	$0.65627696 \pm 0.00000053$
γ (km s^{-1})	-23.53 ± 0.21
K_A (km s^{-1})	17.58 ± 0.29
K_B (km s^{-1})	82.24 ± 1.02
e	0 (fixed)
T_I (HJD$-$2,400,000)	$50\,576.8561 \pm 0.0012$
$a_A \sin i$ (10^6 km)	0.1587 ± 0.0027
$a_B \sin i$ (10^6 km)	0.7422 ± 0.0094
$M_A \sin^3 i$ ($\mathrm{M}_\odot$)	0.05571 ± 0.00190
$M_B \sin^3 i$ ($\mathrm{M}_\odot$)	0.01191 ± 0.00037
$q \equiv M_B/M_A$	0.2138 ± 0.0045
N	67
Time span (days)	4435
σ_A (km s^{-1})	1.8
σ_B (km s^{-1})	6.4

The ephemeris for the primary minimum derived from our spectroscopic solution is

$$T_I\ (\mathrm{HJD}) = 2\,450\,576.8561(12) + 0.656\,276\,96(53) \cdot E.$$

The HIPPARCOS catalog (ESA 1997) does not flag this object as a photometric variable. The median apparent brightness is listed as $H_p = 8.1216$, with a scatter of 0.018 mag. However, when the epoch photometry is phased with the above ephemeris the variations become quite obvious (Figure 2). There is a noticeable decrease in brightness at phase 0.0, and a somewhat shallower secondary minimum at phase 0.5, although the variation seems more or less continuous, as in the ellipsoidal variables. The depth of the primary eclipse is only about 0.05 mag.

The precise nature of the system is as yet unclear. Further photometric observations in standard filters are needed for a full solution of the light curve. These observations are already underway, along with a more definitive analysis of the spectroscopic material.

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THE TIME COORDINATE USED IN THE VARIABLE-STAR COMMUNITY

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The variable-star community does not use a correct physical time coordinate for recording observations and for deriving light-curve elements. Below I describe the problem and propose a solution. IAU Commissions 27 and 42 should take a decision on the subject.

Up to now, all observations, as well as light-curve elements, are published in terms of "JD". The conventional Julian Date, JD, is linked to the Universal Time, UT, which is not a physical time coordinate. Depending on whether you precisely refer to UT1 or UTC, its run is either wavy or has irregular jumps of a full second. Universal Time is not a physical time coordinate because it is defined by the varying rotation rate of the Earth.

The preferred physical time coordinate for astronomy, as recommended by IAU Division I, is Terrestrial Time, TT. Technically, TT is simply defined as TT = TAI + 32.184 sec, where TAI is the International Atomic Time. Physically, TT is the continuation of Ephemeris Time, ET, into the era of TAI. For more details and explanations see Seidelmann & Fukushima (1992) and references therein. The representation of TT and ET in terms of day numbers is called Julian Ephemeris Date, JED.

The mean trend between TT (or ET) and UT is about 0.6 sec/yr for the interval from 1920 to 2000 (over which most of the presently used light-curve elements have been determined), amounting to almost a minute over a century, see Fig. 1.

Now, two problems arise. First, a period defined in terms of UT is not the same as one defined in terms of TT (TAI, ET). The two differ by roughly 2×10^{-8} over the twentieth century. Since some published periods are given to 10 decimal digits, this difference can be highly significant. In other words: A "JD-based" period is not given in days of 86400 seconds, but in days about 2 milliseconds longer.

Second, a variable star with perfectly constant period will show an $O - C$ diagram with humps and bumps with a full amplitude of about 15 sec. The mean trend between TT (or ET) and UT was about 0.9 sec/yr (or 3×10^{-8}) between 1965 and 1985, and it was practically zero between 1920 and 1940, see Fig. 1. In other words: Relative period changes of the order of a few times 10^{-8} are induced by a UT-based time coordinate.

All this is pretty small numbers, and for the majority of all variable-star observations it is well below the observing precision. But there are cases like HW Vir where it is highly significant already. And these cases will tremendously grow in numbers in the near future. In addition, the gradual slowing of the earth's rotation will soon induce a mean decrease of all variable-star periods over time. This will be detectable for a whole group (e.g. the

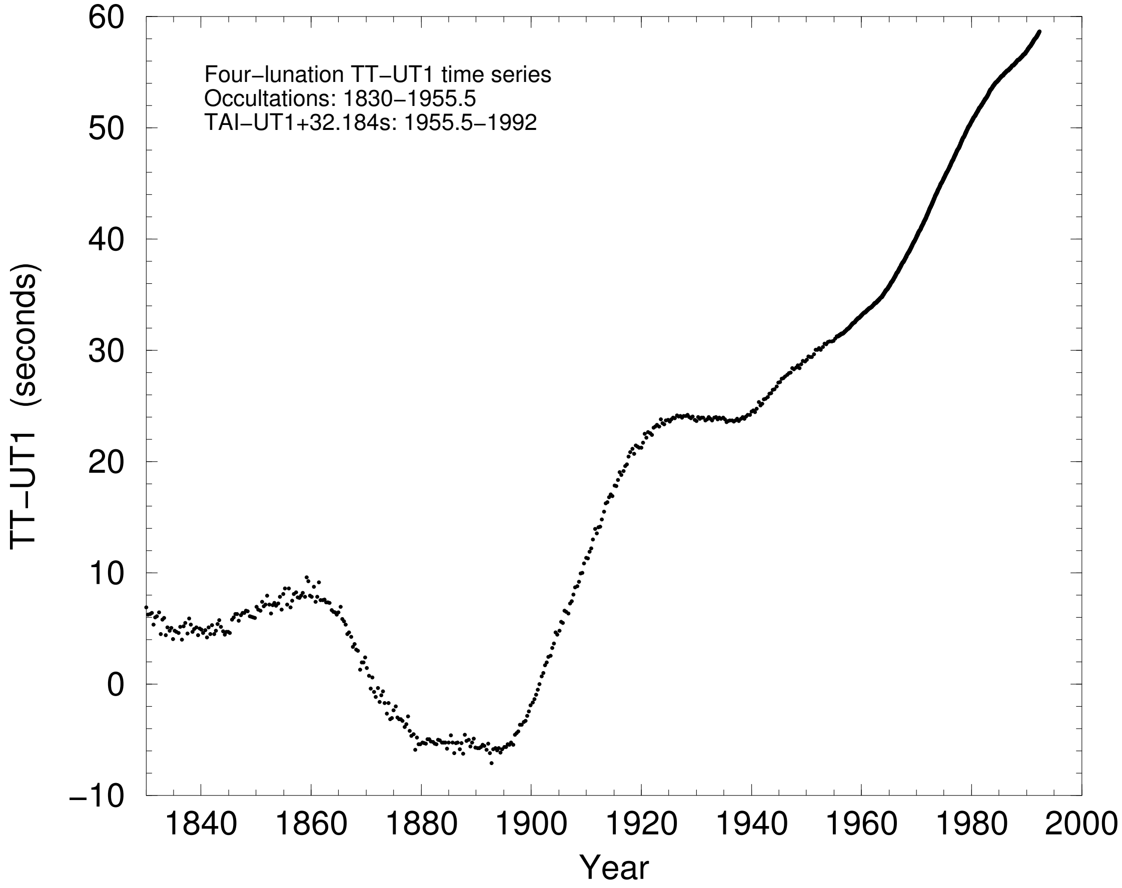

Figure 1. The difference TT − UT1 (or ET − UT1) in the period 1830–1992. The values 1830–1955.5 were derived from lunar occultations, after 1955.5 directly from UT1 − TAI. The UTC scale follows the UT1 curve within 0.9 sec, with 1-sec jumps introduced whenever needed. This graph is a copy of Fig. 5 in Jordi et al. (1994), where a more complete description is given.

RR Lyrae stars) long before it will become obvious for individual stars, and may lead to incorrect astrophysical interpretations.

All that mentioned above is not really new, and the research communities observing pulsars or the solar system, for instance, are fully aware of it. The general variable-star community should — like these others have done long ago — turn to correct physical time units as soon as possible. It is now too late to organize a Joint Discussion for the forthcoming IAU General Assembly, but perhaps a resolution can be taken on the business meeting of either or both commissions at Manchester.

The fairly obvious solution to the problem would be as follows: In the future, all light-curve elements and $O-C$ diagrams must be determined and published in terms of TT, represented in the form of JED. As for raw observations, publication in terms of UTC, represented in the form of JD, is still acceptable, but publication in terms of TT/JED should be preferred. The usage of the TT time coordinate must in any case be indicated by the symbol "JED" instead of "JD".

The convention proposed here is both clear and unambiguous, as well as very easy to use. The transformation from JD to JED is simply

$$\mathrm{JED} = \mathrm{JD} + (32.184 + n_{\mathrm{leap}})/86400,$$

where n_{leap} is the cumulated number of leap seconds applicable at date JD. This number is tabulated in astronomical almanacs. Forthcoming leap seconds are announced in the IAU Circulars regularly. For observational epochs before 1972 (when leap seconds had not been fully in use yet) the values of $\Delta\mathrm{T} = \mathrm{ET} - \mathrm{UT}$, as tabulated in the astronomical almanacs, can directly be used for the transformation. The light-curve elements of an eclipsing variable in the new convention would have the form

$$\mathrm{JED\ (Min\ I)} = 2\,456\,456.4564 + 0.456456456 \times E.$$

As a cautionary remark it should perhaps be noted that the proposed convention, along with the usual procedure of barycentric correction, makes the physical interpretation of variable-star timings correct to the level of about 0.1 sec. Below that level, more disturbing effects become significant which require more conventions and more complex reduction procedures. By far the biggest effect is the topocentric light-time correction (up to 20 msec). All others, e.g. the relativistic corrections due to the non-flat metric along the light path through the solar system and to the varying gravitation potential at the geoid are well below 1 msec.

Acknowledgements: Provision of the Postscript original of Fig. 1 by Carme Jordi is gratefully acknowledged.

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OBSERVATIONS OF TWO HIPPARCOS ECLIPSING VARIABLES†

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New photometric and radial velocity observations of two HIPPARCOS variables, HP Dra = HIP 92835 and V2080 Cyg = HIP 95611 performed in 1998 and 1999, are presented. Both of these stars were selected for radial velocity observations as candidates for new, well detached, double-lined eclipsing binaries. A re-analysis of the satellite data suggested that the periods and the shape of the light curves could be different from that originally presented in the HIPPARCOS and TYCHO catalogues (ESA, 1997). Spectroscopic observations were carried out at the Haute Provence Observatory during three observing runs (years 1998 and 1999), with the CORAVEL and ELODIE spectrometers. Photoelectric observations were collected with the 50-cm telescope of the Cracow Observatory through the Johnson B and V filters. The corrections for differential extinction were applied using the mean seasonal extinction coefficients.

For both systems, the correct periods were determined. Figures 1 and 3 show the V light curves, Figures 2 and 4 present the observed and calculated radial velocity curves. Table 1 summarizes some characteristics of the systems.

HIP 92835 = HP Dra = HD 175900. Catalogued as a new HIPPARCOS EA type eclipsing binary with the period of 6.6930 days. The first spectroscopic observations, between June 2 to 8th, 1998, made with the CORAVEL spectrometer, showed that the period is longer than found originally from 94 points of TYCHO data. Subsequent runs at OHP (August 1998 and 1999) and photometric observations done at Cracow (June 1998 to November 1999) allowed us to find the correct period. HIP 93029 = HD 176341 and BD+52°2471 were used as comparison and check stars.

The new ephemeris is:

$$\begin{array}{l} \text{Min. I} = \text{HJD } 2451041.4812 + 10\overset{\text{d}}{.}7615305 \times E. \\ \qquad\qquad\qquad\qquad \pm 0.0003 \quad \pm 0.0000023 \end{array}$$

The position of the secondary minimum at phase 0.518 and the shape of the velocity curves suggest a non-circular orbit solution. The TYCHO data reduced with the above ephemeris presents the same phase shift of the secondary minimum (adopted as the primary in the HIPPARCOS catalogue). The primary minimum is represented by only one point in the TYCHO data.

Some results from spectral and photometric observations are summarized in Table 1 and presented in Figures 1 and 2.

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†Based in part on the observations made at Observatoire de Haute Provence (CNRS), France and on data from the Hipparcos astrometry satellite.

The preliminary analysis suggests that the system is composed of similar stars of about 1.1 solar mass. The simultaneous solution of the V, B light curves and velocity curves will be published elsewhere.

Table 1

HIP	GCVS-Name	ΔV mag.		Sp. type	K_1	K_2	γ	e
92835	HP Dra	0.30	0.26	G5	62.3	64.5	16.2	0.043
95611	V2080 Cyg	0.41?	0.38	F5	81.6	83.8	3.2	0.0

Remarks to Table 1:

1. The ΔV values correspond to the depth of minimum I and minimum II.
2. K_1 and K_2 are half the amplitudes of radial velocities expressed in km/sec for brighter and fainter components.
3. Columns γ and e give the systemic velocity in km/sec and a preliminary value of the eccentricity.

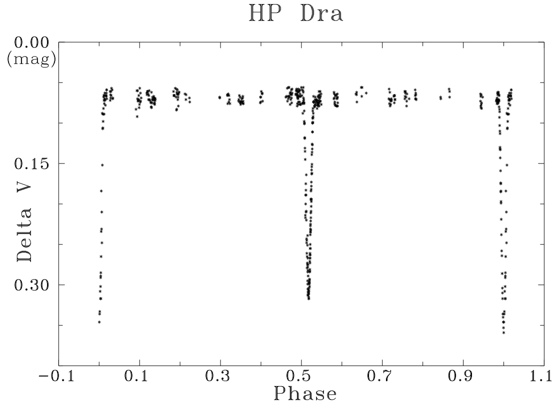

Figure 1. Light curve in V filter

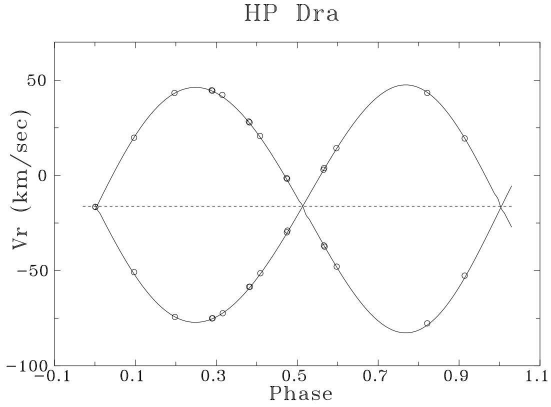

Figure 2. Radial velocity curve

HIP 95611 = V2080 Cyg = HD 183361. Star listed in the HIPPARCOS catalogue as EA variable with the period 2.46680 days. As in the case of HP Dra, it was obvious from the CORAVEL observations in June 1998 that the period should be corrected as follows:

$$\begin{array}{rl}\text{Min. I} = \text{HJD } 2451053.705 + 4\overset{\text{d}}{.}93355 \times E. \\ \pm 0.001 \;\; \pm 0.00002 \end{array}$$

HD 183340 and HIP 95504 = HD 183123 were used as comparison and check stars. The moment of the primary minimum was adopted on the basis of radial velocity data and shows that the HIPPARCOS Min. I is in reality the secondary one. Unfortunately, there are as yet no data fully covering the primary minimum, which should be slightly deeper than the secondary one (Table 1).

The light and velocity curves presented in Figures 1, 2 and 3, 4 are plotted with a phase scale calculated from the ephemerides given above. The vertical scale of the light curves gives the difference between variable and comparison stars and is expressed in V magnitudes.

A tentative solution has been fitted for both systems, using the Wilson–Devinney programme (Wilson, 1993). The computed radial velocities are shown in Figures 2 and 4 as solid lines.

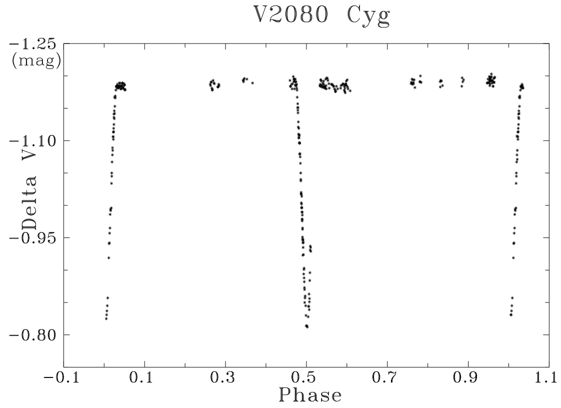

Figure 3. Light curve in V filter

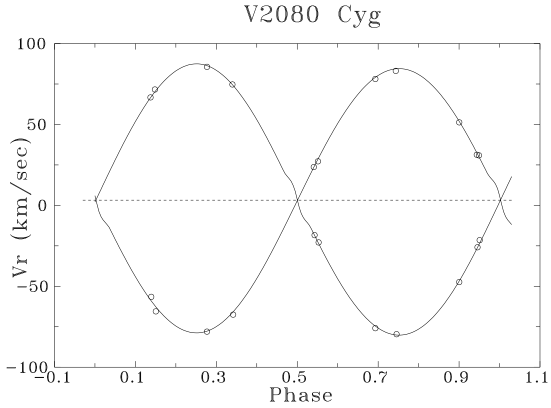

Figure 4. Radial velocity curve

Both stars, HP Dra and V2080 Cyg are good candidates for precise determination of physical properties of the system.

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IDENTIFICATION OF VARIABLE STARS IN GRUS

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Following with a program conducted to improve the coordinates of southern variable and suspected variable stars (López and Girard 1990, López and Lépez 1993), identifications of confirmed variables in the Grus area are herein presented.

Considering the charts recommended by the GCVS (Kholopov et al. 1985), we identified the variable stars on the USNO A2.0 catalogue (Monet et al. 1998), which was read and displayed on the computer screen using a program developed by Manek (1999).

The results are presented in two tables. Table 1 lists those variables included in catalogues such as HIPPARCOS (HIP), TYCHO (TYC) (ESA, 1997) or PPM (Röser and Bastian, 1991). For these stars we only list the identification number in the respective catalogues. We also added, in the AC column, the AC2000 (Urban et al. 1998) catalogue number.

Table 2 lists the positions of the variables we were able to successfully identify in the USNO A2.0. The first column gives the variable star name while the positions, as extracted from the USNO A2.0, are listed in the second and third columns. The Guide Star Catalogue (Lasker et al. 1990) number is listed in the GSC column. In the fifth column we included an alternative designation; in general it is the preliminary name used in the finding chart recommended by the GCVS. Those variables which were also identified in the AC2000 catalogue are marked with an asterisk (*) and the AC2000 number is given in the Notes to Table 2.

VW Gru and AI Gru deserve a special comment: these stars are not included in the USNO A1.0, USNO A2.0 or the GSC. Therefore, in order to report a better position, we extracted a 15 by 15 arcmin area from the CD-ROM set of the Space Telescope Science Institute Digitized Sky Survey (DSS) centered on VW Gru and AI Gru, respectively. The identification of VW Gru was not easy since it is immersed in the glare of the very bright nearby star δ^1 Gru. Both frames were reduced using standard astrometric procedures taking 8 (for VW Gru) and 9 (for AI Gru) USNO A2.0 stars as reference frame.

The coordinate improvement may be considered complete since all of the confirmed variables in this constellation (listed in the GCVS) were identified on some of the modern and standard astrometric catalogues.

We would like to express our gratitude to Dr. Jan Manek for making his program available to display both the USNO A1.0 and USNO A2.0 catalogues. Our thanks also go to Dr. Dave Monet for providing a copy of the USNO A1.0 as well as the USNO A2.0 and to Dr. Nikolai Samus for many helpful comments and suggestions.

Table 1: Variables in HIP, TYC, PPM, and AC catalogues

GCVS	HIP	TYC	PPM	AC
S	110736			
T	110697	7996 0175	302580	
U		8423 0607	327300	3968201
V		7990 0646	327647	3971736
W	112009	8010 1452	328513	3978615
X		8834 0986	350978	4392562
RS	107231	8428 0217	327486	3970199
RU		7503 0171	302597	3352943
RV		8446 0662		3978372
RX		8008 0397		3980665
XZ	112532	8004 0149	303003	3466138
AS		8008 1290	328839	3980945
AW	110188	8442 0285	328121	3975757
AX	112750	8827 0872	350561	4389343
AY		8451 1005	328896	3981287
BC		8449 0210		3979005
BK	110624	7996 0016	302553	3465256
β	112122	8446 1644	328536	
δ^2	111043	8003 1373	328309	3977116
π^1	110478	8439 0392	328190	3976182

Table 2: Positions and Identifications of Variables in Grus

GCVS	RA (2000)	Dec	GSC	Other ID	Note
R	21 48 31.725	−46 54 50.53	8437.0206	HD 207192	
Y	22 47 20.060	−47 54 57.67	8450.0420	COD −48°14311	*
Z	21 34 37.177	−49 07 28.20	8432.0080	S 5125	*
RR	21 38 03.568	−44 41 12.23	7992.0369	S 5127	*
RT	21 51 58.402	−45 59 06.48	8437.1538	S 5133	*
RW	22 42 06.933	−44 09 11.62	8010.1153	S 5148	*
RY	23 19 25.561	−40 17 26.40	8009.0054	COD −47°14285	*
RZ	22 47 11.923	−42 44 38.65	8010.0064	S 5150	*
SS	21 28 06.273	−37 09 35.62	7486.0124	AN 331.1933	
ST	21 50 58.327	−46 11 46.24		S 7472	
SU	21 58 42.128	−42 55 16.37	7990.1136	S 7474	
SV	21 58 49.409	−44 19 29.84	7994.0210	S 7701	*
SW	21 59 11.047	−44 21 03.62	7994.0302	S 7475	
SX	22 04 21.423	−45 25 05.65	8438.1332	S 7476	
SY	22 04 45.801	−43 42 35.38		S 7477	
SZ	22 08 17.848	−42 36 33.22		S 7479	
TT	22 10 25.635	−43 41 36.41		S 5379	
TU	22 13 36.519	−41 58 15.34		S 7482	
TV	22 14 05.715	−43 37 47.14		S 7483	
TW	22 15 07.145	−44 50 12.88	8002.1612	S 7484	

Table 2 (cont'd.)

GCVS	RA (2000)	Dec	GSC	Other ID	Note
TX	22 16 17.718	−41 40 37.09	7999.1253	S 7485	
TY	22 16 39.440	−39 56 17.79	7996.1394	S 7486	
TZ	22 17 20.538	−50 34 34.93	8445.0366	S 5139	
UU	22 17 46.080	−49 38 16.64	8442.0565	S 6481	
UV	22 19 53.864	−47 41 36.68	8442.0056	S 6483	*
UW	22 20 13.157	−54 33 28.56	8822.0225	S 7704	*
UX	22 25 26.275	−46 10 29.17	8439.0349	S 6485	
UY	22 26 20.222	−40 59 29.18	7999.0200	S 7487	
UZ	22 26 55.855	−40 31 43.23		S 7488	
VV	22 27 27.177	−49 38 34.79	8442.0881	S 6486	
VW	22 28 57.625	−43 27 24.16		S 6488	see text
VX	22 29 39.407	−49 00 30.71	8442.0949	S 6489	
VY	22 32 30.449	−46 53 13.67	8446.1221	S 6490	
VZ	22 33 50.216	−50 12 23.35		S 6492	
WW	22 37 04.227	−47 11 06.59		S 6494	
WX	22 42 01.132	−44 32 32.77		S 6496	
WY	22 42 51.276	−46 05 12.74		S 6497	
WZ	22 44 45.873	−42 21 42.47	8007.0676	S 7706	
XX	22 44 59.352	−50 05 44.04		S 6499	
XY	22 46 12.953	−50 00 27.19	8453.0294	S 6500	
YY	22 48 46.579	−50 59 28.06	8453.0634	S 6502	
YZ	22 49 06.198	−44 54 05.04		S 6503	
ZZ	22 49 58.209	−47 32 07.19	8450.0016	S 6504	
AA	22 49 55.697	−46 21 28.64	8447.1369	S 6505	
AB	22 51 05.780	−47 18 40.60		S 6507	
AC	22 51 49.358	−50 29 31.27		S 6508	
AD	22 53 01.695	−44 32 38.71		S 6510	
AE	22 55 51.756	−40 40 16.54	8008.0818	COD −41°15081	
AF	22 56 28.970	−47 21 47.92	8447.1207	S 6511	*
AG	22 58 35.331	−45 13 47.39		S 6514	
AH	22 59 11.565	−49 56 13.62		S 6515	
AI	22 59 17.462	−43 49 16.54		S 6516	see text
AK	23 05 01.847	−43 56 08.82	8011.0120	S 6520	*
AL	23 05 44.297	−48 13 45.31	8451.0492	S 6521	
AM	23 05 47.189	−46 43 37.83		S 6522	
AN	23 07 55.176	−47 25 40.52		S 6526	*
AO	23 08 10.775	−48 22 08.76	8451.1016	S 6527	
AP	23 14 12.460	−50 39 11.71	8454.0048	S 5157	
AQ	23 22 18.017	−42 05 24.26	8016.0800	S 7711	
AR	22 36 41.659	−38 18 09.09	7997.0306	COD −38°15133	*
AT	21 42 38.257	−41 39 34.26	7989.0807	S 7698	*
AU	22 10 03.821	−42 38 34.46	8001.0125	S 7480	
AV	22 16 35.803	−48 35 02.66		S 6480	
AZ	22 35 08.343	−45 17 34.79		S 6493	
BB	22 39 27.663	−45 35 29.05	8446.0058	S 6495	

Table 2 (cont'd.)

GCVS	RA (2000)	Dec	GSC	Other ID	Note
BD	22 47 27.550	−50 35 51.43		S 6501	
BE	22 50 40.197	−44 39 46.66	8010.1525	S 6506	
BF	22 56 52.296	−48 48 22.71	8450.1385	S 6512	*
BG	23 07 52.230	−49 45 48.49	8451.0619	S 6524	
BH	23 07 57.495	−49 25 21.82	8451.0988	S 6525	
BI	22 21 10.437	−44 03 52.64	8002.1544	S 6484	
BL	22 52 31.006	−49 08 32.11	8450.0749	S 6509	
BM	23 03 57.117	−48 50 22.35		S 6518	
BN	23 04 51.267	−45 11 22.69	8448.0001	S 6519	
BO	23 06 58.609	−43 54 37.93	8012.0197	S 6523	*

Notes to Table 2:

Y	AC 3979282	UW	AC 4386194
Z	AC 3968740	AF	AC 3980440
RR	AC 3969308	AK	AC 3981413
RT	AC 3971745	AN	Included in López (1985)
RW	AC 3978711	AR	AC 3465745
RY	AC 3467189	AT	AC 3970121
RZ	AC 3979267	BF	AC 3980481
SV	AC 3972840	BO	AC 3981631
UV	AC 3975848		

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INTRINSICALLY-VARIABLE B STARS IN ECLIPSING BINARY SYSTEMS

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As part of an ongoing series of projects to use the *Hipparcos* database of epoch photometry for variable star research, we have examined the short-term variability of several B0-B3 stars. The ultimate goal was to search for intrinsic short-term variability in B0-B3 stars in EA-type eclipsing systems with well-determined masses. This would enable us to determine accurate pulsation constants (Q-values), and pulsation modes. First, we examined several B0-B3 stars with known or suspected intrinsic short-term variability.

The *Hipparcos* epoch photometry consists of "clusters" of measurements taken within a day or two. We used these to investigate the short-term variability. The clusters are usually separated by many days or weeks. The photometric system is wide-band; it covers most of the visible spectrum. Autocorrelation analysis (Percy et al. 1993) was used to search for characteristic short-term time scales in the measurements obtained out of eclipse. In an autocorrelation diagram (AD), there are minima at multiples of the characteristic time scale, with maxima in between. The accuracy of individual *Hipparcos* measurements is a function of magnitude, and is typically a few millimagnitudes. The accuracy of points in the autocorrelation diagram (Figures 1 and 2) is greater, because each point is the average of ten or more delta mags. Because of the short datasets in the clusters, and the long intervals between the clusters, Fourier analysis was not practical - but autocorrelation analysis is ideal.

γ Peg (HIP 1067, $V = 2.83$) is a B2IV β Cephei star with a period of 0.15 day. The AD showed shallow but clear minima at $\Delta t = 0.15$, 0.30, and 0.45 day, consistent with the known period and the amplitude of 0.01 magnitude published in the *Hipparcos* catalogue (Perryman et al. 1997).

53 Ari (HIP 14514, $V = 6.13$) is a B1.5V β Cephei star with a period of 0.15 day. The AD shows only a weak minimum at $\Delta t = 0.26$ day; this and other maxima and minima are ≤ 0.002 magnitude. Either the star is not variable, or the variability lacks any characteristic time scale. The star is constant according to the *Hipparcos* catalogue.

23 Sex (HIP 50684, $V = 6.66$, B2.5IV) and **53 Psc** (HIP 2903, $V = 5.89$, B2.5IV) are both suspected β Cephei stars which are now regarded as constant to better than 0.01 magnitude. The AD's are sparse, but there are no conspicuous maxima or minima ≥ 0.002 out to $\Delta t = 0.15$ day for either star. This suggests that both are constant.

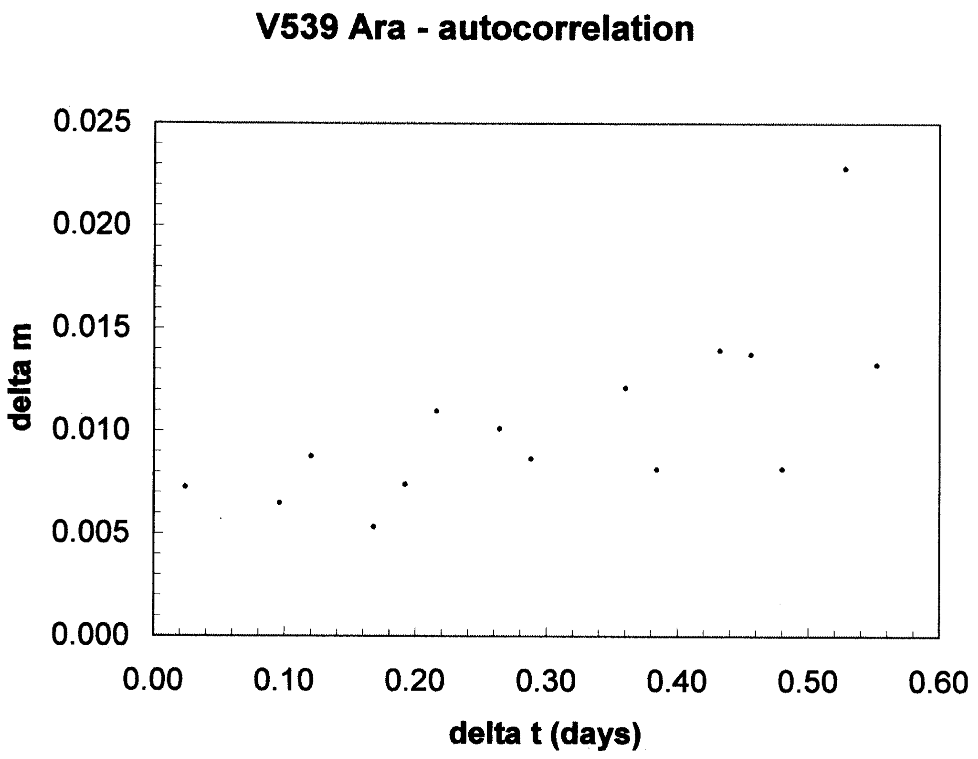

Figure 1.

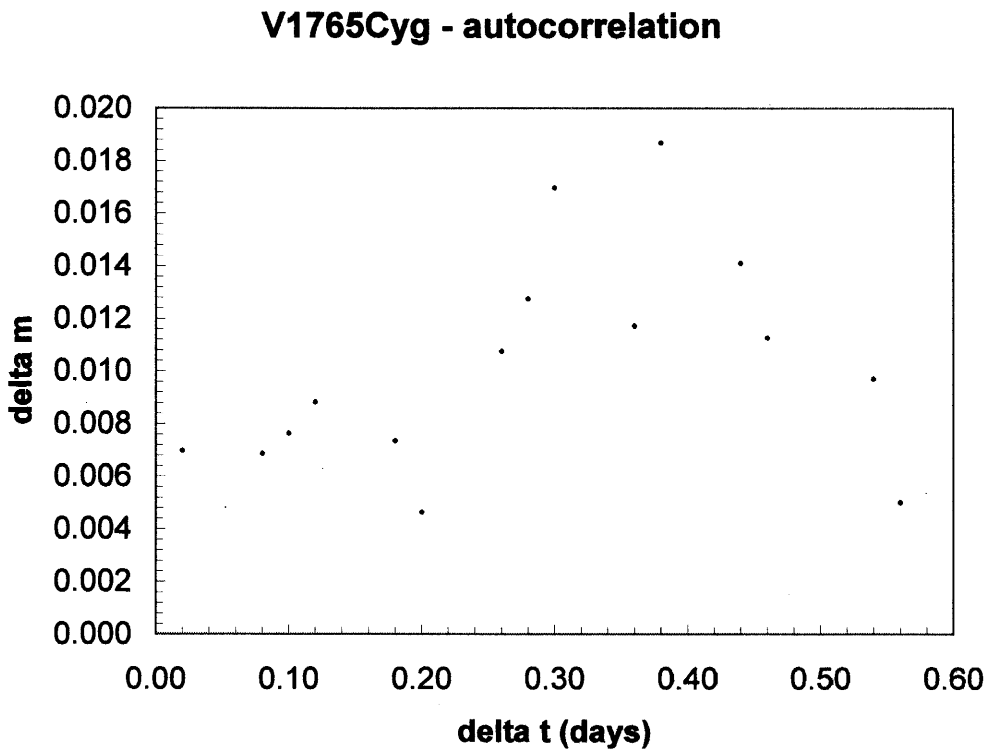

Figure 2.

OX Cas (HIP 5391, $V = 9.99$) is a faint B1V + (?) system in a 2.489-day eclipsing binary. The AD is flat (at a level of 0.03 to 0.05 magnitude, a result of the faintness of the star) to $\Delta t = 0.8$ day. This suggests that there is no short-term variability, larger than a few hundredths of a magnitude, on time scales $\geq$ one day.

V436 Per (HIP 8704, $V = 5.53$) is a B1.5V + (?) system in a 25.9366-day eclipsing binary. The AD slowly rises from $\Delta t = 0.0$ to 0.6 day; there is a weak minimum at 0.7 day. This suggests that the time scale of the short-term variations, if any, is greater than 0.6 day. According to the light curve in the *Hipparcos* catalogue, the scatter at eclipse maximum is very small. Harmanec et al. (1997) have observed line-profile variations in this system, with a time scale of a few hours.

AN Dor (HIP 22663, $V = 7.68$) is a B2 + B3V system in a 2.0328-day eclipsing binary. The AD is very sparse; it is flat to 0.1 day, but there is a weak minimum (defined by one point) at $\Delta t = 0.17$ day. The short-term variability is therefore uncertain.

CV Vel (HIP 44245, $V = 6.70$) is a B2V + B2V system in a 6.889-day eclipsing binary. The AD is sparse, but there is a maximum at $\Delta t = 0.12$ day and a minimum at $\Delta t = 0.25$ day. This suggests that this system may vary with a total range of 0.02 magnitude on a time scale of 0.25 day.

QX Car (HIP 48589, $V = 6.64$) is a B3V + B3V system in a 4.478-day eclipsing binary. The AD is sparse, but is flat to ≤ 0.002 magnitude, out to 0.2 day. This suggests that there are no short-term variations, ≥ 0.01 magnitude, on time scales less than 0.4 day.

V539 Ara (HIP 87314, $V = 5.68$) is a B2V + B3V system in a 3.169-day eclipsing binary; one of the components is a Slowly-Pulsating B (SPB) star with a period of 1.36 days. The AD rises steadily from $\Delta t = 0.0$ to 0.6 day (Figure 1). This suggests that any short-term variability occurs on a time scale ≥ 1.2 days. This is consistent with the known period of the SPB star.

V1765 Cyg (HIP 97485, $V = 6.42$) is a B0Ib + B1V system in a 13.3738-day eclipsing binary, and is interesting because of the presence of the supergiant component. Percy & Khaja (1995) suspected that there were variations on a time scale of 1.5 or 3.0–3.5 days, in addition to the eclipses. These may be intrinsic, or tidally-induced. The AD shows a weak minimum at $\Delta t = 0.2$ day, a maximum at 0.3–0.4 day, and another minimum at 0.6 day (Figure 2). These results suggest that may be small, short-term intrinsic variations in this star. It should be monitored photoelectrically, preferably from multi-longitude sites.

We conclude that autocorrelation analysis is a useful tool for investigating short-term variability in *Hipparcos* stars, given the time distribution of the data.

Acknowledgement. We thank Petr Harmanec for his useful comments.

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HD 209775: A NEW δ SCUTI VARIABLE

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In the course of making photometric observations of planetary transits in HD 209458 (Henry et al. 1999; 2000), we found one of our comparison stars, HD 209775, to be a new small-amplitude variable. Very little has been published about HD 209775; Olsen (1980) estimated a spectral type of Am/p based on his Strömgren *uvby* photometry and the assumption that his Strömgren indices were not contaminated by duplicity. Fehrenbach & Burnage (1982) found the radial velocity to be constant to 2.6 km s^{-1} in six measurements. The *HIPPARCOS* catalogue classifies the star as photometrically constant and gives $V = 7.56$, $B - V = 0.33$, and $\pi = 10.17$ mas (Perryman et al. 1997). Combined with the effective temperature calibration of Flower (1996), the *HIPPARCOS* results imply an absolute magnitude of 2.50 and a spectral type of F0 V.

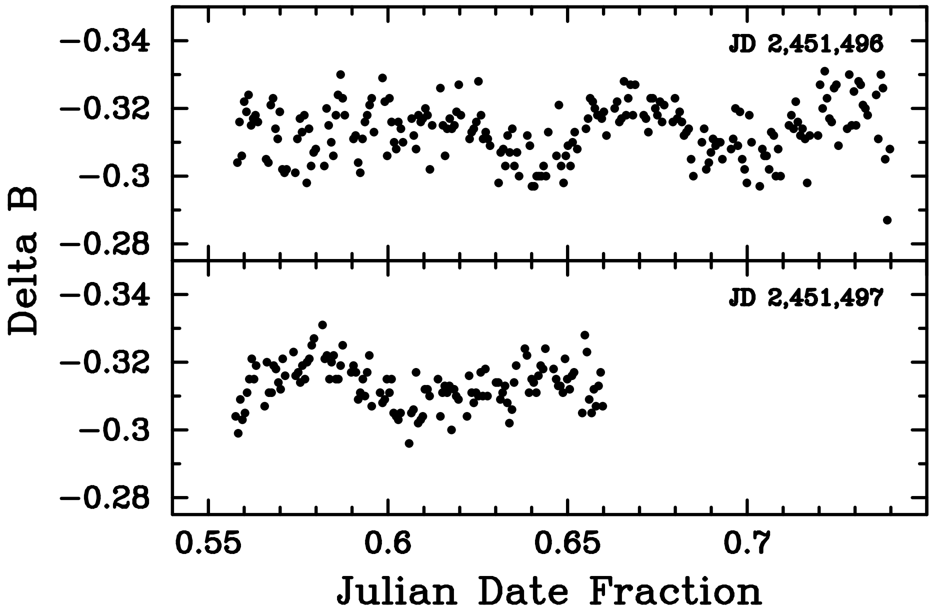

Figure 1. Johnson *B* photometry over two nights acquired with a 0.40 m APT showing HD 209775 to be a new low-amplitude, short-period variable star.

Figure 1 plots our Johnson *B* photometry acquired with the T3 0.40 m automatic photoelectric telescope (APT) located at Fairborn Observatory in southern Arizona. We used HD 209458 ($V = 7.65$, $B - V = 0.594$, G0 V) as a comparison star to compute the differential magnitudes since it has been shown to be constant to 0.0017 mag or better except during transits (Henry et al. 2000). The observations were corrected for differential extinction and transformed to the standard Johnson system. Details on the operation of the APT and the reduction and precision of the data can be found in Henry (1995).

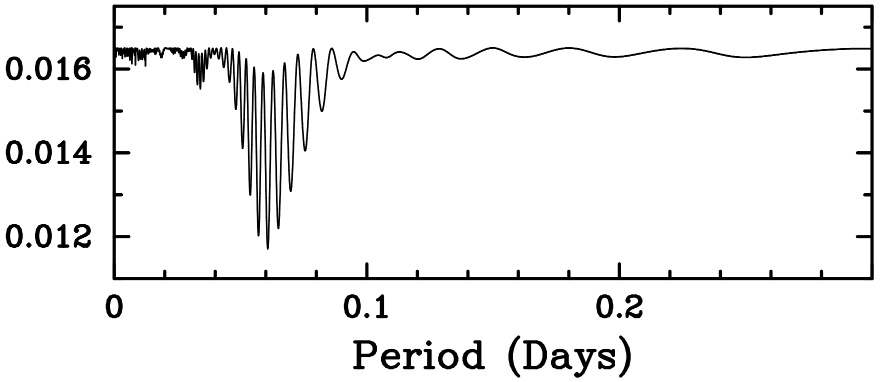

Figure 2. Periodogram analysis of the B data gives a period of 0.0608 ± 0.0002 d and a full amplitude of 0.012 ± 0.001 mag.

The results of periodogram analysis of the B observations from Figure 1 are shown in Figure 2. We find a period of 0.0608 ± 0.0002 d. A least-squares sine fit to the B data at this period gives a full amplitude of 0.012 ± 0.001 mag. From the V observations, we find a period of 0.0607 ± 0.0002 d and an amplitude of 0.007 ± 0.001 mag. The star lies in the region of the HR diagram where the δ Scuti and the γ Doradus variables overlap (Handler 1999). Its short period places it in the δ Scuti class.

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TRIPLE SYSTEM ϵ Vol AND QUADRUPLE SYSTEM η Mus: THE MASS RATIO IN CLOSE BINARY SYSTEMS

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In the course of our spectroscopic study aimed at searching the line Hg II λ 3984 in a sample of 28 spectroscopic binaries with late B primaries, 11 new double-lined spectroscopic binaries were discovered, 10 of which were previously known as single-lined systems: 3 Si stars (HD 35008, HD 61512, and HD 130081), one He-weak star (HD 139160), 5 stars with normal late B primary (HD 68520, HD 87191, HD 102010, HD 114911, and HD 162515) and two stars with HgMn anomaly (HD 75642 and HD 87751) (Hubrig & Mathys 1996). The observations were carried out at the European Southern Observatory for five nights spanning from March 16 to March 20. We used the 1.5 m telescope and the Boller & Chivens spectrograph, equipped with a Ford Aerospace chip. Spectra were recorded at a resolution of approximately 1 Å over the wavelength range 3700–4600 Å.

In two stars with known orbital parameters, HD 68520 (= ε Vol, spectral type B5, V = 4.3) and HD 114911 (= η Mus, spectral type B8, V = 4.8), the lines issued from both components in binary systems are clearly separated in some phases. In this paper we report about the mass ratios of these systems.

HD 68520 (ε Volantis)

This star is listed in the Eighth Catalogue of the Orbital Elements of Spectroscopic Binary Systems (Batten et al. 1989) as a single-lined system. The orbital parameters for the primary component were calculated by Sanford (1914) using the method of Lehmann-Filhes. One of his spectrograms gives evidence of a secondary's spectrum which yielded the mass ratio $\mathcal{M}_1/\mathcal{M}_2 = 1.23$. From our observations we obtain $\mathcal{M}_1/\mathcal{M}_2 = 1.30$.

The catalogue of multiple stars (Tokovinin 1997) indicates ε Vol to have one visual companion which is $2\overset{m}{.}9$ fainter and separated by $6\overset{''}{.}1$ at position angle 24°. From the spectral type of the primary Tokovinin estimates the mass of the primary $\mathcal{M}_1 = 5.76$ $M_\odot$. Assuming a minimum secondary mass for the single-lined system, he obtains $\mathcal{M}_2 = 3.26$ $M_\odot$ for the secondary. Adopting these values the mass ratio for this system will be 1.77.

HD 114911 (η Muscæ)

This star is also listed in the Eighth Catalogue of the Orbital Elements of Spectroscopic Binary Systems (Batten et al. 1989) as a single-lined system. The orbital parameters for the primary component were calculated by Buscombe & Morris (1961). Our observations yield a ratio $\mathcal{M}_1/\mathcal{M}_2 = 1.14$.

In the catalogue of multiple stars (Tokovinin 1997) η Mus is mentioned as a triple star with a visual companion with common proper motion at the distance of $60\farcs00$ and position angle of 332°. This companion is $3\fm4$ fainter than η Mus. From the spectral type of the primary Tokovinin estimates the mass of the primary $\mathcal{M}_1 = 4.48$ $M_\odot$. Assuming a minimum secondary mass for the single-lined system, he obtains $\mathcal{M}_2 = 2.63$ $M_\odot$ for the secondary. Adopting these values the mass ratio will be 1.70.

In fact, the triple system η Mus is a quadruple system. In March 1999 we have observed η Mus with the ESO adaptive optics system ADONIS at the 3.6-m telescope on La Silla. Our observations revealed an additional faint companion separated by $2\farcs71$ at position angle 125° (Hubrig & Mignant 2000). The magnitude differences in the K, H and J bands are $4\fm32$, $4\fm54$ and $5\fm25$, respectively.

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ON VARIABILITY OF R SEXTANTIS

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R Sex (GSC 5474.380, HD 84127) was initially noted as a variable star at Harvard 105 years ago with a luminosity variation from 9.7 to 10.6 photographic magnitudes. R Sex is included in the GCVS (Kholopov et al. 1985) as a doubtful semiregular variable star (Lb:) with a spectral type M5IIIe and without a period established. However, the variability of R Sex was questioned and it was considered as "constant?" in the previous versions of GCVS. Due to the apparent stability in the brightness of R Sex, Bidelman (1980) took into account spectroscopic observations to conclude that R Sex does indeed deserve its variable star designation, due to the presence of hydrogen emission and its spectral variability. By using photometric observations, we demonstrate that the luminosity variation of R Sex is real, and the star shows a light curve that could be consistent with its actual classification as Lb, although the classification as an SRd variable star could also be possible.

In order to confirm the variability of R Sex, we made differential photometry in the V band of the Kron–Cousins system during 18 nights, from 5 April to 10 June 1999, using a Starlight Xpress CCD camera (based on chip SONY ICX027BL 6.1×4.35 mm^2, 500×256 pixels) attached to the Newton focus of the 40-cm reflector at Observatorio del Departamento de Física de la Universidad de Extremadura (Badajoz, Spain). The star GSC 5474.214 ($V = 9.5$) was employed as a comparison and GSC 5474.444 ($V = 9.7$) was chosen as a check star. The comparison star had constant brightness during the observations. Table 1 shows the CCD data obtained by us for each night for R Sex and the comparison star. The mean accuracy of these observations was about 0.010 magnitudes.

Figure 1 displays the light curve obtained for R Sex. This light curve shows a rather flat minimum at HJD 2451308.4, and the most notable feature is an almost linear decline in brightness before the aforementioned date. The overall shape of this decline and the rise following it could be reminiscent of SRd behavior. Although the spectral type M5IIIe is not in a perfect agreement with the typical spectral types of SRd stars (roughly G to K), however, this type of variable stars usually shows strong hydrogen emissions, in accordance with the spectroscopic observations for R Sex (Bidelman 1980). More information would be necessary to confirm this point. The essential characteristics of this type of stars can be found in the works of Dawson & Petterson (1982) and Dupuy et al. (1983). Further observations of this star could confirm the possible new classification as an SRd star if their cycles show some regularity or, on the contrary, to conserve its actual classification as an Lb star if its light curve is irregular.

Table 1: Photometric data for R Sex

Mean HJD	ΔV (variable − comparison)	ΔV (comparison − check)
2451274.4	0.627 ± 0.014	−0.218 ± 0.009
2451276.4	0.640 ± 0.010	−0.223 ± 0.008
2451277.3	0.657 ± 0.010	−0.221 ± 0.008
2451279.3	0.656 ± 0.006	−0.220 ± 0.007
2451281.4	0.675 ± 0.007	−0.223 ± 0.004
2451284.4	0.687 ± 0.005	−0.218 ± 0.004
2451286.3	0.693 ± 0.009	−0.222 ± 0.005
2451292.3	0.724 ± 0.019	−0.213 ± 0.016
2451294.4	0.731 ± 0.007	−0.212 ± 0.003
2451308.4	0.764 ± 0.007	−0.206 ± 0.008
2451315.4	0.673 ± 0.002	−0.221 ± 0.020
2451317.4	0.649 ± 0.007	−0.213 ± 0.013
2451320.4	0.601 ± 0.009	−0.220 ± 0.011
2451327.4	0.477 ± 0.012	−0.220 ± 0.013
2451331.4	0.418 ± 0.015	−0.206 ± 0.020
2451333.4	0.394 ± 0.012	−0.222 ± 0.009
2451335.4	0.379 ± 0.009	−0.214 ± 0.006
2451340.4	0.278 ± 0.005	−0.207 ± 0.020

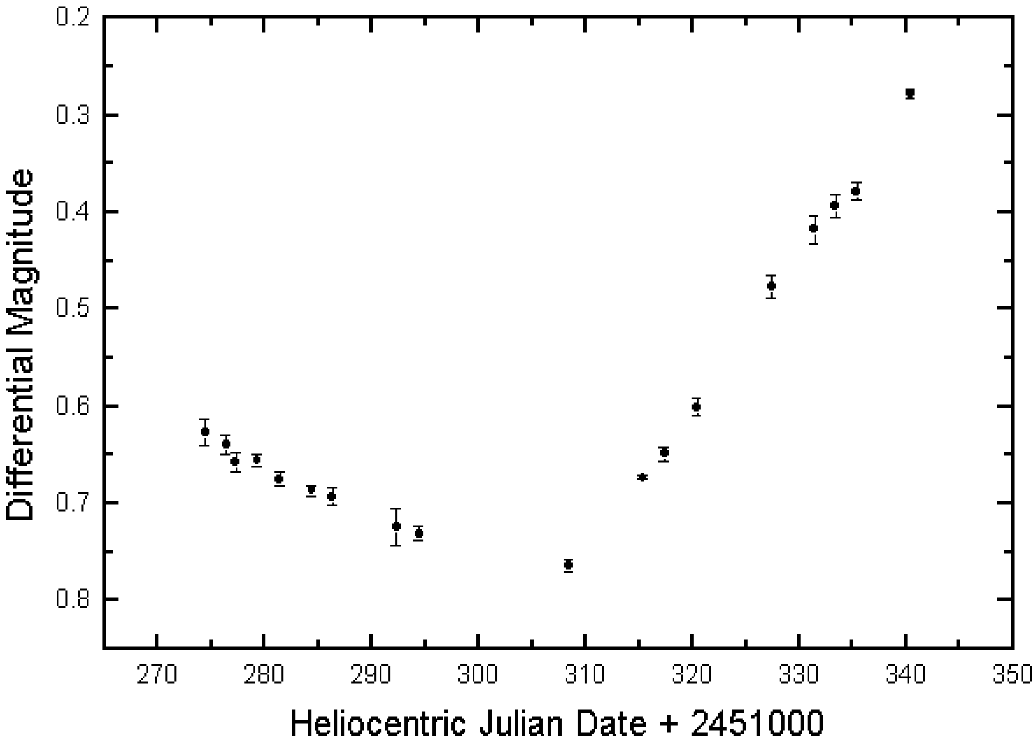

Figure 1. Photometric light curve for R Sex

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PERIOD CHANGES OF THE ECLIPSING BINARY LP CEPHEI

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The semi-detached eclipsing binary LP Cephei (HBV 484 = SVS 681 = CSV 5400 = P 5577 = GSC 4248.1323; $\alpha_{2000} = 21^{\rm h}19^{\rm m}50\overset{\rm s}{.}3$, $\delta_{2000} = +60^\circ42'27''$, Sp. F2 + K1, $V_{\rm max} = 12.9$ mag) is a rarely investigated, rather faint binary with a short orbital period of about 0.693 days. This binary was selected as a possible system for the study of apsidal motion (Hegedüs 1988) and thus it was also added to our observational project of eclipsing binaries with eccentric orbit. LP Cep was discovered to be a variable star photographically by Wachmann (1972), who obtained also the first photographic light curve and determined the first light elements

$$\text{Pri. Min.} = \text{HJD } 2430517.4650 + 0.6930642 \times E.$$

Recently, the first multicolor $UBV(RI)_{\rm C}$ photoelectric observations were carried out by Samec et al. (1995, 1997). They derived a photometric solution using the Wilson-Devinney code and concluded that LP Cep is in a near-contact semidetached configuration consisting of an F2 spectral-type primary and a K1 secondary filling its Roche lobe. They also calculated an improved linear ephemeris

$$\text{Pri. Min.} = \text{HJD } 2449621.7322 + 0.69306251 \times E.$$

Our new CCD photometry of LP Cep was carried out during the years 1995–1999 at the Ondřejov Observatory, Czech Republic. A 65-cm reflecting telescope with a CCD-camera SBIG ST-6 or ST-8 was used. The measurements were done using the standard R filter with typically 60 - 90 s exposure time. The nearby stars GSC 4248.00016 ($V = 13.4 mag$) and GSC 4248.01072 ($V = 12.9 mag$) on the same frame as LP Cep served as comparison and check stars, respectively. The standard error of measurements varies between 0.01 and 0.02 mag. The new moments of primary minimum and their errors were determined using the least squares fit to the data, by the bisecting cord method and the Kwee–van Woerden algorithm. Only the lower part of the eclipses was used. These 7 new times of primary minimum are presented in Table 1. In this table, N stands for the number of observations used in the calculation of the minimum time. The epochs were calculated using the linear light elements given by Wachmann (1972).

Table 1: New precise times of minimum of LP Cep.

JD Hel. – 2400000	Epoch	Error (days)	N
49999.45478	28110.0	0.00002	69
50261.4348	28488.0	0.0001	38
50261.4366*	28488.0	0.0019	13
50525.4934	28869.0	0.0002	29
50945.48889	29475.0	0.00005	38
51442.4113	30192.0	0.0002	34
51535.28135	30326.0	0.00002	67

* published also in Diethelm (1996)

The period change of LP Cep was studied by means of an $O-C$ diagram analysis. We took into consideration all photoelectric measurements of Samec at al. (1997) as well as the original photographic times of minimum obtained by Wachmann (1972). A total of 21 times of minimum light were used in our analysis, with only 2 secondary eclipses among them. The $O-C$ residuals for all times of minimum are shown in Figure 1. The mean seasonal photographic minima based on the plate archive study presented by Blättler (1996) are also plotted.

The variations of $O-C$ values are remarkable and could be caused by a light-time effect. A preliminary analysis of the third body orbit gives the following parameters:

$$P_3 \text{ (period)} = 6370 \pm 25 \text{ days, i.e. } 17.4 \text{ years}$$
$$T_0 \text{ (time of periastron)} = \text{J.D. } 2450490 \pm 30$$
$$A \text{ (semiamplitude)} = 0.0062 \pm 0.0002 \text{ day}$$
$$e = 0.42 \pm 0.12$$
$$\omega = 66^\circ \pm 2^\circ$$

These values were obtained together with the new linear ephemeris

$$\begin{array}{rl}\text{Pri. Min.} = \text{HJD } 2430517.4655 & + \; 0.69306252 \times E, \\ \pm 0.0003 & \pm 0.00000007\end{array}$$

by the least squares method. Assuming a coplanar orbit ($i = 90^\circ$) and a total mass of the eclipsing pair with the F2 primary and K1 secondary, $M_1 + M_2 \simeq 2.2\ M_\odot$ (Harmanec 1988), we can obtain a lower limit for the mass of the third component $M_{3,\mathrm{min}}$. The value of the mass function $f(M) = 0.0051\ M_\odot$, from which the minimum mass of the third body follows as $0.35\ M_\odot$.

Only a small part of the third body period is well-covered by the precise CCD observations. Moreover, the current light-curve analysis of Samec et al. (1997) gives the third light $L_3 = 0$. Possible third component of spectral type M3-M4 with the bolometric magnitude about +9.2 mag could be practically invisible in the system with an F2 primary ($M_\mathrm{bol} = +3.2$ mag). Therefore, new high-accuracy timings of this eclipsing binary are necessary in order to confirm the light-time effect in this system.

Acknowledgement. This work has been supported in part by the Grant Agency of the Czech Republic, grant No. 205-99-0225 This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France.

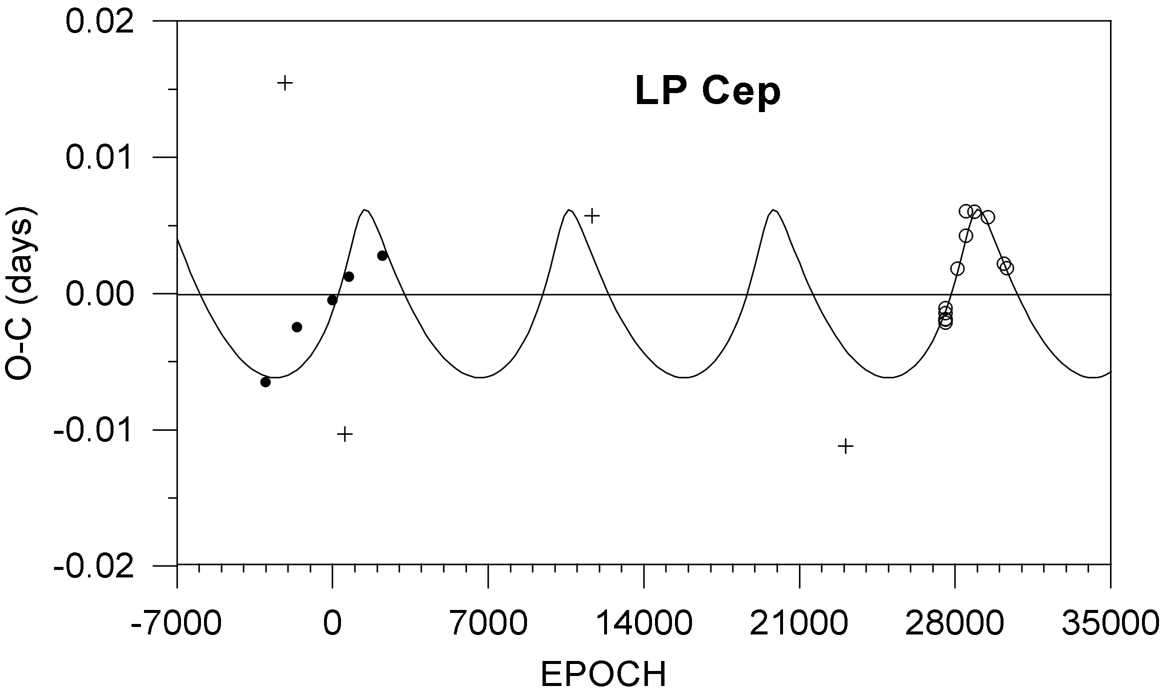

Figure 1. $O-C$ residuals for the times of minimum of LP Cep. The individual photoelectric or our CCD minima are denoted by circles, dots represents the original timings of Wachmann and crosses the mean seasonal minima of Blättler. The curve corresponds to a third body orbit.

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REVISED PERIOD AND FIRST EPOCH OF V1584 Cyg

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Name of the object:
V1584 Cyg = HD 193722

Equatorial coordinates:	**Equinox:**
R.A.= $20^{\mathrm{h}}19\overset{\mathrm{m}}{.}9$ **DEC.=** $46^\circ50'$	2000

Observatory and telescope:
Khajeh Nassir Aldin Observatory, 40-cm reflector

Detector:	P.M. (RCA 1P21)
Filter(s):	*UBV*
Comparison star(s):	HD 193536
Check star(s):	HD 192802
Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	Hot Ap star

Remarks:

UBV photometric observations of the silicon star V1584 Cygni were carried out on eight clear nights from July till September 1997. A total of 350 points were obtained in each filter. Individual observations were averaged over phase range 0.02 to obtain 50 normal points. Aslanov et al. (1989) gave 1.132854 days for period. To find the revised rotational period, we have fitted a sinusoidal wave function separately to the normal points of *UBV* filters. Using this method we have found the rotational period averaged over three filters to be 1.169 (± 0.0003) days. The epoch of minimum light turned out to be

$$\mathrm{HJD(Min)} = 2450621.3275\ (\pm\ 0.0003).$$

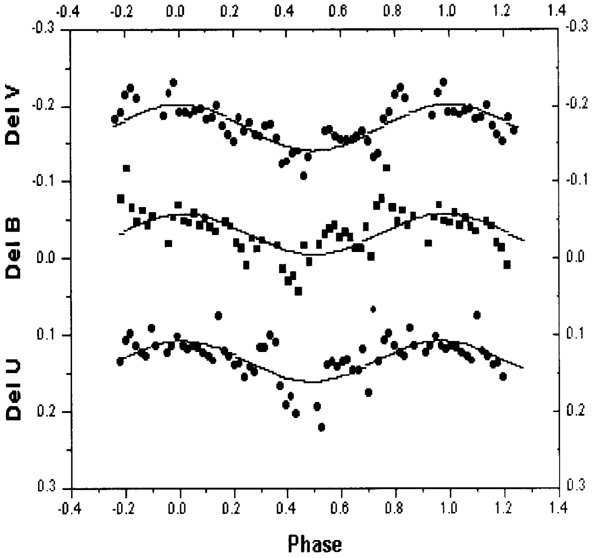

Figure 1.

Acknowledgements:

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Aslanov, I.A., Hildebrandt, G., Khokhlova, V.L., Schöneich, W., 1973, Astrophys. Space Sci., **21**, 477

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CCD OBSERVATION OF THE MIS-CLASSIFIED DWARF NOVA LX And

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Kinman & Mahaffey (1982) discovered a variable star (RR V-3 in their paper), which was named LX And in Kholopov et al. (1985). Kinman & Mahaffey (1982) classified it as an RV Tauri variable of type *b* due to the long-period variations of the mean brightness. Their light curve of LX And provided the mean photographic magnitude of 15.11, the amplitude of brightness variation of $2\overset{\mathrm{m}}{.}90$ and the period of 36.469 days.

In this paper, we report the CCD observations on the optical variability of LX And, suggesting that this star has been mis-classified. The CCD photometric observations were done using an unfiltered ST-7 camera attached to a 25-cm Schmidt–Cassegrain telescope at Kyoto University and V-filtered Mutoh CV-04 camera attached to a 20-cm Reflector telescope at Toyama Astronomical Observatory. The exposure time was 30 s and 60 s, respectively. The images were dark-subtracted, flat-fielded and analyzed with the Java$^{\mathrm{TM}}$-based PSF photometry package developed by one of the authors (TK) and analyzed with Nishi-harima Images made by N. Tokimasa. We determined the magnitude of LX And using the comparison star GSC 2834.846 (Tycho $V = 11.30$, $B - V = 0.56$), whose constancy was confirmed with the check star GSC 2834.1222. The estimated $\mathrm{R_c}$ magnitude 11.02 was used to calculate unfiltered CCD magnitudes of LX And. The difference between the color of LX And and that of the comparison is so small that unfiltered CCD magnitudes will make a good approximation of $\mathrm{R_c}$ magnitude of the variable. We expect to obtain the V-magnitude nearly equal to $\mathrm{R_c}$ magnitude since the $V - R$ color index of dwarf novae is near 0.

Fig. 1 gives the light curve of LX And covering 1 year. The abscissa and ordinate denote time in heliocentric Julian Date and V-magnitude (Toyama: open circles) or unfiltered CCD magnitude (Kyoto: filled circles), respectively. In this light curve, seven brightenings are found, and their duration is much shorter than the quiescence length. These rapid brightenings of large amplitude (more than 3 mag) are not seen in the light curves of RVb-type variables but typical of dwarf novae.

Fig. 2 gives the light curve of LX And covering 2 months. The coordinate system is the same as that of Fig. 1. As shown in Fig. 2, we detected the rapid brightenings compared with the magnitude observed two days earlier, showing 3.35 ± 0.30 mag on HJD 2451484.33, 1.92 ± 0.07 mag on HJD 2451511.20, and 2.36 ± 0.08 mag on HJD 2451535.92. The peak of the outburst was between HJD 2451486.21 and 2451488.27 for the first outburst, between HJD 2451512.19 and 2451516.18 for the second one and between HJD 2451536.92 and

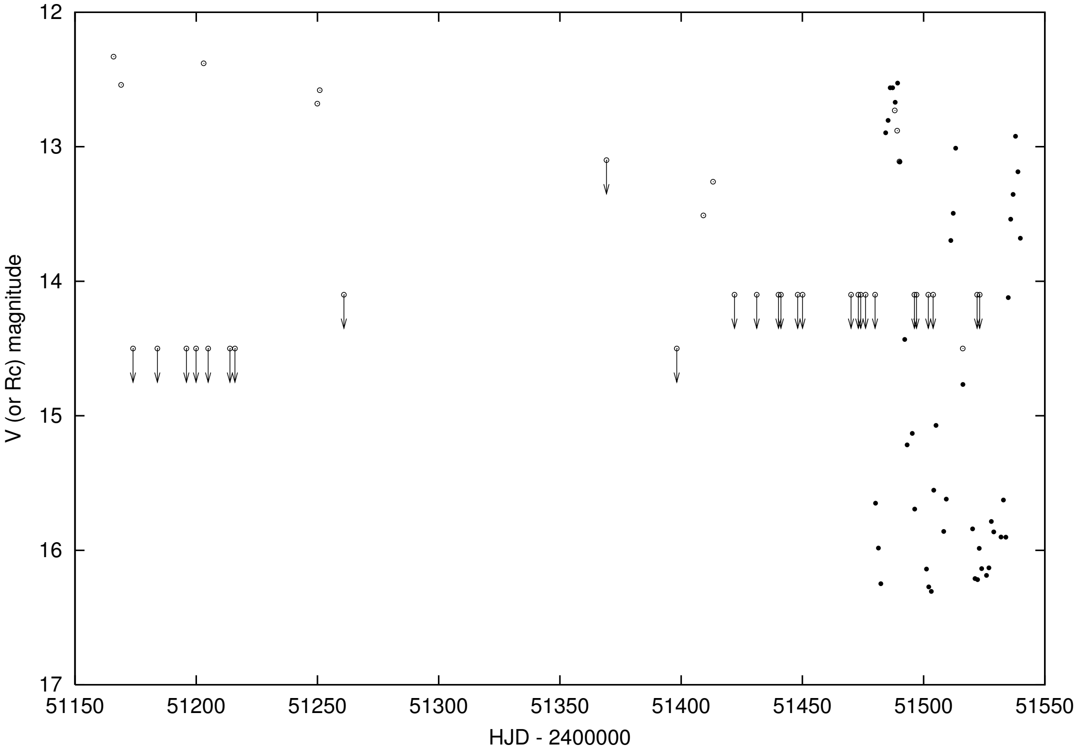

Figure 1. Light curve of LX And covering one year

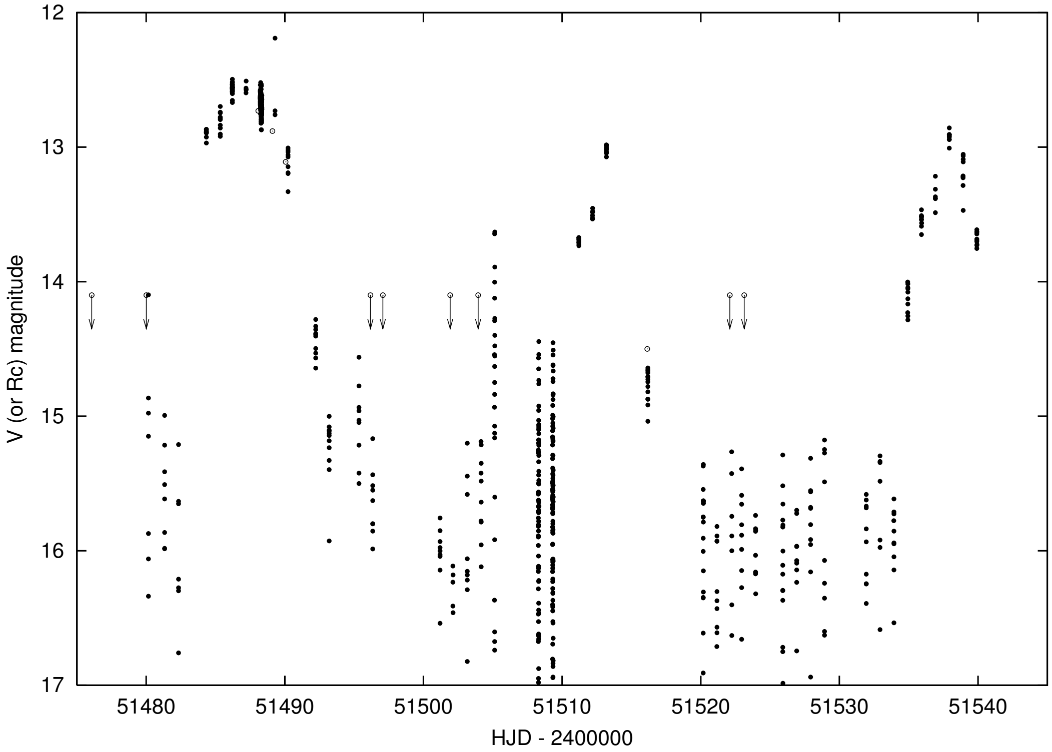

Figure 2. Light curve of LX And covering two months

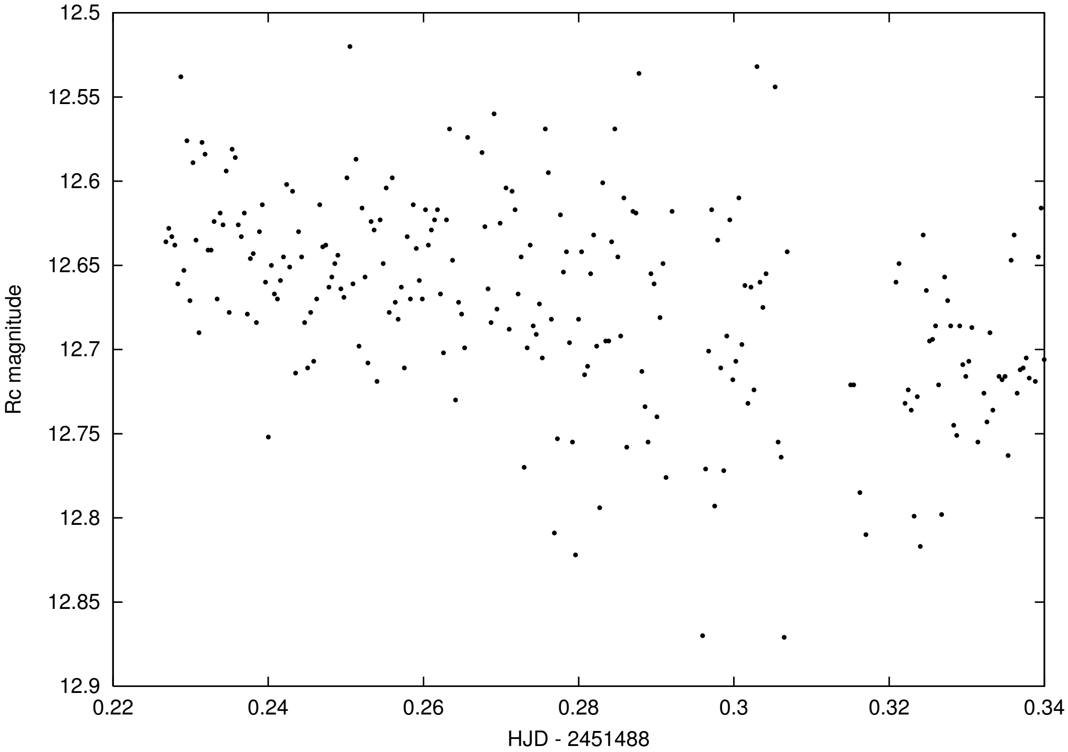

Figure 3. Light curve of LX And on HJD 2451488

2451538.92 for the third one, which indicates that the outburst period is between 21–30 days. The interval between the observed maxima is 26 and 25 days. After outbursts, the brightness returns to quiescence magnitude estimated as $R_c = 15.9 \pm 0.3$. Kinman & Mahaffey (1982) suggested a period of 36.469 days with considerable scatter in the light curve, however, considering their sparse observations and the variation of outburst intervals of dwarf novae, we can see a better periodicity assuming a period of about 26 days in their observations. Fig. 3 provides the light curve during the outburst on HJD 2451488. We could not detect any short time variation from this 2.7-hour observation.

As shown in Fig. 2, the outburst profiles of LX And are also reminiscent of the normal outburst of dwarf novae, and hence we conclude that LX And is a dwarf nova, not RVb-type variable. We will be able to understand the nature of LX And more clearly through spectroscopic observations.

This work is partly supported by the Grant-in-Aid for Scientific Research (10740095) of the Japanese Ministry of Education, Science, Culture.

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DY HERCULIS: MEMBER OF A BINARY SYSTEM?

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The most recent evolutionary model calculations of δ Scuti stars predict that their periods should be constant or increasing in the majority of cases (Breger & Pamyatnykh 1998). The observed period changes of the stars, however, showed discrepancies and could not be fully reconciled with the theoretical expectations.

One of the high amplitude δ Scuti stars with decreasing period is DY Herculis. The study of its period changes has a long history and led to controversial results. Fitch (1957) assumed a uniform increase in its period:

$$\frac{1}{P}\frac{dP}{dt} = +36.4 \times 10^{-8}\ \mathrm{y}^{-1},$$

while Broglia (1961) and Hardie & Lott (1961) gave the values $+17.5 \times 10^{-8}\ \mathrm{y}^{-1}$ and $19.5 \times 10^{-8}\ \mathrm{y}^{-1}$, respectively, although Hardie & Lott noted that between 1950 and 1959 the period was essentially constant.

Szeidl & Mahdy (1981) used almost 30 years of observations in their study and concluded that the period of DY Her was decreasing:

$$\frac{1}{P}\frac{dP}{dt} = -6.2 \times 10^{-8}\ \mathrm{y}^{-1}.$$

They left the old photographic maximum observed at Konkoly Observatory out of attention, which might already suggest that the period of the star did not change linearly. Yang et al. (1993) carried out a least-squares solution almost to the same data that Szeidl & Mahdy used – the time base of the observations was extended only by 10% with three new epochs – they obtained an essentially slower decrease in the period:

$$\frac{1}{P}\frac{dP}{dt} = -3.5 \times 10^{-8}\ \mathrm{y}^{-1}.$$

The results mentioned above clearly showed that the interpretation of the period change of DY Her was erroneous and therefore we decided to carry out a new period analysis of the star.

The list of photographic and photoelectric maxima published in Szeidl & Mahdy (1981) (see detailed references therein) has been supplemented by the recent observations of Yang et al. (1993), Agerer & Huebscher (1996, 1998) and Agerer et al. (1999), and a new, very accurate normal maximum could be deduced from the Hipparcos photometry:

J.D. max. 2448302.6073.

The old visual observations (Tsesevich 1949, Soloviev 1952) proved to be too uncertain, therefore they were neglected in the discussion.

The $O-C$ values have been computed by the elements (see Szeidl & Mahdy 1981):

$$C = \text{J.D. } 2433439.4865 + 0\overset{\text{d}}{.}148631201 \times E.$$

The yearly means of the $O-C$ values are presented in Fig. 1. These data (together with the normal maximum from the Hipparcos photometry) were taken into account in the least-squares solution with higher weight ($w = 5$).

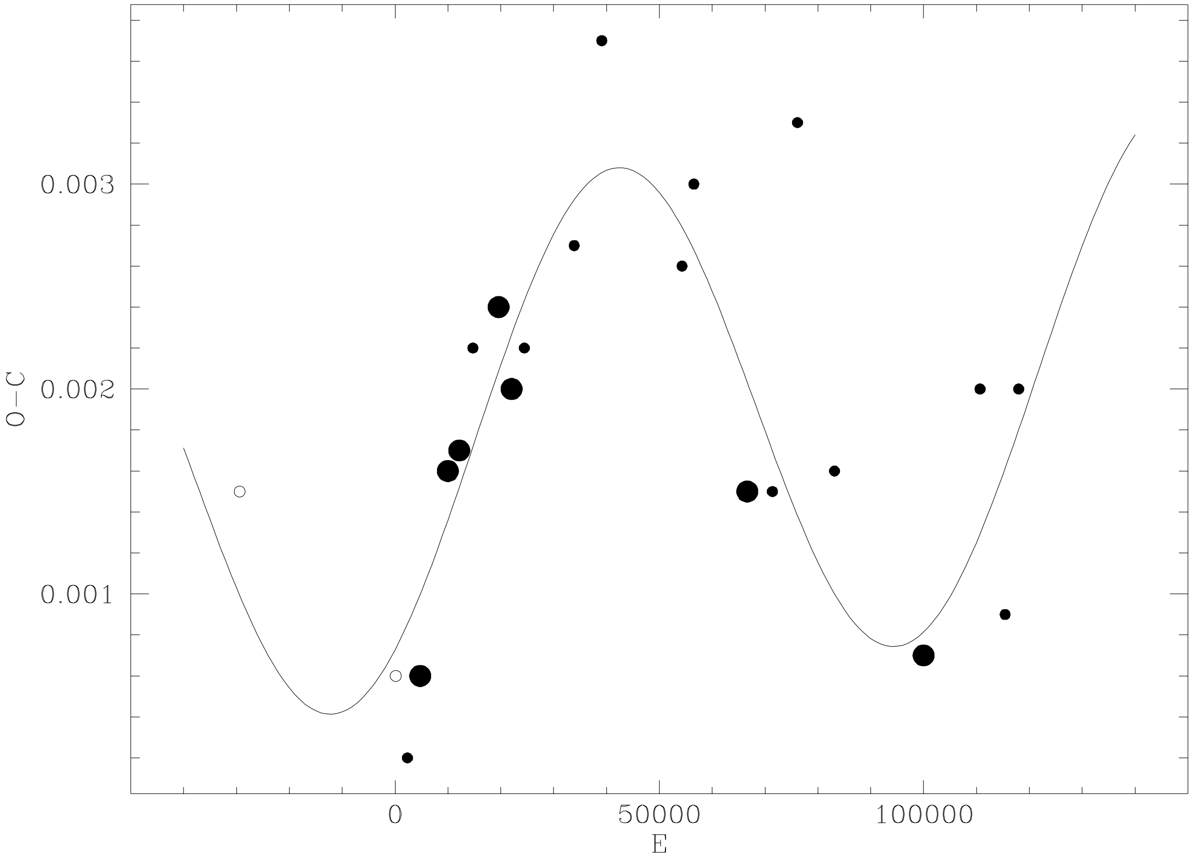

Figure 1. The yearly means of the $O-C$ values. The empty circles indicate photographic, the filled circles photoelectric observations. The big filled circles represent those yearly means, which were derived from three or more individual observed maxima.

It is obvious that the $O-C$ diagram could rather be fitted by a sinusoidal than by a quadratic form. The least-squares solution gives the following fit to the $O-C$ diagram:

$$\begin{array}{l} O-C = 0.00170 + 0.0000000031 \times E + 0.00125 \times \sin(0.0000594 \times E - 0.891). \\ \qquad\quad \pm\, 0.00032 \pm 0.0000000021 \qquad \pm\, 0.00038 \qquad \pm\, 0.0000106 \qquad \pm\, 0.143 \end{array}$$

The only epoch which deviates from the fit by more than one minute is the observed maximum by Yang et al. (1993) at J.D. 2444755.2290 ($E = 76133$).

The new ephemeris for the times of light maximum is

$$C = \text{J.D. } 2433439.48820 + 0.1486312041 \times E + 0.00125 \times \sin(0.0000594 \times E - 0.891).$$

Because a long sinusoidal wave dominates the $O-C$ diagram, nothing can be said about the evolutionary changes of the pulsation period of DY Her.

Our results suggest that DY Her may be a member of a binary system. If we take this interpretation for granted we obtain the following elements for the system (assuming that the orbit is circular):

$$P_{\rm orb} = 15720 \pm 2620 \text{ days} = 43.04 \pm 7.17 \text{ years},$$

$$a_{\rm DY} \sin i = 0.22 \pm 0.07 \text{ AU}.$$

The binary nature of the system cannot easily be demonstrated by radial velocity measurements, because the amplitude of the radial velocity curve is around $K_{\rm DY} = 0.15$ km s^{-1}.

The other component of the system has no significant photometric effect and is probable a dwarf star of low mass.

Although the most plausible interpretation of sinusoidal $O-C$ diagram is the light-time effect caused by the orbital motion, we have to admit that other suggestions are mentioned in the literature to explain the cyclic character of the $O-C$ diagrams. Finally the binary explanation can only be accepted with certainty when several cycles have already been observed.

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CCD PHOTOMETRY IN THE FIELD OF V959 Oph

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Götz (1957) classified V959 Oph as an RR Lyrae star, type RRc, varying between $12\overset{\mathrm{m}}{.}4$ and $13\overset{\mathrm{m}}{.}1$ based on the analysis of plates taken in 1940. He reported a variation with a mean amplitude of $0\overset{\mathrm{m}}{.}6$ for the June data and a decrease by a factor of two in amplitude (only $0\overset{\mathrm{m}}{.}3$) for the July data. A period of 0.084857 days was found. Poretti (1981) analyzed visual measurements obtained by G.E.O.S.-members but could not confirm the strong amplitude variations reported by Götz (1957). A shorter period and smaller amplitude ($0\overset{\mathrm{m}}{.}2$–$0\overset{\mathrm{m}}{.}3$) were also suggested. We intended to perform follow-up observations in order to better determine the period and the type as Rodríguez et al. (1994) classified it among the δ Scuti stars. Very recently Hintz et al. (1999) reported new observations demonstrating a drastic amplitude decrease as well as a period variation for this object.

We observed V959 Oph in 1996 and 1999. A total of 18.6 hours of CCD photometry, resulting in 650 datapoints was obtained. We used a 0.4-m telescope equipped with a Hisis24 camera in 1996 and a SBIG-ST7 camera in 1999. In both cameras the chip is a Kodak KAF400. Observations were obtained without filter. The field-of-view has dimensions $12' \times 8'$. The 1996 frames were calibrated and reduced using the profile fitting algorithm of the software package MIPS (Buil et al. 1993). The 1999 frames were treated with the aperture photometry procedure of the MIRA AP software package[†]. One night of data was reduced with both techniques, giving similar results. In each case our datafiles contain the heliocentric Julian date and the differential magnitude in the sense variable minus comparison star. We refer to Fig. 1 for the identification of the stars we analyzed:

- star 0 = GSC 435 595 ($11\overset{\mathrm{m}}{.}2$);
- star 1 = V959 Oph = GSC 435 926 ($12\overset{\mathrm{m}}{.}1$; the identification was checked and corresponds to the coordinates listed by Poretti (1981) and Hintz et al. (1999));
- star 2 = GSC 435 1757 ($12\overset{\mathrm{m}}{.}6$);
- star 3 = GSC 435 1599 ($14\overset{\mathrm{m}}{.}0$);
- star 4 = V497 Oph = GSC 435 1680 ($15\overset{\mathrm{m}}{.}0$).

All differential magnitudes were computed with respect to our principal comparison star, hereafter star 0. Star 2 was used as a check star. The differences between check and comparison star show a standard deviation of respectively $0\overset{\mathrm{m}}{.}008$ in the 1996 and $0\overset{\mathrm{m}}{.}005$ in the 1999 season (different signal-to-noise ratio). We adopted these figures as the 1-sigma value. We used a 2-sigma detection limit for the analysis of the other stars in the field.

[†] The MIRA AP software is distributed by Axiom Research, Inc.

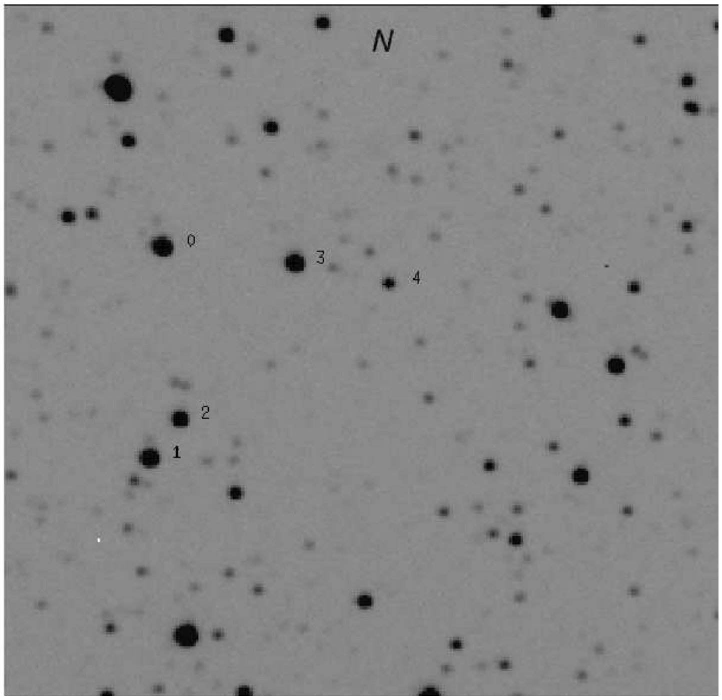

Figure 1. Zoom-in of CCD field-of-view for V959 Oph with star labels as discussed in the text.

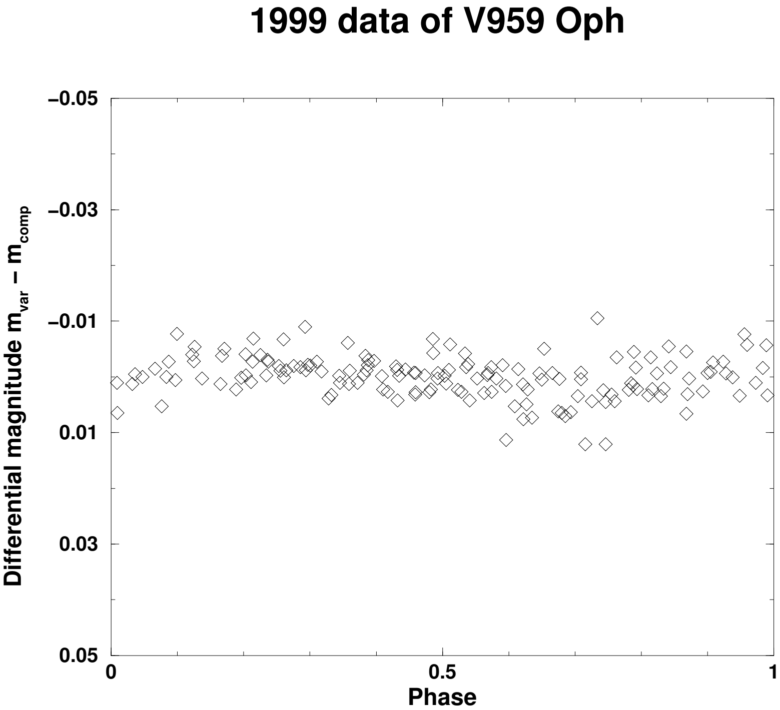

Figure 2. Phase diagram of the 1999 data against the frequency of 10.12433 c/d.

We obtained 9.7 hours of photometric data in 1996 for V959 Oph. It was immediately clear that the large amplitude variations first reported by Götz (1957), later by Poretti (1983) were not present. We concluded that this star was constant at the 2-sigma level, i.e. the amplitude could not be larger than $0\overset{m}{.}016$. Hintz et al. (1999) reported a period of 0.09880 days (frequency = 10.1246 c/d) with a semi-amplitude of $0\overset{m}{.}0075$. Probably due to a low signal-to-noise ratio in our data, we cannot confirm this.

For our subsequent observations we used longer exposure times. The estimated photometric accuracy is now $0\overset{m}{.}005$. Based on 8.9 hrs of data in 1999 we could not detect any short-period variation with a semi-amplitude larger than $0\overset{m}{.}1$. We also can exclude longer period variations as daily averages stay constant over the full length of one observational season. An independent period search was performed but did not reveal any short-period fluctuation. In Fig. 2 we present the phase diagram for our 1999 data fit with the frequency derived by Hintz et al. (1999). However, the fit produced an amplitude with the value of only $0\overset{m}{.}002$. We conclude that the amplitude of this short-period variable has further decreased in the course of 1999, until well below (our) detection level.

Other variables in the field of V959 Oph:

- star 3 = GSC 435 1599, is a new variable star. The differential magnitude with respect to the comparison star shows a standard deviation of $0\overset{m}{.}047$ in the 1999 data, about 10 times larger than the 1-sigma limit. The data indicate slow daily variations with a periodicity much larger than 3 hours (i.e. our longest single observing run). Day-to-day variability with an estimated total amplitude larger than $0\overset{m}{.}1$ is present.
- star 4 = V497 Oph = GSC 435 1680. This star is classified as a slow irregular variable (Kholopov 1985, 1987). A slow, monotonous decrease of the brightness with respect to star 0 was indeed found over a 50-day interval.

In conclusion, we state that no significant short-period variations were found for V959 Oph in 1996 and 1999. Therefore, independently from Hintz et al. (1999), our 1996 observations do not confirm the large amplitude and short-period variation reported by Götz (1957) and by Poretti (1981, 1983). Our 1999 data are constant at the 2-sigma level and cannot be fit with the frequency reported by Hintz et al. (1999). This illustrates the further amplitude decrease for V959 Oph, at least below $0\overset{m}{.}005$. There is momentarily no reason to classify it as a large amplitude δ Scuti variable star! In the same field a new variable star was found, with a periodicity considerably longer than 3 hours and an observed peak-to-peak amplitude larger than 0.1 mag. We also confirm the slow variation of V497 Oph.

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NEW PHOTOELECTRIC LIGHT CURVES OF AB ANDROMEDAE

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AB And (SAO 73069, BD +36°5017), is a W UMa type eclipsing binary (sp. type G5+G5V, $P \approx 0.3318$ days, $V_{\rm max} \approx 9.7$). Since the discovery (Guthnick & Prager 1927) the system is a frequent target of photometric observations (for references see Rovithis-Livaniou & Rovithis 1981; Demircan et al. 1994). The system exhibits asymmetries in minima and deformations in the light curve during maxima, interpreted either by the presence of gaseous streams (Kalchaev & Trutse, 1968) or by spot activity on the primary component (e.g. Bell et al. 1984). Observed orbital period changes are caused probably by combination of the mass transfer from the more to less massive component and the light time effect (see Kalimeris et al. 1994; Borkovits & Hegedüs 1996) or a period modulation due to the magnetic activity cycle of the active primary component (Demircan et al. 1994)

Our U, B, V and R photoelectric photometry was performed over 6 nights from August to December 1999 at the Stará Lesná (SL) and Skalnaté Pleso (SP) Observatories of the Astronomical Institute of the Slovak Academy of Sciences. The 0.6 m Cassegrain telescope equipped with a single-channel pulse-counting photoelectric photometer was used. The journal of observations is listed in Table 1. For all observations a 10 second integration was chosen. SAO 73071 was used as a comparison star (Table 2). Its stability was checked on two nights (August 19 and December 31, 1999) with respect to six other

Table 1: Journal of photometric observations

Date	$\mathrm{HJD_{mean}}$ 2400000 +	Phases	Filters	Obs.
1999 Aug. 19	51140.4070	—	UBV	SL*
1999 Sep. 4	51426.3828	.927–.058	UBV	SL
1999 Oct. 1	51453.4659	.123–.980	UBV	SL
1999 Dec. 8	51521.3016	.782–.195	BV	SL
1999 Dec. 21	51534.2575	.839–.259	BVR	SP
1999 Dec. 31	51544.3079	—	UBV	SP*

* Measurement of comparison stars only

Table 2: Comparison stars and their magnitudes

Star	SAO	BD	U	B	V	Sp.
S1	73115	+35°4988	9.54	9.48	8.93	—
S2	73071	+36°5020	10.10	9.30	8.37	K2
CH	73072	+35°4972	11.48	10.92	10.05	—
S5	73093	+34°4870	10.72	9.75	8.65	—
S6	72992	+36°5003	9.03	7.92	6.76	K0
S7	73003	+37°4769	9.09	8.87	8.21	G5
S8	73007	+34°4847	8.67	7.55	6.39	K0

Note: Star S8 was measured only on December 31, 1999

stars. The comparison star was found to be stable within 0.01 mag. The international magnitude of comparison stars, calculated using the average of the published magnitudes of S6 (see `http://obswww.unige.ch/gcpd/gcpd.html`), are given in Table 2. Their mean errors are lower than 0.01 mag. Data reduction, the atmospheric extinction correction and transformation to the standard system were carried out in the usual way.

We have calculated the times of minima separately for all filters using the Kwee and Van Woerden's method, parabola fit, sliding integration method, tracing paper and "center of mass" method which were described in detail by Ghedini (1982). The computer codes were kindly provided by Dr. R. Komžík (1999). The average times of the primary (I) and secondary (II) minima and their probable errors found by these methods are given in Table 3.

Recent times of minima (Borkovits & Bíró, 1998; Kiss et al., 1999; Agerer & Hübscher, 1999) together with average times of the minima from U,B,V and R passbands (Table 3) were used to determine the ephemeris suitable for future observations:

$$\begin{array}{rl} \text{Min (I)} = \text{HJD } 2451426.3875 + 0\overset{\text{d}}{.}3318925 \times E. \\ \pm 5 \qquad\qquad\quad \pm 4 \end{array} \qquad (1)$$

All individual U, B and V observations are plotted in Fig. 1, using ephemeris (1). These data sets can be freely downloaded from address:

`http://www.ta3.sk/parimuch/archive.html`.

The observed light curves were relatively stable during our observations except small variations in the depth of the primary minimum. The maximum at phase 0.25 was somewhat brighter than maximum at phase 0.75. The descending branch of the primary minimum in B passband observed on December, 21 is fainter than on the other nights.

Table 3: New times of minima and their standard errors (σ) of AB And

HJD 2400000+	σ	Min. type	Filter	HJD 2400000+	σ	Min. type	Filter
51426.38808	0.00014	I	U	51521.30847	0.00013	I	B
51426.38763	0.00010	I	B	51521.30855	0.00004	I	V
51426.38807	0.00007	I	V	51534.25069	0.00024	I	B
51453.43763	0.00002	II	U	51534.25116	0.00018	I	V
51453.43715	0.00001	II	B	51534.25222	0.00021	I	R
51453.43705	0.00002	II	V				

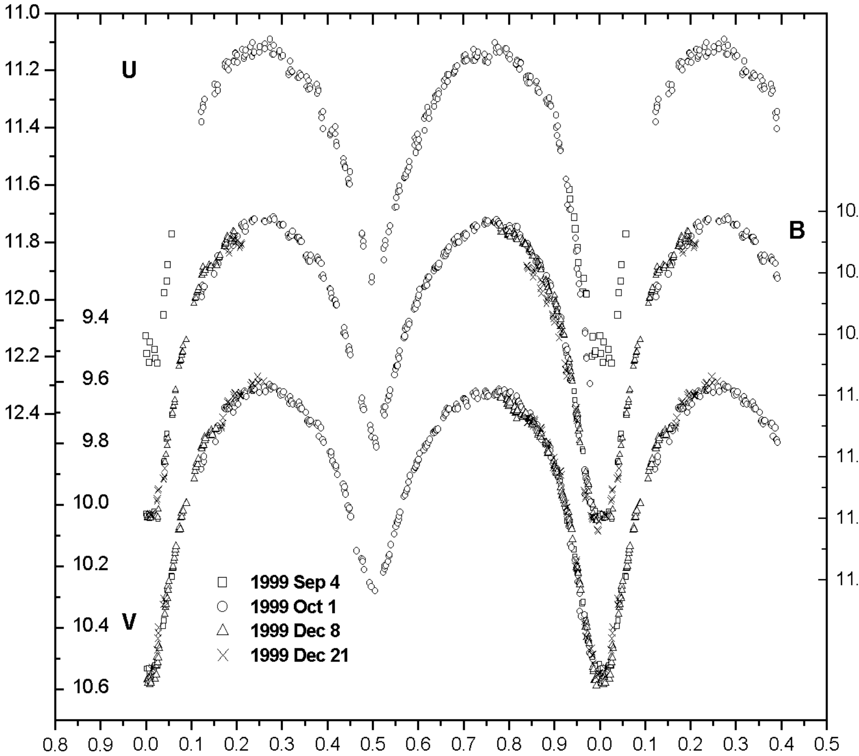

Figure 1. UBV light curves of AB And

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THE VARIABLE LIGHT CURVE OF 56 ARIETIS

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56 Ari (SX Ari, HD 19832, HR 954) is a well studied CP star with a relatively short period of rotation ($P \approx 0.728$ days). Shore & Adelman (1976) mentioned the possibility of a free-body precession of 56 Ari. Their suspicion was based on spectroscopic study of silicon spots on the surface of the star in different epochs. The explanation of observed variations was based on a nonspherical shape of the star caused by its strong magnetic field. The period of precession was predicted to ≈ 3 years. Photometric investigation of 56 Ari, as well as other short period Ap stars was suggested to prove the hypothesis of long term free-body precession. Adelman & Fried (1993) published their *UBV* photometry of 56 Ari from the Braeside Observatory covering two observational seasons in 1990 and 1991. Comparing their light curves with those of Hardie & Schroeder (1963) and Blanco & Catalano (1970) they concluded that the light curves of 56 Ari undertook significant changes.

Our observations of 56 Ari were performed with the 60-cm Cassegrain reflector at the Skalnaté Pleso Observatory equipped with an OPTEC SSP-5A photometer with a Hamamatsu R4457 photomultiplier and standard *UBV* filters. U, B and V light curves were obtained during three seasons: 1996/1997, 1997/1998 and 1998/1999. HR 945 (HD 19600) was used as a comparison star. The same one was used by Hardie & Schroeder (1963), and Adelman & Fried (1993). In the first two seasons the sequence C—V—C—V... was used, where C means two 10 seconds integrations of HR 945 and V four 10 seconds integrations of 56 Ari in each filter. In the season 1998/1999 C was measured once and V twice, using 20 seconds integrations. In the first season 284, in the second one 330 and in the third season 218 measurements of 56 Ari in each filter were secured. Full phase coverage of the curves took 160, 154 and 91 days in the three seasons. The observations were reduced with the REDUCT software package (Komžík 1996).

In Fig. 1 the U light curves of 56 Ari in the first and the third seasons are presented, as these two light curves differ most from each other. We have found differences in the shapes and in the amplitudes of light curves in all three filters. The mean brightness of 56 Ari in the B and V colours is the same as in the years 1990 and 1991 (Adelman & Fried 1993), but it is fainter by ≈ 0.05 magnitudes in U. This difference is probably caused by the red leak of the U filter, as our photomultiplier is sensitive in the red region (up to ≈ 8300 Å). The $B - V$ colour indices of the stars are -0.108 for 56 Ari and $+0.008$ for the comparison star (Mermilliod 1981).

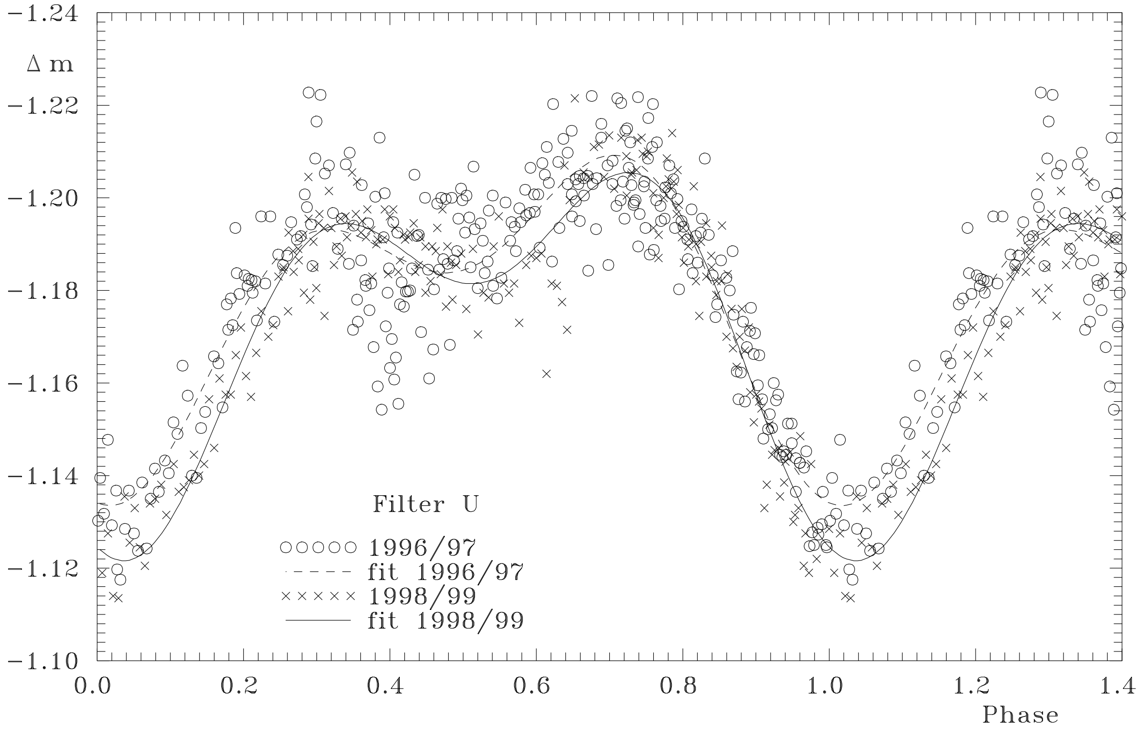

Figure 1. *U* light curves of 56 Ari in two different seasons.

To demonstrate the observed variability of light curves, we present in Fig. 2 only their least-squares fits. The observations were fitted by a sine wave and its first harmonic (Mathys & Manfroid 1985, Heck et al. 1987)

$$\Delta m = a + b \sin(x + \varphi_1) + c \sin(2x + \varphi_2)$$

(where x is the Julian date of observations) with a fixed period. Parameters of the fits: a, b, c, φ_1 and φ_2 are listed in Table 1. S_o is the probable error in magnitudes computed by fit. The ephemeris of Blanco & Catalano (1970)

$$\mathrm{JD_{min}} = 2439797.586 + 0.727902 \times E$$

was used, with the value of period P slightly improved by Adelman & Fried (1993).

Table 1: Parameters of fits of light curves

Season	Filter	a	b	c	φ_1	φ_2	S_o
1996/97	U	−1.178	0.027	0.019	1.220	1.520	0.011
1997/98	U	−1.174	0.027	0.014	1.187	1.226	0.010
1998/99	U	−1.173	0.031	0.021	1.200	1.216	0.008
1996/97	B	−0.769	0.020	0.015	−1.234	−1.540	0.008
1997/98	B	−0.767	0.020	0.014	−1.378	1.404	0.009
1998/99	B	−0.766	0.024	0.018	−1.421	1.235	0.008
1996/97	V	−0.638	0.012	0.011	−1.529	−1.532	0.007
1997/98	V	−0.638	0.012	0.009	−1.531	1.454	0.007
1998/99	V	−0.637	0.017	0.013	−1.568	1.350	0.009

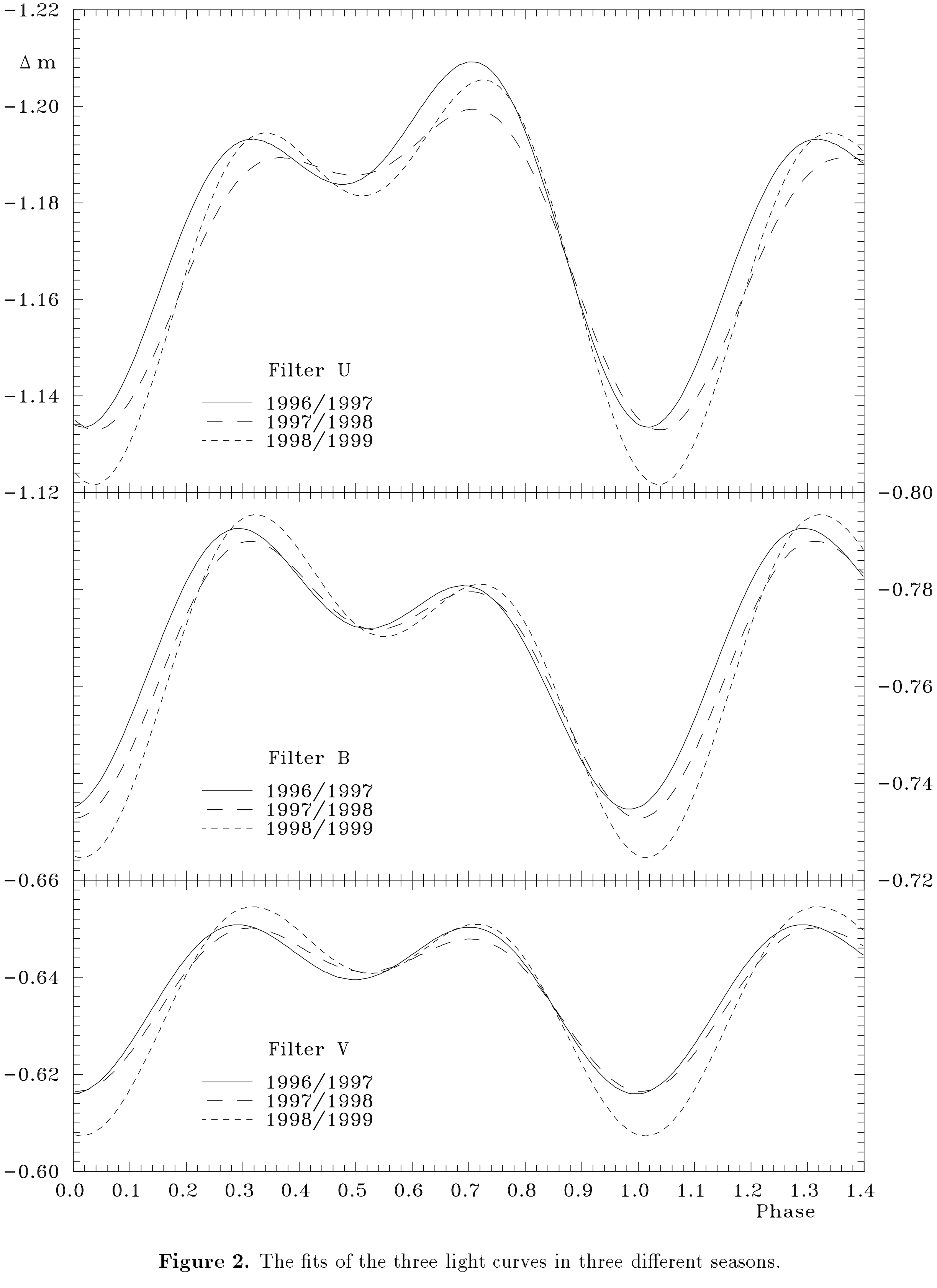

Figure 2. The fits of the three light curves in three different seasons.

The general shape of our light curves is similar to that of Adelman & Fried (1993). The B and V light curves have their primary maxima near phase 0.3, while the U light curve reaches its maximum near phase 0.7. As follows from Fig. 2, the largest differences are between the U light curves. Contrary to this, according to Adelman & Fried (1993) their U light curves of 56 Ari in 1990 and 1991 are more similar than those of B and V. The shape of the B and V light curves of Blanco & Catalano (1970) obtained in 1967 is the same as in this paper. Their U light curve, however, reaches the maximum near phase 0.3, or at least, both the maxima at phases 0.3 and 0.7 are of the same brightness.

There are differences in the positions of primary minima in all the three colours. While the primary minima for U light curves were almost exactly at phase 0.0, the primary minima of the B and V light curves were shifted to phase ≈ 0.95 in the years 1990 and 1991 (Adelman & Fried 1993). In our data sets the V light curves of the first two seasons have their primary minima at phase 0.0 but they are shifted to ≈ 0.02 in the third season. Our B and U light curves show a gradual shift of the minima towards phase 0.02 in the B and 0.04 in the U filter. Such a behaviour of the positions of minima in a phase diagram could be attributed to the increase of the rotational period. Musielok (1988) found an increase of the period by 4 seconds per 100 years for this star, caused by magnetic braking. This value is too small to be recognized in our light curves, as the observations cover an interval of 846 days only. Similar shifts of the primary maxima of the B and V light curves and of both the primary and the secondary maxima of the U light curve are indicated by our fits. The falling branch of our light curves (phases 0.8–0.9) remains unchanged in all the three seasons.

The observed shifts of primary minima, as well as changes in the shapes of light curves are most probably caused by a free-body precession of 56 Ari.

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R CMa — A NEW PULSATING ECLIPSING BINARY STAR

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While studying the pulsating components in eclipsing binaries, one can determine the precise masses and radii with the accuracy of 10^{-2}. It is the significant advantage for selection and fine tuning of the theoretical models to the observed pulsational spectra in asteroseismology. Up to the present, the number of known eclipsing binaries with one pulsating component is limited and these stars are not studied well. There are many intriguing questions about the pulsational properties of the binaries' components at different stages of mass transfer, about the number and the range of the excited modes, about the role of tidal effects in the mode excitation and selection, about the stability of frequencies and amplitudes of modes.

According to strategy of Central Asian Network (CAN) (Mkrtichian et al. 1998), we started a project on search for and study of new eclipsing binaries with pulsating components. In this paper we present our first discovery of δ Scuti-type variability of the primary component of semidetached Algol-type eclipsing binary star R CMa. Having F0 V spectral class, the primary component is situated inside the instability strip of the δ Scuti stars. The spectral type of the secondary star is K1 IV.

For the search for pulsational light variations we used the published blue filter data, which were obtained during 1955–1956 on the 36-inch Steward reflector in Tucson (Koch, 1960). The reduction procedure was as follows: We selected out-of-eclipse parts of light curves and subtracted their slow orbital light variations. Then we analysed the residual data for nights with good photometric quality using DFT-code and the routine for sine-wave approximation of light curves and precise estimations of amplitudes and phases (Andronov 1994).

The frequency spectra (see Fig. 1) for the majority of the nights of R CMa show the main periodic variability at frequency about 21 c/d (68 min). The amplitude varies from night to night, what may be an indication of the close multiperiodicity. Fig. 2 shows the frequency spectrum for the B filter data of merged nights, the resulting frequency of pulsations is 21.21 c/d (with the uncertainty ±1 c/d due to spectral window function). The mean semi-amplitude obtained on nights JD 2435449, JD 2435453, JD 2435458, JD 2435508, JD 2435524, JD 2435528, JD 2435531 and JD 2435536 is 4.4 ± 0.7 mmag. Fig. 3 shows the B-filter pulsational light curve folded with the frequency 21.21 c/d. Koch (1960) used A1 V-type comparison star BD -15° 1734 for his observations. Due to it's spectral type, it is situated outside the borders of the δ Scuti instability strip. Therefore, the light variability found out in differential magnitude variations with high probability is related to R CMa.

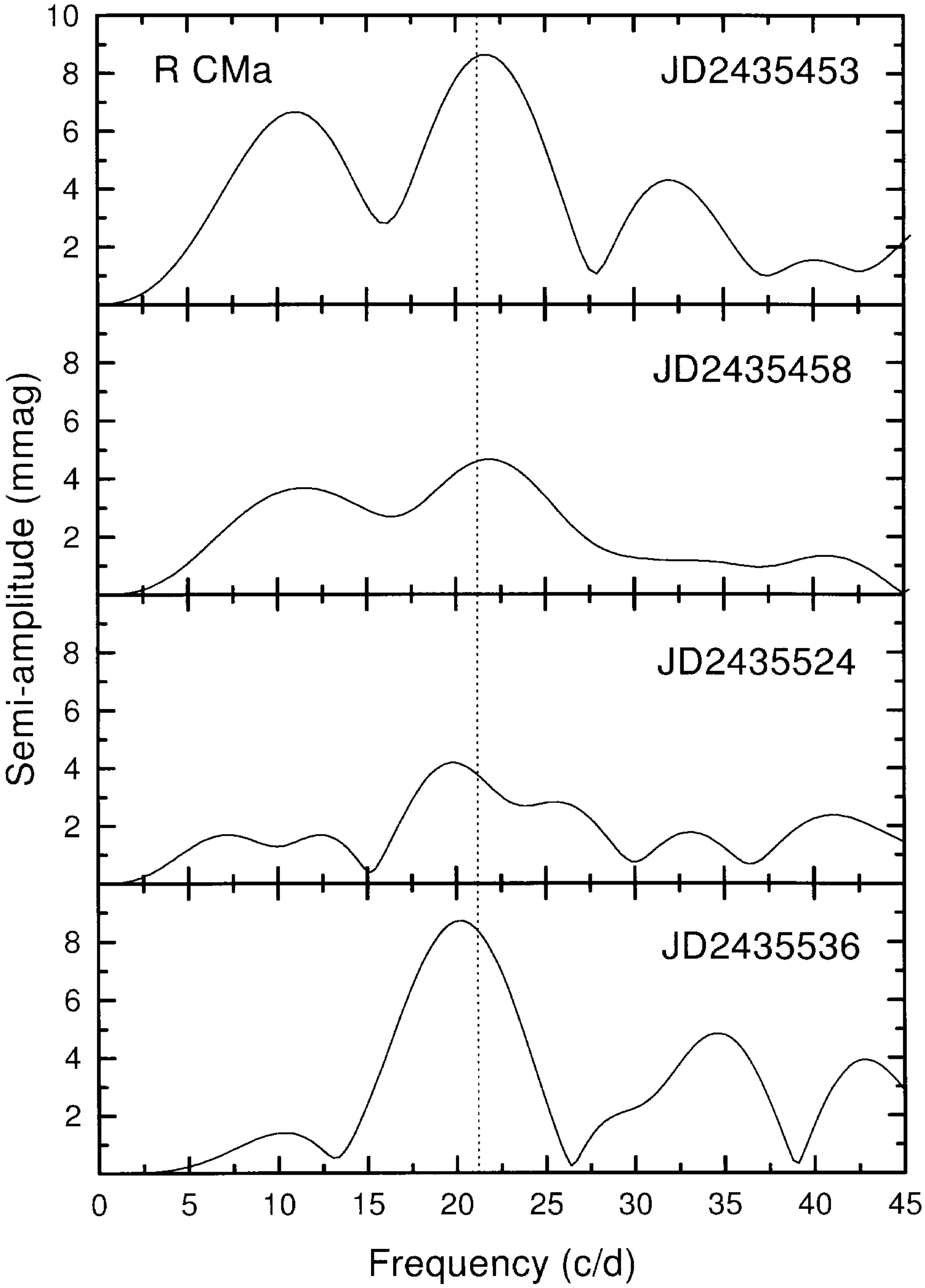

Figure 1. Amplitude spectra of residual data. The dotted line shows the location of frequency 21.21 c/d where pulsations are evident.

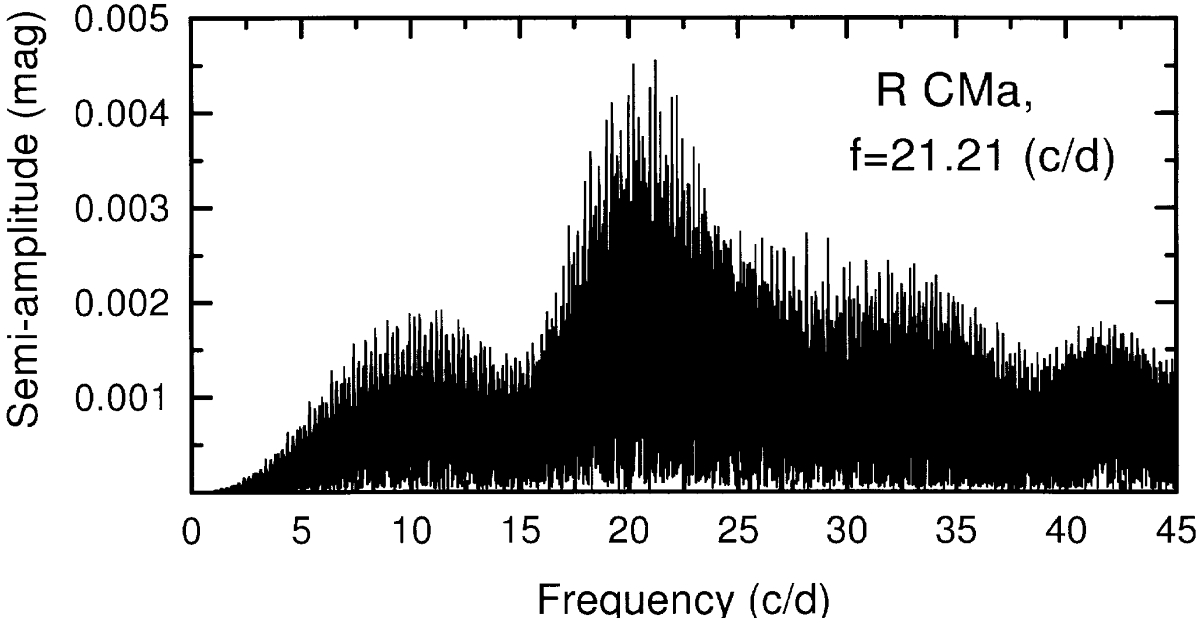

Figure 2. Amplitude spectrum of merged data.

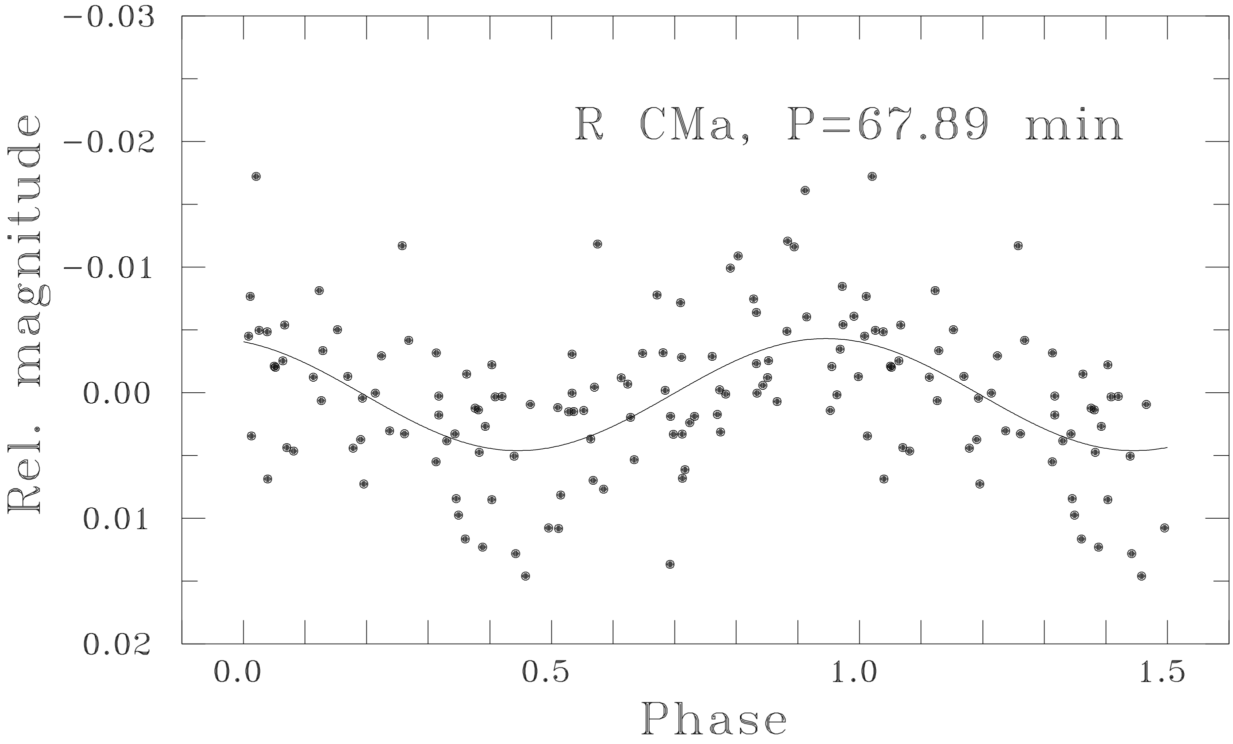

Figure 3. B filter phase curve folded with the period of 67.89 minutes.

This is the first discovery of pulsating δ Scuti-type component in eclipsing binaries obtained during our survey. Further photometry of this object will be acquired in the near future.

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DISCOVERY OF RAPID PULSATIONS IN THE A3 V COMPONENT OF THE ECLIPSING BINARY SYSTEM AS ERIDANI

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According to the strategy of Central Asian Network (CAN) collaboration (Mkrtichian et al. 1998) we started the survey for search for and study of new pulsating components in eclipsing binary stars. In the previous publication (Mkrtichian and Gamarova 2000) we reported about our first discovery of the new pulsating F0 V component of the eclipsing binary system R CMa. In this paper we present our second detection of δ Scuti-type pulsations in the bright component of the eclipsing binary system AS Eri. The Algol-type variability of AS Eri was discovered by Hoffmeister (1934). It is a semi-detached binary system with A3 V primary and K0 IV secondary components. According to spectral class the primary component of AS Eri is situated inside the instability strip. For search for the pulsational light variations we used published photometric data in blue filter which were obtained during 1955–1957 on the 36-inch Steward reflector in Tucson (Koch 1960). During the initial stages of analysis we selected out-of-eclipse parts of light curves and subtracted the slow orbital trends. The phases of orbital period were calculated according to the ephemeris $\mathrm{HJD(Min1)} = 2428538.066 + 2.664152 \times E$ (Koch 1960). For search for pulsations we analysed the residual data for nights with good photometric quality. For precise determination of frequencies and amplitudes of pulsations we used DFT program in combination with iterative sine-wave least-squares routines (Andronov 1994).

The four upper panels in Fig. 1 shows the amplitude spectrum acquired on four good nights JD 2435456, JD 2435508, JD 2435755 and JD 2435803. The 59 c/d signal appears on all these nights. The amplitude spectrum of merged data of AS Eri is presented in Fig. 2. It shows the well visible peak at the frequency of 59.03 c/d (24.39 min) and confirms the presence of rapid pulsations. The uncertainty of frequency of pulsations is the ± 1 c/d due to spectral window pattern of single-site observations.

The mean semi-amplitude of pulsations is 4.5 ± 0.9 mmag. The amplitude of the light-curve is modulated, that may be an evidence of multiperiodicity. Fig. 3 shows the pulsational light curve folded with the frequency $f = 59.03$ (c/d).

The comparison star used by Koch (1960) is BD -3° 576. It has A2 V spectral type, so it is close to the blue border of the instability strip. That is why we were uncertain that the acquired evidence of δ Scuti type variations pointed out the variability of the primary component of AS Eri.

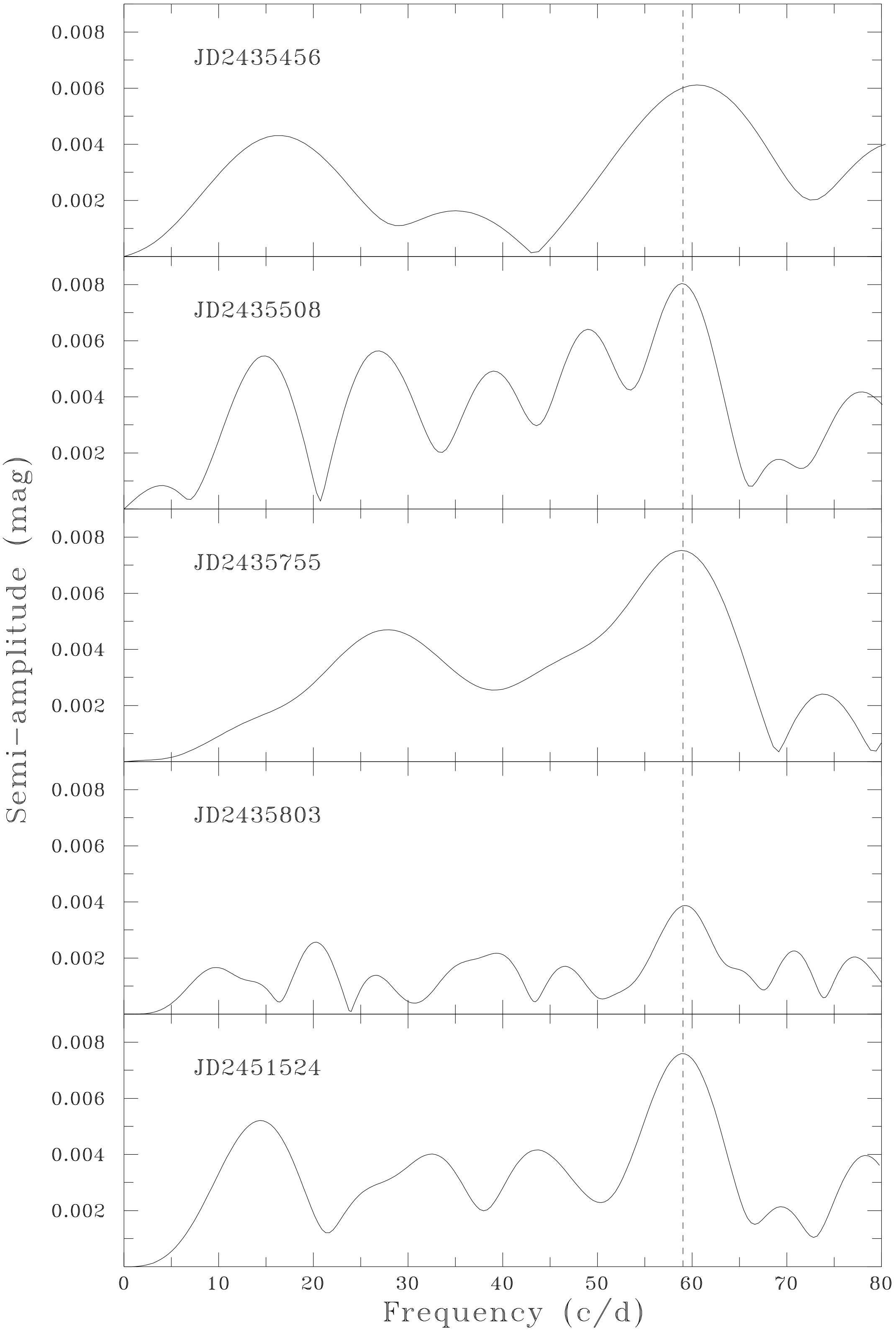

Figure 1. The amplitude spectra

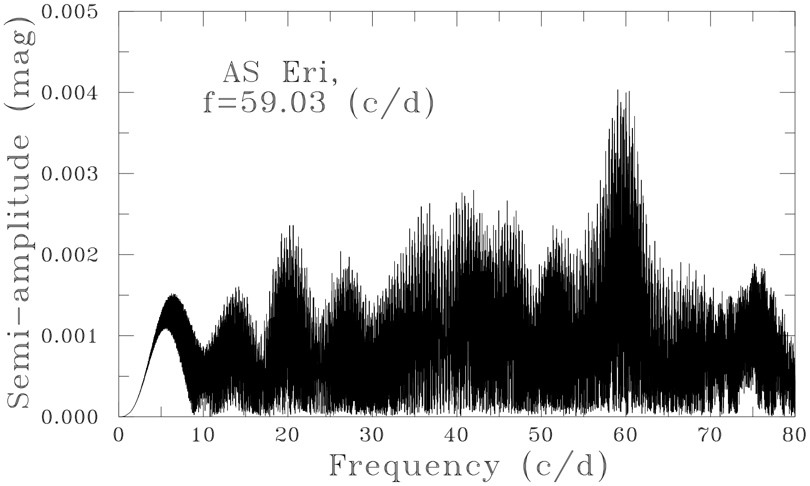

Figure 2. The amplitude spectrum of the merged data of 1955–1957

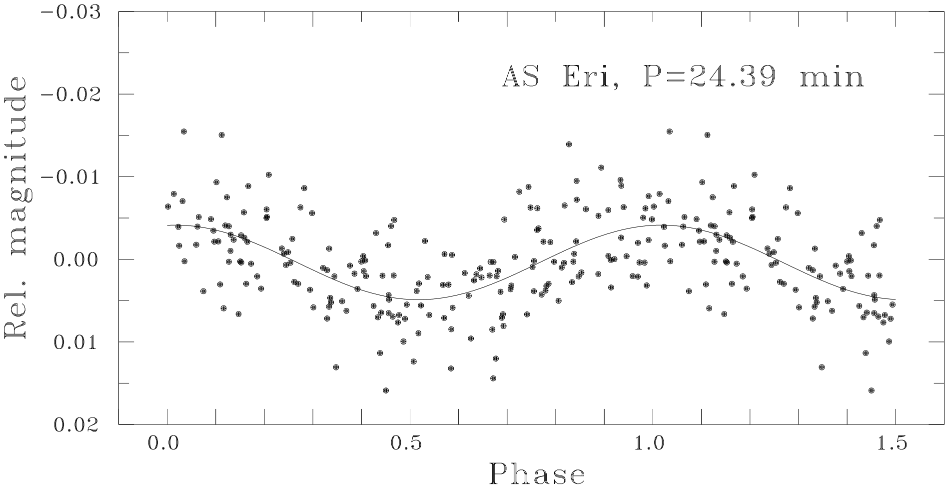

Figure 3. The phase curve of Koch's data

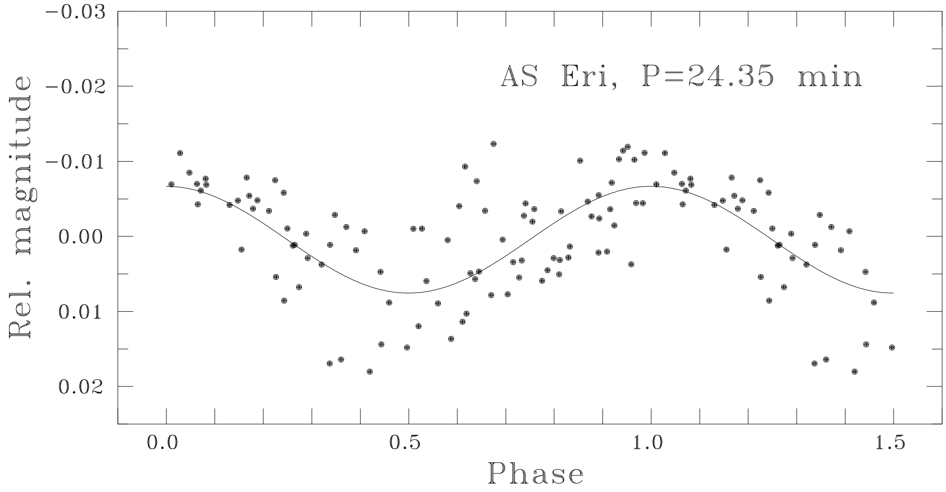

Figure 4. The phase curve on night 11/12 December 1999.

For checking whether the variability is related to AS Eri we carried out independent observations through Johnson V filter using another comparison star (HD 21887 = BD $-04°$ 613, $V = 7\overset{\mathrm{m}}{.}18$, Sp = G5). The observations were carried out on December 11/12, 1999 (JD 2451524) on the 0.48-m telescope of Tien-Shan Astronomical Observatory. The data were reduced in the same manner as described above. Fig. 1 (lowest panel) shows the DFT amplitude spectrum of night 11/12 December 1999 (JD 2451524). The peak at the frequency of 59.14 ± 0.57 c/d with semi-amplitude 7.5 ± 0.1 mmag is well visible and it coincides with the frequency of 59.03 (c/d) found from Koch's data within the errors. Thus, the reality of our detection of δ Scuti-type pulsations in the A3 component of AS Eri is well established.

The excitation of rapid pulsations in A3 V component of AS Eri is unusual. A period of 24.39 min is rather short for δ Scuti-type variability known till now, but it is close to the period of 22.43 min of the A4 V δ Scuti-type primary component recently discovered in RZ Cas (Ohshima et al. 1998, Mkrtichian et al., in preparation). So, AS Eri is the second known δ Scuti-type star with the shortest pulsation period.

It is not ruled out that the excitation of short periodic pulsations in binary stars is one of their specific feature. Increase the number of known eclipsing binaries with pulsating components, accurate determination of properties of these stars and frequency spectra, further theoretical modeling and asteroseismology may shed light on the mechanism selecting such short-periodic pulsations.

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THE ROSSITER–MCLAUGHLIN ROTATION EFFECT FOR HD 209458 DUE TO A PLANETARY TRANSIT

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The Rossiter–McLaughlin rotation effect is a sinusoidal-like distortion that has been historically observed most frequently in the radial-velocity curves of Algol binaries during their primary eclipses. The amplitude and shape of this distortion depends on the relative radii of the eclipsed and the eclipsing stars, limb darkening, the rotational velocity of the eclipsed star and the inclination of the orbital plane. Other astrophysical and dynamical factors can alter the rotation effect, especially its symmetry. These include bright/dark photospheric spots, non-zero orbital eccentricity, a spin axis not aligned to the orbital plane normal (an obliquity) and differential rotation. The mathematical description of this phenomenon has been elegantly developed by Kopal (1959) and Hosakowa (1953) with additional contributions by Worek (1985, 1996).

Henry et al. (2000) and Charbonneau et al. (2000) have recently reported their successes in photometrically detecting the transit of a planet across the disk of the G0V star HD 209458 (= HIP 108859). An attempt should now be made to observe the corresponding Rossiter–McLaughlin rotation effect in this star's radial-velocity curve. The rotation effect would serve to further confirm the existence of the planet and could help verify and possibly improve its radius and the other parameters which the above researchers have derived.

Using the pertinent HD 209458 transit results published by Charbonneau et al. and an adopted solar value for the star's $v \sin i$ (Table 1), a theoretical rotation effect due to a planetary transit has been computed. The accompanying figure (Fig. 1.) shows the rotation effect as it would appear if it were extracted from the star's radial-velocity curve, i.e. the radial-velocity observations during the transit less the expected orbital velocities. The peak-to-trough amplitude in this plot is almost 40 $\mathrm{m\,s^{-1}}$, a value great enough that this distortion should be observable given that radial-velocity measurements for solar-type stars are currently achieving a precision better than ± 10 $\mathrm{m\,s^{-1}}$.

However, some caveats are in order if any attempt is to be made. Namely, the change in the radial velocity happens very quickly during the 3 hour transit so the shortest possible CCD exposures would be required to minimize "phase smearing". Also, an accurate transit ephemeris and a good set of spectroscopic elements are crucial. Lastly, since the star's absorption line profiles are Doppler skewed to the red before mid-transit and to the blue afterwards (Kopal 1959), the photocentric position in these profiles must be measured for the radial velocity.

Table 1: Parameters to calculate the rotation effect

$R_{\mathrm{s}} = 1.1\ \mathrm{R}_{\odot}$
$R_{\mathrm{p}} = 1.27\ \mathrm{R}_{J}$
$i = 87\overset{\circ}{.}1$
$u = 0.50$ (R band)
$a = 0.0467$ AU
$e = 0.0$ (adopted)
$v \sin i = 2000\ \mathrm{m\,s^{-1}}$

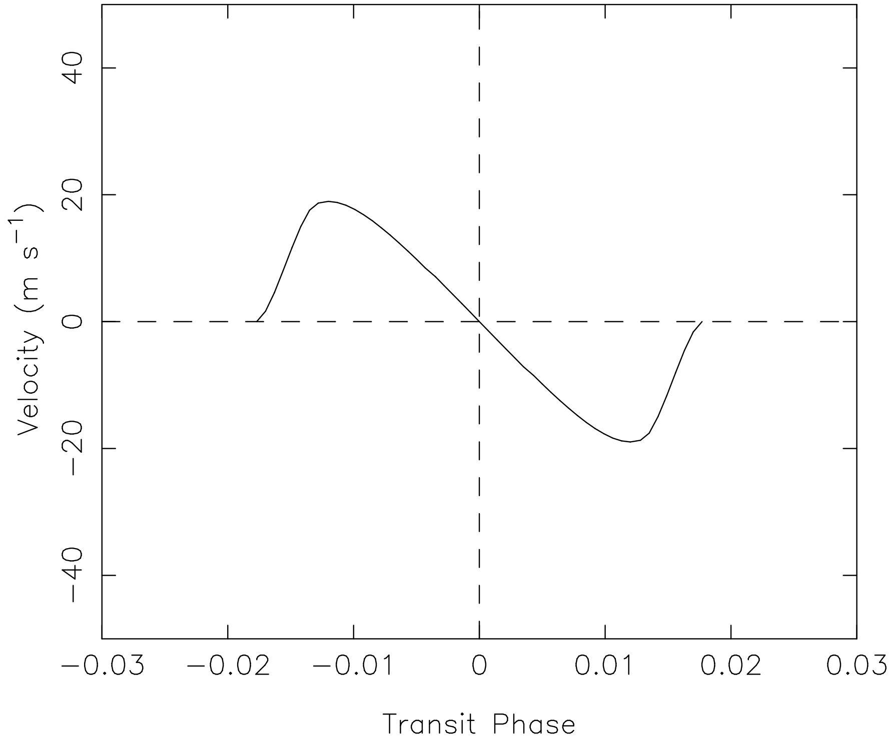

Figure 1. Rotation effect due to a planetary transit

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UBVR-PHOTOMETRY OF THE ECLIPSING BINARY SZ Cam

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The early-type eclipsing binary system SZ Cam is the northern component of the visual double star ADS 2984(B). Both components of this visual double system of almost equal brightness ($V \sim 7^{\rm m}$) and spectral type (O9 IV and B0 III) are the brightest members of the open cluster NGC 1502. The first photoelectric light curves in *UBV* were obtained in 1970–1971 by Kitamura & Yamasaki (1970) and by Polushina (1977). Two more light curves were got later by Chochol (1980) in two non-standard intermediate passband filters and by Gorda & Polushina (1987) in *UBVR* with the use of the area scanning technique in 1984/85 years. As it is given by Mayer et al. (1994) the small fragments of the light curves were obtained by Delgado in 1983 and by Irsmambetova in 1992.

The small spatial separation (approximately $18''$) between two stars of very similar brightness posed particular difficulties for realization of a conventional photometry of this eclipsing binary. As a consequence in some light curves of SZ Cam (see, e.g., Polushina 1977) depths of the minima achieve only 2/3 of their usual values. The fluctuations of brightness, especially in the vicinity of the secondary minimum and distortions of its shape are observed also. Distortions of the light curves can be borne by the nature of this eclipsing binary, however, they can be caused by observational effects as well.

Recently Mayer et al. (1994), Lorenz et al. (1998) and other authors (see, e.g., Harries et al. 1998), using the new spectral data, have explained the triple structure of composite absorption spectral lines of SZ Cam by existence of a third body in the system. Mass ratio had been redefined also ($q = 0.7$ against early $q = 0.2$) and now SZ Cam belongs to the type of completely detached systems instead of semi-detached.

For a long time no full light curve of SZ Cam has been obtained, that is why we have begun new investigation of this system. SZ Cam was observed photoelectrically at Astronomical Observatory of Ural State University, with a 45-cm Cassegrain telescope in *UBVR* filters during 25 nights from October 1996 to November 1999. Bulk of the data was obtained in 1999. In order to eliminate influence of close visual companion ADS 2984A, we used the area scanning technique for our investigations. Thus the visual component was used as the comparison star automatically, because in this case the single-channel photometer worked as a two-channel one. This circumstance allowed us to use the data obtained during nights when the sky conditions were not so good.

More than 700 measurements of the magnitude difference in each colour with a standard error of $\pm0\overset{\rm m}{.}006$ in B, V and $\pm0\overset{\rm m}{.}008$ in U and R filters were obtained. For computation of the photometric phases we used ephemeris suggested by Mayer et al. (1994):

$$\mathrm{JD}_{\odot}\,\mathrm{Min\,I} = 2448932.3474 + 2.698393 \times \mathrm{E}. \qquad (1)$$

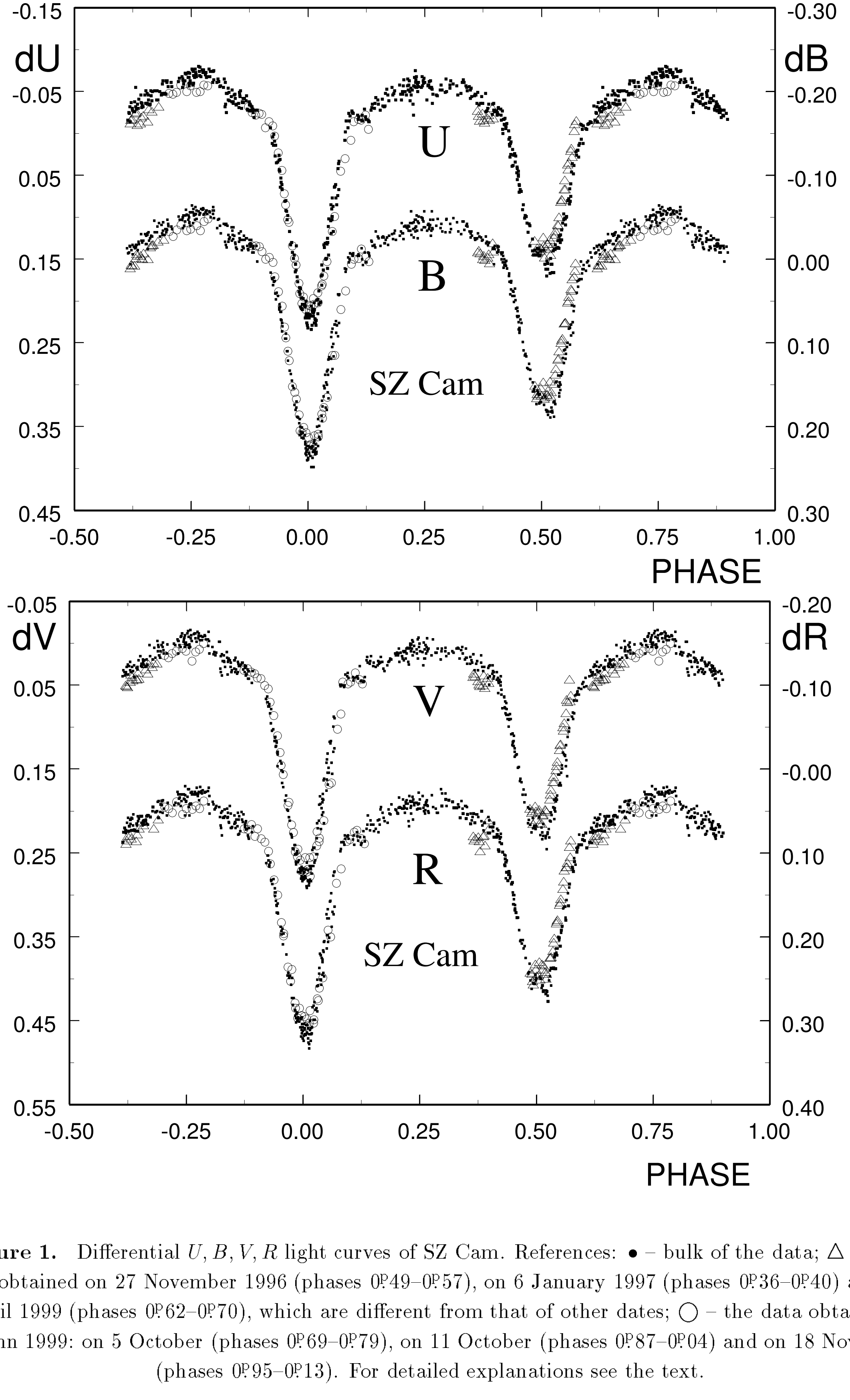

Figure 1. Differential *U*, *B*, *V*, *R* light curves of SZ Cam. References: • – bulk of the data; △ – the data obtained on 27 November 1996 (phases $0\overset{\mathrm{P}}{.}49$–$0\overset{\mathrm{P}}{.}57$), on 6 January 1997 (phases $0\overset{\mathrm{P}}{.}36$–$0\overset{\mathrm{P}}{.}40$) and on 7 April 1999 (phases $0\overset{\mathrm{P}}{.}62$–$0\overset{\mathrm{P}}{.}70$), which are different from that of other dates; ○ – the data obtained in autumn 1999: on 5 October (phases $0\overset{\mathrm{P}}{.}69$–$0\overset{\mathrm{P}}{.}79$), on 11 October (phases $0\overset{\mathrm{P}}{.}87$–$0\overset{\mathrm{P}}{.}04$) and on 18 November (phases $0\overset{\mathrm{P}}{.}95$–$0\overset{\mathrm{P}}{.}13$). For detailed explanations see the text.

Table 1: Moments of minima of SZ Cam

$\mathrm{JD}_{\odot} - 2\,400\,000$	Min	E	$O - C$
46127.3300	II	−1039.5	−0.0379
46150.2684	I	−1031.0	−0.0358
51227.3523 ± .0007	II	850.5	+0.0216
51231.3966 ± .0010	I	852.0	+0.0184
51463.4560 ± .0009	I	938.0	+0.0160
51501.2366 ± .0010	I	952.0	+0.0191

The U, B, V and R light curves are shown in Figure 1. The light curves in all filters have similar shape. The mean depths of the minima are the same value for all colours, with the values of $\delta m = (\Delta m_{\mathrm{max}} - \Delta m_{\mathrm{min}}) = 0\overset{\mathrm{m}}{.}275$ and $\delta m = 0\overset{\mathrm{m}}{.}210$ for primary and secondary minima, correspondingly. Nevertheless, the small variations of values in the depths of minima and brightness fluctuations between particular nights do exist.

For example, the data obtained during nights in the autumn 1999 show decrease of depth of the primary minimum in comparison with observations in the spring 1999 by $0\overset{\mathrm{m}}{.}020$. Secondary minimum was less deep in 1996 by the same value. In addition, the existence of small distortions of the shape of the secondary minimum in the region of it bottom and ascending branch is worth noting. Changes of the level of brightness at the vicinity of beginning and final phases of secondary minimum are worth mentioning as well. The average maximum brightness for the phase $0\overset{\mathrm{P}}{.}75$ is brighter than that for the phase $0\overset{\mathrm{P}}{.}25$ by $0\overset{\mathrm{m}}{.}022$. However, in the data obtained in autumn 1999 both maxima are equal in the brightness. In Figure 1 all these peculiarities are marked by empty circles (autumn 1999) and empty triangles (others).

From our measurements we derived 4 new times of minima and their errors, using a method of parabolic approximation. Two additional times of minima were calculated from our early observations (Gorda & Polushina 1987). Moments of minima and $O - C$ values calculated using the light elements by Mayer et al. (1994) are given in Table 1.

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CCD MINIMA OF SELECTED ECLIPSING BINARIES IN 1999

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Thirty-two new times of minima for selected eclipsing binaries have been determined using a CCD camera at the Prince George Astronomical Observatory in 1999.

All observations were made using an unfiltered SBIG ST6 CCD camera (chip: TI TC-241, 375 × 241 pixels each 23 × 27 μm, with an anti-blooming gate – not the author's choice) cooled to -40° C and mounted at the Cassegrain focus of a 61-cm telescope. The camera was equipped with a telecompressor lens that reduced the focal ratio from $f/12$ to $f/7$. Field of view was then $5\farcm35 \times 7\farcm00$; each pixel covered $1\farcs11 \times 1\farcs30$. Images were taken, in most cases, every two or three minutes throughout the eclipse for a time span of 2 to 4 hours. Finder charts were made using the program Guide 7; the data bases therein proved invaluable.

All data reduction was performed with MIRA AP version 5.04 (and later version 6.01) by Axiom Research Inc. Between exposures, frames were flat-fielded in batch mode and aperture photometry (using a single comparison star) performed. The aperture sizes (pinhole for the star and annular region for the sky background) were adjusted to gather counts from the star in the most efficient manner, and to avoid contamination from other stars in the annular region. For each eclipse, a comparison magnitude, close to the best available value, was adopted and used throughout the eclipse.

Times were adjusted to the mid-point of the exposure in each case. For all of the data sets (depending on the stars' brightnesses, exposure times and other factors), signal to noise values for the variable or comparison varied from 81 to 1355.

In order to determine the time of minimum, several methods were used. First of all, unless the minimum was clearly flat-bottomed, a parabola was fitted by the method of least squares to that part of the central part of the minimum that appeared to fit a parabola well. To estimate the error, the time of minimum was adjusted until an obvious bad fit was seen; the difference in times of minimum was taken as the error by this method.

In the majority of cases, there were significant descending and ascending portions of the curve. The tracing paper method (where the ascending and descending portions of the curve are made to overlap – but now done on a spreadsheet) was used to determine the time of minimum approximately and to determine the symmetric regions of the descending and ascending branches. The bisector of chords method, and the method of Kwee & van Woerden (1956) were then applied to these regions.

Table 1

Date (UT)	Star	Comparison	Minimum (HJD – 2400000)	Est. err. (days)	Type*	Notes
1999-10-14	RT And	GSC 3998-2312	51465.764	0.001	I	
1999-12-01	WZ And	GSC 2799-0902	51513.7810	0.0001	I	
1999-10-05	OO Aql	GSC 1058-0409	51456.7720	0.0002	I	
1999-12-28	CV Boo	GSC 2570-0423	51540.9172	0.00004	I	1
1999-10-19	Y Cam	GSC 4527-0438	51470.8049	0.00014	I	
1999-09-14	XX Cep	GSC 4288-0150	51435.7132	0.0001	I	
1999-09-28	XX Cep	GSC 4288-0150	51449.7371	0.0001	I	
1999-09-21	EG Cep	GSC 4585-0165	51442.86571	0.00007	I	
1999-10-19	ZZ Cyg	GSC 3576-0964	51470.67204	0.00008	I	
1999-05-11	BR Cyg	GSC 3556-3310	51309.8253	0.0002	I	2
1999-09-12	BR Cyg	GSC 3556-3310	51443.75421	0.00007	I	2
1999-09-21	CG Cyg	GSC 2696-2622	51442.71870	0.00008	I	
1999-12-08	Z Dra	GSC 4396-1221	51520.81684	0.00001	I	
1999-10-23	UZ Dra	GSC 4444-0836	51474.86051	0.00016	I	
1999-10-04	SW Lac	GSC 3215-0906	51455.7416	0.0003	I	
1999-12-03	SW Lac	GSC 3215-1586	51515.8613	0.0001	I	
1999-10-27	VX Lac	GSC 3214-1065	51478.7423	0.0001	I	
1999-08-14	FL Lyr	GSC 3542-1400	51404.833	0.002	II	3
1999-09-19	FL Lyr	GSC 3542-1400	51440.770	0.002	I	3
1999-11-29	RW Mon	GSC 0733-0826	51511.92103	0.00005	I	
1999-11-21	RV Per	GSC 2366-1081	51503.8915	0.0002	I	
1999-11-27	ST Per	GSC 2847-1270	51509.8531	0.0001	I	
1999-10-18	XZ Per	GSC 3328-2029	51469.82784	0.00003	I	
1999-11-27	RW Tau	GSC 1826-0015	51509.68687	0.00003	I	
1999-10-11	V Tri	GSC 2293-1382	51462.8213	0.0002	I	
1999-12-31	X Tri	GSC 1763-2015	51543.790	0.001	I	
1999-10-26	RV Tri	GSC 2321-1715	51477.7786	0.0001	I	
1999-12-07	VV UMa	GSC 3810-0988	51519.84743	0.00006	I	
1999-04-28	AW UMa	GSC 1984-0145	51296.829	0.003	II	4
1999-04-13	AG Vir	GSC 0871-0330	51281.8693	0.0006	I	5
1999-05-09	AG Vir	GSC 0871-0330	51307.8597	0.0005	II	5
1999-11-01	BU Vul	GSC 2182-0483	51483.71885	0.00005	I	

Notes:

* I = primary, II = secondary.

1 Ephemeris for identifying type of minimum is from Busch (1985).

2 Comparison star GSC 3556-3310 was later discovered to be NSV 12304. However, light curves of comparison versus check star (GSC 3556-3166) revealed no significant variation over the 0.1 magnitude level that could not be attributed (based on other data) to varying extinction from clouds.

3 Ephemeris for identifying type of minimum is from Keskin & Pohl (1989).

4 Ephemeris for identifying type of minimum is from Pribulla et al. (1999).

5 Ephemeris for identifying type of minimum is from Bell et al. (1990).

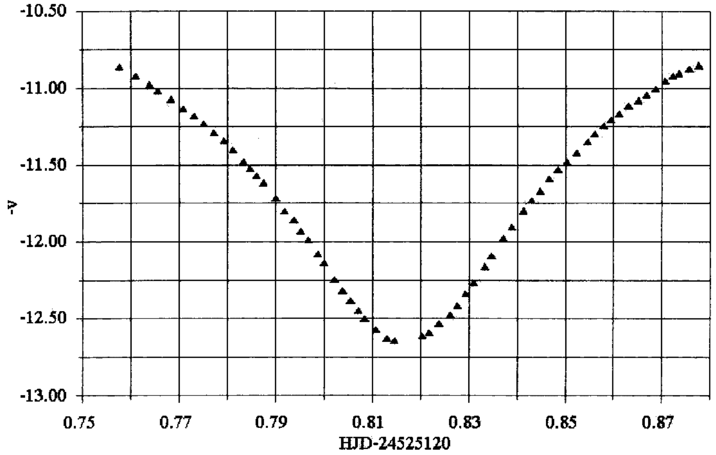

Figure 1. Primary minimum of the 1.36-day semidetached Algol-type binary Z Draconis.

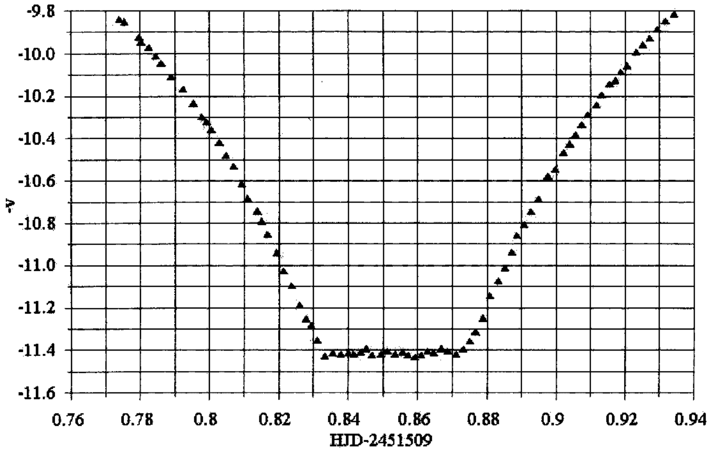

Figure 2. Primary minimum of the 2.65-day semidetached Algol-type binary ST Persei.

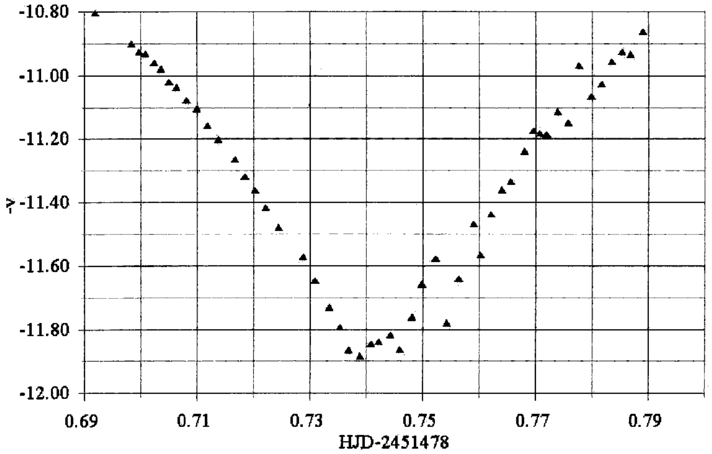

Figure 3. Primary minimum of the 1.07-day Beta Lyrae-type binary VX Lacertae.

The selection of comparison stars generally followed the recommendations of Henden & Kaitchuck (1982). The main consideration was that the difference in brightness between variable and comparison be less than 2 magnitudes; the matching of spectral types (where known) was a secondary consideration.

The quoted error for each time of minimum is the standard deviation of times obtained by the various methods. The greatest source of error by far is spatial variations in thin cloud that act differentially on variable and comparison in a random way (see comments below). Other effects are imperfect flat-fielding (and the drifting of stars on the image), non-linearity from the anti-blooming gate, limitations in the length of observing run (by dawn or dusk, clouds or other problems), and miscellaneous noise in data reduction. Unless otherwise noted, the identification of the type of minimum was from Samolyk (1999).

The light curve for Z Dra is shown in Figure 1. Over the last nine data points, the absorption by thin clouds increased to 0.25 magnitudes.

The light curve for ST Per is shown in Figure 2. Absorption by thin clouds was less than (or constant to) 0.06 magnitudes.

The light curve for VX Lac is shown in Figure 3. Here the sky was photometric up to JD 0.72; the absorption by clouds increased by 2 magnitudes in the interval from JD 0.72 to about 0.74; it remained constant (with fluctuations) thereafter. In solving for the time of minimum, one of the methods was to fit the reflected (smooth) descending portion of the curve to the noisy ascending part by least squares; the JD of the reflection axis agreed with mean of times of minimum obtained by other methods to 0.0001 days.

This combination of a 61-cm telescope and a moderately priced unfiltered CCD camera has yielded some good to excellent light curves around times of minima, some taken in marginal conditions. With less than photometric skies, the method is clearly superior to single-channel photometry (see Nelson, 1998) where no results would be possible at all. In the case of photometric skies, very accurate times of minimum (to a precision of a few seconds) can and have been determined.

It is a pleasure to acknowledge the assistance of the AAVSO Eclipsing Binary Ephemeris, (prepared each year by Gerald Samolyk) which greatly helped the author plan observing sessions. Thanks are also due to Dr. Michael Newberry who has developed a fine CCD data reduction and analysis tool in MIRA and has responded promptly to problems and suggestions for improvement. The author is also a Guest User, Canadian Astronomy Data Centre, which is operated by the Dominion Astrophysical Observatory for the National Research Council of Canada's Herzberg Institute of Astrophysics.

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Bell, S.A., et al., 1990, *MNRAS*, **247**, 632
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Henden, A.A., & Kaitchuck, R.H., 1982, Astronomical Photometry, Van Nostrand Reinhold: New York
Keskin, V. & Pohl, E., 1989, *IBVS*, No. 3355
Kwee, K.K., & van Woerden, H., 1956, *B.A.N.*, **12**, (464), 327
Nelson, R.H., 1998, *IBVS*, No. 4621
Pribulla, T., Chochol, D., & Parimucha, S., 1999, *IBVS*, No. 4751
Samolyk, G., 1999, AAVSO EB Ephemeris

ERRATUM FOR IBVS 4840

In IBVS 4840, the correct time of minimum for AG Vir should be 51281.8282 ± 0.0006 (the original value reported was out by one hour).

Nelson, Robert H.

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REVISED ASTROMETRY OF VARIABLE STARS (2)

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This report describes the revised astrometry and identifications of 31 variable stars discovered in the course of variable star survey based on the MISAO Project observations.

These objects are detected automatically by the PIXY system as candidates of new variable stars from unfiltered CCD images taken by Kadota between 1999 April and August, and a few in 1998 December and 1999 February. Further details are the same as described in Yoshida and Kadota (1999). They are more than 5 arcsec away from the cataloged position. But no other variable objects are found on our images to be identified with around the cataloged position. Therefore we concluded these identifications.

Table 1 shows the astrometry, photometry and identifications. The magnitudes represent the observed range by our observations. The positions and magnitudes are measured using the USNO-A1.0 catalog. The magnitude is based on a preliminary V magnitude calculated from R and B magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

The identification of V1862 Sgr is recorded in SS1-158, but we also confirmed it based on the variability.

At the position of V338 Oph in the original GCVS, there is a red star USNO-A2.0 0600.23362015, however, it does not look variable on our unfiltered CCD images on Apr. 14 and Aug. 1, 1999. Therefore, we concluded our variable star USNO-A2.0 0600.23365338, just besides of USNO-A2.0 0600.23362015, is the true V338 Oph.

References:

Kato, T., 1998,
`http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-chat/msg00700.html`

Yoshida, S., Kadota, K., 1999, *IBVS*, No. 4746

Table 1: Revised Astrometry and Identifications

Star	R.A. (J2000.0)	Decl.	Unfiltered CCD Mag.		Identified with
			Max.	Min.	
V338 Oph	$17^{h}03^{m}11^{s}.368$	$-29^{\circ}00'25''.95$	11.5	13.6	USNO-A2.0 0600.23365338
V1055 Oph	16 57 51.990	−09 32 30.59	9.2	10.6	USNO-A1.0 0750.10238519
V1149 Oph	16 58 08.972	−19 37 36.24	10.8	13.5	USNO-A1.0 0675.11568832
V1170 Oph	16 59 20.153	−20 59 18.40	10.9	12.5	USNO-A2.0 0675.17300460
V1221 Oph	17 01 24.231	−21 57 39.44	11.5	14.1	USNO-A2.0 0675.17461742
V2098 Oph	17 01 49.923	−23 11 32.54	10.6	11.6	GSC 6811.0637 USNO-A2.0 0600.23154617
V2207 Oph	17 00 13.226	−10 37 00.34	10.0	12.3	USNO-A2.0 0750.10252195
RY Sge	19 58 28.493	+16 47 58.57	10.6	12.6	USNO-A1.0 1050.16240370
WW Sgr	18 23 05.769	−27 25 31.09	10.8	12.3	USNO-A1.0 0600.17113538
AX Sge	19 59 27.053	+19 43 21.40	12.6	13.5	USNO-A1.0 1050.16312877
V1156 Sgr	19 02 19.871	−18 31 32.07	12.2	13.3	USNO-A1.0 0675.19132286
V1725 Sgr	17 59 48.14	−31 16 03.4	8.5	9.3	
V1862 Sgr	18 21 57.873	−27 25 20.65	12.3	13.0	GSC 6852.2549 USNO-A1.0 0600.16938944
V2080 Sgr	18 58 31.129	−17 02 31.00	12.1	12.8	USNO-A1.0 0675.18868180
V2081 Sgr	18 59 02.881	−17 44 37.99	10.6	11.4	USNO-A1.0 0675.18904777
V2089 Sgr	19 00 44.61	−19 48 07.6	11.9	12.8	
V2093 Sgr	19 01 17.62	−18 54 28.7	13.4	14.2	
BI Sct	18 57 27.834	−07 31 27.84	9.2	11.4	GSC 5706.0279 USNO-A1.0 0750.15834323
BK Sct	18 57 51.549	−08 23 17.89	12.6	13.7	USNO-A1.0 0750.15878118
BO Sct	18 58 48.725	−10 13 51.90	10.9	13.1	USNO-A1.0 0750.15976559
V346 Sct	18 57 32.34	−06 14 39.5	11.6	13.6	
V362 Sct	18 58 24.12	−07 38 51.9	12.1	13.5	
XX Vul	19 21 01.19	+24 59 32.5	10.3	12.3	
AC Vul	18 59 55.751	+25 10 38.07	10.8	11.6	GSC 2126.1655 USNO-A2.0 1125.11009095
AL Vul	18 59 15.953	+24 34 04.33	10.7	13.1	USNO-A2.0 1125.10973373
AN Vul	19 02 17.839	+25 19 00.80	13.2	14.0	USNO-A2.0 1125.11137255
AO Vul	19 02 37.757	+24 33 26.62	13.6	14.4	GSC 2126.1873 USNO-A2.0 1125.11155842
DE Vul	19 57 52.889	+23 37 29.90	9.6	10.4	GSC 2141.1329 USNO-A1.0 1125.14971709
DH Vul	19 59 14.355	+22 01 13.35	11.6	13.7	USNO-A1.0 1050.16297131
DQ Vul	20 00 03.005	+22 46 52.36	11.1	12.4	USNO-A1.0 1125.15070167
V341 Vul	19 21 45.158	+24 43 17.86	10.7	12.9	USNO-A1.0 1125.12467703

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NEW VARIABLE STARS DISCOVERED IN THE MISAO PROJECT VII: MisV0351–MisV0400

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This report describes 50 new variable stars (MisV0351–MisV0400) discovered in the course of the MISAO Project.

These objects are detected automatically by the PIXY system as candidates of variable stars from unfiltered CCD images taken by Kadota between 1999 April and August, then confirmed by Yoshida and Kadota. Further details are the same as described in Yoshida and Kadota (1999).

Table 1 lists the 50 new variable stars. The position and magnitude are measured using the USNO-A1.0 catalog. The magnitude is based on a preliminary V magnitude calculated from R and B magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

The finding charts are available electronically as 4842-f[nnn].eps, where [nnn] refers to the serial number assigned to the star in the first column of Table 1.

MisV0360 is identified with a carbon star CS4603.

MisV0372 is within the positional error range of an X-ray source 1RXPJ180245-2942.3 at R.A. $18^{\rm h}02^{\rm m}45\overset{\rm s}{.}6$, Decl. $-29^\circ 42' 20''$ (2000.0).

V2084 Sgr is 3.7 arcmin from MisV0391, that was detected on Kadota's unfiltered CCD images as another variable star between 9.8 and 10.8 mag. Therefore, MisV0391 is another new variable star.

NSV 12730 is 2.8 arcmin from MisV0393, that was detected as another variable star between 11.2 and 12.0 mag. Therefore, MisV0393 is another new variable star.

The photometry of MisV0395 was obtained as NGC 6194 No. 1130, which shows it is a red star (Mermilliod et al. 1994).

References:

Kato, T., 1998,
`http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-chat/msg00700.html`

Mermilliod, J.-C., Mermilliod, M., 1994, *Catalogue of Mean UBV Data on Stars*, Springer-Verlag

Yoshida, S., Kadota, K., 1999, *IBVS*, No. 4746

Table 1: List of New Variable Stars

Code	R.A. (J2000.0)	Decl.	Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0351	$19^{h}00^{m}53^{s}.82$	$+00^{\circ}06'24''.0$	12.5	14.3	?	USNO-A2.0 0900.13750040
MisV0352	19 02 04.41	+00 15 42.7	13.0	14.6	?	
MisV0353	19 57 35.03	+37 14 50.6	12.6	[14.8	M?	USNO-A2.0 1200.13953227
MisV0354	19 58 32.16	+36 49 40.0	12.9	[14.8	SR?	
MisV0355	19 58 41.95	+29 56 07.6	12.8	14.1	?	
MisV0356	19 58 55.32	+11 07 03.3	12.0	12.9	SR?	GSC 1075.0782
MisV0357	19 59 13.95	+15 30 44.7	12.9	13.7	?	USNO-A2.0 1050.15923840
MisV0358	20 00 26.70	+33 55 11.3	13.2	14.9	?	
MisV0359	20 00 32.83	+13 13 28.0	12.9	13.8	?	USNO-A2.0 0975.17499216
MisV0360	20 00 37.57	+32 05 42.1	12.0	12.9	SR?	CS4603
MisV0361	20 01 05.88	+22 01 58.6	12.9	14.6	?	USNO-A2.0 1050.16056563
MisV0362	21 00 50.95	+40 30 41.2	13.1	14.8	?	
MisV0363	22 04 39.25	+53 35 29.7	12.7	14.0	SR?	USNO-A2.0 1425.12761422
MisV0364	22 03 05.68	+42 44 07.6	10.5	11.8	SR?	USNO-A2.0 1275.16948498 IRAS 22010+4229
MisV0365	16 57 22.34	−16 24 08.3	13.2	15.2	?	
MisV0366	20 56 10.02	+46 34 53.0	13.1	14.9	?	
MisV0367	21 58 33.33	+50 34 52.1	12.3	13.3	SR?	USNO-A2.0 1350.15460187
MisV0368	21 58 56.65	+55 13 36.5	12.6	13.4	SR	USNO-A2.0 1425.12612175
MisV0369	19 00 11.85	−02 57 24.4	10.8	13.6	SR?	IRAS 18575-0301
MisV0370	19 01 05.00	−03 10 48.7	11.0	13.2	SR?	IRAS 18584-0315
MisV0371	18 57 32.71	−18 55 17.2	13.8	15.2	SR?	
MisV0372	18 02 43.69	−29 42 14.8	11.9	[14.4	M?	
MisV0373	20 57 09.29	+35 18 44.2	11.0	12.7	?	GSC 2696.3197 USNO-A2.0 1200.16576581 IRAS 20552+3507
MisV0374	21 02 34.30	+38 12 33.2	12.9	14.1	?	USNO-A2.0 1275.14555028
MisV0375	16 59 59.33	−09 33 01.0	13.0	[15.0	SR?	

Table 1: cont.

Code	R.A. (J2000.0)	Decl.	Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0376	17 57 31.45	−15 38 16.3	13.3	[14.4	?	USNO-A2.0 0675.23576359 IRAS 17546-1537
MisV0377	17 58 11.26	−17 25 42.9	13.0	[14.3	?	IRAS 17553-1725
MisV0378	17 58 12.45	−13 40 42.1	13.1	[14.5	?	IRAS 17553-1340
MisV0379	17 58 54.36	−14 51 52.8	12.2	[14.6	M?	USNO-A2.0 0750.12439396
MisV0380	17 59 05.61	−16 55 33.0	12.8	[14.4	?	
MisV0381	$17^{\mathrm{h}}59^{\mathrm{m}}15\overset{\mathrm{s}}{.}91$	$-12^{\circ}07'17\overset{''}{.}7$	13.2	14.4	SR?	USNO-A2.0 0750.12451923
MisV0382	17 59 36.49	−16 19 33.8	12.1	[14.5	?	
MisV0383	17 59 38.83	−15 57 57.9	12.9	14.4	SR?	
MisV0384	18 00 49.76	−16 12 54.4	13.0	[14.5	?	USNO-A2.0 0675.23803931
MisV0385	18 00 55.03	−14 38 28.6	12.3	14.2	SR?	
MisV0386	18 01 25.89	−14 56 30.8	13.2	[14.6	SR?	USNO-A2.0 0750.12524613
MisV0387	18 02 06.82	−16 24 44.9	12.5	[14.4	?	USNO-A2.0 0675.23888438 IRAS 17592-1625
MisV0388	18 02 11.87	−11 40 01.7	11.4	13.6	?	IRAS 17593-1140
MisV0389	18 30 44.94	+03 45 22.2	11.1	12.1	?	USNO-A2.0 0900.13032893 IRAS 18282+0343
MisV0390	18 58 59.01	−15 48 10.5	13.1	15.3	?	USNO-A2.0 0675.30915787
MisV0391	18 59 27.21	−13 51 22.9	13.2	14.5	SR?	IRAS 18565-1355
MisV0392	19 58 06.32	+36 59 09.9	12.6	[15.0	M?	
MisV0393	20 02 20.39	+37 18 01.1	13.1	14.6	SR?	USNO-A2.0 1200.14247813
MisV0394	17 00 52.60	−02 28 35.2	12.6	13.9	?	USNO-A2.0 0825.09947996 IRAS 16582-0224
MisV0395	17 56 57.17	−18 52 12.6	13.2	[14.2	?	IRAS 17540-1851
MisV0396	17 57 01.97	−14 23 09.7	11.6	12.8	SR?	USNO-A2.0 0750.12377050 IRAS 17541-1422
MisV0397	17 57 42.00	−20 13 38.5	13.1	14.2	?	IRAS 17547-2013
MisV0398	17 57 48.50	−17 30 34.7	12.5	16.3	?	IRAS 17548-1730
MisV0399	17 57 46.44	−10 53 53.6	12.3	[14.7	M?	IRAS 17550-1053
MisV0400	17 57 49.35	−13 34 05.3	12.9	14.0	?	IRAS 17550-1333

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MIS-IDENTIFICATION OF V854 OPHIUCHI

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This report discusses on the suggested identification of the emission-line star Stephenson No. 141 with V854 Oph.

V854 Oph was classified as a Mira-type variable star with a photographic brightness variation between 11–16 mag and a period of 352 days in the GCVS. One of the emission-line stars discovered by Stephenson, No. 141 is remarked to be identified with V854 Oph (Stephenson 1986). There is a star USNO-A2.0 0750.10233498, R.A. $16^{\mathrm{h}}59^{\mathrm{m}}11\overset{\mathrm{s}}{.}965$, Decl. $-13°30'37''.41$ (2000.0), 11.8 mag (R), 14.5 mag (B), at the cataloged position of Stephenson No. 141 in the USNO-A2.0 catalog. We observed it in the course of the MISAO Project variable star survey (Yoshida and Kadota 1999) and found that the identification is probably erroneous.

Table 1 shows the photometry of Stephenson No. 141. The CCD images were taken by KenIchi Kadota in 1999 with a 300-mm camera lens and 0.16-m $f/3.3$ reflector. The magnitude is measured automatically by the PIXY system using the USNO-A1.0 catalog based on a preliminary V magnitude calculated from R and B magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

The brightness keeps around 13.4 mag and no evident variability was detected at all within six months. This conflicts with the typical feature of a Mira-type variable star.

Within 10 arcmin from this star, no other variable star was found on the images except for one of our new variable stars, MisV0005 (Yoshida and Kadota 1999), = USNO-A1.0 0750.10268837, R.A. $16^{\mathrm{h}}59^{\mathrm{m}}28\overset{\mathrm{s}}{.}077$, Decl. $-13°23'14''.08$ (2000.0), 15.5 mag (R), 19.6 mag (B). Figure 1 shows the chart of Stephenson No. 141 and MisV0005. Table 2 shows the photometry of MisV0005, which implies that this variable star is changing its brightness slowly, so it is possibly a red semiregular variable. The magnitude data in the USNO-A1.0 catalog also implies it is a red star. These facts do not conflict with the cataloged type of V854 Oph. Therefore, this star may be the true V854 Oph, despite the large angular distance from the cataloged position.

Table 1: Photometry of Stephenson No. 141

JD	Mag
2451208.341	13.3
2451277.219	13.4
2451307.186	13.3
2451392.029	13.5

Table 2: Photometry of MisV0005

JD	Mag
2451208.341	12.5
2451277.219	13.8
2451307.186	13.9
2451392.029	12.2

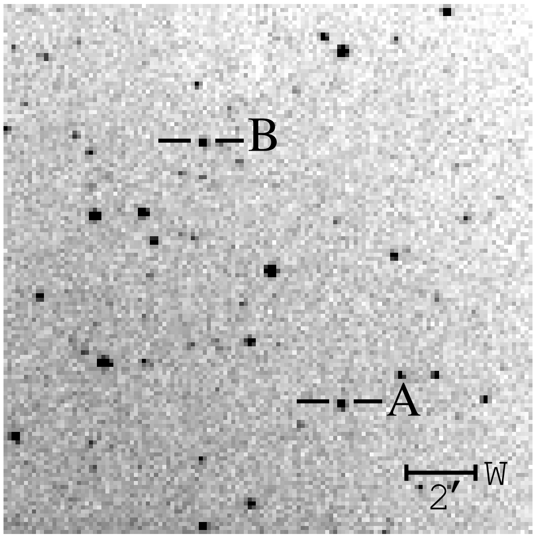

Figure 1. A: Stephenson No. 141, B: MisV0005

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GSC 4832.400: A NEW ECLIPSING BINARY SYSTEM

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Name of the object:
GSC 4832.400

Equatorial coordinates:	**Equinox:**
R.A.= $07^{\mathrm{h}}50^{\mathrm{m}}45\overset{\mathrm{s}}{.}4$ **DEC.=** $-00°00'10''\!.9$	2000.0

Observatory and telescope:
Observatorio del Departamento de Física de la Universidad de Extremadura, Reflector Newton 0.4-m $f/4.5$

Detector:	Starlight Xpress CCD Camera (based in the chip SONY ICX027BL 6.4×4.35 mm^2, 500×256 pixels)
Filter(s):	V (Kron–Cousins system)
Comparison star(s):	GSC 4832.2073
Check star(s):	GSC 4832.912
Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	EW

Table 1

Min HJD 2451000+	Type	Epoch	$O-C$
1242.3875	Secondary	0.5	0.0008
1243.3266	Secondary	3.5	0.0005
1244.4210	Primary	7	−0.0012
1254.4450	Primary	39	0.0020
1256.3233	Primary	45	0.0014

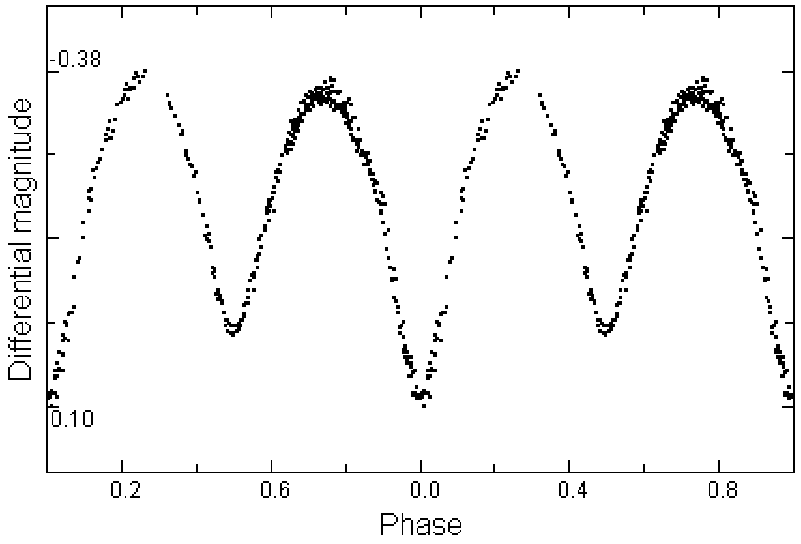

Figure 1. The V light curve obtained for GSC 4832.400. Magnitude differences (variable minus comparison) are plotted versus phase, where the phases are computed using the ephemeris calculated in this work.

Remarks:

The result of this surveillance program showed that GSC 4832.400 is an eclipsing binary system with a period very close to 7.5 hours. Figure 1 shows the differential light curve obtained in the V band. This light curve suggests that GSC 4832.400 could be a near contact binary system. The primary minimum shows $0\overset{\mathrm{m}}{.}43$ average depth, and the secondary minimum $0\overset{\mathrm{m}}{.}37$. The light curve in the V band also seems to show an O'Connell effect (O'Connell 1951), that amounts to $\Delta m = \mathrm{Max.\ I} - \mathrm{Max.\ II} = -0.035$ magnitudes, where Max. I is at phase 0.25 and Max. II at phase 0.75.

Five moments of minima (two secondaries and three primaries) were obtained from our observations according to the Kwee–Van Woerden (1956) method. The following ephemeris was derived for the minimum I:

$$\begin{array}{rl}\mathrm{Min.\ I} = \mathrm{HJD}\ 2451242.23011 & +\ 0\overset{\mathrm{d}}{.}31315 \times E. \\ \pm\ 0.00067 & \pm\ 0.00001\end{array}$$

The times of minima are presented in Table 1. The number of cycles elapsed (E) and $O-C$ residual values are also listed, determined using the ephemeris given above.

Acknowledgements:

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V949 SAGITTARII IS NOT A NOVA BUT A RED VARIABLE

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This report describes the non-cataclysmic variability of V949 Sgr, nova in 1914.

In the course of variable star survey based on the MISAO Project observations, the variability of GSC 6870.1383 = USNO-A2.0 0600.36532866 = IRAS 18379-2812, R.A. = $18^{\rm h}41^{\rm m}03\overset{\rm s}{.}101$, Decl. = $-28^\circ09'35\overset{\prime\prime}{.}61$ (2000.0), 12.0 mag(R), 18.8 mag(B), was discovered from unfiltered CCD images taken by Kadota and named as MisV0508. It is within only 12 arcsec from the cataloged position of V949 Sgr, a nova in 1914.

In the course of observations of the field of V949 Sgr for recovery with the University of Iowa Robotic Telescope by Schmeer, this object was discovered as a 12 mag star and the slow variability was also confirmed.

Table 1: Photometry

JD	Mag	Observer	Instrument	Comparison Star Catalog
2448412	12.2	Kato	I-band CCD	USNO-A1.0 (Kato's V mag)
2451375.087	11.5	Kadota	Unfiltered CCD	USNO-A1.0 (Kato's V mag)
2451429.628	12.0	Schmeer	Unfiltered CCD	USNO-A2.0 (R)
2451444.943	13.3	Kadota	Unfiltered CCD	USNO-A1.0 (Kato's V mag)
2451453.607	12.4	Schmeer	Unfiltered CCD	USNO-A2.0 (R)
2451461.601	12.6	Schmeer	Unfiltered CCD	USNO-A2.0 (R)
2451477.622	13.0	Schmeer	Unfiltered CCD	USNO-A2.0 (R)
2451490.599	13.2	Schmeer	Unfiltered CCD	USNO-A2.0 (R)
2451501.571	13.3	Schmeer	Unfiltered CCD	USNO-A2.0 (R)

Table 1 shows our photometry. Although the magnitude system is different, it evidently shows the slow variability in 1999. It was also bright on the I-band CCD images taken on June 4, 1991 at Ouda Station, Kyoto University. These facts imply that the recent brightening is not an outburst of a recurrent nova, but a semiregular variability.

This object is relatively faint on Duerbeck's finding chart from a UK Schmidt blue-green plate (Duerbeck 1987), but bright on the DSS image at 2446934.278 (JD). The difference between R and B magnitude data in the USNO-A2.0 catalog, taken in 1980 August and 1976 May respectively, also implies that this object is very red or variable. Therefore, this object is probably a non-cataclysmic red variable star.

V949 Sgr is a nova discovered by Innes, Johannesburg Observatory, in 1914 (Duerbeck 1987). But it was only found on the three plates taken between July 16 and 25. No spectroscopic observations were obtained in order to confirm V949 Sgr as a nova. In addition, the peak photographic magnitude was 15.7 in 1914, which well coincides with our observations.

As a conclusion, our variable star and V949 Sgr are the same object, and V949 Sgr is not a nova, but a non-cataclysmic red variable, probably a Mira- or semiregular type.

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THE RV TAURI STAR V6 IN GLOBULAR CLUSTER M56

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The RV Tauri stars are a small group of radially pulsating yellow supergiants. The main observational feature of these stars is "the alternation of shallow and deep minima" in the light curve. Their periods, determined as an interval between two adjacent deep minima, fall in the range from 30 to 150 days. They are located between W Virginis stars and long-period variables in the instability strip of the H–R diagram. According to Jura (1986) RV Tauri stars are low-mass objects in a transition from the asymptotic giant branch (AGB) to the white dwarf phase. This post-AGB phase of stellar evolution is rather short by normal stellar standards (a few thousand years), which is consistent with the relatively small number of RV Tauri variables. While in our Galaxy about 120 such variables are known (Kholopov, 1985), there are only six stars classified as RV Tauri in the globular clusters listed in The Third Catalogue of Variable Stars in Globular Clusters (Sawyer Hogg, 1973). They are V1ωCen, V84M5, V17M28, V6M56, V2M10 and V11M2.

V6M56 is one of the brightest stars in the globular cluster M56 (NGC 6779) and one of the first identified as an RV Tauri star in a globular cluster. It was discovered by Helen Sawyer Hogg in 1940 (Sawyer, 1940), who suggested a 51-day period of the star (Sawyer, 1942). Later, using his own observations, Rosino (1944) suggested a 45.33-day period. Sawyer (1949) showed that V6M56 is an RV Tauri star with a period of 90.02 days. Up to now the most extensive investigations of this star were made by Wehlau and Sawyer Hogg (1985) and Wehlau et al. (1985).

The spectral type (F6-G4e) and the radial velocity of V6M56 were first determined by Joy (1949). Preston et al. (1963) in their classic paper on RV Tauri stars suggested that the star belongs to the Preston type C.

Our observations of V6M56 cover about 17 years, from 1977 to 1993. The variable star was observed with the 60-cm reflector of the Belogradchic Astronomical Station (Bulgaria) between 1977 and 1978 (31 observations on 14 nights) and with the 2-m telescope of the BNAO Rozhen (Bulgaria) from 1981 to 1993 (71 observations on 25 nights). The photometric system is near the B one, as was described in the paper on the red variable stars in M56 (Russeva, 1999). Table 1 lists the B magnitudes of the variable V6M56. The Belogradchic plate numbers are prefixed with 'B' and the Rozhen ones with 'R'. The fourth column gives the numbers of observations per night.

In addition to the present observational material we have used the B measurements by Wehlau and Sawyer Hogg (1985) and Rosino (1944) in order to investigate the period change in V6M56 through $O-C$ analysis. The available data consist of 653 measurements,

Table 1: A list of B observations of V6M56.

PL No.	JDH 24...	B	n
B 53	43305.561	13.22	1
B 62	43308.542	13.78	1
B 76	43365.396	14.09	1
B 82-83	43366.406	14.15	2
B 89	43368.370	14.04	1
B 96-98	43664.511	13.32	3
B104-06	43667.518	13.35	2
B115	43669.416	13.42	1
B122	43672.436	13.67	1
B134-39	43720.485	13.92	6
B141-45	43721.478	14.00	5
B148-52	43722.453	13.39	5
B157	43723.405	14.02	1
B161	43724.361	14.13	1
R210	44787.527	13.36	1
B210	44818.416	13.00	1
B216-18	44843.436	14.60	3
B219-20	44845.461	14.65	2
B223	44846.426	14.73	1
B224-28	44848.427	14.73	4
B231	44849.370	14.72	1
B233	44850.366	14.73	1
R242-44	45112.480	14.62	2
R247-48	45113.519	14.64	2
R251	45114.500	14.52	1
R255	45171.428	13.05	1
R259-62	45172.480	13.02	3
R265-66	45173.485	13.00	2
R554-61	45470.556	14.60	2
R575	45523.437	13.41	1
R833-36	45938.463	13.60	4
R957-65	46230.451	13.94	9
R969-75	46231.456	14.00	7
R1037	46271.476	14.54	1
R1520-25	47739.441	14.50	6
R1667-69	48091.439	14.46	3
R1677-80	48096.462	14.83	4
R1822	48419.468	13.29	1
R1976-81	49161.470	14.82	6
R1982-89	49162.560	14.87	5
R1993-96	49163.458	14.90	4

covering about 59 years, from 1934 to 1993 (JDH2428015 - 2449163). The analysis of all observations permitted the construction of 14 seasonal light curves using the following elements:

$$\text{Primary Min.} = \text{JDH } 2428016.8 + 90\overset{\mathrm{d}}{.}0 \times E.$$

Then we determined the times of primary (deep) and secondary (shallow) minima and corresponding $O-C$ values for each one of the seasonal light curves. The average error is $\pm 0\overset{\mathrm{d}}{.}05$.

Fig. 1a shows the $O-C$ diagram for the two minima, the primary (lower graph) and the secondary (upper graph), respectively. The change of the period, assuming a linear variation, is -0.000005 days/yr, which is less than the expected possible effect of the stellar evolution. According to the linear non-adiabatic calculations of Tuchman et al. (1993) the periods of RV Tauri stars should be decreasing with a measurable rate between -0.3 and -0.001 days/yr. Also Fig. 1a might be fitted with a wave function with a period of about 28879 days and an amplitude of 5-6 days. But this interpretation is quite doubtful, because there are no observations during 14 years (from JDH 2434992 to JDH 2440057). Fig. 1a allowed us to establish that the period $P = 90\overset{\mathrm{d}}{.}0$ remains stable and presents the fundamental period of V6M56. Therefore Fig. 1a indicates that $O-C$ diagrams for the two minima are dominated by the effects of random, cycle-to-cycle fluctuations of the period.

The $O-C$ diagram for the times of the deep minima in the light curve is shown in Fig. 1b. The diagram clearly shows a cyclic variation. It is a reflection of periodic changes, manifested by the alternation of the deep and shallow minima in the role of primary minimum. It seems that the change of the minima do not happen suddenly, and

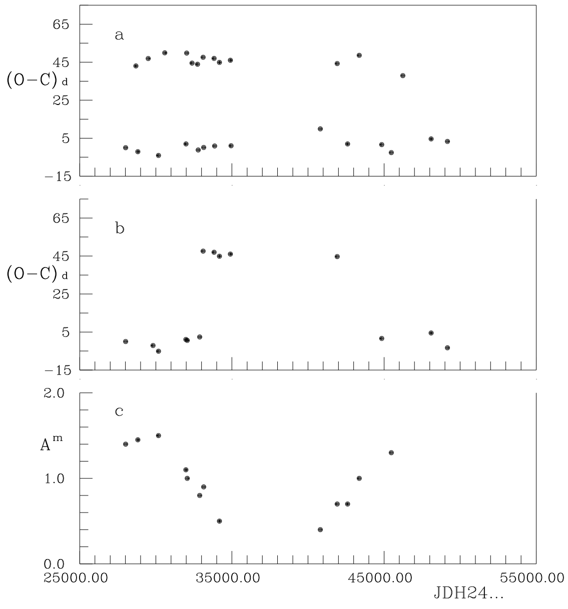

Figure 1. The O-C diagrams of V6M56 (a, b). The amplitude variation of the deep minimum (c).

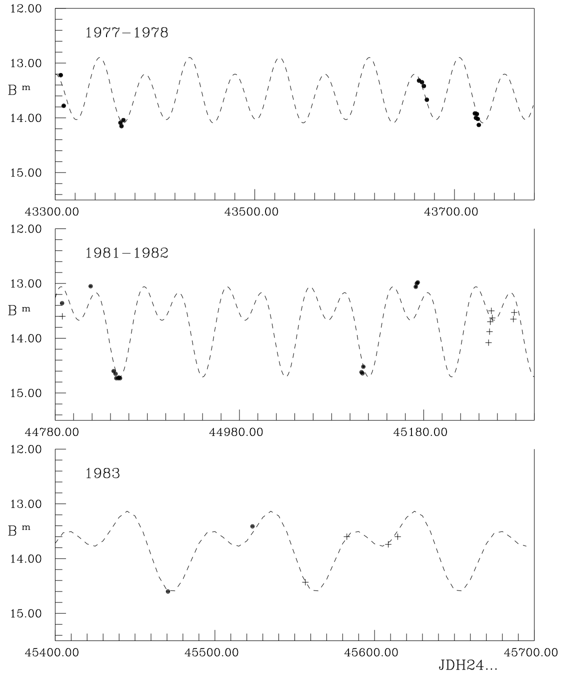

Figure 2. The blue light curves of V6M56. The dashed lines show theoretical ones.

for a few (4) cycles the depth of the minima varies only slightly.

The amplitude variation of the deep minimum is shown in Fig. 1c. The result of a least-squares sine fit is a wave with a cycle length of about 18000 days (200 formal periods of the star) and an amplitude of $1\overset{\mathrm{m}}{.}4$. It is possible to interpret the $O-C$ diagram (Fig. 1b) with the same wave function but it is rather inaccurate. As mentioned above, the variable was observed quite irregularly and the data are sparse.

V17M28, one of the six RV Tauri stars in the globular clusters, has a period $P = 91\overset{\mathrm{d}}{.}7$ close to the period of V6M56. The comparison shows: (1) V17 M28 belongs to the most metal-rich ([m/H] = −1.1 (Smith and Wehlau, 1985)) and V6M56 belongs to the most metal-poor ([m/H] = −2.32 (Webbink, 1985)) known clusters containing such vaiables. (2) The light curve of V17M28 exhibits larger differences in the amplitude during the years of observations (Wehlau et al., 1986), than those observed for V6M56. This confirms the suggestion that RV Tauri stars are not a homogeneous class at all, in agreement with the conclusions of Russell (1997) for the RV Tauri variables in the galactic field. The evolutionary status of these stars is still uncertain, but probably slightly different initial masses or metallicities may cause the RV Tauri phenomenon to occur for stars at several different stages of AGB (or post-AGB) evolution.

The recent non-linear hydrodynamical calculations of Fokin (1994) are made for models with low-mass (0.60 $M_\odot$) and luminosity ($3123 < L/L_\odot < 7000$). He supports the long-standing resonance hypothesis by revealing 2:1 ratio for the fundamental mode and the first overtone. These models describe the RV Tauri behaviour of the stars with periods between $52\overset{\mathrm{d}}{.}0$ and $93\overset{\mathrm{d}}{.}8$. Since the fundamental period of pulsation of V6M56 is practically constant, we suggest that in V6M56 two pulsational modes get excited simultaneously – the fundamental one with $P_\circ = 90^{\mathrm{d}}$ and the first overtone with $P = 1/2P_\circ$. In Fig. 2 parts of some seasonal light curves are shown. Fig. 2a and 2b are constructed using the data from Table 1 (dots) and from Table 1 of Wehlau and Sawyer Hogg (1985) (crosses). The dashed lines show the theoretical light curves obtained with least squares fitting functions for each of the intervals:

$$B = a_i + b_i \sin \omega_0 t + c_i + d_i \sin \omega_1 t + e_i,$$

where $\overline{a_i} = 13.67 \pm 0.08$, $\overline{b_i} = 0.22 \pm 0.10$, $\overline{c_i} = 2.71 \pm 2.00$, $\overline{d_i} = 0.47 \pm 0.02$, $\overline{e_i} = 1.14 \pm 0.34$.

This interpretation satisfactorily explains the alternating behaviour of the different season light curves. Obviously these two periods are not enough to describe the whole long series of observations. It appears that some parameters other than these must be acting here.

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NEW PHOTOELECTRIC LIGHT CURVES OF VW CEPHEI

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VW Cep (BD +75°752, HD 197433, SAO 9828) is a W-type W UMa system with chromospherically-active components of G5V and G8V spectral types. The apparent brightness $V_{\max} \approx 7.3$ mag, short period ($P \approx 0.27832$ days) and pronounced variations of its light curve, make the system a frequent target of photometric observations. The orbital period varies both due to the presence of a third body (Hershey, 1975) and intrinsic physical processes in the eclipsing binary. The starspot model seems to be most probable for explanation of the enhanced light-curve variations (Yamasaki, 1982; Linnel, 1986, 1991; Hendry et al., 1992).

The U, B, V and R photoelectric photometry was performed over 11 nights from September 1998 to January 2000 at the Stará Lesná (SL) and Skalnaté Pleso (SP) Observatories of the Astronomical Institute of the Slovak Academy of Sciences. The 0.6-m Cassegrain telescope equipped with a single-channel pulse-counting photoelectric photometer was used. The journal of observations is listed in Table 1. For all observations a 10-second integration was chosen. SAO 9836 was used as a comparison star (Table 2). Its stability was checked on two nights (September 9 and 14, 1999) with respect to three other stars. The comparison star was found to be stable within 0.01 mag. The magnitudes of comparison stars S1, S2 and CH, calculated using the average of the published magnitudes of S5 (see: `http://obswww.unige.ch/gcpd/gcpd.html`), are given in Table 2. Their mean errors are lower than 0.008 mag. Data reduction, the atmospheric extinction correction and transformation to the standard system were carried out in the usual way.

We have calculated the times of minima separately for all three filters using the Kwee and Van Woerden's method, parabola fit, sliding integration method, tracing paper and "centre of mass" method which were described in detail by Ghedini (1982). The computer codes were kindly provided by Dr. R. Komžík (1999). The minima times prior to August 1999 have been already published (Pribulla et al., 1999). The average times of the primary (I) and secondary (II) minima and their probable errors found by these methods are given in Table 3. Average times of the minima from U, B, V and R passbands were used to determine the ephemeris valid throughout our photometry. Not weighted least squares fitting led to the following ephemeris:

$$\text{Min (I)} = \text{HJD}\ 2\,451\,067.\underset{\pm\,6}{2820} + 0\overset{\mathrm{d}}{.}\underset{\pm\,5}{2783140} \times E. \tag{1}$$

Table 1: Journal of photometric observations.

Date	HJD$_{\rm mean}$ 2400000 +	Phases	Filters	Obs.
1998 Sep 10	51067.462	0.189 – 1.118	UBV	SL
1998 Dec 2	51150.367	0.461 – 1.598	UBV	SL
1998 Dec 3	51151.311	0.642 – 1.214	UBV	SL
1999 Jul 18	51378.464	0.826 – 1.347	UBV	SL
1999 Aug 8	51399.423	0.037 – 0.768	UBV	SL
1999 Aug 28	51419.321	0.843 – 1.984	UBV	SL
1999 Sep 3	51425.363	0.358 – 0.864	UBV	SL
1999 Sep 14	51436.514	0.250 – 0.986	UBV	SL
1999 Nov 29	51512.422	0.156 – 0.727	BV	SL
1999 Dec 6	51519.272	0.774 – 1.292	BV	SL
2000 Jan 12	51556.269	0.687 – 1.114	BVR	SP

Table 2: Comparison stars and their magnitudes

Star	SAO	HD	V	$B-V$	$U-B$	Sp.
S1	9836	197665	7.07	0.38	0.11	F2
S2	9841	197750	8.11	1.19	1.21	K0
CH	9824	197306	8.67	1.04	0.63	K0
S5	9899	199476	7.81	0.69	0.16	G5

Table 3: New times of minima of VW Cep

JD$_{\rm hel}$ 2400000 +	σ	Type	Filter
51399.4496	0.0001	II	U
51399.4502	0.0001	II	B
51399.4505	0.0001	II	V
51436.4639	0.0001	II	U
51436.4637	0.0002	II	B
51436.4641	0.0006	II	V
51512.3080	0.0005	I	B
51512.3057	0.0005	I	V
51512.4480	0.0006	II	B
51512.4466	0.0004	II	V
51519.26293	0.00006	I	B
51519.26298	0.00012	I	V
51556.2784	0.0002	I	B
51556.2782	0.0001	I	R

All individual U, B and V observations are plotted in Fig. 1, using ephemeris (1). These data sets can be freely downloaded from address:

`http://www.ta3.sk/parimuch/archive.html`.

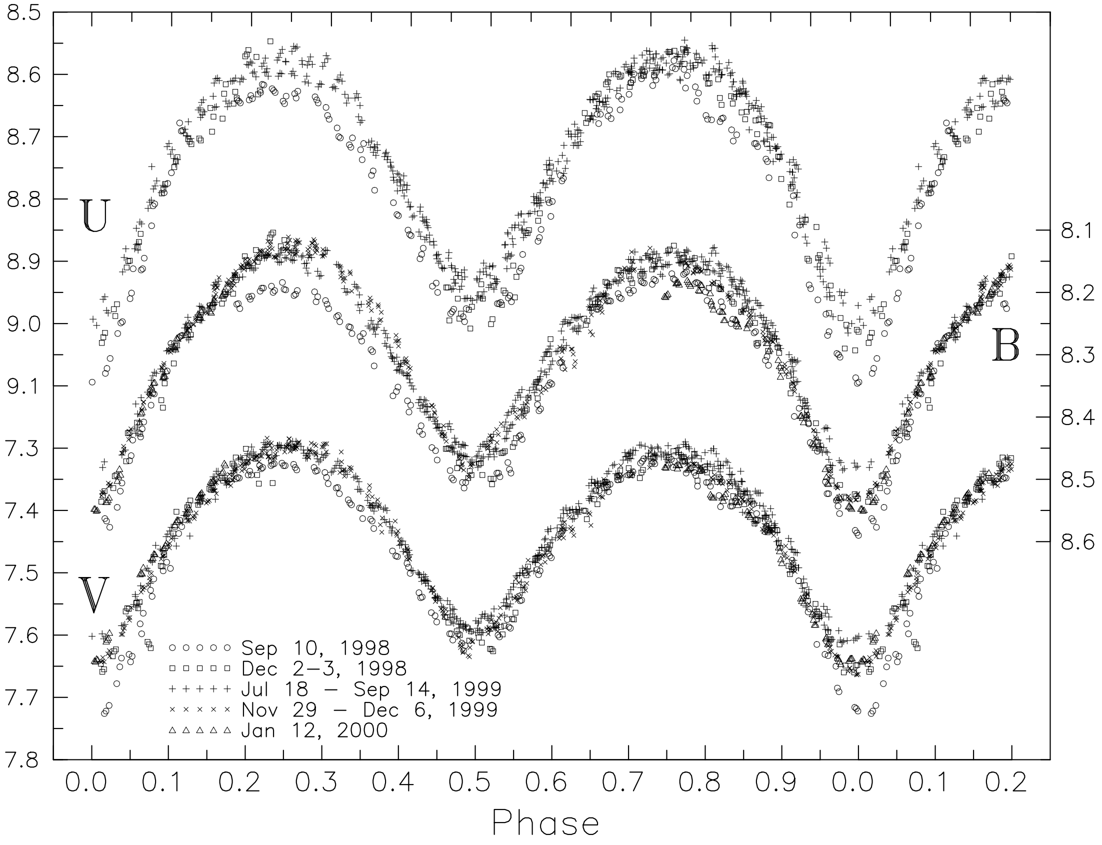

Figure 1. *UBV* light curves of VW Cep

Our observations show pronounced variations of the light curve. The changes are best visible during the primary minimum (Fig. 1). Its depth is highly variable. The primary minimum was sufficiently covered on five nights – September 10, 1998, December 3, 1998, July 18, 1999, December 6, 1999 and January 12, 2000. The minimum was deepest on the first night and shallowest on the third night. On September 10, 1998 VW Cep seems to be somewhat fainter than during other nights. This is best visible in B passband in maximum at the phase 0.25 (Δmag = 0.06).

The observed light curves are quite asymmetric – max I (at the phase 0.25) is about 0.02 mag brighter than max II (at the phase 0.75). The descending branch of the secondary minimum in the U light is fainter than the ascending one. The overall variations of the light curve, however, were only about 0.06 mag over the whole interval of observations.

A more detailed light-curve and period analysis will be published elsewhere.

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A NEW ECLIPSING BINARY STAR NEAR THE BL LAC OBJECT 1ES 1959+650

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During our observational survey to investigate optical micro-variations of BL Lac type objects and quasars, we have discovered serendipitously a new variable star near the BL Lac object 1ES 1959+650 ($\mathrm{RA}_{2000} = 19^{\mathrm{h}}59^{\mathrm{m}}59\overset{\mathrm{s}}{.}85$, $\mathrm{DEC}_{2000} = 65°08'54\overset{''}{.}7$). This newly discovered variable star was catalogued as one of comparison stars for 1ES 1959+650 (♯5, $V = 14\overset{\mathrm{m}}{.}54$, $V-R = 0\overset{\mathrm{m}}{.}54$; Villata et al. 1998), and it is located at $\mathrm{RA}_{2000} = 19^{\mathrm{h}}59^{\mathrm{m}}44\overset{\mathrm{s}}{.}84$, $\mathrm{DEC}_{2000} = 65°10'7\overset{''}{.}4$. A finding chart for the new variable star is shown in Figure 1. The star numbers come from Villata et al. (1998).

We have obtained VR CCD photometry of this star using a 61cm optical telescope and PM512 CCD camera at the Sobaeksan Optical Astronomy Observatory (SOAO) in Korea for three nights (October 5th, November 5th and 6th, 1999). The field of view of the CCD image is $4\overset{'}{.}3 \times 4\overset{'}{.}3$ and its pixel scale is $0\overset{''}{.}5$/pixel. CCD images were pre-processed with the IRAF/CCDRED package. We have performed simple aperture photometry to get instrumental magnitudes with $5''$ aperture radius using the IRAF/DAOPHOT package.

Figure 2 displays magnitude differences between the variable star and other two comparison stars (C1 = ♯2 and C2 = ♯4), and Table 1 lists differential magnitudes between the variable star and C1 star ($V = 12\overset{\mathrm{m}}{.}86$, $V - R = 0\overset{\mathrm{m}}{.}33$). It is obviously found that the brightness of the variable star changes by about 0.4 mag during the observations. Figure 3 illustrates a phase diagram for the variable star. The light curves of this variable star are similar to that of a W UMa type eclipsing binary (Hoffmeister et al. 1985) so that this variable star is classified as a W UMa type eclipsing binary. The period of the variable star is estimated to be about 0.2644 day (the epoch at primary minimum is HJD 2451457.04). Detailed analysis for this new eclipsing binary star will be given elsewhere.

We are grateful to Narae Hwang and the staff of the SOAO for their help during the observations. This research is supported in part by the Ministry of Education, Basic Science Research Institute Grant No. BSRI-98-5411.

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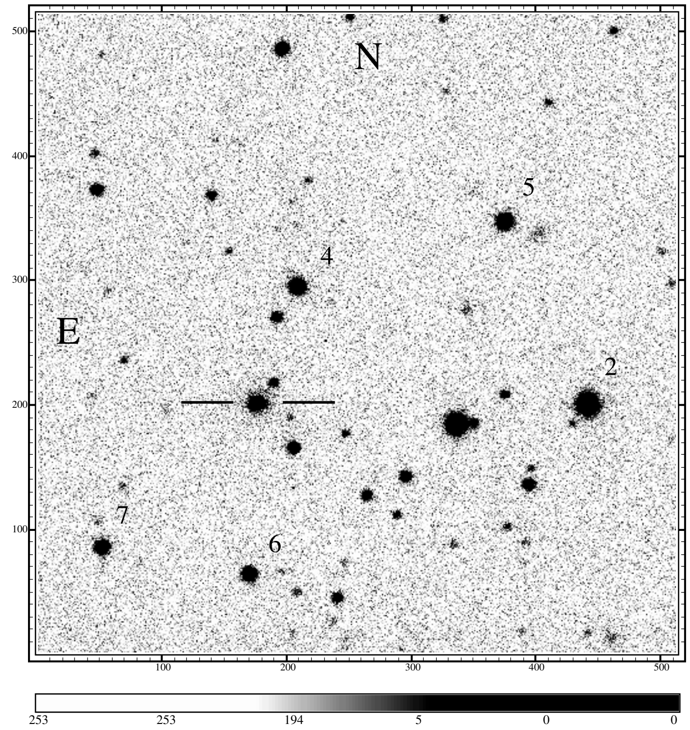

Figure 1. A greyscale map of the CCD image of the observed field ($4'.3 \times 4'.3$) near the BL Lac object 1ES 1959+650 marked by the bars. The star numbers come from Villata *et al.* (1998). A new variable star discovered in this study is ♯5. We used ♯2 as a comparison star (C1) and ♯4 as a check star (C2).

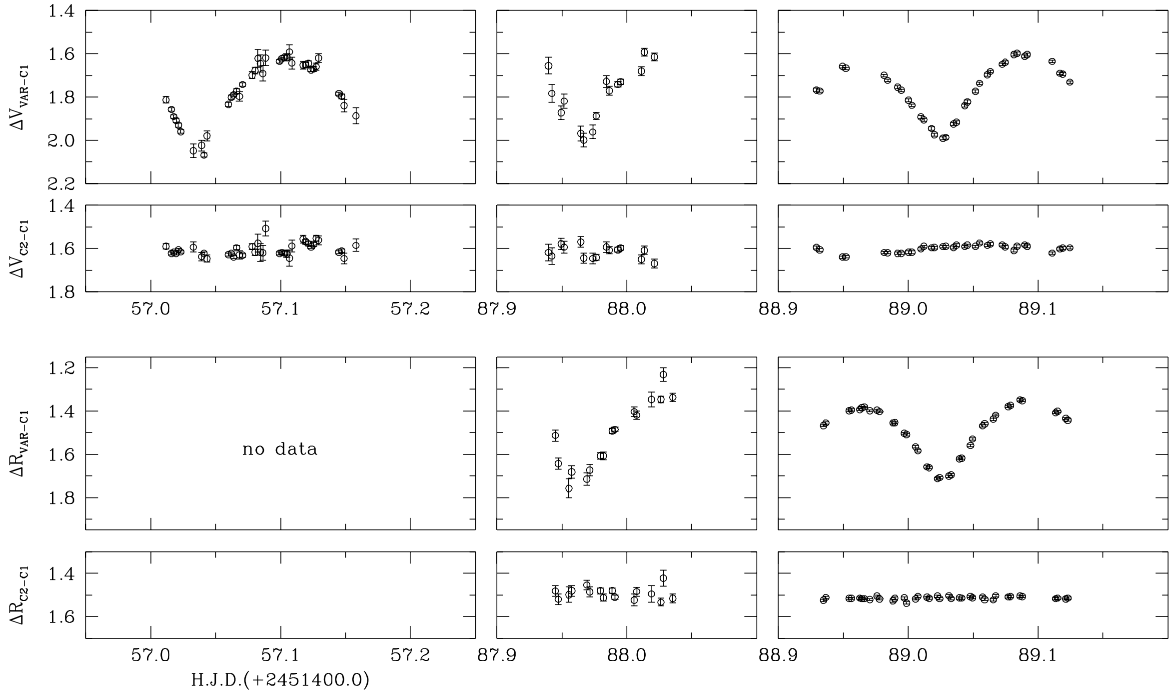

Figure 2. Light variations (V and R bands) of the new variable star with respect to the comparison star C1. Magnitude differences between C1 and C2 are also plotted for comparison in the lower panel.

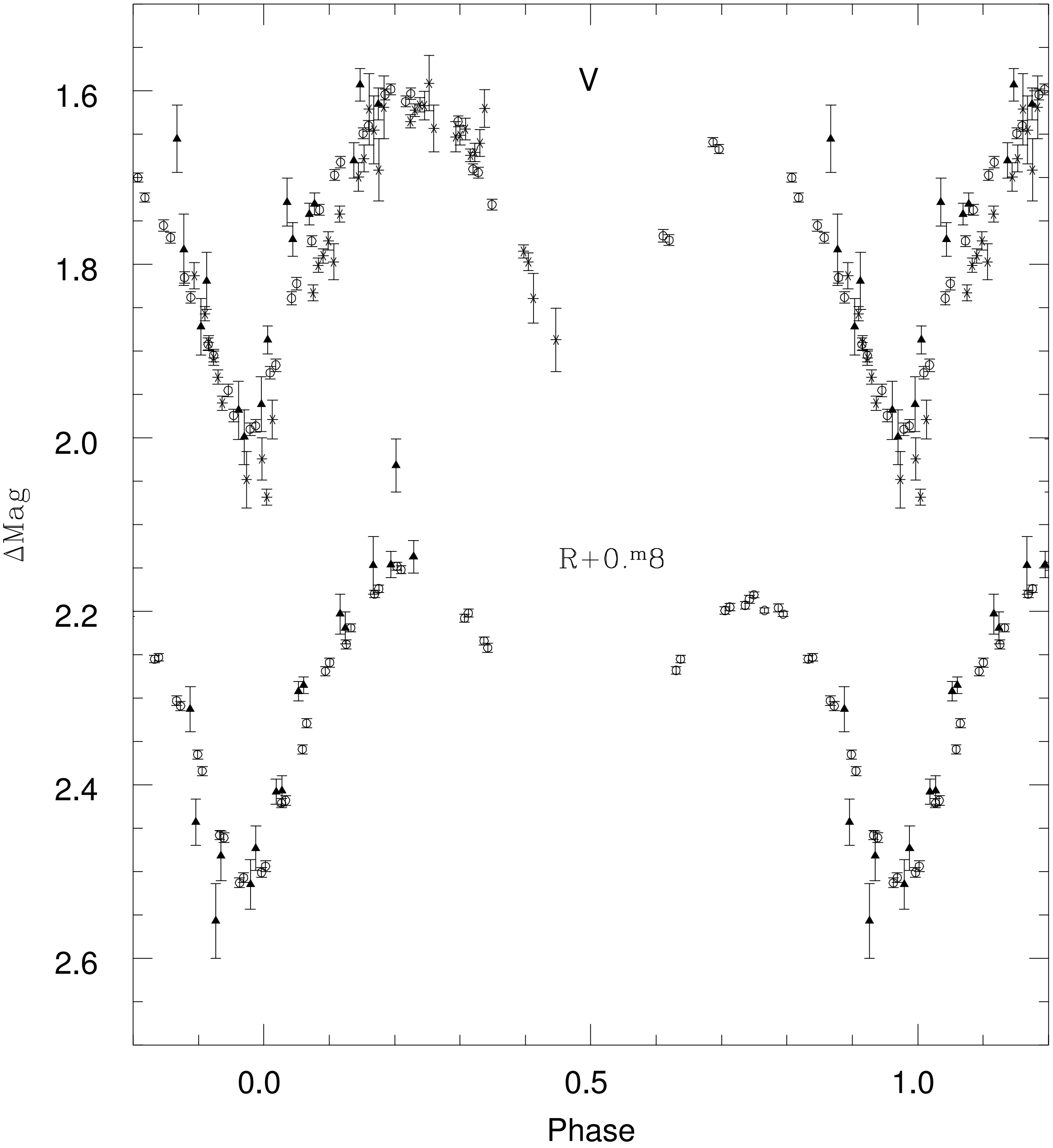

Figure 3. Phase diagram of the new eclipsing binary star. *R* magnitudes of the variable star were arbitrarily increased by +0.8 mag. Asterisks, filled triangles, and open circles represent, respectively, the data for October 5th, November 5th and 6th.

Table 1: Differential V and R magnitudes of the new eclipsing binary with respect to the comparison star C1

HJD 2451400 +	ΔV	HJD 2451400 +	ΔV	HJD 2451400 +	ΔV	HJD 2451400 +	ΔV
57.0118	1.813	57.0992	1.635	87.9668	1.999	89.0179	1.945
57.0161	1.857	57.1011	1.622	87.9738	1.961	89.0201	1.974
57.0177	1.890	57.1030	1.616	87.9763	1.887	89.0269	1.990
57.0197	1.908	57.1049	1.617	87.9843	1.728	89.0291	1.986
57.0214	1.930	57.1068	1.591	87.9865	1.771	89.0349	1.925
57.0232	1.960	57.1088	1.643	87.9932	1.742	89.0372	1.916
57.0330	2.048	57.1176	1.653	87.9954	1.730	89.0436	1.839
57.0392	2.024	57.1194	1.651	88.0112	1.680	89.0457	1.822
57.0411	2.068	57.1215	1.644	88.0137	1.593	89.0518	1.773
57.0435	1.979	57.1235	1.674	88.0211	1.615	89.0549	1.737
57.0599	1.833	57.1254	1.671	88.9294	1.767	89.0610	1.697
57.0620	1.801	57.1273	1.660	88.9319	1.772	89.0634	1.682
57.0640	1.790	57.1293	1.620	88.9496	1.659	89.0725	1.649
57.0660	1.773	57.1450	1.785	88.9520	1.667	89.0747	1.640
57.0682	1.797	57.1470	1.797	88.9814	1.700	89.0814	1.604
57.0707	1.742	57.1489	1.839	88.9843	1.723	89.0837	1.598
57.0782	1.699	57.1581	1.887	88.9918	1.755	89.0897	1.612
57.0804	1.678	87.9397	1.655	88.9946	1.769	89.0918	1.603
57.0825	1.621	87.9424	1.783	89.0004	1.815	89.1110	1.635
57.0845	1.645	87.9493	1.872	89.0028	1.838	89.1169	1.690
57.0864	1.691	87.9517	1.819	89.0099	1.892	89.1191	1.694
57.0885	1.619	87.9645	1.968	89.0121	1.905	89.1246	1.731

HJD 2451400 +	ΔR	HJD 2451400 +	ΔR	HJD 2451400 +	ΔR	HJD 2451400 +	ΔR
87.9451	1.513	88.0282	1.232	88.9971	1.503	89.0573	1.469
87.9473	1.643	88.0353	1.337	88.9987	1.509	89.0590	1.459
87.9553	1.757	88.9347	1.468	89.0056	1.565	89.0657	1.438
87.9575	1.682	88.9365	1.455	89.0074	1.584	89.0675	1.419
87.9694	1.715	88.9545	1.399	89.0145	1.658	89.0771	1.380
87.9716	1.673	88.9564	1.395	89.0162	1.661	89.0789	1.374
87.9797	1.608	88.9626	1.393	89.0226	1.713	89.0862	1.348
87.9821	1.607	88.9644	1.386	89.0242	1.707	89.0879	1.352
87.9888	1.492	88.9662	1.381	89.0315	1.701	89.1135	1.408
87.9908	1.485	88.9705	1.399	89.0331	1.694	89.1151	1.402
88.0056	1.403	88.9761	1.396	89.0396	1.621	89.1215	1.434
88.0077	1.419	88.9780	1.403	89.0411	1.618	89.1229	1.442
88.0190	1.347	88.9882	1.455	89.0480	1.559		
88.0262	1.346	88.9899	1.453	89.0497	1.529		

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GSC 4778 324: A NEW MULTIPERIODIC δ SCUTI STAR

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While observing the high-amplitude δ Scuti star (HADS) V1162 Ori as part of a international multisite campaign, we found a new short-period variable with small amplitude (about 0.01 mag) on our frames. The star, GSC 4778 324, is probably of δ Scuti type.

We observed the field of GSC 4778 324 ($\alpha_{2000} = 05^{\rm h}32^{\rm m}34\overset{\rm s}{.}462, \delta_{2000} = -7^\circ 12' 40\overset{\prime\prime}{.}116$) on 3 nights in December 1999 and on 4 nights in January 2000. A total of 20.3 hours of CCD-photometry, resulting in 637 datapoints was obtained.

We used a 0.4-m telescope equipped with a ST7 camera and V-filter (according to the Bessel specifications). The frames, made in 2×2 binning mode, were dark-framed and flat-fielded. Aperture photometry was performed using MIRA-AP software package[†].

We refer to Fig. 1 for the identification of the stars that we analyzed:

star 0 = GSC 4778 019, our principal comparison star, following the instructions for the multisite observations of V1162 Ori (Arentoft and Sterken, 1999).

star 1 = V1162 Ori, a high-amplitude δ Scuti star;

star 2 = GSC 4778 285 ($11\overset{\rm m}{.}8$);

star 3 = GSC 4778 324 = the new variable star ($10\overset{\rm m}{.}4$);

star 4 = GSC 4778 001 ($12\overset{\rm m}{.}7$).

All differential magnitudes were computed with respect to our principal comparison star, labelled star 0. Stars 2 and 4 were used as check stars and remained constant. The differences between check star 2 and comparison star show a standard deviation of about 0.005 mag.

Our first two datasets (of length about $0\overset{\rm d}{.}07$) showed respectively a maximum and a minimum. The next datasets showed barely any variation (Fig. 2), whereas our last dataset (of length about $0\overset{\rm d}{.}14$) showed one maximum and two minima (Fig. 3). This leads us to conclude that the star is very probably a multiperiodic variable. We used Period98 (Sperl, 1998) to perform a preliminary period analysis and obtained a provisional frequency of 13.693 c/d, i.e. a point of $0\overset{\rm d}{.}073$. The peak-to peak amplitude associated to this frequency is only 0.014 magnitude. The (preliminary) phase diagram, that combines four datasets, is illustrated in Fig. 4.

G. Handler showed interest in our new variable and performed Strömgren photometry with the 0.5-m telescope at S.A.A.O. He obtained the following colour indices: $V = 10.26$, $b - y = 0.202$, $m1 = 0.168$, $c1 = 0.894$, $\beta = 2.797$ (Handler, 2000). These values put the new variable star right in the middle of the δ Scuti instability strip.

[†] The MIRA AP software is distributed by Axiom Research, Inc.

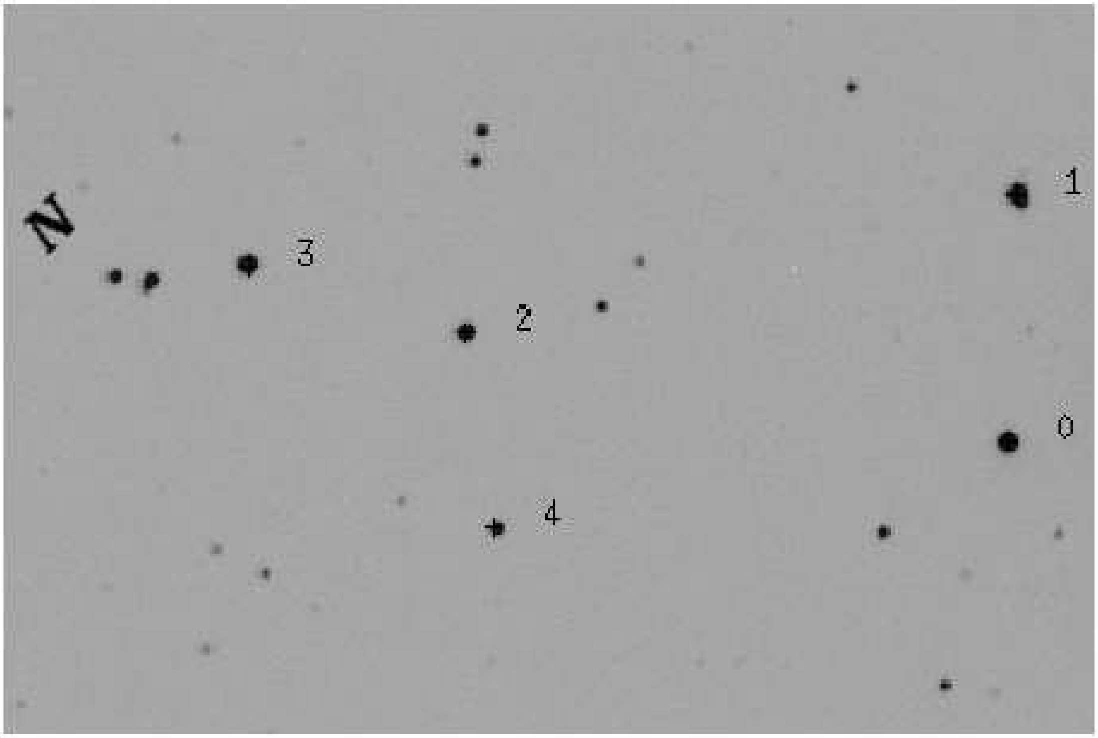

Figure 1. CCD field-of-view for GSC 4778 324 with star labels as discussed in the text. The dimensions are 8′ by 12′. The field is rotated to avoid reflections by a bright neighbouring star.

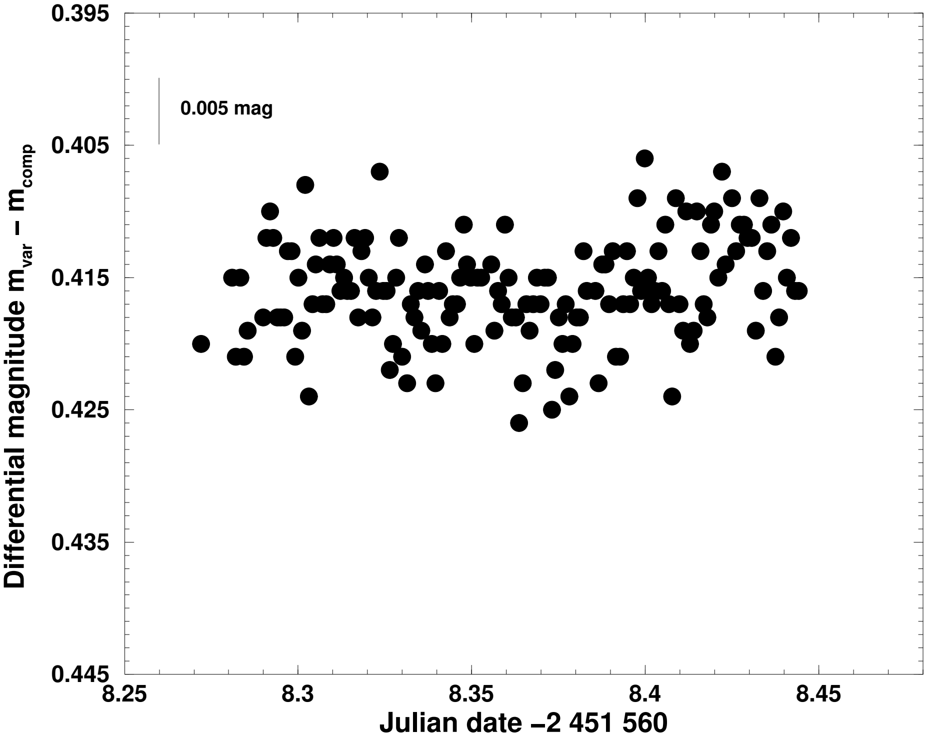

Figure 2. Light curve of GSC 4778 324 on 24/01/2000

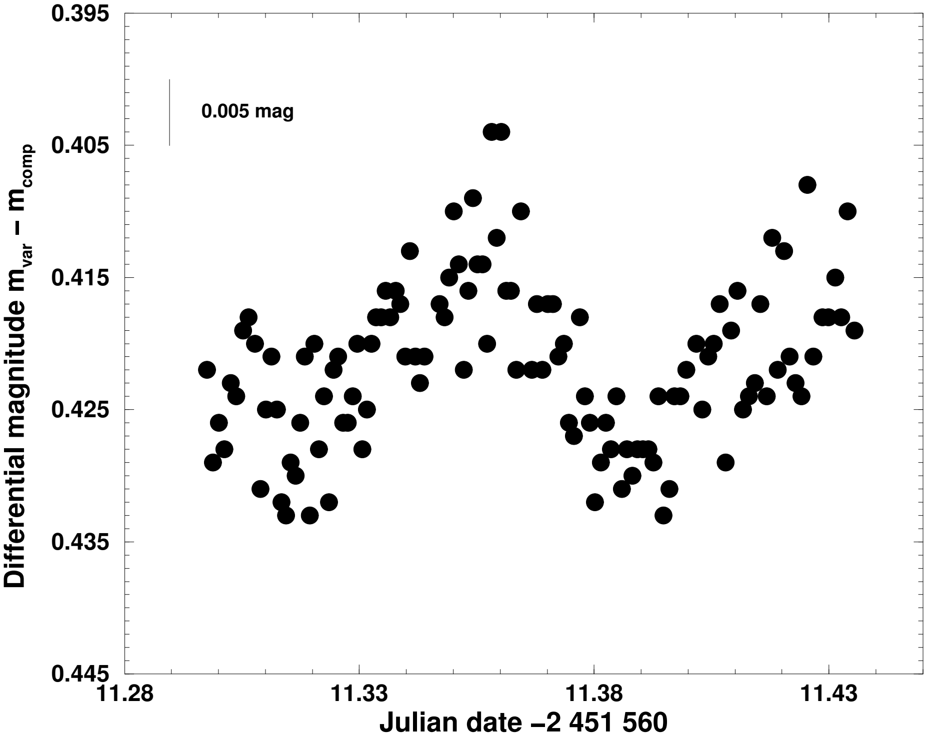

Figure 3. Light curve of GSC 4778 324 on 27/01/2000

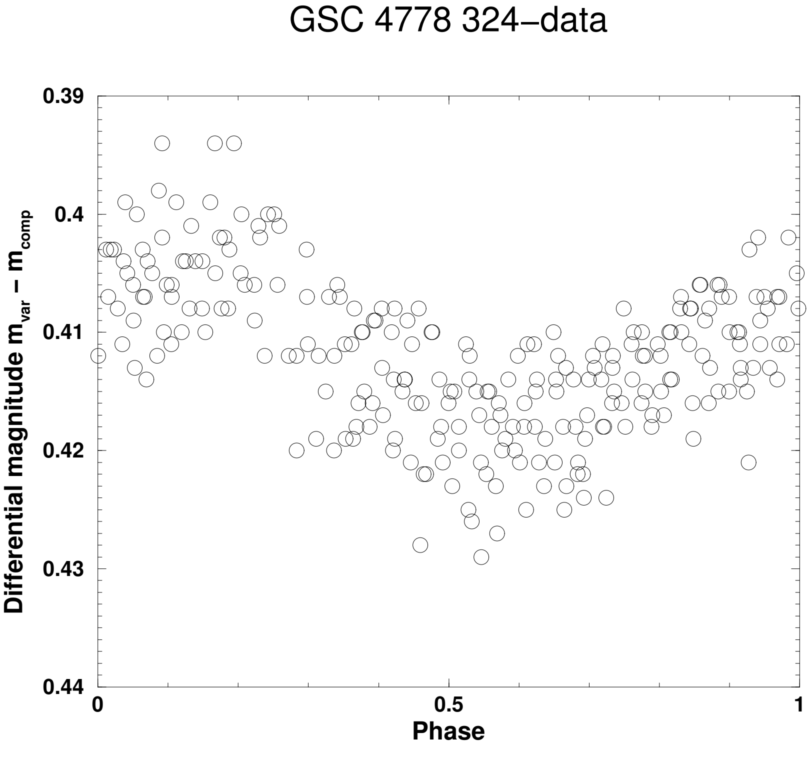

Figure 4. Phase diagram of four datasets against the (preliminary) frequency of 13.693 c/d

The small amplitudes and short-period variations we observed as well as the colours obtained by Handler (2000) lead us to state that GSC 4778 324 is a new δ Scuti variable. The fact that these variations could be detected on some days only and hardly to no longer on some other days, indicates that it is a multiperiodic variable. Further observations are encouraged for trying to solve the complete frequency spectrum.

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HD 152569: A RECLASSIFIED δ SCUTI VARIABLE

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The F0 IVn star HD 152569 is listed as a bona fide γ Doradus variable by Kaye et al. (1999). The γ Doradus stars have spectral types near F0 and low-amplitude photometric variability with periods between about 0.5 and 3 days. The inclusion of HD 152569 in this list was based on photometric variability reported by Kaye (1998). Based on the 1997–8 data set presented here, he found a period of $0\overset{d}{.}8116 \pm 0\overset{d}{.}0002$, but noted severe aliasing difficulties.

We have acquired an additional season of data with the same 0.4-meter automatic photoelectric telescope (APT) used for the earlier observations. Additionally, we have obtained two nights of Strömgren data with the 0.9-meter telescope and six-channel photometer at the Sierra Nevada Observatory (OSN). We used the comparison star HD 151900 (F1 III-IV) and the check star HD 155646 (F6 III) for all observations. Differential magnitudes were corrected for extinction and transformed to their respective standard systems. The observations are summarized in Table 1.

Up to five observations were acquired with the APT each night, spaced at roughly two hour intervals, resulting in severe aliasing problems when analyzed alone. However, when combined with the OSN data containing 50–60 points per night, least squares analysis using the Vaniček method (1971; via a FORTRAN code provided by L. Mantegazza) revealed a primary periodicity of $0\overset{d}{.}075401 \pm 0\overset{d}{.}000001$ and an amplitude of 11.4 ± 0.7 mmag in the combined $V + y$ observations. The resulting least-squares spectrum is shown in Figure 1. The data are shown phased with the principle period from Fig. 1 in Figure 2.

Table 1: Observations of HD 152569.

Year	Date Range HJD – 2450000	Telescope	Filter	$N_{\rm obs}$
1997–8	486 – 643	0.4-m APT	V	185
			B	190
1998–9	847 – 998	0.4-m APT	V	157
			B	156
1999	1388 – 1389	0.9-m OSN	$ubvy-\beta$	111

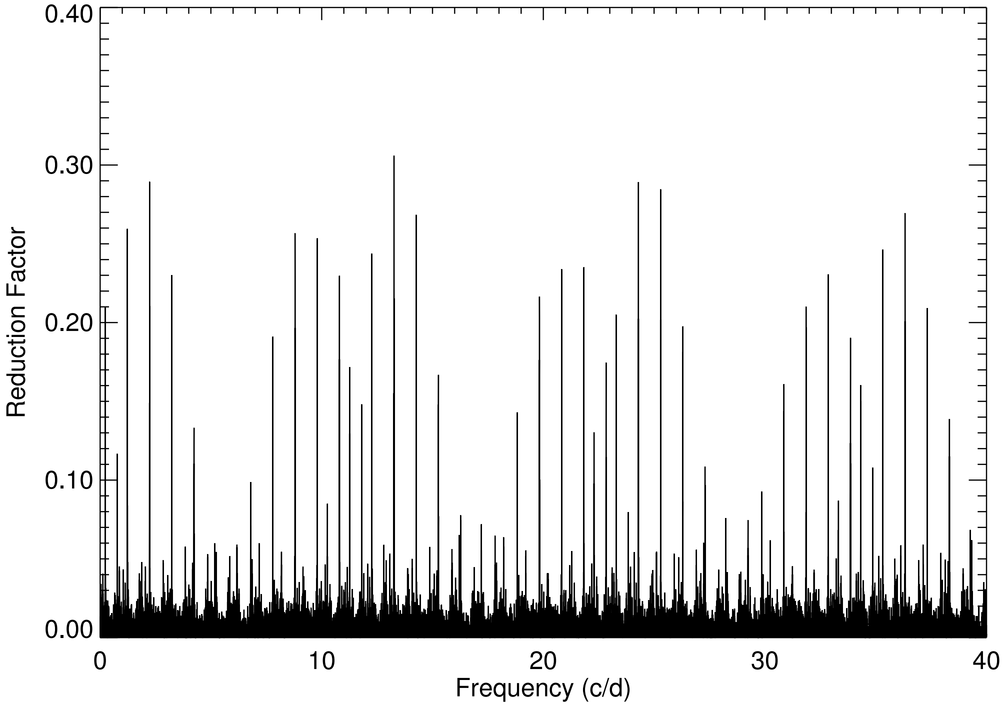

Figure 1. Least-squares spectrum of the $V+y$ data of HD 152569 showing the principle peak at $\nu = 13.26$ d^{-1} ($P = 0\overset{\mathrm{d}}{.}075$). Treating this frequency as a "known constituent", no signals remain above the 0.10 reduction factor level.

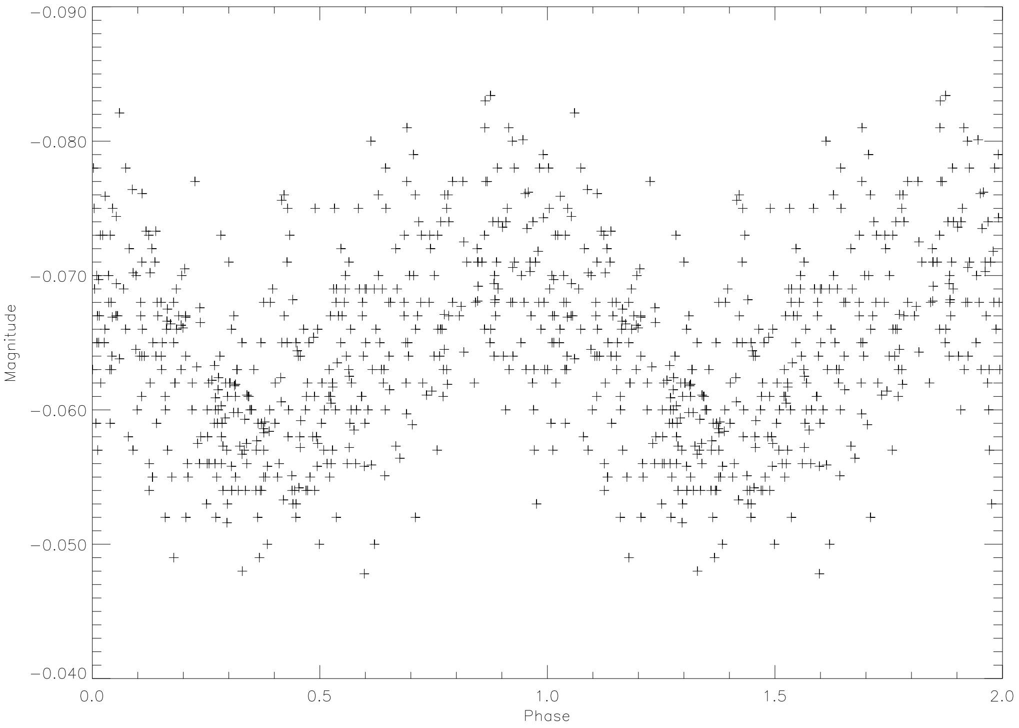

Figure 2. Phased light curve of the $V+y$ data of HD 152569.

The 0.81-day period reported earlier is an alias of the true 0.075-day period. Based on this revised period, we conclude that HD 152569 is *not* a γ Doradus variable but *is* a very low-amplitude δ Scuti star.

Kaye's work was done under the auspices of the U. S. Department of Energy at the Los Alamos National Laboratory under contract No. W-7405-ENG-36. Astronomy with automated telescopes at Tennessee State University is supported through NASA grant NCC5-228 and NSF grant HRD-9706268.

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HD 81882: A NEW δ Sct VARIABLE

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During an observational program on the δ Sct-type pulsating star DL UMa, HD 83271 ($V = 7\overset{m}{.}5$, F2) was used as the main comparison star and HD 83490 ($V = 8\overset{m}{.}1$, A2) and HD 81882 ($8\overset{m}{.}2$, F0) as check stars. These three comparison stars have not been reported as variable before in any catalogue, however our observations showed that while HD 83271 and HD 83490 kept a constant brightness, HD 81882 presents a δ Sct-type photometric variability with a luminosity amplitude of about $0\overset{m}{.}02$ and a main period of about 1.4 hours ($P = 0.06$ days). Figure 1 shows the light curve in the Strömgren b filter corresponding to the night of January 29th, 2000 during about 7 hours of observation. The vertical scale shows magnitude differences HD 81882 – HD 83271 and HD 83490 – HD 83271 versus the Heliocentric Julian Day. Multiperiodicity is also evident from the light curve shown in the figure.

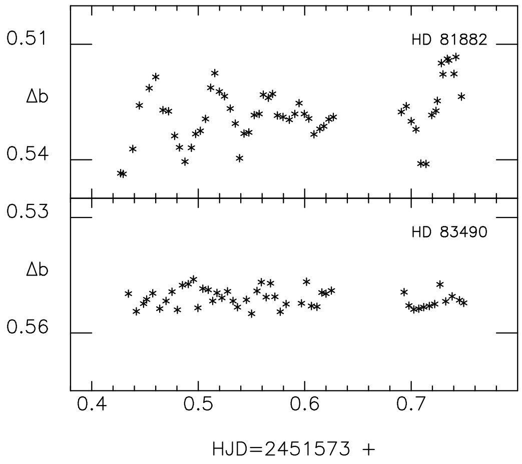

Figure 1. Differential light curves of HD 81882 and HD 83490 relative to HD 83271 in the b filter versus Heliocentric Julian Day

The observations were collected during January, 2000 using the 90-cm telescope at the Observatory of Sierra Nevada, Spain. These observations are simultaneous *uvby* data in the Strömgren photometric system using the six-channel *uvbyβ* spectrograph photometer for simultaneous measurements in *uvby* or in the narrow and wide Hβ channels, respectively (Rodríguez et al. 1997).

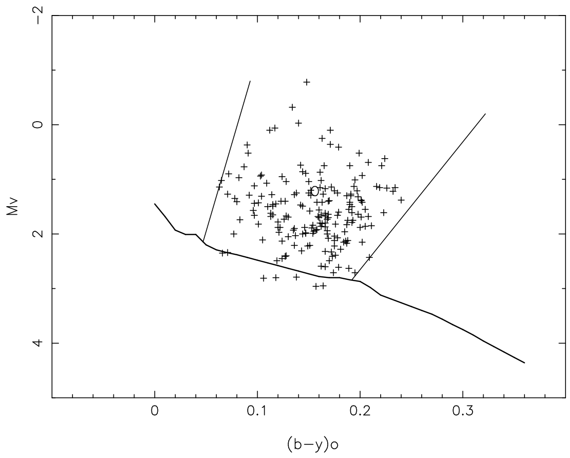

Figure 2. Position of the δ Sct stars in the H–R diagram. HD 81882 is shown with the symbol O

In order to derive the physical parameters of this new variable, the photometric Strömgren indices listed in Hauck & Mermilliod (1998) were used. This catalogue lists the following values: $V = 8\overset{\mathrm{m}}{.}153$, $b-y = 0\overset{\mathrm{m}}{.}156$, $m_1 = 0\overset{\mathrm{m}}{.}187$, $c_1 = 0\overset{\mathrm{m}}{.}977$ and $\beta = 2\overset{\mathrm{m}}{.}751$. Intrinsic indices were derived using the reference lines of Philip & Egret (1980) with the appropriate corrections for gravity and metallicity (Crawford 1975a,b; Philip et al. 1976). Thus, colour excess of $E(b-y) = 0\overset{\mathrm{m}}{.}000$ was found. Then, deviations from the ZAMS's values of $\delta m_1 = -0\overset{\mathrm{m}}{.}002$ and $\delta c_1 = 0\overset{\mathrm{m}}{.}195$ are obtained. This means that this variable is a normal δ Sct star with nearly solar abundances. In fact, a value of [Me/H] = 0.06 is obtained using the Smalley's (1993) calibration for metal abundances. In addition, using the relations by Crawford (1975b) for luminosity, Code et al. (1976) for bolometric correction and the grids by Smalley & Kupka (1997) with [Me/H] = 0.0 for temperature and gravity, we obtain the following values for $M_{\mathrm{bol}} = 1\overset{\mathrm{m}}{.}30$, $T_{\mathrm{e}} = 7370$ K and $\log g = 3.83$. These results place HD 81882 in the middle part of the instability strip corresponding to the δ Sct region as can be seen in Figure 2. This figure shows the sample of δ Sct stars and the observational edges of the instability strip in the δ Sct region from Rodríguez et al. (1994).

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ORBITAL PERIOD AND OSCILLATIONS IN V723 CASSIOPEIAE

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V723 Cas (Nova Cas 1995) was discovered by M. Yamamoto on August 24, 1995 (Hirosawa, 1995) and reached the maximum in $V = 7\overset{m}{.}09$, $B = 7\overset{m}{.}59$ and $R = 6\overset{m}{.}59$ on December 17, 1995 in a short-lived flare. The faint star of $R = 17\overset{m}{.}5$ and $B = 19\overset{m}{.}0$ has been identified as the precursor of the nova (Goranskij et al., 1997). An overall decline from the maximum was accompanied by large flares in 1996. Since 1997 the continuous brightness decline was interrupted only by small flares (at JD 2450670 and 2450860) and variability on different time scales. The brightness of the nova declined to $V = 13\overset{m}{.}66$, $B = 14\overset{m}{.}29$ and $U = 13\overset{m}{.}41$ on January 12, 2000.

The photometric observations taken before December 1996 did not show any strict short-term periodicity. The period analysis of the UBV photoelectric observations taken during quiescent stages (JD 2450421–468, 2450704–794) revealed two possible photometric periods: 0.6350 and 0.6818 days (Chochol & Pribulla, 1998). The folded light curve supported the former one.

The present study is based upon an extensive photometric monitoring at the Sternberg Astronomical Institute in Moscow (SAI), the Tel-Aviv University Wise Observatory (WO) and the Astronomical Institute of the Slovak Academy of Sciences (AISAS).

The SAI monitoring consists of 1203 R band frames taken with the SBIG ST-7 CCD during 19 nights from September to December, 1999 (JD 2451432–2451538). The 60-cm reflector of the Sternberg Institute Crimean station, 38-cm reflector of the Crimean Astrophysical Observatory, and 30-cm refractor of the Sternberg Institute in Moscow were used. The accuracy of CCD photometry varies in the range of $0\overset{m}{.}005$–$0\overset{m}{.}02$ in the R bandpass. Additionally a few night sets of CCD and photoelectric photometry in B, V and I bandpasses were obtained during the same time interval.

The WO monitoring performed by a 1-m telescope consists of 1913 R band frames taken with the Tektronix 1K CCD camera (described by Kaspi et al., 1995) during 23 nights from October 1996 to September 1998 (JD 2450378–2451064). The CCD photometry was performed also in U, B, V and I bandpasses.

The $UBVR$ photoelectric photometry at the AISAS using two 60-cm reflectors of the Stará Lesná and Skalnaté Pleso observatories was performed on 152 nights from August

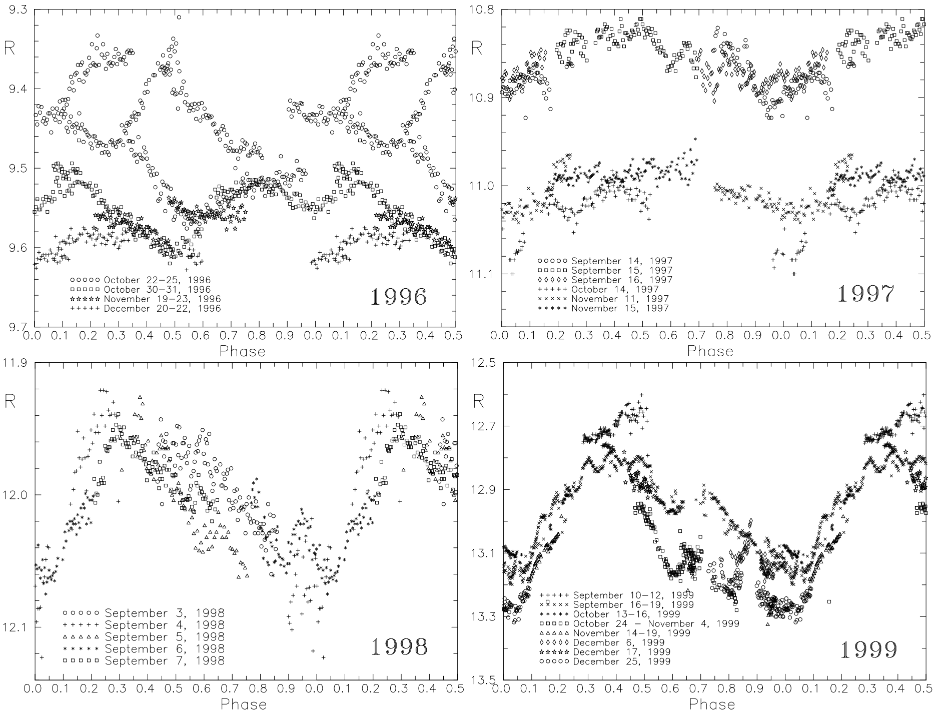

Figure 1. 1996 to 1999 evolution of the R folded light curve of Nova Cas 1995 obtained using the ephemeris (1). The 1996–1998 R data are in instrumental system. Note the different vertical scales for the respective panels

1995 to January 2000 (2449961–2451556). Part of the observations (till March 1998) was already published and analysed (Chochol & Pribulla, 1997, 1998).

The photometric period search was accomplished using the AISAS V observations during the quiescent stages (JD 2450421–468, 2450704–794) combined with the WO and the SAI R observations obtained after JD 2450437. To avoid the problems with the brightness decline and variability on a time scale of tens of days, only the longer runs or subsequent night's data were used. To ascertain the photometric period, the Fourier period analysis was applied. The most significant period in the range 0.1–1 day is $0\overset{d}{.}69325$ (Chochol et al., 2000) close to the period $0\overset{d}{.}6818$ suggested by Chochol & Pribulla (1998). The ephemeris for the brightness minima is

$$\begin{array}{c} \text{Min (I)} = \text{HJD } 2\,450\,421.4801 + 0\overset{d}{.}69325 \times E. \\ \qquad\qquad\qquad \pm 7 \qquad\quad \pm 18 \end{array} \tag{1}$$

The evolution of the R band folded light curves in the years 1996–1999 is shown in Fig. 1. The dispersion of the light curves reflects the decay of the mean light combined with the long-term variability. The observations taken in October and November 1996 show only quasi-periodic variations. The periodicity of the brightness changes started to be visible in December 1996. During the 1997 observation season the photometric period displayed itself as a continuous wave-like variation. In 1998 the amplitude of the variation increased and the light curve changed to a saw-like shape. The full amplitude of the R variations increased from $0\overset{m}{.}13$ in 1998 to $0\overset{m}{.}35$ in 1999.

We have detected 5 minima times in B and R bands at JD 2451… 438.53, 441.27, 445.41, 467.64 and 538.33 during the 1999 observation season. The repeating dip in the phase of 0.6, seen in the 1999 data, may be an eclipse.

Besides, the apparent periodic oscillations were occasionally seen through the 1997–1999 observation seasons. For instance, three consecutive humps are well seen on the 1999 light curve (Fig. 1) near light maximum in the night of JD 2451441 with local maxima at $0\overset{\mathrm{d}}{.}462$, $0\overset{\mathrm{d}}{.}520$ and $0\overset{\mathrm{d}}{.}587$ which suggest the period of $0\overset{\mathrm{d}}{.}062$. The amplitude of oscillation during this night reached $0\overset{\mathrm{m}}{.}05$. Other possible maxima of the humps are seen in the different orbital phases at JD 2451... 432.482, 432.533, 438.573, 485.500, 485.565, 492.517, which improves the period of the oscillation to $0\overset{\mathrm{d}}{.}061512 \pm 0\overset{\mathrm{d}}{.}000003$. The majority of night sets do not show the oscillation and period analysis of the total set did not reveal the corresponding frequency. During the 1998 observation season we detected only two humps on September 6 at JD 2451... 063.34 and 063.46 giving a twice longer period than in 1999. Several solitary humps were also recorded in 1997 (e.g. 2450706.37).

We have verified the constancy of the comparison star with two check stars. Therefore the oscillations have to be attributed to the nova.

Munari et al. (1996) pointed out that V723 Cas displays some resemblance to the classical novae like HR Del but also to symbiotic novae. Our photometry shows that V723 Cas is a cataclysmic binary system with a photometric period of $0\overset{\mathrm{d}}{.}69325$, which we interpret as its orbital period.

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DISCOVERY OF RAPID OSCILLATIONS IN HD 12098

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The rapidly oscillating Ap (roAp) stars are cool, magnetic, chemically peculiar A-type stars that pulsate with periods in the range 6–16 minutes and Johnson B semi-amplitudes ≤ 0.008 mag. In 1998 we initiated the *Naini Tal – Cape roAp Star Survey* to find northern roAp stars. Candidates are selected on the basis of an Ap spectral classification and/or peculiar photometric colours. HD 12098 is classified as an F0 star in the HD catalogue, but it has Strömgren indices indicative of strong metallicity found in the Am and Ap stars, *viz.* $b - y = 0.191$, $m_1 = 0.328$, $c_1 = 0.517$ and $\beta = 2.796$ (Hauck & Mermilliod 1998).

On the basis of these peculiar colours we decided to search for rapid oscillations in HD 12098 on night 21/22 November 1999, JD 2451504. Our observations comprised continuous 10-s integrations in Johnson B light acquired with the ISRO high-speed photometer attached to the 1.0-m Sampurnanand telescope of the Uttar Pradesh State Observatory in Naini Tal.

We were rewarded with the discovery of 7-minute oscillations. These observations were observed again on nights JD2451505, 51534 and 51535. Fig. 1 shows the light curve obtained on night JD 2451534. The data shown here were corrected for coincidence counting losses, sky background and extinction, and were then binned to 40-s integrations. Finally, some mild sky transparency variations on time scales $\geq 1/2$ hr were prewhitened.

Fig. 2 shows the amplitude spectrum of the light curve depicted in Fig. 1. The amplitude spectrum peaks strongly at 2.19 mHz ($P = 7.61$ min). Fig. 2 also underscores the excellent photometric quality attainable on a good night at Naini Tal – the scintillation noise is ≤ 0.25 mmag in this 2-hr run.

Inspection of the available light curves indicates the presence of amplitude modulation, which may be caused by beating among several frequencies and/or non-radial pulsations being seen from variable aspect as the star rotates. An exploratory single-site study of HD 12098 spanning several weeks will reveal the frequencies responsible for this amplitude modulation. At 2.2 mHz, the oscillations in HD 12098 are well resolved from the sky transparency variations at good photometric sites, so the prospects for detailed studies of the oscillations are quite good.

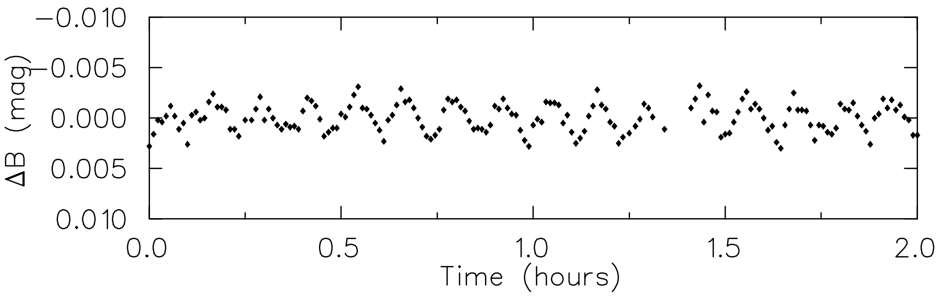

Figure 1.

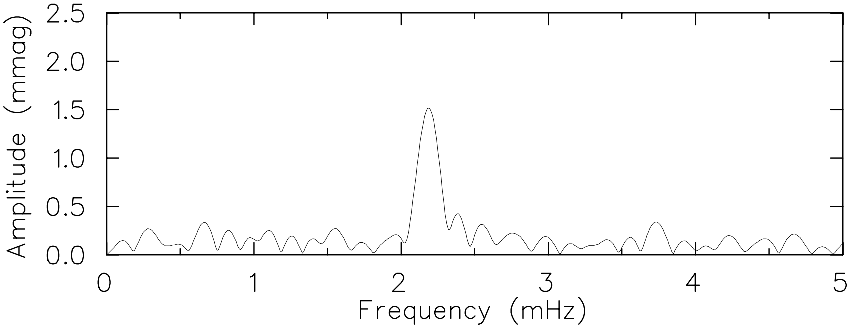

Figure 2.

The discovery or rapid oscillations in HD 12098 is consistent with the high metallicism indicated by the peculiar colours, and implies an Ap (rather than Am) nature for this star.

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NEW VARIABLE STARS DISCOVERED IN THE MISAO PROJECT VIII: MisV0401–MisV0500

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This report describes 100 new variable stars (MisV0401-MisV0500) discovered in the course of the MISAO Project.

These objects are detected automatically by the PIXY system as candidates of variable stars from unfiltered CCD images taken by Kadota between 1999 April and September, then confirmed by Yoshida and Kadota. Further details are the same as described in Yoshida and Kadota (1999).

Table 1 lists the 100 new variable stars. The position and magnitude are measured using the USNO-A1.0 catalog. The magnitude is based on a preliminary V magnitude calculated from R and B magnitude in the catalog based on Kato's (1998) equation:

$$V = R + 0.375(B - R).$$

The finding charts are available electronically as 4854-f[*nnn*].eps where [*nnn*] refers to the serial number assigned to the star in the first column of Table 1.

NSV 11613 is 3.1 arcmin from MisV0438. No star brighter than 15.0 mag was detected at the position of NSV 11613 on Kadota's unfiltered CCD images. However, considering the large angular distance, MisV0438 is probably another new variable object.

TY Oph is 2.1 arcmin from MisV0471, that was detected as a 7.5 mag star. Therefore, MisV0471 is another new variable star.

MisV0476 is identified with a carbon star CS3906 (Stephenson 1989).

MisV0481 is identified with a star at R.A. $17^{\mathrm{h}}58^{\mathrm{m}}\!.7$, Decl. $-28°12'$ (2000.0) whose spectral type is M8III (Buscombe 1995).

MisV0498 is identified with an S-type star GCSS1018 (Stephenson 1984).

References:

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Yoshida, S., Kadota, K., 1999, *IBVS*, No. 4746

Table 1: List of New Variable Stars

Code	R.A. (J2000.0) Decl.		Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0401	$17^{\rm h}58^{\rm m}22^{\rm s}.11$	$-11^\circ45'12''.8$	12.3	15.8	M?	USNO-A2.0 0750.12421932 IRAS 17555-1145
MisV0402	17 58 23.26	−13 36 29.0	13.0	14.1	SR?	IRAS 17555-1336
MisV0403	17 58 29.32	−16 14 01.2	13.4	[15.0	?	IRAS 17555-1613
MisV0404	17 58 37.49	−15 45 19.3	12.8	14.8	SR?	IRAS 17557-1545
MisV0405	17 58 42.38	−18 15 06.0	10.5	12.8	M?	USNO-A2.0 0675.23660643 IRAS 17557-1814
MisV0406	17 59 11.29	−16 20 34.8	13.2	[14.5	?	IRAS 17562-1620
MisV0407	17 59 20.99	−16 48 32.0	13.6	15.2	SR?	IRAS 17564-1648
MisV0408	17 59 46.98	−18 20 33.9	12.5	[14.1	?	USNO-A2.0 0675.23735711 IRAS 17568-1820
MisV0409	17 59 51.35	−18 21 40.4	13.4	[14.1	?	
MisV0410	17 59 58.65	−14 47 18.4	13.2	15.5	?	IRAS 17571-1447
MisV0411	18 00 27.43	−14 33 23.4	12.6	14.6	?	IRAS 17575-1433
MisV0412	18 00 37.85	−14 59 20.7	13.1	[14.6	?	IRAS 17577-1459
MisV0413	18 01 13.65	−18 00 26.2	12.5	14.1	?	USNO-A2.0 0675.23831404 IRAS 17582-1800
MisV0414	18 01 11.09	−18 00 26.8	14.7	[16.5	M?	USNO-A2.0 0675.23828578
MisV0415	18 01 14.93	−15 23 37.5	13.2	16.3	?	USNO-A2.0 0675.23832779 IRAS 17583-1523
MisV0416	18 01 20.01	−12 04 21.8	11.9	13.5	?	USNO-A2.0 0750.12521222 IRAS 17585-1204
MisV0417	18 01 40.01	−17 44 23.5	13.2	[14.1	?	USNO-A2.0 0675.23859393 IRAS 17587-1744
MisV0418	18 01 56.15	−17 06 41.8	13.2	[14.3	SR?	IRAS 17590-1706
MisV0419	18 02 01.68	−16 07 23.9	12.8	[14.5	?	IRAS 17591-1607
MisV0420	18 02 17.60	−15 53 47.8	13.1	[14.5	?	IRAS 17594-1553
MisV0421	18 02 43.65	−17 07 51.0	13.2	14.3	?	IRAS 17598-1707
MisV0422	18 02 48.56	−15 41 24.6	13.0	[14.4	SR?	IRAS 17599-1541
MisV0423	18 02 33.63	+10 11 22.5	11.2	13.5	?	USNO-A2.0 0975.10277873 IRAS 18001+1011
MisV0424	18 28 52.38	+01 50 15.1	11.5	12.4	?	IRAS 18263+0148
MisV0425	18 29 31.18	+04 21 57.3	10.9	12.5	?	USNO-A2.0 0900.12977228 IRAS 18270+0419
MisV0426	18 32 18.41	+03 57 54.2	11.7	13.4	?	GSC 0454.0294 USNO-A2.0 0900.13094993 IRAS 18298+0355
MisV0427	18 32 30.27	+08 46 55.5	12.1	13.4	?	USNO-A2.0 0975.12049981 IRAS 18301+0844
MisV0428	18 41 47.12	−09 03 58.9	12.9	13.8	?	IRAS 18390-0906
MisV0429	18 42 31.88	−01 46 31.2	12.8	13.7	?	IRAS 18399-0149
MisV0430	18 43 39.03	−00 04 29.2	13.0	13.9	?	USNO-A2.0 0825.12758131 IRAS 18410-0007
MisV0431	18 57 21.56	−11 00 20.5	12.0	[14.7	?	USNO-A2.0 0750.15772026 IRAS 18545-1104
MisV0432	18 57 23.48	−15 49 55.5	10.5	11.8	?	USNO-A2.0 0675.30789735 IRAS 18545-1553

Table 1: cont.

Code	R.A. (J2000.0) Decl.		Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0433	$18^{\rm h}57^{\rm m}27^{\rm s}.70$	$-10^\circ57'30''.8$	12.7	14.0	?	IRAS 18546-1101
MisV0434	18 57 30.87	−16 10 03.9	12.8	14.3	?	USNO-A2.0 0675.30800506 IRAS 18546-1614
MisV0435	18 57 47.40	−14 52 08.1	12.6	14.2	?	USNO-A2.0 0750.15819499 IRAS 18549-1456
MisV0436	18 58 26.17	−16 09 23.7	13.3	14.3	?	IRAS 18555-1613
MisV0437	18 59 05.37	−15 15 48.4	11.7	14.8	M?	USNO-A2.0 0675.30924356 IRAS 18562-1519
MisV0438	18 59 32.50	−14 29 37.6	11.2	12.1	?	USNO-A2.0 0750.16000107 IRAS 18567-1433
MisV0439	19 01 21.18	−16 16 36.3	11.3	13.1	?	IRAS 18584-1620
MisV0440	19 02 05.82	−12 36 47.5	10.8	12.2	?	IRAS 18593-1241
MisV0441	19 02 55.86	−14 15 02.7	10.8	11.8	?	GSC 5719.0056 USNO-A2.0 0750.16309019 IRAS 19000-1419
MisV0442	19 57 29.63	+33 29 08.3	12.8	13.8	?	USNO-A2.0 1200.13947329 IRAS 19555+3321
MisV0443	18 01 25.16	−17 24 55.7	13.2	14.2	?	USNO-A2.0 0675.23843703
MisV0444	18 27 32.62	+03 13 49.6	13.3	[14.9	?	USNO-A2.0 0900.12881463
MisV0445	18 59 01.44	−16 51 56.2	11.3	12.6	SR?	GSC 6282.0758 USNO-A2.0 0675.30919054
MisV0446	18 58 44.75	−13 32 38.3	11.8	13.3	?	USNO-A2.0 0750.15920630
MisV0447	17 58 51.75	−15 43 32.7	13.0	14.8	?	
MisV0448	17 59 01.76	−17 41 40.6	12.9	[14.5	?	USNO-A2.0 0675.23682768
MisV0449	17 59 11.95	−15 04 44.8	12.0	15.3	?	USNO-A2.0 0675.23693973
MisV0450	17 59 57.23	−16 11 37.5	13.2	14.7	?	
MisV0451	18 01 15.53	−16 13 02.3	12.5	14.7	?	USNO-A2.0 0675.23833403
MisV0452	18 01 59.95	−17 16 17.7	12.0	13.4	?	USNO-A2.0 0675.23880747
MisV0453	18 02 15.86	−17 16 30.9	13.0	15.1	?	
MisV0454	18 57 26.37	−18 36 23.9	13.3	14.5	?	USNO-A2.0 0675.30793930
MisV0455	18 57 45.26	−18 02 52.8	13.1	14.3	?	USNO-A2.0 0675.30818962
MisV0456	19 01 58.61	−15 45 06.9	12.4	[15.0	?	
MisV0457	19 02 55.24	−16 29 39.5	12.7	13.6	?	USNO-A2.0 0675.31243498
MisV0458	16 59 20.53	−08 07 03.4	12.7	14.6	?	GSC 5643.0225 USNO-A2.0 0750.10236068
MisV0459	17 59 12.66	−14 52 04.7	12.5	13.7	?	USNO-A2.0 0750.12450133
MisV0460	18 00 44.28	−14 50 36.8	13.0	[15.2	?	IRAS 17578-1450
MisV0461	18 42 16.62	−08 59 50.1	12.9	14.5	?	USNO-A2.0 0750.14168377
MisV0462	18 57 18.13	−10 01 51.1	11.4	13.0	?	GSC 5710.1495
MisV0463	18 57 18.55	−13 45 32.0	12.9	14.1	?	USNO-A2.0 0750.15766616
MisV0464	18 59 01.23	−14 50 31.1	12.7	14.1	?	USNO-A2.0 0750.15948920
MisV0465	18 59 09.75	−11 02 32.6	11.2	13.4	?	USNO-A2.0 0750.15963807
MisV0466	18 59 55.55	−10 40 22.8	12.5	13.6	?	USNO-A2.0 0750.16036252
MisV0467	19 00 22.08	−14 31 50.4	12.5	13.9	?	USNO-A2.0 0750.16079439
MisV0468	16 57 29.81	+00 00 01.0	12.5	13.5	?	USNO-A2.0 0900.09141650

Table 1: cont.

Code	R.A. (J2000.0) Decl.		Unfiltered CCD Mag.		Type	Identified with
			Max	Min		
MisV0469	$17^{\rm h}57^{\rm m}50^{\rm s}.04$	$+06^{\circ}48'20''.3$	12.9	14.9	?	USNO-A2.0 0900.11058896
MisV0470	18 28 44.06	+04 31 10.5	13.1	15.5	?	USNO-A2.0 0900.12939140
MisV0471	18 31 32.19	+04 22 51.8	10.8	11.7	?	USNO-A2.0 0900.13064733
MisV0472	19 02 22.16	−18 25 18.5	11.9	13.3	SR?	GSC 6286.0089 USNO-A1.0 0675.19135029 IRAS 18594-1829
MisV0473	17 58 58.64	−29 45 32.4	12.9	14.0	SR?	GSC 6853.2916 USNO-A2.0 0600.29799560
MisV0474	17 58 09.33	−30 04 19.8	13.1	[14.3	SR?	
MisV0475	17 56 48.83	−25 48 32.2	9.8	11.9	?	USNO-A2.0 0600.29618680 IRAS 17536-2548
MisV0476	17 56 58.50	−24 06 12.2	12.5	13.4	?	IRAS 17539-2405 CS3906
MisV0477	17 57 37.53	−28 02 46.5	12.6	[14.4	?	USNO-A2.0 0600.29687396 IRAS 17544-2802
MisV0478	17 58 04.79	−27 06 55.9	10.5	13.2	?	IRAS 17549-2706
MisV0479	17 58 25.35	−27 05 56.2	10.3	12.8	?	IRAS 17552-2705
MisV0480	17 58 32.97	−26 12 16.2	12.7	13.8	?	IRAS 17554-2612
MisV0481	17 58 40.69	−28 12 25.7	9.9	11.9	SR?	IRAS 17555-2812
MisV0482	17 58 48.69	−20 46 54.2	11.8	12.9	?	IRAS 17558-2046
MisV0483	17 59 09.35	−26 38 00.6	10.1	11.9	?	IRAS 17560-2637
MisV0484	17 59 17.41	−29 50 45.7	12.9	14.1	SR?	IRAS 17561-2950
MisV0485	17 59 18.27	−20 52 37.0	11.7	13.9	SR?	USNO-A2.0 0675.23701060 IRAS 17562-2052
MisV0486	17 59 21.88	−24 59 37.2	12.4	14.4	?	IRAS 17562-2459
MisV0487	17 59 41.82	−26 16 00.7	11.3	12.2	?	USNO-A2.0 0600.29862529 IRAS 17565-2615
MisV0488	17 59 41.13	−21 05 25.4	12.0	13.2	?	USNO-A2.0 0675.23728547 IRAS 17566-2105
MisV0489	18 00 09.51	−27 47 41.7	12.2	14.1	SR?	USNO-A2.0 0600.29904984 IRAS 17570-2747
MisV0490	18 00 21.03	−28 13 38.8	11.3	13.3	?	IRAS 17571-2813
MisV0491	18 00 15.66	−21 50 49.0	12.6	14.6	?	IRAS 17572-2150
MisV0492	18 00 32.86	−24 16 20.3	9.7	11.7	?	IRAS 17575-2416
MisV0493	18 00 41.80	−27 52 58.0	10.3	13.2	?	USNO-A2.0 0600.29951868 IRAS 17575-2752
MisV0494	18 00 46.94	−27 18 31.1	12.4	[14.4	?	IRAS 17576-2718
MisV0495	18 01 02.17	−23 40 50.8	13.1	14.0	SR?	IRAS 17579-2340
MisV0496	18 01 24.84	−29 24 21.9	11.5	14.3	?	IRAS 17582-2924
MisV0497	18 01 48.38	−28 52 48.5	10.6	11.8	?	IRAS 17586-2852
MisV0498	18 02 30.49	−24 51 26.5	11.2	12.5	SR?	IRAS 17594-2451 CS3906
MisV0499	18 02 48.60	−21 17 20.4	13.3	14.0	SR?	USNO-A2.0 0675.23928622 IRAS 17598-2117
MisV0500	18 03 06.60	−26 18 08.8	12.2	[14.7	?	USNO-A2.0 0600.30146276 IRAS 17599-2618

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TIMES OF MINIMA OF SOME ECLIPSING BINARIES

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We present minima times derived from photometric observations of some eclipsing binaries. These observations were carried out at the Ege University Observatory (EGE for short) with the 48-cm telescope and at the TÜBİTAK (Scientific and Technical Research Council of Turkey) National Observatory (TUG for short) with the 40-cm telescope in Johnson B, V and R filters. Heliocentric times of minima were estimated for each filter by using the method of Kwee and Van Woerden (1956) with their standard errors. In Table 1, primary eclipses are designated as type 1 eclipses, and secondary eclipses as type 2. The $O-C$ values in column 5 were calculated using ephemeris times given in Table 2. Ephemeris times for YY CrB, V972 Her and V357 Peg were calculated with the least squares method using the obtained minima times. For KP Peg, we have combined other minima times (Keskin & Akan, 1989) with our values in order to calculate the new epoch and period in Table 2. We have used the ephemeris times given by Depasquale et al. (1999) for W UMa.

Table 1

Star	JD of Min (− 2400000)	Type	Filter	$O-C$	Observatory & Observer(s)
V376 And	51510.5408 ± 0.0014	2	R	-0.0008	TUG – 1, 4
	51510.5419 ± 0.0010	2	V	0.0003	TUG – 1, 4
	51510.5421 ± 0.0008	2	B	0.0005	TUG – 1, 4
YY CrB	51361.4267 ± 0.0003	1	B	-0.0006	EGE – 1, 2, 3
	51361.4268 ± 0.0002	1	V	-0.0005	EGE – 1, 2, 3
	51368.3957 ± 0.0004	2	V	0.0012	EGE – 1, 2, 3
	51368.3958 ± 0.0004	2	B	0.0013	EGE – 1, 2, 3
	51368.3958 ± 0.0004	2	R	0.0013	EGE – 1, 2, 3
	51370.4652 ± 0.0006	1	R	-0.0007	TUG – 1
	51370.4652 ± 0.0005	1	V	-0.0006	TUG – 1
	51370.4655 ± 0.0006	1	B	-0.0004	TUG – 1
	51372.3484 ± 0.0003	1	R	-0.0005	TUG – 1
	51372.3486 ± 0.0003	1	V	-0.0003	TUG – 1
	51372.3486 ± 0.0003	1	B	-0.0003	TUG – 1

Table 1 (cont.)

Star	JD of Min (− 2400000)	Type	Filter	$O-C$	Observatory & Observer(s)
V972 Her	51386.3979 ± 0.0001	1	V	−0.0004	TUG – 1
	51386.3984 ± 0.0013	1	B	0.0001	TUG – 1
	51386.3986 ± 0.0007	1	R	0.0003	TUG – 1
	51392.3840 ± 0.0015	2	B	−0.0002	EGE – 2, 3
	51392.3843 ± 0.0015	2	R	0.0001	EGE – 2, 3
	51392.3843 ± 0.0026	2	V	0.0001	EGE – 2, 3
KP Peg	51421.3872 ± 0.0046	1	B	−0.0002	TUG – 2, 3
	51421.3873 ± 0.0010	1	V	−0.0001	TUG – 2, 3
	51421.3874 ± 0.0020	1	R	0.0000	TUG – 2, 3
V357 Peg	51465.4520 ± 0.0003	2	R	−0.0008	EGE – 2, 3
	51465.4521 ± 0.0005	2	B	−0.0007	EGE – 2, 3
	51465.4530 ± 0.0003	2	V	0.0002	EGE – 2, 3
	51489.4591 ± 0.0010	1	B	0.0008	EGE – 1, 2, 3
	51489.4594 ± 0.0011	1	R	0.0011	EGE – 1, 2, 3
	51489.4595 ± 0.0005	1	V	0.0011	EGE – 1, 2, 3
	51510.2804 ± 0.0015	1	B	−0.0020	EGE – 2, 3
	51510.2808 ± 0.0028	1	R	−0.0016	EGE – 2, 3
	51514.3320 ± 0.0003	1	B	0.0004	EGE – 1, 2, 3
	51514.3321 ± 0.0003	1	R	0.0006	EGE – 1, 2, 3
	51514.3324 ± 0.0002	1	V	0.0009	EGE – 1, 2, 3
W UMa	51249.3721 ± 0.0001	1	V	−0.0002	EGE – 1, 2, 3
	51249.3723 ± 0.0002	1	B	0.0000	EGE – 1, 2, 3
	51249.5381 ± 0.0004	2	B	−0.0010	EGE – 1, 2, 3
	51249.5387 ± 0.0001	2	V	−0.0004	EGE – 1, 2, 3
	51276.3966 ± 0.0001	1	B	−0.0004	EGE – 1, 2, 3
	51276.3967 ± 0.0001	1	V	−0.0003	EGE – 1, 2, 3
	51276.3967 ± 0.0002	1	R	−0.0003	EGE – 1, 2, 3
	51276.5630 ± 0.0003	2	V	−0.0008	EGE – 1, 2, 3
	51276.5631 ± 0.0004	2	R	−0.0007	EGE – 1, 2, 3
	51276.5635 ± 0.0001	2	B	−0.0003	EGE – 1, 2, 3
	51291.4099 ± 0.0001	1	B	−0.0008	EGE – 1
	51291.4100 ± 0.0001	1	V	−0.0007	EGE – 1
	51298.4165 ± 0.0002	1	B	−0.0006	EGE – 1, 2, 3
	51298.4169 ± 0.0002	1	V	−0.0002	EGE – 1, 2, 3

1: Varol Keskin, 2: Bülent Yaşarsoy, 3: Esin Sipahi, 4: Selim Selam

Due to the large scattering of observations especially in R filter, the mean values become less reliable. Therefore, we have given minima times separately for each colour in Table 1.

Table 2

Star	HIP No.	Period (days)	Epoch (HJD) – 2400000
V376 And	12039	0.7987	51510.5416
YY CrB	77598	0.376606 ± 0.000027	51372.3489 ± 0.0009
V972 Her	87958	0.443401 ± 0.000018	51386.3983 ± 0.0003
KP Peg	105882	0.7272060 ± 0.0000010	46730.1813 ± 0.0020
V357 Peg	117185	0.578447 ± 0.000010	51489.4583 ± 0.0012
W UMa	47727	0.333638	51268.7233

Due to the lack of more observed minima times of V376 And in different cycles, we have used the average value of minima times obtained in B, V and R filters for the epoch. Period was obtained from HIPPARCOS (ESA, 1997) (http://astro.estec.esa.nl) for calculation of the $O - C$ values.

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Erratum

See IBVS 5282.

The Editors

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IDENTIFICATION OF VARIABLE STARS IN INDUS

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Continuing the program conducted to improve the coordinates of variable and suspected variable stars in the southern hemisphere (López and Girard 1990, López and Lépez 2000), accurate positions for confirmed variables in the Indus region are herein presented.

Considering the finding charts recommended by the GCVS (Kholopov et al. 1985) we identified the confirmed variables in this area in the USNO A2.0 catalogue (Monet et al. 1998) which was read and displayed using a program developed by Manek (1999).

The results are presented in two tables. Table 1 lists those variables included in catalogues such as HIPPARCOS (HIP), TYCHO (TYC) (ESA, 1997) or PPM (Röser and Bastian, 1991). For these stars we only list the identification number in the respective catalogues. We also added, in the AC column, the AC2000 (Urban et al. 1998) catalogue number.

Table 2 lists the positions of the variables we were able to successfully identify in the USNO A2.0. The first column gives the variable star name while the positions, as extracted from the USNO A2.0, are listed in the second and third columns. The Guide Star Catalogue (Lasker et al. 1990) number is listed in the GSC column. In the fifth column we included an alternative designation; in general it is the preliminary name used in the finding chart recommended by the GCVS. Those variables which were also identified in the AC2000 catalogue are marked with an asterisk (*) and the AC2000 number is given in the Notes to Table 2.

The improvement of the coordinates is not complete since two of the confirmed variables in this constellation (listed in the GCVS) were not identified. They are RX Ind and AV Ind, for which, as noted in the GCVS, no finding charts are available.

We would like to express our gratitude to Dr. Jan Manek for making his program available to display both the USNO A1.0 and USNO A2.0 catalogues. Our thanks also go to Dr. Dave Monet for providing a copy of the USNO A1.0 as well as the USNO A2.0 and to Dr. Nikolai Samus for many helpful comments and suggestions.

Table 1: Variables in HIP, TYC, PPM, and AC2000 catalogues

GCVS	HIP	TYC	PPM	AC
R Ind		9124 121		
S Ind		8792 1227	348975	4376676
T Ind	105334	8422 584	327089	3965816
U Ind		8419 978	774536	
V Ind	104613	8422 875	326956	
W Ind		8793 636	774672	4378516
X Ind		8806 1426	774725	
Y Ind		8807 304		
Z Ind		8440 1153	765235	
RR Ind	107490	9122 78		4593294
RS Ind		9327 425	375067	
RT Ind		8795 1088	774562	
RU Ind		8812 1074		
RY Ind		8408 686	326706	
RZ Ind		8429 945		
SS Ind		9123 503		4594813
ST Ind		8410 1555		3956729
SU Ind	103215	8408 1462	326648	3960978
TV Ind		8794 621	348662	
AK Ind	104424	8421 29	326921	
AQ Ind		8821 746		4384869
AX Ind		8800 817	774608	
AY Ind	107705	9331 189	375135	
BB Ind		8407 1031	764937	
BC Ind	107525	9323 259	365372	

Table 2: Positions and Identifications of Variables in Indus

GCVS	RA (2000)	Dec	GSC	Other ID	Note
RV Ind	23 00 59.568	−70 56 19.36		CD−71°1769	
RW Ind	21 58 29.238	−69 12 36.27	9323.0715	380.1931	*
SV Ind	20 30 15.882	−55 04 51.39	8794.1150	S 6893	
SW Ind	20 30 26.171	−48 14 58.19	8410.1623	S 7692	*
SX Ind	20 30 43.031	−46 02 19.20	8406.1135	S 6747	
SY Ind	20 32 54.138	−59 07 09.50	8802.0968	S 6896	
SZ Ind	20 32 29.647	−55 25 37.10	8794.1460	S 6898	
TT Ind	20 33 36.684	−56 31 52.33		S 6899	
TU Ind	20 33 10.557	−45 26 00.89		S 6749	
TW Ind	20 33 42.833	−46 12 36.41	8406.1091	S 6751	
TX Ind	20 34 47.089	−58 43 24.40		S 6900	
TY Ind	20 36 14.739	−59 02 39.80	8802.1130	S 6902	
TZ Ind	20 36 12.133	−53 28 02.98		S 6903	
UU Ind	20 38 53.967	−58 03 57.95	8798.0132	S 6904	
UV Ind	20 39 8.937	−54 25 15.82	8794.0022	S 6905	
UW Ind	20 39 06.742	−53 17 54.93	8790.0708	S 6906	
UX Ind	20 39 40.927	−54 27 32.64	8794.0879	S 6908	
UY Ind	20 40 16.560	−54 07 31.34	8791.1196	S 6910	
UZ Ind	20 40 43.855	−58 21 54.50	8803.0423	S 6909	
VV Ind	20 40 29.803	−53 16 53.75	8791.1130	S 6911	
VW Ind	20 41 00.817	−46 32 35.97	8407.0741	S 6759	
VX Ind	20 41 51.421	−47 06 43.19	8411.1161	S 6764	*
VY Ind	20 42 06.335	−47 04 39.52	8411.0452	S 6766	
VZ Ind	20 42 27.743	−46 07 22.91		S 6767	
WW Ind	20 44 49.083	−55 41 25.49		S 6912	
WX Ind	20 44 32.167	−46 16 30.31	8407.0442	S 6770	
WY Ind	20 44 30.853	−45 41 37.15		S 6771	
WZ Ind	20 46 19.339	−53 48 09.67	8791.1448	S 6915	
XX Ind	20 48 35.261	−58 38 15.55		S 6916	
XY Ind	20 49 26.999	−59 04 29.81		S 6918	
XZ Ind	20 48 35.923	−46 24 53.64	8407.0775	S 6777	
YY Ind	20 49 29.745	−45 35 34.05	8408.0123	S 6778	
YZ Ind	20 51 01.064	−58 26 43.05		S 6919	
ZZ Ind	20 50 27.219	−45 33 07.26		S 6780	
AA Ind	20 50 33.330	−46 46 46.33	8408.0494	S 6781	
AB Ind	20 51 17.183	−46 07 46.74		S 6784	
AC Ind	20 53 20.691	−58 51 57.77		S 6920	
AD Ind	20 53 09.631	−54 49 19.71		S 6921	
AE Ind	20 53 24.441	−56 01 27.59	8796.1142	S 6922	*
AF Ind	20 56 36.000	−59 10 03.44	8804.0529	S 6925	
AG Ind	20 59 38.278	−59 22 35.46	8804.0858	S 6927	

Table 2: cont'd.

GCVS	RA (2000)	Dec	GSC	Other ID	Note
AH Ind	20 59 49.626	−59 16 07.18	8804.0874	S 6928	
AI Ind	21 05 10.615	−46 32 53.05		S 6801	
AL Ind	21 09 57.084	−47 28 52.97	8425.1256	S 6806	
AM Ind	21 14 21.695	−45 27 53.39	8422.0392	S 6815	
AN Ind	21 21 19.636	−46 44 06.56	8422.1067	S 6819	
AO Ind	22 00 29.060	−50 29 39.67	8444.1487	S 7702	*
AP Ind	22 05 44.694	−55 59 59.97	8813.0342	CP−56°9807	
AR Ind	20 31 19.267	−55 23 00.06	8794.0844	S 6894	
AS Ind	20 32 28.472	−55 27 59.85	8794.0842	S 6897	
AT Ind	20 39 30.261	−54 36 36.29		S 6907	
AU Ind	20 46 16.106	−58 36 39.33		S 6914	
AW Ind	20 53 55.251	−57 29 16.70	8800.0196	S 6923	
AZ Ind	22 33 30.767	−69 33 44.09	9337.1994	S 7705	

Notes to Table 2:

RW Ind	AC 4594157	SW Ind	AC 3955468
VX Ind	AC 3958315	AE Ind	AC 4376355
AO Ind	AC 3973094		

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V1162 Ori: A MONO- OR A MULTIPERIODIC HIGH-AMPLITUDE δ SCUTI STAR?

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The detection of the short-period variability of V1162 Ori was reported by Lampens (1985). The light curve of this high-amplitude δ Scuti variable star was first shown to be asymmetric (due to the presence of the first harmonic term) with a single periodicity of 0.078684 days and a half-amplitude of 0.09 mag in V. Poretti et al. (1990) re-observed V1162 Ori in order to investigate the possible presence of a second periodicity but concluded that they had no evidence for a second periodicity and that the star was pulsating monoperiodically. They refined the period to the value of $0.07868616 \pm 0.00000006$ days and also found a slightly larger half-amplitude of 0.098 mag in V.

New data have been obtained by Hintz et al. (1998). Apart from announcing a period break and a 50% decrease in the amplitudes of both terms related to the principal frequency the authors also suggested the appearance of a second frequency (corresponding to a periodicity of about 0.06 days) with a much smaller amplitude, i.e. comparable to the amplitude of the first harmonic term. This additional frequency was detected in their CCD data only (dataset 2) and not in the Strömgren magnitudes (dataset 1). From this, they inferred that V1162 Ori had changed from the single-mode to the double-mode regime.

Very recently Van Cauteren & Lampens (2000) reported the presence of a new δ Scuti star in the field of view of V1162 Ori, measured in the course of an intensive multisite campaign. This star, GSC 4778 324, appears to be a multiperiodic pulsator with a small amplitude (full amplitude of 0.014 mag at most) and a mean periodicity of about 0.07 days. Since it was also one of the brighter comparison stars (star no. 5) used in the reduction of the CCD differential data on V1162 Ori by Hintz et al. (1998), we conclude that the additional frequency found in the Fourier decomposition of the CCD data of V1162 Ori is entirely attributed to the variability of this comparison star. Both the period and the amplitude estimates are compatible with the the ones derived for the new variable star. Furthermore, also Arentoft & Sterken (2000) cannot support the finding of a second periodicity in their very recent paper on V1162 Ori.

Therefore, notwithstanding the other changes that may happen in this interesting δ Scuti star, our conclusion is that V1162 Ori was and still should be considered as a monoperiodic δ Scuti pulsator.

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HIGH-FIELD POLAR AR UMa IN FAINT LUMINOSITY STATE

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AR UMa was classified as a polar based on the Einstein Slew Survey by Remillard et al. (1994). Like other polars, AR UMa switches between "high" (up 13^{m}) and "low" (16^{m}) luminosity states (Wenzel, 1993). The detailed spectral, photometric and polarimetric investigations were introduced by Schmidt et al. (1996). This object has one of the largest magnetic field: about 230 MGs. Beside this, there is an anticorrelation between the luminosity and the degree of polarization.

Our observations of this object were obtained on March 16, 1999 using the 2.6-m Shain Telescope of the Crimean Astrophysical Observatory, altogether 424 points of photometry and circular polarization data with a 4 sec exposure time in the wide R filter ($\lambda \approx 0.5$–0.75 micron). Unfortunately, we had not measured any comparison star, but the brightness of AR UMa was about $16\overset{\mathrm{m}}{.}5$. Our observations spanned a time interval of about 1.56 hours, i.e. only about 80 percent of the 1.932 hour orbital period. The orbital variations are well pronounced in the photometric phase curve (Figure 1a). The phase zero corresponds to the crossing the mean velocity by the radial velocity of the high velocity emission line component. This crossing corresponds to the inferior conjunction of the secondary star (Schmidt et al., 1996, [1]).

Thus the elements are:

$$\mathrm{HJD} = 2450096.9085 + 0.0805 \times E. \qquad (1)$$

Large dispersion of the data may be explained by poor quantum statistics, rather than real oscillations. The mean circular polarization is significantly positive (5.82 ± 0.45 per cent), what corresponds to results for a faint state obtained by previous investigators. The phase curve of circular polarization, which was binned into 16 intervals (Figure 1b), also demonstrates orbital variations. Beside this, the accuracy estimates obtained from the quantum statistics are smaller than real deviations (Shakhovskoy et al., 1998). This argues for a presence of polarization variations within time bins.

AR UMa is a very interesting star, and, during high states of luminosity, its brightness may increase up to 13^{m}–14^{m}, which makes this polar a very perspective object for further investigations.

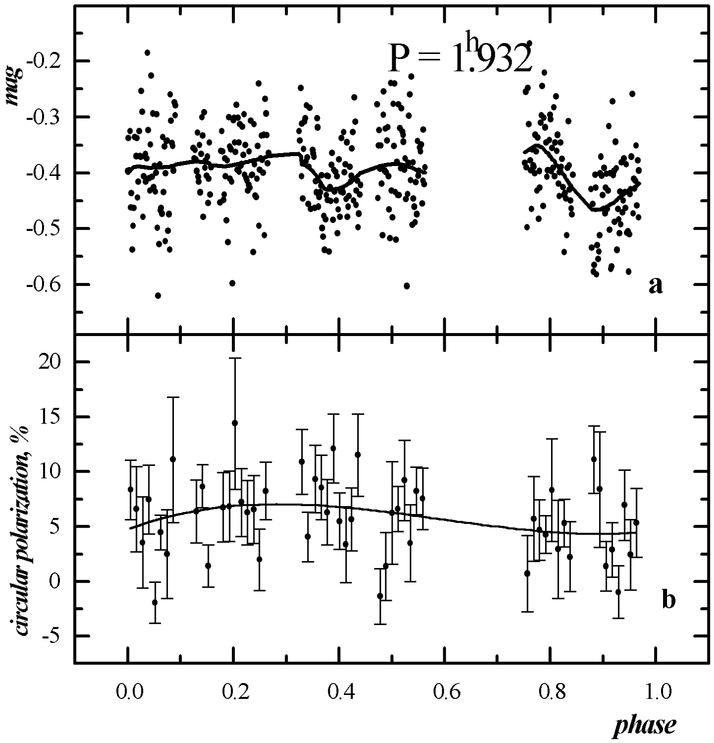

Figure 1. Photometric (a) and circular polarization (b) phase curve of AR UMa, 2.5-m Shain Telescope, CrAO, JD 2451254

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FIRST PHOTOMETRIC OBSERVATIONS OF YY CORONAE BOREALIS

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Name of the object:
YY CrB = BD +38°2706 = HIP 77598 = HD 141990

Equatorial coordinates:	**Equinox:**
R.A.= $15^{\rm h}50^{\rm m}32\overset{\rm s}{.}43$ **DEC.=** $+37^\circ50'07\overset{''}{.}6$	2000

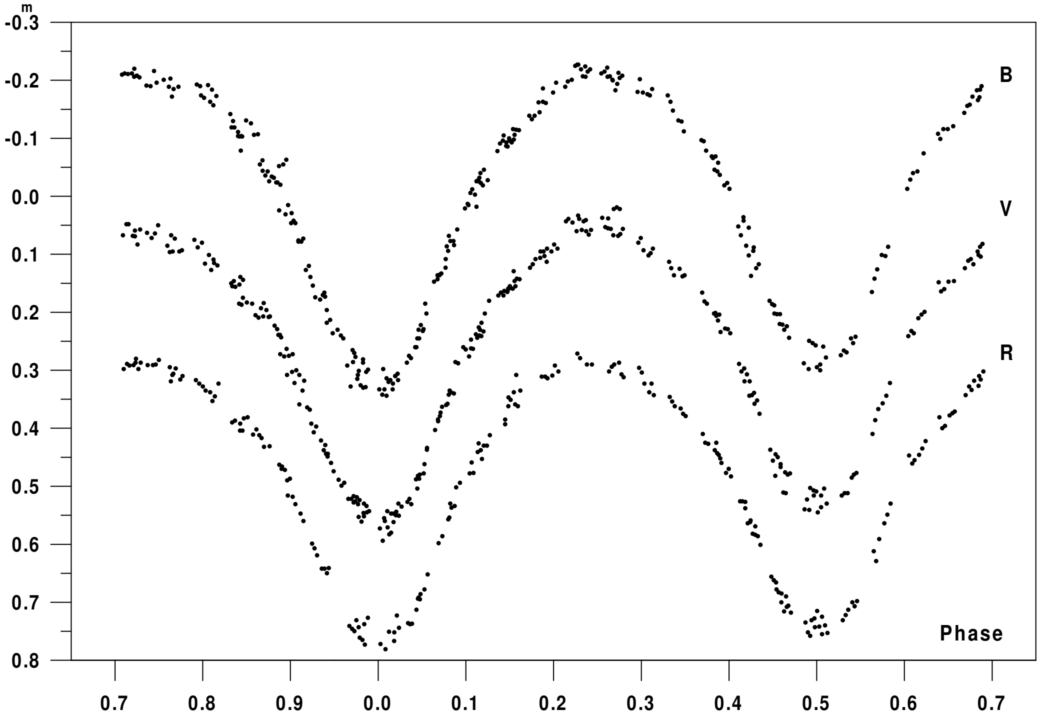

Figure 1. Observations of YY Crb in B, V and R bands. $0\overset{\rm m}{.}2$ and $0\overset{\rm m}{.}4$ values added to V and R light curves respectively, in order to plot all curves detached.

Observatory and telescope:

Ege University Observatory, 48-cm Cassegrain telescope

Detector: Hamamatsu, R 4457 (PMT)

Filter(s): Johnson B, V and R

Comparison star(s): BD +37°2687 = HIP 78028

Check star(s): BD +37°2693 = HIP 78214

Transformed to a standard system: No

Availability of the data:

Upon request

Type of variability: EW

Remarks:

The relatively bright EW type eclipsing binary YY CrB was discovered by HIPPARCOS (ESA, 1998). The photometric observations of the system by HIPPARCOS show a regular W UMa type light curve. The variation range of this light curve is between from $8\overset{\mathrm{m}}{.}643$ to $9\overset{\mathrm{m}}{.}134$ and the light curve has almost equal minima and maxima. The mean orbital period derived by HIPPARCOS from the light curve fit is $0\overset{\mathrm{d}}{.}376565$ and the epoch is given as JD 2448500.2960 (ESA, 1998). Spectral type of the system is given as G5. YY CrB was observed in 1 and 8 July 1999 at the Ege University Observatory and in 10 and 12 July 1999 at TÜBİTAK (Scientific and Technical Research Council of Turkey) National Observatory. It can be seen from the figure that the maxima of all light curves seem to be equal and there are no significant asymmetry. There are continuous variations in the light curves. Due to the irregular brightness variations, one can not observe the same brightness in the same phase in every consecutive observation. Three primary and one secondary minima were obtained during the observations. These minima were given among the other systems' minima in Keskin et al. (2000).

Acknowledgements:

We would like to present our thanks to the TÜBİTAK National Observatory for partial financial and equipment support.

References:

ESA, 1998, The Hipparcos & Tycho Catalogues, SP–1220
Keskin, V., Yaşarsoy, B., Sipahi, E., 2000, *IBVS*, No. 4855

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NEW OBSERVATIONS ON CLASSICAL CEPHEIDS DL Cas AND FM Cas

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Name of the object:
DL Cas

Equatorial coordinates:	**Equinox:**
R.A.= $00^{\rm h}29^{\rm m}58\overset{\rm s}{.}6$ **DEC.=** $+60^\circ12'43\overset{''}{.}1$	2000.0

Name of the object:
FM Cas

Equatorial coordinates:	**Equinox:**
R.A.= $00^{\rm h}14^{\rm m}28\overset{\rm s}{.}2$ **DEC.=** $+56^\circ15'10\overset{''}{.}6$	2000.0

Observatory and telescope:
Szeged Observatory – University of Szeged, 0.4-m Cassegrain-type telescope

Detector:	Single-channel Optec SSP-5A photoelectric photometer

Filter(s):	*UBV*

Comparison star(s):	DL Cas: HD 236433 ($V = 8\overset{\rm m}{.}88$, $B-V = 0\overset{\rm m}{.}97$, $U-B = 0\overset{\rm m}{.}64$) FM Cas: HD 236355 ($V = 9\overset{\rm m}{.}16$, $B-V = 1\overset{\rm m}{.}67$)

Transformed to a standard system:	Johnson
Standard stars (field) used:	Mean transformation coefficients of the differential photometry

Type of variability:	DCEP

Table 1: UBV photometry of DL Cas and FM Cas

DL Cas					**FM Cas**			
Hel. J.D. 2400000 +	φ	V	$B-V$	$U-B$	Hel. J.D. 2400000 +	φ	V	$B-V$
50320.573	0.462	9.108	1.304	0.971	50322.449	0.851	9.163	0.920
50322.411	0.692	9.254	1.362	0.915	50368.342	0.751	9.418	1.060
50368.333	0.431	9.090	1.288	0.903	50370.406	0.106	8.963	0.887
50370.397	0.689	9.238	1.369	0.915	50371.340	0.267	9.117	0.991
50371.335	0.807	9.051	1.228	0.811	50378.384	0.480	9.268	1.115
50387.363	0.810	9.042	1.210	0.763	50387.383	0.029	8.875	0.839
50388.291	0.926	8.776	1.075	0.667	50388.297	0.186	9.062	0.972
50378.375	0.687	9.277	1.323	0.968	50391.465	0.731	9.451	1.090
50391.456	0.322	8.949	1.241	0.826	50393.372	0.060	8.912	0.837
50393.364	0.560	9.183	1.371	0.971	50397.361	0.746	9.420	1.083
50397.320	0.054	8.761	1.089	0.707	50409.252	0.793	9.300	1.039
50409.243	0.545	9.204	1.353	0.928	50413.434	0.513	9.305	1.095
50413.426	0.068	8.790	1.102	0.683				
50855.245	0.291	8.907	1.216	–				
50862.310	0.174	8.841	1.169	–				
51078.410	0.184	8.870	1.147	0.787				

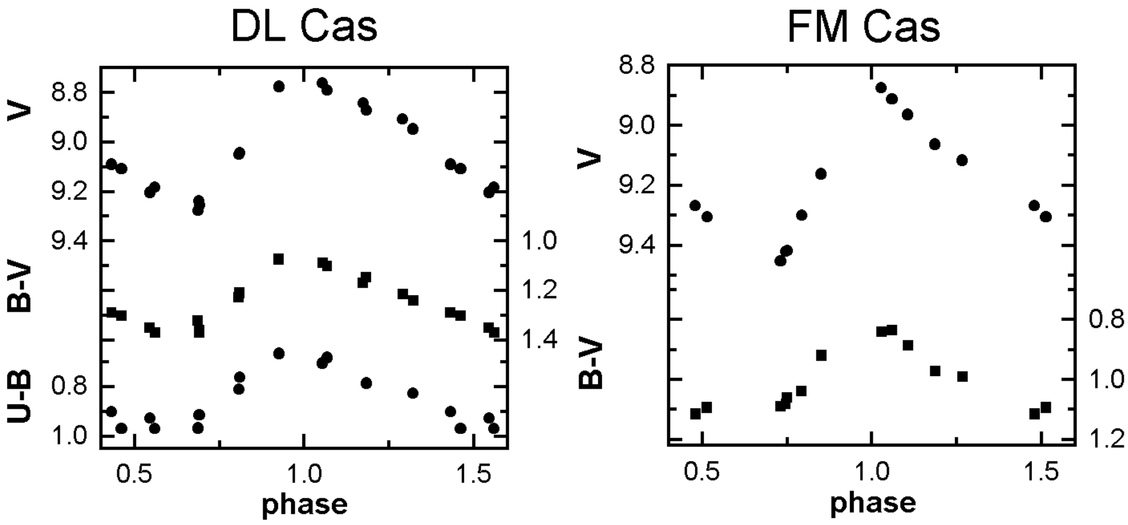

Figure 1. The light and colour curves of DL Cas and FM Cas phased with the ephemerides taken from Moffett & Barnes (1984).

Remarks:

In the course of photoelectric observations of the brightest northern Cepheids (Kiss 1998) we carried out supplementary photometry for DL Cas (a binary Cepheid located in the open cluster NGC 129, Gieren et al. 1994) and the rarely observed Cepheid FM Cas being at an angular distance of only 5° SW from DL Cas. The main aim was to check the period stability of the programme stars. The data obtained between 1996 and 1998 are presented in Table 1. The achieved accuracy is about ±0.015 mag for V and $\pm 0.02 - 0.025$ for $B-V$ and $U-B$.

The light and colour curves presented in Fig. 1 were folded by the following ephemerides (Moffett & Barnes 1984):

$$\text{DL Cas: } P = 8\overset{\text{d}}{.}000610,\ E_0 = 2444948.465,$$
$$\text{FM Cas: } P = 5\overset{\text{d}}{.}809280,\ E_0 = 2444223.567.$$

We compared the resulting V phase diagrams with those of by Moffett & Barnes (1984) to look for small phase shifts caused by the possible period change. While the phases of DL Cas are in very good agreement with the earlier data, in the case of FM Cas a small shift of $\Delta\varphi \approx +0.01$ seems to be necessary to add to our data in order to match the two curves. This corresponds to an $O-C = -0.058$ days, however, it has a quite large uncertainty (comparable to its value) due to the poor phase coverage.

Acknowledgements:

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Gieren, W.P., Welch, D.L., Mermilliod, J.-C., Matthews, J.M., Hertling, G., 1994, *AJ*, **107**, 2093
Kiss, L.L., 1998, *MNRAS*, **297**, 825
Moffett, T.J., Barnes, T.G., 1984, *ApJS*, **55**, 389

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IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 246–254

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As part of initial work on obtaining accurate coordinates and identifications for variables appearing on the long series of Sonneberg *MVS* charts (Hoffmeister 1957, *et seq.*), we have re-examined the two lists presented by Manek (1997a,b) to find external identifications. His identifications were verified as well, and in two cases we present corrections to these. The stars are shown in the same order as in Manek's list, but not all have comments. We thus show in the first column the 'Kiel' preliminary designations, which increase nearly monotonically, to serve as an index between ours and Manek's work.

The working methods for star-identification were similar to those of Manek (1997a) and of Skiff (1999), which includes comparison of the source charts against computer-screen plots of the GSC and/or USNO-A catalogues, and with Digitized Sky Survey images. Identifications in other surveys were sought using SIMBAD and the Strasbourg 'VizieR' catalogue-query utility, and are mentioned here only if they are "new" in the sense of being not present or not linked in SIMBAD. The tedious work of identifying the stars on the sky and obtaining coordinates was done by Kinnunen, while Skiff examined difficult cases and did some sleuthing in the literature.

AN	GCVS	Remarks
121.1931	AT Tau	IRAS 05367+2749
122.1931	AW Tau	[TVH89] 14
123.1931	AY Tau	IRAS 05467+2524
124.1931	CG Tau	improved position: $5^h51^m58\overset{s}{.}9$ $+27°29'25''$ (2000); the northeastern component of a close pair, the variable is not present on POSS-I O print.
125.1931	BB Tau	IRAS 05492+2549
126.1931	BC Tau	IRAS 05499+2413
127.1931	BD Tau	IRAS 05506+2351
129.1931	CO Tau	IRAS 05557+2613
130.1931	BF Tau	IRAS 05566+2645
132.1931	BF Gem	IRAS 05588+2619
134.1931	BR Aur	IRAS 05595+2938
135.1931	BB Aur	IRAS 06001+3138
136.1931	BT Aur	IRAS 06012+2951
139.1931	BV Aur	IRAS 06076+3014

AN	GCVS	Remarks
140.1931	CQ Mon	IRAS 06245+0448 = IRC +00110
148.1931	DS Mon	IRAS 06423–0514
150.1931	DX Mon	[FT96] 214.5–1.8D; IRAS colors are appropriate for an AGB star.
151.1931	DZ Mon	IRAS 06474–0446
157.1931	BQ Mon	IRC –10148
165.1931	FR Mon	IRAS 07154–0932
170.1931	KP Mon	IRAS 07277–1046
173.1931	FX Pup	IRAS 07306–1141
175.1931	NSV 3651	IRAS 07328–1501; the western star of a pair.
176.1931	BF Pup	IRAS 07331–1459; Manek ID is correct (northeastern star of a small triangle).
178.1931	GH Pup	CGCS 1818; GCVS4.1 position 13′.5 in error.
180.1931	GN Pup	IRAS 07442–1453, southern component of a close pair.
181.1931	GO Pup	IRC –10177
182.1931	GQ Pup	IRAS 07462–1615
187.1931	LY Her	IRAS 17431+2521
192.1931	EL Her	the nebulous companion on the east noted by Manek is an $E/SA0^-$ galaxy. EL Her is not obviously variable nor especially red on POSS-I/II plates; is perhaps the apparent variability due to merger with the galaxy in variable seeing?
193.1931	EN Her	IRAS 17516+2639
194.1931	EO Her	IRAS 17519+2813
199.1931	EU Her	IRAS 17563+3155
203.1931	EW Her	IRAS F18020+3322
204.1931	EY Her	IRAS 18027+3241
205.1931	EZ Her	IRAS 18029+2832
206.1931	FF Her	IRAS 18032+3005
208.1931	FH Her	IRAS 18042+3221
209.1931	FI Her	IRAS 18080+3121
Ross 297	CG Her	SV* R 297
210.1931	V555 Oph	northeastern star of a pair.
217.1931	V560 Oph	IRAS 17462–0112
218.1931	V459 Oph	IRAS 17462+0200
220.1931	V460 Oph	FASTT 987
222.1931	V461 Oph	FASTT 897
225.1931	V464 Oph	southeastern component of a close pair.
226.1931	V465 Oph	FASTT 1097
237.1931	V472 Oph	fainter star 20″southeast also very red.
247.1931	V478 Oph	FASTT 850
248.1931	V479 Oph	IRAS 17576+0607 = NSV 9963 = IRC +10344
249.1931	V480 Oph	FASTT 853
253.1931	V483 Oph	IRAS 17588+0258
254.1931	V570 Oph	western star of a pair.
259.1931	V486 Oph	IRAS 18000+0427
260.1931	V488 Oph	IRAS 18002+0418
266.1931	AY Ser	IRAS 18055–0015
29.1926	V426 Oph	present in outburst at epoch 1917.562 in the AC2000 star catalogue (Urban *et al.* 1998).
275.1931	V498 Oph	IRAS 18131+0004
277.1931	V500 Oph	IRAS 18154+0214
279.1931	V352 Aql	Manek ID correct.
280.1931	V353 Aql	IRAS 19128+0457
281.1931	V355 Aql	IRAS 19146+0050
282.1931	V848 Aql	IRAS 19180+0257
283.1931	V531 Aql	IRAS 19203+0608
284.1931	V372 Aql	IRAS 19267+0308
288.1931	V392 Aql	IRAS 19359–0038

AN	GCVS	Remarks
291.1931	UY Sge	IRAS 20181+1627
294.1931	WW Del	IRAS 20245+1527
296.1931	AA Del	IRAS 20290+1750
299.1931	SY Del	IRAS 20309+1448
301.1931	DG Del	eastern star of a pair.
309.1931	DT Del	IRAS 20415+1013
311.1931	DU Del	close double.
315.1931	AZ Del	IRAS 20499+1435
754.1933	V2067 Oph	IRAS 16568–0213
755.1933	NSV 8128	IRAS 16593–0040
756.1933	NSV 8133	IRAS 16599+0204
757.1933	NSV 8188	IRAS 17035+0147
758.1933	NSV 8223	IRAS 17052–0323
759.1933	NSV 8236	IRAS 17065–0230
762.1933	V858 Oph	IRAS 17075–0232
765.1933	V2070 Oph	IRAS 17127–0012
767.1933	V2072 Oph	IRAS 17144–0058
768.1933	V1854 Oph	IRAS F17161–0200
773.1933	V2055 Oph	IRAS 17306–0212
774.1933	NSV 9151	IRAS 17304–0407; Manek ID correct.
776.1933	V539 Aql	IRAS 19452–0355
777.1933	V686 Aql	IRAS 19460–0524
778.1933	V541 Aql	IRAS 19459+0145 = IRC +00452
779.1933	V542 Aql	IRAS 19462–0035
781.1933	V689 Aql	Manek ID correct; SIMBAD ID misattributed: $\neq$ BD–04°4935, etc.
785.1933	V551 Aql	IRAS 19486–0249
789.1933	V554 Aql	IRAS 19507–0444
790.1933	V344 Aql	IRAS 19508+0203
791.1933	V345 Aql	IRAS 19512+0251
792.1933	V556 Aql	IRAS 19521–0326, eastern star of a pair.
793.1933	V558 Aql	IRAS 19522–0358
61.1924	EG Aql	IRAS 19525–0356
796.1933	NSV 12577	southeastern star of a pair.
814.1936	V502 Aql	IRAS 19539–0245, southeastern star of a pair.
798.1933	V724 Aql	HD 357600, verified on HDE chart, but type (A2) probably wrong.
Ross 263	QX Aql	IRAS 19558–0235 = SV* R 263
801.1933	V745 Aql	IRAS 19567–0206
803.1933	V567 Aql	IRAS 19571+0310
804.1933	V568 Aql	IRAS 19577–0201 = IRC +00461
805.1933	V754 Aql	IRAS 19580–0525
806.1933	V752 Aql	IRAS 19578+0012
810.1933	V504 Aql	IRAS 19592+0158; *MVS* chart somewhat distorted, Manek ID in error, should be: $20^{\mathrm{h}}01^{\mathrm{m}}47\overset{\mathrm{s}}{.}10$ $+02^{\circ}07'22\overset{''}{.}6$ (2000, USNO-A2.0), *cf.* POSS-I/II images, which show the variation.
815.1933	V507 Aql	IRAS 20007–0137
822.1933	V782 Aql	southeastern star of a pair.
819.1933	V575 Aql	IRAS 20031+0314
826.1933	V511 Aql	IRAS 20069+0154
828.1933	V513 Aql	IRAS 20075+0013
833.1933	V517 Aql	IRAS 20112+0250
834.1933	V519 Aql	IRAS 20120–0119
836.1933	V520 Aql	IRAS 20121+0015
838.1933	V521 Aql	IRAS 20144–0324
Ross 276	V335 Aql	SV* R 276
843.1933	V595 Aql	IRAS 20190+0033
845.1933	UX Sge	southeastern component of a close double, *cf.* POSS-I/II images.

AN	GCVS	Remarks
852.1933	WY Del	IRAS 20250+1344
854.1933	CV Del	eastern star of a pair.
860.1933	AQ Del	IRAS 20387+1709
861.1933	AS Del	IRAS 20399+1520, Manek ID in error, should be: $20^{h}42^{m}17\overset{s}{.}25$ $+15^{\circ}30'51\overset{''}{.}5$ (2000, USNO-A2.0). Manek's star is in a field with a similar-looking star pattern, but the present star is a much better match to the *MVS* chart and GCVS 4.1 position, and is consistent with the IRAS ID.
862.1933	DV Del	IRAS 20439+1254
868.1933	BT Cep	IRAS 22299+6708

References:

Hoffmeister, C., 1957, *Mitt. Veränder. Sterne*, No. 245

Manek, J., 1997a, *IBVS*, No. 4476

Manek, J., 1997b, *IBVS*, No. 4498

Skiff, B. A., 1999, *IBVS*, No. 4675

Urban, S.E., Corbin T.E., Wycoff, G.L., Martin, J.C., Jackson, E.S., Zacharias, M.I., and Hall, D.M., 1998, *Astron. J.*, **115**, 1212

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 254–255

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This report, the first of a series, contains accurate positions and identifications for known and suspected variables appearing on the Sonneberg *MVS* charts 254 and 255. Discovery details about the stars were given by Hoffmeister in 1936 (Hoffmeister 1936), but the corresponding identification charts for non-Durchmusterung stars were not published until after the War (Hoffmeister 1957, *et seq.*).

The working methods for star-identification were similar to those of Manek (1997) and of Skiff (1999), which includes comparison of the source charts against computer-screen plots of the GSC and/or USNO-A catalogues, and with Digitized Sky Survey (DSS) images via the Goddard 'SkyView' server. Identifications in other surveys were sought using SIMBAD and the Strasbourg 'VizieR' catalogue-query utility. The tedious work of identifying the stars on the sky and obtaining coordinates was done by Kinnunen, while Skiff examined difficult cases and did sleuthing in the literature.

Although some of the stars have accurate coordinates previously published, we have made the identifications *ab initio* in order to provide a complete list matching the *MVS* chart series. The tables below the 'Kiel' (or other) preliminary designation in the first column, followed by the GCVS name. An asterisk here indicates a note following the table.

Next come coordinates and the source for these in column 's', coded as follows: A = USNO-A2.0 (Monet *et al.* 1998), G = GSC-ACT (Gray 1999), S = estimate using large-scale DSS frames from 'SkyView' (McGlynn *et al.* 1996), T = Tycho-2 (Høg *et al.* 2000). The three star catalogues were queried through the Strasbourg 'VizieR' utility (Ochsenbein *et al.* 2000). The positions were taken in the descending order (also roughly in order of decreasing brightness): Tycho-2, GSC-ACT, USNO-A2.0, 'SkyView' estimate. The corresponding uncertainties in the positions (at epoch 2000) are approximately $0\farcs05$, $0\farcs4$, $0\farcs5$, and $2''$, respectively. The Tycho-2 positions are for both epoch and equinox 2000, but the GSC-ACT and USNO-A2.0 positions are for the epoch of the plates involved.

The final columns show GSC and IRAS names as available. Further identifications are given in the Notes. The IRAS and other names are given only if they are "new" in the sense of being not present or not linked in SIMBAD.

Table 1: Variables on *MVS* 254–255

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
660.1935	DE Pup	$7^{\mathrm{h}}48^{\mathrm{m}}41\overset{\mathrm{s}}{.}17$	$-20^\circ24'14\overset{''}{.}7$	G	5989-1439	
661.1935	BV Pup*	7 49 05.26	−23 34 00.1	A		
662.1935	HR Pup	7 52 58.19	−20 52 45.8	G	5994-1340	07507–2044
663.1935	DG Pup	7 54 19.50	−20 31 46.1	G	5990-0683	07521–2023
664.1935	ET Pup*	7 54 37.19	−28 04 58.4	G	6561-1413	
666.1935	DK Pup	7 56 57.76	−25 31 05.4	T	6557-2234	
667.1935	HW Pup	7 57 42.17	−27 36 06.8	G	6562-3505	
668.1935	EX Pup	8 00 38.30	−20 59 34.6	A		07584–2051
669.1935	NSV 3860*	8 00 39.30	−26 56 47.5	T	6562-2125	07585–2648
670.1935	NSV 3862	8 00 58.03	−23 54 45.6	A		
671.1935	IK Pup	8 03 41.76	−23 50 08.2	T	6554-0155	
673.1935	NSV 3898	8 05 32.76	−21 11 47.1	G	6007-1617	08033–2103
674.1935	NSV 3908*	8 07 25.48	−21 49 47.4	G	6007-1592	
675.1935	DO Pup	8 09 05.82	−21 49 26.9	G	6008-2831	
676.1935	NSV 3929*	8 10 06.94	−20 18 28.8	G	6004-1148	08078–2009
677.1935	FL Pup	8 10 21.04	−23 00 47.9	A		08081–2251
679.1935	IT Pup	8 13 02.94	−28 20 32.2	T	6567-1003	
680.1935	CD Pup	8 13 42.79	−24 17 46.9	A		08115–2408
681.1935	FP Pup	8 15 58.63	−23 19 11.9	G	6556-2064	
682.1935	NSV 3978*	8 16 24.07	−21 19 14.3	G	6009-0204	08141–2109
683.1935	FO Pup	8 15 30.32	−24 59 06.1	G	6560-0718	08133–2449
684.1935	NSV 3998	8 18 22.31	−20 32 08.4	A		
685.1935	NSV 3995*	8 17 49.49	−26 00 48.2	G	6560-2934	08156–2551
687.1935	IX Pup	8 19 04.55	−24 02 08.2	G	6556-3742	08169–2352
688.1935	IY Pup	8 19 23.00	−28 15 05.6	A		08172–2805
689.1935	OZ Pup	8 21 53.45	−22 58 12.3	G	6556-5010	08196–2248
690.1935	NSV 4048*	8 23 15.20	−20 58 46.7	G	6009-3815	
691.1935	KM Pup*	8 25 08.90	−22 41 37.9	A		08229–2231
692.1935	NSV 4067*	8 25 23.83	−26 05 04.4	T	6573-4986	

Notes:

BV Pup	apparently in outburst on red plate used for USNO-A2.0 (mr=13.4).
ET Pup	also GSC 6561-3808. GSC v1.1 coordinates given by Morel (1994).
KM Pup	GCVS 4.1 position $3\overset{'}{.}3$ in error.
NSV 3860	CD–26°5353. GSC v1.1 coordinates given by Lopez (1993).
NSV 3908	GSC v1.1 coordinates given by Lopez (1993).
NSV 3929	GSC v1.1 coordinates given by Lopez (1993).
NSV 3978	CGCS 2133. GSC v1.1 coordinates also given by Lopez (1993).
NSV 3995	GSC v1.1 coordinates given by Lopez (1993).
NSV 4048	GSC v1.1 coordinates given by Lopez (1993).
NSV 4067	GSC v1.1 coordinates given by Lopez (1993).

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Morel, M., 1994, *IBVS*, No. 4037

Ochsenbein, F., Bauer, P., and Marcout, J., 2000, *Astron. Astrophys. Suppl. Ser.*, **143**, 23

Skiff, B. A., 1999, *IBVS*, No. 4675

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 255–261

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first reported by Hoffmeister (Hoffmeister 1936). Details about the identification procedure are contained in the first report of the series (Kinnunen & Skiff 2000).

Table 1: Variables on *MVS* 255–261

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
1.1936	CI Cas	$1^{h}21^{m}03^{s}.60$	$+67^{\circ}25'48''.3$	G	4042-0128	
2.1936	CK Cas	1 33 20.02	+68 28 35.5	G	4297-1309	
3.1936	CL Cas	1 42 30.80	+70 25 18.6	G	4314-1645	01386+7010
4.1936	CM Cas	1 52 56.29	+67 56 47.1	G	4310-0268	
5.1936	V392 Cas	2 00 37.26	+69 07 22.0	A		
6.1936	CN Cas	2 21 24.20	+68 06 33.0	G	4311-0495	02172+6752
7.1936	CO Cas	2 22 22.81	+68 30 47.8	A		02181+6817
8.1936	QQ Per*	2 54 40.41	+51 49 28.7	A		
9.1936	NSV 994	2 58 35.48	+46 32 04.5	G	3297-0714	02552+4620
10.1936	BN Per	3 00 55.10	+47 33 02.2	G	3314-0074	
11.1936	BC Per	3 03 31.49	+50 07 43.5	G	3318-0133	
12.1936	BD Per	3 05 07.33	+48 07 46.9	G	3314-2432	
13.1936	QT Per	3 06 09.80	+47 17 01.0	G	3314-1196	
14.1936	BO Per	3 08 03.47	+53 38 26.6	T	3702-0620	
15.1936	V408 Per	3 08 02.87	+47 33 18.1	G	3314-1496	03045+4721
16.1936	BE Per	3 13 48.86	+46 10 16.2	A		
17.1936	HT Per	3 19 19.14	+51 24 38.7	G	3323-0710	
18.1936	V335 Per	3 20 44.62	+46 19 18.7	G	3311-1617	
19.1936	BF Per	3 21 56.82	+46 14 06.5	G	3311-2315	
20.1936	BG Per	3 26 17.86	+50 35 47.4	G	3320-1044	
21.1936	BH Per	3 28 28.13	+50 27 17.9	G	3320-2135	03248+5016
22.1936	V412 Per	3 29 01.11	+49 24 53.6	G	3320-0413	03254+4914
23.1936	BP Per*	3 31 06.72	+49 24 46.7	G	3320-1007	
24.1936	BI Per*	3 32 55.79	+52 44 14.0	G	3703-0513	03292+5234
25.1936	BK Per	3 39 42.57	+52 08 15.5	G	3325-0755	
26.1936	BL Per	3 42 47.10	+48 26 00.2	G	3317-1148	

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
27.1936	WX Cam*	$3^{\rm h}49^{\rm m}03\overset{\rm s}{.}77$	$+53^\circ10'59\overset{''}{.}2$	T	3717-0478	
28.1936	CF Aur	4 54 32.61	+33 56 21.8	G	2395-0190	
29.1936	DD Aur*	4 56 31.59	+33 57 37.4	G	2395-1403	
30.1936	DE Aur	4 56 49.49	+36 47 08.7	G	2399-1309	
31.1936	DF Aur	4 58 54.15	+35 13 51.1	G	2396-0366	04555+3509
32.1936	EI Aur	5 03 14.80	+32 45 10.8	G	2392-0102	
33.1936	DI Aur*	5 06 03.81	+37 25 06.2	G	2401-0673	05026+3721
34.1936	DK Aur*	5 06 30.15	+34 37 41.0	G	2397-0721	
35.1936	II Aur	5 06 41.74	+34 40 54.8	A		
36.1936	DL Aur	5 07 22.77	+32 28 51.7	G	2393-0525	05041+3224
37.1936	DS Aur	5 10 27.64	+33 59 38.4	G	2397-0362	
	DU Aur*	5 11 14.54	+31 19 50.0	A		05080+3116
38.1936	DW Aur	5 14 25.83	+30 01 03.0	A		
39.1936	DZ Aur	5 21 01.08	+38 28 06.0	G	2909-0815	05175+3825
40.1936	EE Aur	5 20 55.48	+35 05 21.0	G	2398-0293	05176+3502
41.1936	EF Aur	5 21 21.33	+38 05 22.9	G	2909-1418	05179+3802
42.1936	EH Aur	5 33 47.09	+34 36 22.7	G	2412-0629	
43.1936	IY Tau	5 42 23.13	+27 56 47.4	G	1869-1239	
44.1936	AX Tau	5 49 43.51	+24 06 56.0	G	1862-2035	05466+2406
45.1936	BL Aur	5 50 23.32	+30 19 47.6	G	2405-1694	
46.1936	AZ Tau	5 51 41.90	+28 18 25.2	G	1875-2114	
47.1936	CS Tau	5 54 08.14	+24 51 09.9	G	1867-1212	05509+2450
48.1936	BE Tau	5 56 08.43	+24 51 10.5	G	1867-1213	
49.1936	EN Tau	5 56 43.48	+25 14 18.3	T	1867-0337	
50.1936	BP Aur	6 01 22.05	+28 33 05.6	G	1876-0140	
51.1936	BQ Aur*	6 01 43.71	+29 27 16.5	G	1876-0074	05585+2927
52.1936	BU Aur	6 09 57.73	+31 24 26.9	T	2420-0258	
53.1936	EP Aur	6 11 32.12	+31 28 52.5	T	2420-0176	
54.1936	BY Mon	6 26 49.67	+03 39 58.8	G	0137-0946	06241+0341
55.1936	DQ Mon	6 31 44.55	+06 57 40.9	G	0158-1085	
56.1936	CR Mon	6 31 24.41	−00 30 58.8	G	4798-0788	
57.1936	NSV 3014	6 32 07.89	+03 08 40.4	G	0150-1044	
58.1936	CT Mon*	6 32 54.39	+05 07 54.5	G	0154-1771	06302+0510
59.1936	DR Mon	6 33 01.83	+06 08 03.7	G	0158-1250	
60.1936	CU Mon	6 32 46.79	+00 02 35.3	G	0146-1103	
61.1936	CW Mon	6 36 54.55	+00 02 17.7	A		
62.1936	CX Mon*	6 37 18.48	+00 55 16.3	T	0146-1374	
63.1936	BZ Mon	6 37 38.20	+04 57 45.6	G	0155-1999	
64.1936	CY Mon	6 38 31.86	−01 36 38.4	G	4799-0105	
65.1936	CD Mon	6 40 30.42	−01 04 44.3	G	4799-1815	
66.1936	V560 Mon	6 46 28.87	−00 15 35.2	G	4800-0738	
67.1936	FY Mon	6 47 08.67	+03 15 33.1	G	0152-2179	
68.1936	DE Mon	6 47 16.38	+00 13 39.0	G	0148-2610	
69.1936	DF Mon*	6 47 35.99	+00 40 56.3	G	0148-1445	
70.1936	V513 Mon	6 47 45.90	+01 06 40.4	A		
71.1936	DG Mon	6 48 05.19	+00 32 17.5	G	0148-1457	
72.1936	DH Mon	6 49 23.66	+04 04 28.8	G	0156-1807	
73.1936	CH Mon	6 51 38.12	+05 56 12.4	G	0160-0530	
74.1936	CK Mon	6 53 46.80	+05 36 41.9	G	0157-0605	
75.1936	DM Mon	6 53 51.96	+01 53 43.8	G	0153-0327	
76.1936	CM Mon	6 56 32.89	+04 39 41.9	A		
77.1936	CN Mon	6 56 35.41	−00 31 12.7	A		
78.1936	DN Mon	6 57 15.78	+04 56 14.5	G	0157-2400	
79.1936	DO Mon*	7 00 00.46	+02 56 06.7	G	0166-0280	
80.1936	CP Mon	7 00 11.91	+04 08 25.3	T	0170-1144	
81.1936	DT Mon	6 45 20.31	−01 42 46.9	A		
82.1936	DU Mon	6 45 18.19	−09 03 04.6	A		

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
83.1936	DV Mon	$6^{h}45^{m}19^{s}.40$	$-08^{\circ}50'19''.9$	G	5378-2034	
84.1936	DW Mon	6 47 51.37	−02 41 19.0	T	4804-2214	
85.1936	DY Mon	6 48 56.32	−06 03 54.5	A		
86.1936	NSV 3227*	6 49 53.72	−05 02 30.7	T	4808-0946	
87.1936	EE Mon	6 50 48.69	−07 58 50.6	G	5379-0332	
88.1936	EF Mon	6 50 47.63	−08 49 53.1	G	5379-1903	06484–0846
89.1936	EL Mon	6 54 45.84	−06 40 05.7	G	4813-0105	
90.1936	EN Mon	6 55 40.14	−05 31 02.4	G	4809-0418	
91.1936	EO Mon	6 55 49.12	−06 53 33.7	G	4813-1873	
92.1936	EQ Mon	6 57 37.19	−09 48 02.9	A		
93.1936	ER Mon	6 58 01.34	−08 02 46.2	A		06556–0758
94.1936	FZ Mon	6 59 22.58	−07 58 00.7	G	5380-0337	
95.1936	ES Mon	6 59 48.69	−07 25 11.5	G	4813-1003	
96.1936	ET Mon	7 00 52.89	−07 24 18.4	A		
97.1936	EU Mon	7 01 20.22	−05 31 45.3	A		
98.1936	EW Mon	7 01 30.57	−08 01 11.1	G	5381-0135	
99.1936	EY Mon	7 02 26.28	−07 35 43.6	A		
100.1936	FG Mon	7 07 08.56	−07 47 42.5	G	5381-0662	
101.1936	FH Mon	7 08 49.40	−02 32 00.6	G	4819-1608	
102.1936	FL Mon	7 11 51.42	−08 39 46.3	G	5394-3521	
103.1936	FM Mon	7 12 19.73	−09 25 32.4	G	5398-1684	
104.1936	FN Mon	7 13 46.61	−09 09 47.0	G	5394-1573	
105.1936	NSV 3481	7 14 51.21	−05 28 51.2	G	4823-0271	
106.1936	FO Mon	7 15 17.28	−06 12 55.2	G	4828-0032	07128–0607
107.1936	FQ Mon	7 16 41.23	−06 56 49.2	A		
108.1936	V634 Mon	7 17 10.07	−01 44 18.8	T	4816-1016	
109.1936	CQ Hya	8 37 45.20	+02 21 24.0	G	0215-0724	
110.1936	GL Hya	8 40 59.23	+02 37 22.4	G	0215-0653	
111.1936	CR Hya	8 41 17.64	+02 30 36.8	G	0215-0575	
112.1936	GN Hya	8 48 18.53	+02 07 15.2	G	0216-1527	
113.1936	UW Cnc	8 50 59.32	+07 36 50.6	G	0810-0614	08482+0748
114.1936	CT Hya	8 51 07.38	+03 08 34.0	A		
115.1936	CU Hya	8 54 20.59	+03 42 23.2	A		
116.1936	GO Hya	8 54 53.50	+06 26 12.9	G	0225-0768	
117.1936	CW Hya	8 55 07.81	+03 39 24.9	A		
118.1936	UX Cnc	9 03 29.51	+07 35 37.9	T	0812-0842	
119.1936	CX Hya	9 06 12.79	+01 41 00.2	G	0226-1311	09036+0152
120.1936	AP Cnc	9 06 52.26	+08 36 30.0	G	0812-1758	
121.1936	CY Hya	9 10 20.88	+05 20 51.2	G	0233-1240	
122.1936	SU CrB	16 23 36.33	+36 25 21.5	G	2586-1210	
123.1936	GR Her	16 26 03.04	+31 47 40.1	G	2581-1305	
124.1936	GS Her	16 28 26.62	+32 08 07.5	G	2581-0397	
125.1936	HU Her	16 29 19.85	+31 09 55.1	G	2581-1896	
126.1936	HT Her	16 29 07.88	+34 13 46.6	G	2584-0847	
127.1936	GT Her	16 30 18.59	+34 27 34.9	G	2584-0908	
128.1936	GU Her	16 32 05.52	+30 23 09.7	T	2581-1840	
129.1936	GV Her	16 34 54.79	+35 15 51.2	G	2587-1676	
130.1936	GW Her	16 36 58.13	+31 44 09.5	G	2582-1571	
131.1936	GZ Her	16 38 31.40	+33 02 31.2	G	2585-0526	
132.1936	HH Her	16 38 40.47	+31 38 44.1	G	2582-1131	
133.1936	HI Her	16 43 50.20	+37 27 42.3	G	2588-2492	
134.1936	HK Her	16 45 09.40	+36 18 49.8	A		
135.1936	HL Her	16 49 39.84	+34 58 19.2	A		
136.1936	HM Her	16 51 16.03	+30 26 59.5	A		
137.1936	HW Her	16 53 02.26	+32 46 41.1	G	2593-0969	
138.1936	HX Her	16 53 22.03	+33 16 29.9	G	2593-0469	
139.1936	HY Her	16 54 34.70	+33 49 31.3	T	2597-0338	16527+3354

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
140.1936	HO Her	$16^{\mathrm{h}}57^{\mathrm{m}}20\overset{\mathrm{s}}{.}81$	$+30^{\circ}21'27\overset{''}{.}6$	G	2590-0839	
141.1936	HP Her	16 56 50.26	+32 20 08.9	A		
142.1936	HZ Her*	16 57 49.83	+35 20 32.6	G	2598-1298	
143.1936	HQ Her	16 58 31.98	+29 54 23.9	A		
144.1936	HR Her	16 58 43.98	+33 35 07.1	A		
145.1936	II Her	16 59 10.84	+38 03 51.9	T	3071-1259	
146.1936	IK Her	17 00 06.79	+31 58 14.4	G	2594-1492	
215.1928	IL Her	17 00 48.67	+30 14 15.6	A		
147.1936	IN Her	17 02 07.56	+34 12 50.3	T	2598-0334	
148.1936	IM Her	17 02 10.80	+32 11 53.4	G	2594-1607	
149.1936	IO Her*	17 02 28.96	+36 44 23.5	T	2602-0079	
150.1936	V365 Her	17 05 39.90	+21 30 58.6	G	1547-0957	
151.1936	V456 Her	17 06 47.61	+21 06 18.3	G	1547-0595	
152.1936	V458 Her	17 08 30.95	+18 31 14.0	G	1539-1217	
153.1936	V462 Her	17 11 10.07	+23 00 10.2	G	2061-0364	
154.1936	V467 Her	17 12 50.82	+25 01 48.5	G	2065-0082	
155.1936	V469 Her	17 14 10.62	+19 45 29.0	G	1544-1671	
156.1936	V476 Her	17 20 48.81	+22 05 52.1	A		
157.1936	FO Her	17 20 59.86	+22 26 52.2	T	1549-1075	F17188+2229
158.1936	V393 Her	17 21 04.03	+26 55 51.1	G	2082-1774	
159.1936	V484 Her*	17 25 31.96	+20 47 05.4	G	1549-0389	
160.1936	V486 Her	17 26 38.39	+26 56 17.8	G	2083-1003	
161.1936	V488 Her	17 27 02.68	+22 53 05.7	G	2075-1920	
162.1936	V490 Her	17 29 38.79	+22 49 10.9	G	2075-0721	
163.1936	V491 Her	17 30 09.13	+20 55 53.1	G	1550-0271	
164.1936	V492 Her	17 30 04.50	+25 23 15.9	G	2079-1189	
165.1936	V493 Her	17 30 16.43	+23 37 17.5	G	2075-0957	
166.1936	NS Her*	17 31 41.49	+21 49 55.1	T	1550-2532	F17295+2152
167.1936	V494 Her	17 32 13.05	+21 23 13.7	G	1550-1400	
	LU Her*	17 32 35.57	+26 12 25.7	G	2079-0303	
168.1936	GP Her	17 33 21.92	+23 35 15.6	G	2075-0650	17312+2337
169.1936	V497 Her	17 33 53.82	+22 37 06.1	G	2075-2146	
170.1936	V503 Her	17 36 40.46	+23 18 12.0	T	2076-1528	
171.1936	V509 Her	17 39 20.35	+22 44 48.4	G	2076-0661	17372+2246
172.1936	V510 Her	17 39 36.76	+21 15 05.0	G	1563-0980	
173.1936	V518 Her	17 42 15.95	+19 41 45.2	G	1559-0401	F17401+1943
174.1936	LX Her	17 43 18.76	+28 15 15.7	G	2089-1389	
175.1936	EM Her	17 52 01.97	+29 40 11.3	G	2102-1861	17500+2940
176.1936	EQ Her*	17 56 35.66	+24 48 47.9	G	2094-2862	17545+2449
177.1936	ET Her	17 58 09.90	+29 02 58.1	G	2102-1038	17562+2903
178.1936	EX Her	18 04 17.60	+28 54 54.1	G	2103-1343	F18023+2854
179.1936	FG Her	18 05 38.58	+31 00 18.2	G	2621-1187	
180.1936	MO Her	18 08 36.18	+29 34 44.8	A		
181.1936	MY Her	18 09 30.80	+27 20 54.3	G	2100-1011	18075+2720
182.1936	MP Her	18 10 15.28	+31 25 09.1	G	2622-1191	
183.1936	FK Her	18 11 17.97	+29 57 48.6	G	2104-0369	
184.1936	MQ Her*	18 11 22.78	+29 11 10.0	A		
185.1936	FL Her	18 11 57.79	+32 27 54.0	T	2626-1277	
186.1936	MR Her	18 15 30.74	+28 15 27.5	G	2104-2233	18135+2814
187.1936	FM Her	18 16 07.06	+29 06 58.1	G	2104-1651	18141+2905
188.1936	MS Her	18 16 53.43	+27 39 46.2	G	2101-0313	
189.1936	V579 Oph*	18 25 32.39	+07 45 20.4	A	1023-0787	
190.1936	V580 Oph	18 25 38.12	+07 36 37.2	A		
191.1936	V581 Oph	18 25 39.50	+08 45 04.6	G	1023-1206	
192.1936	V582 Oph	18 26 40.56	+07 45 42.9	A		
193.1936	V583 Oph	18 26 42.54	+07 03 27.6	A		
194.1936	BK Ser	18 27 03.74	+05 16 43.0	G	0441-0625	

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
195.1936	V586 Oph*	$18^{\rm h}27^{\rm m}15^{\rm s}\!.16$	$+04^{\circ}17'05''\!.1$	T	0441-0699	
196.1936	V585 Oph	18 27 09.13	+07 31 27.7	T	1023-2345	
197.1936	V584 Oph	18 26 58.73	+10 12 31.1	A		
198.1936	BL Ser	18 27 24.38	+05 03 15.7	G	0441-1980	
199.1936	V588 Oph	18 27 17.55	+09 01 57.1	A		
200.1936	V587 Oph	18 27 17.53	+09 35 45.3	G	1027-2245	
201.1936	V589 Oph	18 27 30.21	+09 06 35.9	G	1023-1016	
202.1936	V590 Oph	18 27 31.35	+09 12 26.3	G	1023-0111	
203.1936	BM Ser	18 27 57.81	+04 34 36.4	A		
204.1936	V591 Oph	18 27 45.28	+10 07 30.4	A		18253+1005
205.1936	V593 Oph*	18 27 57.36	+08 23 07.0	T	1023-1019	
206.1936	V592 Oph	18 27 55.21	+09 48 04.2	G	1027-2002	
207.1936	NSV 10870	18 28 14.51	+12 19 51.1	G	1031-1766	
208.1936	V594 Oph*	18 28 34.22	+07 36 11.8	A		
209.1936	V595 Oph	18 28 32.70	+09 44 16.3	G	1027-2054	18261+0942
210.1936	BN Ser	18 28 51.44	+06 17 31.7	G	0445-1312	
211.1936	V596 Oph*	18 28 50.46	+06 59 05.0	A		
212.1936	V597 Oph*	18 28 49.75	+09 31 52.7	T	1027-2087	
213.1936	BO Ser	18 29 05.14	+05 25 46.8	A		
214.1936	V598 Oph	18 28 54.70	+08 42 43.1	G	1023-0944	
215.1936	V600 Oph	18 28 58.98	+08 19 32.1	G	1023-0849	
216.1936	V599 Oph*	18 28 48.67	+11 47 09.1	T	1031-1269	

Notes:

BQ Aur	Lee 186.
DD Aur	outside position error-ellipse of IRAS 04532+3352.
DI Aur	CGCS 847.
DK Aur	CSS 120.
DU Aur	SV* R 155.
WX Cam	epoch 1991.6.
EQ Her	also GSC 2094-1810.
HZ Her	BPS BS 16552-0071 = FBS 1656+354.
IO Her	epoch 1991.7.
LU Her	SV* R 379.
MQ Her	GCVS4.1 position $3'.1$ in error.
NS Her	epoch 1991.7.
V484 Her	GCVS4.1 position $3'.3$ in error.
CT Mon	[MJD95] J063254.40+050754.6.
CX Mon	epoch 1991.9.
DF Mon	misidentified in Skiff (1999).
DO Mon	also GSC 0166-2396.
V579 Oph	eastern component of a close double.
V586 Oph	large proper motion: $+0''.20/-0''.11$.
V593 Oph	epoch 1991.9.
V594 Oph	not IRAS 18261+0734.
V596 Oph	outside position error-ellipse of IRAS 18264+0657.
V597 Oph	epoch 1991.8.
V599 Oph	epoch 1991.7.
BI Per	CGCS 514.
BP Per	FBFTA Per II 102.
QQ Per	not IRAS 02510+5137.
NSV 3227	HD 295604.

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first reported by Hoffmeister (Hoffmeister 1936). Details about the identification procedure are contained in the first report of the series (Kinnunen & Skiff 2000).

Table 1: Variables on *MVS* 262–266

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
217.1936	V601 Oph	$18^{h}29^{m}10^{s}.24$	$+08^{\circ}55'35''.7$	T	1023-1514	18267+0853
218.1936	V602 Oph	18 29 27.12	+11 29 04.1	A		
219.1936	V604 Oph	18 30 12.17	+06 21 16.8	A		18277+0619
220.1936	V603 Oph	18 30 03.56	+08 41 26.0	A		
221.1936	BP Ser	18 30 13.38	+06 16 49.7	G	0458-0918	
222.1936	V605 Oph	18 30 15.21	+09 46 10.7	G	1027-2178	
223.1936	V606 Oph	18 30 38.42	+10 21 19.2	G	1028-1979	
224.1936	V607 Oph*	18 31 06.3	+09 01 33	S		
225.1936	V608 Oph	18 31 15.03	+07 08 27.0	G	0458-1061	
226.1936	V609 Oph	18 31 15.10	+09 35 54.9	G	1028-1898	18288+0933
227.1936	V610 Oph	18 31 23.78	+09 10 10.2	G	1024-1439	
228.1936	V611 Oph	18 31 46.10	+07 17 43.1	T	0458-0105	
229.1936	V612 Oph	18 31 54.89	+11 00 54.1	G	1028-2715	
230.1936	V613 Oph	18 32 20.19	+08 59 05.1	G	1024-0601	
231.1936	V614 Oph	18 32 34.51	+09 57 22.1	T	1028-0332	18302+0955
232.1936	V514 Oph	18 33 04.31	+08 27 37.5	A		
233.1936	V615 Oph	18 32 58.86	+10 51 32.3	A		18306+1049
234.1936	V616 Oph	18 33 08.81	+07 55 14.3	G	1024-1926	
235.1936	V617 Oph	18 33 16.9	+11 37 58	S		

Table 1: Variables on *MVS* 262–266 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
236.1936	V618 Oph	$18^{h}33^{m}41\overset{s}{.}81$	$+06^{\circ}55'16\overset{''}{.}2$	A		
237.1936	V620 Oph*	18 33 47.37	+09 06 59.8	A		
238.1936	V619 Oph	18 33 42.72	+10 49 07.8	A		18313+1046
239.1936	V621 Oph	18 33 56.38	+08 54 26.1	G	1024-1777	18315+0852
240.1936	V622 Oph	18 34 04.48	+08 52 29.4	A		18316+0850
241.1936	V623 Oph	18 34 17.67	+07 48 21.9	G	1024-1698	
242.1936	V624 Oph	18 34 15.40	+09 04 10.2	G	1024-0569	
243.1936	V625 Oph	18 34 17.42	+10 48 27.9	G	1028-1067	
244.1936	V626 Oph	18 34 22.60	+10 27 19.2	G	1028-2279	18320+1024
245.1936	V627 Oph	18 34 33.60	+09 12 41.4	G	1024-0147	
246.1936	V629 Oph	18 35 12.59	+09 28 26.2	A		
247.1936	V628 Oph	18 35 17.63	+10 03 20.1	G	1028-2744	
248.1936	V631 Oph	18 35 35.29	+09 04 00.3	A		18331+0901
249.1936	V632 Oph*	18 35 41.3	+08 10 48	S		
250.1936	V630 Oph	18 35 40.92	+09 18 08.1	A		
251.1936	V634 Oph	18 36 00.03	+06 42 49.8	A		
252.1936	V633 Oph	18 35 48.25	+10 36 58.1	A		18334+1034
253.1936	BR Ser	18 36 14.45	+05 04 40.1	G	0454-1452	
254.1936	V635 Oph	18 36 24.15	+07 36 43.4	A		18340+0734
255.1936	V638 Oph	18 36 44.45	+09 00 05.2	G	1024-0607	
256.1936	V637 Oph	18 36 41.76	+09 56 18.2	G	1028-1266	18343+0953
257.1936	V636 Oph	18 36 41.46	+10 28 21.9	G	1028-1781	
258.1936	V639 Oph	18 37 13.14	+07 33 01.1	G	1024-2024	
259.1936	V643 Oph	18 37 26.68	+06 21 42.1	G	0458-1439	
260.1936	V640 Oph	18 37 08.61	+11 16 16.4	A		
261.1936	V642 Oph*	18 37 22.73	+08 06 28.0	A		
262.1936	V641 Oph	18 37 18.18	+09 11 21.9	A		
263.1936	V644 Oph*	18 37 24.36	+09 58 19.2	A		
264.1936	BS Ser	18 37 48.60	+05 04 01.6	G	0455-1250	
265.1936	V647 Oph	18 37 49.5	+08 10 56	S		18354+0808
266.1936	V646 Oph	18 37 44.33	+10 17 43.9	A		
267.1936	V645 Oph	18 37 41.70	+11 52 19.6	G	1032-0144	
268.1936	V649 Oph	18 38 03.00	+09 23 34.0	G	1028-2040	
269.1936	V650 Oph	18 38 07.54	+12 01 50.1	G	1032-1260	
270.1936	BT Ser	18 38 49.67	+04 50 00.5	G	0455-3129	
271.1936	V651 Oph*	18 38 40.14	+09 22 23.4	A		
272.1936	V653 Oph	18 38 43.52	+11 02 57.4	A		18363+1100
273.1936	V654 Oph	18 39 30.39	+07 57 10.1	G	1025-2059	
274.1936	V656 Oph	18 39 33.68	+07 09 20.0	A		18371+0706
275.1936	V655 Oph	18 39 30.18	+07 52 03.2	A		18370+0749
276.1936	V515 Oph	18 39 33.09	+11 50 39.1	T	1033-2494	
277.1936	BU Ser	18 40 04.16	+05 41 13.0	G	0459-2322	
278.1936	V657 Oph	18 40 04.14	+10 07 52.4	A		
279.1936	V658 Oph	18 40 30.20	+08 14 28.2	A		
280.1936	V659 Oph	18 40 26.94	+10 01 48.8	A		

Table 1: Variables on *MVS* 262–266 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
281.1936	V660 Oph	$18^{\mathrm{h}}40^{\mathrm{m}}41\overset{\mathrm{s}}{.}2$	$+08^{\circ}45'47''$	S		18382+0842
282.1936	V661 Oph	18 40 58.04	+09 13 39.7	A		
283.1936	V662 Oph	18 41 16.56	+09 19 16.6	G	1025-1122	
284.1936	NSV 11212	18 41 34.94	+05 41 46.0	G	0459-1388	
285.1936	KW Her*	18 41 26.03	+12 09 40.9	A		
286.1936	V663 Oph	18 41 58.68	+07 03 43.8	G	0459-0291	
287.1936	V664 Oph	18 41 51.80	+11 20 16.5	G	1033-1393	
288.1936	V665 Oph	18 42 09.99	+10 38 55.1	A		
289.1936	V666 Oph	18 42 24.68	+09 51 32.7	A		
290.1936	V667 Oph*	18 42 30.71	+08 38 05.1	G	1025-1806	18401+0835
291.1936	BV Ser	18 42 55.15	+04 46 02.3	G	0455-0651	18404+0442
292.1936	V668 Oph	18 42 32.63	+10 20 43.9	A		18401+1017
293.1936	BW Ser*	18 43 00.73	+04 06 08.4	T	0455-0225	18405+0403
294.1936	V669 Oph	18 42 49.76	+10 44 19.9	G	1029-2090	18404+1041
295.1936	V670 Oph*	18 43 14.77	+10 07 06.7	G	1029-0274	
296.1936	KX Her	18 43 13.86	+12 23 51.4	G	1033-0618	
297.1936	V671 Oph	18 43 42.57	+09 39 02.4	A		
298.1936	V672 Oph	18 43 58.89	+11 05 44.2	A		
299.1936	V673 Oph	18 44 05.82	+09 24 39.0	A		18416+0921
300.1936	V674 Oph	18 44 07.06	+10 59 53.5	A		18417+1056
301.1936	V675 Oph	18 44 20.64	+10 33 22.5	A		18419+1030
302.1936	V676 Oph	18 44 23.0	+12 00 38	S		18420+1157
303.1936	KY Her	18 44 28.15	+12 46 49.6	A		
304.1936	V677 Oph*	18 44 51.5	+10 53 17	S		
305.1936	BX Ser	18 45 18.13	+04 16 06.8	G	0456-0232	18428+0412
306.1936	BY Ser	18 45 27.65	+04 37 23.3	G	0456-0567	18429+0434
307.1936	V539 Oph	18 45 22.54	+07 22 44.4	G	0460-0313	18429+0719
308.1936	LR Her	18 45 36.65	+12 16 30.6	A		
309.1936	BZ Ser	18 46 24.76	+05 20 16.3	G	0456-0006	
310.1936	V473 Aql	18 46 37.37	+11 29 28.8	G	1034-1358	
311.1936	V474 Aql	18 47 13.68	+10 33 19.7	A		18448+1029
312.1936	KZ Her	18 47 12.24	+12 27 24.1	A		18448+1224
313.1936	V475 Aql	18 48 29.72	+11 39 35.6	A		
314.1936	V476 Aql	18 48 48.59	+07 08 49.1	G	0460-0485	
315.1936	LL Her	18 48 37.16	+12 12 08.2	G	1034-2679	
316.1936	V477 Aql	18 49 24.33	+08 35 39.7	T	1026-2238	
317.1936	V478 Aql*	18 49 37.39	+11 52 03.7	T	1034-2864	18472+1148
318.1936	V479 Aql	18 50 19.64	+10 40 23.8	G	1030-2334	
319.1936	LM Her	18 50 16.06	+12 12 23.4	A		
320.1936	V480 Aql*	18 50 34.88	+07 07 33.9	G	0460-0382	
321.1936	LN Her	18 51 09.83	+12 25 14.0	A		
322.1936	V481 Aql	18 51 19.38	+10 44 28.6	A		
323.1936	LO Her	18 51 45.20	+12 13 09.6	A		
324.1936	V482 Aql	18 51 52.34	+10 37 48.0	G	1030-1826	
325.1936	V484 Aql	18 52 02.29	+09 53 14.4	G	1030-2419	18496+0949

Table 1: Variables on *MVS* 262–266 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
326.1936	V483 Aql	$18^{\rm h}52^{\rm m}00\overset{\rm s}{.}76$	$+10^\circ25'03\overset{''}{.}6$	G	1030-1974	18496+1021
328.1936	V486 Aql*	18 52 09.26	+10 23 00.7	G	1030-0512	18497+1019
327.1936	V485 Aql	18 52 08.87	+09 42 35.7	A		
329.1936	V487 Aql*	18 52 16.8	+10 02 05	S		
330.1936	V488 Aql*	18 53 22.41	+11 02 54.3	A		
331.1936	V489 Aql	18 55 35.01	+12 04 29.8	G	1047-2096	18532+1200
12.1929	LP Her	18 55 41.21	+12 15 28.1	G	1047-1384	
332.1936	V490 Aql	18 58 25.98	+12 59 26.1	G	1047-1520	
333.1936	V492 Aql	18 59 27.24	+05 22 40.2	T	0457-0227	
334.1936	V491 Aql	18 59 10.34	+10 02 10.0	G	1043-1820	18568+0958
335.1936	V406 Aql	19 11 02.78	+01 11 24.4	T	0463-0656	
66.1930	V407 Aql	19 11 10.82	+01 08 52.1	G	0463-4301	
336.1936	NSV 11845*	19 15 17.46	−01 19 46.5	G	5130-0079	
337.1936	V815 Aql	19 22 11.88	−01 32 51.3	G	5130-2265	19195–0138
338.1936	V410 Aql	19 22 18.98	+05 18 32.0	G	0472-1489	
	V816 Aql*	19 23 10.62	−01 31 01.8	G	5131-1758	
339.1936	V849 Aql	19 23 21.58	−01 21 31.7	A		
340.1936	V412 Aql*	19 23 21.00	+01 39 52.8	G	0465-0248	
341.1936	NSV 11993*	19 25 04.21	+04 13 33.1	G	0473-4136	
342.1936	V365 Aql	19 26 15.50	+03 51 27.4	G	0473-6446	
343.1936	V858 Aql*	19 29 12.31	+03 51 41.9	T	0473-3116	
344.1936	V373 Aql	19 29 14.27	+06 48 24.3	G	0477-3335	
345.1936	V380 Aql	19 32 34.58	+02 17 42.2	G	0482-1460	
346.1936	V381 Aql	19 32 53.61	−01 02 13.3	G	5144-0398	
347.1936	V383 Aql	19 35 06.10	+02 02 26.2	G	0482-2195	19325+0155
348.1936	V382 Aql	19 35 09.80	+01 55 31.2	A		19326+0148
349.1936	V385 Aql	19 35 38.81	+04 58 18.5	G	0486-3109	
350.1936	V386 Aql*	19 35 46.06	+06 46 09.6	A		
351.1936	V420 Aql	19 40 14.35	+02 39 02.8	G	0483-1735	
352.1936	CL Vul	19 39 51.70	+22 16 09.5	G	1614-0661	
353.1936	DG Sge	19 40 35.16	+19 17 08.1	A		
354.1936	XY Sge	19 41 06.36	+17 56 11.1	G	1606-1320	19388+1749
355.1936	NSV 12307*	19 41 44.44	+20 30 24.6	G	1610-0169	
356.1936	GG Vul	19 42 13.88	+20 28 49.7	G	1610-0511	
357.1936	GH Vul	19 42 33.74	+20 09 57.6	A		
358.1936	CM Vul	19 42 35.38	+22 57 59.5	G	2139-2147	
359.1936	DP Sge*	19 43 47.8	+18 16 01	S		
360.1936	CO Vul*	19 43 43.86	+19 34 07.7	G	1610-0042	
361.1936	CN Vul	19 43 34.01	+22 44 59.2	G	2139-0323	
362.1936	YY Sge	19 44 08.49	+18 00 08.0	A		
363.1936	YZ Sge*	19 44 57.39	+17 08 45.6	G	1619-1576	
364.1936	CP Vul	19 45 18.1	+19 29 44	S		
365.1936	ZZ Sge	19 46 18.23	+18 44 38.4	G	1619-0175	

Table 1: Variables on *MVS* 262–266 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
366.1936	BR Vul	$19^{\mathrm{h}}46^{\mathrm{m}}35\overset{\mathrm{s}}{.}19$	$+22^\circ53'23\overset{\prime\prime}{.}2$	T	2139-2370	
125.1940	AA Sge	19 46 31.06	+18 45 05.5	G	1623-0940	19443+1837
367.1936	CR Vul	19 46 59.36	+19 57 57.9	G	1623-1482	19447+1950
368.1936	DT Sge	19 47 25.29	+18 54 41.8	A		
369.1936	DH Sge*	19 47 36.01	+16 54 35.5	A		
370.1936	CT Vul	19 47 32.57	+20 54 17.9	A		
371.1936	V688 Aql	19 48 28.88	+15 37 16.1	T	1615-1752	
372.1936	CU Vul*	19 48 35.06	+21 40 06.3	T	1627-0814	19464+2132
373.1936	AD Sge	19 48 54.19	+17 33 42.1	A		19466+1726
374.1936	AE Sge	19 49 00.87	+18 45 19.2	G	1623-0354	
375.1936	CV Vul	19 49 12.70	+20 52 56.9	G	1627-2698	19470+2045
376.1936	GV Vul	19 49 23.76	+20 39 14.3	A		
377.1936	AH Sge	19 50 10.20	+17 30 08.2	G	1619-3073	
378.1936	EU Vul	19 50 31.68	+22 12 04.8	G	1627-0343	
379.1936	V602 Aql	19 51 00.61	+16 26 43.7	T	1615-2201	
380.1936	V1045 Aql	19 51 05.43	+15 19 19.3	G	1615-1349	
382.1936	V1046 Aql	19 51 20.27	+15 19 08.5	G	1615-0521	
381.1936	CW Vul	19 51 02.04	+20 31 07.6	A		19488+2023
383.1936	CX Vul*	19 51 10.93	+20 45 21.5	A		
384.1936	AK Sge	19 51 45.66	+16 49 34.3	G	1615-2703	
	V1053 Aql*	19 51 54.35	+15 34 39.6	A		19496+1526
385.1936	V707 Aql	19 52 20.38	+16 05 16.8	A		
386.1936	V708 Aql	19 52 28.82	+14 53 11.4	G	1070-1171	
43.1928	DP Vul*	19 52 18.1	+19 39 27			
387.1936	V713 Aql*	19 53 42.26	+15 31 10.7	G	1616-3293	19514+1523
388.1936	AN Sge*	19 54 12.53	+17 44 03.3	G	1620-0433	19519+1736
389.1936	V1064 Aql	19 54 56.73	+15 32 19.9	G	1616-0302	
390.1936	HL Vul	19 55 15.17	+20 46 20.9	A		
391.1936	DX Sge	19 55 59.84	+18 19 16.0	A		
392.1936	AR Sge	19 56 20.18	+20 59 53.4	A		
142.1905	AS Sge*	19 56 38.7	+17 19 40	S		
393.1936	NSV 12591	19 56 45.26	+19 47 34.9	A		
394.1936	V731 Aql	19 57 06.76	+15 33 02.9	G	1616-1804	
395.1936	AT Sge	19 57 04.26	+17 08 36.6	G	1620-1459	19548+1700
396.1936	V734 Aql*	19 57 30.26	+15 43 42.4	G	1616-2258	
146.1905	VY Sge*	19 57 32.5	+16 11 46	S		19552+1603
397.1936	AU Sge	19 57 33.55	+18 00 20.7	A		
398.1936	V735 Aql	19 57 43.61	+15 49 08.0	A		19554+1540
399.1936	DE Vul	19 57 52.81	+23 37 29.3	G	2141-1329	19557+2329
400.1936	EH Sge	19 58 08.28	+21 07 07.1	A		
401.1936	V744 Aql	19 58 35.35	+16 02 53.2	A		
402.1936	DH Vul	19 59 14.34	+22 01 13.3	A		
403.1936	AX Sge	19 59 27.06	+19 43 21.8	A		
404.1936	NSV 12664	19 59 45.66	+21 21 55.4	A		
405.1936	BB Sge	20 00 03.45	+18 01 54.1	A		
406.1936	NSV 12671	20 00 12.29	+19 49 03.2	A		
407.1936	BD Sge	20 00 47.41	+17 53 17.5	A		

Notes:

V386 Aql	contributes to IRAS 19332+0639, which has significant 60μ and 100μ flux, suggesting an obscured nebula or galaxy is also present in the immediate field to the northwest.
V412 Aql	IRC +00428.
V478 Aql	CGCS 4122; Tycho-2 position epoch 1991.9.
V480 Aql	outside position error-ellipse of IRAS 18482+0703.
V486 Aql	eastern star of a pair.
V487 Aql	variability evident on POSS-I/II red plates.
V488 Aql	outside position error-ellipse of IRAS 18511+1059.
V713 Aql	IRAS position has very large error-ellipse, so possibly includes other objects.
V734 Aql	northwestern star of a pair.
V816 Aql	SV* R 309; eastern star of a pair.
V858 Aql	IRC +00436.
V1053 Aql	HV 5480.
KW Her	ID uncertain; alternate candidate at end-figures $25^{\rm s}\!.69/23''\!.6$.
V607 Oph	northern star of a close pair. faint on POSS-I red plate, but bright on POSS-II blue plate.
V620 Oph	variation evident on POSS-I/II red plates.
V632 Oph	faint on both POSS-I and POSS-II red/blue plates (blue mag. $\sim$20).
V642 Oph	ID somewhat uncertain.
V644 Oph	outside position error-ellipse of IRAS 18351+0955.
V651 Oph	blue in USNO-A2.0.
V667 Oph	EIC 700.
V670 Oph	*MVS* chart distorted. two star-like flaws appear only on POSS-I red plate scan at: $18^{\rm h}43^{\rm m}15^{\rm s}\!.1$ $+10^\circ07'26''$ and $18^{\rm h}43^{\rm m}15^{\rm s}\!.4$ $+10^\circ07'30''$ (2000).
V677 Oph	crowded, but variability certain on POSS-I/II.
VY Sge	close companions N and W.
YZ Sge	ID certain via POSS-II IV-N plate.
AN Sge	northern component of close double, resolved in GSC (but with same ID).
AS Sge	CSS2 47; variability clearly evident via POSS-I/II.
DP Sge	crowded: on west side of tight ($\sim15''$) clump of stars.
DH Sge	western star of a pair.
BW Ser	C* 2644; Tycho-2 position epoch 1991.8, northwestern star of a pair.
CO Vul	C* 2782.
CU Vul	IRC +20435 = DO 18188 = C* 2798; Tycho position epoch 1991.8.
CX Vul	variability certain via POSS-I/II.
DP Vul	USNO-UJ1.0 position from Skiff (1997) adopted.
NSV 11845	ID uncertain, crowded; GCVS ID adopted—no candidates in field are obviously variable on POSS-I/II.
NSV 11993	not IRAS 19226+0407 (which is nebular).
NSV 12307	not IRAS 19396+2024.

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 267–272

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first reported by Hoffmeister (Hoffmeister 1936). Details about the identification procedure are contained in the first report of the series (Kinnunen & Skiff 2000). We appreciate correspondence with Nikolai Samus in regard to the confused identities of FQ Cas and V378 Cas.

Table 1: Variables on *MVS* 267–272

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
408.1936	BE Sge	$20^{h}01^{m}08^{s}.25$	$+21^{\circ}19'44''.9$	G	1629-1846	
409.1936	HQ Vul	20 02 13.96	+22 38 26.6	A		
410.1936	BF Sge	20 02 23.08	+21 05 24.9	T	1629-0945	
411.1936	BG Sge	20 02 45.11	+20 47 09.5	G	1629-0869	
412.1936	DI Vul	20 02 57.20	+21 42 00.0	G	1629-2068	20007+2133
413.1936	BH Sge	20 03 18.62	+18 08 19.5	G	1621-1032	20010+1759
414.1936	BI Sge	20 03 22.78	+18 38 59.7	A		
415.1936	BK Sge	20 04 08.61	+16 21 39.2	A		20018+1613
416.1936	V778 Aql	20 05 24.92	+14 51 07.6	A		20031+1442
417.1936	ER Sge	20 05 38.50	+16 41 35.6	A		
418.1936	BP Sge	20 05 57.92	+16 42 32.3	A		
419.1936	BO Sge	20 05 50.17	+19 14 38.9	G	1625-0948	20035+1905
420.1936	V781 Aql	20 06 46.11	+15 01 56.7	G	1617-2870	
387.1934	V1094 Aql	20 06 42.29	+14 59 40.9	A		
421.1936	V783 Aql*	20 06 52.61	+15 16 05.2	A		
422.1936	BT Sge	20 06 35.65	+21 35 06.5	A		20044+2126
423.1936	BV Sge	20 07 03.51	+19 03 05.4	G	1625-1292	
424.1936	BW Sge	20 08 42.66	+17 43 53.6	A		20064+1735
425.1936	BX Sge	20 09 10.25	+18 46 08.9	A		20069+1837

Table 1: Variables on *MVS* 267–272 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
426.1936	BY Sge	$20^{\mathrm{h}}09^{\mathrm{m}}47\overset{\mathrm{s}}{.}20$	$+17^{\circ}18'33\overset{''}{.}6$	A		
427.1936	CC Sge	20 10 22.77	+16 57 24.6	G	1622-0015	20081+1648
428.1936	CD Sge	20 10 28.54	+17 34 19.7	A		20081+1725
429.1936	NSV 12864	20 10 38.93	+17 53 27.3	A		
430.1936	DM Vul	20 10 40.92	+21 41 37.8	G	1630-3115	
431.1936	EZ Sge	20 11 12.96	+18 20 56.6	G	1622-1023	
432.1936	CG Sge	20 11 13.48	+21 00 52.6	A		
433.1936	CI Sge	20 11 27.25	+17 44 26.4	G	1622-1284	
434.1936	FF Sge	20 11 43.30	+21 14 57.2	G	1630-0550	
435.1936	UZ Sge	20 12 16.21	+19 20 55.5	G	1626-1289	
436.1936	FH Sge	20 12 58.89	+17 59 02.4	A		
	V586 Aql*	20 13 14.01	+15 00 32.0	G	1618-1761	
437.1936	FI Sge	20 13 16.21	+17 30 37.4	A		
438.1936	CM Sge	20 13 31.20	+17 41 57.9	A		
439.1936	CO Sge	20 14 08.06	+17 40 55.1	G	1622-0604	
440.1936	FP Sge*	20 14 45.84	+19 36 49.5	A		
441.1936	CQ Sge	20 16 00.59	+20 15 56.6	A		20137+2006
442.1936	CR Sge	20 16 54.05	+16 41 33.3	G	1631-0258	20146+1632
443.1936	CS Sge	20 17 10.83	+18 28 15.8	G	1635-0101	20149+1818
444.1936	V537 Aql	19 46 54.82	+02 13 13.4	A		19443+0205
445.1936	V538 Aql	19 47 27.54	+00 13 15.5	A		
446.1936	V682 Aql	19 47 55.32	+01 44 11.0	G	0480-0413	
447.1936	V540 Aql	19 48 13.45	+02 39 13.0	A		
448.1936	V544 Aql	19 49 32.15	−02 58 38.9	G	5150-0455	
449.1936	V546 Aql*	19 49 53.58	−04 01 20.8	G	5154-0294	
450.1936	V547 Aql	19 49 51.66	−01 05 19.9	A		19472–0113
451.1936	V691 Aql	19 50 26.12	−01 44 02.8	G	5146-1164	
452.1936	V692 Aql	19 50 21.54	+01 48 13.4	G	0480-1295	
453.1936	V693 Aql	19 50 33.07	−00 56 03.7	G	5146-2259	
454.1936	V550 Aql	19 50 53.63	+00 46 03.5	G	0480-0632	19483+0038
455.1936	V552 Aql	19 51 21.76	−01 29 29.8	G	5146-2515	19487–0137
456.1936	V709 Aql	19 53 11.75	−01 14 44.5	G	5147-1301	
457.1936	V555 Aql	19 53 26.61	−04 44 00.5	G	5155-2068	
458.1936	V608 Aql	19 53 58.84	−00 42 46.4	T	5147-0560	
459.1936	V557 Aql	19 54 42.00	+03 21 47.3	G	0485-0004	
460.1936	V717 Aql	19 55 11.74	+00 13 18.8	G	0481-1312	
461.1936	V560 Aql	19 55 38.02	−00 18 42.7	A		19530–0026
462.1936	NSV 12564	19 55 33.30	+03 11 47.8	G	0485-3008	
463.1936	V720 Aql	19 55 44.33	+01 50 37.8	G	0481-1028	
464.1936	V722 Aql	19 56 00.70	−01 44 47.3	G	5147-1573	
465.1936	V561 Aql	19 55 54.49	+01 34 14.2	A		
466.1936	V723 Aql	19 56 38.50	−00 58 22.3	G	5147-1181	
467.1936	V563 Aql	19 57 16.05	−01 31 01.8	G	5147-2417	
468.1936	V739 Aql	19 58 39.67	−04 49 21.1	A		
469.1936	V738 Aql	19 58 30.77	+00 19 20.3	G	0481-1228	
470.1936	V564 Aql*	19 58 34.95	+02 36 47.4	G	0485-2649	19560+0228

Table 1: Variables on *MVS* 267–272 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
471.1936	V751 Aql	$20^{h}00^{m}18^{s}.60$	$+02^{\circ}14'59''.7$	A		
472.1936	NSV 12683	20 00 59.75	+03 15 44.1	T	0498-0606	
473.1936	V763 Aql	20 01 32.82	−03 34 53.7	G	5164-0827	
474.1936	NSV 12709	20 02 03.11	+02 56 09.0	G	0498-0580	
475.1936	V571 Aql	20 02 07.20	+03 11 53.3	A		
476.1936	V506 Aql	20 02 50.79	−04 32 56.4	G	5168-1998	20001–0441
477.1936	V769 Aql	20 03 12.73	−03 40 48.8	G	5164-1535	
478.1936	V573 Aql	20 03 40.39	+01 12 49.4	G	0494-0419	20011+0104
479.1936	V508 Aql	20 05 32.76	−00 44 18.9	G	5160-2101	
480.1936	V577 Aql	20 05 57.54	+01 52 50.7	G	0498-0447	
481.1936	V779 Aql	20 06 48.43	−00 48 32.7	A		
482.1936	V785 Aql	20 07 37.47	+02 53 31.4	A		
483.1936	V578 Aql	20 07 59.66	−04 39 24.6	G	5169-2073	
484.1936	V786 Aql	20 08 08.46	−00 21 51.9	G	5161-2381	
485.1936	V579 Aql	20 08 11.95	−00 01 21.2	G	5161-2236	
486.1936	V580 Aql	20 08 38.68	−04 25 19.8	A		20060–0434
	V581 Aql*	20 08 29.03	+00 49 06.2	G	0495-2939	
487.1936	V582 Aql	20 09 10.74	−00 07 02.1	G	5161-2124	
488.1936	V789 Aql	20 09 17.69	−00 10 21.0	G	5161-2190	
489.1936	V583 Aql	20 10 00.36	−01 41 05.2	G	5161-1407	
490.1936	V584 Aql	20 10 29.83	−01 37 40.8	T	5161-1122	
491.1936	V585 Aql	20 10 39.57	−03 00 49.8	G	5165-0522	
492.1936	V791 Aql	20 13 19.40	+03 06 48.5	G	0499-2681	20107+0257
493.1936	V792 Aql	20 15 02.40	−00 28 58.9	G	5162-2255	
494.1936	V587 Aql	20 15 32.17	−02 58 22.0	G	5166-0460	
495.1936	V588 Aql	20 15 40.24	−03 57 03.4	G	5170-0923	
496.1936	V793 Aql	20 15 23.00	+03 21 07.2	G	0500-2405	
497.1936	NSV 12970	20 17 03.17	−03 32 03.0	A		
498.1936	V590 Aql	20 17 08.55	−04 03 06.9	G	5170-1089	
499.1936	V794 Aql	20 17 34.03	−03 39 50.2	A		
500.1936	V591 Aql	20 17 29.49	+01 48 37.2	A		
501.1936	V592 Aql	20 18 31.62	+00 25 13.4	G	0496-2577	
502.1936	V593 Aql	20 19 04.49	+01 54 14.2	G	0500-1779	
503.1936	V594 Aql	20 21 03.46	+02 34 01.9	G	0500-0122	
504.1936	V414 Cyg	19 56 55.96	+42 51 55.4	G	3145-1077	19552+4243
505.1936	V415 Cyg	19 57 37.27	+41 45 35.6	A		19559+4137
506.1936	V416 Cyg	19 58 09.83	+43 06 14.9	G	3145-0013	
507.1936	V417 Cyg	20 00 58.73	+39 42 17.6	G	3154-1185	
508.1936	V418 Cyg	20 01 10.20	+43 06 52.0	A		
509.1936	NSV 12726	20 01 48.02	+39 20 55.0	G	3150-0013	
510.1936	V419 Cyg*	20 02 29.6	+38 35 22	S		
511.1936	V420 Cyg	20 02 42.79	+42 08 52.4	T	3158-1311	20010+4200
512.1936	V421 Cyg	20 02 54.06	+40 30 23.4	A		
513.1936	V422 Cyg	20 04 00.05	+37 49 36.4	A		
514.1936	V423 Cyg	20 03 57.51	+39 59 16.9	G	3154-3204	20021+3950
515.1936	V1305 Cyg*	20 04 53.11	+37 45 11.8	T	3150-1912	

Table 1: Variables on *MVS* 267–272 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
516.1936	V447 Cyg*	$20^{\rm h}05^{\rm m}53^{\rm s}.15$	$+35^{\circ}52'11''.1$	G	2682-1579	
517.1936	V424 Cyg	20 05 56.60	+40 36 35.2	G	3154-1737	
518.1936	V425 Cyg	20 08 04.56	+36 07 26.0	T	2683-2026	
519.1936	V427 Cyg	20 08 03.48	+37 36 43.4	T	3150-1466	20062+3727
520.1936	V426 Cyg	20 07 48.81	+41 39 48.5	G	3158-0428	
521.1936	V402 Cyg	20 09 07.76	+37 09 07.1	T	2683-1235	
522.1936	V491 Cyg	20 10 38.29	+35 35 11.2	A		
523.1936	V428 Cyg	20 10 56.84	+36 34 47.5	G	2683-0808	20090+3625
524.1936	V429 Cyg	20 11 06.16	+36 06 49.0	G	2683-1186	
525.1936	V430 Cyg	20 11 26.20	+35 42 28.2	A	2683-3766	
526.1936	V1043 Cyg	20 13 06.67	+37 48 22.9	G	3151-0928	
527.1936	V431 Cyg	20 13 12.26	+41 27 25.7	G	3159-0739	
528.1936	V432 Cyg*	20 15 29.36	+37 01 11.4	T	2684-2006	
529.1936	V433 Cyg*	20 15 39.86	+38 25 45.1	A		
530.1936	V434 Cyg	20 16 19.06	+37 55 44.2	A		
531.1936	V435 Cyg	20 16 26.98	+38 45 40.9	G	3151-2195	
532.1936	V396 Cyg	20 16 12.68	+42 06 31.6	T	3159-1240	
533.1936	V1046 Cyg	20 16 47.49	+36 32 59.9	G	2684-1860	
534.1936	V436 Cyg*	20 17 08.58	+36 53 13.2	G	2684-1641	
535.1936	V437 Cyg	20 17 14.9	+41 47 02	S		
536.1936	V438 Cyg	20 18 54.31	+40 03 52.2	T	3155-0282	
537.1936	V439 Cyg	20 21 33.59	+37 24 51.8	G	2684-0184	
538.1936	V498 Cyg	20 23 10.83	+39 09 44.3	T	3152-0577	
539.1936	V440 Cyg*	20 25 23.25	+40 52 17.8	T	3156-1827	20235+4042
	V441 Cyg*	20 27 08.12	+36 33 06.5	T	2697-0092	
540.1936	V443 Cyg	20 27 45.64	+38 41 23.8	T	3152-1283	
541.1936	V445 Cyg	20 28 18.95	+38 17 43.3	G	3152-0142	
542.1936	V1393 Cyg*	20 33 39.10	+41 19 26.0	T	3161-1360	
543.1936	V446 Cyg	20 42 34.64	+38 42 09.6	G	3166-0354	
544.1936	V1788 Cyg	20 42 37.19	+38 27 25.6	G	3166-1400	
545.1936	NSV 13185	20 35 38.65	+73 00 09.2	T	4455-0330	20359+7249
546.1936	FP Cep	20 54 53.98	+66 26 41.2	G	4259-0062	
547.1936	FQ Cep	20 55 10.04	+67 01 58.4	G	4259-0951	
548.1936	NSV 13480	21 00 05.34	+74 35 27.0	G	4472-0047	21003+7423
549.1936	NSV 13584	21 08 47.52	+73 26 12.7	G	4472-1139	21087+7313
550.1936	NSV 13610	21 12 13.56	+71 03 51.4	G	4465-0422	21118+7051
551.1936	AW Cep	21 11 30.13	+73 53 15.5	G	4472-1000	21115+7340
552.1936	GG Cep	21 20 22.58	+67 25 51.9	G	4260-0743	
553.1936	AX Cep	21 26 54.00	+70 13 15.4	G	4465-0671	
554.1936	NSV 13788	21 32 12.17	+74 00 43.6	G	4473-1203	21319+7347
555.1936	NSV 13842	21 40 08.82	+68 02 43.7	G	4462-0125	F21391+6748
556.1936	CT Cep*	21 46 12.29	+67 38 10.9	T	4462-1503	21451+6724
557.1936	EL Cep	21 46 22.55	+69 11 06.9	G	4462-2121	
558.1936	IP Cep	21 46 55.47	+68 52 49.7	T	4462-1480	
559.1936	NSV 13916	21 52 39.20	+67 39 24.5	A		
560.1936	BG Cep	22 00 30.65	+68 28 22.7	G	4463-2730	

Table 1: Variables on *MVS* 267–272 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
561.1936	BI Cep	$22^{\mathrm{h}}02^{\mathrm{m}}02\overset{\mathrm{s}}{.}80$	$+68^\circ 24' 32\overset{''}{.}0$	G	4463-2825	22008+6809
562.1936	BH Cep	22 01 42.87	+69 44 36.5	T	4467-2136	
563.1936	BK Cep	22 08 26.78	+68 18 09.4	G	4463-0342	
564.1936	BL Cep	22 13 09.30	+67 35 34.0	G	4463-0778	
565.1936	BM Cep	22 16 45.63	+66 59 39.1	G	4275-0545	
566.1936	BN Cep	22 17 01.84	+66 36 34.2	G	4275-0672	
567.1936	BP Cep	22 19 29.98	+66 48 17.4	T	4276-0353	
568.1936	BQ Cep	22 26 56.31	+68 25 11.6	G	4476-1308	22254+6809
569.1936	BS Cep*	22 29 05.44	+65 14 41.7	A		
570.1936	BU Cep	22 32 15.55	+64 58 40.4	G	4272-0809	
571.1936	BV Cep	22 38 41.45	+69 37 55.3	G	4480-0243	
572.1936	BW Cep	22 41 17.00	+63 02 37.3	G	4269-0023	
573.1936	BX Cep*	22 50 15.69	+65 21 02.3	T	4273-0434	
574.1936	BY Cep	22 51 50.66	+65 38 53.9	G	4290-1064	22500+6522
575.1936	BZ Cep	22 54 13.86	+64 03 19.9	G	4286-1006	
576.1936	BB Cep	22 55 30.22	+64 00 31.1	T	4286-0902	
577.1936	CC Cep	23 01 28.55	+61 40 19.5	A		
578.1936	CD Cep	23 04 31.78	+64 08 44.6	A	4286-0679	23025+6352
579.1936	CE Cep	23 04 30.3	+64 45 50	S		
580.1936	CF Cep	23 05 56.48	+69 37 23.6	A		
581.1936	CG Cep	23 10 25.97	+66 33 31.8	A		
582.1936	CI Cep	23 11 26.84	+62 58 54.5	G	4283-0552	
583.1936	CL Cep	23 12 57.14	+65 36 09.9	G	4287-0195	
584.1936	DP Cas	23 20 12.65	+62 18 26.2	G	4283-0857	
585.1936	CM Cep	23 22 37.99	+65 17 58.4	T	4287-1333	
586.1936	NSV 14533	23 22 53.22	+62 05 10.2	G	4283-0049	
587.1936	DQ Cas	23 24 57.30	+62 18 51.0	G	4283-0555	
588.1936	CN Cep	23 25 34.83	+64 47 25.5	G	4287-1183	
589.1936	DS Cas*	23 32 20.90	+62 06 32.1	T	4284-0514	
590.1936	DX Cas	23 39 35.14	+59 35 09.9	G	4012-0685	23372+5918
591.1936	EF Cas	23 43 23.47	+58 12 25.6	G	4012-0458	23409+5755
	EO Cas*	23 51 27.30	+62 51 47.0	A	4285-3539	
592.1936	EQ Cas	23 52 53.30	+55 00 48.9	T	4005-1753	
593.1936	ER Cas	23 54 52.72	+61 20 38.8	G	4281-0462	23523+6103
594.1936	EX Cas	00 02 41.79	+61 51 40.1	G	4014-0116	
595.1936	WY Cas*	23 58 01.30	+56 29 13.5	T	4009-1430	
596.1936	EY Cas	00 03 22.75	+57 44 53.6	G	3660-0401	
597.1936	DI Cas*	00 04 40.8	+55 32 17	S		00020+5515
598.1936	FG Cas	00 05 29.17	+56 23 02.9	A		
	FK Cas	00 06 03.01	+55 12 01.7	A		
599.1936	NSV 39	00 07 11.46	+57 19 58.7	G	3660-0987	
	FN Cas*	00 15 50.62	+57 32 39.6	G	3661-1214	
600.1936	FQ Cas*	00 21 25.56	+59 13 55.3	G	3665-0330	
	V378 Cas*	00 21 45.57	+59 14 55.3	G	3665-1366	
601.1936	FS Cas	00 24 39.48	+57 18 26.8	A		
602.1936	FT Cas	00 25 00.27	+59 31 24.0	A		
603.1936	FX Cas	00 38 06.64	+57 12 04.1	G	3662-2100	
604.1936	FZ Cas	00 39 04.85	+59 40 41.2	T	3666-1409	

Notes:

V546 Aql	chart distorted.
V564 Aql	IRAS source flux includes contribution from the nearby galaxy UGC 11501.
V581 Aql	SV* R 267.
V586 Aql	SV* R 270.
V783 Aql	blue in USNO-A2.0.
WY Cas	Tycho-2 epoch 1991.7.
DI Cas	northern star of a pair.
DS Cas	Tycho-2 epoch 1991.6.
EO Cas	SV* R 227.
FN Cas	southwestern star of a pair.
FQ Cas	can be confused with nearby V378 Cas, *cf.* Richter (1961).
V378 Cas	near FQ Cas.
BS Cep	nearby IRAS 22275+6459 is a nebula.
BX Cep	SV* R 94.
CT Cep	IRC +70178.
V419 Cyg	Yoshida *et al.* position slightly in error.
V432 Cyg	Tycho-2 epoch 1991.6; southeastern star of a pair.
V433 Cyg	SV* M 257.
V436 Cyg	C* 2888.
V440 Cyg	Tycho-2 epoch 1991.6.
V441 Cyg	SVS 601.
V447 Cyg	[MJD95] J200553.15+355210.9.
V1305 Cyg	northern star in a small trio.
V1393 Cyg	Ass Cyg OB 2-37 = [MT91] 601.
FP Sge	mean coordinates of a close double.

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COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4866

Konkoly Observatory
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FIRST PHOTOMETRIC OBSERVATIONS OF V357 PEGASI

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Name of the object:
V357 Peg = BD +24°4828 = HIP 117185 = HD 222994

Equatorial coordinates:	**Equinox:**
R.A.= $23^h45^m35\overset{s}{.}06$ **DEC.=** $+25^\circ28'18''\!.9$	2000

Observatory and telescope:
Ege University Observatory, 48-cm Cassegrain telescope

Detector:	Hamamatsu, R 4457 (PMT)
Filter(s):	Johnson B, V and R
Comparison star(s):	BD +25°5001 = TYC 2254-01880-1
Check star(s):	BD +23°4795 = HD 222633
Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	EW

Remarks:
V357 Peg is EW type eclipsing binary system which was discovered by HIPPARCOS (ESA, 1997). The mean orbital period derived by HIPPARCOS from the light curve fit is $0\overset{d}{.}578452$ and the epoch is given as JD 2448500.3159 (ESA, 1997). Spectral type of the system is given as F5. V357 Peg was observed in 13 October, 6, 27, 30 November and 1 December 1999 at the Ege University Observatory. It can be seen from Figure 1 that the maxima of all light curves seem to be of equal magnitudes and they seem symmetrical. Like almost all W UMa systems, there are irregular light variations over all phases in the light curves but no significant scattering are seen in minima. Our light curves show that the secondary minima of the system are deeper than the primary minima. Three primary and one secondary minima were obtained during the observations. These minima were given among the other systems' minima in Keskin et al. (2000). The new computed period and epoch were also given.

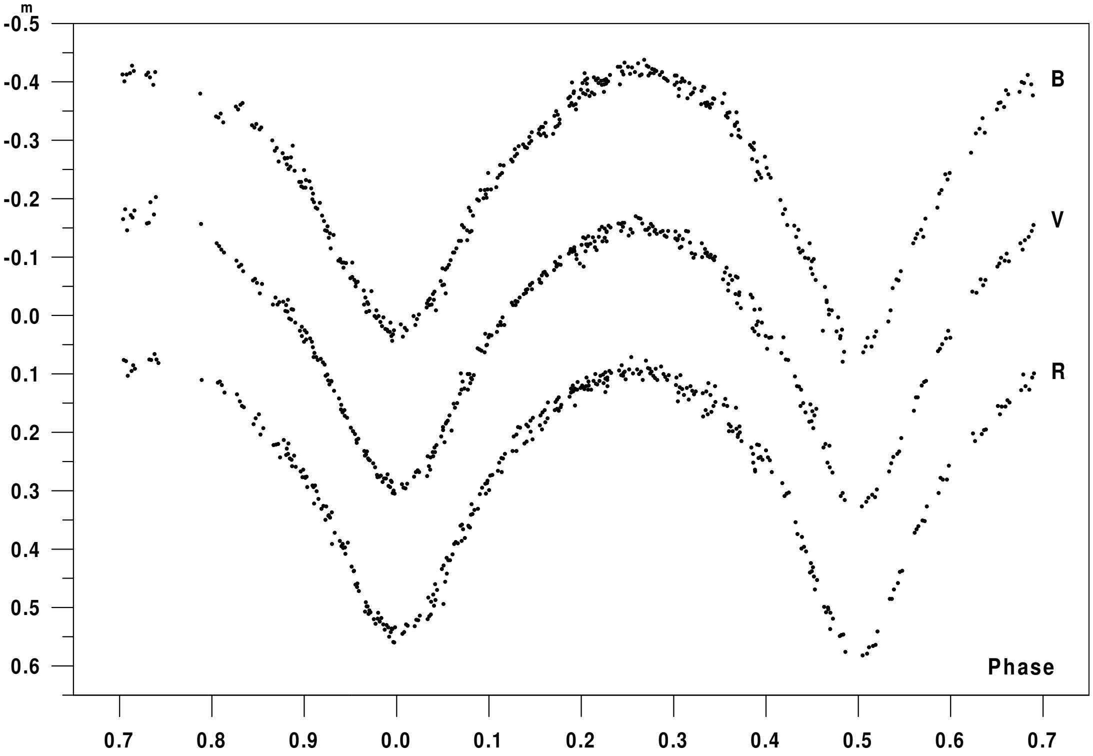

Figure 1.

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Keskin, V., Yaşarsoy, B., Sipahi, E., 2000, *IBVS*, No. 4855

Erratum

See IBVS 5282.

The Editors

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FLARES IN THE ACTIVE GIANT V390 Aur

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V390 Aur = HD33798, an approximately 7th magnitude G8III star was found to flare on January 1, 1998 and February 22, 1998. Fekel & Marschall (1991) classified the star as a chromospherically active single giant. They pointed out to the moderately strong Ca II K & H emission cores and periodic photometric variability for it. No flare events were reported for this star up to now.

We carried out observations of this star with the 60-cm telescope at Belogradchik Observatory and a single-channel photoelectric photometer attached. The equipment is described in Antov & Konstantinova-Antova (1995). UBV measurements and U-filter patrol monitoring with an integration time of 1 sec were done. The standard deviation of random noise fluctuations σ was in the interval $0\overset{m}{.}01$–$0\overset{m}{.}02$. The differential photometry method was applied with HD34533A as a comparison star. The data processing with the program package APR (Kirov et al. 1991) was done.

Short-lived flares were detected during $23^h58^m55^s$ total effective monitoring time obtained in the period December 30, 1997–March 3, 1999. More than 9 such events are observed during 2 nights. The longest event duration is 11 sec and the shortest one is 1 sec. The largest detected amplitude is $0\overset{m}{.}29$. Data for the flares are presented in Figures 1 and 2 and in Table 1. The inspection of the UBV light curves obtained by us (Fig. 3) shows that the appearance of flares independent from the brightness of the star in these bands.

Van Biesbroeck (1974) reported about a $3\overset{m}{.}3$ fainter secondary star located at 0.4 arcsec away of V390 Aur. The Hipparcos mission confirmed his measurement. The components cannot be separated in the photometer diaphragm, that is why they are observed together with our equipment. But taking in mind the event durations, the shape of their light curves and the secondary star magnitude, we came to the conclusion that it is more likely these events to happen on the primary star, V390 Aur, in spite of the possibility such ones to occur on the secondary star could not be ruled out completely. If we assume that flares with such resulting amplitudes are produced by the secondary star, then their real amplitudes should be $\geq 1\overset{m}{.}5$. Flares with U-amplitude of approximately $1\overset{m}{.}5$ and a duration of the order of 10 sec were detected on active red dwarf stars. However, a set of events having similar characteristics occurs very rarely. We have not observed such ones during our long practice as flare star observers.

If we consider the detected flares as a manifestation of the giant chromospheric activity their properties should be explained, in particular, by analysing the general differences

Table 1: Data for the observed events.

Date	Event No.	Δm_U	σ	U.T. beginning	Duration [sec]
January 1, 1998	1	$0\overset{\mathrm{m}}{.}12$	$0\overset{\mathrm{m}}{.}015$	$20^{\mathrm{h}}47^{\mathrm{m}}33^{\mathrm{s}}$	11
	2	$0\overset{\mathrm{m}}{.}18$	$0\overset{\mathrm{m}}{.}015$	$20^{\mathrm{h}}47^{\mathrm{m}}57^{\mathrm{s}}$	1
	3	$0\overset{\mathrm{m}}{.}17$	$0\overset{\mathrm{m}}{.}015$	$20^{\mathrm{h}}48^{\mathrm{m}}12^{\mathrm{s}}$	9
	4	$0\overset{\mathrm{m}}{.}14$	$0\overset{\mathrm{m}}{.}015$	$20^{\mathrm{h}}48^{\mathrm{m}}53^{\mathrm{s}}$	9
	5	$0\overset{\mathrm{m}}{.}13$	$0\overset{\mathrm{m}}{.}015$	$20^{\mathrm{h}}52^{\mathrm{m}}08^{\mathrm{s}}$	3
	6	$0\overset{\mathrm{m}}{.}06$	$0\overset{\mathrm{m}}{.}015$	$20^{\mathrm{h}}52^{\mathrm{m}}45^{\mathrm{s}}$	11
February 22, 1998	1	$0\overset{\mathrm{m}}{.}29$	$0\overset{\mathrm{m}}{.}02$	$21^{\mathrm{h}}24^{\mathrm{m}}05^{\mathrm{s}}$	6
	2	$0\overset{\mathrm{m}}{.}18$	$0\overset{\mathrm{m}}{.}02$	$21^{\mathrm{h}}24^{\mathrm{m}}10^{\mathrm{s}}$	2
	3	$0\overset{\mathrm{m}}{.}12$	$0\overset{\mathrm{m}}{.}02$	$21^{\mathrm{h}}24^{\mathrm{m}}12^{\mathrm{s}}$	4

between the giant atmosphere and those ones of the active dwarf stars. The giant atmosphere is less dense with a smaller gravity. This fact implies smaller density and larger sizes of the active areas in giant stars. The Hα behaviour of V390 Aur, reported by Strassmeier et al. (1990) and our high-resolution (0.2 Å) Hα observations, obtained during 6 nights in the period August 26, 1996–February 18, 1998 with the 2-m RCC telescope and CCD camera mounted on the Coude spectrograph at the Rozhen Observatory are in agreement with the above mentioned speculations. Hα is a normal absorption feature and is not collisional dominated as it is in the active dwarf stars (Cram & Mullan 1985, Houdebine & Stempels 1997). Let us recall that Fekel & Marschall (1991) reported moderately strong Ca II K & H emission cores for V390 Aur.

Following the solar paradigm we must point out that the early analyses of the hard X-ray emission (Van Beek et al. 1974, De Jager et al. 1976) revealed that the impulsive phase of a solar flare consists of a number of events with a duration of few seconds, the so-called elementary flare bursts. Evidence for quasiquantization of energy release in solar flares is presented in Kaufman et al. (1980). The rapid variations detected in the millimeter-wave radio flux are interpreted as an effect of superposition of individual "sub-bursts" having duration of order of 0.05 s. Based on these observational results, Dermendjiev (1989) proposed a magnetohydrodynamic model for the elementary solar flare bursts. The main assumption in the model is the current cord formation in vortex rings, where accelerated to high energies electrons may provide a burst-like event.

Katsova et al. (1997) considered the impulsive stellar flares as a set of elementary bursts too. However, one basic assumption of the gas-dynamic model (Katsova & Livshits, 1991) is that a low-temperature condensation formed in the chromosphere during the flare process should emit in the optical continuum. The minimum duration of a flare depends on the characteristic gas-dynamic time (a ratio of the length of the scale heights to the sound speed) in these layers and in the case of the giant star V390 Aur optical spikes with a duration shorter than 100 sec could not be easily explained by the theory.

A possible explanation of the observed events could be given within the framework of influence of fluxes of accelerated particles onto more dense chromospheric and upper photospheric layers. These particles should propagate from one foot point to another and give rise of the optical continuum in one or several low-lying loops.

The unusual spike structure of the V390 Aur flares needs a further investigation and is a challenge to the theory. In future, high-speed simultaneous patrol observations are also required to refine our knowledge on the characteristics of the flares in this star.

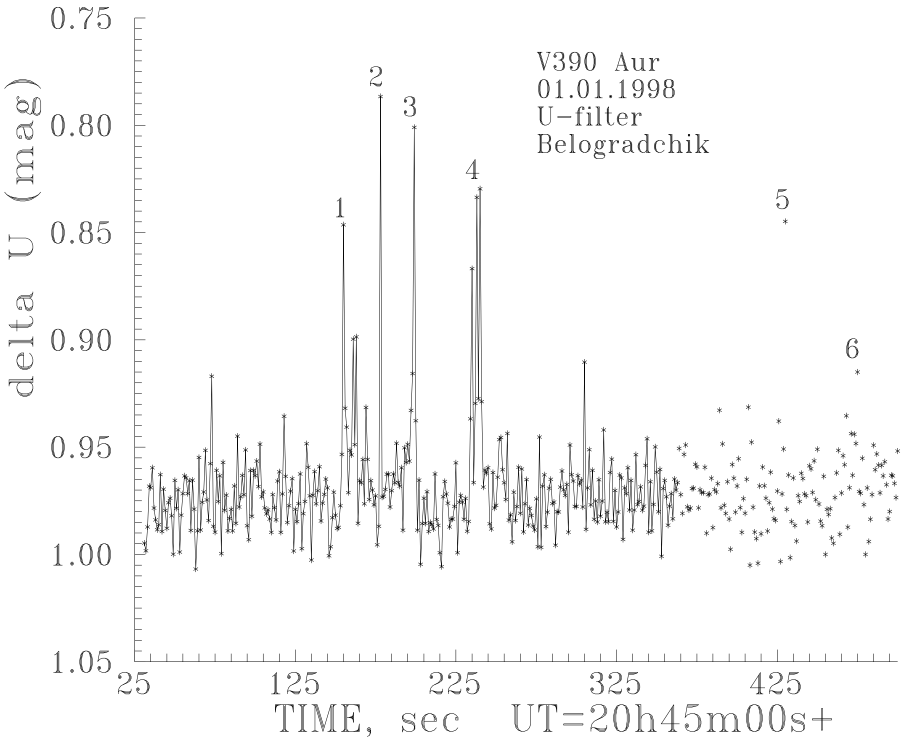

Figure 1. Flares detected on January 1, 1998. The events specified in Table 1 are labeled by numbers.

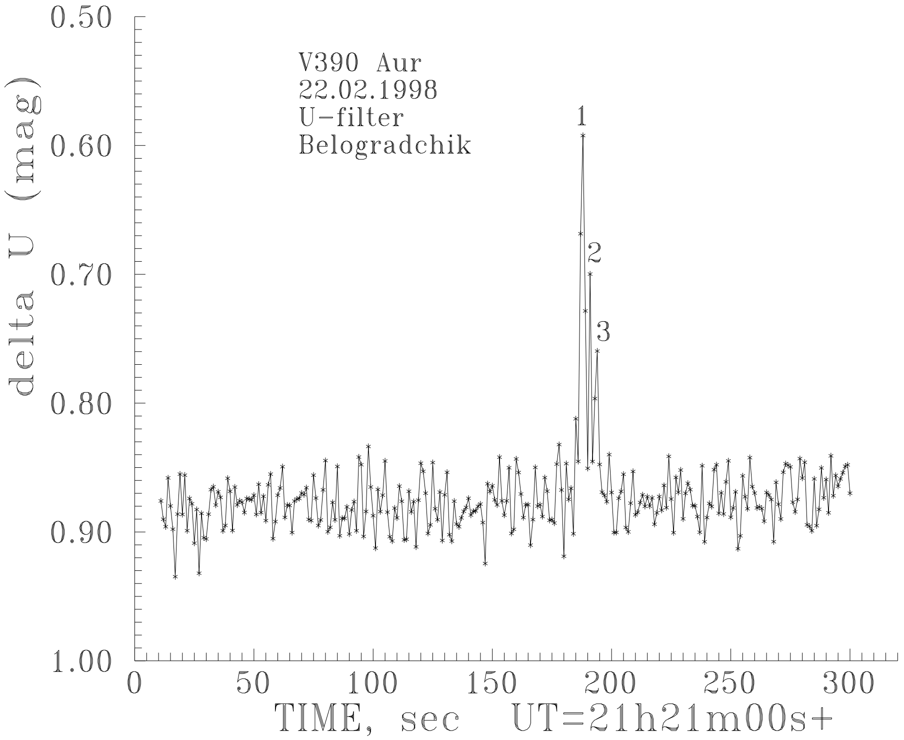

Figure 2. The flare detected on February 22, 1998. The elementary events are labeled by numbers.

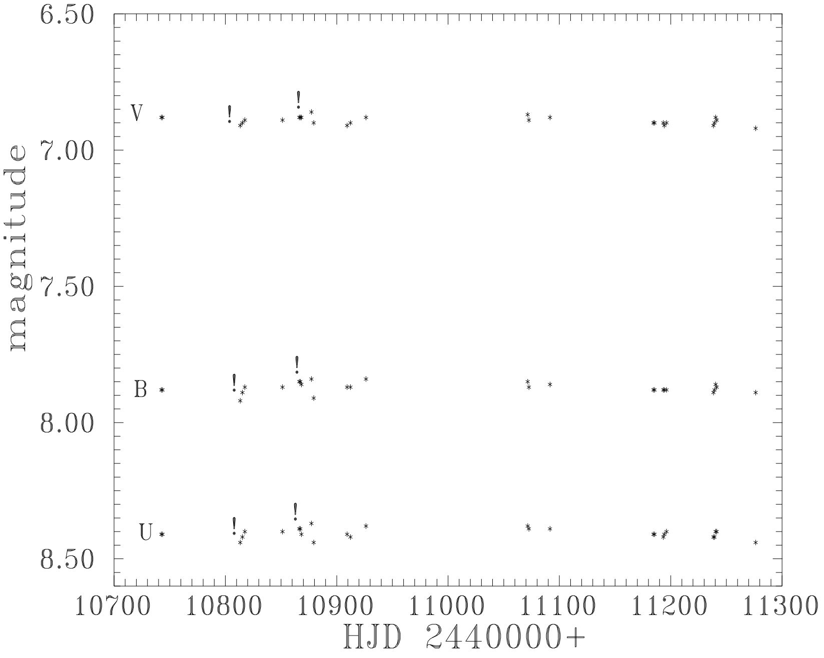

Figure 3. V390 Aur UBV light curves. The moments of the detected flares are denoted by exclamation marks.

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 272–275

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The lists below are a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first reported by Hoffmeister (1937, 1942). Accurate positions for some of the stars here have been published by López & Girard (1990), López & Lépez (1993), and Skiff (1999). Details about the identification procedure are contained in the first report of our series (Kinnunen & Skiff 2000). We appreciate helpful correspondence with Nikolai Samus in regard to GN Ori.

Table 1: Variables on *MVS* 272–274

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
83.1937	DP Mon	$6^{h}25^{m}43^{s}.87$	$+06^{\circ}39'18''.6$	G	0145-0321	
84.1937	CC Mon	6 39 56.31	+06 42 28.5	G	0159-1704	
85.1937	CF Mon	6 49 21.99	−00 23 46.6	A		
86.1937	DK Mon*	6 50 37.70	+01 43 40.0	A		
87.1937	CI Mon	6 52 19.86	+01 44 49.1	A		
88.1937	CO Mon*	6 57 03.97	+06 19 00.5	T	0161-1515	06543+0623
89.1937	NSV 3301	6 57 42.14	+06 18 03.5	G	0161-2555	
90.1937	NSV 3300	6 57 33.61	+05 06 42.3	T	0157-2460	
91.1937	UU Mon	6 59 45.07	+02 12 28.5	G	0153-1382	
92.1937	GH Ori	7 04 41.46	−02 28 19.0	G	4818-2919	
93.1937	BX Gem	6 21 33.66	+21 56 06.6	G	1327-1442	06185+2157
94.1937	BY Gem	6 22 37.77	+20 33 35.1	G	1323-1721	06196+2035
95.1937	BZ Gem	6 23 09.46	+21 51 45.6	G	1327-0529	06201+2153
96.1937	GN Ori	6 25 14.11	+17 01 52.0	A		06223+1703
97.1937	CF Gem	6 27 15.33	+18 04 23.8	G	1332-1256	06243+1806
98.1937	CG Gem	6 27 54.79	+20 33 10.6	G	1336-1047	
99.1937	CM Gem	6 31 35.34	+17 54 23.8	A		
100.1937	CN Gem*	6 32 33.73	+17 50 11.5	G	1333-1494	06296+1752

Table 1: Variables on *MVS* 272–274 (cont'd.)

AN	GCVS	RA (2000)	Dec	s	GSC	IRAS
101.1937	CP Gem	$6^{h}33^{m}41^{s}\!.67$	$+19^{\circ}29'36''\!.5$	G	1337-1799	
102.1937	CO Gem*	6 33 55.58	+21 32 04.2	G	1341-1853	
103.1937	CT Gem	6 36 41.72	+18 27 06.0	G	1333-1368	06337+1829
104.1937	CU Gem	6 37 22.79	+21 44 29.8	A		
105.1937	DZ Gem	6 38 20.69	+21 18 51.9	G	1341-0664	
106.1937	CV Gem	6 39 21.95	+21 10 37.8	A		
107.1937	CY Gem*	6 40 43.17	+18 46 19.5	T	1338-2056	06377+1849
108.1937	CZ Gem*	6 41 56.51	+24 08 23.8	G	1893-0200	
109.1937	DF Gem	6 47 03.22	+16 18 36.6	G	1330-0616	06441+1621
110.1937	V573 Cyg	21 08 44.98	+47 24 09.0	G	3592-7133	
111.1937	V574 Cyg	21 08 54.22	+46 58 40.7	G	3592-3844	21072+4646
112.1937	V575 Cyg	21 09 19.24	+46 10 27.2	G	3588-8422	
113.1937	NSV 13576	21 10 12.12	+43 50 24.6	A		
114.1937	V577 Cyg*	21 09 59.99	+46 44 20.1	G	3588-0592	21082+4631
115.1937	V580 Cyg	21 10 49.41	+44 49 59.1	A		21090+4437
116.1937	V1553 Cyg	21 12 06.86	+43 42 29.6	G	3181-0792	
117.1937	NSV 13602	21 12 25.60	+47 57 54.6	A		
118.1937	V585 Cyg	21 13 37.87	+47 01 33.9	A		21118+4649
119.1937	V589 Cyg	21 16 57.31	+48 07 39.8	G	3593-1966	
120.1937	V590 Cyg*	21 17 21.26	+45 42 29.0	T	3589-5632	
121.1937	V592 Cyg*	21 17 42.45	+46 03 48.3	G	3589-1451	21159+4551
122.1937	V596 Cyg*	21 21 37.62	+41 40 53.3	G	3190-0705	
123.1937	V600 Cyg	21 22 56.51	+45 29 40.7	G	3590-0047	21211+4516
124.1937	V601 Cyg	21 23 21.42	+46 14 01.1	A		
125.1937	V607 Cyg	21 26 52.22	+41 39 03.0	A		21249+4125
126.1937	V612 Cyg	21 29 19.59	+45 56 55.8	G	3590-1472	21274+4543
127.1937	V613 Cyg	21 29 31.73	+42 56 56.8	G	3190-2081	21275+4243
128.1937	V614 Cyg	21 30 40.31	+40 56 22.9	A		
129.1937	V618 Cyg*	21 31 19.09	+48 59 23.2	A		
130.1937	V625 Cyg*	21 33 28.94	+46 44 51.6	A		21316+4631
131.1937	V635 Cyg*	21 37 51.41	+48 24 13.1	G	3595-0470	
132.1937	V637 Cyg*	21 37 57.94	+48 08 06.1	G	3595-0645	21361+4754
133.1937	V639 Cyg	21 38 57.75	+42 35 37.2	G	3191-0605	21369+4221
134.1937	V640 Cyg	21 39 16.81	+41 13 32.1	G	3187-0696	21372+4059
135.1937	V641 Cyg	21 39 10.02	+46 43 31.8	A		
136.1937	V644 Cyg*	21 40 12.8	+45 27 18	S	3591-2307	
137.1937	V659 Cyg	21 47 44.16	+45 53 53.4	G	3604-1725	21458+4539
138.1937	V662 Cyg	21 48 10.29	+45 39 35.8	A		21462+4525
139.1937	V665 Cyg	21 49 16.01	+43 03 36.5	A		
140.1937	V666 Cyg	21 49 25.90	+43 22 25.5	A		21474+4308
141.1937	V667 Cyg	21 49 24.78	+49 33 13.9	A		
142.1937	V677 Cyg	21 53 17.65	+44 03 23.0	G	3197-0163	
143.1937	V684 Cyg	21 59 45.97	+47 16 04.3	A		

Notes:

V577 Cyg	contributes to the IRAS source, but Hα-emission stars CGHA 56 and CGHA 57 are also in the immediate field west and northeast.
V590 Cyg	*MVS* chart has south up, east right.
V592 Cyg	EM* CGHA 81. *MVS* chart has south up, east right.
V596 Cyg	*MVS* chart has south up, east right.
V618 Cyg	Cl* NGC 7092 PLAT 3456.
V625 Cyg	ID uncertain: *MVS* chart is distorted or for another field.
V635 Cyg	Cl* NGC 7092 PLAT 7855.
V637 Cyg	also AN 45.1919.
V644 Cyg	northwestern component of a close pair; GSC position is for photocenter.
CN Gem	GCVS 4.1 position $3'.8$ in error.
CO Gem	CSS 225.
CY Gem	Tycho-2 position epoch 1991.8.
CZ Gem	GCVS 4.1 position $3'.9$ in error.
CO Mon	Tycho-2 position epoch 1991.8.
DK Mon	*MVS* chart ambiguous, but is the western star of a close pair; variable on POSS-I/II.
GN Ori	not the carbon star CGCS 1261 = IRAS 06224+1701.

Table 2: Variables on *MVS* 274–275

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3263	RT Hor	$3^{\rm h}28^{\rm m}43^{\rm s}.79$	$-55^\circ58'44''.5$	G	8496-1459	
S 3264	X Men*	3 32 29.70	−76 26 55.4	G	9363-0155	
S 3267	RT Col	5 16 50.60	−27 28 24.5	G	6482-0603	
S 3269	RW Col*	6 03 38.58	−31 35 24.9	T	7071-0298	
S 3272	RX Col	6 13 14.73	−37 15 00.7	G	7084-0453	
S 3273	CH Pup*	6 45 14.10	−36 32 13.3	T		
S 3274	IU Car	6 53 07.47	−59 35 44.4	T	8548-1214	
S 3275	CI Pup	7 10 20.97	−33 24 38.9	T	7094-3168	
S 3281	IV Car	10 02 36.66	−58 57 22.5	T	8611-2013	
S 3283	CH Vel	10 48 20.05	−41 30 38.0	A		10460–4114
S 3284	CI Vel*	11 01 01.28	−54 24 41.6	T	8619-1606	
S 3285	V491 Cen	11 34 59.04	−57 30 14.5	T	8638-2751	11326–5713
S 3289	V494 Cen	12 50 32.43	−38 16 30.8	G	7772-0250	
S 3296	VX Aps*	15 59 56.61	−75 13 20.8	G	9429-0076	
S 3298	EF TrA	16 40 34.07	−68 15 05.7	T	9274-4088	
S 3302	BH Pav	18 34 40.57	−65 27 03.0	T	9077-2070	
S 3303	BK Tel*	18 47 40.53	−46 08 17.3	T	8373-0540	18440–4611
S 3306	BO Tel	19 15 51.98	−54 51 18.9	G	8764-1665	
S 3308	BM Pav*	19 28 17.41	−62 48 49.3	T	9088-0946	19237–6254
S 3310	BN Pav	19 38 03.38	−60 36 39.6	T	9084-1868	
S 3313	BP Pav	19 58 00.14	−65 44 10.0	T	9097-1105	
S 3314	BQ Pav	20 00 11.07	−69 52 54.6	T	9311-0866	F19550–7001
S 3317	BT Pav	20 51 00.50	−63 41 31.6	T	9104-0623	
S 3323	RX PsA*	22 13 09.92	−27 16 09.4	T	6958-0561	22103–2731

Notes:

VX Aps	assumed to be the northwestern star of a pair.
RW Col	HIP 28699.
X Men	*MVS* chart rotated: north to upper left.
BM Pav	HD 182351.
RX PsA	Tycho-2 position epoch 1991.5.
CH Pup	Tycho-2 position epoch 1991.6.
BK Tel	Tycho-2 position epoch 1991.7.
CI Vel	Tycho-2 position epoch 1991.7.

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López, C. E., and Lépez, H. S., 1993, *IBVS*, No. 3908
López, C. E., and Girard, T. M., 1990, *Publ. Astron. Soc. Pac.*, **102**, 1018
Skiff, B. A., 1999, *IBVS*, No. 4676

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PULSATIONS OF V927 HERCULIS

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V927 Herculis ($\alpha_{2000} = 16^{\rm h}56^{\rm m}19\overset{\rm s}{.}9$, $\delta_{2000} = +50^\circ 07' 36\overset{''}{.}8$, HIP 82883, HD 234366, GSC 03506-01493) was found to be a variable star by the HIPPARCOS satellite. The Variability Annex of the HIPPARCOS Catalogue (ESA 1997) reports V927 Her to have a period of $0\overset{\rm d}{.}130528$ with H_p magnitudes ranging between 10.125 to 10.233. The spectral type is listed as F5, but no further classification is given. Duerbeck (1997) lists V927 Her (although it is identified as V925 Her) as an F5 V and classifies it as a pulsator, which would make it a δ Scuti candidate.

As part of our ongoing δ Scuti star program we selected stars from the Variability Annex of the HIPPARCOS Catalogue that showed δ Scuti type characteristics. During the summer of 1999 several of these variable stars were observed with the David Derrick Telescope of the Orson Pratt Observatory at Brigham Young University (Hereafter DDT). Observations were made with a Pictor 416XT CCD mounted at the Newtonian focus of the telescope. This gave a plate scale of 0.93 arcsec/pixel. Observations were made through a standard Johnson V filter modeled after Bessell (1990). In this paper we will report only the observations of V927 Her. Five nights of data were obtained between 20 May and 22 July 1999. The CCD field for the DDT is shown in Fig. 1.

All frames were reduced using standard IRAF functions. Apparent magnitudes were determined using the comparison star (GSC 03506-01588 ($V = 10.56$), TYCHO 3506-1588-1 ($V_J = 10.54$)) labeled Comp 1 in Fig. 1. From this we found an average magnitude of V927 Her of $V_J = 9.92$.

From the light curves produced six times of maximum light were determined. These times are given in Table 1. From a linear regression we found an ephemeris for V927 Her as given in Eq. 1. This value is in agreement with the value from HIPPARCOS.

$$\mathrm{HJD_{max}} = 2451318.7659 + 0.13053\,(\pm\,0.00001) \times E. \tag{1}$$

Using Eq. 1 the data were phased and the curve is shown in Fig. 2. Clearly the amplitude of V927 Her is not constant. The amplitude varies from 0.05 to 0.14, with the magnitude of minimum light staying at a roughly constant value of 9.98. Due to this variable amplitude we choose to examine the data with the frequency search program Period98. From Period98 we found the presence of only two reliable frequencies in the data $f_1 = 7.6628$ c/d ($P_1 = 0\overset{\rm d}{.}130512$) and $f_2 = 8.0020$ c/d ($P_2 = 0\overset{\rm d}{.}124981$). This yields a period ratio of 0.96. A third frequency of $f = 0.57$ c/d was found that is not equivalent to $f_2 - f_1$. However, this third frequency is not considered reliable. If confirmed the third

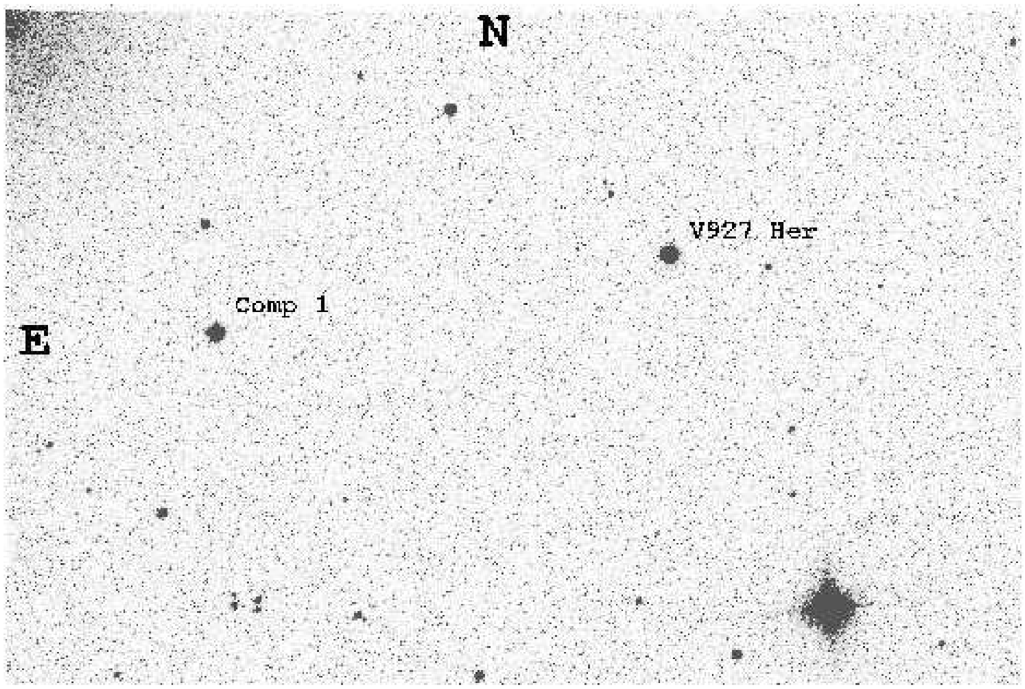

Figure 1. CCD field of V927 Her with comparison star labeled. The field of view is $8' \times 12'$.

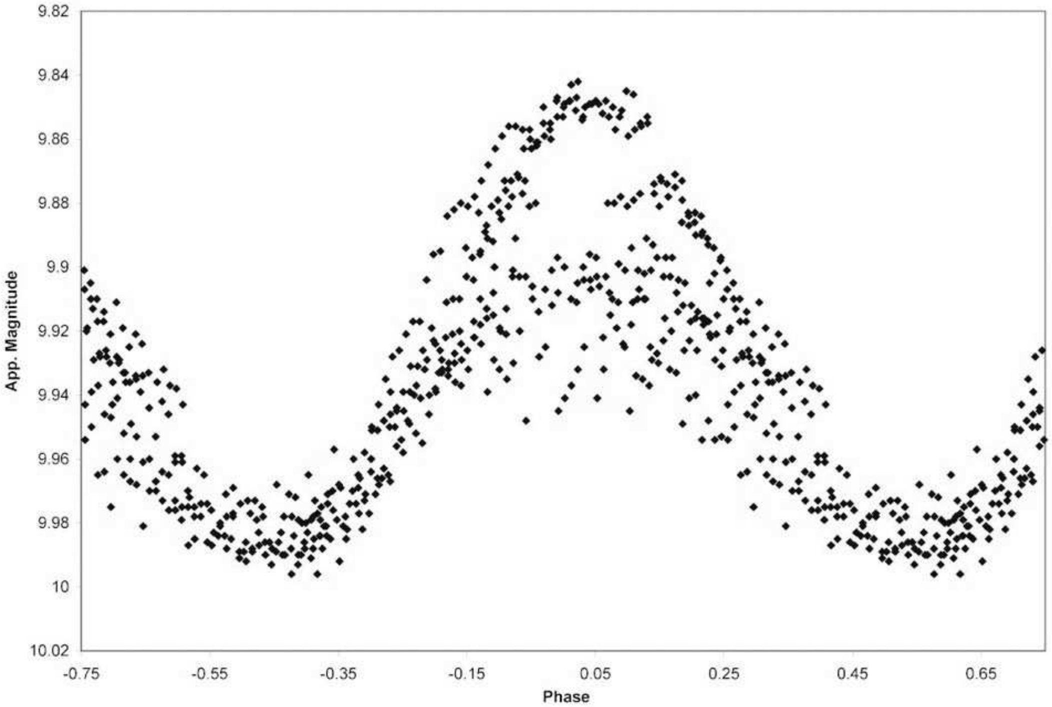

Figure 2. Phased light curve of V927 Herculis

Table 1: New times of maximum light for V927 Herculis

HJD 2400000.0 +	Cycle
51318.7673	0
51341.7384	176
51341.8715	177
51348.7862	230
51363.7932	345
51381.6850	482

frequency is γ Doradus like (Kaye et al. 1999). If the third period could be confirmed V927 Her would have to be considered a Hybrid.

The current data set is too small, and from a single site, for any major conclusions to be drawn. A set of Strömgren data to determine physical parameters and data from multiple sites would be useful to define the nature of this star.

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THE 75TH NAME-LIST OF VARIABLE STARS

Corrected version, 17 July 2000

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The present 75th Name-List of Variable Stars, compiled basically in the manner first introduced in the 67th Name-List (IBVS No. 2681, 1985), contains all data necessary for identification of 916 new variables finally designated in 1999. The total number of designated variable stars, not counting designated non-existing stars or stars subsequently identified with earlier-designated variables, has now reached 35985.

The 75th Name-List consists of two tables. Table 1 contains the list of new variables arranged in the order of their right ascensions. It gives the ordinal number and the designation of each variable; its equatorial coordinates for the equinox 1950.0 (we present right ascensions to $0\overset{s}{.}1$ and declinations to $1''$. The coordinates were found in the literature, taken from positional catalogues, including USNO A1.0/A2.0 and GSC, or determined by the authors); the range of variability (sometimes the column "Min" gives, in parentheses, the amplitude of light variation; the symbol "(" means that the star, in minimum light, becomes fainter, than the magnitude indicated); and the system of magnitudes used ("P" are photographic magnitudes; the symbols "Rc", "Ic" designate magnitudes in Cousins's RI system; the symbols "b", "v" mean Strömgren's b, v magnitudes; "Hp" stands for magnitudes in the system of the Hipparcos Catalog; "L′" are infrared magnitudes at 3.8 μm; the rest of designations are standard Johnson $UBVRIJKLM$ magnitudes); the type of variability according to the classification system described in the forewords to the first three volumes of the 4th GCVS edition (with the additions introduced in the 68th Name-List, IBVS No. 3058, 1987, in the 69th Name-List, IBVS No. 3323, 1989, and in the 72nd Name-List, IBVS No. 4140, and two additions described below; see also the description of variability types and distribution of stars over variability types at `http://www.sai.msu.su/groups/cluster/gcvs/gcvs/iii/vartype.txt`); two references to the list of papers which follows Table 2 (the first reference is to the investigation of the star, the second one indicates the paper containing a finding chart, or the corresponding Durchmusterung – BD, CoD, or CPD – containing the variable, or the Hubble Space Telescope Guide Star Catalog – GSC – or the USNO A1.0/A2.0 catalog – USNO – if the star can be found using one of them).

In a small number of cases, the value of the variability amplitude (column "Min", in parentheses) could not be expressed in the same system of magnitudes as the star's brightness; in such cases we indicate the photometric band for the amplitude separately. For KL Dra, V1010 Her, and V370 Peg, the magnitudes in maximum brightness are from unfiltered CCD observations.

In the present Name-List, we have introduced two new variability types for pulsating variables.

GDOR. γ Doradus stars. Early type F dwarfs showing (multiple) periods from several tenths of a day to slightly in excess of one day. Amplitudes usually do not exceed $0\overset{m}{.}1$. Presumably low degree g-mode non-radial pulsators. Prototype: γ Dor.

RPHS. Very rapidly pulsating hot (subdwarf B) stars. Typical periods are hundreds of seconds, amplitudes are within several hundredths of a magnitude. Prototype: V361 Hya = EC 14026–2647. Suggestions of a better designation for the new type are welcome.

A version of Table 1 given in the electronic supplement to this paper (file 4870-t1.txt) contains also coordinates for the equinox 2000.0. In the electronic table, no spaces are left between hour and minutes, minutes and seconds of right ascension or between degrees and minutes, minutes and seconds of declination.

Table 2 contains the list of variables arranged in the order of their variable star names within constellations. After the designation of a variable, its ordinal number from Table 1 is given, as well as identifications with several major catalogues and identifications necessary to find this star in the papers referred to in Table 1 or in the papers with the first (or independent) announcement of the discovery of its variability, referred to (in some cases) in square brackets after the corresponding identification in Table 2. In variance with our earlier practice, we did not include names of discoverers different from the name of the author(s) of the paper referred to. After the identifications, some minimal remarks are given if necessary. Table 2 and the list of references are also presented in the form of ASCII files in the electronic supplement to this paper (files 4870-t2.txt and 4870-t3.txt). The abbreviated names of the catalogues in Table 2 generally follow conventions of the GCVS or of the SIMBAD data base; in its electronic version, "Name" stands for non-standard names or abbreviations, mainly from discovery announcements, and "Rmrk", for remarks.

The small table below contains corrected coordinates for two stars from the Name-List No. 73 (IBVS No. 4471, 1997).

No.	Star	$\alpha_{1950.0}$	$\delta_{1950.0}$
73283	FI UMa	$11^h09^m50\overset{s}{.}6$	$+55°09'59''$
73684	V389 Cep	$21^h27^m13\overset{s}{.}0$	$+55°45'14''$

Note that corrected coordinates for many GCVS variable stars and NSV catalog suspected variables can be found at our web site

`http://www.sai.msu.su/groups/cluster/gcvs/gcvs/`

so that we recommend variable star researchers to retrieve updated versions of our catalogs from time to time.

Thanks are due to M.S. Frolov and S.V. Antipin for their help during the preparation of the present Name-List and to all members of the GCVS team who prepared information for the variable star data base. We would like to thank many scientists who immediately responsed to our requests to provide missing data or correct erroneous data necessary for this Name-List. This study was supported in part by Russian Foundation for Basic Research through grant 99-02-16333, by the Russian Federal Scientific and Technological Programme "Astronomy", and by the Support Programme for Leading Scientific Schools of Russia.

Table 1

No.	Name		R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m	Type		Ref.	
75001	V823	Cas	00 03 06.1	+63 07 32	11.4	12.2	B	*	068	GSC
75002	V402	And	00 08 31.8	+30 15 55	15.5	(17.8	B	UG	001	001
75003	V824	Cas	00 19 45.5	+62 45 21	11.03	11.36	V	DCEP	069	069
75004	V825	Cas	00 22 32.1	+60 29 17	14.1	15.0	B	CEP(B)	070	070
75005	DY	Tuc	00 23 30.7	-72 22 38	17.40	17.85	V	RRC	270	
75006	EN	Cet	00 24 54.3	-01 25 03	14.5	(18.5	R	UG	096	
75007	V826	Cas	00 32 11.3	+61 02 31	10.5	14.6	V	LB:	071	071
75008	V827	Cas	00 34 24.5	+62 56 27	12.3	12.7	B	DCEPS	069	069
75009	V403	And	00 36 08.1	+45 17 22	12.6	(15.0	P	SR:	002	USNO
75010	V828	Cas	00 39 33.4	+61 39 21	14.96	15.75	U	INT	072	073
75011	DZ	Tuc	00 48 59.3	-73 32 24	14.7	(0.2)	V	E+X	271	
75012	DS	Psc	00 56 17.3	+02 47 47	11.73	12.19	V	EW	214	017
75013	V404	And	00 58 35.4	+40 58 53	11.3	11.9	Rc	EA/DM	003	003
75014	DT	Psc	01 11 19.7	+28 15 57	6.37	6.45	Hp	SR:	215	BD
75015	V829	Cas	01 14 26.3	+66 58 05	10.00	(2.4)	K	M	074	
75016	V830	Cas	01 15 26.2	+50 24 33	13.2	(0.60)	V	RRC	075	076
75017	EO	Cet	01 21 11.7	-05 21 24	12.32	(0.05)	V	RPHS	097	GSC
75018	BV	Scl	01 23 07.0	-29 02 31	8.36	(0.04)	V	ACV	026	CoD
75019	V831	Cas	01 43 32.5	+61 06 25	11.49	(0.19)	V	XP	077	GSC
75020	V832	Cas	01 44 12.0	+60 27 00	7.3	7.8	K	ZAND:	078	GSC
75021	AI	Tri	02 00 55.4	+29 45 04	15.30	18.20	V	XM	267	267
75022	V595	Per	02 18 35.7	+56 53 48	9.08	(0.03)	V	BCEP	209	209
75023	V405	And	02 19 10.4	+47 15 41	11.0	11.31	V	RS	004	004
75024	AK	Tri	02 21 39.6	+33 02 25	12.0	(0.34)	V	EW	268	269
75025	EP	Cet	02 21 47.4	-16 28 49	6.74	6.77	V	GDOR	029	BD
75026	V596	Per	02 29 21.0	+57 48 51	9.03	(2.5)	K	M	074	
75027	V406	And	02 32 09.1	+45 42 58	9.22	9.42	V	EB	005	BD
75028	AF	Hor	02 40 10.9	-53 12 15	11.8	(4.0 U)	V	UV	099	GSC
75029	AO	For	02 40 56.0	-31 16 52	7.51	7.54	V	BY:	139	CoD
75030	V597	Per	02 50 30.4	+39 52 06	9.30	(0.02)	V	DSCTC	210	BD
75031	V833	Cas	02 50 34.8	+63 21 06	13.6	14.9	B	DCEP	069	069
75032	V834	Cas	03 02 05.0	+57 34 08	15.6	17.0	B	DCEP	069	069
75033	V835	Cas	03 02 56.0	+65 16 32	11.9	14.4	P	SR:	002	GSC
75034	V836	Cas	03 04 38.3	+61 56 48	12.6	13.1	B	DCEP	069	069
75035	V598	Per	03 07 22.4	+55 19 10	13.2	15.0	B	DCEP	069	069
75036	V599	Per	03 12 10.2	+50 17 51	13.9	14.9	U	UV:	211	211
75037	V600	Per	03 15 55.3	+32 30 24	7.62	8.06	V	EB	212	BD
75038	FT	Cam	03 17 08.6	+60 54 39	14.0	(17.6	B	UG	041	041
75039	FU	Cam	03 19 26.6	+64 46 09	12.2	14.8	P	M	002	GSC
75040	V601	Per	03 19 30.8	+48 42 29	16.96	17.16	Ic	BY	213	213
75041	FV	Cam	03 21 55.3	+67 58 01	13.4	14.9	P	SR:	002	GSC
75042	V602	Per	03 25 51.9	+49 10 18	13.1	14.5	U	UV	211	211
75043	FW	Cam	03 26 00.8	+67 13 52	13.8	(14.7	P	M:	002	
75044	FX	Cam	03 28 33.9	+67 54 35	12.1	12.8	P	SR:	002	GSC
75045	FY	Cam	03 32 10.7	+61 26 06	13.8	(15.1	P	M:	002	GSC
75046	FZ	Cam	03 36 14.5	+60 37 11	12.1	13.2	P	SR:	002	GSC

Table 1 (continued)

No.	Name	R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m			Type	Ref.
75047	GG Cam	03 36 28.4	+60 55 24	12.7	14.6		P	SR:	002 GSC
75048	GH Cam	03 36 49.1	+66 55 07	13.8	17.0	:	B	EA	042 GSC
75049	GI Cam	03 38 10.3	+68 25 56	13.6	14.3		P	SR:	002 GSC
75050	GK Cam	03 39 24.6	+65 37 30	12.1	12.9		P	SR:	002 GSC
75051	V1168 Tau	03 41 06.3	+24 07 09	11.63	(0.16)		V	BY	260 261
75052	V1169 Tau	03 41 14.7	+24 37 23	10.79	(0.03)		V	BY	262 261
75053	V1170 Tau	03 41 27.3	+24 26 01	11.57	(0.05)		V	BY	260 261
75054	V1171 Tau	03 43 29.5	+24 16 47	11.10	(0.12)		V	BY	260 261
75055	V603 Per	03 44 02.6	+51 01 36	12.8	(14.5		P	M:	002 USNO
75056	GL Cam	03 44 36.4	+58 08 01	12.4	13.8		P	SR:	002 GSC
75057	V1172 Tau	03 44 40.1	+23 18 53	13.51	(0.12)		V	BY	260 261
75058	V1173 Tau	03 47 06.2	+23 58 23	14.02	(0.07)		V	BY	262 261
75059	V1174 Tau	03 47 35.3	+24 21 27	12.65	(0.02)		V	BY:	263 261
75060	V1175 Tau	03 47 41.4	+23 47 00	10.31	(0.07)		V	BY	260 261
75061	V1176 Tau	03 47 55.8	+23 41 07	11.57	(0.04)		V	BY:	263 261
75062	GM Cam	03 55 04.6	+57 52 36	12.4	(15.0		P	M	002
75063	GN Cam	03 58 19.0	+59 11 02	13.3	14.6		P	SR:	002 GSC
75064	GO Cam	03 59 12.2	+56 05 23	12.8	14.5		P	SR:	002 GSC
75065	GP Cam	04 00 28.2	+55 47 15	10.5	11.4		P	SR:	002 GSC
75066	GQ Cam	04 05 18.7	+56 57 35	8.13	8.20		Hp	ACYG	030 BD
75067	V604 Per	04 08 38.4	+48 32 25	12.9	14.0		P	SR:	002 GSC
75068	GR Cam	04 11 19.9	+52 48 08	12.0	14.4		P	SR:	002 GSC
75069	GS Cam	04 11 51.9	+54 12 12	14.0	14.9		P	SR:	002 USNO
75070	V605 Per	04 13 54.7	+52 05 45	12.8	13.7		P	SR:	002 GSC
75071	GT Cam	04 15 18.4	+53 48 47	12.8	13.8		P	SR:	002 GSC
75072	V606 Per	04 16 41.6	+51 38 22	13.1	14.3		P	SR:	002 USNO
75073	GU Cam	04 20 43.0	+55 48 50	11.8	13.4		P	SR:	002 GSC
75074	V607 Per	04 22 14.4	+52 12 32	12.7	13.7		P	SR:	002 GSC
75075	V608 Per	04 22 59.0	+51 39 19	12.7	13.8		P	SR:	002 GSC
75076	GV Cam	04 24 40.3	+66 39 13	13.2	14.3		P	SR:	002 GSC
75077	GW Cam	04 27 28.6	+58 11 41	12.2	13.0		P	SR:	002 GSC
75078	GX Cam	04 28 30.8	+63 15 02	13.8	14.7		P	SR:	002 GSC
75079	GY Cam	04 30 46.0	+62 10 13	12.5	14.2		P	SR:	002 GSC
75080	GZ Cam	04 31 00.5	+59 55 19	13.4	14.2		P	SR:	002 GSC
75081	HH Cam	04 31 07.1	+57 17 18	11.3	13.2		P	SR:	002 GSC
75082	HI Cam	04 31 08.9	+63 06 08	13.7	(15.0		P	M:	002
75083	HK Cam	04 31 21.2	+66 44 54	11.8	12.6		P	SR:	002 GSC
75084	V464 Aur	04 35 57.9	+32 48 42	12.1	(15.2		P	M	002 GSC
75085	HL Cam	04 39 22.7	+68 49 02	12.7	13.9		P	SR:	002 GSC
75086	HM Cam	04 42 23.0	+54 23 26	12.6	(15.1		P	M:	002 GSC
75087	V465 Aur	04 43 28.5	+35 52 18	12.5	13.3		P	SR	002 GSC
75088	V609 Per	04 44 39.8	+51 36 01	13.6	(14.6		P	SR	002 USNO
75089	V610 Per	04 46 11.3	+40 12 12	12.8	14.0		P	SR:	002 GSC
75090	HN Cam	04 46 11.5	+60 05 27	13.4	14.1		P	SR:	002 GSC
75091	V466 Aur	04 48 48.3	+36 58 29	13.3	14.5		P	SR:	002 GSC
75092	V467 Aur	04 52 24.1	+40 41 29	10.3	11.5		P	SR:	002 GSC

Table 1 (continued)

No.	Name		R.A. (1950.0)	Decl.	Max	Min		Type	Ref.
			h m s	o ’ "	m	m			
75093	V468	Aur	04 52 34.3	+44 41 56	13.2	(0.24)	V	EW	034 GSC
75094	V469	Aur	04 52 35.1	+36 43 42	12.8	13.9	P	SR:	002 GSC
75095	V470	Aur	04 52 38.0	+44 42 11	13.8	(0.93)	V	DCEP	034 035
75096	V471	Aur	04 52 42.1	+37 14 02	13.0	13.8	P	SR:	002 GSC
75097	V472	Aur	04 56 28.5	+34 58 35	12.8	14.1	P	SR:	002 GSC
75098	V473	Aur	04 59 33.6	+36 39 55	11.9	12.7	P	SR:	002 GSC
75099	V474	Aur	05 01 19.5	+40 02 05	12.1	13.2	P	SR:	002 GSC
75100	V475	Aur	05 03 19.4	+29 22 32	13.8	14.9	P	SR:	002 GSC
75101	V476	Aur	05 04 04.2	+42 39 06	12.1	13.4	P	SR:	002 GSC
75102	V477	Aur	05 05 27.7	+51 56 20	12.4	14.8	P	SR:	002 286
75103	V478	Aur	05 06 14.8	+40 40 39	12.2	13.5	P	SR:	002 GSC
75104	V479	Aur	05 06 49.5	+39 19 36	10.1	11.6	P	SR:	002 GSC
75105	V480	Aur	05 06 52.3	+39 45 40	11.7	13.2	P	SR:	002 GSC
75106	V481	Aur	05 06 52.4	+41 15 53	11.7	12.8	P	SR:	002 GSC
75107	V482	Aur	05 07 24.4	+33 53 37	12.0	13.8	P	SR:	002 GSC
75108	V1396	Ori	05 07 34.9	+04 35 02	15.36	(0.14)	V	ZZA	194 194
75109	V483	Aur	05 07 39.8	+54 14 21	11.7	(15.0	P	M	002 GSC
75110	HO	Cam	05 08 30.5	+59 16 02	12.1	(15.3	P	M	002 GSC
75111	V484	Aur	05 09 16.8	+53 51 11	12.3	13.1	P	SR:	002 GSC
75112	V1177	Tau	05 09 33.4	+16 40 21	14.11	(0.01)	V	DSCTC	264 264
75113	V1178	Tau	05 09 39.0	+16 41 20	12.57	(0.03)	V	DSCTC	264 264
75114	V1179	Tau	05 09 44.1	+16 38 59	14.38	(0.03)	V	DSCTC	264 264
75115	V1180	Tau	05 09 46.9	+16 37 29	15.23	(0.03)	V	DSCTC	264 264
75116	V1181	Tau	05 09 47.5	+16 38 29	12.84	(0.03)	V	DSCTC	264 264
75117	V1182	Tau	05 09 49.6	+16 38 12	13.50	(0.03)	V	DSCTC	264 264
75118	V1183	Tau	05 09 53.8	+16 35 09	13.4	(0.03)	V	DSCTC	264 264
75119	V485	Aur	05 12 48.7	+50 10 17	11.0	(15.0	P	M	002 USNO
75120	V486	Aur	05 14 23.7	+36 56 21	12.5	13.6	P	SR:	002 GSC
75121	YZ	Lep	05 17 05.7	-18 34 14	6.30	6.36	Hp	LBV	160 BD
75122	V487	Aur	05 17 19.6	+38 07 52	12.0	14.1	P	SR:	002 GSC
75123	V488	Aur	05 18 44.7	+47 00 06	13.3	(15.0	P	M:	002 USNO
75124	V489	Aur	05 18 51.6	+42 54 50	10.9	12.1	P	SR:	002 GSC
75125	AN	Col	05 19 28.1	-34 23 35	6.03	6.11	V	BE	098 CoD
75126	ZZ	Lep	05 25 09.4	-12 44 17	9.77	10.02	V	NL:	161 BD
75127	V490	Aur	05 25 21.7	+35 03 18	12.7	13.5	P	SR:	002 GSC
75128	V491	Aur	05 26 56.5	+39 13 25	13.7	15.0	P	L	002 USNO
75129	AO	Col	05 30 47.4	-28 02 50	11.9	(15.0	P	M:	002 GSC
75130	V1397	Ori	05 32 41.0	-05 30 23	14.3	(1.43)	I	INS	195 196
75131	V1398	Ori	05 32 45.9	-05 25 34	12.88	(2.34)	Ic	INSB	197 196
75132	V1399	Ori	05 32 53.5	-05 25 42	10.68	(0.16)	Ic	INB	302 196
75133	V1400	Ori	05 32 57.2	-05 26 29	14.13	(1.18)	Ic	INB	197 196
75134	V492	Aur	05 32 58.1	+52 00 44	12.6	(14.3	P	SR:	002 GSC
75135	V1401	Ori	05 33 13.9	-05 29 42	14.0	(0.69)	I	INS	195 196
75136	V1402	Ori	05 37 27.5	+12 37 41	6.73	14.02	U	UV	198 199
75137	V1403	Ori	05 37 31.8	-01 21 16	10.60	11.62	V	EA	200 201
75138	V1404	Ori	05 37 46.9	+13 46 52	6.52	8.25	J	M	202 203

Table 1 (continued)

No.	Name		R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m		Type	Ref.	
75139	V1184	Tau	05 44 04.5	+20 59 33	14.35	18.0	R	FU:	265	266
75140	V493	Aur	05 46 02.6	+54 21 52	10.4	15.0	P	M	036	036
75141	AA	Lep	05 52 06.6	-22 42 17	10.4	13.1	P	M:	002	GSC
75142	AB	Lep	05 53 01.2	-22 54 28	12.5	(0.1)	V	RS:	162	162
75143	V494	Aur	05 56 20.3	+55 27 08	11.5	14.1	P	M	002	037
75144	V776	Mon	05 56 46.4	-10 52 48	12.3	(0.4)	V	SRA	169	BD
75145	AC	Lep	05 57 59.2	-12 54 01	6.28	6.30	Hp	GDOR:	029	BD
75146	HP	Cam	06 01 18.2	+67 33 17	11.3	13.1	P	SR:	002	GSC
75147	AP	Col	06 03 04.3	-34 33 36	13.40	(2.5 U)	B	UV	099	100
75148	HQ	Cam	06 15 22.9	+67 16 42	12.1	14.3	P	EA	002	GSC
75149	V349	Gem	06 17 32.8	+23 47 55	12.2	15.2	P	M:	064	064
75150	V777	Mon	06 17 37.0	-10 36 52	8.78	8.94	V	R:	170	BD
75151	V778	Mon	06 23 06.1	+06 40 52	10.65	11.45	V	SRB	119	119
75152	beta	Mon	06 26 23.5	-06 59 58	3.77	3.84	Hp	BE	174	BD
75153	NS	CMa	06 27 16.0	-31 13 30	14.00	16.71	V	EA	056	GSC
75154	NT	CMa	06 27 40.1	-31 15 54	16.79	17.83	V	RRAB	056	057
75155	NU	CMa	06 27 40.2	-31 14 57	17.72	18.08	V	EW	056	057
75156	NV	CMa	06 27 42.1	-31 14 50	16.27	16.95	V	EA	056	057
75157	NW	CMa	06 27 51.4	-31 16 13	16.56	16.95	V	EW	056	057
75158	NX	CMa	06 28 02.6	-31 18 12	16.20	16.47	V	EA	056	USNO
75159	V350	Gem	06 31 21.6	+14 18 58	11.7	14.4	P	M	064	064
75160	V779	Mon	06 37 03.0	-08 11 25	14.4	(15.0	P	SR:	002	USNO
75161	V780	Mon	06 37 51.5	+09 50 12	12.50	(0.24Ic)	V	E:	171	171
75162	NY	CMa	06 38 04.4	-12 50 16	13.0	14.4	P	SR:	002	GSC
75163	V781	Mon	06 38 17.7	+09 37 49	14.31	(0.15Ic)	V	INT	171	171
75164	V351	Gem	06 40 12.8	+15 06 45	10.6	14.2	P	M	021	021
75165	NZ	CMa	06 40 16.5	-22 18 39	8.82	8.90	Hp	LBV	030	BD
75166	V495	Aur	06 43 49.2	+47 13 33	12.72	13.28	V	EA	038	038
75167	OO	CMa	06 44 14.1	-26 17 00	12.2	15.0	P	M:	002	GSC
75168	V782	Mon	06 44 56.0	-00 58 08	13.9	(15.0	P	M:	002	USNO
75169	V783	Mon	06 49 33.3	+02 46 31	11.08	11.19	V	DSCT	119	119
75170	V784	Mon	06 49 47.1	+02 46 07	12.75	13.02	V	DCEPS	119	119
75171	OP	CMa	06 51 50.4	-15 03 21	14.8	(15.1	P	SR:	002	USNO
75172	OQ	CMa	06 52 06.8	-14 56 12	12.0	14.0	P	SR:	002	GSC
75173	OR	CMa	06 53 20.2	-12 00 59	13.7	(17	P	M	002	
75174	V785	Mon	07 06 23.0	-00 12 32	12.5	14.4	V	SRA:	172	
75175	OS	CMa	07 07 18.2	-16 09 09	6.04	6.07	Hp	ACYG	030	BD
75176	BX	CMi	07 08 03.7	+07 58 50	10.81	11.48	V	EA	060	061
75177	HR	Cam	07 10 53.1	+74 06 03	15.4	(0.06)	V	R	043	044
75178	OT	CMa	07 12 41.1	-32 54 31	11.5	(15.0	P	M	021	021
75179	HS	Cam	07 14 18.9	+66 03 14	19.4	(4.)	B	EA+XM	045	045
75180	V352	Gem	07 15 44.7	+15 40 40	10.7	14.5	P	M	002	GSC
75181	OU	CMa	07 16 06.6	-13 08 24	15.17	(0.5)	B	EB:	059	059
75182	V786	Mon	07 16 52.9	-00 37 55	11.0	13.7	V	M	172	GSC
75183	V787	Mon	07 17 28.8	-02 03 24	12.5	14.7	V	SRA	172	USNO
75184	V788	Mon	07 22 25.9	-00 18 46	13.1	(0.15Rc)	V	EW:	173	173

Table 1 (continued)

No.	Name		R.A. (1950.0)	Decl.	Max	Min		Type	Ref.	
			h m s	o ’ "	m	m				
75185	V789	Mon	07 22 40.3	-00 19 37	9.34	(0.17Rc)	V	RS:	173	173
75186	V496	Aur	07 24 24.8	+40 53 03	15.7	(21.	R	UG	039	
75187	V441	Pup	07 26 50.2	-26 00 14	9.6	10.9	K	X+BE	216	217
75188	BY	CMi	07 28 51.5	+04 51 33	14.1	15.0	P	EA	062	063
75189	V442	Pup	07 39 18.3	-32 31 34	7.72	7.84	Hp	ACYG	218	CoD
75190	V443	Pup	07 43 57.5	-34 12 26	10.49	(0.04)	V	E/WR	067	CoD
75191	V353	Gem	07 50 04.7	+13 30 44	13.1	14.9	P	LB	140	141
75192	DD	Lyn	07 52 25.5	+35 32 45	6.23	(0.03b)	V	DSCTC	040	BD
75193	HT	Cam	07 52 31.7	+63 14 02	17.2	(1.4)	B	XM	046	046
75194	V790	Mon	07 59 06.9	-09 57 19	12.3	15.0	P	M:	002	
75195	HU	Cam	08 01 03.5	+76 33 31	14.4	(0.48)	V	RRAB	047	048
75196	zeta	Pup	08 01 49.6	-39 51 41	2.11	2.17	Hp	ACYG	111	CoD
75197	HV	Cam	08 05 19.4	+76 13 46	15.2	(0.52R)	V	EA	049	GSC
75198	V444	Pup	08 12 02.9	-35 58 54	12.99	16.49	V	INT	219	220
75199	HW	Cam	08 16 26.4	+84 02 40	10.3	(0.45)	V	EA	050	051
75200	DE	Lyn	08 21 29.8	+57 53 16	12.9	13.9	P	E	002	GSC
75201	V539	Car	08 25 22.9	-57 08 11	8.86	(0.13)	V	ACV	066	CPD
75202	GP	Cnc	08 35 29.3	+07 24 06	11.2	(0.09)	R	DSCTC	052	052
75203	V363	Vel	08 36 10.3	-38 35 01	8.84	8.93	Hp	LBV	030	CoD
75204	DF	Lyn	08 36 50.8	+40 25 43	15.77	(0.20)	B	ZZA	165	166
75205	V364	Vel	08 38 27.2	-52 47 16	11.86	(0.07)	V	BY	278	278
75206	V365	Vel	08 38 42.2	-53 27 26	10.45	(0.08)	V	BY	278	278
75207	V366	Vel	08 40 00.7	-53 11 55	12.56	(0.15)	V	BY	278	278
75208	V367	Vel	08 40 13.4	-52 48 47	13.36	(0.10)	V	BY	278	278
75209	V368	Vel	08 40 31.2	-52 41 26	13.57	(0.22)	V	BY	278	278
75210	V369	Vel	08 40 38.3	-52 43 06	15.88	(0.05)	V	BY	278	278
75211	V370	Vel	08 40 48.3	-52 45 14	10.70	(0.07)	V	BY	278	278
75212	V371	Vel	08 40 52.2	-52 51 07	13.96	(0.13)	V	BY	278	278
75213	V372	Vel	08 42 01.0	-52 46 48	13.84	(0.10)	V	BY	278	278
75214	V373	Vel	08 42 01.0	-52 46 51	14.45	(0.09)	V	BY	278	278
75215	V374	Vel	08 42 01.8	-52 30 35	11.73	(0.12)	V	BY	278	278
75216	V375	Vel	08 42 12.9	-52 47 37	15.32	(0.05)	V	BY	278	278
75217	V376	Vel	08 42 38.2	-52 42 23	10.85	(0.08)	V	BY	278	278
75218	V377	Vel	08 42 58.7	-52 31 36	11.46	(0.08)	V	BY	278	278
75219	V378	Vel	08 43 05.6	-45 47 58	11.06	(0.12)	V	EA/WR	067	020
75220	V379	Vel	08 43 59.4	-52 41 03	12.76	(0.14)	V	BY	278	278
75221	V380	Vel	08 44 10.7	-52 15 00	9.91	(0.07)	V	BY:	278	278
75222	V357	Hya	08 51 04.6	-13 19 52	13.2	(15.3	P	M	002	GSC
75223	DG	Lyn	09 02 01.6	+40 41 31	13.6	14.5	P	EB:	002	GSC
75224	DH	Lyn	09 05 32.5	+42 21 31	12.0	14.5	P	SR:	002	GSC
75225	GQ	Cnc	09 09 11.7	+27 02 39	13.4	(0.97)	V	EW	053	GSC
75226	VY	LMi	09 24 36.2	+37 11 27	12.85	13.95	V	RRAB	158	158
75227	IW	UMa	09 25 47.3	+43 57 10	11.9	(0.50)	V	EA	272	272
75228	DI	Lyn	09 32 15.3	+40 11 12	6.79	6.87	V	EA	167	BD
75229	V358	Hya	09 32 24.7	+04 58 46	9.53	(0.51)	V	EA	146	BD
75230	VZ	LMi	09 36 25.3	+34 28 29	10.3	(15.0	P	M	002	USNO

Table 1 (continued)

No.	Name		R.A. (1950.0)	Decl.	Max	Min		Type	Ref.	
			h m s	o ’ "	m	m				
75231	IX	UMa	09 45 36.0	+43 53 56	7.79	(0.01)	V	DSCTC	273	BD
75232	V359	Hya	09 56 48.3	-12 30 51	7.85	7.88	V	ACV	147	BD
75233	DR	Oct	10 11 08.9	-84 50 05	8.70	8.73	V	RS:	179	CPD
75234	GG	Leo	10 12 56.2	+09 19 39	15.8	17.2	V	XM	155	155
75235	V381	Vel	10 14 50.6	-40 48 44	18.25	18.60	B	XM	279	279
75236	UX	Sex	10 22 47.9	-09 05 25	15.88	(0.08)	V	RPHS	258	USNO
75237	GH	Leo	10 31 04.9	+23 24 46	14.25	14.70	U	*	156	157
75238	GI	Leo	10 36 58.7	+12 39 02	10.5	12.2	P	SR	064	064
75239	IY	UMa	10 40 47.5	+58 23 18	13.0	(15.3	P	UGSU+E	313	USNO
75240	V382	Vel	10 42 42.9	-52 09 44	2.66	16.4	V	NA	280	312
75241	V540	Car	10 45 18.1	-57 03 41	6.98	7.04	Hp	ACYG	030	CPD
75242	UY	Sex	10 47 29.1	+00 15 19	13.49	(0.08)	V	RPHS	259	256
75243	V541	Car	10 49 10.2	-62 01 06	11.73	(0.09)	V	EA/WR	067	020
75244	WW	LMi	10 51 59.5	+25 45 27	6.16	6.23	V	DSCTC	159	BD
75245	IZ	UMa	11 37 02.2	+42 21 58	16.78	(0.15)	B	ZZA	165	166
75246	KK	UMa	11 42 17.5	+65 04 17	12.6	(15.0	P	M	002	GSC
75247	KL	UMa	11 44 33.3	+61 32 12	13.48	(0.10)	V	RPHS	274	275
75248	KM	UMa	11 45 12.8	+35 30 16	11.0	11.6	P	EW:	276	BD
75249	V1023	Cen	11 45 29.4	-40 00 48	7.94	(0.05v)	V	DSCTC	081	CoD
75250	DZ	Cha	11 47 15.8	-78 34 19	12.72	13.06	V	INT	086	GSC
75251	LZ	Mus	11 53 38.5	-65 17 38	9.45	(18.	V	NA	175	176
75252	UY	UMi	12 14 45.1	+87 58 38	6.30	6.38	Hp	GDOR:	029	BD
75253	MM	Mus	12 16 47.1	-73 49 52	14.03	14.48	V	EW:	177	178
75254	V360	Hya	12 16 53.3	-27 44 22	11.0	(15.4	P	M	148	149
75255	MN	Mus	12 17 04.2	-73 54 12	14.59	15.12	V	EW	177	USNO
75256	V1024	Cen	12 17 33.9	-53 38 53	9.36	(0.10)	V	SRD:	082	CPD
75257	KU	Com	12 18 55.8	+25 16 28	7.42	(0.01)	V	DSCTC:	101	BD
75258	VX	Crv	12 19 17.3	-13 36 32	11.4	(16.	P	M	105	105
75259	DD	CVn	12 22 30.1	+43 07 52	7.15	(0.04)	V	GDOR	054	BD
75260	MO	Mus	12 26 38.4	-66 35 03	7.37	7.42	Hp	ACYG	030	CPD
75261	gamma	Mus	12 29 27.2	-71 51 25	3.78	3.80	Hp	LBV	030	CPD
75262	KV	Com	12 33 02.6	+20 11 12	14.5	15.5	P	E+UV	102	102
75263	V1025	Cen	12 35 34.1	-38 26 17	15.20	16.45	B	XM	083	083
75264	KN	UMa	12 37 35.1	+55 27 50	11.77	(0.35Rc)	V	BY:	277	277
75265	V1026	Cen	12 48 58.5	-51 51 24	9.33	9.38	Hp	GDOR:	029	CoD
75266	KW	Com	12 51 08.9	+23 03 51	15.0	16.5	P	E+UV	102	102
75267	IR	Dra	12 53 29.5	+65 42 34	5.26	5.34	Hp	GDOR	029	BD
75268	KX	Com	12 54 25.9	+23 46 03	13.0	15.5	P	UV	102	102
75269	V1027	Cen	12 55 36.2	-31 42 52	12.0	(15.0	P	M	002	GSC
75270	KY	Com	12 56 33.1	+21 29 06	15.5	17.5	P	E+UV	102	102
75271	KZ	Com	12 58 06.7	+23 11 50	15.0	17.0	P	UV	102	102
75272	V1028	Cen	12 58 24.4	-48 37 11	10.52	10.70	Hp	BE	084	CoD
75273	V1029	Cen	13 14 49.2	-63 25 27	7.86	7.95	Hp	ACYG	030	CPD
75274	LL	Com	13 15 39.0	+30 23 48	12.3	13.0	P	EB	103	103
75275	MP	Mus	13 18 32.9	-69 22 30	10.30	10.42	V	IT	086	CPD
75276	DE	CVn	13 24 45.6	+45 48 28	13.68	(0.13)	Rc	E	055	055

Table 1 (continued)

No.	Name		R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m		Type	Ref.	
75277	V1030	Cen	13 25 01.5	-47 07 47	9.28	(0.03)	V	DSCTC:	085	CoD
75278	NX	Vir	13 32 41.1	-22 07 57	12.7	(15.1	P	M:	281	GSC
75279	NY	Vir	13 36 13.5	-01 46 36	13.30	14.22	V	EA+RPHS	282	256
75280	IS	Dra	13 39 02.8	+68 11 12	13.1	(1.31)	V	RRAB	131	132
75281	V1031	Cen	13 39 14.5	-30 19 48	12.4	14.5	P	M	002	GSC
75282	FQ	Boo	13 47 15.1	+08 39 23	6.59	(0.02b)	V	DSCTC	040	BD
75283	FR	Boo	14 00 57.5	+24 50 15	9.29	(0.04)	B	RS	011	BD
75284	V361	Hya	14 02 41.8	-26 47 15	15.28	(0.10)	V	RPHS	150	GSC
75285	V1032	Cen	14 05 05.7	-41 09 40	12.05	12.19	V	IT	086	CoD
75286	DD	Cir	14 19 09.0	-68 55 08	7.5	(21.	V	NA	292	293
75287	IT	Dra	14 27 35.5	+60 36 31	7.53	(0.03b)	V	DSCTC	133	BD
75288	NZ	Vir	14 28 15.5	+07 32 50	11.06	(0.20Rc)	V	EA/RS	283	GSC
75289	PQ	Aps	14 51 03.0	-81 59 08	14.44	15.08	B	RRC	012	GSC
75290	OO	Vir	14 58 59.9	+02 38 08	12.3	14.1	P	SR	021	021
75291	KK	Lib	15 00 50.1	-09 32 50	12.8	14.6	P	SR	021	021
75292	LO	Lup	15 04 14.0	-45 51 44	11.3	(0.16)	V	IT	163	164
75293	LP	Lup	15 04 31.9	-45 03 52	10.3	(0.12)	V	IT	163	164
75294	IU	Dra	15 04 56.8	+64 14 16	8.42	(0.04)	V	BY	134	BD
75295	LQ	Lup	15 05 16.6	-44 11 49	10.8	(0.09)	V	IT	163	164
75296	FS	Boo	15 10 24.1	+45 57 55	13.1	(15.0	P	M	002	USNO
75297	LR	Lup	15 10 31.3	-46 17 55	14.6	(0.17)	V	IT	163	164
75298	LS	Lup	15 12 30.4	-44 07 13	11.8	(0.25)	V	IT	163	164
75299	LT	Lup	15 12 38.7	-33 20 55	10.8	(0.10)	V	IT	163	164
75300	LU	Lup	15 14 36.7	-36 55 59	15.6	(0.09V)	B	IT	163	164
75301	LV	Lup	15 14 37.2	-36 55 58	16.2	(0.08V)	B	IT	163	164
75302	LW	Lup	15 15 14.4	-37 27 06	10.7	(0.18)	V	IT	163	164
75303	LX	Lup	15 15 35.5	-40 39 59	10.3	(0.06)	V	IT	163	164
75304	LY	Lup	15 15 58.5	-40 45 14	11.2	(0.13)	V	IT	163	164
75305	LZ	Lup	15 18 55.1	-39 49 08	11.7	(0.33)	V	IT	163	164
75306	MM	Lup	15 20 07.4	-40 45 07	11.7	(0.08)	V	IT	163	164
75307	MN	Lup	15 20 16.0	-38 10 50	13.8	(0.08)	V	IT	163	164
75308	MO	Lup	15 20 57.0	-31 59 14	12.3	(0.20)	V	IT	163	164
75309	MP	Lup	15 21 20.1	-36 41 27	11.3	(0.11)	V	IT	163	164
75310	MQ	Lup	15 22 21.6	-36 03 15	13.2	(0.10)	V	IT	163	164
75311	MR	Lup	15 22 25.8	-35 27 01	12.8	(0.12)	V	IT	163	164
75312	MS	Lup	15 22 34.2	-44 50 45	10.8	(0.15)	V	IT	163	164
75313	QW	Ser	15 23 47.9	+08 28 31	12.8	(15.3	P	UG:	002	USNO
75314	MT	Lup	15 34 46.7	-37 57 34	12.2	(0.16)	V	IT	163	164
75315	IV	Dra	15 35 02.2	+53 29 01	13.54	(0.50R)	V	EW	135	135
75316	MU	Lup	15 37 25.0	-37 46 40	12.2	(0.10)	V	IT	163	164
75317	MV	Lup	15 46 44.2	-36 20 52	13.0	(0.12)	V	IT	163	164
75318	QX	Ser	15 47 26.1	+25 36 40	8.66	(0.08)	V	E/RS	011	BD
75319	MW	Lup	15 49 01.2	-38 10 36	13.2	(0.21)	V	IT	163	164
75320	MX	Lup	15 52 16.9	-37 00 57	12.9	(0.25)	V	IT	163	164
75321	QY	Ser	15 52 22.3	+20 27 23	5.42	5.50	V	SRB	251	BD
75322	QZ	Ser	15 54 43.5	+21 15 49	12.7	(14.9	P	UG:	252	USNO

Table 1 (continued)

No.	Name		R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m		Type	Ref.	
75323	V335	Ser	15 56 32.7	+00 44 14	7.6	8.3	V	EA	253	BD
75324	V336	Ser	15 56 58.3	+19 48 25	11.5	14.1	P	M:	254	GSC
75325	MY	Lup	15 57 19.1	-41 47 05	11.30	12.24	V	IT	086	CoD
75326	MZ	Lup	15 57 57.4	-33 11 51	10.9	(0.05)	V	IT	163	164
75327	NN	Lup	15 58 43.2	-36 04 34	12.0	(0.11)	V	IT	163	164
75328	NO	Lup	16 00 00.9	-32 31 05	12.6	(0.21)	V	IT	163	164
75329	NP	Lup	16 02 12.9	-38 29 39	13.7	(0.07)	V	IT	163	164
75330	V337	Ser	16 02 49.5	+10 48 39	11.8	14.5	P	SR:	021	021
75331	NQ	Lup	16 04 57.5	-38 36 08	13.0	(0.08)	V	IT	163	164
75332	V1093	Sco	16 05 06.5	-38 52 45	14.6	(0.48)	V	IT	163	164
75333	V1094	Sco	16 05 14.2	-39 15 08	12.5	(0.50)	V	EB	163	164
75334	V338	Ser	16 05 37.4	+07 12 24	12.84	(0.25)	V	RPHS	255	256
75335	V1095	Sco	16 06 18.2	-38 47 16	11.5	(0.13)	V	IT	163	164
75336	V1096	Sco	16 06 41.2	-40 08 22	11.1	(0.10)	V	IT	163	164
75337	V1097	Sco	16 09 38.8	-39 56 55	13.1	(0.13)	V	IT	163	164
75338	V1098	Sco	16 11 13.0	-19 30 56	11.20	12.05	V	INT	086	GSC
75339	V1099	Sco	16 20 05.1	-39 51 03	11.0	(0.12)	V	IT	163	164
75340	V1100	Sco	16 20 07.8	-29 49 06	12.0	(15.1	P	M	002	GSC
75341	V1004	Her	16 21 15.4	+15 40 22	11.2	13.0	P	SR:	002	GSC
75342	iota	TrA	16 23 17.6	-63 56 49	5.30	5.42	Hp	GDOR:	029	CPD
75343	V2394	Oph	16 28 39.0	-24 18 52	11.25	11.95	U	EW	180	CoD
75344	V1005	Her	16 30 35.5	+50 27 29	14.11	14.68	Rc	EW	142	142
75345	V871	Ara	16 33 38.8	-48 36 09	11.0	13.4	V	EA	028	CoD
75346	V872	Ara	16 36 52.0	-51 23 01	6.37	6.39	Hp	GDOR:	029	CoD
75347	V2395	Oph	16 39 10.8	-20 25 07	13.0	(15.6	P	M:	181	USNO
75348	V2396	Oph	16 41 53.0	-20 06 48	11.7	(15.	P	M:	021	021
75349	IW	Dra	16 45 06.1	+53 17 14	11.1	(14.9	P	M	002	GSC
75350	V2397	Oph	16 54 13.4	-09 02 09	12.0	(15.3	P	M:	002	USNO
75351	V2398	Oph	16 57 27.5	-27 33 40	11.32	12.82	U	IT	086	CoD
75352	V873	Ara	17 01 35.5	-47 00 03	7.17	7.23	Hp	ACYG	030	CoD
75353	V1006	Her	17 01 37.6	+39 09 01	10.11	(0.79)	V	SRD:	143	BD
75354	V1101	Sco	17 02 22.9	-36 21 21	18.3	19.3	V	XI	238	239
75355	V1102	Sco	17 02 23.5	-36 20 57	17.31	(20.	V	M:	239	240
75356	V1103	Sco	17 02 27.8	-36 22 01	19.7	20.45	V	EW	241	241
75357	V1104	Sco	17 03 20.5	-42 32 42	8.96	9.14	V	GCAS:	242	CoD
75358	V874	Ara	17 04 58.8	-52 35 34	12.5	17.5	P	M:	031	GSC
75359	V875	Ara	17 05 47.4	-51 37 05	12.4	(2.)	B	SR:	031	GSC
75360	V2399	Oph	17 07 28.3	-10 15 09	13.3	(15.6	P	M	002	GSC
75361	V2400	Oph	17 09 33.3	-24 11 12	14.15	14.70	V	XM	182	182
75362	V2401	Oph	17 13 06.7	-04 27 04	13.0	(15.5	P	M	064	064
75363	V1105	Sco	17 13 46.3	-32 03 01	15.2	17.2	R	M	183	184
75364	V2402	Oph	17 14 00.0	-28 50 41	12.2	17.2	R	M	183	184
75365	V2403	Oph	17 14 00.3	-29 47 45	15.1	17.2	R	M	183	184
75366	V1106	Sco	17 14 04.0	-30 15 45	15.4	18.8	R	M	183	184
75367	V2404	Oph	17 14 09.9	-28 02 27	14.7	17.2	R	M	183	184
75368	V1107	Sco	17 14 17.8	-30 20 50	14.3	17.2	R	M	183	184

Table 1 (continued)

No.	Name	R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m	Type	Ref.
75369	V1108 Sco	17 14 19.9	-30 10 54	14.3	17.1	R M	183 184
75370	V2405 Oph	17 14 27.4	-28 23 14	15.6	17.3	R M	183 184
75371	V2406 Oph	17 14 32.6	-29 30 06	13.1	17.2	R M	183 184
75372	V1109 Sco	17 14 43.0	-30 07 56	12.5	16.8	R M	183 184
75373	V2407 Oph	17 14 53.5	-29 22 20	14.0	17.2	R M	183 184
75374	V876 Ara	17 14 54.7	-54 42 42	15.6	(0.10)	V ZZA	032 033
75375	V2408 Oph	17 15 01.3	-29 51 03	14.5	17.3	R M	183 184
75376	V2409 Oph	17 15 02.0	-29 03 21	12.5	17.3	R M	183 184
75377	V2410 Oph	17 15 03.0	-29 52 24	15.6	17.2	R M	183 184
75378	V2411 Oph	17 15 13.7	-30 04 25	14.2	17.2	R M	183 184
75379	V2412 Oph	17 15 22.2	-30 01 46	15.0	17.3	R M	183 184
75380	V2413 Oph	17 15 23.4	-29 35 10	14.6	17.3	R M	183 184
75381	V2414 Oph	17 15 29.9	-27 58 05	14.2	17.1	R M	183 184
75382	V2415 Oph	17 15 32.3	-29 40 07	13.9	17.3	R M	183 184
75383	V2416 Oph	17 15 37.4	-28 43 14	13.2	17.1	R M	183 184
75384	V1110 Sco	17 15 38.7	-30 53 39	13.9	15.6	R M	183 184
75385	V2417 Oph	17 15 47.6	-01 44 21	13.9	(15.5	P M:	002 USNO
75386	V2418 Oph	17 15 56.9	-29 44 16	15.3	17.3	R M	183 184
75387	V2419 Oph	17 15 57.8	-29 54 31	14.8	17.2	R M	183 184
75388	V1111 Sco	17 16 06.3	-30 33 30	15.0	17.2	R M	183 184
75389	V1112 Sco	17 16 10.7	-30 51 24	14.1	16.9	R M	183 184
75390	V2420 Oph	17 16 13.0	-29 50 44	15.8	17.3	R M	183 184
75391	V2421 Oph	17 16 16.5	-29 39 42	14.2	17.3	R M	183 184
75392	V1113 Sco	17 16 26.5	-30 44 18	14.5	17.2	R M	183 184
75393	V1114 Sco	17 16 27.2	-30 51 09	13.8	17.3	R M	183 184
75394	V2422 Oph	17 16 35.9	-29 05 59	15.0	17.3	R M	183 184
75395	V2423 Oph	17 16 36.4	-28 29 02	15.2	17.3	R M	183 184
75396	V2424 Oph	17 16 41.1	-05 46 11	12.3	(15.6	P M	021 021
75397	V2425 Oph	17 16 44.6	-00 07 16	10.6	(0.83)	V EA	188 BD
75398	V2426 Oph	17 16 51.0	-28 56 58	11.9	17.1	R M	183 184
75399	V2427 Oph	17 16 52.2	-28 13 21	14.8	17.2	R M	183 184
75400	V2428 Oph	17 16 55.1	-28 22 28	15.2	17.2	R M	183 184
75401	V1115 Sco	17 16 58.6	-30 58 07	15.3	17.3	R M	183 184
75402	V2429 Oph	17 17 10.7	-28 39 12	14.7	17.3	R M	183 184
75403	V1116 Sco	17 17 13.6	-30 33 48	13.6	17.3	R M	183 184
75404	V1117 Sco	17 17 14.0	-30 59 20	15.8	17.3	R M	183 184
75405	V2430 Oph	17 17 15.7	-28 01 24	14.6	17.2	R M	183 184
75406	V2431 Oph	17 17 20.8	-28 10 43	14.6	17.2	R M	183 184
75407	V1118 Sco	17 17 26.2	-31 04 24	15.9	17.3	R M	183 184
75408	V1119 Sco	17 17 28.2	-30 29 42	15.0	17.3	R M	183 184
75409	V1120 Sco	17 17 31.7	-30 31 41	15.4	17.3	R M	183 184
75410	V2432 Oph	17 17 40.3	-28 14 22	15.8	17.2	R M	183 184
75411	V2433 Oph	17 18 19.6	-28 38 01	15.6	17.2	R M	183 184
75412	V1121 Sco	17 18 20.6	-30 11 04	15.8	17.2	R M	183 184
75413	V2434 Oph	17 18 36.1	-29 14 40	11.2	17.2	R M	183 184
75414	V2435 Oph	17 18 52.5	-29 41 03	15.6	17.3	R M	183 184

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min	Type	Ref.
		h m s	o ’ "	m	m		
75415	V1122 Sco	17 19 01.9	-30 31 17	14.5	17.3	R M	183 184
75416	V2436 Oph	17 19 12.6	-29 51 47	15.3	17.2	R M	183 184
75417	V2437 Oph	17 19 18.1	-29 36 43	15.5	17.3	R M	183 184
75418	V2438 Oph	17 19 23.7	-28 26 48	16.5	17.3	R SRA	183 184
75419	V2439 Oph	17 19 31.6	-28 09 40	15.7	17.3	R M	183 184
75420	V2440 Oph	17 19 42.5	-29 50 21	15.4	17.3	R M	183 184
75421	V1123 Sco	17 19 43.2	-30 24 06	15.9	17.2	R M	183 184
75422	V2441 Oph	17 19 49.2	-28 29 06	15.2	17.2	R M	183 184
75423	V2442 Oph	17 20 02.8	-29 17 46	15.0	17.2	R M	183 184
75424	V2443 Oph	17 20 03.2	-08 31 17	12.4	15.2	P M	002 USNO
75425	V1124 Sco	17 20 03.4	-30 04 36	14.3	17.3	R M	183 184
75426	V2444 Oph	17 20 05.0	-28 53 19	14.4	17.2	R M	183 184
75427	V2445 Oph	17 20 07.2	-28 08 53	14.7	17.3	R M	183 184
75428	V2446 Oph	17 20 11.1	-28 59 09	13.9	17.3	R M	183 184
75429	V1125 Sco	17 20 13.0	-31 50 02	16.2	17.2	R SRA	183 184
75430	V2447 Oph	17 20 15.2	-28 32 54	15.8	17.3	R M	183 184
75431	V2448 Oph	17 20 21.2	-28 01 54	15.0	17.2	R M	183 184
75432	V2449 Oph	17 20 27.4	-28 55 15	15.2	17.2	R M	183 184
75433	V2450 Oph	17 20 30.3	-30 00 32	16.2	17.3	R SRA	183 184
75434	V2451 Oph	17 20 36.0	-28 04 47	15.6	17.3	R M	183 184
75435	V1126 Sco	17 20 46.6	-30 52 27	16.6	17.3	R SRA	183 184
75436	V2452 Oph	17 21 26.1	-29 06 52	15.0	17.3	R M	183 184
75437	V2453 Oph	17 21 27.2	-29 12 16	12.9	17.3	R M	183 184
75438	V2454 Oph	17 21 33.9	-27 56 06	15.1	17.2	R M	183 184
75439	V2455 Oph	17 21 53.3	-28 22 16	14.6	16.9	R M	183 184
75440	V2456 Oph	17 21 57.2	-28 56 33	14.6	17.3	R M	183 184
75441	V2457 Oph	17 22 00.1	-29 03 30	14.0	17.2	R M	183 184
75442	V2458 Oph	17 22 12.3	-29 05 27	14.6	17.3	R M	183 184
75443	V2459 Oph	17 22 22.7	-29 02 25	14.1	17.3	R M	183 184
75444	V1007 Her	17 22 30.4	+41 16 49	17.1	(1.50)	R XM	144 144
75445	V2460 Oph	17 22 48.8	-29 18 35	15.1	17.3	R M	183 184
75446	V1127 Sco	17 23 10.7	-30 26 57	14.8	17.3	R M	183 184
75447	V2461 Oph	17 23 18.8	-00 48 53	13.5	(15.5	P M:	002 GSC
75448	V2462 Oph	17 23 43.7	-28 48 46	15.2	17.2	R M	183 184
75449	V2463 Oph	17 23 47.3	-29 45 33	14.6	17.2	R M	183 184
75450	V2464 Oph	17 23 48.3	-29 44 23	14.2	17.3	R M	183 184
75451	V2465 Oph	17 23 55.7	-28 50 08	12.8	17.1	R M	183 184
75452	V1128 Sco	17 23 58.9	-30 43 24	15.8	17.3	R M	183 184
75453	V1129 Sco	17 24 00.0	-30 07 26	16.1	17.2	R SRA	183 184
75454	V2466 Oph	17 24 06.8	-29 21 12	16.1	17.2	R SRA	183 184
75455	V1130 Sco	17 24 15.0	-30 45 25	15.2	17.2	R M	183 184
75456	V2467 Oph	17 24 18.4	-29 53 17	15.2	17.3	R M	183 184
75457	V2468 Oph	17 24 18.4	-29 13 06	14.9	17.3	R M	183 184
75458	V2469 Oph	17 24 39.2	-29 05 59	15.5	17.2	R M	183 184
75459	V2470 Oph	17 24 43.8	-28 19 06	14.3	17.2	R M	183 184
75460	V1131 Sco	17 24 47.1	-30 08 52	15.2	17.2	R M	183 184

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min	Type	Ref.
		h m s	o ' "	m	m		
75461	V2471 Oph	17 24 51.5	-29 41 11	14.6	17.2	R M	183 184
75462	V339 Ser	17 25 03.0	-13 38 36	13.8	(14.7	P M	021 021
75463	V2472 Oph	17 25 23.5	-29 36 25	15.6	17.3	R M	183 184
75464	V2473 Oph	17 25 31.6	-28 41 14	15.4	17.3	R M	183 184
75465	V2474 Oph	17 25 37.3	-30 01 43	15.7	17.3	R M	183 184
75466	V2475 Oph	17 25 41.3	-28 39 20	16.0	17.3	R M	183 184
75467	V2476 Oph	17 25 46.6	-28 58 50	15.3	17.2	R M	183 184
75468	V2477 Oph	17 26 04.9	-28 57 58	13.9	17.3	R M	183 184
75469	V2478 Oph	17 26 24.6	-28 13 38	16.6	17.3	R SRA	183 184
75470	V1132 Sco	17 26 27.3	-30 23 05	16.3	18.3	R M	183 184
75471	V2479 Oph	17 26 27.7	-29 04 09	15.0	17.2	R M	183 184
75472	V2480 Oph	17 26 39.2	-29 01 49	14.7	17.2	R M	183 184
75473	V1133 Sco	17 26 51.8	-30 21 45	13.6	17.2	R M	183 184
75474	V1134 Sco	17 26 52.1	-31 41 25	14.6	17.2	R M	183 184
75475	V2481 Oph	17 27 07.4	-29 52 12	15.4	17.2	R M	183 184
75476	V1135 Sco	17 27 11.6	-30 06 14	14.8	17.3	R M	183 184
75477	V2482 Oph	17 27 50.5	-28 22 20	15.6	17.3	R M	183 184
75478	V2483 Oph	17 27 59.7	-29 27 43	16.4	17.3	R SRA	183 184
75479	V340 Ser	17 27 59.9	-11 19 55	9.52	9.70	V RV:	082 BD
75480	V1136 Sco	17 28 05.4	-30 16 19	15.5	17.3	R M	183 184
75481	V2484 Oph	17 28 12.7	-29 51 53	15.3	17.2	R M	183 184
75482	V2485 Oph	17 28 26.0	-28 00 47	15.8	17.2	R M	183 184
75483	V2486 Oph	17 28 51.2	-28 48 24	15.2	17.2	R M	183 184
75484	V2487 Oph	17 29 02.9	-19 11 46	9.5	17.7	P NA	189 USNO
75485	V1137 Sco	17 29 29.9	-30 09 08	15.3	17.3	R M	183 184
75486	V1138 Sco	17 29 52.3	-30 26 24	15.7	17.2	R M	183 184
75487	V2488 Oph	17 30 19.9	-29 55 47	10.5	17.1	R M	183 184
75488	V2489 Oph	17 31 05.7	-29 22 50	15.3	17.3	R M	183 184
75489	V2490 Oph	17 31 48.4	-28 44 55	16.1	17.3	R SRA	183 184
75490	V2491 Oph	17 32 01.8	-28 00 58	16.2	17.2	R SRA	183 184
75491	V1139 Sco	17 32 05.6	-30 53 10	14.3	17.2	R M	183 184
75492	V1140 Sco	17 32 12.3	-31 11 22	14.9	17.2	R M	183 184
75493	V2492 Oph	17 33 42.3	-28 44 53	14.4	17.3	R M	183 184
75494	V2493 Oph	17 35 05.5	+11 24 09	13.2	(0.84)	V RR(B)	190 017
75495	V2494 Oph	17 36 45.0	-07 57 24	12.8	15.5	P M	002 GSC
75496	V2495 Oph	17 36 48.9	-02 10 33	12.8	(15.4	P M	002 GSC
75497	V2496 Oph	17 40 33.7	-29 14 26	8.8	10.5	K M	191
75498	V2497 Oph	17 40 35.6	-29 14 19	8.5	9.8	K M	191
75499	V2498 Oph	17 40 35.8	-04 19 38	14.5	(15.5	P M	002 USNO
75500	V4445 Sgr	17 40 46.4	-28 59 11	8.2	9.2	K M	191
75501	V4446 Sgr	17 40 46.5	-28 49 13	9.9	11.5	K M	191
75502	V4447 Sgr	17 40 53.5	-29 18 38	9.3	11.9	K M	191
75503	V4448 Sgr	17 40 56.2	-29 23 30	10.1	11.3	K M	191
75504	V4449 Sgr	17 41 04.6	-28 43 50	7.7	8.8	K M	191
75505	V4450 Sgr	17 41 08.9	-28 43 06	8.8	10.3	K M	191
75506	V4451 Sgr	17 41 17.7	-28 49 41	9.0	11.4	K M	191

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min		Type	Ref.
		h m s	o ’ "	m	m			
75507	V4452 Sgr	17 41 18.5	-29 03 44	5.93	6.96	L’	M	226
75508	V4453 Sgr	17 41 19.4	-28 59 59	8.75	9.90	K	M	191
75509	V4454 Sgr	17 41 20.6	-28 59 47	8.9	9.6	K	M:	191
75510	V4455 Sgr	17 41 22.1	-29 21 52	12.6	15.0	K	M	191
75511	V4456 Sgr	17 41 22.6	-29 21 51	11.3	12.6	K	M	191
75512	V4457 Sgr	17 41 23.5	-29 09 23	10.6	12.6	K	M	191
75513	V4458 Sgr	17 41 24.1	-29 03 21	3.60	5.51	L’	M	226
75514	V4459 Sgr	17 41 25.7	-28 59 05	11.0	12.8	K	M	191
75515	V4460 Sgr	17 41 26.0	-29 21 50	11.1	12.1	K	M	191
75516	V4461 Sgr	17 41 27.2	-29 22 08	9.9	11.4	K	M	191
75517	V4462 Sgr	17 41 28.5	-29 15 33	10.0	12.6	K	M	191
75518	V4463 Sgr	17 41 33.6	-29 04 23	9.6	11.8	K	M	191
75519	V4464 Sgr	17 41 34.4	-28 55 44	13.4	14.7	K	M	191
75520	V4465 Sgr	17 41 35.1	-29 05 01	9.9	12.1	K	M	191
75521	V4466 Sgr	17 41 40.3	-29 08 32	10.8	12.7	K	M	191
75522	V4467 Sgr	17 41 40.3	-29 08 07	8.95	10.10	K	M	191
75523	V4468 Sgr	17 41 43.2	-29 12 31	8.25	9.25	K	M	191
75524	V4469 Sgr	17 41 45.1	-28 51 14	10.9	12.6	K	M	191
75525	V4470 Sgr	17 41 45.8	-29 12 13	4.74	5.92	L’	M	226
75526	V4471 Sgr	17 41 46.5	-29 19 30	10.1	12.6	K	M	191
75527	V4472 Sgr	17 41 51.8	-28 49 45	11.6	12.5	K	M:	191
75528	V4473 Sgr	17 41 52.3	-29 06 00	9.2	10.6	K	M	191
75529	V4474 Sgr	17 41 53.1	-28 49 13	10.3	11.1	K	M:	191
75530	V4475 Sgr	17 41 54.1	-29 16 01	7.0	8.0	K	M	191
75531	V4476 Sgr	17 41 55.2	-29 15 53	9.5	11.4	K	M	191
75532	V4477 Sgr	17 41 56.1	-29 02 21	8.4	9.7	K	M	191
75533	V4478 Sgr	17 41 57.3	-29 02 29	9.0	9.7	K	M:	191
75534	V4479 Sgr	17 41 58.3	-28 58 05	9.6	11.5	K	M	191
75535	V4480 Sgr	17 41 59.2	-29 17 01	10.2	13.1	K	M	191
75536	V4481 Sgr	17 42 01.3	-28 37 26	11.0	13.6	K	M	191
75537	V4482 Sgr	17 42 01.8	-29 11 44	8.9	10.5	K	M	191
75538	V4483 Sgr	17 42 02.1	-29 08 25	8.9	10.1	K	M	191
75539	V4484 Sgr	17 42 02.2	-28 39 32	8.0	9.7	K	M	191
75540	V4485 Sgr	17 42 02.9	-29 14 16	10.2	13.3	K	M	191
75541	V4486 Sgr	17 42 02.9	-29 05 44	12.9	14.1	K	M	191
75542	V4487 Sgr	17 42 03.3	-29 06 09	9.8	11.4	K	M	191
75543	V4488 Sgr	17 42 03.5	-29 08 07	11.1	13.2	K	M	191
75544	V4489 Sgr	17 42 03.5	-28 46 32	5.18	6.72	L’	M	226
75545	V4490 Sgr	17 42 05.3	-29 14 26	7.9	9.2	K	M	191
75546	V4491 Sgr	17 42 06.9	-29 16 53	12.8	14.6	K	M	191
75547	V4492 Sgr	17 42 07.0	-29 04 42	5.34	6.98	L’	M	226
75548	V4493 Sgr	17 42 07.9	-28 57 29	8.4	9.4	K	M	191
75549	V4494 Sgr	17 42 08.3	-29 12 55	8.4	10.0	K	M	191
75550	V4495 Sgr	17 42 08.5	-28 57 48	10.1	12.0	K	M	191
75551	V4496 Sgr	17 42 15.4	-29 06 54	5.45	6.94	L’	M	226
75552	V4497 Sgr	17 42 18.5	-29 08 06	6.32	7.72	L’	M	226

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min		Type	Ref.
		h m s	o ’ "	m	m			
75553	V4498 Sgr	17 42 19.2	-29 19 49	9.7	11.3	K	M	191
75554	V4499 Sgr	17 42 19.2	-28 38 25	10.1	12.2	K	M	191
75555	V4500 Sgr	17 42 20.4	-29 23 49	11.6	12.4	K	M:	191
75556	V4501 Sgr	17 42 21.1	-28 45 11	5.91	6.85	L’	M	226
75557	V4502 Sgr	17 42 21.7	-28 45 08	6.91	7.53	L’	LB	226
75558	V4503 Sgr	17 42 22.3	-29 10 12	8.30	(9.8	L’	SR:	226
75559	V4504 Sgr	17 42 22.5	-29 02 19	9.8	11.5	K	M	191
75560	V4505 Sgr	17 42 22.7	-29 01 06	6.35	7.93	L’	M	226
75561	V4506 Sgr	17 42 23.7	-28 48 46	10.8	13.2	K	M	191
75562	V4507 Sgr	17 42 23.9	-29 04 52	8.4	10.2	K	M	191
75563	V4508 Sgr	17 42 27.3	-28 58 16	11.7	12.6	K	SR:	191
75564	V4509 Sgr	17 42 27.5	-29 01 24	12.0	12.6	K	LB	191
75565	V4510 Sgr	17 42 27.7	-29 00 56	7.8	8.7	K	M:	191
75566	V4511 Sgr	17 42 29.7	-28 59 10	9.2	9.9	K	M:	191
75567	V4512 Sgr	17 42 29.9	-28 59 14	9.6	10.8	K	M	191
75568	V4513 Sgr	17 42 29.9	-28 59 46	11.2	12.6	K	LB	191
75569	V4514 Sgr	17 42 30.5	-29 00 20	10.0	10.9	K	M:	191
75570	V4515 Sgr	17 42 31.7	-28 58 09	9.2	10.3	K	M	191
75571	V4516 Sgr	17 42 32.1	-28 57 52	8.0	10.2	K	M	191
75572	V4517 Sgr	17 42 33.6	-28 58 03	8.0	8.4	K	LB	191
75573	V4518 Sgr	17 42 36.6	-28 31 30	8.5	11.0	K	M	191
75574	V4519 Sgr	17 42 37.5	-29 09 36	8.8	11.1	K	M	191
75575	V4520 Sgr	17 42 38.8	-28 57 40	8.9	10.4	K	M	191
75576	V4521 Sgr	17 42 40.7	-28 56 59	10.3	11.7	K	M	191
75577	V4522 Sgr	17 42 40.9	-28 46 58	4.75	6.22	L’	M	226
75578	V4523 Sgr	17 42 41.5	-29 13 22	9.8	12.0	K	M	191
75579	V4524 Sgr	17 42 41.7	-28 43 42	11.5	14.2	K	M	191
75580	V4525 Sgr	17 42 42.1	-29 13 31	8.4	9.3	K	M:	191
75581	V4526 Sgr	17 42 42.6	-28 59 26	11.9	13.6	K	M	191
75582	V4527 Sgr	17 42 42.8	-28 57 04	9.7	10.4	K	M:	191
75583	V4528 Sgr	17 42 44.0	-28 58 45	8.8	9.3	K	M:	191
75584	V4529 Sgr	17 42 44.2	-28 30 38	8.7	11.7	K	M	191
75585	V4530 Sgr	17 42 45.5	-28 54 43	5.57	7.03	L’	M	226
75586	V4531 Sgr	17 42 45.5	-28 44 10	5.81	8.48	L’	M	226
75587	V4532 Sgr	17 42 45.9	-28 38 20	9.7	12.0	K	M	191
75588	V4533 Sgr	17 42 48.1	-29 00 04	8.6	9.2	K	M:	191
75589	V4534 Sgr	17 42 48.2	-28 57 26	9.7	12.2	K	M	191
75590	V4535 Sgr	17 42 48.8	-28 54 16	8.7	9.6	K	M:	191 227
75591	V4536 Sgr	17 42 49.8	-28 49 05	10.7	13.0	K	M	191
75592	V4537 Sgr	17 42 49.9	-28 49 04	11.0	12.7	K	M	191
75593	V4538 Sgr	17 42 50.2	-29 00 15	14.3	15.1	K	LB	191
75594	V4539 Sgr	17 42 51.2	-28 48 51	10.0	11.5	K	M	191
75595	V4540 Sgr	17 42 51.2	-28 48 53	10.1	11.6	K	M	191
75596	V4541 Sgr	17 42 52.6	-28 43 13	11.9	13.1	K	M	191
75597	V4542 Sgr	17 42 54.5	-28 42 51	9.5	10.8	K	M	191
75598	V4543 Sgr	17 42 55.4	-29 08 22	12.5	13.3	K	M:	191

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min		Type	Ref.
		h m s	o ' "	m	m			
75599	V4544 Sgr	17 42 56.2	-29 12 52	10.1	12.9	K	M	191
75600	V4545 Sgr	17 42 57.0	-28 51 08	13.2	14.7	K	LB:	191
75601	V4546 Sgr	17 42 57.1	-29 08 05	11.2	12.8	K	M	191
75602	V4547 Sgr	17 42 59.5	-28 59 35	8.7	9.4	K	M:	191
75603	V4548 Sgr	17 43 04.4	-28 35 32	11.8	13.8	K	M	191
75604	V4549 Sgr	17 43 04.6	-28 43 10	8.4	9.5	K	M	191
75605	V4550 Sgr	17 43 04.6	-28 54 35	6.42	8.47	L'	M	226
75606	V4551 Sgr	17 43 11.7	-28 45 17	9.3	11.2	K	M	191
75607	V4552 Sgr	17 43 14.2	-28 58 54	10.6	13.0	K	M	191
75608	V4553 Sgr	17 43 15.1	-28 48 55	8.3	10.0	K	M	191
75609	V4554 Sgr	17 43 17.4	-28 52 31	9.0	9.6	K	M:	191
75610	V4555 Sgr	17 43 18.1	-28 52 13	8.1	9.8	K	M	191
75611	V4556 Sgr	17 43 20.7	-28 30 28	9.2	10.4	K	M	191
75612	V4557 Sgr	17 43 21.2	-28 38 42	8.4	9.5	K	M	191
75613	V4558 Sgr	17 43 21.3	-28 30 01	9.4	10.1	K	M:	191
75614	V4559 Sgr	17 43 21.6	-28 34 35	11.2	12.4	K	M	191
75615	V4560 Sgr	17 43 22.8	-28 43 56	10.0	11.2	K	M	191
75616	V4561 Sgr	17 43 24.4	-29 20 46	10.6	13.4	K	M	191
75617	V4562 Sgr	17 43 24.6	-28 57 52	7.36	9.53	L'	M	226
75618	V4563 Sgr	17 43 25.7	-28 31 02	14.2	15.0	K	LB:	191
75619	V4564 Sgr	17 43 26.4	-29 18 23	9.0	10.0	K	M	191
75620	V4565 Sgr	17 43 26.9	-29 18 26	9.4	10.8	K	M	191
75621	V4566 Sgr	17 43 27.3	-28 31 19	9.5	10.8	K	M	191
75622	V4567 Sgr	17 43 32.3	-28 32 21	10.5	12.2	K	M	191
75623	V4568 Sgr	17 43 37.4	-28 46 10	13.5	14.0	K	LB:	191
75624	V4569 Sgr	17 43 48.4	-18 01 37	12.0	(14.5	P	M	228 USNO
75625	V4570 Sgr	17 43 51.8	-28 44 52	9.2	11.1	K	M	191
75626	V4571 Sgr	17 44 08.0	-29 19 29	8.7	9.4	K	M:	191
75627	V4572 Sgr	17 44 10.0	-29 19 23	9.4	11.2	K	M	191
75628	V4573 Sgr	17 44 11.0	-28 38 19	10.7	13.1	K	M	191
75629	V4574 Sgr	17 44 13.9	-28 31 42	8.15	9.65	K	M	191
75630	V4575 Sgr	17 44 29.5	-28 34 45	12.6	14.7	K	M	191
75631	V4576 Sgr	17 44 29.8	-28 34 21	9.1	9.8	K	M:	191
75632	V1141 Sco	17 50 58.8	-30 02 20	8.5	(20.	V	NA	244 245
75633	V341 Ser	17 51 48.1	-10 14 04	13.1	14.4	P	LB	021 021
75634	V1142 Sco	17 52 11.0	-31 01 14	6.9	(20.	V	NA	246 311
75635	V2499 Oph	17 54 17.3	+10 06 47	11.5	14.7	V	M	095 095
75636	V2500 Oph	17 55 22.8	+04 33 15	9.55	(0.02)	V	BY	192 300
75637	V4577 Sgr	17 57 19.0	-28 48 26	6.53	7.63	J	M	229
75638	V342 Ser	17 58 58.1	-10 40 27	12.7	15.3	P	M	021 021
75639	V4578 Sgr	17 59 20.6	-23 34 41	12.92	(0.10)	V	WR	109 020
75640	V4579 Sgr	18 00 28.7	-28 00 17	11.0	16.5	B	NB	307 GSC
75641	V2501 Oph	18 02 34.2	+08 57 21	12.3	(0.31)	V	SR:	193 GSC
75642	V1008 Her	18 03 53.8	+31 39 57	13.5	(18.0	B	UG	001 001
75643	V4444 Sgr	18 04 27.9	-27 20 40	7.7	(21.	V	NA	225 304
75644	V4580 Sgr	18 05 03.4	-36 59 12	16.6	(20.0	V	XN+XP	230

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min		Type	Ref.	
		h m s	o ’ "	m	m				
75645	V4581 Sgr	18 05 25.9	-32 42 03	17.8	18.6	B	RRAB	231	231
75646	V4582 Sgr	18 05 26.6	-32 19 24	16.8	17.5	B	RRAB	231	231
75647	V4583 Sgr	18 05 38.4	-31 57 09	16.8	18.0	B	RRAB	231	231
75648	V4584 Sgr	18 05 38.9	-32 31 17	16.8	17.3	B	EW	231	231
75649	V4585 Sgr	18 05 41.9	-32 03 17	17.1	18.2	B	RRAB	231	231
75650	V4586 Sgr	18 05 44.0	-32 23 48	16.4	17.5	B	RRAB	231	231
75651	V4587 Sgr	18 05 44.8	-32 33 42	17.9	18.8	B	RRAB:	231	231
75652	V4588 Sgr	18 05 50.5	-32 34 10	17.5	18.4	B	RRAB	231	231
75653	V4589 Sgr	18 05 50.5	-32 42 56	16.5	18.2	B	RRAB	231	231
75654	V4590 Sgr	18 06 04.5	-32 32 00	16.9	18.5	B	RRAB	231	231
75655	V4591 Sgr	18 06 04.8	-32 06 45	17.2	18.7	B	RRAB	231	231
75656	V4592 Sgr	18 06 09.6	-32 23 48	16.8	17.9	B	RRAB	231	231
75657	V4593 Sgr	18 06 15.5	-32 03 45	17.0	17.8	B	RRAB	231	231
75658	V4594 Sgr	18 06 20.8	-31 51 33	16.5	17.0	B	RRC:	231	231
75659	V4595 Sgr	18 06 35.3	-31 47 15	16.8	18.1	B	RRAB	231	231
75660	V4596 Sgr	18 06 36.7	-32 18 04	17.0	18.3	B	RRAB	231	231
75661	V4597 Sgr	18 06 47.3	-32 38 33	17.1	17.8	B	RRAB	231	231
75662	V4598 Sgr	18 06 52.4	-32 27 45	16.8	18.1	B	RRAB	231	231
75663	V4599 Sgr	18 06 53.1	-32 20 20	17.1	18.0	B	RRC	231	231
75664	V4600 Sgr	18 06 57.3	-32 24 19	17.1	18.1	B	RRAB	231	231
75665	V4601 Sgr	18 07 02.7	-31 49 33	16.8	17.9	B	RRAB	231	231
75666	V4602 Sgr	18 07 03.0	-31 54 48	16.8	17.2	B	RRAB	231	231
75667	V4603 Sgr	18 07 04.3	-32 24 10	17.1	18.4	B	RRAB	231	231
75668	V4604 Sgr	18 07 06.6	-32 36 34	17.0	18.3	B	RRAB	231	231
75669	V4605 Sgr	18 07 19.8	-32 15 13	16.4	17.8	B	RRAB	231	231
75670	V4606 Sgr	18 07 23.9	-32 21 16	16.9	18.2	B	RRAB	231	231
75671	V4607 Sgr	18 07 24.4	-32 06 47	17.2	18.2	B	RRAB	231	231
75672	V4608 Sgr	18 07 28.8	-32 32 40	17.1	17.7	B	RRC	231	231
75673	V4609 Sgr	18 07 30.5	-32 38 44	16.1	17.2	B	RRAB	231	231
75674	V4610 Sgr	18 07 43.0	-32 23 14	16.9	18.6	B	RRAB	231	231
75675	V4611 Sgr	18 07 46.7	-32 22 56	16.0	17.4	B	RRAB	231	231
75676	V4612 Sgr	18 07 57.5	-32 31 04	17.0	17.8	B	RRAB	231	231
75677	V4613 Sgr	18 07 58.6	-32 27 25	17.2	18.4	B	RRAB	231	231
75678	V4614 Sgr	18 08 02.8	-31 45 57	17.1	18.2	B	RRAB	231	231
75679	V4615 Sgr	18 08 05.4	-31 57 42	17.0	18.4	B	RRAB	231	231
75680	V4616 Sgr	18 08 06.0	-31 48 52	16.4	17.9	B	RRAB	231	231
75681	V4617 Sgr	18 08 06.1	-32 15 49	17.1	17.9	B	RRC:	231	231
75682	V4618 Sgr	18 08 12.9	-32 43 41	15.9	17.2	B	RRAB	231	231
75683	V4619 Sgr	18 08 15.0	-31 55 40	17.6	18.6	B	RRAB	231	231
75684	V4620 Sgr	18 08 15.2	-31 49 21	16.0	17.7	B	RRAB	231	231
75685	V4621 Sgr	18 08 15.8	-32 13 24	16.6	17.4	B	RRAB	231	231
75686	V4622 Sgr	18 08 21.4	-32 25 48	17.1	18.1	B	RRAB	231	231
75687	V4623 Sgr	18 08 24.4	-31 39 57	15.9	16.3	B	EA	231	231
75688	V4624 Sgr	18 08 32.5	-31 47 15	16.8	18.0	B	RRAB	231	231
75689	V4625 Sgr	18 08 34.2	-32 02 39	15.8	17.6	B	RRAB	231	231
75690	V4626 Sgr	18 08 35.3	-31 55 23	16.8	18.3	B	RRA	231	231

Table 1 (continued)

No.	Name		R.A. (1950.0)	Decl.	Max	Min		Type	Ref.
			h m s	o ’ "	m	m			
75691	V4627	Sgr	18 08 37.5	-32 23 52	16.3	17.7	B	RRAB	231 231
75692	V4628	Sgr	18 08 40.7	-32 16 08	16.5	17.5	B	RRAB	231 231
75693	V4629	Sgr	18 08 44.1	-31 53 09	15.8	17.1	B	RRAB	231 231
75694	V4630	Sgr	18 08 44.4	-32 17 47	16.7	17.7	B	RRAB	231 231
75695	V4631	Sgr	18 08 46.0	-32 07 47	16.8	18.1	B	RRAB	231 231
75696	V4632	Sgr	18 08 46.7	-32 24 33	16.4	17.6	B	RRAB	231 231
75697	V343	Ser	18 09 34.6	-11 40 55	11.7	14.9	P	ZAND	257 GSC
75698	V1009	Her	18 10 37.0	+21 23 28	11.2	12.5	P	SR	002 GSC
75699	V1010	Her	18 12 20.2	+30 42 39	17.8	(21.	B	UG:	145 299
75700	IX	Dra	18 12 35.4	+67 03 52	14.7	18.8	B	UG:	136 136
75701	V2502	Oph	18 14 32.3	+00 59 13	6.61	6.77	Hp	GDOR:	029 BD
75702	V4641	Sgr	18 16 16.1	-25 25 43	9.	13.8	V	XN	309 310
75703	V4633	Sgr	18 18 32.0	-27 33 06	7.4	(20.	V	NA	232 233
75704	V458	Sct	18 19 41.5	-10 09 01	10.5	11.5	B	CEP(B)	249 BD
75705	IY	Dra	18 23 02.3	+64 18 56	11.8	(15.0	P	M:	002 GSC
75706	V459	Sct	18 23 02.7	-12 21 44	14.7	16.2	B	DCEP	250 GSC
75707	V460	Sct	18 24 16.0	-12 24 43	13.38	(0.22)	V	WR	109 020
75708	V4634	Sgr	18 26 25.1	-23 49 51	18.8	19.7	B	XB	234 235
75709	V559	Lyr	18 26 29.6	+31 19 34	11.3	13.1	P	E	002 GSC
75710	V1011	Her	18 27 25.3	+22 32 21	10.4	11.6	P	EA	002 GSC
75711	V560	Lyr	18 27 33.5	+26 54 08	12.0	(15.2	P	M	168 USNO
75712	V4635	Sgr	18 30 29.4	-30 11 45	11.6	(15.0	P	M	002 GSC
75713	V461	Sct	18 33 59.1	-13 54 30	11.2	(13.9	P	M	002 USNO
75714	V462	Sct	18 38 22.0	-04 29 07	12.28	(0.15)	V	WR	109 020
75715	V1485	Aql	18 41 35.0	-03 51 04	11.88	12.70	V	WR	019 020
75716	V4636	Sgr	18 47 45.4	-16 37 02	12.4	15.0	P	M	064 064
75717	V4637	Sgr	18 49 12.9	-26 31 45	11.8	(15.0	V	M	236 236
75718	IZ	Dra	18 49 21.2	+62 13 50	11.1	14.9	V	M	087 087
75719	V1486	Aql	19 02 43.8	-03 23 10	12.8	(14.6	P	M	021 021
75720	V1493	Aql	19 05 17.4	+12 26 40	10.04	(21.)	V	NA	018 285
75721	V721	CrA	19 06 23.7	-37 09 19	13.17	13.56	V	INT	086 104
75722	KK	Dra	19 07 10.7	+59 19 01	11.8	14.8	V	EA	087 087
75723	V561	Lyr	19 12 07.0	+33 23 45	14.89	14.99	V	RR:	119 119
75724	V1487	Aql	19 12 50.0	+10 51 26	12.15	14.3	K	XN	022 023
75725	V1494	Aql	19 20 37.1	+04 51 30	4.02	16.	V	N	305 306
75726	KL	Dra	19 23 50.9	+59 35 47	16.8	(21.	B	UG	138
75727	KM	Dra	19 25 45.4	+58 46 33	12.8	(16.0	V	M	087 087
75728	V2176	Cyg	19 26 04.1	+54 11 42	13.4	(20.	V	UGSU	106 107
75729	V1488	Aql	19 29 59.1	-06 33 12	14.7	16.2	P	UV	024 024
75730	KN	Dra	19 30 01.5	+59 13 38	10.4	14.5	V	M	087 087
75731	V4638	Sgr	19 31 03.1	-21 02 30	9.05	9.33	V	SR	169 BD
75732	V2177	Cyg	19 34 11.2	+54 33 11	12.9	15.0	V	SRA	087 087
75733	KO	Dra	19 34 25.7	+62 13 03	13.5	14.7	V	IA:	087 087
75734	V2178	Cyg	19 38 22.2	+38 51 20	15.5	17.	P	RRAB	108 USNO
75735	V349	Tel	19 46 21.9	-50 43 45	7.60	7.73	Hp	GDOR:	029 CoD
75736	V2179	Cyg	19 46 34.8	+51 37 43	12.3	14.9	V	SRA	087 087

Table 1 (continued)

No.	Name		R.A. (1950.0)	Decl.	Max	Min		Type	Ref.	
			h m s	o ’ "	m	m				
75737	V405	Vul	19 50 54.1	+21 06 59	15.0 :	18. :	P	UGSU:	284	284
75738	V1489	Aql	19 51 14.0	+09 15 36	12.1	(0.15)	V	CEP:	025	GSC
75739	V1490	Aql	19 51 16.1	+09 15 58	10.5	11.0	V	EA	025	GSC
75740	V345	Sge	19 51 23.9	+18 35 00	13.9	14.4	B	SRA	221	222
75741	V1491	Aql	19 51 43.0	+13 08 24	9.97	(0.07U)	V	ACV	026	BD
75742	V4639	Sgr	19 52 25.2	-24 35 39	12.3	14.3	P	EA	002	GSC
75743	V393	Pav	19 53 05.1	-57 46 25	17.6	(1.8)	V	XM	205	205
75744	V2180	Cyg	19 57 14.4	+31 18 55	12.3	(0.09)	V	WR	109	020
75745	V346	Sge	20 01 17.7	+20 56 42	15.2	16.3	P	EB	224	153
75746	V347	Sge	20 02 18.7	+21 05 23	16.1	16.5	P	EA	223	153
75747	KP	Dra	20 04 43.6	+63 16 17	12.0	14.4	V	E	087	087
75748	V2181	Cyg	20 07 49.0	+30 25 35	13.0	(0.9)	V	E	110	110
75749	V1492	Aql	20 09 19.6	+08 46 16	13.3	(1.0)	R	EA	027	USNO
75750	V4640	Sgr	20 11 44.0	-40 14 55	12.47	(0.02)	V	RPHS	237	GSC
75751	V2182	Cyg	20 13 12.1	+52 50 23	13.4	15.5	V	SRA	087	087
75752	KQ	Dra	20 13 13.5	+65 47 17	11.5	(15.5	V	M	087	087
75753	NS	Del	20 13 22.3	+13 41 42	9.22	(0.09U)	V	ACV	026	BD
75754	V348	Sge	20 13 28.5	+19 06 47	11.6	13.1	P	SR:	002	GSC
75755	V350	Tel	20 14 36.9	-51 14 34	7.55	(0.03U)	V	ACV	026	CoD
75756	KR	Dra	20 15 17.4	+63 37 12	13.0	15.8	V	SRB	087	087
75757	KS	Dra	20 17 56.7	+62 23 16	11.8	(16.2	V	M	087	087
75758	V2183	Cyg	20 19 39.0	+36 45 36	9.80	10.00	Hp	WR	111	BD
75759	NT	Del	20 20 09.1	+19 56 37	15.7	(0.09)	V	ZZ:	128	129
75760	V2184	Cyg	20 20 27.9	+52 51 46	12.7	(15.2	V	M	087	087
75761	KT	Dra	20 22 44.2	+65 18 33	11.8	15.8	V	M	087	087
75762	CG	Mic	20 25 38.2	-43 24 58	8.88	(0.04U)	V	ACV	026	CoD
75763	CH	Mic	20 27 29.4	-38 44 48	8.85	(0.06U)	V	ACV	026	CoD
75764	V464	Cep	20 28 28.0	+64 06 17	11.9	15.4	V	M	087	087
75765	V465	Cep	20 30 12.6	+60 30 19	12.8	(0.09)	Rc	LB	088	088
75766	V466	Cep	20 30 13.7	+60 26 35	15.6	(0.36)	Rc	EW	088	088
75767	V467	Cep	20 30 18.6	+60 27 57	14.1	(0.36)	Rc	EA	088	088
75768	V468	Cep	20 30 24.4	+60 30 06	12.0	(0.14)	Rc	LB:	088	088
75769	V469	Cep	20 30 26.8	+60 28 04	12.1	(0.02)	Rc	LB:	088	088
75770	V470	Cep	20 30 28.9	+60 29 22	14.4	(0.40)	Rc	EA	088	088
75771	V2185	Cyg	20 31 21.7	+41 02 42	10.62	10.70	Ic	EA	112	112
75772	V2186	Cyg	20 31 22.9	+41 12 04	10.99	11.13	Ic	EA	112	112
75773	V2187	Cyg	20 31 30.5	+41 07 21	13.17	(0.08)	Ic	BCEP	112	112
75774	V2188	Cyg	20 31 30.7	+41 05 17	11.70	(0.06)	Ic	BE	112	112
75775	V2189	Cyg	20 31 33.3	+41 07 43	14.62	14.80	Ic	EA	112	112
75776	V2190	Cyg	20 31 37.1	+41 11 45	12.28	(0.05)	Ic	BCEP:	112	112
75777	V2191	Cyg	20 31 42.9	+41 09 58	13.14	13.42	Ic	EA	112	112
75778	V471	Cep	20 32 27.6	+61 42 10	13.1	14.7	V	SRB	087	087
75779	V2192	Cyg	20 34 15.3	+60 55 22	13.4	(16.2	V	LB	087	087
75780	V2193	Cyg	20 34 50.0	+32 13 03	11.6	12.2	P	LB:	113	GSC
75781	V2194	Cyg	20 35 07.9	+53 15 47	12.1	14.4	V	SRA	087	087
75782	V2195	Cyg	20 41 03.2	+35 19 26	12.1	13.7	P	RR:	115	116

Table 1 (continued)

No.	Name		R.A. (1950.0)			Decl.			Max	Min		Type	Ref.	
			h	m	s	o	’	"	m	m				
75783	V2196	Cyg	20	42	42.7	+54	22	57	12.8	14.0	V	SRA	087	087
75784	V472	Cep	20	46	11.1	+60	24	21	13.2	(16.2	V	SRD	087	087
75785	V473	Cep	20	46	28.8	+61	27	04	12.3	(16.2	V	M	087	087
75786	V474	Cep	20	48	00.8	+63	15	16	12.3	(16.0	V	LB	087	087
75787	V2197	Cyg	20	48	21.0	+37	45	30	10.9	12.4	P	E	117	116
75788	LY	Aqr	20	48	26.3	-08	38	54	22.34	23.24	Rc	R	013	013
75789	BX	Cap	20	49	47.3	-20	31	21	11.2	12.8	P	LB	064	GSC
75790	V475	Cep	20	54	31.2	+58	03	44	13.0	(16.0	V	M:	087	087
75791	V2198	Cyg	20	54	53.9	+52	45	26	13.7	(19.	V	M:	087	087
75792	V2199	Cyg	20	57	29.4	+36	27	19	13.3	14.2	P	RRC	117	116
75793	V476	Cep	20	59	23.3	+57	53	18	14.2	(16.0	V	SRA:	087	087
75794	V2200	Cyg	20	59	25.5	+43	31	29	7.12	(0.04)	U	ACV	118	BD
75795	NU	Del	20	59	48.6	+17	58	47	9.8	14.6	P	M:	130	130
75796	V477	Cep	21	02	13.5	+59	46	33	12.4	15.3	V	M	087	087
75797	CI	Mic	21	02	27.6	-35	54	08	9.07	(0.03)	V	ACV	026	CoD
75798	V2201	Cyg	21	02	37.8	+49	32	41	13.4	14.5	B	DCEP	069	069
75799	V2202	Cyg	21	06	56.3	+31	48	06	15.30	15.43	V	RRC:	119	119
75800	V478	Cep	21	09	36.2	+57	48	43	13.7	16.0	V	SRA	087	087
75801	V2203	Cyg	21	09	57.6	+44	01	30	13.38	(0.07)	V	RPHS	120	121
75802	V364	Peg	21	10	05.7	+12	19	44	15.0	(19.0	R	UG	206	
75803	CD	Ind	21	11	54.1	-58	53	24	16.0	17.9	V	XM	151	151
75804	V479	Cep	21	12	38.8	+61	38	55	11.8	13.7	V	SRA	079	079
75805	V480	Cep	21	15	37.2	+55	17	44	12.1	14.6	V	M	087	087
75806	V2204	Cyg	21	15	41.7	+54	12	04	12.0	15.5	V	M	087	087
75807	V481	Cep	21	18	12.4	+61	13	28	12.1	16.0	V	M	079	079
75808	LZ	Aqr	21	20	36.4	-06	00	46	17.24	21.50	Rc	XNDR+E:	014	
75809	V482	Cep	21	22	49.2	+59	14	51	13.5	15.5	V	SRA	079	079
75810	V483	Cep	21	23	46.7	+61	46	36	13.4	15.3	V	SRA	079	079
75811	V484	Cep	21	26	14.0	+62	40	17	13.2	15.0	V	SRA	079	079
75812	V485	Cep	21	30	01.7	+64	14	19	12.6	(16.0	V	M	087	087
75813	V486	Cep	21	31	48.8	+61	33	08	11.8	14.3	V	SRA	079	079
75814	V487	Cep	21	33	03.6	+58	37	38	13.5	15.6	V	SRA	079	079
75815	V488	Cep	21	33	47.6	+57	23	12	12.4	13.4	P	IN	089	089
75816	V2205	Cyg	21	34	17.0	+54	35	41	11.7	13.6	V	LB	079	079
75817	V489	Cep	21	34	27.0	+65	44	06	13.3	(0.51)	V	E/RS:	090	090
75818	V2206	Cyg	21	35	12.2	+54	27	27	13.3	(16.2	V	LB	079	079
75819	V2207	Cyg	21	36	57.5	+41	29	36	16.2	18.2	P	EA	122	122
75820	V365	Peg	21	37	09.0	+22	48	02	10.12	10.59	V	EB	207	GSC
75821	gamma	Cap	21	37	19.4	-16	53	21	3.20	(0.03)	J	ACV	065	BD
75822	V2208	Cyg	21	37	43.1	+43	04	43	15.5	(19.5	P	M	122	123
75823	V490	Cep	21	37	56.0	+56	45	32	15.2	15.8	B	XP	091	USNO
75824	V491	Cep	21	38	37.6	+59	22	04	12.3	14.7	V	SRA	079	079
75825	BY	Cap	21	38	49.8	-14	16	18	5.13	5.18	V	RS	011	BD
75826	V2209	Cyg	21	42	06.9	+44	25	14	15.2	(17.5	B	UG:	041	041
75827	V492	Cep	21	42	56.4	+66	25	23	14.3	15.3	V	LB	079	079
75828	V493	Cep	21	46	49.6	+57	46	53	13.7	15.1	V	SRB	079	079

Table 1 (continued)

No.	Name	R.A. (1950.0) h m s	Decl. o ’ "	Max m	Min m	Type	Ref.
75829	V494 Cep	21 46 54.2	+62 24 08	12.6	14.5	V SRB	079 079
75830	CE Ind	21 47 09.5	-73 24 13	8.86	(0.02)	V ACV	026 CPD
75831	V2210 Cyg	21 47 28.1	+41 23 29	13.5	15.4	P EA	122 122
75832	V495 Cep	21 49 25.8	+59 13 34	12.8	14.8	V LB	079 079
75833	V496 Cep	21 50 54.4	+62 34 31	12.9	(16.0	V M	079 079
75834	V2211 Cyg	21 51 40.3	+52 45 47	13.2	14.1	P BE	124 125
75835	V2212 Cyg	21 51 55.0	+52 07 14	12.4	(16.0	V M	079 079
75836	V497 Cep	21 52 00.4	+62 21 02	8.89	9.04	V E:	092 BD
75837	V498 Cep	21 53 21.3	+63 42 08	11.5	(16.0	V M	079 079
75838	V499 Cep	21 53 51.7	+63 29 18	12.0	14.7	V M	079 079
75839	V500 Cep	21 54 05.9	+63 42 08	13.5	14.8	V LB	079 079
75840	V501 Cep	21 56 02.7	+63 58 29	12.2	15.5	V M	079 079
75841	V502 Cep	21 56 25.1	+64 21 04	14.1	15.3	V SRA	079 079
75842	V503 Cep	21 56 50.8	+65 45 41	11.8	16.0	V M	079 079
75843	V504 Cep	21 57 00.3	+63 29 05	11.4	15.2	V M	079 079
75844	V425 Lac	21 57 22.6	+43 38 57	15.2	15.5	P SRA	152 153
75845	V505 Cep	21 59 51.6	+65 56 01	12.0	14.5	V SRB	079 079
75846	V506 Cep	22 00 07.7	+62 44 57	12.4	15.3	V M	079 079
75847	V507 Cep	22 01 07.2	+61 22 58	12.4	14.7	V SRA	079 079
75848	V508 Cep	22 01 49.6	+62 03 56	11.8	14.1	V LB	079 079
75849	V509 Cep	22 02 54.8	+63 56 07	14.1	(16.0	V LB	079 079
75850	V510 Cep	22 02 57.2	+61 50 12	12.0	14.3	V LB	079 079
75851	V511 Cep	22 05 07.1	+64 25 19	13.0	14.9	V SRB	079 079
75852	V512 Cep	22 05 35.3	+65 13 29	11.8	14.6	V M	079 079
75853	V426 Lac	22 06 46.4	+48 40 39	16.1	17.6	P SR	152 154
75854	V513 Cep	22 07 02.7	+63 20 10	12.5	(16.0	V M	079 079
75855	V514 Cep	22 09 18.7	+59 23 53	12.5	16.0	V M	079 079
75856	V515 Cep	22 09 56.6	+59 50 42	13.2	(16.0	V M	079 079
75857	V516 Cep	22 12 44.0	+59 49 35	12.7	14.4	V SRA	079 079
75858	V517 Cep	22 14 12.5	+66 02 54	13.8	15.0	V LB	079 079
75859	V427 Lac	22 17 11.9	+49 05 01	14.8	16.5	P EA	152 154
75860	V518 Cep	22 18 31.2	+60 31 07	13.2	14.0	V LB	079 079
75861	V428 Lac	22 18 58.6	+48 10 53	15.3	(17.3	P M	126 127
75862	V429 Lac	22 19 37.5	+47 16 32	14.5	14.8	P SRA	152 154
75863	V519 Cep	22 20 53.3	+63 54 14	13.6	(16.0	V M	079 079
75864	V520 Cep	22 21 14.6	+56 27 38	12.2	14.6	V SRA	079 079
75865	V521 Cep	22 21 51.8	+58 29 43	14.0	15.2	V L	079 079
75866	V430 Lac	22 24 43.0	+44 25 54	14.2	16.6	P EA	126 127
75867	V522 Cep	22 24 49.8	+58 16 17	11.0	13.3	V LB	079 079
75868	V431 Lac	22 28 57.4	+46 58 15	14.3	15.6	P EA	152 154
75869	V432 Lac	22 30 17.2	+54 55 24	13.8	15.5	V SRB	079 079
75870	MM Aqr	22 30 29.4	-20 17 52	10.09	(0.01)	B ACVO	015 BD
75871	V433 Lac	22 32 20.8	+44 01 04	14.8	15.4	P EA	126 127
75872	V523 Cep	22 33 59.1	+64 24 22	13.0	15.8	V M	079 079
75873	V524 Cep	22 35 45.3	+61 00 33	11.8	(14.5	V M	079 079
75874	V366 Peg	22 38 31.4	+26 07 02	15.18	15.36	V DSCT:	119 119

Table 1 (continued)

No.	Name	R.A. (1950.0)	Decl.	Max	Min		Type	Ref.
		h m s	o ’ "	m	m			
75875	V525 Cep	22 40 47.3	+60 08 16	12.57	12.85	V	BE	094 GSC
75876	V526 Cep	22 41 10.5	+65 43 08	10.9	16.0	V	M	079 079
75877	V367 Peg	22 42 33.4	+16 39 28	15.8	(17.6	B	UG	041 041
75878	V527 Cep	22 48 57.9	+61 48 48	12.8	16.0	V	M	079 079
75879	V528 Cep	22 49 31.4	+58 10 01	12.6	(16.0	V	M	079 079
75880	V529 Cep	22 52 43.7	+57 31 26	13.3	14.9	P	DCEP	006 007
75881	EE Tuc	22 54 54.3	-59 21 24	6.72	6.82	Hp	GDOR:	029 CPD
75882	V368 Peg	22 56 13.2	+10 53 07	13.3	(17.7	B	UGSU	204 041
75883	V369 Peg	23 01 13.2	+17 01 44	15.8	(18.0	B	UGSU	001 001
75884	MN Aqr	23 01 20.4	-21 10 36	12.5	(15.5	P	M:	016 017
75885	V407 And	23 08 41.8	+50 00 06	15.5	16.6	P	RRAB	006 007
75886	V530 Cep	23 13 06.2	+78 40 17	11.8	15.	V	M	095 291
75887	V837 Cas	23 13 13.0	+57 10 43	12.5	(16.2	V	LB	079 079
75888	V531 Cep	23 16 04.4	+65 36 19	11.9	16.1	V	M	079 079
75889	V532 Cep	23 16 27.5	+63 52 27	13.0	15.0	V	SR	079 079
75890	V533 Cep	23 17 53.1	+65 15 42	12.7	16.0	V	M	079 079
75891	V408 And	23 19 34.7	+48 41 19	14.8	15.6	P	RRAB	006 008
75892	V838 Cas	23 20 44.7	+55 58 55	12.6	(15.0	V	SR	079 079
75893	V839 Cas	23 22 21.7	+61 22 21	13.07	13.13	B	LBV	080 080
75894	V840 Cas	23 22 23.2	+61 22 29	15.06	15.13	B	DSCTC	080 080
75895	V841 Cas	23 22 31.1	+61 20 23	17.4	18.0	B	EA	080 080
75896	V842 Cas	23 22 37.7	+61 20 01	13.00	13.09	B	LBV	080 080
75897	V843 Cas	23 22 38.6	+61 18 53	14.30	14.35	B	LBV	080 080
75898	V844 Cas	23 23 12.4	+55 05 37	12.5	(15.0	V	M	079 079
75899	V845 Cas	23 23 57.0	+57 07 25	13.9	14.8	P	RR:	006 007
75900	V409 And	23 24 50.4	+39 44 53	14.1	(0.15)	B	ZZ	009 GSC
75901	V534 Cep	23 27 11.0	+64 43 08	12.6	15.3	V	LB	079 079
75902	V410 And	23 29 33.2	+48 42 44	14.4	15.1	P	RRAB	006 007
75903	V846 Cas	23 31 01.1	+60 50 34	14.2	15.0	B	DCEP	069 069
75904	V847 Cas	23 33 45.2	+53 27 24	14.8	15.6	P	EA:	006 007
75905	V848 Cas	23 34 00.6	+53 00 20	15.2	16.2	P	EA:	006 007
75906	V849 Cas	23 35 14.0	+52 50 40	13.8	15.6	P	*	006 008
75907	V850 Cas	23 35 17.2	+58 34 10	12.9	15.2	V	SR	079 079
75908	V851 Cas	23 35 36.8	+53 27 08	14.1	15.1	P	EA:	006 007
75909	V411 And	23 38 01.8	+50 16 22	15.0	16.1	P	EB	006 008
75910	V852 Cas	23 43 43.4	+58 23 37	13.1	15.1	V	SR	079 079
75911	V853 Cas	23 46 44.6	+54 37 23	12.5	15.5	V	M	079 079
75912	V854 Cas	23 49 41.4	+66 18 09	11.3	14.3	V	M	079 079
75913	BW Scl	23 50 25.0	-39 08 28	16.20	16.54	V	NL	247 248
75914	V412 And	23 51 07.5	+45 20 40	11.9	(0.44)	V	EA	010 GSC
75915	V413 And	23 51 31.8	+39 00 15	7.61	8.46	U	EA/RS	296 BD
75916	V370 Peg	23 52 06.5	+28 06 08	16.3	(21.	R	UG:	208 303

Table 2

V402 And = 75002 = Var 62.
V403 And = 75009 = Tmz V64.
V404 And = 75013 = IRXSJ010124.9+411503 = GSC 2807.01423.
V405 And = 75023 = GSC 3298.01172 = RX J0222.4+4729.
V406 And = 75027 = NSV 15549 = HIP 012056 = HD 15965 (A) = BD +45°628 = SAO 038145 = GSC 3295.02164 = PPM 45234.
V407 And = 75885 = NSV 14448 = S 9476.
V408 And = 75891 = NSV 14525 = S 10111.
V409 And = 75900 = GSC 3234.00590 = WD 2324+3944 = HS 2324+3944 [009].
V410 And = 75902 = NSV 14601 = S 9479.
V411 And = 75909 = NSV 14662 = S 10118.
V412 And = 75914 = GSC 3639.01081.
V413 And = 75915 = HIP 117844 = HD 223971 (F8) = BD +38°5091 = SAO 073597 = GSC 3233.00166 = ADS 17087 AB = IRAS 23515+3900 = PPM 89232.
PQ Aps = 75289 = No. 434 [012] = GSC 9440.00527. Field star in the region of the globular cluster IC 4499.
LY Aqr = 75788 = PSR J2051-0827. The star is irradiated by a millisecond pulsar at a $2\overset{\mathrm{h}}{.}4$ orbit.
LZ Aqr = 75808 = XTE J2123-058.
MM Aqr = 75870 = HD 213637 (F2) = BD −20°6447 = CPD −20°8374 = GSC 6391.00745 = PPM 273945.
MN Aqr = 75884 = AN 188.1937 = CSV 5649 = NSV 14411 = HV 9754.
V1485 Aql = 75715 = HIP 091911 = GSC 5121.00188 = WR 121 = AS 320 = LS IV −03°9.
V1486 Aql = 75719 = GSC 5132.01651 = IRAS 19027–0323.
V1487 Aql = 75724 = GRS 1915+105 = X-ray Nova Aql 1992.
V1488 Aql = 75729 = Tsesevich's "GM Aql". Erroneously called "GM Aql" in several papers.
V1489 Aql = 75738 = GSC 1062.00092.
V1490 Aql = 75739 = GSC 1062.00033 = Be V1.
V1491 Aql = 75741 = HD 188309 (A2) = BD +12°4129 = SAO 105394 = GSC 1070.01862 = PPM 137182.
V1492 Aql = 75749 = Be V2.
V1493 Aql = 75720 = Nova Aql 1999 No. 1.
V1494 Aql = 75725 = Nova Aql 1999 No. 2.
V871 Ara = 75345 = HD 331015 (A) = CoD −48°10986 = CPD −48°8614 = GSC 8329.03364.
V872 Ara = 75346 = NSV 20726 = HIP 081650 = HD 149989 (A5) = CoD −51°10403 = CPD −51°9815 = SAO 244058 = GSC 8337.01763 = PPM 345296.
V873 Ara = 75352 = HIP 083603 = HD 154043 (B2) = CoD −46°11203 = CPD −46°8376 = SAO 227604 = GSC 8332.00658 = GSC 8332.01687 = LSS 3908 = IRAS 17015–4700 = PPM 322577.
V874 Ara = 75358 = NSV 08216 = CSV 2952 = HV 9017 = AN 486.1935 = GSC 8727.01397 = Prager 4213 = IRAS 17049–5235.
V875 Ara = 75359 = GSC 8340.02253 = Hazen's var [031].
V876 Ara = 75374 = WD 1714-547 = BPM 24754 = L 269-72.
V464 Aur = 75084 = Tmz V67 = GSC 2378.00943 = IRAS 04359+3248.
V465 Aur = 75087 = Tmz V150 = GSC 2386.01166 = IRAS 04434+3552.
V466 Aur = 75091 = Tmz V145 = GSC 2399.00613 = IRAS 04488+3658.
V467 Aur = 75092 = Tmz V138 = GSC 2898.02103 = IRAS 04523+4041.
V468 Aur = 75093 = GSC 2906.00213.
V469 Aur = 75094 = Tmz V137 = GSC 2399.01065 = IRAS 04525+3643 E = CCS-II 815.
V470 Aur = 75095 = NSV 01771 = CSV 6139 = GSC 2906.00279 = VB 11 [035].
V471 Aur = 75096 = Tmz V142 = GSC 2399.00707 = IRAS 04527+3417.
V472 Aur = 75097 = Tmz V132 = GSC 2396.01097 = IRAS 04564+3458.
V473 Aur = 75098 = Tmz V148 = GSC 2400.02106 = IRAS 04595+3639 = CCS-II 840.
V474 Aur = 75099 = Tmz V135 = GSC 2899.01951 = IRAS 05012+4002.
V475 Aur = 75100 = Tmz V151 = GSC 1857.00534 = IRAS 05033+2922.
V476 Aur = 75101 = Tmz V125 = GSC 2903.01077 = IRAS 05040+4238.
V477 Aur = 75102 = NSV 01838 = CSV 493 = AN 642.1936 = Prager 2681 = Tmz V117 = IRAS 05054+5156.
V478 Aur = 75103 = Tmz V141 = GSC 2899.01662 = IRAS 05062+4040 = CCS-II 863.
V479 Aur = 75104 = Tmz V149 = GSC 2900.01610 = IRAS 05068+3919 = CCS 293 = CCS-II 866.

Table 2 (continued)

V480 Aur = 75105 = Tmz V147 = GSC 2900.01811 = IRAS 05068+3945 = CCS 292 = CCS-II 867.
V481 Aur = 75106 = Tmz V140 = GSC 2904.00165 = IRAS 05068+4115.
V482 Aur = 75107 = Tmz V154 = GSC 2397.00008 = IRAS 05074+3353.
V483 Aur = 75109 = Tmz V113 = GSC 3735.00617 = IRAS 05076+5414.
V484 Aur = 75111 = Tmz V114 = GSC 3735.00892 = IRAS 05092+5351.
V485 Aur = 75119 = Tmz V61 = IRAS 05128+5010.
V486 Aur = 75120 = Tmz V144 = GSC 2402.00333 = IRAS 05143+3656.
V487 Aur = 75122 = Tmz V139 = GSC 2909.00681 = IRAS 05173+3807.
V488 Aur = 75123 = Tmz V128 = IRAS 05187+4700.
V489 Aur = 75124 = Tmz V127 = GSC 2917.02203.
V490 Aur = 75127 = Tmz V143 = GSC 2411.00721 = IRAS 05253+3504.
V491 Aur = 75128 = Tmz V134.
V492 Aur = 75134 = Tmz V116 = GSC 3371.01920 = IRAS 05329+5200 = CCS-II 995.
V493 Aur = 75140 = Q 1997/029 = TAV J0550+543 = GSC 3754.00324.
V494 Aur = 75143 = Tmz V27 [002] = Q 1992/092 [037] = TAV 0556+55 = IRAS 05563+5527.
V495 Aur = 75166 = NSV 03199 = CSV 851 = HV 7661 = Prager 2895 = GSC 3394.01630.
V496 Aur = 75186 = Cataclysmic var in Aur.
FQ Boo = 75282 = HIP 067481 = HD 120500 (A0) = BD +09°2814 = SAO 120130 = GSC 0900.00517 = PPM 160087.
FR Boo = 75283 = HIP 068660 = HD 122767 (K0) = BD +25°2723 = SAO 083143 = GSC 2006.00326 = IRAS 14009+2450 = PPM 103044.
FS Boo = 75296 = Tmz V124 = IRAS 05084+4543.
FT Cam = 75038 = Var 64.
FU Cam = 75039 = Tmz V69 = GSC 4057.02314 = IRAS 03194+6446.
FV Cam = 75041 = Tmz V165 = GSC 4326.00987 = IRAS 03219+6758.
FW Cam = 75043 = Tmz V167 = IRAS 03259+6713.
FX Cam = 75044 = Tmz V166 = GSC 4326.01134 = IRAS 03285+6754.
FY Cam = 75045 = Tmz V174 = GSC 4062.00894 = IRAS 03321+6126.
FZ Cam = 75046 = Tmz V175 = GSC 4062.01834 = IRAS 03362+6037.
GG Cam = 75047 = Tmz V176 = GSC 4062.01264 = IRAS 03364+6055.
GH Cam = 75048 = GSC 4074.01055.
GI Cam = 75049 = Tmz V161 = GSC 4327.02146 = IRAS 03381+6825.
GK Cam = 75050 = Tmz V164 = GSC 4075.00206 = IRAS 03394+6537.
GL Cam = 75056 = Tmz V177 = GSC 3729.00639 = IRAS 03445+5807.
GM Cam = 75062 = Tmz V180 = IRAS 03550+5752.
GN Cam = 75063 = Tmz V179 = GSC 3730.01328 = IRAS 03583+5911.
GO Cam = 75064 = Tmz V181 = GSC 3722.00779 = IRAS 03592+5605 = CCS 174 = CCS-II 599.
GP Cam = 75065 = Tmz V186 = GSC 3722.00392 = IRC+60137 = IRAS 04004+5547.
GQ Cam = 75066 = HIP 019404 = HD 25914 (B0) = BD +56°884 = SAO 024438 = GSC 3726.00069 = LS V +56°56 = PPM 28950.
GR Cam = 75068 = Tmz V66 = GSC 3719.00598 = IRAS 04113+5248 = CCS-II 634.
GS Cam = 75069 = Tmz V199 = IRAS 04118+5412 = CCS-II 638.
GT Cam = 75071 = Tmz V187 = GSC 3719.00086 = IRAS 04153+5348.
GU Cam = 75073 = Tmz V171 = GSC 3723.01031 = IRAS 04207+5548 = CCS-II 674.
GV Cam = 75076 = Tmz V170 = GSC 4077.00415 = IRAS 04246+6639.
GW Cam = 75077 = Tmz V172 = GSC 3744.00340 = IRAS 04274+5811.
GX Cam = 75078 = Tmz V158 = GSC 4069.00121.
GY Cam = 75079 = Tmz V121 = GSC 4082.00838 = AFGL 595 = IRAS 04307+6210.
GZ Cam = 75080 = Tmz V178 = GSC 4078.01230 = IRAS 04310+5955.
HH Cam = 75081 = Tmz V120 = GSC 3740.00267 = IRAS 04310+5717 = CCS-II 717.
HI Cam = 75082 = Tmz V156 = IRAS 04311+6306.
HK Cam = 75083 = Tmz V168 = GSC 4090.00861 = IRAS 04313+6644.
HL Cam = 75085 = Tmz V160 = GSC 4329.02580 = IRAS 04393+6849.
HM Cam = 75086 = Tmz V118 = GSC 3737.01376 = IRAS 04423+5423 = CCS-II 759.
HN Cam = 75090 = Tmz V119 = GSC 4078.00980 = IRAS 04462+6005.
HO Cam = 75110 = Tmz V13 = GSC 3747.01489 = IRAS 05084+5916.
HP Cam = 75146 = Tmz V78 = GSC 4345.00822 = IRAS 06013+6733.
HQ Cam = 75148 = Tmz V79 = GSC 4108.00235.
HR Cam = 75177 = WD 0710+741 = GD 448 = LP 034-185 [044].

Table 2 (continued)

HS Cam = 75179 = RX J0719.2+6557 = 1RXSJ071913.4+655734.
HT Cam = 75193 = RX J0757.0+6306 = 1RXSJ075700.5+630602.
HU Cam = 75195 = NSV 03881 = CSV 1189 = AN 215.1937 = GSC 4540.02590.
HV Cam = 75197 = GSC 4540.01553.
HW Cam = 75199 = NSV 03999 = CSV 6617 = GSC 4631.01941 = BV 217 [051].
GP Cnc = 75202 = GSC 0223.01761.
GQ Cnc = 75225 = NSV 04411 = CSV 6694 = GSC 1954.00180.
DD CVn = 75259 = HIP 060571 = HD 108100 (F2) = BD +43°2221 = SAO 044164 = GSC 3020.00692 = PPM 52972.
DE CVn = 75276 = RX J1326.9+4532 = GSC 3460.00780.
NS CMa = 75153 = V4 (NGC 2243) = GSC 7074.00075.
NT CMa = 75154 = V6 (NGC 2243) [056] = 4130 (NGC 2243) [057] = 287 (NGC 2243) [058]. Field star.
NU CMa = 75155 = V2 (NGC 2243) [056] = 4105 (NGC 2243) [057] = 296 (NGC 2243) [058].
NV CMa = 75156 = V1 (NGC 2243) [056] = 2101 (NGC 2243) [057] = 379 (NGC 2243) [058].
NW CMa = 75157 = V3 (NGC 2243) [056] = 3219 (NGC 2243) [057].
NX CMa = 75158 = V5 (NGC 2243) [056].
NY CMa = 75162 = Tmz V106 = GSC 5386.01721 = IRAS 06380–1250.
NZ CMa = 75165 = HIP 032101 = HD 48424 (B8) = BD −22°1503 = CoD −22°3397 = CPD −22°1405 = SAO 172191 = GSC 5961.01025 = PPM 250861.
OO CMa = 75167 = Tmz V101 = GSC 6529.02034 = IRAS 06442–2617.
OP CMa = 75171 = Tmz V105 = IRAS 06518–1503.
OQ CMa = 75172 = Tmz V104 = GSC 5950.00603 = IRAS 06521–1456.
OR CMa = 75173 = Tmz V108 = IRAS 06533–1200.
OS CMa = 75175 = HIP 034561 = HR 2699 = HD 54764 (B3) = BD −16°1802 = SAO 152477 = GSC 5964.00378 = ADS 5837 A = IDS 0705.1S1604 A = LSS 202 = PPM 218247.
OT CMa = 75178 = NSV 17396 = Tmz V21 = GSC 7107.00835 = IRAS 07126–3254.
OU CMa = 75181 = Star 10.
BX CMi = 75176 = NSV 03438 = CSV 6558 = Weber 23 = GSC 0762.02022.
BY CMi = 75188 = NSV 03624 = CSV 1065 = GSC 0186.01233 = AN 286.1928 = Prager 478.
BX Cap = 75789 = Tmz V5 = GSC 6352.01154.
BY Cap = 75825 = HIP 107095 = 42 Cap = HR 8283 = HD 206301 (G5) = BD −14°6102 = SAO 164580 = GSC 5799.01135 = LTT 8644 = IRAS 21388–1416 = PPM 239206.
γ Cap = 75821 = HIP 106985 = γ Cap = 40 Cap = HD 206088 (F0p) = BD −17°6340 = SAO 164560 = GSC 6362.01078 = PPM 239166.
V539 Car = 75201 = NSV 17897 = HD 71808 (B9) = CoD −56°2246 = CPD −56°1643 = SAO 235981 = GSC 8575.01296 = PPM 336909.
V540 Car = 75241 = HIP 052762 = HD 93619 (A0) = CoD −56°3569 = CPD −56°3810 = SAO 238476 = GSC 8622.00626 = LSS 1906 = PPM 339453.
V541 Car = 75243 = HD 94035 (Oa) = GSC 8961.00618 = WR 30 = LSS 1970 = He 3-507.
V823 Cas = 75001 = GSC 4018.01807. Triple-mode pulsator, similar to AC And.
V824 Cas = 75003 = Var 52 = GSC 4019.03103.
V825 Cas = 75004 = GSC 4015.00972.
V826 Cas = 75007 = NSV 00203 = Q 1989/051 = GSC 4016.00784 = IRAS 00321+6102 = CCS 20 = CCS-II 82.
V827 Cas = 75008 = Var 53 = GSC 4020.00751.
V828 Cas = 75010 = HBC 6 = LkHα 200.
V829 Cas = 75015 = AFGL 190 = IRAS 01144+6658. Position needs improvement.
V830 Cas = 75016 = NSV 00461 = CSV 5909 = Weber 97 = GSC 3276.01206.
V831 Cas = 75019 = RX J0146.9+6121 = 2S 0142+61 = GSC 4032.02521 = LS I +61°235.
V832 Cas = 75020 = MWC 17 = GSC 4032.02792 = IRAS 01441+6026.
V833 Cas = 75031 = Var 54 = GSC 4052.00261.
V834 Cas = 75032 = Var 55.
V835 Cas = 75033 = Tmz V62 = GSC 4056.01024 = IRAS 03028+6516 = CSS 54 = CSS-II 70.
V836 Cas = 75034 = Var 56 = GSC 4053.01572.
V837 Cas = 75887 = LD 269 = IRAS 23132+5710.
V838 Cas = 75892 = LD 273 = IRAS 23207+5558.
V839 Cas = 75893 = V2 (NGC 7654) = GSC 4279.00020.
V840 Cas = 75894 = V5 (NGC 7654).

Table 2 (continued)

V841 Cas = 75895 = V4 (NGC 7654).
V842 Cas = 75896 = V1 (NGC 7654) = GSC 4279.00242.
V843 Cas = 75897 = V3 (NGC 7654).
V844 Cas = 75898 = LD 274 = GSC 4003.01940 = IRAS 23232+5505.
V845 Cas = 75899 = NSV 14557 = S 9478.
V846 Cas = 75903 = Var 59 = GSC 4280.00611.
V847 Cas = 75904 = NSV 14636 = S 9480.
V848 Cas = 75905 = NSV 14637 = S 9481.
V849 Cas = 75906 = NSV 14645 = S 10116 = GSC 4000.00280. Variations around a mean level which gradually becomes brighter. Similar to FG Sge?
V850 Cas = 75907 = LD 277 = IRAS 23352+5834.
V851 Cas = 75908 = NSV 14647 = S 9483.
V852 Cas = 75910 = LD 278 = IRAS 23437+5823.
V853 Cas = 75911 = LD 279 = IRAS 23467+5437.
V854 Cas = 75912 = LD 280 = TASV J2352+665 [287] = IRC+70202 [288] = AFGL3170 = IRAS 23496+6618.
V1023 Cen = 75249 = HIP 057567 = HD 102541 (A2) = CoD −39°7307 = CPD −39°5270 = SAO 223032 = GSC 7745.00853 = PPM 316792.
V1024 Cen = 75256 = CoD −53°4543 = CPD −53°5072 = SAO 239853 (F2) = GSC 8633.03030 = PPM 340889.
V1025 Cen = 75263 = RX J1238-38.
V1026 Cen = 75265 = NSV 19502 = HIP 062774 = HD 111709 (F0) = CoD −51°7065 = CPD −51°5561 = SAO 240327 = GSC 8257.00858 = PPM 341371.
V1027 Cen = 75269 = Tmz V38 = GSC 7253.01614 = IRAS 12555–3142.
V1028 Cen = 75272 = NSV 19573 = HIP 063547 = CoD −48°7859 = CPD −48°5215 = GSC 8254.01269 = IRAS 12584–4837 = He 3-847 = Wray 15 1048.
V1029 Cen = 75273 = NSV 19694 = HIP 064896 = HD 115363 (B0) = CoD −63°831 = CPD −63°2684 = SAO 252250 = GSC 8994.03853 = LSS 3014 = PPM 360011.
V1030 Cen = 75277 = HD 116979 (F8) = CoD −46°8663 = CPD −46°6362 = SAO 224154 = GSC 8252.03215 [085] = PPM 318503.
V1031 Cen = 75281 = Tmz V40 = GSC 7266.01333 = IRAS 13392–3019.
V1032 Cen = 75285 = CoD −40°8434 = GSC 7811.01917 = IRAS 14050–4109 = PDS 70 [086].
V464 Cep = 75764 = LD 298 = IRAS 20284+6406.
V465 Cep = 75765 = Küstner 80 (NGC 6939) = Star 33 (NGC 6939) = GSC 4233.01966. Field star?
V466 Cep = 75766 = Star 154 (NGC 6939).
V467 Cep = 75767 = Küstner 95 (NGC 6939) = Star 63 (NGC 6939).
V468 Cep = 75768 = Küstner 125 (NGC 6939) = Star 28 (NGC 6939) = GSC 4233.01726.
V469 Cep = 75769 = Küstner 134 (NGC 6939) = Star 11 (NGC 6939) = GSC 4233.01561.
V470 Cep = 75770 = Küstner 147 (NGC 6939) = Star 98 (NGC 6939).
V471 Cep = 75778 = LD 299.
V472 Cep = 75784 = LD 304 = IRAS 20461+6024.
V473 Cep = 75785 = LD 305 = IRAS 20464+6127.
V474 Cep = 75786 = LD 306 = IRAS 20480+6315.
V475 Cep = 75790 = LD 307.
V476 Cep = 75793 = LD 309 = IRAS 20593+5753.
V477 Cep = 75796 = LD 310 = IRAS 21021+5946.
V478 Cep = 75800 = LD 312 = GSC 3961.00044.
V479 Cep = 75804 = LD 221 = GSC 4248.00077 = IRAS 21126+6138.
V480 Cep = 75805 = LD 313 = IRAS 21156+5517.
V481 Cep = 75807 = LD 222 = IRAS 21182+6113.
V482 Cep = 75809 = LD 223.
V483 Cep = 75810 = LD 224 = GSC 4252.00770 = IRAS 21237+6146.
V484 Cep = 75811 = LD 225 = IRAS 21262+6240.
V485 Cep = 75812 = LD 315 = GSC 4257.00783 = IRAS 21300+6414.
V486 Cep = 75813 = LD 226 = GSC 4249.00543 = IRAS 21318+6133.
V487 Cep = 75814 = LD 227.
V488 Cep = 75815 = NSV 13802 = Gieseking 15 [289] = GSC 3975.00109 = IRAS 21337+5723. In the region of the nebula IC 1396.
V489 Cep = 75817 = GSC 4261.01197.
V490 Cep = 75823 = Cep X-4 = GS 2138+56.

Table 2 (continued)

V491 Cep = 75824 = LD 230 = IRAS 21386+5922.
V492 Cep = 75827 = LD 231 = IRAS 21429+6625.
V493 Cep = 75828 = LD 232 = IRAS 21468+5747.
V494 Cep = 75829 = LD 233 = IRAS 21469+6224.
V495 Cep = 75832 = LD 234 = IRAS 21494+5913.
V496 Cep = 75833 = LD 235 = IRAS 21509+6234 [290].
V497 Cep = 75836 = NSV 13949 = HIP 108052 = BD +61°2213 = SAO 019711 = GSC 4266.01293 = ADS 15430 A = PPM 23275 (B8) = Hill 4 (NGC 7160).
V498 Cep = 75837 = LD 237.
V499 Cep = 75838 = LD 238 = GSC 4266.03002 = IRAS 21538+6329.
V500 Cep = 75839 = NSV 25795 = LD 239 [079] = GSC 4270.00646 = IRAS 21540+6341 = 154 (Be 33) [093] = CCS 3087 = CCS-II 5508.
V501 Cep = 75840 = NSV 25800 = LD 240 = Q 1995/033 = IRAS 21560+6358.
V502 Cep = 75841 = LD 241.
V503 Cep = 75842 = LD 242.
V504 Cep = 75843 = LD 243 = GSC 4266.02925 = IRAS 21570+6329.
V505 Cep = 75845 = LD 244 = GSC 4275.02480.
V506 Cep = 75846 = LD 245 = IRAS 22001+6244.
V507 Cep = 75847 = LD 246 = GSC 4263.00653.
V508 Cep = 75848 = LD 247 = GSC 4267.02116 = IRAS 22018+6203 = CCS 3105 = CCS-II 5565.
V509 Cep = 75849 = LD 248 = GSC 4271.02284 = IRAS 22029+6356.
V510 Cep = 75850 = LD 249 = GSC 4267.00544 = IRAS 22029+6150 = CCS 3108 = CCS-II 5569.
V511 Cep = 75851 = LD 250 = IRAS 22051+6425.
V512 Cep = 75852 = LD 251 = GSC 4271.00380 = IRAS 22056+6513.
V513 Cep = 75854 = LD 252 = GSC 4267.02710.
V514 Cep = 75855 = LD 253 = GSC 3981.00582 = IRAS 22093+5923.
V515 Cep = 75856 = LD 254 = IRAS 22099+5950.
V516 Cep = 75857 = LD 255 = IRAS 22127+5949 = CCS 3122 = CCS-II 5613.
V517 Cep = 75858 = LD 256.
V518 Cep = 75860 = LD 257.
V519 Cep = 75863 = LD 258 = IRAS 22208+6354.
V520 Cep = 75864 = LD 259 = IRAS 22212+5627 = CCS 3127 = CCS-II 5644.
V521 Cep = 75865 = LD 260.
V522 Cep = 75867 = LD 261 = GSC 3995.00119 = IRAS 22248+5816.
V523 Cep = 75872 = LD 263 = IRAS 22339+6424.
V524 Cep = 75873 = LD 264 = IRAS 22357+6100.
V525 Cep = 75875 = MWC 657 = GSC 4265.00873 = IRAS 22407+6008.
V526 Cep = 75876 = LD 265 = IRAS 22411+6543.
V527 Cep = 75878 = LD 267 = IRAS 22489+6148.
V528 Cep = 75879 = LD 268 = IRAS 22495+5810.
V529 Cep = 75880 = NSV 14361 = GSC 3993.00410 = S 9473.
V530 Cep = 75886 = NSV 14469 = CSV 5694 = AN 396.1933 [291] = Prager 2390 = GSC 4609.00465 = IRAS 23131+7840.
V531 Cep = 75888 = LD 270 = IRAS 23160+6536.
V532 Cep = 75889 = LD 271 = IRAS 23164+6352.
V533 Cep = 75890 = LD 272 = IRAS 23178+6515.
V534 Cep = 75901 = LD 276 = IRAS 23271+6443 = CCS-II 5885.
EN Cet = 75006 = Cataclysmic variable in Cetus.
EO Cet = 75017 = PB 8783 = GSC 4684.01213.
EP Cet = 75025 = NSV 15500 = HIP 011192 = HD 14940 (F0) = BD −16°438 = SAO 148373 = GSC 5860.02589 = PPM 211469.
DZ Cha = 75250 = NSV 18943 = GSC 9419.01065 = IRAS 11472–7834 = PDS 59 [086].
DD Cir = 75286 = Nova Cir 1999.
AN Col = 75125 = HIP 025007 = HR 1772 = HD 35165 (B5p) = CoD −34°2207 = CPD −34°647 = SAO 195770 = GSC 7051.02303 = IDS 0517.7S3427 = PPM 281348 = He 3-7.
AO Col = 75129 = Tmz V111 = GSC 6484.00290 = IRAS 05307-2802.
AP Col = 75147 = RE J0604-34 [099] = 2RE J0604-34 = EUVEJ0604-34.5 = LTT 2449 = L 523-55 = LP 949-15 = GSC 7079.01500.

Table 2 (continued)

KU Com = 75257 = HIP 060266 = HD 107513 (A3) = BD +25°2495 = SAO 082262 = GSC 1989.00507 = Tr 82 (Coma cluster) = PPM 101832.

KV Com = 75262 = S 10935 = RX J1235.5+1954 = GSC 1448.00255.

KW Com = 75266 = S 10936 = RX J1253.6+2247 = GSC 1993.00876.

KX Com = 75268 = S 10937 = RX J1256.8+2329 = GSC 1993.02793.

KY Com = 75270 = S 10938 = RX J1258.9+2112 = GSC 1456.00171.

KZ Com = 75271 = S 10939 = RX J1300.5+2255.

LL Com = 75274 = NSV 06177 = CSV 7014 = SVS 1257 = GSC 2535.00670.

V721 CrA = 75721 = NSV 24696 = IRAS 19063–3709 = Hα 16 [104] = PDS 99 [086].

VX Crv = 75258 = NSV 05572 = CSV 1852 = Ross Var 234 = Prager 811.

V2176 Cyg = 75728 = USNO 1425.09823278.

V2177 Cyg = 75732 = LD 286.

V2178 Cyg = 75734 = RR Lyr type star [295].The coordinates in [295] refer to V2178 Cyg but the period, to V1510 Cyg.

V2179 Cyg = 75736 = LD 287 = GSC 3569.01495.

V2180 Cyg = 75744 = WR 130 = AS 374 = He 3 1810 = GSC 2670.01448.

V2181 Cyg = 75748 = Fr 4 = GSC 2671.01059.

V2182 Cyg = 75751 = LD 291.

V2183 Cyg = 75758 = NSV 13040 = HIP 120155 = HD 193928 (Oa) = BD +36°4028 = WR 141 = He 3 1888 = GSC 2684.00384 = LS II +36°65.

V2184 Cyg = 75760 = LD 295 = IRAS 20204+5251.

V2185 Cyg = 75771 = MT 421 (Cyg OB2) = R 856 (Cyg OB2) = GSC 3157.00617. Member of Cyg OB2 association.

V2186 Cyg = 75772 = MT 429 (Cyg OB2) = R 678 (Cyg OB2) = GSC 3161.01142. Member of Cyg OB2 association.

V2187 Cyg = 75773 = MT 487 (Cyg OB2) = R 713 (Cyg OB2) = Schulte 63 (Cyg OB2). Member of Cyg OB2 association.

V2188 Cyg = 75774 = MT 488 (Cyg OB2) = R 701 (Cyg OB2) = Schulte 64 (Cyg OB2). Member of Cyg OB2 association.

V2189 Cyg = 75775 = MT 506 (Cyg OB2). Cyg OB2 association nonmember.

V2190 Cyg = 75776 = MT 522 (Cyg OB2) = R 726 (Cyg OB2) = GSC 3161.01194. Member of Cyg OB2 association.

V2191 Cyg = 75777 = MT 554 (Cyg OB2) = R 721 (Cyg OB2). Member of Cyg OB2 association. VB. NE component varies.

V2192 Cyg = 75779 = LD 300 = IRAS 20342+6055.

V2193 Cyg = 75780 = NSV 13178 = CSV 5232 = GSC 2690.01033 = IRAS 20348+3212 = Zinner 1928 = DHK 23. Erroneously called BD +31°4152 in [113]. Mistakes in photometric data and identifications corrected in [114].

V2194 Cyg = 75781 = LD 302 = IRAS 20351+5315.

V2195 Cyg = 75782 = NSV 25294 = HIP 102237 = MS 8 [115] = V8 [116] = GSC 2695.01133 = G 210-31 = Ross766 = LHS 3574 = LTT 16056.

V2196 Cyg = 75783 = LD 303 = IRAS 20427+5422.

V2197 Cyg = 75787 = V58 = GSC 3167.01279.

V2198 Cyg = 75791 = LD 308 = IRAS 20549+5245.

V2199 Cyg = 75792 = V91.

V2200 Cyg = 75794 = NSV 13465 = CSV 103034 = HIP 103736 = HD 200311 (A0) = BD +43°3786 = SAO 050358 = GSC 3180.01158 = PPM 60842.

V2201 Cyg = 75798 = Var 58 = GSC 3596.00433.

V2202 Cyg = 75799 = Anon A Cyg = GSC 2706.03255.

V2203 Cyg = 75801 = KPD 2109+4401 = GSC 3181.03975.

V2204 Cyg = 75806 = LD 314 = GSC 3957.00189 = IRAS 21156+5412.

V2205 Cyg = 75816 = LD 228.

V2206 Cyg = 75818 = LD 229 = IRAS 21352+5427.

V2207 Cyg = 75819 = Var 2.

V2208 Cyg = 75822 = NSV 25722 = Var 3 [122] = LD 62 [123] = IRAS 21377+4304.

V2209 Cyg = 75826 = Var 66.

V2210 Cyg = 75831 = Var 1 = GSC 3192.00135.

V2211 Cyg = 75834 = MWC 645 = GSC 3968.03492 = IRAS 21516+5245.

V2212 Cyg = 75835 = LD 236 = IRAS 21519+5207.

NS Del = 75753 = HIP 099866 = HD 192687 (A2) = BD +13°4334 = SAO 105903 = GSC 1085.01893 = PPM 138000.

Table 2 (continued)

NT Del = 75759 = HD 193949 (Pd) = GSC 1639.01907 = IRAS 20201+1956 = The central star of the planetary nebula NGC 6905 = PK 61–9°1 = He 2-466.
NU Del = 75795 = Var in Del.
IR Dra = 75267 = NSV 19558 = HIP 063076 = 8 Dra = HR 4916 = HD 112429 (F0) = BD +66°778 = SAO 015941 = GSC 4168.00930 = IRAS 12534+6542 = PPM 18423. According to [297], type EW.
IS Dra = 75280 = NSV 06391 = CSV 7077 = BV 352 = GSC 4402.00018.
IT Dra = 75287 = HIP 070819 = HD 127411 (A2) = BD +61°1432 = SAO 016394 = GSC 4173.01299 = PPM 19029.
IU Dra = 75294 = NSV 20246 = HIP 073869 = HD 134319 (G5) = BD +64°1046 = SAO 016592 = GSC 4183.00491 = PPM 19283.
IV Dra = 75315 = GSC 3869.00484.
IW Dra = 75349 = Tmz V53 = GSC 3979.02090 = IRAS 16451+5317.
IX Dra = 75700 = KUV 18126+6704 [298] = Object A [136].
IY Dra = 75705 = Tmz V80 = GSC 4222.02085 = IRAS 18230+6418.
IZ Dra = 75718 = LD 281 = GSC 4219.02324 = IRAS 18493+6213.
KK Dra = 75722 = LD 282 = GSC 3932.00152.
KL Dra = 75726 = SN 1998di/anon. gal. [137]. From its spectrum, a galactic cataclysmic var [138].
KM Dra = 75727 = LD 283 = GSC 3933.00532.
KN Dra = 75730 = LD 284 = GSC 3933.00464 = IRAS 19300+5913.
KO Dra = 75733 = LD 285.
KP Dra = 75747 = LD 289 = GSC 4236.01227.
KQ Dra = 75752 = LD 290 = IRAS 20132+6547.
KR Dra = 75756 = LD 292 = GSC 4240.01183.
KS Dra = 75757 = LD 293 = GSC 4237.01933.
KT Dra = 75761 = LD 296 = GSC 4241.01345 = IRAS 20227+6518.
AO For = 75029 = HIP 012694 = HD 17025 (G0) = CoD −31°1099 = CPD −31°314 = SAO 193876 = GSC 7011.00599 = PPM 278256.
V349 Gem = 75149 = Tmz V9 = IRAS 06175+2347.
V350 Gem = 75159 = Tmz V11 = GSC 0745.01464 = IRAS 06313+1418.
V351 Gem = 75164 = Tmz V12 = IRAS 06402+1506 = CCS-II 1362.
V352 Gem = 75180 = Tmz V76 = GSC 1346.01099 = IRAS 07157+1540.
V353 Gem = 75191 = TASV J0752+133 = Q 1995/015 = GSC 0791.01215 = IRAS 07500+1330.
V1004 Her = 75341 = Tmz V70 = GSC 1505.00511 = IRAS 16212+1540.
V1005 Her = 75344 = GSC 3505.00677.
V1006 Her = 75353 = NSV 08156 = CSV 7585 = BD +39°3076 = BV 280 = GSC 3072.01250.
V1007 Her = 75444 = S 10946 = RX J1724.0+4114.
V1008 Her = 75642 = Var 61.
V1009 Her = 75698 = Tmz V31 = GSC 1579.01739.
V1010 Her = 75699 = Var star in Hercules.
V1011 Her = 75710 = Tmz V30 = GSC 2106.02463 = 1RX J182931.3+223426.
AF Hor = 75028 = RE J0241–53 N = GSC 8491.01194. The fainter star in a pair of two dMe stars at 25″ separation.
V357 Hya = 75222 = Tmz V84 = GSC 5455.00584 = IRAS 08510–1319.
V358 Hya = 75229 = NSV 04539 = CSV 101063 = AN 349.1934 = Prager 3303 = HD 82908 (A2) = BD +05°2200 = SAO 117785 = GSC 0238.00737 = PPM 155983.
V359 Hya = 75232 = HIP 048958 = HD 86592 (A0) = BD −12°3045 = SAO 155635 = GSC 5484.00804 = PPM 222283.
V360 Hya = 75254 = NSV 05552 = CSV 1846 = AN 27.1937 = BV 1662 = Prager 3538 = GSC 6689.01152 = IRAS 12168–2744.
V361 Hya = 75284 = EC 14026–2647 = GSC 6737.01229.
CD Ind = 75803 = EUVE J2115–58.6 = RX J2115.7–5840.
CE Ind = 75830 = HD 207259 (A0) = CoD −73°1585 = CPD −73°2240 = GSC 9335.00291 = PPM 375158.
V425 Lac = 75844 = NSV 13990 = S 8425 = GSC 3197.00357.
V426 Lac = 75853 = NSV 14046 = CSV 5517 = S 4581.
V427 Lac = 75859 = NSV 14115 = CSV 5542 = S 4587.
V428 Lac = 75861 = NSV 14131 = S 8582.
V429 Lac = 75862 = NSV 14134 = CSV 5545 = S 4588 = GSC 3611.01909.
V430 Lac = 75866 = NSV 14161 = S 8584.

Table 2 (continued)

V431 Lac = 75868 = NSV 14189 = CSV 5566 = S 4592.
V432 Lac = 75869 = LD 262 = IRAS 22302+5455.
V433 Lac = 75871 = NSV 14220 = S 8588.
GG Leo = 75234 = RX J1015.6+0904.
GH Leo = 75237 = PG 1031+234 = Ton 527. A magnetic white dwarf showing variability with the rotation period.
GI Leo = 75238 = Tmz V1 = GSC 0842.00327 = IRAS 10369+1239.
VY LMi = 75226 = NSV 04493 = CSV 6721 = GSC 2500.00189.
VZ LMi = 75230 = Tmz V35 = IRAS 09364+3428.
WW LMi = 75244 = HIP 053355 = 48 LMi = HR 4254 = HD 94480 (F0) = BD +26°2147 = SAO 081576 = GSC 1978.00604 = PPM 100749.
YZ Lep = 75121 = HIP 024825 = HR 1753 = HD 34798 (B8) = BD −18°1055 = SAO 150335 = ADS 3910 A = GSC 5906.01520 = PPM 215590.
ZZ Lep = 75126 = HD 35914 (Pa) = BD −12°1172 = PK 215–24°1 = The central star of the planetary nebula IC 418 = GSC 5340.00684 = IRAS 05251–1244 = PPM 215798.
AA Lep = 75141 = Tmz V110 = GSC 6491.00614 = IRAS 05521-2242.
AB Lep = 75142 = The central star of the planetary nebula LoTr 1 = PK 228–22°1 = GSC 6491.00367. Chromospheric activity on the cool companion?
AC Lep = 75145 = NSV 16753 = HIP 028434 = HR 2118 = HD 40745 (F0) = BD −12°1337 = SAO 151011 = GSC 5357.01904 = PPM 216566.
KK Lib = 75291 = Tmz V25 = GSC 5583.00456.
LO Lup = 75292 = RX J1507.6–4603 = GSC 8293.02003.
LP Lup = 75293 = RX J1507.9–4515 = GSC 8293.00642.
LQ Lup = 75295 = RX J1508.6–4423 = GSC 7833.02400.
LR Lup = 75297 = RX J1514.0–4629 A.
LS Lup = 75298 = RX J1515.9–4418 = GSC 7834.01690.
LT Lup = 75299 = RX J1515.8–3331 = GSC 7316.00888.
LU Lup = 75300 = RX J1517.8–3706 A.
LV Lup = 75301 = RX J1517.8–3706 B.
LW Lup = 75302 = RX J1518.5–3738 = GSC 7822.00158.
LX Lup = 75303 = RX J1518.9–4050 = GSC 7826.02975.
LY Lup = 75304 = RX J1519.3–4056 = GSC 7826.02835.
LZ Lup = 75305 = RX J1522.2–3959 = GSC 7839.00870.
MM Lup = 75306 = RX J1523.4–4055 = GSC 7839.01905.
MN Lup = 75307 = RX J1523.5–3821.
MO Lup = 75308 = RX J1524.0–3209 = GSC 7317.00295.
MP Lup = 75309 = RX J1524.5–3652 = GSC 7325.00465.
MQ Lup = 75310 = RX J1525.5–3613 = GSC 7325.00008.
MR Lup = 75311 = RX J1525.6–3537 = GSC 7325.00322.
MS Lup = 75312 = RX J1526.0–4501 = GSC 8295.01530.
MT Lup = 75314 = RX J1538.0–3807 = GSC 7836.00597.
MU Lup = 75316 = RX J1540.7–3756 = GSC 7837.00269.
MV Lup = 75317 = RX J1550.0–3629 = GSC 7340.01137.
MW Lup = 75319 = RX J1552.3–3819 = GSC 7838.01188.
MX Lup = 75320 = RX J1555.6–3709 = GSC 7341.00480.
MY Lup = 75325 = NSV 20470 = CoD −41°10484 = GSC 7859.01039 = IRAS 15573–4147 = PDS 77 [086].
MZ Lup = 75326 = RX J1601.2–3320 = GSC 7333.00719.
NN Lup = 75327 = RX J1602.0–3613 = GSC 7341.00534.
NO Lup = 75328 = RX J1603.2–3239 = GSC 7334.00765.
NP Lup = 75329 = RX J1605.6–3837.
NQ Lup = 75331 = RX J1608.3–3843 = GSC 7851.01078.
DD Lyn = 75192 = HIP 038723 = HR 3083 = HD 64491 (A0) = BD +35°1705 = SAO 060453 = GSC 2475.01304 = PPM 73264.
DE Lyn = 75200 = Tmz V86 = GSC 3803.01143.
DF Lyn = 75204 = KUV 08368+4026 = WD 0837+403.
DG Lyn = 75223 = Tmz V89 = GSC 2986.00317.
DH Lyn = 75224 = Tmz V87 = GSC 2987.01123 = IRAS 09055+4221.
DI Lyn = 75228 = NSV 18235 = HIP 047053 = HR 3811 = HD 82780 (F2) = BD +40°2226 = SAO 042931 = ADS 7438 A = GSC 2992.01686 = PPM 74624.

Table 2 (continued)

V559 Lyr = 75709 = Tmz V32 = GSC 2624.00209.
V560 Lyr = 75711 = Had V10 = IRAS 18275+2654.
V561 Lyr = 75723 = Anon Lyr = GSC 2657.00147.
CG Mic = 75762 = HD 194750 (A0) = CoD −43°14014 = CPD −43°9241 = SAO 230234 = GSC 7961.01441 = PPM 326212.
CH Mic = 75763 = HD 195112 (B9) = CoD −38°14071 = CPD −38°8036 = GSC 7950.00486 = PPM 300274.
CI Mic = 75797 = HD 200623 (A2) = CoD −36°14592 = CPD −36°9308 = SAO 212697 = GSC 7483.00326 = PPM 300974.
V776 Mon = 75144 = BD −10°1334 = GSC 5352.00921 = IRAS 05567–1052 = CSS 124 = CSS-II 176.
V777 Mon = 75150 = NSV 02919 = HIP 030089 = HD 44179 (B8) = BD −10°1476 = SAO 151362 = ADS 4954 = GSC 5367.01134 = AFGL 915 = IRAS 06176–1036 = The central star of the Red Rectangle Nebula.
V778 Mon = 75151 = Anon B Mon = GSC 0145.00898 = IRAS 06230+0640.
V779 Mon = 75160 = Tmz V107 = IRAS 06370–0811.
V780 Mon = 75161 = W66 (NGC 2264) = VSB 46 (NGC 2264) = No. 43 (“B” region) [171].
V781 Mon = 75163 = NSV 03115 = CSV 102518 = W149 (NGC 2264) = VSB 105 (NGC 2264) = No. 26 (“C” region) [171].
V782 Mon = 75168 = Tmz V112 = IRAS 06449–0058.
V783 Mon = 75169 = Anon A Mon = GSC 0152.00069.
V784 Mon = 75170 = Anon C Mon = GSC 0152.00239.
V785 Mon = 75174 = R6 = IRAS 07063–0012.
V786 Mon = 75182 = R36 = GSC 4816.00252 = IRAS 07168–0037 = CSS 220 = CSS-II 334.
V787 Mon = 75183 = R28 = IRAS 07174–0203.
V788 Mon = 75184 = GSC 4817.00508.
V789 Mon = 75185 = BD −00°1712 = RE J0725–002 = EUVEJ0725–00.4 = GSC 4817.00468 = PPM 176902.
V790 Mon = 75194 = Tmz V82 = IRAS 07591–0957.
β Mon = 75152 = NSV 02977 = HIP 030867 = β Mon = 11 Mon = HR 2356 = HR 2357 = HR 2358 = HD 45725 (B2p) = HD 45726 = HD 45727 = BD −06°1574 = BD −06°1575 = SAO 133316 = SAO 133317 = ADS 5107 ABC = GSC 4797.01880 = GSC 4797.01881 = GSC 4797.01882 = MWC 143.
LZ Mus = 75251 = Nova Mus 1998.
MM Mus = 75253 = NSV 05551 = CSV 6905 = S 6397 = V3 [177] = GSC 9239.01860.
MN Mus = 75255 = V2 .
MO Mus = 75260 = HIP 060944 = HD 108659 (B3) = CoD −66°1234 = CPD −66°1783 = SAO 251932 = GSC 8987.01208 = PPM 359448.
MP Mus = 75275 = CPD −68°1894 = GSC 9246.00971 = IRAS 13185–6922 = PDS 66 [086] = He 3-892 = Wray 15 1092.
γ Mus = 75261 = HIP 061199 = γ Mus = HR 4773 = HD 109026 (B5) = CoD −71°850 = CPD −71°1336 = SAO 256955 = GSC 9236.02907 = PPM 371540.
DR Oct = 75233 = HIP 049616 = HD 89499 (G5) = CoD −84°102 = CPD −84°263 = GSC 9511.01761 = LHS 2221 = LTT 3751 = L 5–1.
V2394 Oph = 75343 = CoD −24°12698 = CPD −24°5704 = SAO 184441 = GSC 6799.00309 = PPM 265627.
V2395 Oph = 75347 = Had V5.
V2396 Oph = 75348 = Tmz V15 = IRAS 16418–2006.
V2397 Oph = 75350 = Tmz V73 = IRAS 16542–0902.
V2398 Oph = 75351 = NSV 20879 = HIP 083232 = CoD −27°11363 = GSC 6818.01058 = IRAS 16574–2733 = AS 216 = He 3-1311 = HBC 656.
V2399 Oph = 75360 = Tmz V72 = GSC 5648.00581 = IRAS 17074–1015.
V2400 Oph = 75361 = RX J1712.6–2414.
V2401 Oph = 75362 = Tmz V6 = GSC 5074.00435.
V2402 Oph = 75364 = Ter 0005.
V2403 Oph = 75365 = Ter 0006.
V2404 Oph = 75367 = Ter 0010.
V2405 Oph = 75370 = Ter 0018.
V2406 Oph = 75371 = Ter 0020.
V2407 Oph = 75373 = Ter 0028.
V2408 Oph = 75375 = Ter 0029.

Table 2 (continued)

V2409 Oph = 75376 = Ter 0030.
V2410 Oph = 75377 = Ter 0031.
V2411 Oph = 75378 = Ter 0034.
V2412 Oph = 75379 = Ter 0036.
V2413 Oph = 75380 = Ter 0037.
V2414 Oph = 75381 = Ter 0038.
V2415 Oph = 75382 = Ter 0039.
V2416 Oph = 75383 = Ter 0042.
V2417 Oph = 75385 = Tmz V54.
V2418 Oph = 75386 = Ter 0050.
V2419 Oph = 75387 = Ter 0051 = IRAS 17159–2954.
V2420 Oph = 75390 = Ter 0058.
V2421 Oph = 75391 = Ter 0059.
V2422 Oph = 75394 = Ter 0067.
V2423 Oph = 75395 = Ter 0068.
V2424 Oph = 75396 = Tmz V14 = IRAS 17166–0546.
V2425 Oph = 75397 = NSV 08513 = CSV 7634 = BD −00°3264 = BV 167 = GSC 5066.00280.
V2426 Oph = 75398 = Ter 0070 = IRAS 17168–2856.
V2427 Oph = 75399 = Ter 0071.
V2428 Oph = 75400 = Ter 0073.
V2429 Oph = 75402 = Ter 0077.
V2430 Oph = 75405 = Ter 0081.
V2431 Oph = 75406 = Ter 0084.
V2432 Oph = 75410 = Ter 0090.
V2433 Oph = 75411 = Ter 0098 = IRAS 17183–2838.
V2434 Oph = 75413 = Ter 0105 = GSC 6837.00483 = IRAS 17186–2914 = CSS 523 = CSS-II 975 = Hen 176.
V2435 Oph = 75414 = Ter 0113.
V2436 Oph = 75416 = Ter 0119.
V2437 Oph = 75417 = Ter 0121.
V2438 Oph = 75418 = Ter 0123.
V2439 Oph = 75419 = Ter 0125.
V2440 Oph = 75420 = Ter 0132.
V2441 Oph = 75422 = Ter 0136.
V2442 Oph = 75423 = Ter 0139.
V2443 Oph = 75424 = Tmz V41 = IRAS 17200–0831.
V2444 Oph = 75426 = Ter 0141.
V2445 Oph = 75427 = Ter 0144.
V2446 Oph = 75428 = Ter 0146 = IRAS 17201–2859.
V2447 Oph = 75430 = Ter 0149.
V2448 Oph = 75431 = Ter 0150.
V2449 Oph = 75432 = Ter 0152.
V2450 Oph = 75433 = Ter 0153.
V2451 Oph = 75434 = Ter 0154.
V2452 Oph = 75436 = Ter 0166.
V2453 Oph = 75437 = Ter 0168.
V2454 Oph = 75438 = Ter 0172.
V2455 Oph = 75439 = Ter 0177.
V2456 Oph = 75440 = Ter 0180.
V2457 Oph = 75441 = Ter 0184.
V2458 Oph = 75442 = Ter 0186.
V2459 Oph = 75443 = Ter 0192.
V2460 Oph = 75445 = Ter 0203.
V2461 Oph = 75447 = Tmz V58 = GSC 5067.00337 = IRAS 17233–0048.
V2462 Oph = 75448 = Ter 0225.
V2463 Oph = 75449 = NSV 08653 = Ter 0227 = Ter 0297 [185].
V2464 Oph = 75450 = NSV 08654 = Ter 0228 = Ter 0173 [186].
V2465 Oph = 75451 = Ter 0236.
V2466 Oph = 75454 = Ter 0244 = IRAS 17241–2921.
V2467 Oph = 75456 = NSV 08679 = Ter 0254 = Ter 0002 [186].
V2468 Oph = 75457 = NSV 08678 = Ter 0253 = Ter 0406 [185].

Table 2 (continued)

V2469 Oph = 75458 = Ter 0274.
V2470 Oph = 75459 = Ter 0280.
V2471 Oph = 75461 = NSV 08710 = Ter 0287 = Ter 0004 [186].
V2472 Oph = 75463 = NSV 08757 = Ter 0320 = Ter 0091 [186].
V2473 Oph = 75464 = Ter 0332.
V2474 Oph = 75465 = NSV 08787 = Ter 0337 = Ter 0096 [186].
V2475 Oph = 75466 = Ter 0340.
V2476 Oph = 75467 = Ter 0345.
V2477 Oph = 75468 = Ter 0368.
V2478 Oph = 75469 = Ter 0385.
V2479 Oph = 75471 = Ter 0390.
V2480 Oph = 75472 = Ter 0399.
V2481 Oph = 75475 = NSV 08922 = Ter 0432 = Ter 0039 [186].
V2482 Oph = 75477 = Ter 0474.
V2483 Oph = 75478 = NSV 09001 = Ter 0485 = Ter 0052 [186].
V2484 Oph = 75481 = NSV 09028 = Ter 0495 = Ter 0056 [186].
V2485 Oph = 75482 = Ter 0506.
V2486 Oph = 75483 = Ter 0529.
V2487 Oph = 75484 = Nova Oph 1998.
V2488 Oph = 75487 = Ter 0574 = IRAS 17303–2955.
V2489 Oph = 75488 = Ter 0586.
V2490 Oph = 75489 = Ter 0599.
V2491 Oph = 75490 = NSV 22756 = Ter 0602 = Ter 2622 [187].
V2492 Oph = 75493 = Ter 0620.
V2493 Oph = 75494 = NSV 09295 = CSV 3321 = HV 10994 = GSC 1001.00723.
V2494 Oph = 75495 = Tmz V51 = GSC 5660.00180 = IRAS 17367–0757.
V2495 Oph = 75496 = Tmz V77 = GSC 5085.01171 = IRAS 17368–0210.
V2496 Oph = 75497 = LWHM 9 = OH 359.508+0.179.
V2497 Oph = 75498 = LWHM 10 = OH 359.513+0.174.
V2498 Oph = 75499 = Tmz V29 = IRAS 17405-0419.
V2499 Oph = 75635 = NSV 09887 = CSV 3600 = AN 359.1933 = Prager 1357 = GSC 1011.01856 = IRAS 17542+1006.
V2500 Oph = 75636 = NSV 09910 = CSV 7737 = HIP 087937 = BD +04°3561 = Barnard's star = GSC 0425.00184 = Gliese 699 = G 140–24 = LHS 57 = LTT 15309.
V2501 Oph = 75641 = Be V6 = GSC 1008.00332.
V2502 Oph = 75701 = NSV 24359 = HIP 089601 = HR 6844 = HD 167858 (F0) = BD +00°3907 = SAO 123320 = GSC 0432.01027 = PPM 165535.
V1396 Ori = 75108 = WD 0507+0435 = HS 0507+0434 = GSC 0107.02201. VB (two DA white dwarfs). Variability refers to component B.
V1397 Ori = 75130 = NSV 02274 = CSV 6249 = Rosino E18 [301] = JW 320 (Orion nebula) [196].
V1398 Ori = 75131 = NSV 02284 = CSV 6253 = Rosino E20 [301] = JW 409 (Orion nebula) [196] = Par 1824 = Brun 557.
V1399 Ori = 75132 = NSV 02310 = CSV 100591 = JW 669 (Orion nebula) [196] = Par 1961 = Brun 658.
V1400 Ori = 75133 = JW 762 (Orion nebula) [196] = Par 2010.
V1401 Ori = 75135 = NSV 02363 = CSV 6291 = Rosino E33 [301] = JW 954 (Orion nebula) [196] = Par 2166.
V1402 Ori = 75136 = G 102–21 = GSC 0722.00041.
V1403 Ori = 75137 = NSV 02541 = CSV 650 = SVS 1007 [201] = HD 290807 (G5) = GSC 4767.00483.
V1404 Ori = 75138 = AFGL 799 = IRAS 05377+1346.
V393 Pav = 75743 = RX J1957.1–5738.
V364 Peg = 75802 = Cataclysmic var in Pegasus.
V365 Peg = 75820 = NSV 13826 = CSV 5455 = HV 6152 = Prager 5616 = GSC 2189.00704.
V366 Peg = 75874 = Anon Peg = GSC 2228.01602.
V367 Peg = 75877 = Var 65.
V368 Peg = 75882 = Var 63.
V369 Peg = 75883 = NSV 26006 = KUV 23012+1702.
V370 Peg = 75916 = Cataclysmic var in Pegasus.
V595 Per = 75022 = NSV 00802 = BD +56°575 = SAO 023251 = GSC 3694.01255 = PPM 27521 = Oo 2299 (χ Per).

Table 2 (continued)

V596 Per = 75026 = AFGL 341 = IRAS 02293+5748.
V597 Per = 75030 = HD 17892 (A5) = BD +39°659 = SAO 055974 = GSC 2850.00397 = PPM 45638.
V598 Per = 75035 = Var 57 = GSC 3706.00612.
V599 Per = 75036 = FS 3 (α Per) = GSC 3319.00537. Cluster non-member? Not identical with Ross 347 = LTT 11060.
V600 Per = 75037 = HD 20511 (A0) = BD +32°602 = SAO 056342 = GSC 2345.01896 = PPM 68334.
V601 Per = 75040 = AP J0323+4853 (α Per).
V602 Per = 75042 = FS 4 (α Per) = AP 78 (α Per) = GSC 3320.00475.
V603 Per = 75055 = Tmz V189 = IRAS 03440+5101.
V604 Per = 75067 = Tmz V184 = GSC 3332.00001 = IRAS 04086+4832.
V605 Per = 75070 = Tmz V188 = GSC 3340.00336 = IRAS 04139+5205.
V606 Per = 75072 = Tmz V191 = IRAS 04167+5138.
V607 Per = 75074 = Tmz V198 = GSC 3341.00174 = IRAS 04222+5212.
V608 Per = 75075 = Tmz V197 = GSC 3341.00799 = IRAS 04229+5139 = CCS 210 = CCS-II 682.
V609 Per = 75088 = Tmz V115 = IRAS 04446+5135.
V610 Per = 75089 = Tmz V133 = GSC 2897.02362 = IRAS 04461+4012.
DS Psc = 75012 = NSV 00361 = CSV 111 = HV 6379 = Prager 2493 = GSC 0015.00112.
DT Psc = 75014 = NSV 00444 = HIP 005772 = HR 363 = HD 7351 (Ma) = BD +27°196 = SAO 074576 = GSC 1753.02053 = RAFGL 4090S = IRC+30024 = IRAS 01113+2815 = CSS 20 = CSS-II 26 = PPM 90593.
V441 Pup = 75187 = XRS 07283-258 = 3A 0726-260 = 4U 0728-25 = GSC 6542.02168.
V442 Pup = 75189 = NSV 17558 = HIP 037444 = HD 62150 (Oe5) = CoD −32°4287 = CPD −32°1682 = SAO 198293 = GSC 7110.03221 = LSS 675 = PPM 284275.
V443 Pup = 75190 = HIP 037876 = HD 63099 (Oa) = CoD −34°3879 = CPD −34°1643 = GSC 7114.00644 = WR 9 = He 3-73 = LSS 753 = IC 2206.
V444 Pup = 75198 = PHα 41 [219] = Wray 15 180 = HBC 559 = GSC 7133.04546 = IRAS 08120–3559.
ζ Pup = 75196 = HIP 039429 = ζ Pup = HR 3165 = HD 66811 (Od) = CoD −39°3939 = CPD −39°2111 = SAO 198752 = GSC 7663.04093 = LSS 949 = PPM 312524.
V345 Sge = 75740 = Sanders 142 (NGC 6838) = V7 (NGC 6838) = GSC 1620.01470. Cluster non-member.
V346 Sge = 75745 = NSV 12742 = S 8348.
V347 Sge = 75746 = NSV 12763 = S 8352.
V348 Sge = 75754 = Tmz V60 = GSC 1626.01154 = IRAS 20134+1906.
V4444 Sgr = 75643 = Nova Sgr 1999.
V4445 Sgr = 75500 = LWHM 30 = OH 359.748+0.274.
V4446 Sgr = 75501 = LWHM 54 = OH 359.889+0.361.
V4447 Sgr = 75502 = LWHM 6 = OH 359.487+0.081.
V4448 Sgr = 75503 = No. 7. In the LWHM 3 field.
V4449 Sgr = 75504 = LWHM 76 = OH 0.001+0.352.
V4450 Sgr = 75505 = LWHM 79 = OH 0.019+0.345.
V4451 Sgr = 75506 = LWHM 64 = OH 359.943+0.260.
V4452 Sgr = 75507 = LWHM 29 = OH 359.746+0.134.
V4453 Sgr = 75508 = LWHM 41 = OH 359.800+0.165.
V4454 Sgr = 75509 = No. 1. In the LWHM 41 field.
V4455 Sgr = 75510 = LWHM 7 = OH 359.496–0.036.
V4456 Sgr = 75511 = No. 10. In the LWHM 7 field.
V4457 Sgr = 75512 = LWHM 21 = OH 359.675–0.069.
V4458 Sgr = 75513 = LWHM 33 = OH 359.762+0.120.
V4459 Sgr = 75514 = LWHM 46 = OH 359.825+0.153.
V4460 Sgr = 75515 = No. 10. In the LWHM 8 field.
V4461 Sgr = 75516 = LWHM 8 = OH 359.502–0.054.
V4462 Sgr = 75517 = LWHM 14 = OH 359.598+0.000.
V4463 Sgr = 75518 = LWHM 35 = OH 359.765+0.082.
V4464 Sgr = 75519 = LWHM 55 = OH 359.890+0.155.
V4465 Sgr = 75520 = LWHM 32 = OH 359.760+0.072.
V4466 Sgr = 75521 = LWHM 27 = OH 359.719+0.025.
V4467 Sgr = 75522 = No. 1. In the LWHM 27 field.

Table 2 (continued)

V4468 Sgr = 75523 = LWHM 20 = OH 359.669–0.019.
V4469 Sgr = 75524 = LWHM 71 = OH 359.974+0.162.
V4470 Sgr = 75525 = LWHM 22 = OH 359.678–0.024.
V4471 Sgr = 75526 = LWHM 12 = OH 359.576–0.091.
V4472 Sgr = 75527 = No. 23. In the LWHM 78 field.
V4473 Sgr = 75528 = LWHM 38 = OH 359.778+0.010.
V4474 Sgr = 75529 = LWHM 78 = OH 0.018+0.156.
V4475 Sgr = 75530 = LWHM 18 = OH 359.640–0.084.
V4476 Sgr = 75531 = No. 18. In the LWHM 18 field.
V4477 Sgr = 75532 = LWHM 48 = OH 359.837+0.030.
V4478 Sgr = 75533 = No. 3. In the LWHM 48 field.
V4479 Sgr = 75534 = LWHM 57 = OH 359.902+0.061.
V4480 Sgr = 75535 = LWHM 17 = OH 359.636–0.108.
V4481 Sgr = 75536 = LWHM 101 = OH 0.200+0.233.
V4482 Sgr = 75537 = LWHM 26 = OH 359.716–0.070.
V4483 Sgr = 75538 = LWHM 34 = OH 359.763–0.042.
V4484 Sgr = 75539 = LWHM 96 = OH 0.173+0.211.
V4485 Sgr = 75540 = LWHM 23 = OH 359.681–0.095.
V4486 Sgr = 75541 = LWHM 42 = OH 359.803–0.021.
V4487 Sgr = 75542 = No. 11 = OH 359.797–0.025. In the LWHM 42 field.
V4488 Sgr = 75543 = No. 63. In the LWHM 34 field.
V4489 Sgr = 75544 = LWHM 86 = OH 0.076+0.146.
V4490 Sgr = 75545 = LWHM 24 = OH 359.684–0.104.
V4491 Sgr = 75546 = LWHM 19 = OH 359.652–0.131.
V4492 Sgr = 75547 = LWHM 47 = OH 359.825–0.024.
V4493 Sgr = 75548 = No. 1. In the LWHM 60 field.
V4494 Sgr = 75549 = LWHM 25 = OH 359.711–0.100.
V4495 Sgr = 75550 = No. 29. In the LWHM 60 field.
V4496 Sgr = 75551 = LWHM 44 = OH 359.810–0.070.
V4497 Sgr = 75552 = LWHM 40 = OH 359.799–0.090.
V4498 Sgr = 75553 = LWHM 16 = OH 359.634–0.195.
V4499 Sgr = 75554 = LWHM 104 = OH 0.221+0.168.
V4500 Sgr = 75555 = No. 15. In the LWHM 13 field.
V4501 Sgr = 75556 = LWHM 91 = OH/IR 0.13+0.10 = OH 0.129+0.103. The second of the two variables with the same OH/IR name in [226].
V4502 Sgr = 75557 = OH/IR 0.13+0.10. The first of the two variables with the same OH/IR name in [226].
V4503 Sgr = 75558 = LWHM 37 = OH 359.776–0.120.
V4504 Sgr = 75559 = LWHM 53 = OH 359.888–0.051.
V4505 Sgr = 75560 = LWHM 58 = OH 359.906–0.041.
V4506 Sgr = 75561 = LWHM 88 = OH 0.083+0.064.
V4507 Sgr = 75562 = LWHM 50 = OH 359.855–0.078.
V4508 Sgr = 75563 = LWHM 68 = OH 359.955–0.031. A close double star.
V4509 Sgr = 75564 = LWHM 59 = OH 359.911–0.059.
V4510 Sgr = 75565 = No. 1 = OH 359.918–0.055. In the LWHM 59 field.
V4511 Sgr = 75566 = No. 7 = OH 359.947–0.046. In the LWHM 65 field.
V4512 Sgr = 75567 = LWHM 65 = OH 359.946–0.047.
V4513 Sgr = 75568 = LWHM 63 = OH 359.939–0.052.
V4514 Sgr = 75569 = No. 7 = OH 359.932–0.059. In the LWHM 61 field.
V4515 Sgr = 75570 = No. 11 = OH 359.965–0.043. In the LWHM 69 field.
V4516 Sgr = 75571 = No. 1. In the LWHM 69 field.
V4517 Sgr = 75572 = LWHM 69 = OH 359.970–0.049.
V4518 Sgr = 75573 = LWHM 115 = OH 0.352+0.175.
V4519 Sgr = 75574 = LWHM 45 = OH 359.814–0.162.
V4520 Sgr = 75575 = LWHM 73 = OH 359.986–0.061.
V4521 Sgr = 75576 = LWHM 75 = OH 359.999–0.061.
V4522 Sgr = 75577 = LWHM 95 = OH 0.142+0.026.
V4523 Sgr = 75578 = LWHM 36 = OH 359.768–0.207.
V4524 Sgr = 75579 = LWHM 99 = OH 0.189+0.052.
V4525 Sgr = 75580 = No. 3. In the LWHM 36 field.

Table 2 (continued)

V4526 Sgr = 75581 = No. 57. In the LWHM 72 field.
V4527 Sgr = 75582 = No. 6. In the LWHM 75 field.
V4528 Sgr = 75583 = No. 2. In the LWHM 72 field.
V4529 Sgr = 75584 = LWHM 116 = OH 0.379+0.159.
V4530 Sgr = 75585 = LWHM 81 = OH 0.040–0.056.
V4531 Sgr = 75586 = LWHM 100 = OH 0.190+0.036.
V4532 Sgr = 75587 = LWHM 109 = OH 0.274+0.086.
V4533 Sgr = 75588 = No. 5. In the LWHM 70 field.
V4534 Sgr = 75589 = LWHM 77 = OH 0.007–0.088.
V4535 Sgr = 75590 = NSV 23765 = LWHM 82 [191] = VR3 [227] = OH 0.053–0.062 = IRAS 17428–2854.
V4536 Sgr = 75591 = No. 31. In the LWHM 93 field.
V4537 Sgr = 75592 = LWHM 92 = OH 0.129–0.020.
V4538 Sgr = 75593 = LWHM 70 = OH 359.971–0.119.
V4539 Sgr = 75594 = No. 8. In the LWHM 92 field.
V4540 Sgr = 75595 = LWHM 93 = OH 0.134–0.023.
V4541 Sgr = 75596 = LWHM 103 = OH 0.217+0.023.
V4542 Sgr = 75597 = No. 7. In the LWHM 103 field.
V4543 Sgr = 75598 = No. 85. In the LWHM 85 field.
V4544 Sgr = 75599 = LWHM 43 = OH 359.803–0.248.
V4545 Sgr = 75600 = LWHM 90 = OH 0.113–0.060.
V4546 Sgr = 75601 = LWHM 51 = OH 359.873–0.209.
V4547 Sgr = 75602 = No. 2. In the LWHM 74 field.
V4548 Sgr = 75603 = LWHM 114 = OH 0.349+0.053.
V4549 Sgr = 75604 = LWHM 106 = OH 0.241–0.014.
V4550 Sgr = 75605 = LWHM 87 = OH 0.079–0.114.
V4551 Sgr = 75606 = LWHM 105 = OH 0.225–0.055.
V4552 Sgr = 75607 = LWHM 80 = OH 0.036–0.182.
V4553 Sgr = 75608 = LWHM 98 = OH 0.180–0.098.
V4554 Sgr = 75609 = No. 4. In the LWHM 94 field.
V4555 Sgr = 75610 = LWHM 94 = OH 0.138–0.136.
V4556 Sgr = 75611 = LWHM 121 = OH 0.452+0.046.
V4557 Sgr = 75612 = LWHM 113 = OH 0.336–0.027.
V4558 Sgr = 75613 = No. 6. In the LWHM 121 field.
V4559 Sgr = 75614 = LWHM 117 = OH 0.395+0.008.
V4560 Sgr = 75615 = LWHM 108 = OH 0.265–0.078.
V4561 Sgr = 75616 = LWHM 28 = OH 359.745–0.404.
V4562 Sgr = 75617 = LWHM 85 = OH 0.071–0.205.
V4563 Sgr = 75618 = LWHM 122 = OH 0.453+0.026.
V4564 Sgr = 75619 = No. 1. In the LWHM 39 field.
V4565 Sgr = 75620 = LWHM 39 = OH 359.783–0.392.
V4566 Sgr = 75621 = No. 11. In the LWHM 122 field.
V4567 Sgr = 75622 = LWHM 120 = OH 0.447–0.006.
V4568 Sgr = 75623 = LWHM 107 = OH 0.261–0.143.
V4569 Sgr = 75624 = Had V1 = IRAS 17437–1801.
V4570 Sgr = 75625 = LWHM 110 = OH 0.307–0.176.
V4571 Sgr = 75626 = No. 3. In the LWHM 49 field.
V4572 Sgr = 75627 = LWHM 49 = OH 359.851–0.533.
V4573 Sgr = 75628 = LWHM 119 = OH 0.437–0.179.
V4574 Sgr = 75629 = LWHM 127 = OH 0.536–0.130.
V4575 Sgr = 75630 = LWHM 126 = OH 0.523–0.206.
V4576 Sgr = 75631 = No. 1. In the LWHM 126 field.
V4577 Sgr = 75637 = TLE 105 = IRAS 17573–2848.
V4578 Sgr = 75639 = WR 105 = AS 268 = LSS 4569 = Ve 2-47 = GSC 6842.01547.
V4579 Sgr = 75640 = NSV 24159 = Nova Sgr 1986 = GSC 6850.03110.
V4580 Sgr = 75644 = SAX J1808.4–3658 = XTE J1808–369.
V4581 Sgr = 75645 = Var 1. Near NGC 6558.
V4582 Sgr = 75646 = Var 2. Near NGC 6558.
V4583 Sgr = 75647 = Var 3. Near NGC 6558.
V4584 Sgr = 75648 = Var E1. Near NGC 6558.
V4585 Sgr = 75649 = Var 4. Near NGC 6558.

Table 2 (continued)

V4586 Sgr = 75650 = Var 5. Near NGC 6558.
V4587 Sgr = 75651 = Var 6. Near NGC 6558.
V4588 Sgr = 75652 = Var 8. Near NGC 6558.
V4589 Sgr = 75653 = Var 7. Near NGC 6558.
V4590 Sgr = 75654 = Var 9. Near NGC 6558.
V4591 Sgr = 75655 = Var 10. Near NGC 6558.
V4592 Sgr = 75656 = Var 12. Near NGC 6558.
V4593 Sgr = 75657 = Var 13. Near NGC 6558.
V4594 Sgr = 75658 = Var 14. Near NGC 6558.
V4595 Sgr = 75659 = Var 16. Near NGC 6558.
V4596 Sgr = 75660 = Var 17. Near NGC 6558.
V4597 Sgr = 75661 = Var 19. Near NGC 6558.
V4598 Sgr = 75662 = Var 20. Near NGC 6558.
V4599 Sgr = 75663 = Var 21. Near NGC 6558.
V4600 Sgr = 75664 = Var 23. Near NGC 6558.
V4601 Sgr = 75665 = Var 26. Near NGC 6558.
V4602 Sgr = 75666 = Var 27. Near NGC 6558.
V4603 Sgr = 75667 = Var 28. Near NGC 6558.
V4604 Sgr = 75668 = Var 31. Near NGC 6558.
V4605 Sgr = 75669 = Var 32. Near NGC 6558.
V4606 Sgr = 75670 = Var 34. Near NGC 6558.
V4607 Sgr = 75671 = Var 35. Near NGC 6558.
V4608 Sgr = 75672 = Var 36. Near NGC 6558.
V4609 Sgr = 75673 = Var 38. Near NGC 6558.
V4610 Sgr = 75674 = Var 40. Near NGC 6558.
V4611 Sgr = 75675 = Var 41. Near NGC 6558.
V4612 Sgr = 75676 = Var 44. Near NGC 6558.
V4613 Sgr = 75677 = Var 45. Near NGC 6558.
V4614 Sgr = 75678 = Var 46. Near NGC 6558.
V4615 Sgr = 75679 = Var 47. Near NGC 6558.
V4616 Sgr = 75680 = Var 49. Near NGC 6558.
V4617 Sgr = 75681 = Var 48. Near NGC 6558.
V4618 Sgr = 75682 = Var 50. Near NGC 6558.
V4619 Sgr = 75683 = Var 51. Near NGC 6558.
V4620 Sgr = 75684 = Var 52. Near NGC 6558.
V4621 Sgr = 75685 = Var 53. Near NGC 6558.
V4622 Sgr = 75686 = Var 54. Near NGC 6558.
V4623 Sgr = 75687 = Var E3. Near NGC 6558.
V4624 Sgr = 75688 = Var 55. Near NGC 6558.
V4625 Sgr = 75689 = Var 56. Near NGC 6558.
V4626 Sgr = 75690 = Var 57. Near NGC 6558.
V4627 Sgr = 75691 = Var 58. Near NGC 6558.
V4628 Sgr = 75692 = Var 59. Near NGC 6558.
V4629 Sgr = 75693 = Var 60. Near NGC 6558.
V4630 Sgr = 75694 = Var 61. Near NGC 6558.
V4631 Sgr = 75695 = Var 62. Near NGC 6558.
V4632 Sgr = 75696 = Var 63. Near NGC 6558.
V4633 Sgr = 75703 = Nova Sgr 1998.
V4634 Sgr = 75708 = NSV 24453 = GS 1826–24.
V4635 Sgr = 75712 = Tmz V59 = GSC 7394.00153 = IRAS 18304–3011.
V4636 Sgr = 75716 = Tmz V8.
V4637 Sgr = 75717 = IRAS 18491–2631.
V4638 Sgr = 75731 = HD 184185 (Mb) = BD −21°5435 = CPD −21°7432 = SAO 188285 = GSC 6310.01156 = IRAS 19310–2102 = PPM 269966.
V4639 Sgr = 75742 = Tmz V74 = GSC 6895.01345.
V4640 Sgr = 75750 = CoD −40°13747 sf = EC 20117–4014 = GSC 7952.02164.
V4641 Sgr = 75702 = SAX J1819.3–2525 = XTE J1819–254 = GSC 6848.03786. In many papers, erroneously called GM Sgr. The chart in [308] is wrong.
V1093 Sco = 75332 = RX J1608.5–3900 A.
V1094 Sco = 75333 = RX J1608.6–3922 = GSC 7855.01162.
V1095 Sco = 75335 = RX J1609.7–3854 = GSC 7851.00658.

Table 2 (continued)

V1096 Sco = 75336 = RX J1610.1–4016 = GSC 7856.00051.
V1097 Sco = 75337 = RX J1613.0–4004 = GSC 7856.00085.
V1098 Sco = 75338 = NSV 20552 = PDS 81 [086] = GSC 6209.00923 = IRAS 16112–1930.
V1099 Sco = 75339 = HD 147402 (G0) = CoD −39°10425 = CPD −39°6939 = GSC 7857.00514 = PPM 294997.
V1100 Sco = 75340 = Tmz V56 = GSC 6806.00309 = IRAS 16201–2949.
V1101 Sco = 75354 = Sco X-2 = GX 349+2 = X 1702–363 = 3U 1702–36 = 2S 1702–363.
V1102 Sco = 75355 = M [239]. In the field of the X-ray source Sco X-2 = GX 349+2.
V1103 Sco = 75356 = V2 . In the field of the X-ray source Sco X-2 = GX 349+2.
V1104 Sco = 75357 = HD 326823 (Oe5) = CoD −42°11834 = CPD −42°7632 = GSC 7877.00311 = IRAS 17033–4232 = He 3 1330 = LSS 3918.
V1105 Sco = 75363 = Ter 0001.
V1106 Sco = 75366 = Ter 0008.
V1107 Sco = 75368 = Ter 0012.
V1108 Sco = 75369 = Ter 0015.
V1109 Sco = 75372 = Ter 0024.
V1110 Sco = 75384 = Ter 0043.
V1111 Sco = 75388 = Ter 0054.
V1112 Sco = 75389 = Ter 0056.
V1113 Sco = 75392 = Ter 0062.
V1114 Sco = 75393 = Ter 0063.
V1115 Sco = 75401 = Ter 0075.
V1116 Sco = 75403 = Ter 0079.
V1117 Sco = 75404 = Ter 0080.
V1118 Sco = 75407 = Ter 0086.
V1119 Sco = 75408 = Ter 0087.
V1120 Sco = 75409 = Ter 0089.
V1121 Sco = 75412 = Ter 0099.
V1122 Sco = 75415 = Ter 0116.
V1123 Sco = 75421 = Ter 0133.
V1124 Sco = 75425 = Ter 0140.
V1125 Sco = 75429 = Ter 0148.
V1126 Sco = 75435 = Ter 0157.
V1127 Sco = 75446 = Ter 0210.
V1128 Sco = 75452 = NSV 21994 = Ter 0237 = Ter 1517 [243].
V1129 Sco = 75453 = Ter 0240.
V1130 Sco = 75455 = Ter 0249 = IRAS 17242–3045.
V1131 Sco = 75460 = NSV 08706 = Ter 0283 = Ter 0314 [185].
V1132 Sco = 75470 = NSV 08864 = Ter 0389 = Ter 0110 [186].
V1133 Sco = 75473 = NSV 08889 = Ter 0410 = Ter 0356 [185].
V1134 Sco = 75474 = Ter 0411 = IRAS 17268–3141.
V1135 Sco = 75476 = NSV 08927 = Ter 0438 = Ter 0041 [186].
V1136 Sco = 75480 = NSV 09015 = Ter 0490 = Ter 0256 [186].
V1137 Sco = 75485 = NSV 09110 = Ter 0549 = Ter 0391 [185].
V1138 Sco = 75486 = NSV 09123 = Ter 0560 = Ter 0402 [185].
V1139 Sco = 75491 = Ter 0603 = IRAS 17321–3053.
V1140 Sco = 75492 = Ter 0605 = IRAS 17322–3111.
V1141 Sco = 75632 = Nova Sco 1997.
V1142 Sco = 75634 = Nova Sco 1998.
BV Scl = 75018 = HIP 006659 = HD 8717 (A0) = CoD −29°454 = CPD −29°158 = SAO 167038 = GSC 6428.00971 = PPM 243953.
BW Scl = 75913 = HE 2350–3908 = RX J2353.0–3852.
V458 Sct = 75704 = BD −10°4669 = GSC 5681.00292.
V459 Sct = 75706 = Var 60 = GSC 5698.04942.
V460 Sct = 75707 = AS 306 = He 3-1698 = LS IV −12°59 = GSC 5698.03822.
V461 Sct = 75713 = Tmz V52 = IRAS 18339–1354.
V462 Sct = 75714 = WR 120 = LS IV −4°14 = GSC 5121.00128.
QW Ser = 75313 = Tmz V46.
QX Ser = 75318 = HIP 077504 = HD 141690 (G5) = BD +25°2973 = SAO 084018 = ADS 9799 A = GSC 2037.00751 = PPM 104348.

Table 2 (continued)

QY Ser = 75321 = HIP 077902 = HR 5924 = HD 142574 (K5) = BD +20°3166 = SAO 084070 = IRC+20288 = RAFGL5021S = GSC 1502.01783 = PPM 104412.
QZ Ser = 75322 = Had V4.
V335 Ser = 75323 = HD 143213 (A0) = BD +01°3151 = SAO 121294 = GSC 0353.00301 = PPM 162113.
V336 Ser = 75324 = Had V7 = GSC 1499.00347 = IRAS 15569+1948.
V337 Ser = 75330 = Tmz V26 = GSC 0949.00094.
V338 Ser = 75334 = PG 1605+072 = GSC 0379.00781.
V339 Ser = 75462 = Tmz V18.
V340 Ser = 75479 = HD 158616 (F8) = BD −11°4391 = SAO 160603 = GSC 5667.00225 = IRAS 17279–1119 = PPM 233173.
V341 Ser = 75633 = NSV 24033 = Tmz V19 = IRC–10384 = GSC 5678.00416 = IRAS 17518–1014.
V342 Ser = 75638 = Tmz V16 = GSC 5679.00529 = IRAS 17589–1040 = CSS 542 = CSS-II 1016.
V343 Ser = 75697 = NSV 24326 = Tmz V17 = AS 289 = He 3-1627 = GSC 5684.00522 = IRAS 18095–1140.
UX Sex = 75236 = EC 10228–0905.
UY Sex = 75242 = PG 1047+003 = GSC 4914.00003.
V1168 Tau = 75051 = NSV 15750 = HII 263 (Pleiades) = GSC 1799.00141.
V1169 Tau = 75052 = HII 293 (Pleiades) = GSC 1803.00812.
V1170 Tau = 75053 = NSV 15752 = BD +24°544 = HII 345 (Pleiades) = GSC 1803.00276.
V1171 Tau = 75054 = NSV 15769 = HII 1032 (Pleiades) = GSC 1804.01947.
V1172 Tau = 75057 = NSV 01304 = CSV 100318 = Zinner 224 = HII 1512 (Pleiades) = GSC 1800.01545.
V1173 Tau = 75058 = HII 2548 (Pleiades) = GSC 1800.00865.
V1174 Tau = 75059 = HII 2741 (Pleiades) = GSC 1804.00092.
V1175 Tau = 75060 = NSV 15810 = HD 283067 (G0) = HII 2786 (Pleiades) = GSC 1800.01526.
V1176 Tau = 75061 = HII 2881 (Pleiades) = GSC 1800.01215.
V1177 Tau = 75112 = 145 (NGC 1817) = GSC 1283.00556.
V1178 Tau = 75113 = 163 (NGC 1817) = GSC 1283.01144.
V1179 Tau = 75114 = 114 (NGC 1817).
V1180 Tau = 75115 = 73 (NGC 1817).
V1181 Tau = 75116 = 99 (NGC 1817) = GSC 1283.00791.
V1182 Tau = 75117 = 88 (NGC 1817) = GSC 1283.00831.
V1183 Tau = 75118 = 16 (NGC 1817) = GSC 1283.01040.
V1184 Tau = 75139 = CB 34 V [265] = CB 34 FU [266].
V349 Tel = 75735 = NSV 24896 = HIP 097590 = HD 187028 (F0) = CoD −50°12691 = CPD −50°11201 = SAO 246291 = GSC 8398.00746 = GSC 8398.01633 = PPM 348036.
V350 Tel = 75755 = HIP 100090 = HD 192674 (A0) = CoD −51°12473 = CPD −51°11451 = SAO 246522 = GSC 8417.00674 = GSC 8417.01498 = PPM 348432.
AI Tri = 75021 = RX J0203.8+2959.
AK Tri = 75024 = NSV 00821 = CSV 5986 = Weber 139 = GSC 2327.01518.
ι TrA = 75342 = NSV 20629 = HIP 080645 = ι TrA = HR 6109 = HD 147787 (F0) = CoD −63°1201 = CPD −63°3923 = SAO 253555 = IDS 1618.7S6350 A = GSC 9045.02767 = IRAS 16232–6356 = PPM 362089.
DY Tuc = 75005 = OGLEGC 223. Near NGC 104. Galaxy field star.
DZ Tuc = 75011 = AX J0051–73.3 = RX J0050.7–7316. In the field of the SMC.
EE Tuc = 75881 = NSV 25982 = HIP 113402 = HD 216910 (F0) = CoD −59°8045 = CPD −59°7842 = SAO 247657 = GSC 8830.00856 = PPM 350666.
IW UMa = 75227 = NSV 04497 = CSV 1450 = SVS 863 = GSC 2997.01204.
IX UMa = 75231 = HIP 048129 = HD 84800 (A2) = BD +44°1908 = SAO 043050 = GSC 2999.01299 = PPM 51500.
IY UMa = 75239 = Tmz V85.
IZ UMa = 75245 = WD 1137+422 = KUV 11370+4222.
KK UMa = 75246 = NSV 18878 = Tmz V48 = GSC 4156.00392 = IRAS 11422+6504.
KL UMa = 75247 = Feige 48 = GSC 4153.00613.
KM UMa = 75248 = NSV 05339 = CSV 6866 = BD +36°2217 = Weber 7 = GSC 2526.01034.
KN UMa = 75264 = RX J1239.8+5511 = GSC 3844.00317.

Table 2 (continued)

UY UMi = 75252 = NSV 19351 = HIP 059767 = HR 4686 = HD 107192 (F0) = BD +88°71 = SAO 002010 = GSC 4641.00778 = PPM 2113.
V363 Vel = 75203 = HIP 042349 = HD 73654 (B8) = CoD −38°4684 = CPD −38°2514 = SAO 199446 = GSC 7662.01409 = PPM 285469.
V364 Vel = 75205 = VXR 12 (IC 2391) = SHJM 6 (IC 2391) = GSC 8568.00819.
V365 Vel = 75206 = CoD −53°2392 = CPD −53°1805 = VXR 14 (IC 2391) = GSC 8569.02827.
V366 Vel = 75207 = VXR 35a (IC 2391) = SHJM 3 (IC 2391) = GSC 8569.03438.
V367 Vel = 75208 = VXR 38a (IC 2391) = SHJM 8 (IC 2391) = GSC 8569.00414.
V368 Vel = 75209 = VXR 41 (IC 2391) = SHJM 9 (IC 2391) = GSC 8569.01100.
V369 Vel = 75210 = VXR 42a (IC 2391).
V370 Vel = 75211 = CoD −52°2502 = CPD −52°1604 = VXR 45a (IC 2391) = GSC 8569.00672 = GSC 8569.02014.
V371 Vel = 75212 = VXR 47 (IC 2391) = SHJM 10 (IC 2391) = GSC 8569.00696.
V372 Vel = 75213 = VXR 60b (IC 2391) = SHJM 5 (IC 2391) = GSC 8569.00072 N.
V373 Vel = 75214 = VXR 60a (IC 2391) = SHJM 4 (IC 2391) = GSC 8569.00072 S.
V374 Vel = 75215 = VXR 62a (IC 2391) = GSC 8569.00456.
V375 Vel = 75216 = VXR 64a (IC 2391).
V376 Vel = 75217 = CoD −52°2524 = CPD −52°1632 = VXR 70 (IC 2391) = GSC 8569.00678.
V377 Vel = 75218 = VXR 72 (IC 2391) = GSC 8569.00230.
V378 Vel = 75219 = CoD −45°4482 = CPD −45°2957 = WR 12 = He 3-200 = LSS 1145 = GSC 8151.04295.
V379 Vel = 75220 = VXR 76a (IC 2391) = GSC 8569.01122.
V380 Vel = 75221 = CoD −51°3197 = CPD −51°1613 = VXR 77a (IC 2391) = GSC 8563.00481.
V381 Vel = 75235 = RX J1016.9–4103 = 1RXSJ101659.4–410332.
V382 Vel = 75240 = Nova Vel 1999.
NX Vir = 75278 = Had V9 = GSC 6133.00949 = IRAS 13326–2207.
NY Vir = 75279 = PG 1336–018 = GSC 4966.00491.
NZ Vir = 75288 = MS 1428.2+0732 = GSC 0331.00665.
OO Vir = 75290 = Tmz V28 = GSC 0338.00597.
V405 Vul = 75737 = S 10943 = RX J1953.1+2115.

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ERRATUM FOR IBVS 4870

See IBVS 5969 - NL 80/I for information on FS Boo.

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REVISED ELEMENTS AND CCD LIGHT CURVE FOR AQ BOOTIS

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Name of the object:
AQ Boo = S 8091 = GSC 01460.578

Equatorial coordinates:	**Equinox:**
R.A.= $13^h47^m26.9^s$ **DEC.=** $+17°18'24''$	2000.0

Observatory and telescope:
Private observatory, Schlüsselacher, Wald, 0.15-m refractor

Detector:	SBIG ST-7 CCD camera

Filter(s):	None

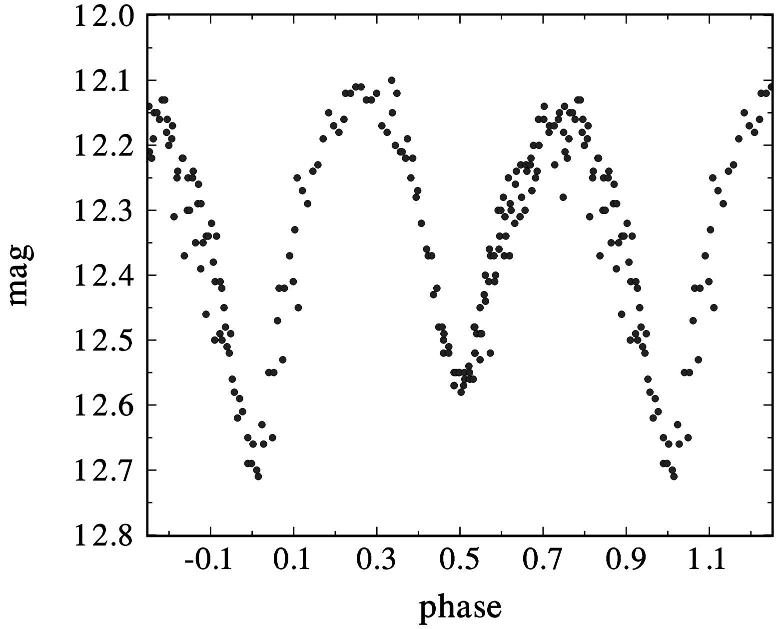

Figure 1. CCD light curve (without filter) of AQ Boo folded with the elements (2)

Comparison star(s):	GSC 01460.003

Check star(s):	GSC 01460.206

Transformed to a standard system:	No

Availability of the data:

Upon request from blaettler-wald@bluewin.ch

Type of variability:	EW

Remarks:

AQ Bootis is one of the many variable stars detected at Sonneberg Observatory by Hoffmeister (1964). In later articles, the star was investigated by Meinunger & Wenzel (1968) as well as by Schmidt (1996), who assigned AQ Bootis to the EW class of the eclipsing binaries and gave the approximate elements of variation

$$\mathrm{JD(min,hel)} = 2448716.724 + 0\overset{\mathrm{d}}{.}333412 \times E. \qquad (1)$$

Due to a typographical error in the text, some degree of ambiguity as to the correct value of the period remains, either $0\overset{\mathrm{d}}{.}333412$ or $0\overset{\mathrm{d}}{.}33412$. Our observational setup yields photometry at the $0\overset{\mathrm{m}}{.}03$ level. A total of 189 CCD measurements during 6 nights from JD 2451377 to JD 2451602 have been obtained. Due to the proximity of the comparison star to AQ Boo, no correction for differential extinction was applied to the data. From a long observing run covering 5.5 hours (JD 2451602) comprising both a primary as well as a secondary minimum it was evident, that the true value of the period is close to $0\overset{\mathrm{d}}{.}33314$. All our CCD observations are best represented by the new elements

$$\mathrm{JD(min,hel)} = 2451602.3922(6) + 0\overset{\mathrm{d}}{.}33314114(8) \times E. \qquad (2)$$

As can be seen in the following table, these elements of variation also fit the initial minimum of the elements (1) to a satisfying degree.

JD(hel)	Est. err.	E	$O-C$	Reference
2448716.724		−8662.0	+0.003	Schmidt (1996)
2450518.517	0.003	−3253.5	−0.001	Diethelm (1997)
2450941.4413	0.0013	−1984.0	+0.0011	Diethelm (1998)
2451334.5469	0.0011	−804.0	+0.0001	Blättler (1999)
2451358.365	0.002	−732.5	−0.001	Blättler (1999)
2451602.3928	0.0009	0.0	+0.0006	Blättler (2000)
2451602.5585	0.0003	0.5	−0.0003	Blättler (2000)

AQ Bootis is a W UMa type eclipsing binary, whose primary minimum is a transit, while the secondary is an occultation. Some of the scatter in Figure 1 indicates, that its light curve is not absolutely stable.

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TIMES OF EXTREMA OF SELECTED ECLIPSING BINARIES AND TWO SX Phe STARS

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We present heliocentric times of minima for six eclipsing binaries (Table 1) and times of extrema for two high amplitude SX Phoenicis stars (Table 2). Both times of maxima and minima can be used to study slow period changes in SX Phe stars, as is for example the case with the prototype SX Phe itself (Rodríguez et al., 1995). Times of minima may also be used to check the constancy of the shape and the skewness of the light curve. The observations were obtained with a 0.4-m telescope equipped with a Hisis24 CCD-camera. The chip is a Kodak KAF400 in a 2 × 2 binning mode. No filter was used. All frames were dark-framed and flat-fielded using routines of the MIPS-software. Differential photometry was performed using the method of profile fitting, also available in MIPS (Buil et al., 1993). The overall photometric accuracy is better than 0.01 mag, as verified from the differences comparison – check star in the case of BL Cam.

The times of minima of the eclipsing binaries were calculated by fitting a second degree polynomial through the observations. For the SX Phe stars, a third degree polynomial was fitted. The quality of this fit can be verified in Figure 1, where the data and the fit of one extremum of BL Cam are shown.

The $O-C$ values listed in the tables have been calculated relative to the elements mentioned in the General Catalogue of Variable Stars (GCVS, Kholopov et al., 1985). The theoretical times of minima used to compute the $O-C$ values of both SX Phe stars were calculated from the difference between the times of maximum and minimum as listed in the GCVS (Table 2).

In the case of IP Peg we used the ephemeris of Wolf et al. (1993) which is valid for the moment of white dwarf egress. We subsequently corrected the $O-C$ value with $0\overset{d}{.}043$ in order to obtain the value for mid-eclipse. For BL Cam we also computed the $O-C$ values relative to two additional sets of elements derived by Hintz et al. (1997). From a comparison between the different sets of values for BL Cam we can confirm the presence of the quadratic term included in their set nr. 3.

Table 1: $O - C$ values for six eclipsing binaries

Star	N	JD Hel.	Error	$O - C$	Remark
UW Boo	151	2451299.4174	0.0002	0.000	
Z Dra	48	2451253.4047	0.0001	−0.120	
VX Lac	37	2451431.4651	0.0011	0.030	
UU Lyn	54	2451270.4313	0.0004	−0.0043	
IP Peg	27	2449972.4129	0.0001	−0.0022	cataclysmic variable
XZ UMa	67	2451270.3409	0.0003	−0.049	

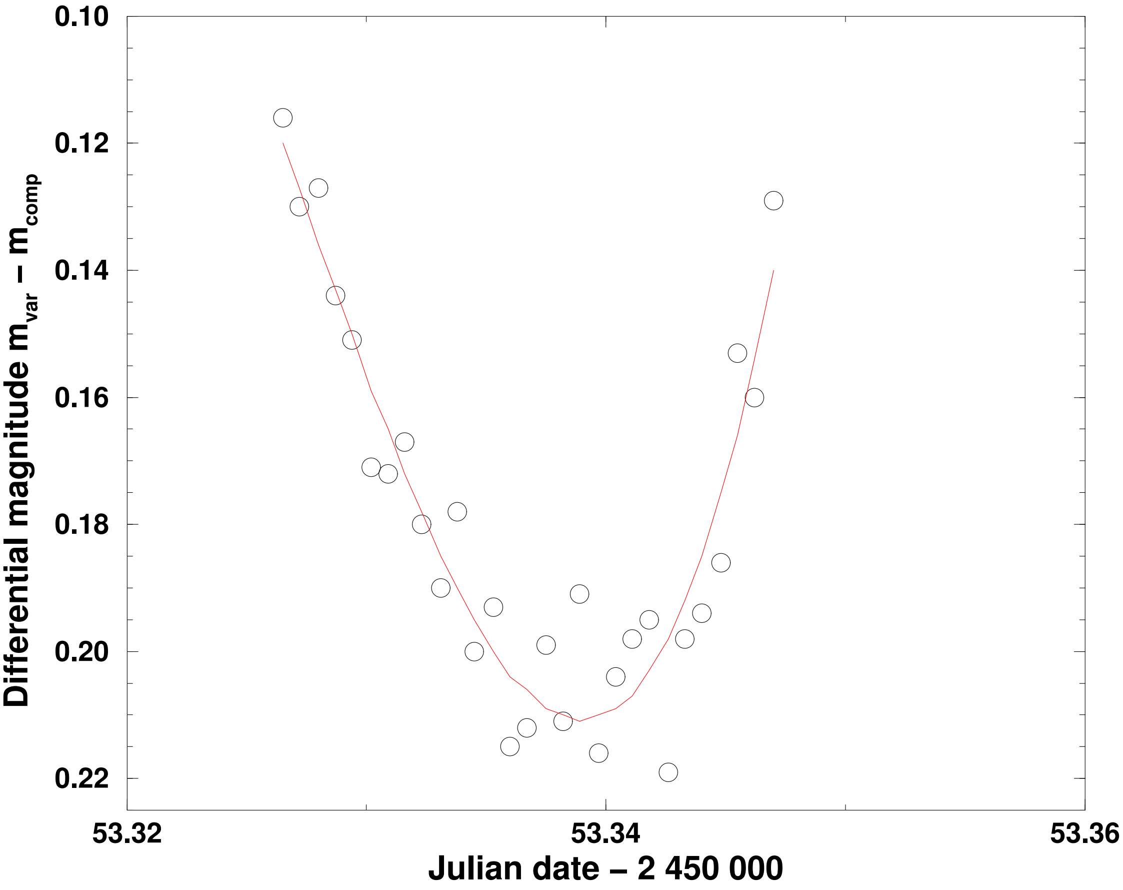

Figure 1. Data and polynomial fit are shown for one observed minimum of BL Cam

Table 2: $O-C$ values for two SX Phoenicis stars

Star	N	JD Hel.	Error	Max/ Min	$O-C$ GCVS	$O-C$ Hintz (2)	$O-C$ Hintz (3)
BL Cam	17	2450014.4750	0.0008	−	0.0019	0.0027	−0.0004
BL Cam	11	2450014.4916	0.0002	+	0.0025	0.0032	0.0002
BL Cam	17	2450014.5138	0.0005	−	0.0016	0.0024	−0.0007
BL Cam	13	2450014.5314	0.0003	+	0.0032	0.0039	0.0009
BL Cam	17	2450053.3168	0.0002	+	0.0037	0.0043	0.0011
BL Cam	29	2450053.3390	0.0004	−	0.0029	0.0034	0.0002
BL Cam	19	2450053.3552	0.0002	+	0.0030	0.0036	0.0004
BL Cam	26	2450053.3771	0.0005	−	0.0019	0.0024	−0.0008
BL Cam	19	2450053.3930	0.0003	+	0.0017	0.0023	−0.0009
BL Cam	26	2450053.4165	0.0005	−	0.0022	0.0027	−0.0005
BL Cam	19	2450053.4330	0.0003	+	0.0027	0.0032	0.0000
BL Cam	16	2451135.5071	0.0002	+	0.0116	0.0058	−0.0012
BL Cam	36	2451135.5295	0.0004	−	0.0109	0.0051	−0.0019
BL Cam	23	2451135.5457	0.0001	+	0.0111	0.0053	−0.0017
BL Cam	32	2451135.5685	0.0004	−	0.0108	0.0050	−0.0020
BL Cam	22	2451135.5851	0.0003	+	0.0114	0.0056	−0.0014
BL Cam	33	2451135.6082	0.0003	−	0.0114	0.0056	−0.0013
BL Cam	22	2451135.6254	0.0004	+	0.0126	0.0068	−0.0002
BL Cam	25	2451135.6470	0.0006	−	0.0111	0.0053	−0.0016
BL Cam	19	2451138.4785	0.0002	+	0.0116	0.0057	−0.0012
BL Cam	36	2451138.5025	0.0003	−	0.0125	0.0066	−0.0003
BL Cam	17	2451138.5184	0.0002	+	0.0124	0.0065	−0.0004
BL Cam	28	2451138.5402	0.0003	−	0.0111	0.0053	−0.0017
BL Cam	19	2451138.5569	0.0001	+	0.0118	0.0059	−0.0010
BL Cam	29	2451138.5782	0.0003	−	0.0100	0.0042	−0.0028
BL Cam	16	2451138.5963	0.0003	+	0.0121	0.0062	−0.0007
BL Cam	17	2451138.6153	0.0006	−	0.0080	0.0022	−0.0048
BL Cam	27	2451139.2955	0.0002	+	0.0075	0.0017	−0.0053
BL Cam	20	2451139.3236	0.0004	−	0.0125	0.0067	−0.0003
BL Cam	21	2451139.3402	0.0003	+	0.0131	0.0073	0.0003
BL Cam	23	2451139.3621	0.0007	−	0.0119	0.0061	−0.0009
BL Cam	15	2451139.3795	0.0002	+	0.0133	0.0075	0.0005
BL Cam	27	2451139.4001	0.0004	−	0.0108	0.0050	−0.0020
BL Cam	15	2451139.4168	0.0002	+	0.0115	0.0057	−0.0013
BL Cam	21	2451139.4393	0.0009	−	0.0109	0.0051	−0.0019
BL Cam	28	2451140.3394	0.0004	−	0.0118	0.0060	−0.0010
BL Cam	17	2451140.3568	0.0002	+	0.0132	0.0073	0.0004
BL Cam	26	2451140.3787	0.0003	−	0.0120	0.0062	−0.0008
BL Cam	15	2451140.3957	0.0007	+	0.0130	0.0071	0.0002
BL Cam	20	2451140.4166	0.0004	−	0.0108	0.0050	−0.0020

Table 2: $O - C$ values for two SX Phoenicis stars (cont.)

Star	N	JD Hel.	Error	Max/ Min	$O - C$ GCVS
DY Peg	25	2449964.4421	0.0007	−	−0.0034
DY Peg	17	2449964.4681	0.0003	+	−0.0008
DY Peg	23	2449996.3368	0.0003	+	−0.0009
DY Peg	21	2449996.3853	0.0012	−	0.0019
DY Peg	11	2449996.4094	0.0006	+	−0.0012
DY Peg	15	2450003.3375	0.0002	+	−0.0011
DY Peg	17	2450004.4312	0.0003	+	−0.0013

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DEEPLY ECLIPSING DWARF NOVA RX J0909.8+1849

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RX J0909.8+1849 (= 1RXS J090950.6+184956) is a cataclysmic variable identified in the course of the Hamburg/RASS identifications of ROSAT sources (Bade et al. 1998). Bade et al. (1998) reported the magnitude of the object as 16.4. The J2000.0 coordinates are $09^{\mathrm{h}}09^{\mathrm{m}}50\overset{\mathrm{s}}{.}56$, $+18^{\circ}49'47\overset{''}{.}2$. After the discovery of an apparent outburst of $V = 12.5$ on GSC (Kato 1998), we started systematic visual and CCD monitoring in order to verify the nature of variability. A total of 40 negative visual observations were obtained between 1998 April 3 and 2000 February 1 (by Kinnunen, Watanabe and Maehara; typical upper limits: 14.0–14.5), until the eventual detection of an outburst by Maehara at visual magnitude 13.0 on 2000 February 10 (Maehara and Kato 2000). The beginning of the outburst dates back to 2000 February 7 (mag 12.9) on CCD images by Schmeer using the 50-cm reflector at the Iowa Robotic Observatory (Schmeer 2000). This outburst was independenly discovered by Gänsicke et al. (2000; the object is referred to as HS 0907+1902). Schmeer (2000) noted an unexpected fading of 1.9 mag on 2000 February 10.303 UT. Upon the notification of the outburst and knowing the unusual temporal fading, we started time-resolved CCD photometry.

The Kyoto observations (Kato and Uemura) were done using an unfiltered ST-7 camera attached to the Meade 25-cm Schmidt–Cassegrain telescope. The exposure time was 30 s. The images were dark-subtracted, flat-fielded, and analyzed using the Java$^{\mathrm{TM}}$-based aperture photometry package developed by on of the authors (Kato). The differential magnitudes of the variable were measured against GSC 1404.1852 (Tycho-2 V-magnitude 11.08), whose constancy was confirmed by comparison with GSC 1404.778 (Tycho-2 V-magnitude 11.12). Soon after the beginning of the observation, we detected a deep eclipse with an amplitude of 1.6 mag (Figure 1), with a total duration of 24 min and a flat-bottomed eclipse profile. The eclipsing nature of the object was independently detected by Vanmunster (2000a) and Gänsicke et al. (2000). The immediately identified orbital

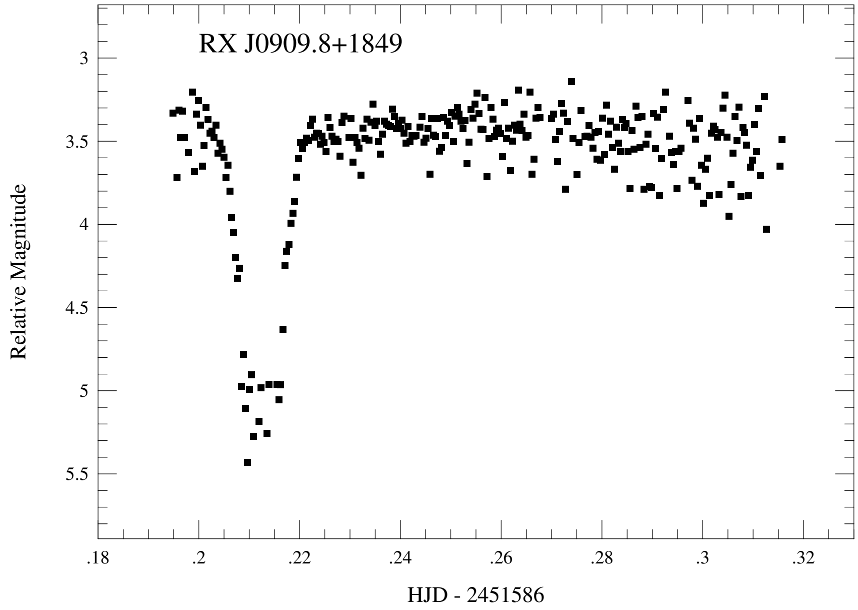

Figure 1. Eclipse of RX J0909.8+1849 (2000 February 11)

period of 0.175 d or 4.2 hours (Vanmunster 2000b; Gänsicke et al. 2000) places RX J0909.8+1849 as a cataclysmic variable above the period gap.

Our subsequent observations revealed clear fading from outburst. Figure 2 represents the outburst light curve constructed from Kyoto observations. Magnitudes are relative to GSC 1404.1852. A total of seven eclipses were caught by us. Together with two eclipse timings reported by Vanmunster (2000c) and seven eclipses reported by Gänsicke et al. (2000), we obtained the following ephemeris.

$$\mathrm{Min(HJD)} = 2451586.21266(10) + 0\overset{\mathrm{d}}{.}1754457(38) \times E, \tag{1}$$

where E refers to the cycle number since our first eclipse observation. Errors in the last digit are given in brackets. Table 1 lists the eclipse timings. This ephemeris clearly explains the temporal fading reported by Schmeer (2000) being caused by a deep eclipse.

The presence of the long-lasting faint state and a short outburst is a clear signature of RX J0909.8+1849 being a dwarf nova. The lack of detectable outbursts in 1998 and 1999 may constrain the outburst frequency. Including the 2000 February outburst, visual observations recording magnitudes brighter than 14.0 comprise 7% of all observations. Taking this value as the rough estimate of the outburst duty cycle, the system may be classified as one of SS Cyg-type dwarf novae with relatively rare outbursts. Since such bright, deeply eclipsing dwarf novae above the period gap are extremely rare (only IP Peg and EX Dra reach magnitudes brighter than 13), the system will provide an excellent opportunity in spatially resolving the accretion disk. Another noteworthy feature of RX J0909.8+1849 is the relatively strong X-ray emission. IP Peg is not recorded in the ROSAT 1RXS catalog; EX Dra is four times fainter than RX J0909.8+1849. This may reflect some sort of magnetic nature of the white dwarf in RX J0909.8+1849, although no coherent photometric modulations suggesting the white dwarf spin were found in our

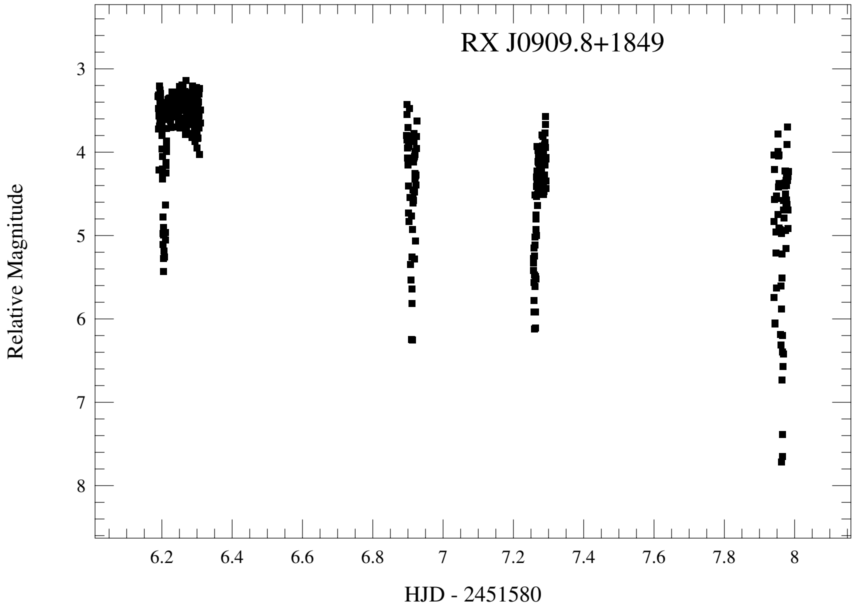

Figure 2. Outburst of RX J0909.8+1849 from Kyoto data. Eclipses getting increasingly deeper are superimposed on the general decline trend.

Table 1: Eclipses of RX J0909.8+1849

Time[a]	E	$O-C$[b]	Observer/source[c]
51581.8263	−25	−0.0002	Gänsicke et al. (2000)
51582.0017	−24	−0.0003	Gänsicke et al. (2000)
51585.6861	−3	−0.0002	Gänsicke et al. (2000)
51586.21253	0	−0.00012	Kato and Uemura
51586.38832	1	0.00023	Vanmunster (2000c)
51586.56370	2	0.00018	Vanmunster (2000c)
51586.91463	4	0.00018	Kato and Uemura
51587.96811	10	0.00099	Kato and Uemura
51588.31800	12	0.00000	Buczynski
51589.8969	21	−0.0001	Gänsicke et al. (2000)
51590.07237	22	−0.00009	Garradd
51590.7742	26	−0.0001	Gänsicke et al. (2000)
51590.9496	27	−0.0001	Gänsicke et al. (2000)
51590.94995	27	0.00026	Garradd
51591.12455	28	−0.00059	Garradd
51599.7219	77	−0.0001	Gänsicke et al. (2000)

[a] HJD − 2400000

[b] against Eq. (1), (d)

[c] Buczynski (33-cm reflector + SXL8 CCD);
Garradd (45-cm reflector + AP-7 CCD)

data. A more detailed analysis of the eclipses during this outburst and the following quiescence will be presented in a separate paper.

This work is partly supported by the Grant-in-Aid for Scientific Research (10740095) of the Japanese Ministry of Education, Science, Culture, and Sports. Schmeer's observations were made with the Iowa Robotic Observatory, and he wishes to thank Robert Mutel and his students.

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Vanmunster, T., 2000b, *vsnet-alert circulation*, No. 4210, available at http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-alert/msg04210.html

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THE VARIABLE PERIOD OF RY CANIS MINORIS

BAV MITTEILUNGEN NR. 127

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RY CMi = GSC 177.1211 = 283.1928 was discovered by Hoffmeister (1930). He announced it as an eclipsing variable of Algol type between $11\overset{\mathrm{m}}{.}9$ and $14\overset{\mathrm{m}}{.}9$ (pg) and a period of $3\overset{\mathrm{d}}{.}2654$. Further investigations made by Kukarkin (1930) were used by Rügemer (1932) to refine the elements to:

$$\text{Min I} = \text{HJD } 2425323.51 + 3\overset{\mathrm{d}}{.}265211 \times E. \tag{1}$$

With these elements, RY CMi is listed in the fourth edition of the GCVS (Kholopov et al., 1985, 1999).

Visual and CCD observations in the last decade made by Borovicka (1993), Diethelm (1996), Locher (1989, 1990) and Paschke (1988, 1989, 1992, 1993) yielded however large $O-C$ values.

Williams (1996) made a survey using old Harvard plates covering the years after the observations of Hoffmeister. He derived times of normal minima to improve the ephemeris (1) to:

$$\text{Min I} = \text{HJD } 2427478.559 + 3\overset{\mathrm{d}}{.}265222 \times E. \tag{2}$$

In order to check the long-term behaviour of the period and to bridge the gap between the Harvard plates and the CCD measurements, additional observations on 272 sky patrol plates of Sonneberg Observatory were performed by T.B. They cover a time interval between J.D. 2438004 and 2450428.

All minima published until today together with the newly found ones are listed in Table 1; Figure 1 gives the corresponding $O-C$ diagram according to elements (2).

Assuming two consecutive constant periods, the following set of linear elements can be derived by least squares fitting:

From JD 2425000 (approx.) to JD 2437500 (approx.):

$$\begin{array}{rcl} \text{Min I} = \text{HJD } 2427478.578 & + & 3\overset{\mathrm{d}}{.}265204 \times E. \\ \pm 19 & & \pm 24 \end{array} \tag{3}$$

From JD 2437500 (approx.) to JD 2450150 (last observed minimum):

$$\begin{array}{rcl} \text{Min I} = \text{HJD } 2449031.410 & + & 3\overset{\mathrm{d}}{.}264998 \times E. \\ \pm 24 & & \pm 4 \end{array} \tag{4}$$

Table 1: Minima of RY CMi according ephemeris (2)

HJD	Epoch	$O-C_2$	Method	Weight	Observer
25323.47	-660	-0.04	pg	1	Hoffmeister
25346.37	-653	0.00	pg	1	Hoffmeister
25532.63	-596	0.14	pg	1	Hoffmeister
25643.47	-562	-0.03	pg	1	Hoffmeister
25653.38	-559	0.08	pg	1	Hoffmeister
27419.778	-18	-0.007	pgN	1	Williams
27478.612	0	0.053	pgN	1	Williams
30750.309	1002	-0.002	pgN	1	Williams
31504.590	1233	0.012	pgN	1	Williams
31850.667	1339	-0.024	pgN	1	Williams
38387.480	3341	-0.186	pg	2	Berthold
38472.379	3367	-0.182	pg	1	Berthold
38671.581	3428	-0.159	pg	2	Berthold
40150.625	3881	-0.261	pg	1	Berthold
41332.528	4243	-0.368	pg	2	Berthold
41391.350	4261	-0.320	pg	1	Berthold
44166.542	5111	-0.567	pg	1	Berthold
44251.466	5137	-0.538	pg	2	Berthold
45407.350	5491	-0.543	pg	1	Berthold
46360.612	5783	-0.726	pg	1	Berthold
47170.40	6031	-0.71	visN	2	Paschke
47206.31	6042	-0.72	pg	2	Paschke
47552.413	6148	-0.731	vis	5	Locher
47591.57	6160	-0.76	visN	5	Paschke
47921.330	6261	-0.784	pg	1	Berthold
47970.352	6276	-0.740	vis	2	Locher
48698.355	6499	-0.882	CCDN	5	Paschke
48982.417	6586	-0.894	pg	2	Berthold
49031.382	6601	-0.907	pg	2	Berthold
49031.385	6601	-0.904	CCD	10	Borovicka
49031.390	6601	-0.899	CCD	10	Paschke
50151.339	6944	-0.922	CCD	5	Diethelm

Remark: ‘N’ refers to normal minima

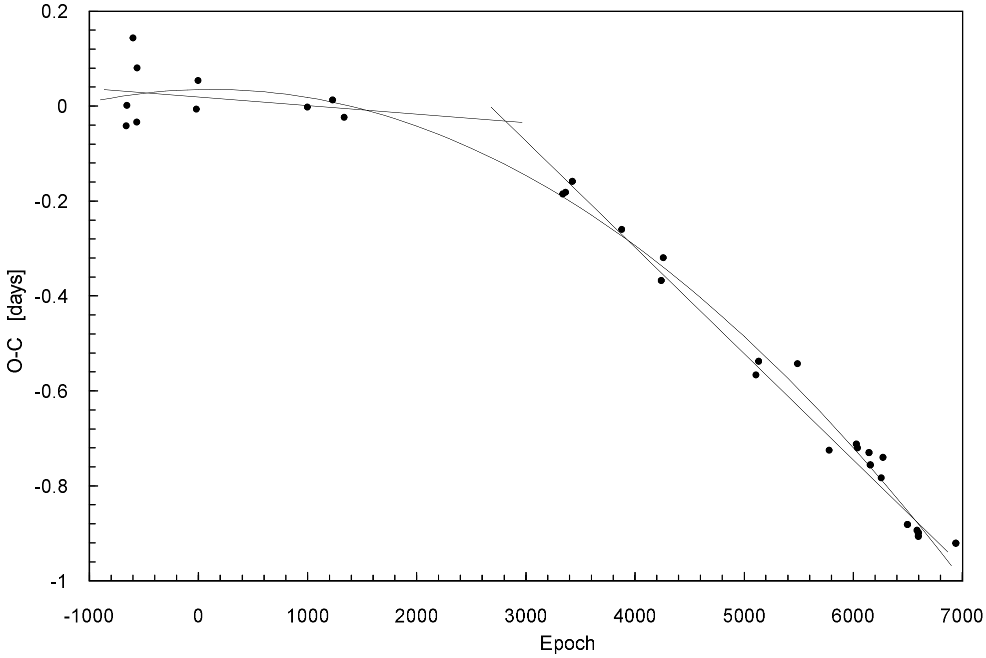

Figure 1. $O-C$ diagram of the available minima according to ephemeris (2).

Alternatively, a weighted quadratic least squares fit is also possible to achieve, yielding the following elements:

$$\begin{array}{rl}\text{Min I} = \text{HJD } 2427478.594 + 3\overset{\text{d}}{.}265227 \times E - 2.18 \times 10^{-8} \times E^2. \\ \pm 11 \qquad\qquad \pm 7 \qquad\qquad \pm 10\end{array} \qquad (5)$$

Based on the quadratic elements we can derive the rate of the period change as $dP \sim -4\overset{\text{d}}{.}36 \times 10^{-8}$ per orbital revolution.

The observed changes in period make RY CMi an interesting case to which more attention should be paid. In spite of the brightness and the large amplitude of the star, neither a photoelectric observed light-curve nor any spectral data are available. We therefore suggest spectroscopy and multicolour CCD photometry of this object.

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NEW FIELD VARIABLE STARS I

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In the course of photometric and astrometric observations of selected minor planets, we obtained 4415 individual CCD frames at the Konkoly Observatory between April 1998 and January 2000 (Sárneczky et al. 1999, Kiss et al. 1999, Szabó et al. 2000). In order to extract as much information as possible, we have surveyed this large amount of data to identify known or new variable stars captured on those frames which were obtained as time-series CCD photometry of certain asteroids. As the typical observations covered 4-6 hours per night, we could only find short-period variable stars.

The observations were carried out with the 60/90/180-cm Schmidt telescope at the Piszkéstető Mountain Station of the Konkoly Observatory. The detector was a Photometrics AT200 CCD camera (1536 × 1024 pixels, KAF-1600 chip with UV-coating). The field of view was $29' \times 18'$. The observations were mostly unfiltered, but in several cases we used the Cousins R_C filter.

The photometric reductions were done with the *ROMAFOT* package of ESO-MIDAS version 98NOVpl2.1. We have examined time-series observations that covered at least 90 minutes. For constructing light curves we used a multi-object multi-frame analysing software developed by Balog et al. (2000). This software, called APPLE, determines interactively the sub-pixel size shifts of the frames caused by the guiding errors of the telescope. Differential instrumental magnitudes were determined relative to an average value calculated from many (typically 10-20) stars. The resulting light curves were checked interactively by plotting them on the computer screen. The photometric accuracy is between 0.01–0.05 mag, depending on the target brightness.

We have found seventeen variable stars on the examined CCD frames. The SIMBAD database was used to identify them with previously known variables, but all of them turned out to be new discoveries. Six variables were observed in February, 2000 with an objective prism at the Konkoly Observatory in order to determine approximate spectral types. We present light curves for the other eleven variables in this paper (Figs. 1, 2), while the remaining six stars together with their spectra will be published in a subsequent paper. The presented observational data are available upon request from the first author.

Basic data (identifications, celestial coordinates and magnitudes) of the new variables are summarized in Table 1. The sparse phase coverage did not allow reliable classification

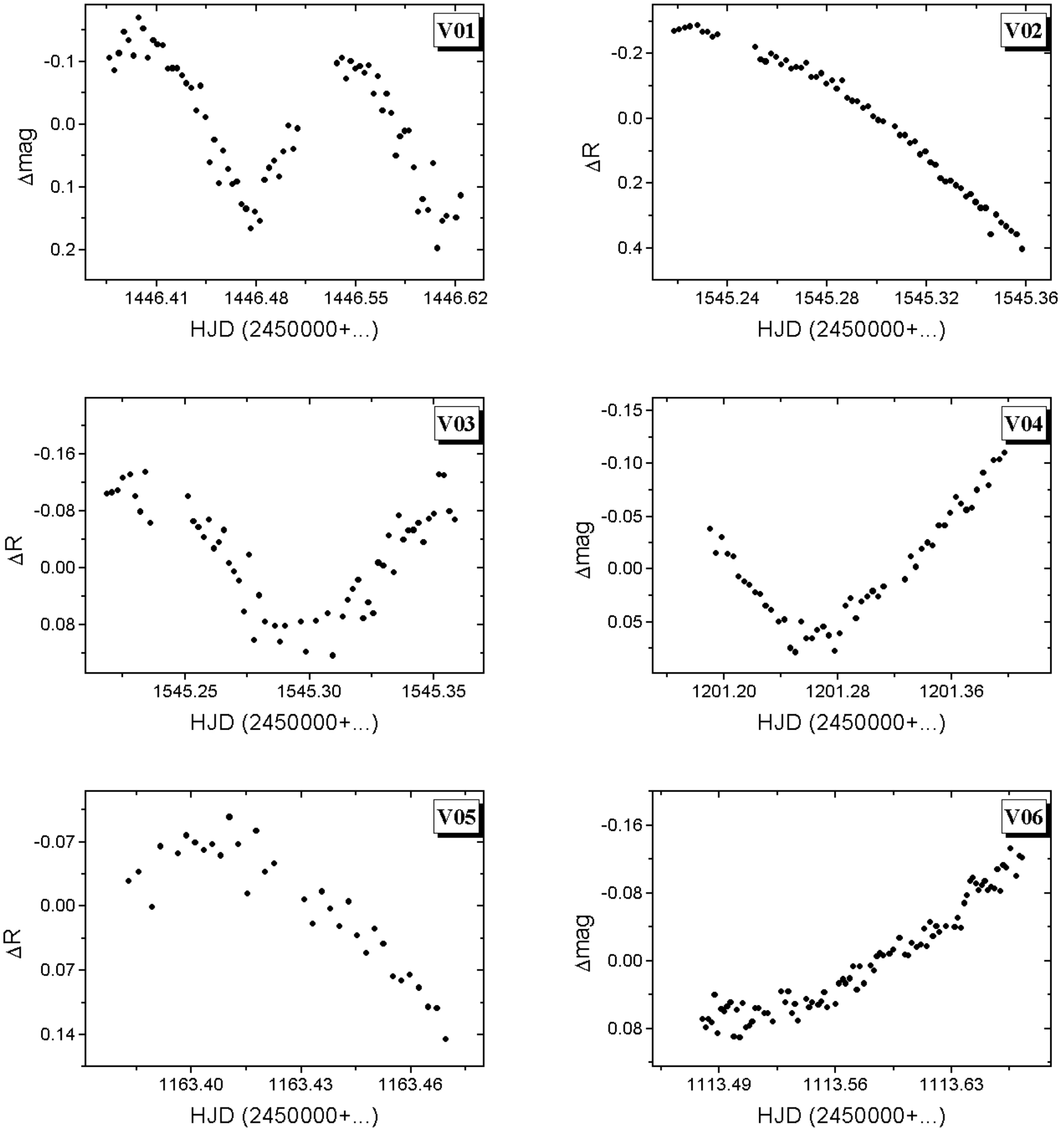

Figure 1. Light curves of 6 new variable stars

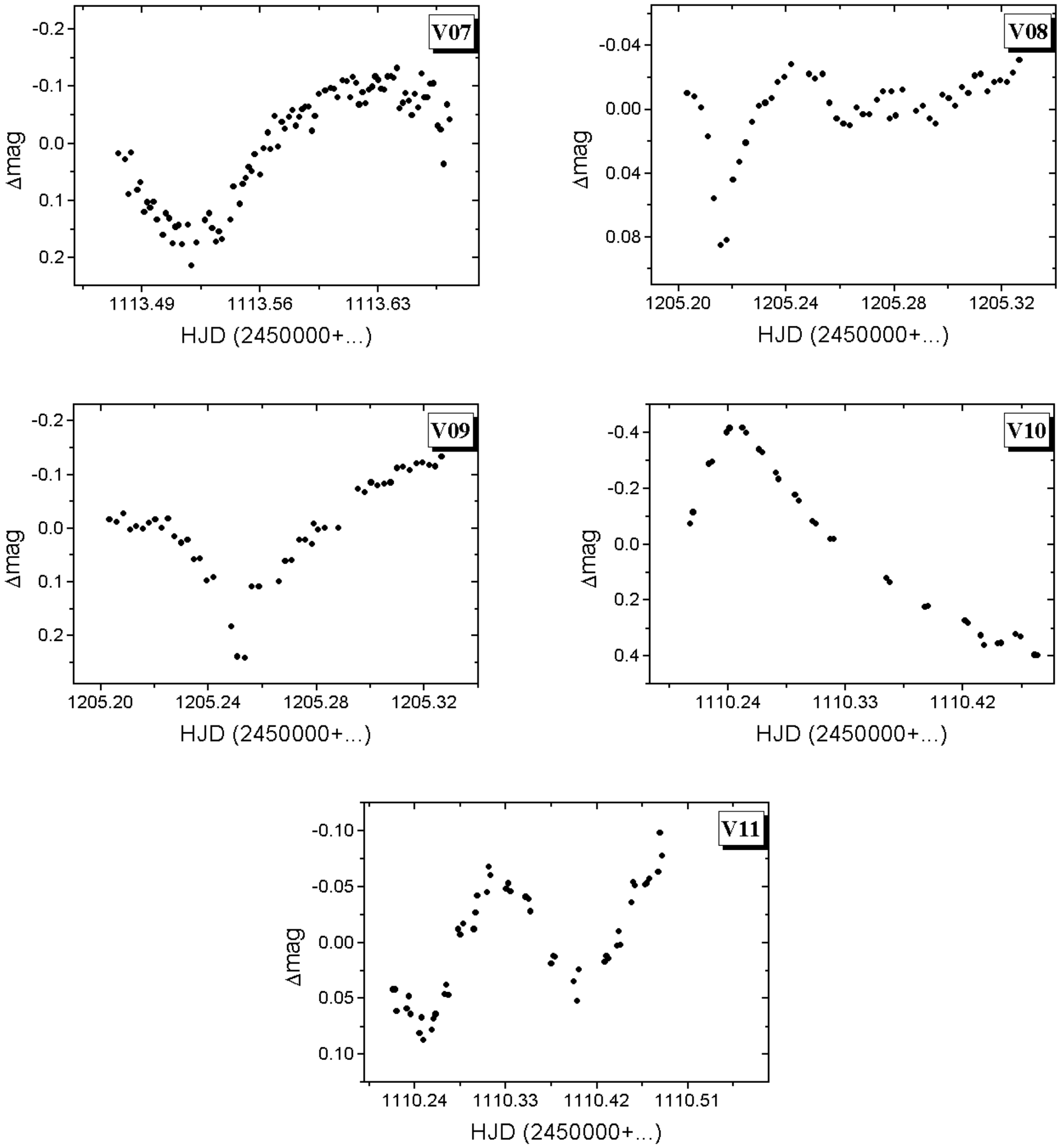

Figure 2. Light curves of 5 new variable stars

Table 1: Basic data of the new variables. The coordinates, red and blue magnitudes have been taken from USNO-A2.0

Variable	R.A. (2000)	Dec. (2000)	Red mag.	Blue mag.	Type
V01	$01^{\mathrm{h}}23^{\mathrm{m}}02^{\mathrm{s}}\!.75$	$+25^\circ37'12''\!.90$	16.3	17.0	EW
V02	$04^{\mathrm{h}}29^{\mathrm{m}}31^{\mathrm{s}}\!.58$	$+39^\circ52'47''\!.45$	15.7	16.2	–
V03	$04^{\mathrm{h}}30^{\mathrm{m}}35^{\mathrm{s}}\!.11$	$+39^\circ45'44''\!.51$	17.0	18.2	EW
V04	$04^{\mathrm{h}}31^{\mathrm{m}}16^{\mathrm{s}}\!.85$	$+13^\circ06'41''\!.83$	17.0	18.1	–
V05	$05^{\mathrm{h}}02^{\mathrm{m}}00^{\mathrm{s}}\!.46$	$+10^\circ37'23''\!.31$	16.2	17.1	–
V06	$05^{\mathrm{h}}31^{\mathrm{m}}03^{\mathrm{s}}\!.25$	$+10^\circ28'43''\!.57$	15.2	17.6	–
V07	$05^{\mathrm{h}}31^{\mathrm{m}}12^{\mathrm{s}}\!.78$	$+10^\circ27'42''\!.99$	16.7	17.4	EW
V08	$06^{\mathrm{h}}32^{\mathrm{m}}27^{\mathrm{s}}\!.44$	$+27^\circ17'04''\!.79$	14.7	15.2	EA
V09	$06^{\mathrm{h}}32^{\mathrm{m}}49^{\mathrm{s}}\!.06$	$+27^\circ20'09''\!.16$	16.0	16.4	–
V10	$23^{\mathrm{h}}29^{\mathrm{m}}24^{\mathrm{s}}\!.67$	$+10^\circ01'17''\!.08$	15.6	15.6	RRab
V11	$23^{\mathrm{h}}47^{\mathrm{m}}39^{\mathrm{s}}\!.84$	$+09^\circ20'29''\!.93$	15.1	16.1	EW

of the variable stars, therefore, we give only a rough estimate of the type of variability based on the light curve shapes and USNO-A2.0 colours. Further multicolour photometry is needed to clarify the real nature of these new variables.

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HD 87271: A PULSATING CLASSICAL λ BOOTIS STAR

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The λ Bootis stars are a chemically peculiar subgroup of the A-type stars, characterized by deficiencies of Fe-peak elements, but having approximately solar abundances of C, N, O and S (e.g. Paunzen 1999 and references therein). There are two main competing theories attempting to explain this abundance pattern: a mass loss/diffusion theory (Michaud & Charland 1986) and an accretion/diffusion theory (Venn & Lambert 1990). The first theory would generate λ Bootis stars only after about 10^9 yrs, whereas the second one can yield λ Bootis stars within a few $\times\ 10^6$ yrs (Charbonneau 1993), although older λ Bootis stars would be possible (cf. Gray & Corbally 1998). Age determinations for λ Bootis stars are therefore of interest. Pulsation information may thus help to discriminate between these two theories. As many λ Bootis stars are located within the δ Scuti instability strip (at a few $\times\ 10^9$ yrs) and do pulsate, this has been attempted by Paunzen et al. (1998). In this note we report the discovery of a new pulsating λ Bootis star.

Whilst searching HIPPARCOS photometry (ESA 1997) for new γ Doradus star candidates (Handler 1999a), several possible new δ Scuti stars were set aside. One of them was HD 87271, which is a 7th magnitude equatorial star with an HD spectral classification of A0; no other classification was found in the literature. The standard deviation of the HIPPARCOS measurements of HD 87271 exceeds the mean of its formal errors (usually a very good estimate of the real accuracy of the data) by more than a factor of 2 and the amplitude spectrum of these data (Fig. 1) is not consistent with noise, but it is inconclusive otherwise.

To shed more light on the nature of HD 87271, Strömgren photometry was obtained (Handler 1999b). This showed the star to be located in the δ Scuti instability strip, but it also revealed that HD 87271 is quite metal-poor. This prompted us to study the star in more detail.

Two classification spectra of the star were taken with the Gray/Miller spectrograph on the 0.8-m telescope of the Dark Sky Observatory (Appalachian State University) using a 1024×1024 Tektronics thinned, back-illuminated CCD. The spectra were reduced using standard methods under IRAF, and have $S/N > 300$. The first spectrum has a resolution of 3.6 Å/2 pixels and a spectral range from 3800–5600 Å. The second has a resolution

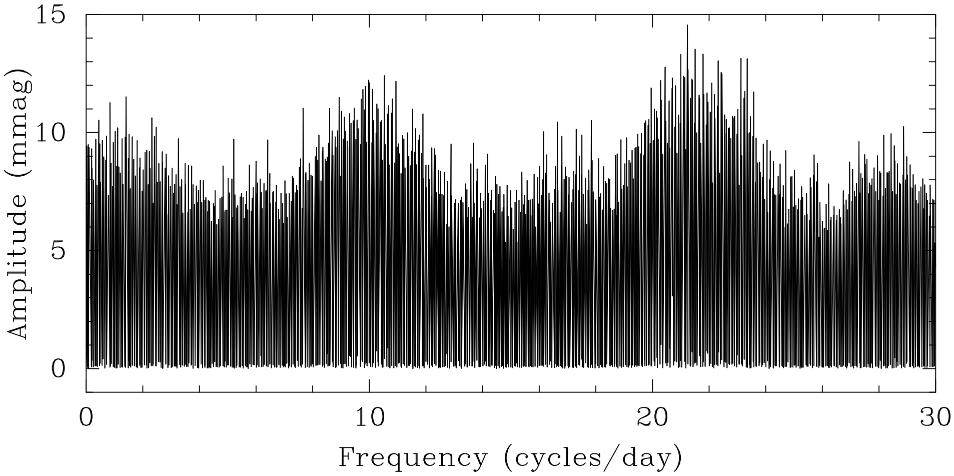

Figure 1. Amplitude spectrum of the HIPPARCOS photometry of HD 87271. δ Scuti-type variability can be suspected, but not proven.

of 1.8 Å/2 pixels and a spectral range from 3800–4600 Å. Both spectra yielded the same classification. HD 87271 appears to be a classical λ Bootis star, and may be one of the most extreme known. The hydrogen lines in HD 87271 are a good match to an A9 dwarf, and are the best indicators of the effective temperature of the star. However, the metallic-line spectrum, including the K-line and the Mg II $\lambda\,4481$ line, is extremely weak, and roughly matches an A0 star in strength (although not in morphology — the zero-volt lines are more dominant in HD 87271 which is considerably cooler than the typical A0 star). Thus, the spectral type is A9 kA0mA0 V λ Boo (kA0 and mA0 would be the spectral types derived from the *K*-line and *m*etal lines only, respectively). The spectrum of HD 87271 is shown in Fig. 2, in comparison with HR 4881, another extreme λ Bootis star.

HD 87271 was tested for light variations. Differential photoelectric photometry was taken with a single-channel photometer (with a GaAs tube as the detector) attached the 0.6-m telescope at Siding Spring Observatory, Australia. Two comparison stars, HD 87178 (F6III) and HD 87423 (F5) were used in the observing sequence C1–V–C2–V–C1–V–C2… There is no evidence for variability of the two comparison stars, whose magnitude differences showed an rms scatter of 3.5 mmag for the B filter and 4.5 mmag for the V filter per single measurement after the reductions, which comprised dead time correction, subtraction of sky background and compensation for extinction and transparency changes. The reduced light curves of HD 87271 are shown in Fig. 3.

It is quite clear that HD 87271 is a multiperiodic pulsator; the mean period in our observations is about 80 minutes. This is in good agreement with the time scales and supposed complexity of the light variations anticipated from the HIPPARCOS photometry.

Turning to a discussion of the physical properties of HD 87271, one can estimate an effective temperature of 7650 ± 150 K from the Strömgren indices using the model atmosphere calibration by Kurucz (1991). This is consistent with the A9 hydrogen-line spectral type derived above. The HIPPARCOS parallax of the star yields an absolute magnitude of $M_v = 1.26$ mag, which is in agreement with the absolute magnitude estimated from calibrations of Strömgren photometry (Crawford 1979). We point out that the latter

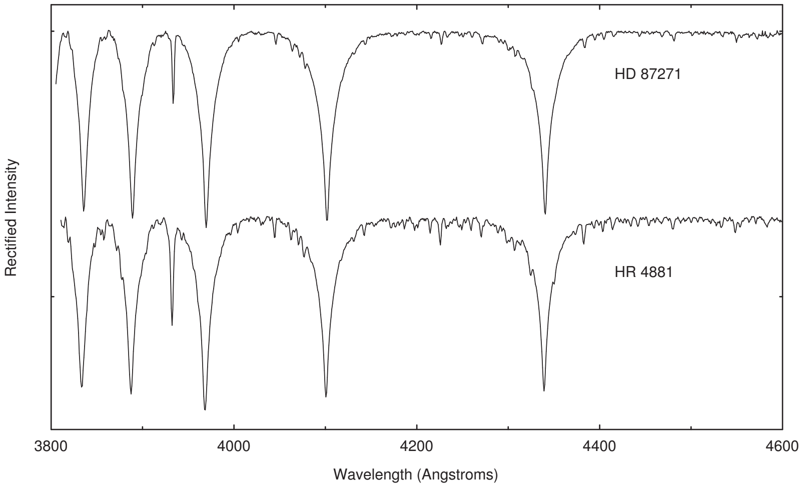

Figure 2. The classification spectrum of HD 87271 compared with that of another extreme λ Bootis star, HR 4881.

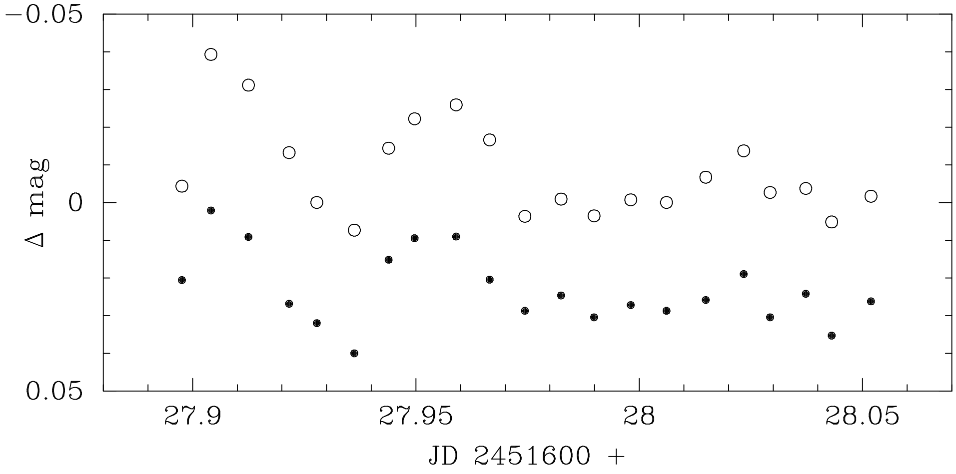

Figure 3. Differential B (open circles) and V (filled circles) filter light curves of HD 87271. The presence of multiperiodic pulsations is quite obvious.

and the effective temperature given above should be taken with caution, as the chemical peculiarity of the star surely affects the results. Still, they are sufficient for our purposes.

With this absolute magnitude and temperature, the evolutionary state of HD 87271 is ambiguous, as it is close to the TAMS. We cannot say whether it is still on the main sequence or already in the post-main sequence phase of evolution. By comparison with evolutionary tracks (e.g. those plotted by Handler et al. 1997) we estimate the mass of HD 87271 to be close to 2.05 $M_\odot$. This results in a pulsation "constant" $Q = 0.017$ d for an 80-minute period and indicates pulsation near the third radial overtone, which is quite typical for a pulsating λ Bootis star with physical parameters as inferred above (cf. Paunzen et al. 1998).

We conclude with the remark that HD 87271 is a highly interesting object for further study. High-resolution spectra to perform an abundance analysis would be desirable and the apparently rich pulsation spectrum coupled with rather high amplitudes would make a more detailed asteroseismological study worthwhile.

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PHOTOELECTRIC MINIMA OF ECLIPSING BINARIES

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The following table lists the unpublished photoelectric times of minima of several binaries observed at Mt. Suhora Observatory of Cracow Pedagogical University after 1997. The observations were made using a double channel photometer (Kreiner et al. 1993), attached to the 0.6/7.5-m Cassegrain telescope. They were reduced in a usual way and left in the instrumental system (near to the UBVRI). The times of minima were determined using Kwee and van Woerden (KW) (1956) method or by parabola fitting (PF) or by Kordylewski's tracing paper (TP) (Szafraniec 1948) graphic method. The $O-C$ values were computed using elements given in the General Catalogue of Variable Stars (IV edition, Moscow, 1985-87). Entries in all columns are self-explanatory. For a few stars we use following elements to $O-C$ calculations.

BH CMi	$2450518.3851 + 0.55994477 \times E$
DQ Her	$2434954.9438 + 0.1936209014 \times E$
HW Vir	$2445730.5569 + 0.1167195525 \times E$
PG1336-18	$2450223.3613 + 0.101015999 \times E$

Observers: MD – Marek Dróżdż; JK – Jerzy Krzesiński; SZ – Stanisław Zoła; WO – Waldemar Ogłoza.

Table 1

Star	Filters	HJD 2400000+	Error	$O-C$	Type	Method	Observer
ZZ Aur	B,V	50800.641	±0.016	0.012	Pri.	PF	MD
	B,V,R	51111.4676	±0.0002	0.0103	Pri.	KW	WO
	R	51147.5443	±0.0020	0.0141	Sec.	PF	WO
AO Cam	V	51199.4585	±0.0001	0.0834	Sec.	KW	MD
	V	51199.6237	±0.0001	0.0836	Pri.	KW	MD
	B,V,R,I	51237.397	±0.004	0.0816	Sec.	KW	MD
	B,V,R,I	51241.5223	±0.0002	0.0828	Pri.	KW	MD
	B,V,R,I	51597.486	±0.005	0.0659	Pri.	PF	MD
BH CMi	U,B,V,R	50067.6330	±0.0004	0.034	Pri.	KW	WO
	B,V,R	50088.608	±0.008	−0.0189	Sec.	KW	WO
	B,V,R,I	50518.3846	±0.0017	−0.0005	Pri.	KW	WO
	B,V,R,I	51189.4860	±0.004	0.0071	Sec.	KW	SZ

Table 1 (cont.)

Star	Filters	HJD 2400000+	Error	$O-C$	Type	Method	Observer
XZ CMi	B,V,R,I	51159.5274	±0.0012	−0.0089	Pri.	KW	MD
CC Com	B,V,R,I	51207.5459	±0.0001	−0.0103	Sec.	KW	WO
V1061 Cyg	B,V,R,I	51159.3789	±0.0011	−0.008	Pri.	KW	MD
UX Her	V,R	50943.3753	±0.0002	0.0307	Pri.	KW	SZ
	V,R	50970.4873	±0.0002	0.0378	Pri.	KW	SZ
DQ Her	–	50629.5307	±0.0004	0.0068	Pri.	KW	JK
	–	50632.4306	±0.0003	0.0024	Pri.	KW	JK
XY Leo	V,R,I	51257.4389	±0.0003	−0.1366	Pri.	KW	SZ
	B,V,R,I	51550.4893	±0.0004	−0.1322	Sec.	KW	WO
	B,V,R,I	51550.6314	±0.0004	−0.1321	Pri.	KW	WO
SW Lyn	U,B,V,R	49762.3114	±0.0008	0.0118	Pri.	TP	MD
	B,V,R,I	50753.5418	±0.0002	0.0286	Pri.	KW	MD
	B,V,R,I	50865.6120	±0.0004	0.0317	Pri.	KW	MD
	B,V,R	50866.2562	±0.0003	0.0319	Pri.	KW	MD
	B,V,R,I	50884.2888	±0.0005	0.0307	Pri.	TP	MD
UZ Lyr	B,V,R	50674.4031	±0.0003	−0.0085	Pri.	KW	WO
V Sge	V,R	50969.4725	±0.0004	−0.0213	Pri.	KW	SZ
W UMi	B,V,R,I	51151.3950	±0.0005	−0.1154	Pri.	KW	MD
HW Vir	U,B,V,R,I	49778.6249	±0.0005	0.0005	Pri.	KW	WO
	B,V,	49785.6279	±0.0002	0.0003	Pri.	KW	WO
	U	49808.5048	±0.0007	0.0002	Pri.	KW	WO
	B,V,	50552.4744	±0.0002	−0.0007	Pri.	KW	WO
	R,I	50594.3768	±0.0007	−0.0006	Pri.	KW	WO
	R	50604.4147	±0.0010	−0.0006	Pri.	KW	WO
	I	50927.4938	±0.0002	−0.0012	Pri.	KW	WO
	V,R	51300.4125	±0.0002	−0.0014	Pri.	KW	SZ
	R	51301.3460	±0.0001	−0.0017	Pri.	KW	SZ
	R	51301.4629	±0.0001	−0.0015	Pri.	KW	SZ
PG1336-18	–	51278.3724	±0.0001	0.0000	Pri.	PF	JK, WO
	–	51278.4228	±0.0003	−0.0001	Sec.	KW	JK, WO
	–	51278.4734	±0.0002	0.0000	Pri.	PF	JK, WO
	–	51278.5237	±0.0003	−0.0002	Sec.	KW	JK, WO
	–	51278.5742	±0.0002	−0.0002	Pri.	PF	JK, WO
	–	51281.3020	±0.0002	0.0001	Pri.	PF	JK, WO
	–	51281.3521	±0.0004	−0.0003	Sec.	PF	JK, WO
	–	51283.3221	±0.0002	−0.0001	Pri.	PF	JK, WO
	–	51283.3725	±0.0005	−0.0002	Sec.	PF	JK, WO
	–	51283.4231	±0.0002	−0.0001	Pri.	PF	JK, WO
	–	51284.5342	±0.0002	−0.0002	Pri.	PF	JK, WO
	–	51318.3740	±0.0001	−0.0007	Pri.	TP	JK, WO
	–	51318.4750	±0.0001	−0.0007	Pri.	TP	JK, WO
	–	51320.3942	±0.0001	−0.0008	Pri.	TP	JK,WO
	–	51320.4954	±0.0002	−0.0007	Pri.	TP	JK,WO

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 275–281

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first described by Hoffmeister (1943). Details about the identification procedure and table layout are contained in the first report of our series (Kinnunen & Skiff 2000).

Table 1: Variables on *MVS* 275–281

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3329	GW Cas*	$0^{\mathrm{h}}46^{\mathrm{m}}53\overset{\mathrm{s}}{.}27$	$+56^\circ40'08\overset{''}{.}4$	G	3663-1363	00439+5623
S 3330	GX Cas	0 49 01.50	+56 52 44.6	A		
S 3331	GY Cas*	0 49 35.31	+56 09 29.6	A		
S 3332	GZ Cas	0 51 43.32	+55 59 22.9	T	3659-0751	00488+5543
S 3333	HH Cas	0 51 53.34	+55 59 11.3	T	3659-0043	
S 3334	HI Cas	0 55 29.77	+53 52 20.5	G	3668-0949	00525+5336
S 3335	HK Cas	0 57 20.05	+55 26 19.9	G	3672-1922	
S 3336	HL Cas	1 00 21.48	+56 49 28.6	T	3676-1768	
S 3337	HM Cas	1 00 34.81	+55 36 21.9	A		00576+5520
S 3338	HN Cas	1 00 54.37	+55 54 17.8	G	3672-1509	
S 3339	HO Cas	1 02 43.56	+61 51 43.0	G	4017-0408	
S 3340	HP Cas	1 04 13.15	+54 04 53.3	G	3668-2034	01012+5348
S 3341	HQ Cas	1 07 50.56	+60 07 10.2	G	4017-1534	
S 3342	HR Cas	1 07 07.88	+54 37 08.0	A		
S 3343	HT Cas	1 10 12.95	+60 04 36.2	A		
S 3344	HU Cas*	1 11 03.64	+57 20 45.9	T	3677-1213	
S 3345	HV Cas	1 11 03.45	+53 43 40.3	G	3669-0133	
S 3346	HW Cas	1 12 25.91	+54 50 08.0	G	3673-0549	01093+5434
S 3347	HX Cas	1 16 11.94	+59 15 22.2	G	3681-0656	01130+5859
S 3348	HY Cas	1 16 06.94	+57 14 24.4	A		
S 3349	V419 Cas	1 19 05.65	+56 53 48.1	A		
S 3350	HZ Cas	1 21 49.93	+54 58 48.6	T	3674-0666	01187+5443

Table 1: Variables on *MVS* 275–281 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3351	II Cas	$1^{\rm h}26^{\rm m}40^{\rm s}.97$	$+60^\circ46'45''.6$	A		01234+6031
S 3352	IK Cas	1 26 36.90	+55 09 35.3	G	3674-1125	
S 3353	IL Cas	1 30 46.78	+60 06 02.4	T	4031-2917	
S 3354	IM Cas	1 32 00.25	+62 19 44.5	T	4035-0724	
S 3355	ES Per	1 32 50.16	+54 20 35.6	A		
S 3356	ET Per	1 39 22.17	+53 52 19.2	G	3671-1029	
S 3357	EU Per	1 39 27.29	+54 30 57.3	T	3675-1883	01362+5415
S 3358	IN Cas	1 40 57.16	+56 19 44.2	A		
S 3359	IO Cas	1 47 02.66	+59 36 23.0	A		
S 3360	IP Cas	1 48 55.86	+54 43 29.3	T	3688-2090	01456+5428
S 3361	IQ Cas	1 49 41.76	+59 43 10.3	T	3696-0917	
S 3362	EV Per	1 49 29.94	+53 58 36.6	G	3684-0997	01462+5343
S 3363	EW Per*	1 52 15.54	+56 58 02.5	G	3692-1494	
S 3364	BY Per	1 54 35.60	+54 47 59.9	A		
S 3365	CC Per	1 59 37.06	+55 59 22.1	A		
S 3366	CE Per	2 03 03.67	+52 11 48.1	G	3292-1670	01597+5157
S 3367	CF Per	2 03 23.65	+57 43 20.8	T	3693-1307	01599+5728
S 3368	CT Per	2 11 34.54	+59 06 05.6	G	3697-0702	02080+5852
S 3369	DH Per	2 22 01.46	+53 08 34.0	A		
S 3370	DM Per*	2 25 58.01	+56 06 10.0	T	3690-1139	
S 3371	DO Per*	2 27 22.17	+55 31 10.9	A		
S 3372	DT Per	2 31 23.15	+56 52 57.4	G	3695-1810	
S 3373	DU Per	2 32 45.05	+58 14 37.5	G	3699-1448	02290+5801
S 3374	EG Per	2 37 00.50	+53 58 26.7	A		02334+5345
S 3375	EL Per	2 40 16.63	+52 08 26.9	T	3308-2174	
S 3376	EY Per	3 52 00.48	+44 49 27.9	G	2876-0272	
S 3377	FF Per	3 52 36.58	+47 28 52.1	G	3330-2101	
S 3378	FG Per	3 53 30.2	+47 39 04	S		03499+4730
S 3379	FH Per	3 54 39.38	+47 06 38.9	G	3330-2279	
	FI Per*	3 54 56.80	+48 36 02.1	A		
S 3380	FK Per	3 57 00.52	+44 32 05.2	G	2876-1018	
S 3381	HW Per	3 58 46.09	+44 44 06.1	G	2876-1967	
S 3382	FL Per	3 59 37.27	+46 27 44.7	G	3327-1405	03560+4619
	FM Per*	4 03 27.02	+47 59 52.1	G	3331-1127	
S 3383	FN Per	4 04 17.19	+45 25 39.9	T	3327-0863	04007+4517
	FO Per*	4 08 34.95	+51 14 48.3	A		
S 3384	FP Per	4 10 29.63	+45 54 43.2	G	3328-1060	
	FR Per*	4 11 32.51	+51 20 03.0	T	3340-0761	04077+5121
S 3385	FS Per	4 12 05.18	+48 13 57.3	G	3332-2150	04084+4806
S 3386	FT Per	4 12 19.69	+44 45 41.8	G	2890-0881	04087+4438
S 3387	HX Per	4 13 01.11	+45 26 13.3	G	3328-0010	04094+4518
S 3388	FU Per	4 14 56.81	+48 49 16.6	A		04112+4841
S 3389	FV Per*	4 15 05.26	+46 50 04.1	G	3328-1349	04114+4642
S 3390	HY Per	4 20 56.32	+50 52 07.4	G	3341-1520	
S 3391	HZ Per	4 25 37.30	+45 37 13.4	G	3329-0799	
	FW Per*	4 27 44.56	+52 28 50.9	G	3341-0406	
S 3392	II Per	4 29 37.63	+44 25 40.5	A		
	FY Per*	4 41 56.59	+50 42 36.4	G	3355-0750	
S 3393	GL Per	4 19 09.00	+40 45 43.7	G	2882-1344	04157+4038

Table 1: Variables on *MVS* 275–281 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3394	GO Per	$4^{\mathrm{h}}22^{\mathrm{m}}31\overset{\mathrm{s}}{.}20$	$+39^\circ35'13''.7$	G	2883-1507	04191+3928
S 3395	GR Per	4 23 36.65	+38 38 03.8	G	2879-1163	04202+3831
S 3396	GQ Per*	4 23 23.21	+36 12 53.9	T	2384-1024	
S 3397	GT Per	4 27 14.95	+40 54 33.8	G	2883-2252	
S 3398	GU Per	4 27 32.43	+41 47 02.8	G	2887-2722	
S 3399	GV Per	4 27 49.65	+41 41 32.7	T	2887-2754	
S 3400	NZ Per*	4 27 59.45	+37 50 30.9	T	2879-0341	
S 3401	GW Per	4 29 17.94	+42 33 37.5	A		04257+4226
S 3402	GX Per*	4 29 16.83	+40 44 54.9	G	2883-2210	04258+4038
	GY Per*	4 29 15.12	+39 33 44.0	G	2883-2423	
S 3403	GI Per	4 29 43.25	+39 52 02.0	T	2883-2547	
S 3404	GZ Per*	4 29 51.28	+38 59 35.3	G	2879-1011	
S 3405	HI Per	4 35 11.77	+39 19 48.2	G	2880-0431	
S 3406	HM Per	4 39 42.84	+39 01 42.9	G	2880-1905	
S 3407	EU Aur	4 40 35.82	+35 25 10.4	G	2382-0533	
S 3408	HN Per	4 41 08.76	+39 25 17.6	G	2897-1468	04377+3919
	HO Per*	4 41 28.70	+40 11 30.5	T	2897-2025	
S 3409	HQ Per	4 43 57.89	+40 50 05.2	G	2897-1485	
S 3410	V421 Per	4 45 34.91	+43 34 22.4	A		
S 3411	HR Per	4 49 34.66	+40 43 31.0	G	2897-0685	04460+4038
S 3412	EV Aur	4 51 24.42	+42 46 59.9	G	2902-0591	04479+4242
S 3413	EW Aur*	4 51 24.84	+38 11 18.9	G	2894-2717	
S 3414	EX Aur*	4 52 41.45	+38 01 18.1	G	2894-2641	
S 3415	EY Aur	4 53 15.57	+41 48 57.0	G	2902-2207	04497+4144
S 3416	EZ Aur	4 53 13.04	+40 43 43.2	T	2898-2116	04497+4038
S 3417	FF Aur	4 55 18.13	+39 58 47.1	G	2898-1000	
S 3418	FH Aur	4 56 16.16	+40 04 32.2	G	2898-2371	04527+3959
S 3419	FI Aur	5 02 24.73	+42 09 42.1	G	2903-1803	
S 3420	BS Gem	6 10 18.42	+22 45 11.8	A		
S 3421	BT Gem	6 11 41.11	+23 19 39.9	A		
S 3422	BV Gem	6 15 34.26	+23 44 52.9	G	1877-0548	
S 3423	BW Gem	6 15 59.89	+23 44 50.9	G	1877-1395	
S 3424	GL Ori	6 18 52.37	+20 08 32.7	G	1323-0451	06158+2009
S 3425	GM Ori	6 23 51.40	+17 00 47.4	G	1319-1951	
S 3426	CE Gem	6 26 12.6	+16 44 19	S		
S 3427	CH Gem	6 28 08.03	+22 54 28.8	G	1879-1967	
S 3428	CI Gem*	6 30 05.86	+22 18 50.7	*		
S 3429	CK Gem	6 30 37.10	+19 38 28.3	A		
	CL Gem*	6 31 16.09	+18 14 21.0	T	1332-0807	
S 3430	CQ Gem*	6 33 58.21	+21 14 38.1	G	1341-0064	06309+2116
S 3431	CS Gem	6 36 30.78	+21 37 52.6	G	1341-1481	06334+2140
S 3432	CW Gem	6 39 58.90	+21 52 33.8	G	1341-0105	
S 3433	CX Gem	6 40 03.75	+21 49 18.7	G	1342-0844	
S 3434	DD Gem*	6 43 23.65	+19 14 52.8	A		
S 3435	DT CMa	7 17 41.00	–14 12 59.5	G	5407-3153	
S 3436	NSV 3523	7 18 17.51	–13 21 55.1	A		
S 3437	NSV 3531*	7 19 14.3	–17 58 27	S	5969-0224	07170–1752
S 3438	DV CMa	7 19 17.42	–14 19 04.8	A		07169–1413
S 3439	DW CMa*	7 19 35.94	–17 39 18.7	G	5969-2200	
S 3440	DO CMa	7 22 03.90	–16 13 18.0	G	5966-1784	

Table 1: Variables on *MVS* 275–281 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3441	BW CMa	$7^{\mathrm{h}}22^{\mathrm{m}}08\overset{\mathrm{s}}{.}03$	$-18^{\circ}38'19\overset{''}{.}0$	A		
S 3442	EE CMa	7 23 11.80	−15 19 31.7	A		
S 3443	DP CMa	7 23 59.24	−17 12 58.4	G	5970-0124	
S 3444	DX CMa	7 24 43.94	−12 57 59.6	A		07223–1251
S 3445	KN Mon	7 25 50.84	−10 41 07.7	G	5400-1645	07234–1035
S 3446	KQ Mon	7 31 21.13	−10 21 49.0	G	5400-1088	
S 3447	NSV 3628*	7 31 55.36	−12 47 23.1	T	5405-1001	
S 3448	FW Pup	7 32 41.78	−12 46 27.6	G	5405-1299	
	EF Pup*	7 33 18.83	−12 21 25.6	G	5405-0260	07309–1214
S 3449	OO Pup	7 33 38.81	−16 19 01.7	G	5979-1909	
S 3450	FY Pup	7 35 58.83	−15 55 02.4	G	5979-1778	07337–1548
S 3451	HP Pup*	7 37 14.78	−16 53 39.1	A		
S 3452	GV Pup	7 42 08.70	−13 00 12.5	G	5418-0692	
	GL Pup*	7 42 41.10	−12 13 27.1	A		07403–1206
S 3453	GM Pup	7 45 44.17	−17 33 01.6	G	5985-1357	07434–1725
S 3454	GW Pup	7 46 23.72	−17 25 09.1	G	5985-0931	
S 3455	IK Mon	7 46 47.38	−10 48 32.6	A		07444–1041
S 3456	GP Pup	7 48 32.55	−15 11 16.1	G	5981-1031	
S 3457	KW Pup*	7 49 20.32	−15 05 37.1	T	5981-1097	
S 3458	GS Pup	7 51 57.45	−16 46 37.9	G	5981-0421	
S 3459	V457 Her*	17 08 23.89	+20 42 56.4	T	1547-1394	17062+2046
S 3460	V468 Her	17 13 40.05	+20 58 49.0	G	1548-0915	
	V471 Her*	17 15 02.64	+22 25 56.2	A		
S 3461	V472 Her	17 15 48.53	+21 27 57.4	T	1548-1335	17136+2131
S 3462	V387 Her	17 18 47.05	+20 14 30.6	T	1544-1390	
S 3463	V475 Her*	17 19 59.55	+24 12 06.2	G	2074-1393	
S 3464	V479 Her	17 21 26.18	+18 33 19.9	T	1541-0273	17192+1836
S 3465	V397 Her	17 23 08.28	+22 39 29.6	G	2074-0071	
S 3466	V500 Her	17 35 58.58	+18 28 35.8	T	1542-0070	
S 3467	NU Her	17 36 05.17	+22 15 31.2	A		17339+2217
S 3468	V506 Her	17 38 11.32	+18 53 17.2	G	1559-0242	
S 3469	V514 Her	17 40 56.96	+24 02 56.3	G	2076-1685	
S 3470	V619 Aql	19 32 58.34	+07 41 10.2	G	1056-3411	19305+0734
S 3471	V630 Aql	19 35 42.49	+07 52 11.1	G	1056-2859	
S 3472	V640 Aql	19 37 52.48	+10 47 09.2	T	1060-2030	
	V536 Aql*	19 38 57.41	+10 30 16.6	A		19365+1023
S 3473	V667 Aql	19 44 37.97	+10 09 21.7	T	1061-0217	
S 3474	V675 Aql	19 46 02.72	+13 58 53.2	G	1069-0208	19437+1351
S 3475	V685 Aql*	19 48 02.93	+14 50 36.6	G	1070-0061	19457+1443
S 3476	V705 Aql	19 51 46.37	+12 35 16.1	A		19494+1227
S 3477	V719 Aql	19 55 30.61	+07 25 41.9	T	0493-0115	
S 3478	V748 Aql*	19 59 39.63	+10 46 22.8	A		
	V509 Cyg*	20 37 38.58	+47 13 07.4	T	3578-2519	
S 3479	V513 Cyg	20 45 56.78	+40 38 22.6	T	3170-0931	
S 3480	V522 Cyg*	20 59 05.93	+48 05 37.4	A		20574+4753

Table 1: Variables on *MVS* 275–281 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3481	NSV 13583	$21^{h}11^{m}00^{s}.50$	$+39^{\circ}58'21''.9$	T	3173-2920	
S 3482	V527 Cyg*	21 10 47.37	+45 14 13.7	G	3588-1858	
S 3483	V529 Cyg	21 13 00.01	+40 08 28.3	A		
S 3484	V531 Cyg	21 18 30.91	+41 07 59.4	A		
S 3485	V532 Cyg	21 20 32.90	+45 28 03.0	T	3589-4843	
S 3486	V534 Cyg	21 21 08.45	+44 15 04.5	G	3194-1023	
S 3487	V535 Cyg	21 21 23.24	+42 14 13.7	A		
	V459 Cyg*	21 10 54.38	+49 08 31.4	T	3596-0297	
S 3488	V582 Cyg	21 11 51.39	+46 34 17.7	T	3589-4749	
S 3489	V602 Cyg	21 23 36.01	+41 33 11.4	T	3190-0950	
S 3490	V606 Cyg	21 26 24.50	+47 20 12.9	G	3594-1727	
	V611 Cyg*	21 29 22.23	+41 56 16.5	T	3190-1370	
S 3491	V623 Cyg	21 33 06.47	+45 43 35.9	G	3590-2430	21312+4530
S 3492	V624 Cyg*	21 33 14.53	+43 55 11.6	T	3195-1012	21313+4341
S 3493	V626 Cyg	21 34 03.88	+45 21 17.1	G	3591-2896	21321+4507
S 3494	V629 Cyg	21 34 15.20	+44 07 57.6	G	3195-1887	
S 3495	V655 Cyg	21 43 52.78	+48 00 37.0	G	3595-0548	
S 3496	V658 Cyg	21 47 40.4	+42 43 45	S		
S 3497	V664 Cyg	21 48 33.74	+40 58 36.0	T	3188-1369	
S 3498	V671 Cyg	21 50 15.12	+47 48 01.5	T	3608-0743	21483+4733
S 3499	V673 Cyg	21 51 37.72	+43 09 58.9	G	3197-2745	21496+4255
S 3500	NSV 14294	22 43 14.71	+50 57 32.2	G	3633-1395	22411+5041
S 3501	DS Lac	22 42 54.32	+55 18 41.7	A		22408+5502
S 3502	FH Lac	22 45 12.22	+50 25 10.1	G	3629-1699	22430+5009
S 3503	FK Lac	22 46 33.43	+52 09 28.7	G	3633-2237	
S 3504	EF Lac*	22 49 49.57	+48 37 54.5	A		22476+4821
S 3505	FM Lac*	22 51 10.93	+53 06 46.5	G	3984-2315	22490+5250
S 3506	EI Lac	22 55 44.42	+49 45 28.5	G	3630-1416	
S 3507	CS And	22 58 05.73	+48 45 33.3	T	3630-1025	22558+4829
S 3508	KW Cas	22 58 48.55	+57 13 30.8	G	3993-1422	22567+5657
S 3509	CT And	22 59 37.23	+51 40 17.1	G	3634-0152	22574+5124
S 3510	CU And	23 01 01.64	+49 58 25.4	G	3630-0666	
S 3511	BP And	23 00 59.10	+50 01 08.3	G	3630-0094	
S 3512	CV And*	23 00 59.96	+50 18 32.1	A	3630-0158	
	BQ And*	23 02 05.08	+51 35 40.2	G	3634-0270	22598+5119
S 3513	V343 Cas	23 04 49.64	+56 32 57.8	G	3993-2216	23026+5616
S 3514	CW And	23 06 04.15	+50 04 17.7	G	3631-0192	23038+4947
	IR Cas*	23 06 52.38	+54 04 52.2	T	3998-2007	
S 3515	CX And*	23 07 24.52	+50 45 51.6	G	3635-1496	23051+5029
S 3516	CY And	23 07 46.67	+51 14 31.8	G	3635-1046	23055+5058
S 3517	V345 Cas	23 08 39.88	+54 06 54.8	A		
S 3518	V560 Cas	23 10 43.36	+57 15 54.3	T	4006-0708	23085+5659
S 3519	V346 Cas*	23 10 55.57	+53 13 50.3	G	3998-2251	23086+5257
S 3520	BL And	23 11 24.26	+51 52 31.3	T	3635-1169	

Table 1: Variables on *MVS* 275–281 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3521	V561 Cas	$23^{\rm h}11^{\rm m}15^{\rm s}.05$	$+55^\circ 56' 16''.2$	G	4002-0167	23090+5539
S 3522	V349 Cas	23 11 31.02	+56 01 30.3	G	4002-0352	
S 3523	V350 Cas	23 12 02.60	+53 40 31.3	G	3998-2392	
S 3524	NSV 14453	23 11 58.95	+49 39 36.6	G	3631-1728	23097+4923
S 3525	V351 Cas*	23 12 12.94	+56 26 24.4	G	4006-0915	23100+5610
S 3526	V562 Cas	23 13 13.39	+56 36 12.6	G	4006-0523	
S 3527	DD And	23 17 10.63	+52 49 39.9	G	3998-0867	23148+5233
S 3528	DE And	23 17 26.13	+48 33 06.2	A		
S 3529	BE And	23 19 42.96	+48 40 09.1	T	3640-0649	
S 3530	LN Cas	23 20 22.04	+54 45 41.5	G	4003-2399	23180+5429
S 3531	DG And	23 23 18.32	+52 10 57.9	G	3648-0197	23209+5154
S 3532	V353 Cas*	23 23 28.12	+56 10 01.1	T	4003-0145	23211+5553
S 3533	DH And	23 24 38.67	+49 03 02.0	G	3644-2062	23223+4846
S 3534	V354 Cas	23 26 27.24	+53 53 06.9	A		23241+5336
S 3535	DI And	23 26 56.31	+48 57 21.2	G	3645-2006	
S 3536	NSV 14570	23 27 03.64	+54 37 15.1	A		
S 3537	V355 Cas	23 27 06.32	+56 44 44.4	G	4007-1293	
S 3538	V356 Cas*	23 29 13.16	+56 39 33.4	T	4007-1055	23268+5622
S 3539	V357 Cas	23 29 50.66	+54 57 59.5	G	4003-2012	
S 3540	DN And	23 35 51.36	+50 10 19.1	G	3645-0286	23334+4953
S 3541	LS Cas	23 38 09.89	+56 01 46.8	G	4004-1031	23357+5545

Notes:

BQ And	AN 459.1937.
CV And	southeastern star of a close pair.
CX And	southeastern star of a pair.
V536 Aql	AN 112.1904.
V685 Aql	IRC +10440.
V748 Aql	GCVS 4.1 position $4'.8$ in error.
EW Aur	USNO-A2.0 position given by Skiff (1999).
EX Aur	near to but outside the position error-ellipse of IRAS 04493+3756.
DW CMa	a nebula is associated with the variable and IRAS source.
GW Cas	northwestern star of a pair.
GY Cas	GCVS 4.1 position $3'.2$ in error.
HU Cas	eastern component of an unequal pair.
IR Cas	SVS 635.
V346 Cas	*MVS* chart has the wrong star of a wide pair marked.
V351 Cas	GCVS 4.1 position $3'.4$ in error.
V353 Cas	IRC +60403.
V356 Cas	IRC +60407.
V459 Cyg	AN 659.1936; *not* IRAS 21093+4857 = WB89 47, which is a background molecular cloud; the variable is outside the IRAS error ellipse.
V509 Cyg	AN 731.1933; northeastern star of a pair.
V522 Cyg	IRAS source includes long-wavelength flux due to nebulae associated with the variable.
V527 Cyg	EM* CGHA 60.
V611 Cyg	AN 53.1939.
V624 Cyg	IRC +40484.

Notes (cont'd.):

CI Gem	identification and position of Schmeer & Duerbeck (1999) adopted.
CL Gem	AN 691.1933.
CQ Gem	GCVS 4.1 position $3'\!.0$ in error.
DD Gem	eastern star of a pair; GCVS 4.1 position $3'\!.2$ in error.
V457 Her	BD+20°3401 (–3′ BD Dec error).
V471 Her	SV* R 378.
V475 Her	1RXS J171959.4+241202. The difference in USNO-A2.0 and GSC-ACT positions implies a modest proper motion of $0''\!.09$/year to the southwest. Together with the x-ray detection, this suggests the star is a nearby active dwarf.
EF Lac	southmost of trio.
FM Lac	southern star of a close double.
DM Per	HD 14871.
DO Per	GCVS 4.1 position $3'\!.2$ in error.
EW Per	near to but outside the position error-ellipse of IRAS 01489+5643.
FI Per	SV* R 2.
FM Per	SVS 663.
FO Per	AN 22.1939.
FR Per	AN 636.1936.
FV Per	IRC +50113.
FW Per	SVS 664.
FY Per	AN 640.1936.
GQ Per	HD 279815.
GX Per	GCVS 4.1 position $3'\!.7$ in error.
GY Per	AN 423.1928.
GZ Per	westernmost of a trio.
HO Per	SVS 767.
NZ Per	HD 279863.
EF Pup	AN 12.1937.
GL Pup	AN 13.1937.
HP Pup	GCVS 4.1 position $4'\!.2$ in error.
KW Pup	brighter of a pair.
NSV 3531	western component of a close double; variable on POSS-I/II. Lopez (1993) gives the GSC v1.1 position for the mean of the pair.
NSV 3628	BD–12°2011.

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 281–286

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first described by Hoffmeister (1944). Details about the identification procedure and table layout are contained in the first report of our series (Kinnunen & Skiff 2000).

Table 1: Variables on *MVS* 281–286

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3543	TY Ari	$2^{\mathrm{h}}08^{\mathrm{m}}40\overset{\mathrm{s}}{.}27$	$+25^\circ13'06\overset{''}{.}8$	G	1761-1085	
S 3544	TV Ari	2 11 08.69	+20 26 59.8	G	1220-1677	
	SY Ari*	2 17 34.09	+21 42 59.4	G	1220-0669	
S 3545	NSV 1754	4 53 08.59	–03 29 52.8	T	4741-0842	
S 3546	NSV 1781	4 56 51.89	–06 32 08.6	T	4749-0626	04544–0636
	V1008 Ori*	4 57 06.30	–01 47 14.9	G	4737-0705	04545–0151
	V1009 Ori*	5 05 34.62	–02 38 06.8	G	4754-0706	
S 3547	V1010 Ori	5 06 35.25	–03 01 11.7	G	4754-1029	
S 3548	V1011 Ori	5 10 10.85	–02 54 05.2	G	4755-1043	05076–0257
S 3549	NSV 1855	5 09 57.72	–09 36 56.6	G	5334-0355	
	V1012 Ori*	5 11 33.75	–02 22 29.2	A		
	V531 Ori*	5 12 20.53	–02 55 52.4	G	4755-0553	
S 3550	V534 Ori*	5 20 25.75	–05 47 06.5	G	4764-1259	
S 3551	V1014 Ori	5 23 02.90	–06 30 46.2	G	4765-0654	05206–0633
S 3552	EP Gem	6 36 47.41	+14 54 01.8	G	0745-0018	
S 3553	IN Mon*	6 39 29.90	+11 24 31.5	G	0754-2314	
S 3554	EV Gem	6 40 55.23	+12 34 54.2	G	0754-1750	06381+1237
S 3555	IS Mon*	6 45 14.20	+10 05 47.0	T	0750-0569	
S 3556	FG Gem	6 47 49.65	+16 51 47.6	T	1330-0912	
S 3557	FF Gem	6 47 50.23	+17 06 28.7	T	1334-0804	
S 3558	EF Gem	6 51 01.82	+17 29 54.9	G	1335-0815	
S 3559	FO Gem	6 53 28.52	+12 53 49.0	A		
S 3560	IT Mon	6 54 00.10	+09 00 06.8	G	0748-1041	06513+0903

Table 1: Variables on *MVS* 281–286 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3561	IV Mon	$6^{h}56^{m}21\overset{s}{.}84$	$+10^{\circ}57'28\overset{''}{.}8$	T	0752-0921	06536+1101
S 3562	FR Gem	6 56 52.05	+16 56 14.0	G	1348-1467	
S 3563	FT Gem	6 57 24.61	+13 42 06.6	G	0760-0326	
S 3564	IZ Mon	7 00 44.84	+08 49 03.1	T	0748-0575	
	FY Gem*	7 01 32.83	+14 55 18.3	G	0761-1999	06587+1459
	FZ Gem*	7 01 35.26	+15 01 00.4	A		
S 3565	KL Mon	7 03 46.14	+08 54 26.4	T	0749-1271	07010+0858
S 3566	GH Gem*	7 04 12.78	+12 03 34.3	G	0757-2117	
S 3567	GI Gem	7 04 40.85	+13 26 12.5	G	0761-0680	
S 3568	GK Gem	7 04 57.43	+13 56 47.8	G	0761-1545	
S 3569	KM Mon	7 04 42.12	+09 01 28.4	A		
S 3570	GL Gem	7 04 59.46	+10 51 04.5	T	0753-2063	07022+1055
S 3571	GN Gem	7 06 14.82	+11 30 18.8	G	0757-0971	07034+1134
S 3572	GO Gem*	7 07 34.58	+17 01 46.7	T	1349-0052	07046+1706
S 3573	GP Gem	7 09 29.19	+12 58 04.0	G	0770-0564	
S 3574	AH CMi*	7 10 44.96	+10 59 09.4	G	0766-0093	
S 3575	AN Leo	11 23 22.45	+06 38 05.1	T	0270-0519	
S 3576	AQ Leo	11 23 55.28	+10 18 59.3	G	0858-0781	
S 3577	AS Leo	11 29 11.24	+09 32 11.6	G	0856-0821	
S 3578	AX Leo	11 33 03.79	+12 09 13.5	T	0859-0119	
	ZZ Leo*	11 36 54.82	+09 31 45.3	T	0857-0229	
	AA Leo*	11 39 14.22	+10 19 38.3	T	0860-0368	
	ST Leo	11 38 32.67	+10 33 41.8	T	0860-0138	
S 3579	OW Her	18 03 00.85	+36 28 45.9	G	2633-0352	
S 3580	QS Her	18 13 18.68	+34 55 18.0	T	2630-0384	18115+3454
S 3581	QT Her	18 13 36.24	+39 08 17.6	G	3103-0977	18119+3907
S 3582	HT Lyr*	18 15 12.08	+38 18 08.0	A		
S 3583	HU Lyr	18 15 34.96	+36 51 39.4	T	2634-0559	18138+3650
S 3584	IM Lyr	18 19 04.20	+38 40 25.1	G	3103-1144	
S 3585	IS Lyr	18 25 29.61	+31 33 05.4	G	2623-0048	18236+3131
S 3586	IT Lyr	18 25 59.74	+31 29 50.0	T		
S 3587	IU Lyr	18 25 53.86	+35 33 40.4	G	2631-0287	18241+3531
S 3588	IV Lyr	18 27 11.50	+33 49 51.2	G	2632-1789	18253+3347
	KL Lyr*	18 30 13.33	+37 29 39.1	A		
S 3589	KT Lyr	18 32 42.26	+32 58 55.4	A		
S 3590	KZ Lyr	18 34 13.18	+32 35 42.5	A		
S 3591	KY Lyr*	18 34 17.04	+34 03 02.2	G	2632-0049	18324+3400
S 3592	LM Lyr	18 35 36.38	+39 29 42.9	G	3109-2418	18339+3927
S 3593	GH Cas	1 49 03.38	+56 16 26.8	G	3692-2619	
S 3594	CI Per	2 05 02.20	+57 08 34.8	G	3693-1900	
S 3595	CP Per	2 08 08.62	+52 00 17.5	A		
S 3596	CX Per	2 14 47.90	+51 48 18.5	A		02114+5134
S 3597	CY Per	2 15 01.58	+54 13 08.1	A		
S 3598	DD Per	2 15 19.37	+53 10 15.0	A		
S 3599	DL Per	2 25 11.24	+51 55 20.3	A		02217+5141
S 3600	DP Per	2 27 48.89	+57 05 51.8	G	3695-1428	02242+5652

Table 1: Variables on *MVS* 281–286 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3601	DR Per	2 28 25.87	+57 10 06.9	A		02248+5656
S 3602	GN Cas	2 30 58.69	+60 48 05.9	A		
S 3603	DV Per	2 32 36.68	+53 09 31.2	A		
S 3604	EH Per	2 37 38.39	+52 58 41.0	G	3687-1876	02341+5245
S 3605	EK Per	2 40 13.05	+56 11 42.2	A		02366+5558
S 3606	GQ Cas	2 44 19.01	+60 55 55.7	G	4047-1797	02404+6043
S 3607	GS Cas*	2 51 12.32	+59 13 49.9	T	3712-1849	
S 3608	EP Per	2 55 11.57	+54 25 46.7	A		02515+5413
S 3609	EQ Per	2 55 58.62	+52 10 24.6	A		
	ER Per*	2 56 55.76	+54 38 35.8	T	3705-0629	
S 3610	NSV 12012	19 25 42.43	+08 00 26.0	A		
S 3611	V610 Aql*	19 27 28.94	+07 11 34.7	A		
S 3612	V611 Aql	19 27 39.99	+11 48 45.5	G	1063-0715	
S 3613	NSV 12082	19 29 45.39	+07 44 22.6	A		
S 3614	V613 Aql	19 30 42.43	+07 47 40.7	G	1055-1263	
S 3615	V616 Aql	19 31 36.12	+10 49 07.4	G	1059-2485	
S 3616	V617 Aql*	19 32 01.1	+12 34 46	S		
S 3617	V618 Aql	19 32 22.82	+11 59 03.3	A		19300+1152
S 3618	V533 Aql	19 32 33.29	+11 02 30.5	A		19301+1056
S 3619	V629 Aql	19 35 29.63	+09 12 36.2	A		
S 3620	V634 Aql	19 36 40.44	+07 02 42.2	A		
S 3621	V632 Aql	19 36 10.32	+15 28 47.7	G	1602-0910	19338+1522
S 3622	V636 Aql*	19 37 08.9	+07 18 20	S		
S 3623	V639 Aql	19 37 41.39	+08 16 47.9	A		
S 3624	NSV 12241	19 38 54.89	+06 19 58.4	A		
S 3625	V644 Aql	19 38 32.48	+11 54 12.8	A		
S 3626	V646 Aql	19 39 02.32	+08 20 24.7	A		19366+0813
S 3627	NSV 12272	19 40 02.84	+15 03 22.1	G	1602-0762	19377+1456
S 3628	V651 Aql	19 40 47.47	+06 29 04.7	A		
S 3629	V652 Aql	19 40 26.80	+08 23 48.2	A		19380+0816
S 3630	V653 Aql	19 40 39.46	+10 02 32.7	A		19382+0955
S 3631	V654 Aql	19 42 01.48	+06 15 38.1	G	0491-1305	
S 3632	V655 Aql	19 42 03.49	+07 46 02.3	A		19396+0738
S 3633	V656 Aql	19 42 09.9	+07 09 56	S		19397+0702
S 3634	V657 Aql*	19 42 21.93	+15 45 58.8	G	1602-1676	19400+1538
S 3635	V658 Aql	19 42 39.00	+15 45 58.8	A		19403+1538
S 3636	V659 Aql	19 43 04.55	+15 11 07.8	A		
S 3637	V661 Aql	19 43 44.17	+06 04 10.7	G	0491-2836	19412+0556
S 3638	V662 Aql*	19 43 52.21	+05 37 17.7	G	0487-0112	19413+0529
S 3639	V663 Aql	19 44 02.58	+05 36 41.5	A		19415+0529
S 3640	V665 Aql*	19 44 17.37	+06 06 02.9	G	0491-2675	
S 3641	V668 Aql	19 45 00.67	+05 51 28.0	A		
S 3642	V670 Aql	19 45 07.68	+09 53 58.1	T	1061-0365	19427+0946
	NR Aql*	19 45 21.53	+09 53 32.5	A		
	V672 Aql*	19 45 37.69	+08 01 17.1	T	1057-1390	
3643	NSV 12375	19 45 31.01	+11 36 30.7	G	1065-0158	

Table 1: Variables on *MVS* 281–286 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3644	V673 Aql	19 45 37.89	+10 16 32.9	A		19432+1009
S 3645	V676 Aql*	19 46 42.78	+06 24 45.5	A		
S 3646	V678 Aql	19 46 58.77	+15 25 23.4	G	1615-2628	19446+1517
S 3647	V680 Aql	19 47 38.37	+05 35 44.0	G	0488-0307	19451+0528
S 3648	V679 Aql	19 47 14.10	+15 18 42.3	T	1615-1287	19449+1511
S 3649	V690 Aql	19 49 32.95	+09 07 59.1	A		
S 3650	V696 Aql	19 50 17.65	+14 41 59.1	A		19479+1434
S 3651	V697 Aql	19 50 52.25	+05 44 04.3	A		
S 3652	V1054 Aql*	19 52 18.21	+11 55 41.0	T	1066-0906	
S 3653	V710 Aql	19 52 51.96	+09 20 30.6	A		
S 3654	V714 Aql	19 54 06.35	+07 53 33.0	G	1058-0244	
	V715 Aql*	19 54 23.63	+08 00 18.2	G	1058-0562	
S 3655	V718 Aql	19 54 45.15	+14 09 58.2	G	1070-2636	19524+1402
S 3656	V721 Aql	19 55 36.18	+08 23 20.6	A		
S 3657	V728 Aql	19 57 00.29	+06 18 36.1	G	0493-2928	
S 3658	V730 Aql	19 57 03.09	+11 48 30.2	G	1079-2043	19546+1140
S 3659	V729 Aql	19 56 50.69	+13 17 50.3	A		
S 3660	V740 Aql	19 58 31.50	+05 44 05.1	A		
S 3661	V741 Aql	19 58 35.47	+08 05 29.8	A		
S 3662	V743 Aql	19 58 44.06	+09 57 12.1	A		
S 3663	V746 Aql	19 58 58.53	+11 35 06.3	A		
S 3664	V750 Aql	20 00 05.51	+10 21 01.8	G	1075-0855	19576+1012
S 3665	V753 Aql	20 00 08.15	+10 15 21.7	A		
S 3666	V756 Aql	20 00 20.74	+13 04 12.4	A		
S 3667	V764 Aql	20 01 31.88	+05 32 58.1	A		
S 3668	NSV 12745	20 03 30.62	+10 30 55.0	T		20011+1022
S 3669	V771 Aql	20 03 27.94	+13 11 07.6	A		
S 3670	V772 Aql	20 03 58.61	+11 38 41.3	A		
S 3671	V775 Aql	20 04 29.48	+08 30 34.4	A		20020+0821
S 3672	V776 Aql	20 04 34.34	+08 29 19.6	G	1072-1532	20021+0820
S 3673	V774 Aql	20 04 43.42	+11 41 26.4	T	1080-1097	
S 3674	V777 Aql	20 05 11.62	+07 41 28.2	G	1072-2324	
	V438 Aql*	20 05 01.46	+07 41 12.9	G	1072-1623	20025+0732
S 3675	V780 Aql	20 06 27.74	+08 19 26.3	G	1072-0788	20040+0810
S 3676	V784 Aql	20 07 07.19	+13 29 59.0	A		
S 3677	WX Sge*	19 39 25.08	+17 08 44.8	G	1606-1351	19371+1701
S 3678	V664 Aql*	19 43 45.96	+15 13 42.5	A		
S 3679	GM Vul	19 45 37.84	+22 51 13.7	A		
S 3680	CQ Vul*	19 46 01.62	+24 14 21.3	G	2139-1354	
S 3681	DS Sge	19 46 26.75	+17 03 31.9	A		
S 3682	CS Vul	19 47 24.30	+19 40 22.4	T	1623-0759	
S 3683	EV Vul*	19 51 38.40	+23 53 16.9	T	2140-1051	19495+2345
S 3684	V1060 Aql	19 53 37.95	+15 08 10.8	A		
S 3685	AM Sge*	19 53 45.18	+19 22 31.9	A		

Table 1: Variables on *MVS* 281–286 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3686	DV Sge	19 55 53.90	+16 22 13.6	A		
	DW Sge*	19 55 54.31	+19 32 36.6	A		
	DF Vul*	19 57 56.9	+22 40 58	S		19558+2232
	EI Sge*	19 59 07.51	+19 27 53.1	A		
S 3687	V755 Aql	20 00 07.26	+14 42 28.7	A		
S 3688	BC Sge	20 00 23.36	+16 16 04.9	A		19580+1607
S 3689	NSV 12688	20 01 04.56	+16 21 43.6	A		
S 3690	EM Sge	20 01 19.95	+20 54 33.5	A		19591+2046
S 3691	HR Vul	20 02 25.15	+22 03 33.3	A		
S 3692	BL Sge*	20 04 21.63	+17 48 36.4	A		20020+1739
S 3693	BR Sge	20 06 26.66	+21 13 57.6	A		
	DK Vul*	20 06 33.96	+24 26 00.0	T	2158-0309	
S 3694	DE Sge	20 07 13.50	+20 50 11.1	G	1629-0176	
S 3695	V1095 Aql	20 08 05.53	+15 16 45.0	T	1618-1418	20057+1507
S 3696	V1096 Aql	20 08 45.25	+14 54 33.7	A		
S 3697	ES Sge	20 08 53.63	+17 31 40.7	A		
S 3698	BZ Sge	20 10 12.91	+19 30 57.0	G	1626-1080	
S 3699	CF Sge	20 11 03.04	+20 02 06.6	A		
S 3700	HX Vul	20 11 00.26	+22 51 42.9	A		
S 3701	CH Sge	20 11 22.38	+19 28 51.0	A		
S 3702	FG Sge	20 11 56.06	+20 20 04.4	T	1626-0619	
S 3703	CK Sge	20 12 14.39	+19 19 10.8	G	1626-0917	
S 3704	HY Vul	20 12 16.76	+22 06 02.1	A		
S 3705	FM Sge*	20 14 09.86	+18 48 00.4	G	1626-0015	20119+1838
S 3706	CP Sge	20 14 05.90	+18 37 28.0	G	1622-0128	
S 3707	CX Sge	20 14 25.31	+20 14 48.4	A		20121+2005
S 3708	DN Vul	20 15 43.71	+21 57 33.9	G	1630-1629	
S 3709	FS Sge	20 18 18.08	+19 53 32.4	G	1639-1180	20160+1944
S 3710	CY Sge	20 18 26.72	+19 07 57.3	G	1639-0604	
S 3711	NV Vul	20 18 16.64	+24 29 48.9	T	2159-0543	
S 3712	CZ Sge	20 19 22.63	+18 23 33.6	A		
S 3713	CT Sge*	20 19 08.3	+20 42 57	S		

Notes:

NR Aql	HV 5460.
V438 Aql	AN 379.1933.
V610 Aql	very close double: oval on POSS-II J/F scans.
V617 Aql	variable on POSS-I/II red plates.
V636 Aql	crowded.
V657 Aql	crowded by close companions on northwest.
V662 Aql	large IRAS position error-ellipse.
V664 Aql	very bright on POSS-II F and N plates.
V665 Aql	IRAS position given (erroneously) by Skiff (1999).
V672 Aql	AN 704.1933.
V676 Aql	southwestern of pair.
V715 Aql	AN 85.1903.
V1054 Aql	HD 356115; just outside error-ellipse of IRAS 19499+1147.
SY Ari	AN 193.1935
AH CMi	fainter companion 9″ southeast.
GS Cas	fainter close companion S.

Notes (cont'd.):

FY Gem	AN 12.1934.
FZ Gem	AN 475.1934.
GH Gem	*MVS* chart mislabelled as GH Mon.
GO Gem	GCVS 4.1 position 3′.0 in error.
ZZ Leo	AN 3.1935.
AA Leo	AN 5.1935.
HT Lyr	brighter star lies 17″ east.
KL Lyr	AN 207.1935.
KY Lyr	large IRAS position error-ellipse.
V531 Ori	AN 435.1934.
V534 Ori	EM* StHA 38.
V1008 Ori	AN 429.1934.
V1009 Ori	AN 430.1934; middle of trio.
V1012 Ori	AN 434.1934.
ER Per	HD 18124.
IN Mon	IRC +10131.
IS Mon	LS VI +10°13.
WX Sge	IRC +20423.
AM Sge	not red on USNO-A2.0.
BL Sge	crowded: southernmost star in compact trio; bright on POSS-I red plate; very faint on POSS-II F plate.
EI Sge	AN 11.1928; USNO-UJ1.0 position given by Skiff (1997).
FM Sge	crowded.
CT Sge	crowded: faint companion merged on northeast, brighter star ~8″ south-southeast.
DW Sge	AN 26.1928; USNO-UJ1.0 position given by Skiff (1997).
CQ Vul	[MJD95] J194601.66+241421.9 = [MS98] 03-00022.
DF Vul	AN 149.1905; southwestern star of a merged pair on DSS; a bright companion lies 13″ southwest.
DK Vul	AN 494.1934.
EV Vul	HD 345076 (HDE type in error, is an early-B star).

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GSC 03822_01056, A NEW MODERATE AMPLITUDE VARIABLE STAR

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Name of the object:
GSC 03822_01056

Equatorial coordinates:	**Equinox:**
R.A.= $10^{\mathrm{h}}33^{\mathrm{m}}53^{\mathrm{s}}$ **DEC.=** $+58^\circ 46' 54''$	J2000

Observatory and telescope:
The King's University Observatory, 0.32-m $f/4.8$ Newtonian

Detector:	CB 245 CCD detector
Filter(s):	Unfiltered
Comparison star(s):	GSC 03822_00072
Check star(s):	GSC 03822_01157
Transformed to a standard system:	No

Availability of the data:
Upon request at bmartin@kingsu.ab.ca

Type of variability:	Unknown — suspect Delta Scuti

Remarks:
Field star GSC 03822_01056 was found to be variable during a routine campaign on the cataclysmic variable star DW UMa. Amplitude (Max – Min) is approximately 0.25 mag. The period is $\sim 0\overset{\mathrm{d}}{.}15$ and the highly symmetric light curve is suggestive of Delta Scuti type.

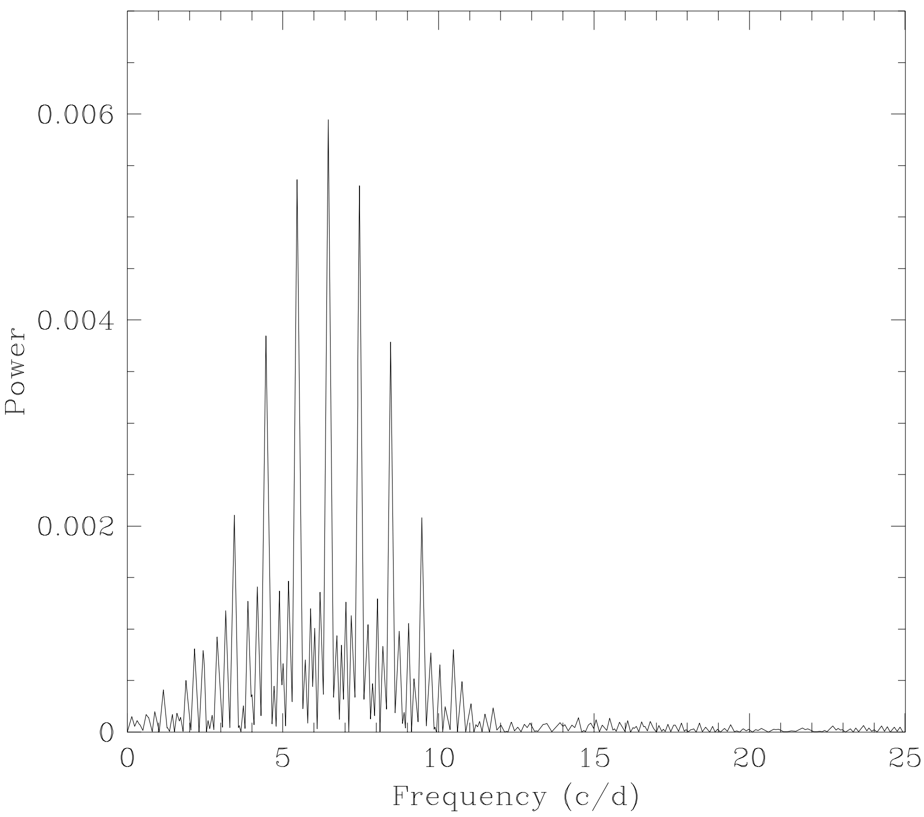

Figure 1.

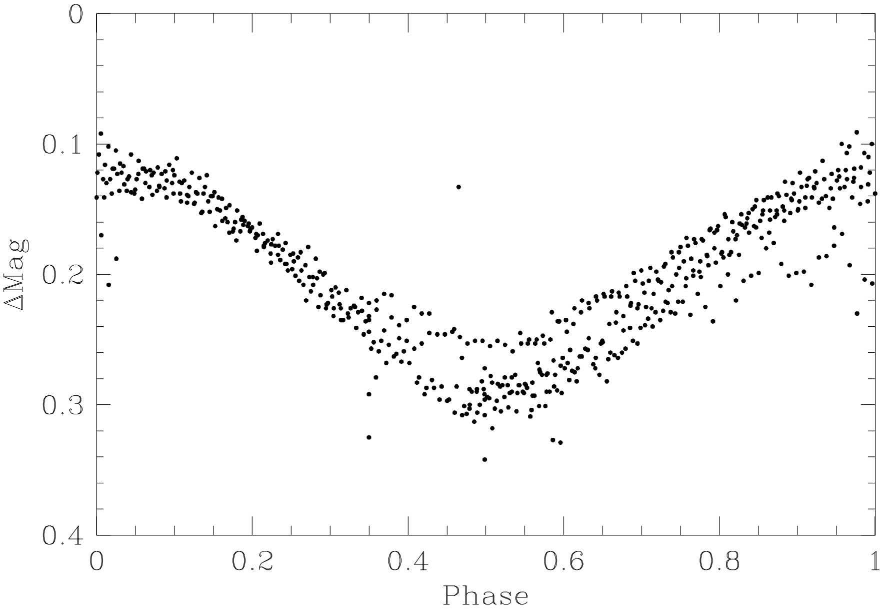

Figure 2.

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4881

Konkoly Observatory
Budapest
20 April 2000

HU ISSN 0374 – 0676

NEW FIELD VARIABLE STARS II

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[4] Guest Observer at the Konkoly Observatory

In the course of photometric and astrometric observations of selected minor planets, we obtained more than 4000 individual CCD frames at the Konkoly Observatory between April, 1998 and January, 2000. We have surveyed all of the time-series CCD photometric observations in order to identify and/or discover variable stars observed by chance in these images. We have discovered 17 new variable stars and the first 11 was presented in the first part of this series (Csák et al. 2000, Paper I). The remaining 6 stars are in the focus of this paper.

The observations, the instruments and the applied methods of analysis were the same as described in Paper I. The individual data shown in Figs. 1 and 2 are available upon request from the first author. The sparse phase coverage did not allow reliable classification of the variable stars, though the majority seem to be eclipsing binaries. V17 has the best data series, because we made 3-hour long follow-up observations on two nights in January 2000 (Fig. 2). This enabled a more accurate period determination which resulted in a period of 0.1275 ± 0.0001 days. The unfavourable data distribution caused all data to cover very similar phases, therefore, any multiplet of this shortest value cannot be ruled out. Basic data (identifications, celestial coordinates and magnitudes) of the new variables are summarized in Table 1. The given types of variability (based on the light curve shapes and USNO-A2.0 colours) should be considered only as approximate ones.

In addition to the photometry, we obtained low-resolution spectra with an objective prism at the Konkoly Observatory in February, 2000. The telescope and the detector were the same as above, while the prism has a refracting angle of 5° giving 580 Å/mm resolution at Hγ (Kun 1992). Since the observations were unfiltered, a wide spectral region (approximately between 3800 Å and 9000 Å) was detected limited by the spectral response of the CCD and the atmospheric transmission.

We took 10-minute spectra of all stars, but V12 and V13 turned out to be too faint. Almost 300 MK spectral standards taken from Jaschek et al. (1964) were observed to form a homogeneous basis for a preliminary spectral type determination that makes use of integral properties of the obtained digital spectra. The spectral extraction was done with a newly developed software which automatically detects the boundaries of the spectral images. The extracted spectra were adjusted to match the strongest atmospheric telluric

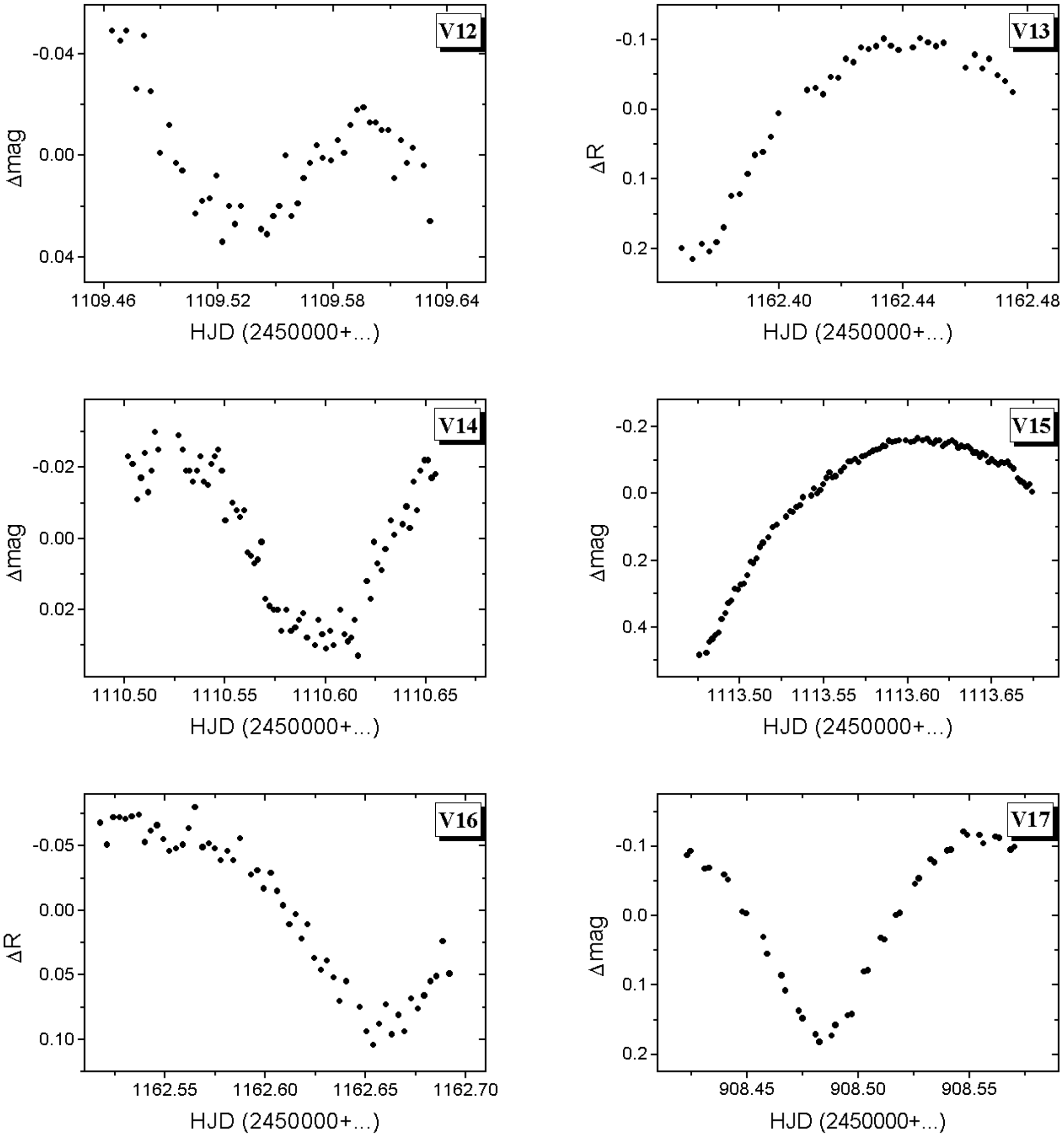

Figure 1. Light curves of 6 new variable stars

Table 1: Basic data of the new variables. The coordinates, red and blue magnitudes were taken from USNO-A2.0

Variable	R.A. (2000)	Dec. (2000)	Red mag.	Blue mag.	Sp. type	Type
V12	$03^{\mathrm{h}}36^{\mathrm{m}}27\overset{\mathrm{s}}{.}60$	$+36^\circ22'27\overset{''}{.}03$	15.5	16.9	–	EW
V13	$05^{\mathrm{h}}02^{\mathrm{m}}53\overset{\mathrm{s}}{.}72$	$+10^\circ36'49\overset{''}{.}93$	15.2	16.1	–	EW
V14	$05^{\mathrm{h}}26^{\mathrm{m}}30\overset{\mathrm{s}}{.}92$	$+12^\circ57'27\overset{''}{.}33$	12.8	14.0	G4	EW
V15	$05^{\mathrm{h}}31^{\mathrm{m}}34\overset{\mathrm{s}}{.}58$	$+10^\circ33'59\overset{''}{.}49$	14.0	14.8	F3	–
V16	$11^{\mathrm{h}}42^{\mathrm{m}}15\overset{\mathrm{s}}{.}70$	$+27^\circ33'05\overset{''}{.}33$	14.9	14.8	G3	EW
V17	$13^{\mathrm{h}}14^{\mathrm{m}}47\overset{\mathrm{s}}{.}64$	$-03^\circ54'42\overset{''}{.}70$	13.6	14.3	F8	EW

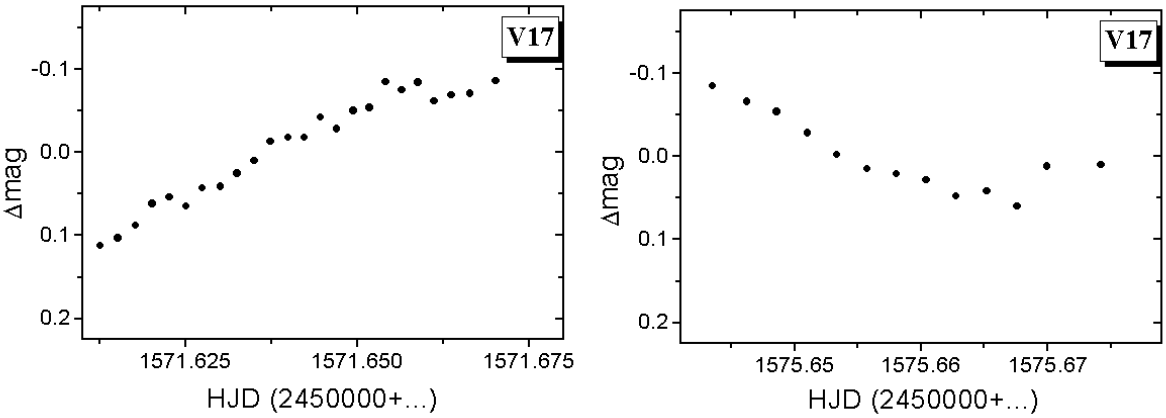

Figure 2. Follow-up observations of V17

band O_2 at 7594 Å (see, e.g., Appendix E in Gray, 1992) and normalized to their maximum values near 7500 Å. The wavelength calibration was based on the hydrogen Balmer series lines in the spectrum of α Lyr. The spectral response function of the CCD chip was calibrated with the same spectrum of Vega, knowing its tabulated absolute flux spectrum taken from Gray (1992). All of the observed spectra were divided by the resulting spectral response function. Sample spectra are plotted in Fig. 3.

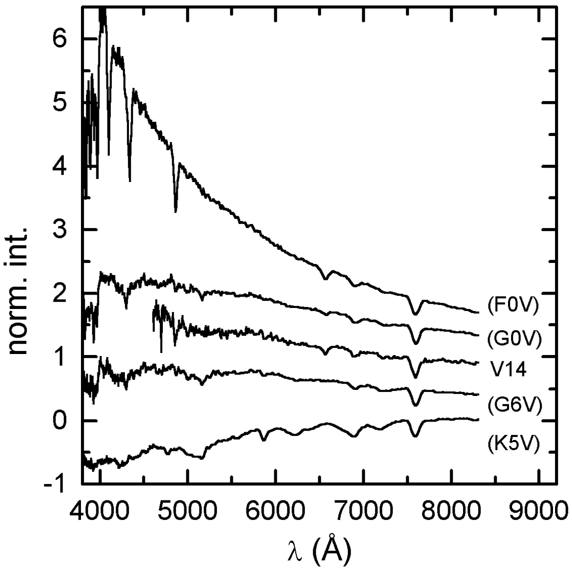

Figure 3. Sample spectra of standard stars and V14. The marked spectral standards are the following ones: HD150553 (F0V), HD72905 (G0V), HD112859 (G6V) and HD75632 (K5V).

We calculated a simple empirical parameter (A) by integrating the normalized and calibrated spectra between 4600 and 7500 Å ($A = \sum_{4600}^{7500} i(\lambda)\Delta\lambda$). A is related with the mean slope of the continuum, which is a considerably tight function of the spectral type (Gray 1992). The spectral type was parametrized by assigning 20 to B0, 30 to A0, ...

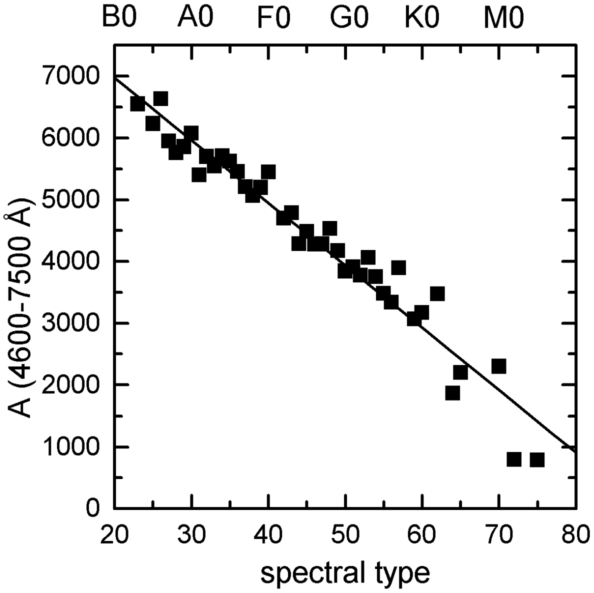

Figure 4. The relation between the integrated parameter A and spectral type.

being one of the usual ways in semi-automatic spectral type determinations (e.g. Stock 1994). We determined a linear fit to estimate the spectral types of new variables with an error of 3 subclass (see Fig. 4). Since this method suffers from the possible effects of the interstellar reddening, the spectral class was also checked by visual comparison of different standards (as in Fig. 3). The fact that we did not have to change the resulting spectral class of any of the variables indicates the usefulness of the method.

This work has been supported by Hungarian OTKA Grant #F032258, Pro Renovanda Cultura Hungariae Foundation Grant DT 1999 ápr./36. and Szeged Observatory Foundation. The warm hospitality of the staff of the Konkoly Observatory and their provision of telescope time is gratefully acknowledged. We used the SIMBAD database, operated at CDS, Strasbourg, France.

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COMMISSIONS 27 AND 42 OF THE IAU
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OUTBURST ACTIVITY OF BF ERIDANI IN 1999

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BF Eri was originally classified as a slowly varying variable star. The fourth edition of General Catalogue of Variable Stars listed it as a semiregular variable star with a range of 13.5–15.5 *pg*. More recent identification with the Einstein X-ray source led to the correct classification as a cataclysmic variable, which has been suggested to be a low-amplitude dwarf nova based on photometry (Kato 1999 and references therein). We report on the 1999 outburst activity of BF Eri.

The observations were done using an unfiltered ST-7 camera attached to the Meade 25-cm Schmidt-Cassegrain telescope. The exposure time was 30 s. The images were dark-subtracted, flat-fielded, and analyzed using the Java$^{\mathrm{TM}}$-based aperture photometry package developed by one of the authors (TK). The differential magnitudes of the variable were measured against GSC 4743.801 (USNO *r*-magnitude 11.7), whose constancy was confirmed by comparison with GSC 4743.797 (USNO *r*-magnitude 12.3).

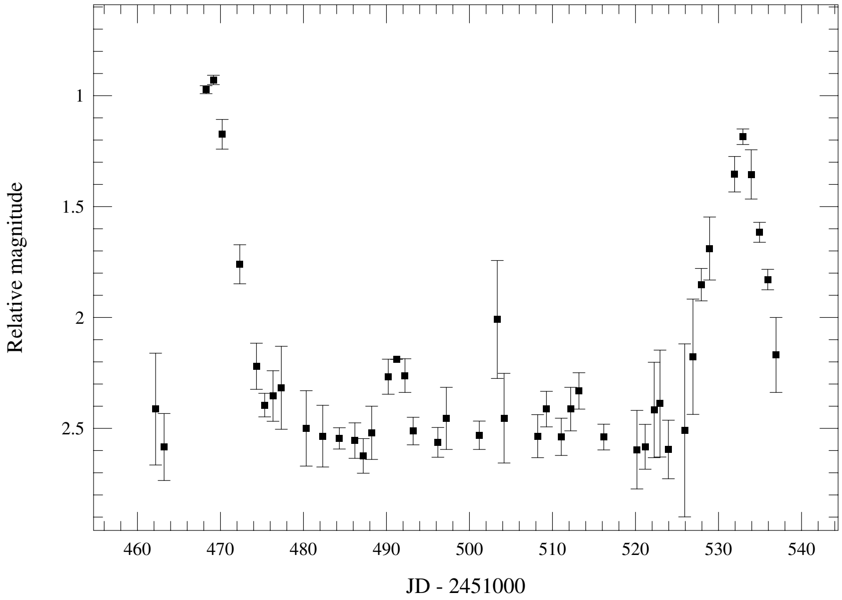

Figure 1. Light curve of BF Eri in 1999

The resultant light curve of BF Eri in 1999 is shown in Figure 1. Each point represents a nightly averaged magnitude of 3 to 10 frames, with an error bar indicating the standard error. The light curve clearly indicates the presence of two distinct outbursts, reaching maxima around JD 2451469 and 2451533. The interval between these two outbursts was 64 d, which is close to the one-third of the GCVS period (198 d), and it can be considered as a typical recurrence time of this dwarf nova. When compared to earlier observations (Kato 1999), the amplitude (1.6 mag) of outbursts is remarkably larger in this season than in the previous season, more clearly confirming the dwarf nova-type classification. The difference in the outburst activity between seasons may indicate the presence of alternating stages of low and high outburst amplitudes, as are most clearly demonstrated in Z Cam-type dwarf novae (e.g. Warner 1995).

The rise to the second outburst (JD 2451533) was well covered by observations. The slow rise took seven days, while the fade (though not completely covered by observations) was much faster. This is clearly a signature of "inside-out" type outburst (Smak 1984). The overall outburst behavior in 1999 resembles that of a low-amplitude dwarf nova, RU Peg.

References:

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COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number 4883

Konkoly Observatory
Budapest
25 April 2000

HU ISSN 0374 – 0676

THREE-COLOUR PHOTOMETRY OF MM HERCULIS DURING 1998–1999

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Name of the object:
MM Her = BD +22°3245 = HD 341475

Equatorial coordinates:	**Equinox:**
R.A.= $17^{h}58^{m}35\overset{s}{.}99$ **DEC.=** $22°08\overset{'}{.}78$	1999

Observatory and telescope:
Ege University Observatory, 48-cm Cassegrain telescope

Detector:	Hamamatsu, R4457 (PMT)

Filter(s):	B, V and R filters of Johnson UBV system

Comparison star(s):	BD +21°3274 = HD 341480

Check star(s):	BD +22°3250 = HD 164306

Transformed to a standard system:	UBV
Standard stars (field) used:	Pleiades stars

Availability of the data:
Upon request

Type of variability:	EA

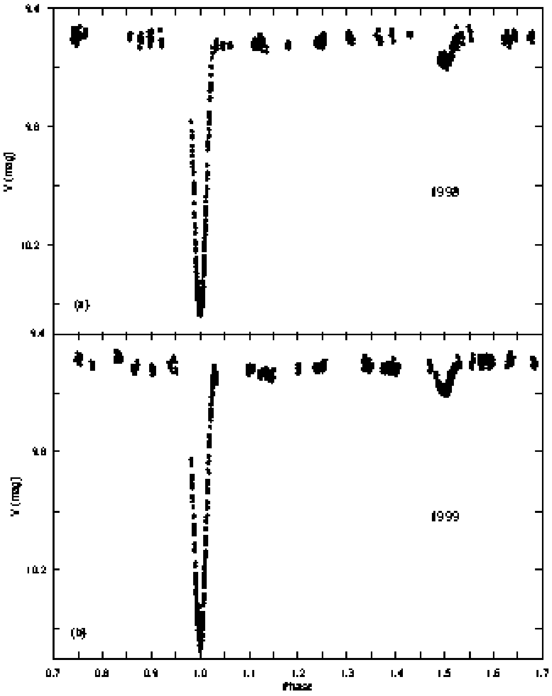

Figure 1. The light curves of MM Herculis obtained in 1998 and 1999.

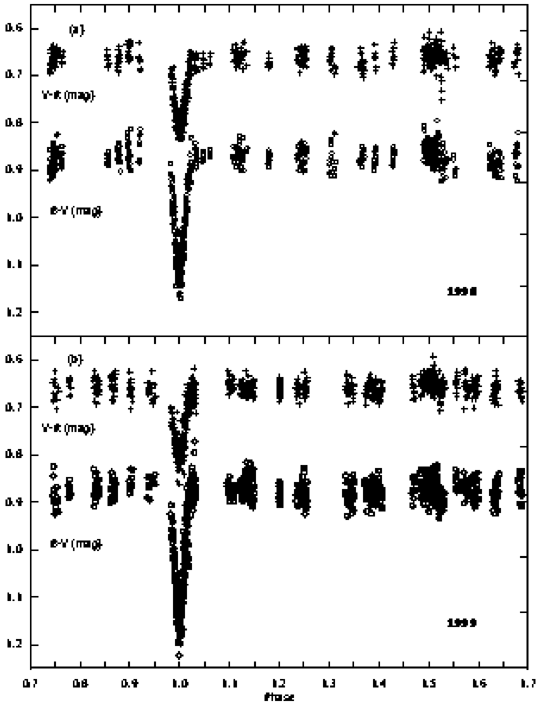

Figure 2. The colour curves of MM Her obtained in 1998 (upper panel) and 1999 (bottom panel). The open circle and plus symbols indicate $B-V$ and $V-R$ colours, respectively.

Remarks:

The eclipsing binary MM Herculis is one of the most active binary systems in the class of RS CVn stars. The system was first observed visually by Tsesevich (1954). Recently, its light variations were examined by Heckert and Ordway (1995), Evren and Taş (1999) and Taş et al. (1999). Our observing run includes 42 nights between May 5 and October 8, 1998 and 45 nights between March 1 and October 6, 1999. We obtained 749 and 912 data points for each colour in 1998 and 1999, respectively. The light (in V) and colour (in $B-V$ and $V-R$) curves obtained in these years are shown in Figures 1a,b and 2a,b. The phase of each observation was computed by the following light elements

$$\mathrm{HJD}_{\mathrm{minI}} = 2445551.4274 + 7\overset{\mathrm{d}}{.}960326 \times E.$$

Wave-like distortions outside the eclipses are clearly seen from Fig 1. The amplitudes of the waves are about $0\overset{\mathrm{m}}{.}04$ and $0\overset{\mathrm{m}}{.}05$ in 1998 and 1999, respectively. The light variations seen outside eclipses are caused by star spots and the distortion waves possess two minima separated by almost half a period. The brightness at mid-primary minimum of the system obtained in 1999 is about $0\overset{\mathrm{m}}{.}04$ fainter than the one in 1998.

Acknowledgements:

I would like to thank Drs. C. Ibanoglu and S. Evren for their advice and guidance. This work was supported by Ege University Research Fund (Project No. 99/FEN/014).

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COMMISSIONS 27 AND 42 OF THE IAU
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Number 4884

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HU ISSN 0374 – 0676

SPECTROSCOPIC IDENTIFICATION OF STARS MISCLASSIFIED AS CATACLYSMIC VARIABLES

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In a recent paper, Bennert et al. (1999, hereafter B99) presented lightcurves of four systems which were classified as possible cataclysmic variables (CVs) in the catalogue of Downes et al. (1997). The authors found no evidence for a variability and thus argued that these systems are misclassified. They also called for a spectroscopic confirmation of their conclusion. While for one of these systems, FBS 1614+711, this proof was already provided by Liu et al. (1999), we here present spectroscopy of the other three systems, HM Aur, NSV 7956, and FBS 0827+738, and additionally of PG 1316+678.

The history of the first three systems was already presented comprehensively by B99, and we therefore refer the reader to their paper. PG 1316+678 is a little studied object found in the Palomar-Green sky survey and was classified as a possible CV by Green et al. (1986). However, Misselt & Shafter (1995) found no variability in a $1\overset{h}{.}5$ lightcurve, and consequently suggested a misclassification.

The spectra presented here were taken on February 2, 2000, at the 1.82-m telescope at Mt. Ekar, Asiago Observatory, using the AFOSC[1] system. The objects were observed both with grism 7 (λ4444–6677 Å, $\Delta\lambda_{\rm FWHM} = 9.2$ Å) and with grism 8 (λ6333–8431 Å, $\Delta\lambda_{\rm FWHM} = 8.4$ Å) to cover the blue and the red part of the spectrum, respectively. As an exception, NSV 7956 was observed with grism 7 only, due to technical problems following that exposure. For wavelength calibration purposes, comparison spectra were taken with a He-lamp for grism 7 and with a Ne-lamp for grism 8. The slit aperture was chosen to $2\overset{''}{.}1$, accounting for the seeing conditions. Additionally, CCD images were taken with a Bessel V filter to allow for a comparison with the differential magnitudes provided by B99. Standard reduction concerning BIAS, domeflats, optimal extraction (Horne 1986), and wavelength calibration, was performed with IRAF[2] packages. No flux calibration was attempted. Details of the observations are given in Table 1.

Differential photometry was performed with respect to the comparison stars used in B99. We find only minor differences in the range of −0.04 to −0.09 magnitudes for the

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[1] Asiago Faint Object Spectroscopic Camera

[2] IRAF is distributed by the National Optical Astronomy Observatories.

Table 1: Characteristics of the spectra. Columns 2–5 give the exposure time in seconds and the average airmass for bot grisms. Columns 6 and 7 contain the spectral type which gave the best fit for the metal and Balmer lines, respectively (uncertain types are included in brackets), while the last column (8) gives the concluded type.

Object	Grism 7		Grism 8		Spectral Type		
	$t_{\rm exp}$	$M(z)$	$t_{\rm exp}$	$M(z)$	metal	Balmer	result
HM Aur	300	1.0	30	1.0			M7– III
NSV 7956	300	1.3	—	—	G8 III	K1– III–IV	G9+ III
FBS 0827+738	1800	1.1	1800	1.2	G5+ III	(G4+ V–IV)	G5+ III
PG 1316+678	600	1.1	720	1.1	(F7+ II–III)	(M0+ II–III)	F?

resulting differential magnitudes. These values are also found for common comparison stars, and we therefore ascribe them to instrumental differences (i.e. Bessel vs. Johnson filters). We thus conclude that the objects have been at the same brightness level both in the B99 and in our data set.

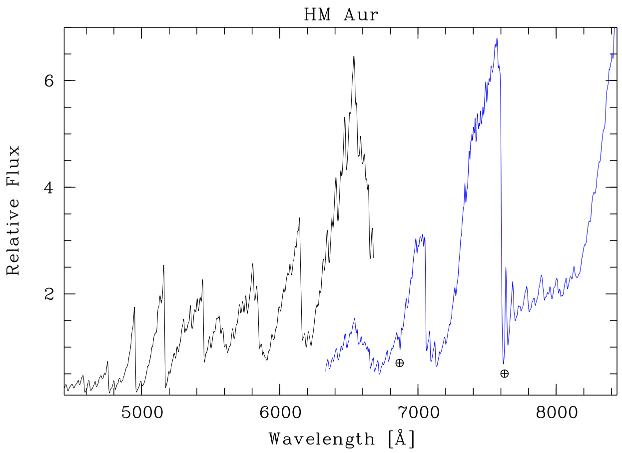

Figure 1. Spectroscopic data: HM Aur. The blue and red spectra have been scaled in order to fit into one plot. Atmospheric features are indicated by ⊕.

The resulting spectra are shown in Figs. 1 and 2. They contain both the blue and the red spectrum, which have been scaled accordingly. NSV 7956 is shown at the same wavelength scale to allow for a direct comparison with the other objects. Although in the case of FBS 0827+738 and PG 1316+678, the S/N is rather modest, the presence of emission lines can be definitely excluded for all systems, thus speaking against a CV nature of these objects.

For a more precise analysis, the catalogues of Jacoby et al. (1984), Kiehling (1987), and Silva & Cornell (1992) were used for comparison. After adjusting the spectral resolution of the catalogue and the observed spectra a pseudocontinuum has been determined in the following way. To avoid an overestimation introduced by noise, first the spectra have been smoothed by convolving them with a gaussian function with $\sigma = 3$ Å. Then the blue and red spectra have been fitted iteratively with polynomials of degree 6 and 3, respectively. After each step the points situated under the polynomial have been replaced by the regression curve itself. After 20 steps the iteration converged sufficiently. Now

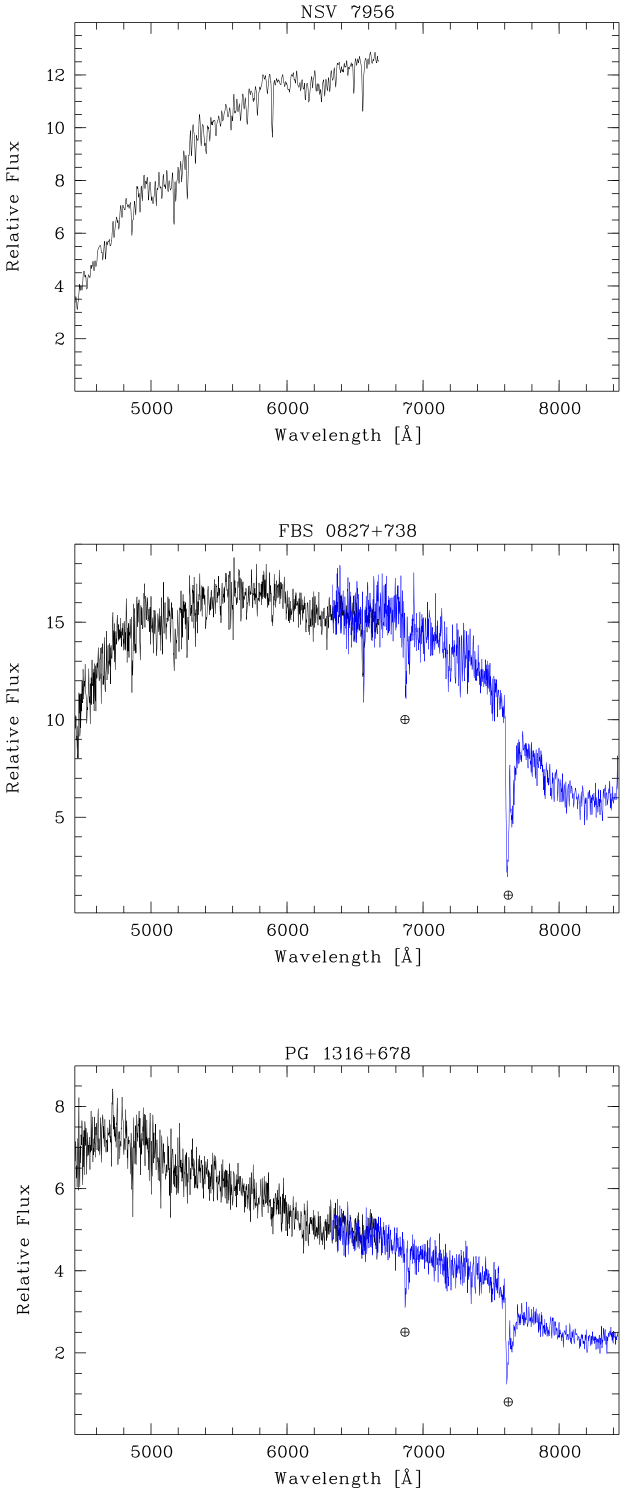

Figure 2. Spectroscopic data for NSV 7956 (top), FBS 0827+738 (middle), and PG 1316+678 (bottom). The blue and red spectra for the latter two have been scaled to match the overlapping region (λ6330–6680 Å). Atmospheric features are indicated by $\oplus$.

the line profiles were fitted with the catalogue spectra, applying the smallest euclidean distance technique.

Apart from HM Aur, where the whole spectrum could be fitted, we concentrated on strong lines only, i.e. the metal lines at 5153–5197 (Mgb), 5240–5286 (blend), 5874–5909 (NaD), and 6471–6507 (blend), and the Balmer lines at 4846–4877 (Hβ) and 6532–6584 (Hα). Both line types were examined separately to account for a possible binary character, which, however, was not detected for any of the stars within the uncertainties. The results are given in Table 1.

Unambiguous conclusions could be drawn especially in the cases of HM Aur (almost perfect fit) and NSV 7956 (average of two well-defined results). For FBS 0827+738, we based our result on the metal type, which, however, matches also the more uncertain Balmer one. In the case of PG 1316+678, the metal type is very uncertain, nevertheless the deviation from the better defined Balmer type is significant. The absence of molecular absorption bands, however, does not favour the suggested late Balmer type, which is mimicked by the almost complete absence of the Hα line, which is very surprising within the rather early metal type. The poor quality of the spectrum and its peculiarity makes a definite classification impossible. This object thus represents an interesting target for further spectroscopic studies.

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COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4885

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25 April 2000

HU ISSN 0374 – 0676

THE NEW EB SYSTEM GSC 4741_1263

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Name of the object:
GSC 4741_1263

Equatorial coordinates:	**Equinox:**
R.A.= $04^h53^m22^s$ **DEC.=** $-03^\circ22'55''$	2000.0

Observatory and telescope:
L'Ametlla del Valles Observatory, 0.5-m Newtonian telescope; Mollet del Valles Observatory, 0.4-m Newtonian telescope; Esteve Duran Observatory, 0.6-m Cassegrain telescope; Monegrillo Observatory, 0.4-m Newtonian telescope; Hostalets de Pierola, 0.4-m Newtonian telescope

Detector:	CCD

Filter(s):	*V*

Comparison star(s):	GSC 4741_1265

Check star(s):	None

Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	EB

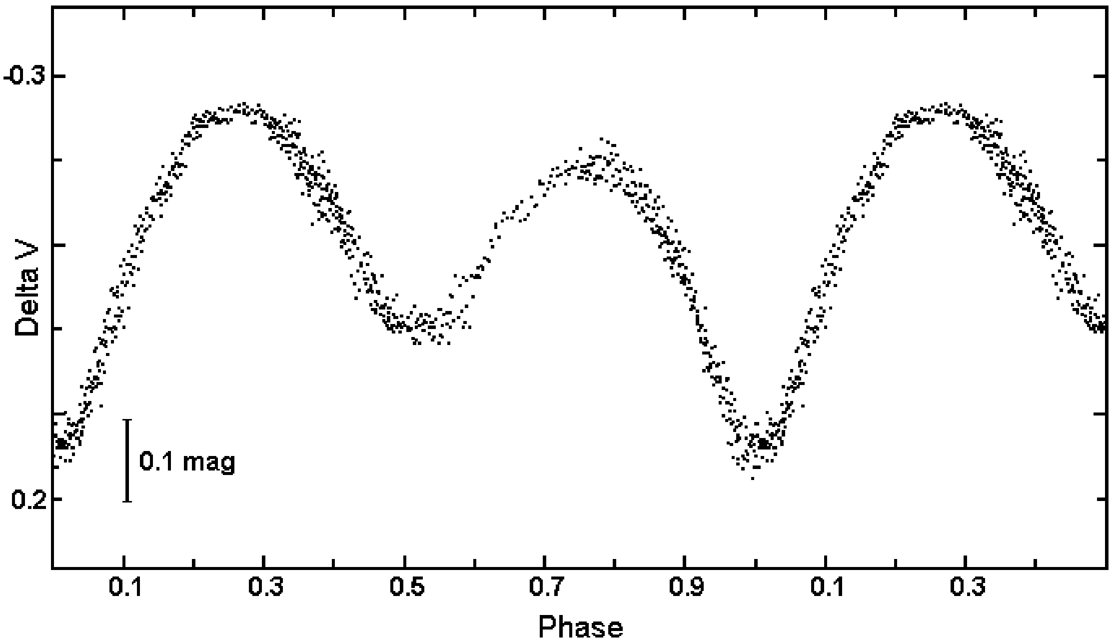

Figure 1. Phase curve of the EB type star GSC 4741_1263

Remarks:

Its variability was discovered with the 0.4-m Newtonian telescope at Mollet del Valles Observatory, and observed for 28 nights from November 1996 to February 1998. This star is included in the Tycho Catalogue with a derived Johnson V magnitude of 11.48 and a $B-V$ color index of +0.335. Observations show that GSC 4741_1263 is a β Lyrae type eclipsing binary system with a period of 0.6140 days, a V amplitude of 0.394 ± 0.015 for primary minimum and 0.252 ± 0.015 for secondary minimum (Figure 1). The phase curve shows an O'Connell effect of $0\overset{\mathrm{m}}{.}068$ where the maximum around phase 0.75 is the dimmer. Also the secondary minimum is not centered at phase 0.5 but appears around phase 0.52, and although both minima look flat, the secondary one is broader. These two light curve features suggest that the orbit of the components might be eccentric.

The following ephemeris was computed for this star:

$$\begin{array}{rl} \text{Min. I} = \text{HJD } 2450775.50510 + & 0\overset{\mathrm{d}}{.}614068 \times E. \\ \pm 0.00065 & \pm 0.000010 \end{array}$$

Reference:

ESA, 1997, The Hipparcos and Tycho Catalogues, ESA SP-1200

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 4886

Konkoly Observatory
Budapest
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HU ISSN 0374 – 0676

NSV 01754: A NEW ECLIPSING BINARY SYSTEM IN ORION

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Name of the object:
NSV 01754, S 03545, CSV 000453, GSC 4741_842

Equatorial coordinates:	**Equinox:**
R.A.= $04^h53^m09^s$ **DEC.=** $-03^\circ29'53''$	2000.0

Observatory and telescope:
L'Ametlla del Valles observatory, 0.5-m Newtonian telescope; Monegrillo Observatory, 0.4-m Newtonian telescope

Detector:	CCD
Filter(s):	*V*
Comparison star(s):	GSC 4741_1265
Check star(s):	None
Transformed to a standard system:	No

Availability of the data:
Upon request

Type of variability:	EA

Remarks:

Light variations of NSV 01754 were first reported by Hoffmeister (1944). The star was later included in the New Catalogue of Suspected Variable Stars (Kholopov, 1982) as a variable with rapid light changes, a photographic brightness variation between $12\overset{m}{.}0$ and $12\overset{m}{.}5$, and an A spectral type, but not further information is given. NSV 01754 was observed on 24 nights, from December 1996 to February 1998. Observations show that NSV 01754 is an EA type eclipsing binary system with a period slightly over 1.8 days. During primary minimum the star fades 1.12 magnitudes, while during the secondary minimum the star is 0.12 magnitudes dimmer (Figure 1). The following ephemeris was computed:

$$\text{Min. I} = \text{HJD } \underset{\pm 0.00033}{2450775.52365} + \underset{\pm 0.0001}{1\overset{d}{.}8228} \times E.$$

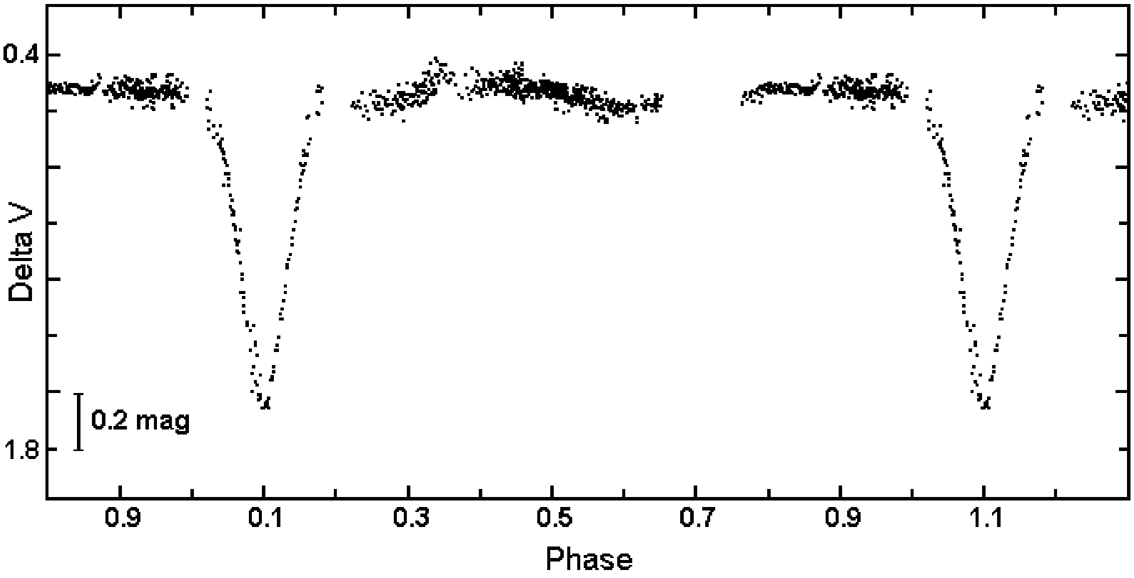

Figure 1. Phase curve of the EA type star NSV 01754

References:

Hoffmeister, C., 1944, *AN*, **274**, 176
Kholopov, P. N. (ed.), 1982, New Catalogue of Suspected Variable Stars, Nauka, Moscow

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CCD TIMES OF MINIMA OF FAINT ECLIPSING BINARIES I

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The list given below contains 114 times of minima of 68 individual eclipsing binaries obtained during 1995–1997. All minima have been obtained by means of a SBIG ST 7 CCD camera attached to the 400-mm $f/1750$ Newton reflector at the N. Copernicus Observatory and Planetarium Brno, only several observations have been done by smaller instruments or by means of CCD camera SBIG ST 4 (see column Notes in the Table 1).

One of the purposes of the observing programs of our observatory is to derive timings of minima mainly of relatively faint stars (fainter than 12 mag in the minimum). The aim of our observations was to obtain times of minima and new information about the shape of the light curve of (neglected) eclipsing binaries. The observed stars were chosen mainly from the observing program of B.R.N.O. – Variable Star Section of Czech Astronomical Society. Detailed description and results of the running observational program can be found in Contributions of N. Copernicus Observatory and Planetarium Brno.

The camera was used without any filter so that only magnitudes in the instrumental, red sensitive (close to R-band) system could be obtained. The exposures ran mostly 60 s. The MUNIDOS software packet (Hroch & Novák, 1997) was used for observation processing. The results are given in the Table 1. The following data are given: The name of the star, the heliocentric JD of minimum (-2400000), the error of the determination of minimum obtained by the Gaspani's (1995) method having the meaning of a standard deviation of the determination, the abbreviation of the name of the observer(s), the total number of images used, the number of images (points) on the descending branch, the epoch and the $O-C$ value relative to the linear light elements taken from the 4th edition of the GCVS (Kholopov et al., 1985) or to another light elements. The cases of missing or wrong light elements in GCVS are marked by (*) at the name of the star. The others than GCVS's elements are given in the Table 2. The majority of minima given in the Table 1 are primary ones. Secondary minima are marked in the column *Notes*. The times of minima obtained by superposition of two or more parts of light curve from different nights are denoted as "normal min." in the Table 1.

References:

Gaspani, A., 3rd GEOS workshop on variable star data acquisition and processing techniques, 13-14 May 1995, S. Pellegrino Terme, Italy
Hroch, F., Novák, R., 1997, MUNIDOS, `http://ian.cz/munipack/`
Kholopov, P. N. et al., 1985, General Catalogue of Variable Stars, 4th edition, Moscow

Table 1: Times of minima of observed systems

Starname	JDhel	Error	Observer	Tot N	Desc N	Epoch	$O-C$	Notes
DO And	50773.3462	0.0014	JŠ	25	10	21904.5	−0.0078	sec. min.
HS And	50773.3166	0.0014	JŠ	35	25	5357.0	0.1976	
MO And*	50688.5397	0.0028	JŠ	24	9	6605.0	0.1579	
	50773.4726	0.0021	JŠ	45	32	6649.0	0.1516	
NSV14578 And*	50713.5217	0.0035	JŠ	48	26	15972.0	−0.0570	
UU Aqr*	50012.2867	0.0003	EŠ	39	19	22405.0	0.0305	
	50311.4758	0.0009	JŠ	19	10	24234.0	0.0335	filter I
V873 Aql	50662.5020	0.0090	MZ	20	13	33591.0	0.0230	
	50667.4136	0.0104	MZ, JŠ	16	7	33605.0	−0.0714	
V1075 Aql	50662.5283	0.0042	MZ	15	10	26138.0	−0.0101	
	50693.3596	0.0014	JŠ	26	8	26173.0	−0.0131	
V1299 Aql	49932.4548	0.0031	EŠ	33	15	5969.0	−0.0301	
V1355 Aql	49940.5474	0.0025	EŠ	30	6	28136.0	−0.1474	
	50000.3810	0.0020	EŠ	26	8	28252.0	−0.1462	
	50029.2634	0.0026	EŠ	16	8	28308.0	−0.1484	
SU Boo	50235.5048	0.0038	JŠ	49	28	18680.0	−0.0048	RL150
AR Boo	50180.4108	0.0028	JŠ	36	17	32441.0	0.1400	normal min.
AB Cas	50750.3718	0.0021	JŠ	20	10	5879.0	0.0580	
AE Cas	50708.4521	0.0014	JŠ	15	4	33324.0	0.0705	
CV Cas	50660.4749	0.0021	JŠ	29	16	4770.0	0.4751	
EP Cas	50773.2449	0.0014	JŠ	20	9	27776.0	−0.0299	
MS Cas	50601.4068	0.0021	JŠ	10	4	13239.0	0.0319	
	50750.3501	0.0014	JŠ	24	13	13366.0	0.0377	
V357 Cas	50773.3475	0.0028	JŠ	16	7	28021.0	−0.0562	
V360 Cas	50750.4661	0.0014	JŠ	32	20	12931.0	−0.0872	
V702 Cas*	50660.5150	0.0049	JŠ	27	18	4240.0	0.0011	
NSV14647 Cas*	50671.5404	0.0028	JŠ	25	14	22452.0	0.0279	
	50750.2849	0.0014	JŠ	39	20	22534.0	0.0302	
	50773.3254	0.0028	JŠ	35	18	22558.0	0.0242	
AE Cyg	49925.4765	0.0028	EŠ	19	10	5509.0	−0.0047	
PV Cyg	50658.4538	0.0021	JŠ	30	16	20812.0	0.1915	
V370 Cyg	50752.3584	0.0028	JŠ	28	12	20816.0	−0.0090	
V435 Cyg	50688.5497	0.0042	JŠ, MZ	16	10	3666.0	0.1670	
V443 Cyg	50234.4466	0.0030	JŠ	51	28	27597.0	0.0240	RL150
V706 Cyg	49987.5056	0.0024	EŠ	15	8	21171.0	−0.0275	
	50604.3658	0.0021	JŠ	10	4	22494.0	−0.0239	
	50624.4135	0.0014	JŠ	16	6	22537.0	−0.0252	
	50658.4507	0.0021	JŠ	18	11	22610.0	−0.0247	
	50671.5074	0.0021	JŠ	13	6	22638.0	−0.0231	
	50693.4161	0.0014	JŠ	16	8	22685.0	−0.0284	
V1048 Cyg	50609.4406	0.0014	JŠ	27	14	30876.0	0.0164	
	50658.4289	0.0014	JŠ	22	11	30942.0	0.0179	
V1130 Cyg	49926.4487	0.0022	EŠ	21	9	30405.0	−0.0279	
	50708.4090	0.0028	JŠ	16	10	31795.0	−0.0277	
	50713.4734	0.0014	JŠ	12	6	31804.0	−0.0264	
V1321 Cyg	50240.4371	0.0041	JŠ	41	30	36892.0	0.0471	RF150
	50643.4928	0.0056	JŠ	16	8	37999.0	0.0551	
	50671.5308	0.0028	JŠ	22	10	38076.0	0.0582	
	50752.3538	0.0014	JŠ	22	15	38298.0	0.0532	
	50707.5757	0.0056	JŠ	14	7	38175.0	0.0581	
V1414 Cyg	50667.4503	0.0056	MZ, JŠ	21	10	30656.0	0.0396	
	50686.4315	0.0035	JŠ	24	11	30683.0	0.0364	
	50693.4663	0.0014	JŠ	32	16	30693.0	0.0400	
V1723 Cyg	50671.4236	0.0021	JŠ	8	4	8967.0	0.0359	
V1856 Cyg*	50196.5539	0.0025	JŠ	31	15	2279.0	0.0107	
	50752.3265	0.0022	JŠ	29	11	2557.0	0.0112	
V1870 Cyg*	50657.3811	0.0026	JŠ	20	11	11917.0	−0.0148	
V1908 Cyg*	50658.3742	0.0021	JŠ	25	10	3128.0	−0.1565	

Table 1 (cont.)

Starname	JDhel	Error	Observer	Tot N	Desc N	Epoch	$O-C$	Notes
XY Dra	50601.4788	0.0021	JŠ	40	12	10743.0	0.4063	
V502 Her	50643.4751	0.0021	JŠ	18	7	53361.0	0.0028	
V719 Her	50284.4245	0.0019	JŠ	49	19	25862.0	−0.1234	RF150
BS Lac	50671.5431	0.0042	JŠ	33	21	4536.0	−0.2081	
	50688.4270	0.0048	MZ, JŠ	20	9	4542.0	−0.2094	
EL Lac	50609.4717	0.0028	JŠ	27	19	8945.0	0.1393	
EQ Lac	50643.4101	0.0021	JŠ	14	7	6853.0	0.0952	
IP Lac	50601.4654	0.0014	JŠ	20	9	19647.5	0.0641	sec. min.
	50604.4447	0.0014	JŠ	24	10	19651.0	0.0614	
	50624.4686	0.0021	JŠ	17	7	19674.5	0.0630	sec. min.
	50688.3722	0.0067	MZ	13	7	19749.5	0.0658	sec. min.
V344 Lac	50658.3828	0.0014	JŠ	18	12	13859.0	−0.0641	
DU Leo*	49811.4763	0.0041	JŠ	33	21	1064.5	−0.0011	sec. min., RF35+ST4
AH Lyn*	50184.4602	0.0025	JŠ	54	29	12335.0	−0.0038	
DU Lyr	50196.5354	0.0034	JŠ	33	22	24387.0	0.1464	
	50597.4615	0.0014	JŠ	23	15	24866.0	0.1495	
ET Lyr	50686.4243	0.0042	JŠ	34	6	6347.0	−0.0647	
FL Lyr	49909.5271	0.0029	JŠ	25	16	5366.0	−0.0019	RF35
PY Lyr	50713.4200	0.0021	JŠ	18	10	14501.0	0.1223	
V401 Lyr	50643.3897	0.0014	JŠ	33	9	14819.5	0.0044	sec. min.
V839 Oph	49919.4266	0.0040	JŠ	28	5	23157.0	−0.0909	RF35
V981 Oph	50604.3734	0.0014	JŠ	10	5	10175.0	−0.0084	
EF Ori	50096.3213	0.0021	JŠ	26	10	6714.0	−1.0755	
	50138.4277	0.0023	EŠ	111	53	6725.0	0.3177	
GU Ori*	50120.2312	0.0025	JŠ	25	8	14979.0	−0.0025	
	50138.3520	0.0031	JŠ	43	12	15017.5	−0.0029	sec. min.
	50139.2915	0.0020	JŠ	37	18	15019.5	−0.0048	sec. min.
	50147.2955	0.0035	JŠ	24	9	15036.5	−0.0024	sec. min.
	50163.2988	0.0021	JŠ	35	15	15070.5	−0.0022	sec. min.
	50773.5269	0.0014	JŠ	46	24	16367.0	−0.0120	
V648 Ori	50750.5648	0.0010	JŠ	26	16	15219.0	0.0383	
U Peg	50002.4319	0.0048	JŠ	25	14	35996.5	−0.0564	sec. min., RF35
	50006.3630	0.0034	JŠ	28	10	36007.0	−0.0605	RF35
BX Peg	50316.3607	0.0007	JŠ	34	15	21828.0	−0.0416	filter R, RF150
	50316.5003	0.0028	MZ	53	26	21828.5	−0.0422	filter R, RF150
	50707.5502	0.0028	JŠ	11	6	23223.0	−0.0391	
	50713.2946	0.0028	JŠ	18	11	23243.5	−0.0434	sec. min.
CE Peg	50030.3720	0.0031	EŠ	28	14	39315.0	−0.2443	
	50660.5290	0.0056	JŠ	20	13	40296.5	0.0911	sec. min.
CU Peg	50708.5489	0.0021	JŠ	48	27	1427.0	0.0538	
ER Peg	50708.3775	0.0042	JŠ	32	12	2278.0	0.1252	
DK Per	50750.3680	0.0007	JŠ	24	9	9187.0	0.0212	
PS Per	50713.6127	0.0014	JŠ	47	16	37293.0	0.0572	
TY Tri*	50773.3337	0.0021	JŠ	27	7	4435.0	−0.0831	
EU Vul	50667.2998	0.0118	MZ	22	4	15752.0	0.0266	normal min.
	50688.4954	0.0093	MZ, JŠ	15	9	15776.0	0.0291	
FF Vul	49940.4945	0.0025	EŠ	30	17	32032.5	0.0305	sec. min.
	50000.3466	0.0031	EŠ	27	13	32167.0	0.0319	
	50713.4240	0.0021	JŠ	22	12	33769.5	0.0193	sec. min.
FM Vul	50601.4163	0.0021	JŠ	15	9	8725.0	0.0172	
GI Vul	50597.4542	0.0014	JŠ	15	7	32257.0	−0.0124	
	50624.4151	0.0014	JŠ	13	7	32313.0	−0.0145	
	50662.4546	0.0069	MZ	19	9	32392.0	−0.0122	
GP Vul	50297.5357	0.0019	JŠ	45	17	15202.0	−0.0424	
NO Vul	50597.5005	0.0007	JŠ	19	6	11466.0	−0.0421	
	50652.3717	0.0007	JŠ	13	6	11614.0	−0.0447	

Observers: EŠ: E. Šafářová, JŠ: J. Šafář, MZ: M. Zejda

Table 2: Other published light elements used

Starname	Basic epoch	Period	Reference
MO And	2437937.852	1.930436	Kinman, T.D., Mahaffey, C.T., Wirtanen, C.A., 1982, *AJ*, **87**, 2, 314
NSV14578 And	2428021.390	1.4207481	Häussler, K., 1990, *VSS*, **10**, No. 4, 374
UU Aqr	2446347.2667	0.163579089	Goldader, J. D., Garnavich, P., 1989, *IBVS* No. 3361
V702 Cas	2440150.474	2.478783	Häussler, K., 1990, *MVS*, **12**, No. 4, 74
NSV14647 Cas	2429111.508	0.960271	Busch, H., et al., 1990, *VSS*, **10**, No. 4, 354
V1856 Cyg	2445640.412	1.99918	Margoni, R., et al., 1989, *AsApSuppl*, **81**, 393
V1870 Cyg	2441245.385	0.789797	Margoni, R., et al., 1989, *AsApSuppl*, **81**, 393
V1908 Cyg	2442950.490	2.4642074	Zemljannikova, S. V., 1986, *VS*, **22**, No. 3, 359
DU Leo	2448348.658	1.37418454	Williams, D. B., 1994, *IBVS* No. 3999
AH Lyn	2437647.022	1.016412	Kinman, T.D., Mahaffey, C.T., Wirtanen, C.A., 1982, *AJ*, **87**, 2, 314
GU Ori	2443069.903	0.470681	Samolyk, G., 1985, *JAAVSO*, **14**, No. 1, 12
TY Tri	2435778.460	3.38105	Meinunger, L., 1986, *MVS*, **11**, No. 1, 1

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CCD TIMES OF MINIMA OF FAINT ECLIPSING BINARIES II

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The list given below contains 152 times of minima of 99 individual eclipsing binaries. All minima have been obtained in 1998 by means of a SBIG ST 7 CCD camera attached to the 400-mm $f/1750$ Newton reflector at the N. Copernicus Observatory and Planetarium Brno.

The camera was used without any filter so that only magnitudes in the instrumental, red sensitive (close to R-band) system could be obtained. The exposures ran mostly 60 s. The MUNIDOS software packet (Hroch & Novák, 1997) was used for observation processing. The results are given in Table 1. The following data are given: The name of the star, the heliocentric JD of minimum (-2400000), the error of the determination of minimum obtained by the Gaspani's (1995) method having the meaning of a standard deviation of the determination, the abbreviation of the name of the observer(s), the total number of images used, the number of images (points) on the descending branch, the epoch and the $O-C$ value relative to the linear light elements taken from the 4th edition of the GCVS (Kholopov, 1985) or to another light elements. The cases of missing or wrong light elements in GCVS are marked by (*) at the name of the star. The others than GCVS's elements are given in Table 2. The majority of minima given in Table 1 are primary ones. Secondary minima are marked in the column *Notes*. The times of minima obtained by superposition of two or more parts of light curve from different nights are denoted as "normal min." in Table 1.

References:

Gaspani, A., 3rd GEOS workshop on variable star data acquisition and processing techniques, 13-14 May 1995, S. Pellegrino Terme, Italy

Hroch, F., Novák, R., 1997, MUNIDOS, `http://ian.cz/munipack/`

Kholopov, P. N. et al., 1985, General Catalogue of Variable Stars, 4th edition, Moscow

Table 1: Times of minima of observed systems

Starname	JDhel	Error	Observer	TotN	DescN	Epoch	$O-C$	Notes
GK And	51129.3858	0.0031	JŠ	17	7	6214.0	−0.2383	
EX Aqr	51036.5451	0.0025	JŠ	28	14	14790.0	0.0307	
	51045.4347	0.0130	MZ	19	10	14800.0	0.0264	
GK Aqr*	51036.3908	0.0018	JŠ	13	4	17724.0	0.0893	
LT Aql	50947.5578	0.0055	MZ	12	8	13594.0	0.0642	
	51045.4011	0.0024	MZ	18	9	13647.0	0.0590	
V631 Aql	51081.3870	0.0020	MZ	13	7	18975.0	−0.4359	
V770 Aql	51081.4175	0.0028	MZ	14	9	14022.0	−0.4941	sec. min.
V873 Aql	51040.4507	0.0020	MZ	15	8	34648.0	0.0196	
V919 Aql	50961.4510	0.0022	JŠ	18	8	19561.0	−0.0192	
V1045 Aql	50927.5605	0.0019	JŠ	17	11	10582.0	−0.0090	
V1075 Aql	51040.4643	0.0027	MZ	18	9	26567.0	−0.0149	
V1299 Aql	51016.4547	0.0035	JŠ	24	15	6574.0	−0.0359	
FR Aur	50899.3803	0.0034	JŠ	21	14	6521.5	−0.1293	sec. min.
HU Aur	51129.2836	0.0025	JŠ	15	5	17345.0	−0.0199	
LV Aur*	50849.4144	0.0035	JŠ	45	16	3403.0	−0.2355	
V379 Aur*	50841.3046	0.0028	JŠ	10	7	8745.0	−0.0692	
	50849.4139	0.0021	JŠ	10	6	8751.0	−0.0661	
	50895.3481	0.0021	JŠ	17	8	8785.0	−0.0672	
	50899.4026	0.0028	JŠ	20	12	8788.0	−0.0658	
TU Boo	50895.4495	0.0025	JŠ	18	10	54979.0	0.0815	
TY Boo	50849.5976	0.0021	JŠ	24	13	51614.0	−0.0888	
	50919.5274	0.0063	MZ	11	5	51834.0	0.0685	
AR Boo	50919.4714	0.0081	MZ	10	4	34215.0	−0.0660	
RY Cnc	50888.4525	0.0018	JŠ	45	17	7713.0	0.0361	
EH Cnc*	50895.4231	0.0022	JŠ	19	11	12264.0	0.0301	
	50899.3922	0.0035	JŠ	25	14	12273.5	0.0279	sec. min.
	50927.4049	0.0026	JŠ	27	21	12340.5	0.0323	sec. min.
AP CMi*	50864.3328	0.0021	JŠ	17	10	1738.0	−0.0144	
CV Cas	50849.3713	0.0021	JŠ	21	11	4843.0	0.4792	
GH Cas	50849.3490	0.0028	JŠ	16	8	6614.0	−0.2714	
MM Cas	51045.5200	0.0036	MZ	22	13	13504.0	0.0581	
MS Cas	50961.4358	0.0024	JŠ	22	15	13546.0	0.0309	
IM Cep	50943.4194	0.0028	MZ	17	7	22800.0	−0.0748	
LL Cep	50947.4753	0.0040	MZ	18	11	30387.0	0.0067	normal min.
	51045.4856	0.0067	MZ	20	11	30512.0	−0.0019	
V357 Cep*	50829.2556	0.0014	JŠ	24	12	3301.0	−0.1209	
V358 Cep*	50839.3165	0.0021	JŠ	16	8	11839.0	0.0242	
	50864.3757	0.0021	JŠ	36	17	11892.0	0.0234	normal min.
CC Com	50849.5945	0.0014	JŠ	23	6	51276.5	−0.0085	sec. min.
	50919.5497	0.0024	MZ	17	9	51593.5	−0.0109	sec. + normal min.
	50925.3987	0.0006	JŠ	18	6	51620.0	−0.0101	
	50937.4264	0.0013	MZ	9	6	51674.5	−0.0098	sec. min.
	50946.3646	0.0012	JŠ	26	18	51715.0	−0.0094	
CN Com	50895.4597	0.0030	JŠ	17	8	17985.0	0.0513	
GM Cyg	51016.5516	0.0015	JŠ	53	32	3921.0	−0.2600	
PW Cyg	51081.4063	0.0030	MZ	17	10	9311.0	−0.0438	
V370 Cyg	50947.5392	0.0021	MZ	12	7	21068.0	−0.0133	
V443 Cyg	50947.5353	0.0017	MZ	12	7	28455.0	0.0274	
V500 Cyg	51016.4602	0.0031	JŠ	26	14	23973.0	0.0632	
V680 Cyg	51016.4255	0.0042	JŠ	26	11	6001.0	0.0494	
V706 Cyg	50947.5299	0.0066	MZ	10	6	23230.0	−0.0241	
	50961.5147	0.0020	JŠ	20	8	23260.0	−0.0270	
	51040.3400	0.0014	MZ	21	9	23429.0	0.0011	normal min.
	51040.5547	0.0017	MZ	16	11	23429.5	−0.0174	sec. min.
	51045.4416	0.0071	MZ	25	14	23440.0	−0.0262	
	51081.3424	0.0018	MZ	11	4	23517.0	−0.0271	

Table 1 (cont.)

Starname	JDhel	Error	Observer	TotN	DescN	Epoch	$O-C$	Notes
V963 Cyg	50899.5948	0.0015	JŠ	33	12	23332.0	0.0016	
	50943.5272	0.0016	MZ	12	6	23395.0	0.0020	
	51040.4569	0.0026	MZ	20	10	23534.0	0.0023	
V995 Cyg	51036.5781	0.0015	JŠ	45	33	6941.0	0.2233	
V1048 Cyg	50943.4402	0.0033	MZ	16	10	31326.0	0.0152	
	51142.3596	0.0014	MZ	12	8	31594.0	0.0185	normal min.
V1130 Cyg	51036.3792	0.0030	JŠ	15	8	32378.0	−0.0308	
V1321 Cyg	50943.5031	0.0104	MZ	13	7	38823.0	0.0551	
	51142.2998	0.0051	MZ	11	5	39369.0	0.0587	
V1414 Cyg	51120.2623	0.0022	JŠ	19	9	31300.0	0.0385	
V1723 Cyg	51045.3752	0.0017	MZ	19	10	9390.0	0.0386	
V1787 Cyg*	50943.3969	0.0015	MZ	14	6	7428.0	0.0481	
	51045.4499	0.0037	MZ	21	9	7566.0	0.0363	
V1870 Cyg*	50927.4893	0.0017	JŠ	17	8	12259.0	−0.0171	
	51040.4300	0.0017	MZ	15	7	12402.0	−0.0174	
	51142.3090	0.0013	MZ	11	5	12531.0	−0.0222	
V1908 Cyg*	50961.4567	0.0034	JŠ	19	8	3251.0	−0.1716	
EQ Del	51016.3853	0.0026	JŠ	25	7	10418.0	−0.0552	
WX Dra	50899.5695	0.0026	JŠ	44	23	3179.0	0.0146	
	51045.5211	0.0030	MZ	16	8	3260.0	0.0152	
XY Dra	50888.5629	0.0015	JŠ	83	36	10867.0	0.5272	
	50895.5095	0.0045	JŠ	43	21	10870.0	0.5311	
	50961.4891	0.0031	JŠ	32	21	10898.5	−0.6017	sec. min.
AR Dra	50919.4903	0.0083	MZ	10	7	11912.0	0.0026	
CM Dra	50895.5706	0.0025	JŠ	24	5	6308.5	0.0020	sec. min.
GM Gem	50841.2817	0.0028	JŠ	13	6	15052.0	−0.0061	
	50864.3955	0.0021	JŠ	20	13	15069.0	−0.0067	normal min.
	51129.5252	0.0016	JŠ	15	9	15264.0	−0.0127	
HR Gem	50899.3809	0.0032	JŠ	21	14	19252.0	0.0172	
KV Gem*	50839.3303	0.0028	JŠ	17	9			
	50849.3680	0.0028	JŠ	12	5			
V502 Her	51016.4443	0.0027	JŠ	18	11	54371.0	0.0024	
V643 Her	51036.3199	0.0040	JŠ	20	4	12237.0	−0.2632	
V719 Her	50946.3488	0.0014	JŠ	11	7	27832.0	0.1370	
	51045.3824	0.0024	MZ	13	5	28127.0	0.0889	
V732 Her	50899.5045	0.0028	JŠ	16	8	17770.0	−0.1645	
	51120.2815	0.0024	JŠ	19	11	18190.0	−0.1022	
AG Lac	51036.3339	0.0015	JŠ	13	4	34898.5	0.0402	sec. min.
	51081.4630	0.0045	MZ	17	9	34958.5	0.0385	sec. min.
EL Lac	50943.4750	0.0076	MZ	14	6	9064.0	0.1343	normal min.
EX Lac	51043.3925	0.0018	JŠ	22	13	15091.0	0.1918	
IP Lac	50943.5457	0.0017	MZ	11	6	20049.0	0.0622	
	50961.4353	0.0028	JŠ	21	14	20070.0	0.0596	
	51081.5712	0.0011	MZ	13	5	20211.0	0.0620	
UX Leo	50895.4403	0.0035	JŠ	25	14	13423.0	−0.2595	
VZ Leo	50888.3005	0.0016	JŠ	17	8	18097.0	−0.0444	
CE Leo	50888.2880	0.0013	JŠ	19	7	19249.5	−0.0010	sec. min.
	50895.4150	0.0028	JŠ	15	6	19273.0	−0.0046	
	50921.3604	0.0049	MZ	10	5	19358.5	−0.0024	sec. min.
SX Lyn	50849.5293	0.0028	JŠ	19	5	2675.0	−0.0060	
AH Lyn*	50925.4266	0.0023	JŠ	20	11	13064.0	−0.0018	
RVLyr	51036.4858	0.0040	JŠ	38	17	1531.0	−0.0908	
ET Lyr	51142.2704	0.0076	MZ	22	14	6545.0	−0.0555	normal min.
GZ Lyr	50943.4196	0.0059	MZ	12	6	9313.0	−0.0055	
V401 Lyr	50927.4432	0.0025	JŠ	21	9	15158.0	−0.0658	
UU Mon	50849.3013	0.0021	JŠ	20	12	17060.0	0.0046	
AY Mon	50841.2829	0.0035	JŠ	19	6	10537.0	0.0147	
NN Mon	50888.3940	0.0027	JŠ	22	16	22751.5	0.0602	sec. min.

Table 1 (cont.)

Starname	JDhel	Error	Observer	TotN	DescN	Epoch	$O-C$	Notes
V396 Mon	50841.3736	0.0035	JŠ	18	7	40550.5	−0.0310	sec. min.
	51129.5117	0.0023	JŠ	24	14	41277.5	−0.0357	sec. min.
V752 Oph	50927.5368	0.0024	JŠ	40	14	4371.0	−0.0667	
V396 Mon	50832.2573	0.0028	JŠ	18	6	40527.5	−0.0314	sec. min.
GU Ori*	50839.4256	0.0021	JŠ	32	7	16507.0	−0.0087	
	50888.3750	0.0024	JŠ	19	10	16611.0	−0.0101	
OS Ori	50849.3661	0.0028	JŠ	21	13	2292.0	−0.0222	
V645 Ori	50839.3591	0.0035	JŠ	24	8	21710.0	0.0353	
BX Peg	50829.2453	0.0021	JŠ	21	8	23657.0	−0.0467	
CE Peg	51043.5017	0.0005	JŠ	25	17	40893.0	−0.2222	
PS Per	50839.2981	0.0021	JŠ	18	7	37472.0	0.0528	
	50841.4035	0.0021	JŠ	14	11	37475.0	0.0517	
QU Per	51129.2428	0.0024	JŠ	23	11	6267.0	−0.0051	
DK Sge	51081.4724	0.0032	MZ	19	12	24848.0	0.1189	normal min.
	51129.3503	0.0020	JŠ	18	15	24925.0	0.1167	
DK Sct	51036.3865	0.0030	JŠ	17	7	18297.0	0.0285	
BI Ser	50921.4635	0.0069	MZ,JŠ	22	12	3865.0	0.1806	normal min.
	50927.4877	0.0042	JŠ	23	11	3870.0	0.1804	
CX Ser	50849.6004	0.0021	JŠ	25	8	19689.5	−0.0665	sec. min.
	50921.4009	0.0054	MZ	9	5	19761.5	−0.0710	sec. min.
	50927.3844	0.0020	JŠ	19	13	19767.5	−0.0713	sec. min.
AC Tau	50849.2598	0.0021	JŠ	15	7	2551.0	0.0686	
AQ Tau	50841.2828	0.0056	JŠ	16	5	17427.0	−0.0502	
	51129.4363	0.0027	JŠ	19	10	17664.0	−0.0660	
V407 Tau	50839.4669	0.0042	JŠ	48	21	6980.0	0.2916	
BT Vul	51043.4686	0.0010	JŠ	29	14	13706.0	0.0014	
DN Vul	51043.4620	0.0010	JŠ	29	20	6197.0	0.8983	
FF Vul	50961.4966	0.0018	JŠ	17	5	34327.0	0.0122	
	51043.3771	0.0013	JŠ	19	7	34511.0	0.0153	
	51129.2541	0.0022	JŠ	16	6	34704.0	0.0100	
FM Vul	50899.5818	0.0024	JŠ	30	14	9105.0	0.0192	
GI Vul	50947.4901	0.0025	MZ	12	5	32984.0	−0.0148	
	51081.3425	0.0021	MZ	11	6	33262.0	−0.0147	
NO Vul	50895.5939	0.0017	JŠ	19	9	12270.0	−0.0466	
	50937.4815	0.0016	MZ	9	5	12383.0	−0.0558	
	50947.4989	0.0026	MZ	13	6	12410.0	−0.0492	
	51081.3473	0.0023	MZ	12	7	12771.0	−0.0482	

Observers: JŠ: J. Šafář, MZ: M. Zejda

Table 2: Other published light elements used

Starname	Basic epoch	Period	Reference
GK Aqr	2445233.292	0.3274097	Kurochkin, N. E., 1986, VS 22, No. 3, 327
LV Aur	2439026.590	3.474305	Splittgerber, E., 1985, MVS 10, No. 7, 153
V379 Aur	2439026.564	1.351036	Splittgerber, E., 1985, MVS 10, No. 7, 153
EH Cnc	2445768.624	0.418034	Figer, A., le Borgne, J. F., Dumont, M., 1985, IBVS No. 2755
AP CMi	2447105.34	2.162835	Borovička, J., 1990, BBSAG Bull. 95
V357 Cep	2446507.463	1.309274	Borovička, J., 1988, Brno Contribution 28, 34
V358 Cep	2445241.471	0.4728289	Diethelm, R., 1990, BBSAG Bull 96
V1787 Cyg	2445449.6	0.7396	Locher, K., 1983, BBSAG Bull. 67
V1870 Cyg	2441245.385	0.789797	Margoni, R., et al., 1989, AsApSuppl 81, 393
V1908 Cyg	2442950.490	2.4642074	Zemljannikova, S. V., 1986, VS 22, No. 3, 359
KV Gem			light elements given in GCVS are wrong
AH Lyn	2437647.022	1.016412	Kinman, T.D., Mahaffey, C.T., Wirtanen, C.A., 1982, AJ 87, 314
GU Ori	2443069.903	0.470681	Samolyk, G., 1985, JAAVSO 14, No. 1, 12

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PHOTOMETRY OF STARS IN THE FIELD OF BI ANDROMEDAE

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BI Andromedae ($2^{\rm h}25^{\rm m}54\overset{\rm s}{.}34$; $+38^\circ07'22\overset{\prime\prime}{.}2$ [2000]) is a chemically-peculiar AGB variable of type S7.5 Zr6Ti4 (Åke 1979). The star is an interesting one, and although fairly well-studied in the infrared, has not been followed in the visible. The period of variation (if any) is not well determined. The most recent work in this regard appears to be by Götz (1956), who found a period of $159\overset{\rm d}{.}5$ with a photographic-blue range from $11\overset{\rm m}{.}0$ to $13\overset{\rm m}{.}3$.

As a check on the AAVSO standard chart comparison sequence, I made $V/(b-y)$ measurements of stars in the field. I worked from the AAVSO 'special' (e)-scale chart issued March 1958 but redrafted more recently (AAVSO 2000). The stars were observed on a single night (21 January 1996 UT) using the Lowell 53-cm photometric telescope, Strömgren b and y filters, and a $29''$ diaphragm. I also measured fifteen primary and secondary standards whose *rms* residuals from linear fits were 0.009 and 0.005 mag. in V and $b-y$, respectively. Since the field was observed at low airmass, mean extinction values (Lockwood & Thompson 1986) were applied in the reductions. The match with HD 15025 in common with Perry & Johnston (1982) and Olsen (1983) is satisfactory, so the results for the other stars should be adequate for most purposes.

Table 1 shows the results for the stars in order of decreasing brightness. An asterisk by the star name indicates a note following the table. The positions are from Tycho-2 (Høg *et al.* 2000). The sequence covers the known range of the variable in roughly half-magnitude increments. The spectral types in lower-case and parentheses are *estimates* based on the $b-y$ colors along with the assumption of near-zero reddening.

The magnitudes on the 1958 AAVSO chart have a lot of scatter: some are accurate, others off by 0.5 mag.

Table 1: Photometry of stars in the field of BI Andromedae

Name	RA (2000)	Dec	V	$b-y$	spec
HD 15025*	$2^{\mathrm{h}}26^{\mathrm{m}}24\overset{\mathrm{s}}{.}17$	$+38°13'51\overset{''}{.}1$	8.065	0.132	F0
BD+37°550	2 25 29.92	+37 50 35.2	9.453	0.619	K0
BD+37°553*	2 26 05.90	+38 25 30.3	9.932	0.345	(f8v)
GSC 2831-0144	2 24 30.53	+38 15 01.8	10.332	0.244	(f2v)
BD+37°551*	2 25 38.29	+38 18 40.6	10.667	0.587	(g8iii)
GSC 2831-1586	2 26 13.72	+38 20 32.8	10.995	0.331	(f8v)
GSC 2831-0298	2 25 46.06	+38 15 31.8	11.393	0.351	(f8v)
GSC 2831-0702	2 25 49.20	+38 07 15.5	12.201	0.355	(f8v)

Notes

HD 15025	$V=8.08$, $b-y=0.132$ (Perry & Johnston 1982); $V=8.075$, $b-y=0.142$ (Olsen 1983).
BD+37°553	GSC 2831-2395.
BD+37°551	GSC 2831-0278.

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PHOTOMETRY OF STARS IN THE FIELD OF AF CYGNI AND AW CYGNI

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At the request of AAVSO chartmaker Charles Scovil, I observed a number of comparison stars in the field of the carbon star variable AW Cygni and the brighter star AF Cygni. The preliminary AAVSO sequence had both a zero-point and scale error at the faint end, evident even from visual observations. The present results were originally distributed via the 'vsnet' list-server (Skiff 1996).

The observations were made with the Lowell 53-cm photometric telescope on the UT dates 14 and 25 August, 1 September 1992, 4 October 1995, and 9 October 1996 using either 19″ or 29″ diaphragms and Strömgren b and y filters. The number of standard stars ranged from a handful to a couple dozen on each night. The field was observed at low airmass, so mean extinction values (Lockwood & Thompson 1986) were applied in the reductions. The per-star residuals in the linear fits to the standards averaged between $0\overset{m}{.}004$ and $0\overset{m}{.}008$ in both V and $b-y$. Data on the first night were taken only in the Strömgren y filter. These were re-reduced to add in the color term to correct them to standard V using colors from later observations. I have left the 14 August 1992 magnitude of AF Cygni without adjustment, since the color at that time could have been somewhat different than what was observed later.

Table 1 shows the results for the stars in order of decreasing brightness; observations of the variables are given in the first two entries. An asterisk by the star name indicates a note following the table. The positions are from Tycho-2 (Høg *et al.* 2000) except for the last four stars, which are from the GSC-ACT (Gray 1999). Where two observations have been made, the *rms* scatter of these are given in the second line of the relevant entries.

BD+45°2901 is a little-reddened early-M giant, and my two observations are sufficiently different to suggest it is perhaps slightly variable, but not at a level to make it unsuitable as a comparison star for visual observers. It is worth noting that the colors of the two named variables lie well beyond the range of the standard stars, and so are subject to both 'reduction' and 'conformity' errors of the type described by Manfroid & Sterken (1992). Based on my experience with this particular instrumental set-up, the errors in color and magnitude for AF Cyg will not be substantial, but those for the very red carbon star AW Cyg could amount to several percent.

Table 1: Photometry of stars in the field of AF and AW Cygni

Name	RA (2000)	Dec	V	$b-y$	n	spec	Remarks
AF Cygni*	$19^{\rm h}30^{\rm m}12\overset{\rm s}{.}86$	$+46^\circ08'52\overset{''}{.}1$	7.65	—		M4III	HD 184008
			7.49	1.50			
AW Cygni*	19 28 47.57	+46 02 38.2	8.86	3.21		C5,4	BD+45°2906
HD 184147*	19 31 01.09	+46 19 54.5	7.166	−0.016	2,1	A0	
			.007				
HD 183299*	19 26 52.82	+45 50 09.8	8.022	0.694	2,1	G5	
			.006				
BD+45°2898	19 26 40.94	+46 10 15.1	9.293	0.577	2	G5	
			.004	.003			
HD 183829	19 29 17.81	+46 21 26.1	9.338	0.076	2,1	A0	
			.006				
BD+45°2901*	19 27 25.86	+46 08 06.9	9.665	1.016	2	M1	DO 37291
			.034	.016			
GSC 3543-2174	19 27 58.03	+45 54 46.8	10.174	0.224	2		
			.014	.001			
GSC 3543-2617	19 28 18.15	+45 59 59.8	11.008	0.111	2		
			.002	.008			
GSC 3543-2408	19 28 00.17	+45 52 37.5	11.180	0.669	2		
			.003	.010			
GSC 3543-0802	19 29 16.07	+46 01 50.0	11.848	0.263	2		
			.001	.003			
GSC 3543-0998	19 28 50.40	+46 00 10.6	12.570	0.360	2		
			.020	.024			
GSC 3543-1411	19 28 40.69	+46 01 44.0	13.19	0.45	2		
			.02	.05			
GSC 3543-2413	19 28 51.16	+46 01 44.9	13.84	0.84	2		
			.02	.04			

Notes

AF Cyg	observations on 14 Aug 1992 UT (JD 2448848.7) and 4 Oct 1995 UT (JD 2449994.7).
AW Cyg	GSC 3543-2275; observation on 4 Oct 1995 UT (JD 2449994.7).
HD 184147	$V = 7.160$ (Kornilov *et al.* 1991).
HD 183299	$V = 8.026$, $b-y = 0.693$ (Olsen 1993).
BD+45°2901	slightly variable?

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PHOTOMETRY OF STARS IN THE FIELD OF BF CYGNI

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The symbiotic variable BF Cygni ($19^{\rm h}23^{\rm m}53\overset{\rm s}{.}51$; $+29^\circ40'29\overset{''}{.}2$ [2000]) lies a few arcminutes from the fifth-magnitude star 2 Cygni in a crowded region of the southern Cygnus starcloud with numerous other variables. Monitoring of the star by visual observers has been hampered by poor comparison sequences. The original BAA sequence simply did not reach faint enough to cover the minimum observed in 1995, when the star faded to $m_v \sim 12.5$, and fainter still in more recent years. The AAVSO chart goes fainter, but is based on photographic photometry that clearly has a zero-point error. At the request of Gary Poyner (British Astronomical Association Variable Star Section) I verified and extended the comparisons to reach past the level of the 1995 faint episode. I worked from the AAVSO preliminary (d)-scale chart last revised in September 1988 (AAVSO 2000). For stars fainter than AAVSO '125' (which has $V = 12.2$), I chose stars closer to the variable than the ones labelled on the chart. The results were originally distributed via the 'vsnet' list-server (Skiff 1996).

The observations were made with the Lowell 53-cm photometric telescope on the UT dates 26 October and 13 November 1995, and 5 August 1996 using a $29''$ diaphragm and Strömgren b and y filters. About ten primary and secondary standards were observed each night for adjustment to the standard system. The field was observed at low airmass, so mean extinction values (Lockwood & Thompson 1986) were applied in the reductions. The per-star residuals in the linear fits to the standards averaged between $0\overset{\rm m}{.}006$ and $0\overset{\rm m}{.}010$ in both V and $b-y$.

Table 1 shows the results for the stars in order of decreasing brightness. An asterisk by the star name indicates a note following the table. The positions are from Tycho-2 (Høg *et al.* 2000) or the GSC-ACT (Gray 1999). The *rms* scatter of the magnitudes and colors are given in the second line of each entry. These new data have been incorporated onto the revised BAA chart (Poyner 1995). Benson & Salter (1999) provide BVRI photometry for two additional stars in this field that complement the present set.

Table 1: Photometry of stars in the field of BF Cygni

Name	RA (2000)	Dec	V	$b-y$	n	spec	Remarks
BD+29°3579	$19^{\rm h}23^{\rm m}11\overset{\rm s}{.}33$	$+29°30'09\overset{''}{.}6$	9.742	1.202	3	K2	
			.033	.016			
BD+29°3586*	19 24 37.35	+29 34 17.1	10.522	0.259	3		GSC 2137-0298
			.014	.004			
GSC 2137-1762	19 24 12.68	+29 35 04.3	10.987	0.783	2		
			.025	.018			
GSC 2136-0649	19 23 35.51	+29 39 18.8	11.312	0.822	3		
			.019	.017			
GSC 2136-0027*	19 23 27.69	+29 41 27.7	12.208	0.680	3		
			.013	.017			
GSC 2136-0778	19 23 41.06	+29 37 04.7	12.888	0.760	2		
			.023	.023			
GSC 2137-1408*	19 23 52.35	+29 43 57.5	13.40	0.49	2		
			.05	.01			

Notes

GSC 2136-0027	star ∼20″ north excluded, but two very faint companions included.
GSC 2137-1408	very faint close companion on northeast.

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PHOTOMETRY OF STARS IN THE FIELD OF CI CYGNI

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CI Cygni ($19^{\rm h}50^{\rm m}11\overset{\rm s}{.}83$; $+35°41'03\overset{''}{.}0$ [2000]) is a well-studied symbiotic star with a typical range of variation between visual magnitudes 9 and 12. Most of this is due to the luminous cool component, which is of spectral type about M5 (*e.g.* Muerset & Schmid 1999). Although otherwise quite well-studied, CI Cygni appears not have a convincing photometric sequence published for it. At the request of AAVSO chartmaker Charles Scovil, I have obtained $V/(b-y)$ photometry for selected stars appearing on this group's chart for the variable. The results were originally distributed via the 'vsnet' list-server (Skiff 1996).

The preliminary AAVSO (e)-scale chart dated December 1973 (AAVSO 2000) contains mainly visual estimates for the comparison stars. However, the results presented here indicate that both the magnitude zero-point and scale are reasonably good, apart from the usual scatter of a few tenths of a magnitude common on these charts.

I observed the stars on the UT dates 11 July 1994 and 13 October 1996 using the Lowell 53-cm photometric telescope, either a $19''$ or $29''$ aperture, and Strömgren y and b filters. The 1994 data were taken during a full night of observing that included over 30 primary and secondary standards whose residuals averaged $0\overset{\rm m}{.}007$ in both V and $b-y$; the shorter second session involved thirteen standards with similar scatter. Mean extinction coefficients (Lockwood & Thompson 1986) were applied in the reductions.

Table 1 shows the results for the stars in order of decreasing brightness. An asterisk by the star name indicates a note following the table. The positions are from Tycho-2 (Høg *et al.* 2000) except for the last two stars, which are taken from USNO-A2.0 (Monet *et al.* 1998). These are assigned names based on the rounded J2000 coordinates. (The GSC becomes incomplete at a bright level in this very crowded field.) Most of the stars were observed on both nights, and the *rms* dispersion of these are given in the second line of the relevant entries. For the faintest star, measured once, the uncertainty given in parentheses is the scatter in the batch of integrations plus the error in the fit to the standards taken in quadrature.

Most of the spectral types are from a paper by Mikołajewska & Mikołajewski (1980), who give photographic UBV photometry and MK types for a couple hundred stars in the field of this variable. The photometry here unfortunately shows a lot of scatter ($\sim 0\overset{\rm m}{.}2$). However, the MK types for fainter stars appear to be consistent with those given in the HDE catalogue and with the present photometry assuming a modest amount of reddening. The region lies just outside the spectral surveys done at Case and Crimea (*e.g.* Numerova 1958).

Photometry for many of these stars and others in the field was published by Howarth & Bailey (1980). In comparison to my results, their V magnitudes range from $0\overset{\mathrm{m}}{.}05$ to $0\overset{\mathrm{m}}{.}2$ too bright as a function of color (redder stars are progressively too bright). A photographic-blue/visual sequence is given by Mjalkovskij (1977), which suffers mainly from zero-point offsets relative to Johnson B and V. Photoelectric photometry for a few isolated stars used as comparisons by various observers is more consistent, and two of these are mentioned in the notes to the table.

Among the individual stars, I was surprised to find that the very red star GSC 2677-1273 appears to be not variable. The relatively large error in the color results from it lying outside the range of the standard stars, which extended to only $b-y=1.17$. The Tycho-2 photometry gives $V=10.70\pm0.06$ and $B-V=2.2\pm0.4$. It is not an IRAS source nor does it appear in the Dearborn catalogue of red stars. Perhaps it is an K-type bright-giant or Ib supergiant that is significantly reddened.

Table 1: Photometry of stars in the field of CI Cygni

Name	RA (2000)	Dec	V	$b-y$	n	spec
HD 226041	$19^{\mathrm{h}}49^{\mathrm{m}}59\overset{\mathrm{s}}{.}62$	$+35°40'14\overset{''}{.}4$	8.588	0.236	2	F5
			.022	.002		
HD 226107*	19 50 38.83	+35 50 27.6	8.620	-0.029	2	B9V
			.001	.003		
HD 226117	19 50 49.47	+35 47 44.6	9.009	0.812	2	K2III
			.011	.005		
HD 225992*	19 49 30.02	+35 50 01.7	10.487	0.188	2	F1V
			.004	.012		
GSC 2677-1273	19 50 39.72	+35 33 41.9	10.673	1.344	2	
			.010	.030		
GSC 2677-0784	19 50 32.60	+35 32 52.0	11.170	0.783	2	
			.009	.013		
GSC 2861-0298	19 50 33.06	+35 42 41.9	11.56	0.28	1	
GSC 2861-1332	19 50 24.58	+35 43 09.9	11.715	0.201	2	B6IV
			.015	.001		
J195019+3539.5	19 50 19.00	+35 39 31.7	12.52	0.43	2	
			.04	.02		
J195022+3541.1	19 50 21.63	+35 41 05.2	13.42	0.36	1	
			(.04)	(.04)		

Notes
HD 226107 $V=8.55$ (Golay 1958).
HD 225992 $V=10.49$ (Belyakina 1976).

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PHOTOMETRY OF STARS IN THE FIELD OF AP PEGASI

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AP Pegasi is a poorly-observed Mira variable showing maxima as bright as visual magnitude 9. At the request of AAVSO chartmaker Charles Scovil, I measured several stars in the field suitable as comparisons for visual and CCD observers while the star is bright. The current AAVSO (d)-scale chart, dated November 1982 (AAVSO 2000), has no proper photometry of the sequence stars. The present results were originally distributed via the 'vsnet' list-server (Skiff 1996).

I observed the stars on 20 October 1994, and 10 and 11 October 1996 UT using the Lowell 53-cm photometric telescope, $19''$ or $29''$ diaphragms, and Strömgren b and y filters. Between ten and thirty-one primary and secondary standard stars were used each night for adjustment to the standard system. The field was observed at low airmass, so mean extinction values (Lockwood & Thompson 1986) were applied in the reductions. The per-star residuals in the linear fits to the standards averaged between $0\overset{m}{.}005$ and $0\overset{m}{.}007$ in V and $b-y$ on all three nights. Although the colors of the standards extended to $b-y \sim 1.1$, the variable and one red field star were nevertheless outside the calibration regime.

Table 1 shows the results for the stars in order of decreasing brightness; an observation of the variable itself is given in the first entry. An asterisk by the star name indicates a note following the table. The positions are from Tycho-2 (Høg *et al.* 2000) except for the last star, which is from the GSC-ACT (Gray 1999). Two observations have been made on the fainter stars, and the *rms* scatter of these are given in the second line of the relevant entries. Spectral types given in parentheses and lower-case characters are *estimates* based simply on the $b-y$ colors and the assumption of near-zero reddening.

The red star GSC 1668-0160 was not obviously variable in my two observations made two years apart, but is clearly a mid-M giant (it has negligible proper motion in Tycho-2), and so must be variable at some level.

Table 1: Photometry of stars in the field of AP Pegasi

Name	RA (2000)	Dec	V	$b-y$	n	spec	Remarks
AP Pegasi*	$21^{\mathrm{h}}29^{\mathrm{m}}22\overset{\mathrm{s}}{.}89$	$+18^{\circ}09'59\overset{''}{.}4$	11.811	1.450	1	M6e	DO 20495
HD 204560*	21 28 59.92	+17 54 21.3	6.407	0.863	1	K5	HR 8221
HD 204725*	21 30 06.85	+18 34 42.7	7.429	0.165	1	A5	
BD+17°4595*	21 30 07.68	+18 16 21.3	9.256	0.420	1	G0	
BD+17°4591*	21 28 43.82	+18 09 47.3	9.454	0.346	1	F8	
BD+17°4590	21 27 53.91	+17 59 05.8	9.918	0.269	1	F2	
BD+17°4593	21 29 24.48	+17 47 27.9	9.996	0.341	1	(f8v)	GSC 1668-0189
GSC 1668-0160	21 29 23.20	+18 05 48.2	10.840	1.221	2	(m3/5iii)	DO 20496
			.021	.012			
GSC 1668-0082	21 29 24.59	+18 07 59.6	12.089	0.292	2	(f5v)	
			.023	.045			
GSC 1668-0007	21 29 20.83	+18 10 24.9	12.998	0.378	2	(g0v)	
			.015	.011			

Notes

AP Peg	observation on 20 October 1994 UT (JD 2449645.7).
HD 204560	$V = 6.425$ (Kornilov *et al.* 1991).
HD 204725	$V = 7.435$, $b-y = 0.154$ (Olsen 1983); $V = 7.432$ (Kornilov *et al.* 1991)
BD+17°4595	large proper motion.
BD+17°4591	ADS 15005, companion at $22''$ excluded; $V = 9.46$ (Henden 1980).

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PHOTOMETRY OF STARS IN THE FIELD OF CQ TAURI

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CQ Tauri (HD 36910) is a variable pre-main-sequence star ranging mostly between visual magnitudes $9^{\rm m}$ and $11\overset{\rm m}{.}5$. The AAVSO 'standard' (d)-scale chart for this star (AAVSO 2000) shows magnitudes from the survey by Kalandadze (1964), who provided photographic *UBV* photometry and MK spectral types for some 3600 stars in the Taurus/Gemini Milky Way. As a check on the magnitude zero-point and scale, I have done $V/(b-y)$ photometry of many of the sequence stars in the field. The results were originally distributed via the 'vsnet' list-server (Skiff 1995).

I observed the stars on the UT dates 31 October and 30 November 1994 using the Lowell 53-cm photometric telescope, 29″ aperture, and Strömgren y and b filters. A total of 23 and 30 primary and secondary standards were observed on the respective nights whose residuals averaged $0\overset{\rm m}{.}007$ in both V and $b-y$. Mean extinction coefficients (Lockwood & Thompson 1986) were applied in the reductions.

Table 1 shows the results for the stars in order of decreasing brightness. Observations of CQ Tauri on the two nights are shown in the first entry. An asterisk by the star name indicates a note following the table. The positions are from Tycho-2 (Høg *et al.* 2000). Most of the stars were observed on both nights, and the *rms* dispersion of these are given in the second line of the relevant entries.

The V magnitudes of Kalandadze, although internally consistent, show a zero-point error of about $-0\overset{\rm m}{.}2$ (Kalandadze too bright). The MK types shown in the table are mostly from this source as well. These appear to be quite reliable, and show the effects of reddening by the Taurus dark clouds in the middle distance. A later survey of the same region by Chargeishvili (1988) gives similar types for the same stars. Visual observations of CQ Tauri in the AAVSO database (`http://www.aavso.org/aavso/curvegenerator.shtml`) are consistent with my V magnitudes made on the same dates despite the offset in the chart zero-point, which perhaps compensates roughly for the color term between V and the dark-adapted visual response. The two measurements of the carbon star HD 244898 suggest it is a small-amplitude variable. The observations by Paupers *et al.* (1994) show it about $0\overset{\rm m}{.}3$ brighter, so variability seems certain. The star is not especially red.

Table 1: Photometry of stars in the field of CQ Tauri

Name	RA (2000)	Dec	V	$b-y$	n	spec	Remarks
CQ Tauri*	$5^{\mathrm{h}}35^{\mathrm{m}}58^{\mathrm{s}}.46$	$+24^\circ44'54''.1$	11.040	0.517		F2IVe	HD 36910
			10.413	0.534			
HD 36758	5 35 03.57	+24 17 26.8	6.829	0.653	2	G8	IRAS 05320+2415
			.002	.000			
HD 37012	5 36 28.06	+24 22 06.4	8.003	1.267	2	K5II	
			.004	.001			
HD 245084*	5 35 23.67	+25 01 20.3	8.563	0.773	2	G8III	
			.004	.006			
HD 245225	5 36 07.87	+24 28 42.3	9.129	1.042	2	K3III	
			.001	.008			
HD 245133	5 35 33.62	+24 31 56.2	9.268	0.301	2	B9V	
			.003	.004			
HD 244897	5 34 23.70	+24 55 21.8	9.670	0.983	2	K0	GSC 1852-0119
			.003	.011			
HD 245180*	5 35 49.70	+24 55 22.8	9.812	0.227	2	B3V	
			.001	.009			
HD 244898*	5 34 25.47	+24 51 11.8	10.065	1.020		C4,4	CGCS 990
			10.112	1.012			
HD 245030*	5 35 02.87	+24 29 04.9	10.132	0.357	1	G2IV	
HD 245224	5 36 04.13	+24 31 23.1	10.298	0.375	2	A5	
			.004	.015			
HD 245029*	5 35 05.05	+24 37 05.4	10.501	0.560	1	F5	
BD+24°879	5 36 25.04	+24 47 52.2	10.893	0.355	2	B3IIIe	LS V +24°3
			.004	.001			
GSC 1865-1630*	5 35 56.11	+24 42 47.6	11.457	0.438	2	G5:	
			.003	.004			
GSC 1865-1722	5 36 35.96	+24 44 03.7	11.878	0.440	1	A1	

Notes

CQ Tauri	observations on 31 Oct 1994 UT (JD 2449656.9) and 30 Nov 1994 UT (JD 2449686.9).
HD 245084	$V = 8.55$ (Yoss *et al.* 1991).
HD 245180	close double; $V = 9.814$, $b - y = 0.223$ (Westin 1982).
HD 244898	observations on 31 Oct 1994 UT (JD 2449656.9) and 30 Nov 1994 UT (JD 2449686.9). $V = 9.73$ (Paupers *et al.* 1994).
HD 245030	$V = 10.12$ (Yoss *et al.* 1991).
HD 245029	BD+24°867 = GSC 1865-1744.
GSC 1865-1630	probably a dwarf on the basis of $b - y$ color and modest proper motion.

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 287–291

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first described by Hoffmeister (1949) in the difficult-to-find “Ergänzungshefte” to the *Astronomische Nachrichten*, and are the first group from a collection of some 1440 variables from this publication. Details about the identification procedure and table layout are contained in the first report of our series (Kinnunen & Skiff 2000). We are grateful to librarians Antoinette Beiser (Lowell) and Brenda Corbin (U. S. Naval Observatory, Washington) for providing a photocopy of the Hoffmeister survey; “bibliothécaire extraordinaire” Suzanne Laloë (Obs. Paris-Meudon) advised on how this obscure journal should be cited.

Table 1: Variables on *MVS* 287–291

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3714	V434 Ori	$5^{h}23^{m}36^{s}.97$	$+12^{\circ}44'40''.0$	G	0708-0277	05207+1241
S 3715	V435 Ori	5 24 03.93	+06 18 23.7	G	0113-1060	05213+0615
S 3716	V440 Ori*	5 28 23.24	+08 41 27.8	G	0700-0875	
S 3717	V370 Ori	5 30 01.89	+12 13 09.8	G	0709-1229	
S 3718	GY Ori*	5 30 13.14	+12 08 45.8	G	0709-1597	
	HK Ori*	5 31 28.04	+12 09 10.3	T	0709-0857	
S 3719	V465 Ori*	5 33 51.31	+12 10 56.5	G	0709-0463	
S 3720	V471 Ori*	5 35 24.44	+13 29 25.8	G	0713-0490	05325+1327
S 3721	V506 Ori*	5 39 09.23	+09 25 30.4	G	0718-1019	
S 3722	V512 Ori	5 40 43.17	+12 49 07.8	G	0722-0172	
S 3723	V515 Ori	5 41 29.55	+09 07 19.8	G	0714-0926	
S 3724	V1022 Ori	5 43 23.21	+09 05 31.8	G	0714-0231	
S 3725	V521 Ori	5 44 19.26	+11 48 47.4	T	0722-1086	
S 3726	V520 Ori	5 44 04.99	+06 57 15.6	T	0127-0715	
S 3727	QS Ori	5 45 36.70	+12 16 15.2	G	0723-0588	
S 3728	QT Ori	5 47 03.00	+05 55 04.0	G	0128-0066	
S 3729	V526 Ori	5 50 41.56	+09 18 19.9	A		
S 3730	V527 Ori*	5 53 04.88	+13 07 00.1	T	0724-0155	
S 3731	DU Tau	5 30 26.06	+21 53 23.0	T	1309-3220	

Table 1: Variables on *MVS* 287–291 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3732	NSV 2055	$5^h31^m15^s.70$	$+22^\circ01'01''.9$	G	1309-3010	
	DW Tau*	5 37 44.08	+17 45 30.1	A		05348+1743
S 3733	DX Tau	5 41 05.11	+16 35 30.4	G	1298-0853	05381+1634
S 3734	DZ Tau	5 42 38.57	+22 01 19.7	G	1310-1377	05396+2159
S 3735	EE Tau	5 42 38.11	+19 21 51.4	T	1306-1020	
	HY Tau	5 43 22.38	+19 24 05.5	G	1306-0895	
	EF Tau*	5 43 31.81	+19 25 12.2	G	1306-1298	
	CP Tau*	5 45 26.53	+15 30 45.3	T	1299-1450	
S 3736	EU Tau	5 45 40.53	+18 39 24.8	T	1303-0289	
	EG Tau*	5 45 43.92	+18 38 15.9	G	1303-0352	05428+1837
S 3737	EH Tau	5 45 33.62	+16 26 55.9	G	1299-0591	05426+1625
	EI Tau*	5 46 56.53	+17 54 31.6	G	1303-1131	05440+1753
S 3738	EK Tau	5 49 25.24	+19 49 14.8	A		05464+1948
S 3739	EL Tau	5 49 21.52	+13 12 07.9	T	0727-0240	
S 3740	QU Ori	5 50 03.99	+21 51 39.0	G	1311-1519	
S 3741	QV Ori	5 50 04.35	+19 59 22.8	A		
S 3742	EM Tau	5 50 14.62	+15 59 29.5	A		05473+1558
S 3743	EW Tau	5 51 35.22	+16 01 57.3	T	1299-0624	
S 3744	QW Ori	5 53 40.24	+21 45 37.4	T	1324-0643	
S 3745	V335 Ori	5 57 41.49	+21 47 17.6	G	1324-0802	
S 3746	V641 Ori	5 57 17.69	+14 06 15.9	G	0728-1223	
S 3747	V337 Ori	5 59 20.57	+20 02 07.5	T	1320-0167	
S 3748	V339 Ori	6 01 04.66	+16 54 41.0	G	1317-0868	
S 3749	V341 Ori	6 03 37.33	+14 42 48.4	G	0729-0713	
S 3750	V342 Ori	6 04 01.14	+21 13 33.5	G	1325-0585	
S 3751	HH Gem	6 37 06.92	+13 08 46.9	A		
S 3752	KV Gem	6 47 12.58	+15 43 34.5	G	1330-1213	
S 3753	FI Gem	6 49 09.06	+16 09 45.0	G	1331-1775	
S 3754	FS Gem*	6 57 21.23	+16 30 13.9	A		
S 3755	IX Mon	6 57 47.49	+11 48 21.0	G	0756-0468	
S 3756	EG Gem	6 57 51.87	+13 08 24.4	T	0760-0258	
S 3757	EH Gem	6 59 27.55	+12 18 55.2	G	0756-1515	06566+1223
S 3758	IY Mon*	7 00 39.28	+10 34 52.3	G	0752-2551	06578+1039
S 3759	KK Mon	7 01 27.99	+10 26 38.2	G	0753-2552	06587+1030
	EV Mon*	7 02 08.57	+10 45 43.2	G	0753-1043	06593+1050
S 3760	GG Gem	7 02 40.85	+17 29 37.3	T	1348-1311	
S 3761	GM Gem	7 05 29.82	+10 39 36.4	G	0753-2029	
S 3762	AB CMi	7 07 57.33	+11 58 19.1	G	0757-0337	
S 3763	GQ Gem	7 10 02.85	+14 47 05.5	A		
S 3764	GL CMa	6 38 28.44	−16 56 12.1	T	5952-2317	06362–1653
S 3765	NSV 3084	6 40 05.53	−13 55 30.6	T		06377–1352
S 3766	DY CMa	6 42 37.58	−14 27 18.9	T	5390-2077	
S 3767	GN CMa	6 42 27.43	−19 00 50.1	T	5957-2754	
S 3768	DF CMa*	6 44 53.59	−21 16 47.2	A		06427–2113
S 3769	GO CMa*	6 46 15.51	−12 52 52.5	T	5387-1068	
S 3770	DG CMa	6 46 13.13	−18 45 44.4	A		06440–1842
S 3771	DH CMa	6 46 41.05	−12 45 18.5	A		06443–1241
S 3772	NSV 3209	6 46 32.95	−19 19 18.0	G	5957-1622	06443–1915
S 3773	GI CMa	6 47 43.04	−13 40 00.2	G	5391-2142	
S 3774	DK CMa	6 49 06.38	−13 46 19.6	G	5391-1545	06468–1342
S 3775	NSV 3228*	6 49 44.42	−14 46 49.7	T	5391-2884	

Table 1: Variables on *MVS* 287–291 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3776	DL CMa	$6^{\rm h}51^{\rm m}48^{\rm s}.56$	$-19^\circ02'17''.8$	G	5958-0638	
S 3777	GQ CMa	6 54 01.11	–13 13 09.3	G	5392-0191	
S 3778	GR CMa	6 55 07.04	–14 09 32.8	G	5392-0530	
S 3779	GS CMa*	6 55 40.79	–16 51 49.3	T	5950-2065	
	DN CMa*	6 55 17.41	–16 47 52.3	G	5950-0443	
S 3780	NSV 3327	6 59 55.79	–15 55 47.6	G	5963-0870	
S 3781	NSV 3339	7 01 36.94	–14 21 31.0	A		
S 3782	NSV 3393	7 06 38.02	–15 48 07.8	A		
S 3783	GV CMa*	7 08 14.04	–18 30 33.3	T	5968-2615	
S 3784	GX CMa	7 12 00.38	–19 20 36.2	G	5973-0124	07097–1915
S 3785	BO CMa	7 13 48.88	–19 41 25.9	T	5973-0870	
S 3786	MO CMa*	7 14 42.14	–17 25 41.0	T	5969-0923	
S 3787	LN Pup	7 55 09.08	–23 10 24.0	T	6553-1168	
S 3788	NSV 3893*	8 04 53.06	–20 15 58.1	G	6003-2281	08026–2007
S 3789	NSV 3921	8 08 37.95	–21 20 56.7	T	6008-1327	08064–2112
S 3790	LY Pup	8 12 02.87	–23 16 35.8	T	6555-1537	
S 3791	NSV 3979*	8 16 25.25	–21 26 59.1	G	6009-0326	08142–2117
S 3792	IZ Pup	8 24 04.51	–21 57 42.8	G	6010-1949	
S 3793	NSV 4059*	8 24 09.65	–21 58 06.2	G	6010-2033	08219–2148
S 3794	NSV 4066	8 25 18.18	–22 49 38.0	T	6569-2491	
S 3795	NSV 3759	7 50 21.41	–23 25 20.4	G	6553-3104	
S 3796	NSV 3913*	8 07 40.25	–25 19 51.3	T	6559-1805	
S 3797	NSV 3948	8 13 06.59	–27 13 35.2	G	6563-2670	08110–2704
	FT Pup*	8 25 42.71	–23 37 14.2	G	6569-3910	
S 3798	NSV 4072	8 25 40.00	–23 39 24.7	G	6569-3946	
S 3799	PS Her	18 08 41.82	+32 02 06.3	G	2625-0410	
S 3800	PT Her	18 09 39.13	+35 09 39.5	G	2630-0997	18078+3508
	PV Her*	18 09 50.31	+35 49 56.5	G	2634-0416	18080+3549
S 3801	HX Lyr	18 17 00.05	+34 48 56.1	T	2630-0208	
S 3802	IO Lyr*	18 22 38.00	+32 57 32.6	*	2627-1159	
S 3803	IW Lyr	18 28 01.36	+38 59 52.2	G	3104-1859	
S 3804	IX Lyr	18 28 56.34	+32 14 50.0	G	2628-0458	18270+3212
S 3805	KN Lyr	18 30 44.64	+38 23 55.0	G	3105-1085	
S 3806	KP Lyr	18 30 51.84	+38 38 25.3	T	3105-0726	
S 3807	KR Lyr	18 30 57.09	+37 44 29.6	A		
S 3808	LL Lyr*	18 35 12.87	+38 20 04.6	A		
S 3809	LP Lyr	18 38 20.31	+32 32 44.6	G	2641-2110	F18364+3230
S 3810	CY Dra	19 46 05.22	+59 34 26.2	T	3946-0531	
S 3811	V755 Cyg	19 48 36.93	+52 47 36.0	G	3935-1694	
S 3812	V756 Cyg	19 48 39.53	+53 16 39.6	G	3935-0978	19474+5309
S 3813	V542 Cyg	19 49 10.52	+58 31 59.4	A		
S 3814	V548 Cyg	19 56 58.31	+54 47 58.3	T	3939-1341	
S 3815	V757 Cyg	19 57 12.67	+53 10 26.2	G	3935-1734	
S 3816	V760 Cyg	20 01 37.42	+53 28 31.6	G	3936-1533	20003+5320
S 3817	V549 Cyg	20 02 50.29	+56 51 22.0	G	3944-1633	
S 3818	V761 Cyg	20 06 06.99	+53 04 17.6	G	3936-1791	20048+5255
S 3819	V1514 Cyg	20 07 01.33	+58 16 40.9	T	3948-1689	20060+5808
S 3820	NSV 12843	20 08 11.89	+59 47 42.6	G	3948-1598	

Table 1: Variables on *MVS* 287–291 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3821	V763 Cyg	$20^{h}09^{m}30^{s}\!.57$	$+52^{\circ}12'55''\!.3$	G	3571-1082	
S 3822	V762 Cyg	20 08 39.62	+59 26 27.7	G	3948-2114	20077+5917
S 3823	V764 Cyg	20 09 14.44	+59 32 02.1	G	3948-0183	20082+5923
S 3824	V558 Cyg	20 11 56.26	+54 29 09.2	G	3940-0876	20106+5420
S 3825	V786 Cyg*	20 14 28.57	+59 44 20.9	G	3949-0269	20135+5935
S 3826	V767 Cyg	20 16 49.97	+53 12 24.1	A		
S 3827	V770 Cyg	20 20 16.93	+55 08 56.9	G	3941-1952	20190+5459
S 3828	V771 Cyg	20 22 25.22	+59 20 20.9	G	3949-1692	20213+5910
S 3829	V772 Cyg*	20 23 31.42	+54 11 13.1	G	3937-0655	
S 3830	V561 Cyg	20 25 58.20	+52 08 41.2	G	3584-1773	20245+5158
S 3831	DS Cep	20 24 40.99	+59 58 40.6	T	3949-0311	20236+5948
S 3832	V773 Cyg	20 25 27.03	+56 57 30.4	T	3945-1590	20242+5647
S 3833	V728 Cyg	20 26 40.13	+58 46 47.9	T	3962-1273	
S 3834	NSV 13109	20 28 29.59	+56 46 06.3	G	3958-1495	
	V564 Cyg*	20 31 21.54	+54 52 52.8	A		
S 3835	V776 Cyg	20 33 22.10	+55 19 38.5	G	3954-1200	
S 3836	DT Cep	20 33 22.16	+60 13 52.8	G	4233-2148	
S 3837	V777 Cyg*	20 35 25.16	+53 55 47.0	T	3950-0274	
S 3838	V566 Cyg	20 35 13.85	+55 58 50.8	A		
S 3839	V778 Cyg*	20 36 07.40	+60 05 26.2	T	4246-1005	
S 3840	V1787 Cyg	20 37 45.31	+55 16 31.0	G	3954-1724	
S 3841	DU Cep	20 41 07.21	+58 26 38.1	G	3963-1407	20399+5815
S 3842	DD Cep	20 42 30.50	+59 15 57.5	G	3963-0187	20413+5905
S 3843	V717 Cyg	20 01 05.02	+30 49 52.3	T	2670-3884	
S 3844	V718 Cyg*	20 03 05.14	+30 20 12.9	G	2670-3287	
S 3845	EE Vul	20 04 03.50	+28 14 01.3	A		
S 3846	V720 Cyg	20 04 05.99	+29 57 38.4	G	2153-0502	
S 3847	V550 Cyg*	20 05 04.87	+32 21 23.8	A		
S 3848	V722 Cyg	20 06 02.01	+30 40 49.6	G	2671-2340	20040+3032
S 3849	V552 Cyg	20 06 00.88	+33 09 07.8	A		
S 3850	V723 Cyg	20 06 12.03	+32 08 46.7	G	2675-2245	20042+3159
S 3851	V724 Cyg	20 07 36.11	+33 54 10.9	A		
S 3852	V743 Cyg	20 09 41.35	+29 24 00.4	T	2166-0551	
S 3853	V489 Cyg	20 09 52.42	+30 21 04.2	T	2671-0147	20078+3012
S 3854	V1823 Cyg	20 12 06.36	+34 38 33.5	T	2679-1740	
S 3855	V557 Cyg*	20 12 57.97	+32 14 56.4	G	2675-1793	
S 3856	V493 Cyg	20 13 25.80	+32 55 26.7	G	2675-2526	
S 3857	V494 Cyg	20 13 56.34	+34 16 49.4	G	2679-0500	
S 3858	EF Vul	20 15 18.59	+26 03 38.0	T	2159-0176	
S 3859	V469 Cyg	20 14 48.88	+34 44 22.6	G	2679-2164	
S 3860	EO Vul	20 21 03.90	+27 33 53.1	T	2163-0791	
S 3861	DS Vul	20 21 28.78	+26 42 14.8	A		20193+2632
S 3862	EH Vul	20 28 01.91	+26 03 35.4	G	2160-0460	
S 3863	V505 Cyg	20 29 28.87	+32 47 50.1	T	2689-0728	
S 3864	V730 Cyg	20 35 33.44	+34 23 42.8	A		20335+3413

Notes:

DF CMa	just outside IRAS position error-ellipse.
DN CMa	AN 676.1936.
GO CMa	C* 579.
GS CMa	PPM 713261.
GV CMa	PPM 713578.
MO CMa	NSV 3482 = SS 95.
V550 Cyg	southeastern component of a close pair; position also given by Skiff (1999).
V557 Cyg	IRC +30420.
V564 Cyg	AN 449.1934.
V718 Cyg	GSC v1.1 position given by Skiff (1999).
V772 Cyg	GCVS 4.1 position $3\overset{\prime}{.}6$ in error.
V777 Cyg	Kiso C3-39.
V778 Cyg	[PCC93] 419.
V786 Cyg	IRC +60285.
FS Gem	ID somewhat uncertain; blue candidate assumed.
PV Her	AN 364.1933.
IO Lyr	Hipparcos position given; not in Tycho-2.
LL Lyr	in outburst on POSS-I plates.
EV Mon	AN 88.1933.
IY Mon	southeastern component of close double.
GY Ori	CSI+12-05274.
HK Ori	AN 43.1939.
V440 Ori	BD+08°971.
V465 Ori	GCVS 4.1 position $3\overset{\prime}{.}0$ in error.
V471 Ori	northeastern component of close double.
V506 Ori	Haro 6-74.
V527 Ori	brighter of a pair.
FT Pup	AN 849.1936.
CP Tau	AN 281.1934.
DW Tau	HV 6915.
EF Tau	HV 6920.
EG Tau	HV 6922.
EI Tau	HV 6923.
NSV 3228	brighter of a pair.
NSV 3893	western star of a pair.
NSV 3913	CD–24°6497.
NSV 3979	wrong star marked on chart.
NSV 4059	CSV 1295.

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 291–295

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first described by Hoffmeister (1949). Details about the identification procedure and table layout are contained in the first report of our series (Kinnunen & Skiff 2000). We again acknowledge correspondence with Nikolai Samus in regard to the identification of KP Cas. Steve Levine's PMM pixel-server (Levine 2000) made this recovery a cinch.

Table 1: Variables on *MVS* 291–295

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3865	KP Cas*	$0^{\rm h}38^{\rm m}54^{\rm s}.70$	$+61^\circ12'59''.9$	A		
S 3866	OO Cas	0 44 00.93	+58 56 05.7	T	3667-0376	
S 3867	OS Cas*	0 50 38.48	+60 13 07.2	G	4016-1660	
S 3868	OT Cas	0 53 02.68	+60 35 48.2	A		00500+6019
S 3869	OU Cas*	0 53 16.77	+60 41 44.1	A		
S 3870	OV Cas	0 53 38.03	+63 20 29.1	G	4021-1465	
S 3871	MM Cas	0 54 34.96	+54 26 36.4	T	3672-0571	
S 3872	OW Cas	1 01 21.47	+54 10 30.3	A		
S 3873	V552 Cas*	1 05 18.66	+63 21 24.7	A		
S 3874	KT Cas	1 04 50.17	+54 06 19.9	T	3668-1034	
S 3875	V366 Cas*	1 08 25.61	+58 44 16.9	G	3681-0494	
S 3876	OY Cas	1 11 57.49	+62 07 25.4	A		
S 3877	OZ Cas	1 14 19.57	+62 02 38.6	G	4034-1221	
S 3878	V555 Cas*	1 16 08.22	+55 30 10.2	T	3673-1576	01130+5514
S 3879	PP Cas*	1 20 01.47	+57 31 29.1	T	3678-0224	01168+5715
S 3880	V588 Cas*	1 22 38.09	+54 23 08.3	G	3674-0352	
S 3881	V556 Cas*	1 23 51.77	+62 31 20.0	G	4034-1188	
S 3882	PQ Cas	1 28 36.19	+61 12 07.7	G	4031-2015	01252+6056
S 3883	KU Cas	1 31 02.39	+57 54 12.4	A		
S 3884	IS Per*	1 32 10.23	+54 16 34.9	G	3670-0078	
S 3885	LR Cas	1 32 49.90	+63 01 03.2	T	4035-0600	

Table 1: Variables on *MVS* 291–295 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3886	PR Cas*	$1^h32^m51^s.36$	$+58^\circ01'32''.4$	G	3678-0609	
S 3887	PS Cas	1 35 30.42	+55 42 53.9	G	3675-0346	
S 3888	KV Cas	1 36 38.08	+61 13 26.5	G	4031-1551	
S 3889	PT Cas	1 38 05.61	+55 58 14.8	G	3675-0803	01348+5543
S 3890	PU Cas	1 41 28.11	+59 13 13.9	T	3683-1639	01381+5858
S 3891	MN Cas	1 42 03.04	+54 57 35.8	T	3675-2528	
S 3892	HS Per*	1 52 11.62	+57 06 42.9	G	3692-1540	
S 3893	NSV 1545	4 18 16.97	+35 45 28.0	G	2383-2130	
S 3894	GM Per	4 19 50.87	+41 07 41.8	T	2882-0761	04164+4100
S 3895	GN Per	4 20 52.38	+41 03 30.1	G	2883-0026	04174+4056
S 3896	NSV 1559*	4 21 08.70	+40 56 47.7	A		
S 3897	GP Per	4 23 19.19	+44 14 12.5	G	2891-1394	
S 3898	NSV 1580	4 23 29.08	+42 22 50.1	G	2887-2232	
S 3899	GS Per	4 23 59.63	+41 56 27.6	G	2887-2020	
S 3900	IK Per	4 29 27.46	+42 03 10.7	T	2887-2716	
S 3901	HH Per	4 32 59.35	+41 58 54.5	A		
S 3902	HK Per	4 36 24.95	+41 36 14.2	G	2888-1910	
S 3903	KR Per	4 37 08.91	+44 12 39.7	T	2892-1828	
S 3904	HL Per	4 37 54.13	+39 56 17.2	G	2884-1407	04344+3950
S 3905	HP Per	4 43 31.21	+39 42 45.8	A		
S 3906	NSV 1704	4 44 47.05	+43 35 01.9	A		04412+4329
S 3907	OX Per	4 46 17.95	+36 57 24.4	G	2386-0791	
S 3908	FG Aur	4 55 45.98	+37 21 06.0	G	2399-0029	
S 3909	HW Aur	5 01 25.24	+39 48 12.0	G	2899-1734	
S 3910	FK Aur	5 03 36.05	+40 29 40.3	G	2899-0413	
S 3911	FL Aur	5 05 39.51	+41 13 00.1	G	2899-0115	
S 3912	NSV 1823	5 06 29.04	+40 33 58.1	A		
S 3913	V1013 Ori	5 17 37.15	+05 59 48.6	G	0112-1569	
S 3914	V432 Ori	5 18 47.97	+13 59 12.2	G	0711-2315	
S 3915	V433 Ori	5 21 06.95	+12 45 41.0	G	0707-0658	05183+1242
S 3916	GV Ori	5 23 58.99	+14 34 49.0	G	0712-1569	
S 3917	NSV 2005	5 28 17.00	+04 21 29.9	G	0109-2028	
S 3918	V449 Ori	5 31 16.14	+11 25 31.4	G	0709-1106	
S 3919	HI Ori*	5 31 23.59	+12 09 43.8	G	0709-0378	
S 3920	HM Ori*	5 31 47.79	+12 18 08.2	G	0709-0366	
S 3921	V455 Ori	5 32 15.44	+12 09 34.4	A		
S 3922	V460 Ori*	5 32 43.04	+12 21 08.3	G	0709-1308	05299+1219
S 3923	V503 Ori	5 36 50.17	+10 33 37.5	A		
S 3924	V504 Ori	5 38 09.54	+12 32 14.0	A		
S 3925	V516 Ori*	5 42 13.76	+08 43 56.8	A		
S 3926	V517 Ori	5 42 47.33	+11 07 11.2	G	0718-0147	
S 3927	V519 Ori	5 43 51.08	+09 17 28.9	G	0714-0167	
S 3928	QR Ori	5 44 09.00	+09 09 15.1	A		05413+0907
S 3929	V524 Ori	5 47 16.06	+10 04 52.7	G	0719-0575	
S 3930	V525 Ori	5 50 33.99	+10 23 42.5	A		
S 3931	NSV 2724	5 54 37.10	+04 54 12.1	G	0125-0449	
S 3932	V528 Ori	5 55 48.43	+07 49 36.0	G	0716-0914	
S 3933	DT Tau	5 28 47.17	+16 08 32.7	G	1297-0169	
S 3934	DV Tau	5 31 06.33	+18 33 38.0	T	1301-0792	
S 3935	EX Tau	5 44 19.58	+13 27 55.2	A		

Table 1: Variables on *MVS* 291–295 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3936	QX Ori	$5^{\rm h}53^{\rm m}33\overset{\rm s}{.}27$	$+13^\circ56'55\overset{''}{.}3$	A		05507+1356
S 3937	QY Ori	5 56 12.38	+16 28 27.4	A		
S 3938	QZ Ori*	5 56 03.38	+12 39 02.3	G	0724-0867	05532+1238
S 3939	V336 Ori	5 57 34.39	+19 49 11.7	G	1320-2007	
S 3940	V338 Ori*	5 59 41.66	+16 51 14.8	A		
S 3941	V340 Ori	6 01 25.63	+15 30 09.6	T	1313-1397	
S 3942	CQ Tau	5 35 58.46	+24 44 54.1	T	1865-1798	
	FN Aur*	5 39 45.98	+32 34 04.7	T	2408-0676	
S 3943	FO Aur	5 43 03.98	+32 12 15.2	G	2409-1108	
S 3944	FP Aur	5 43 38.78	+30 53 31.5	T	2405-0090	
S 3945	FQ Aur	5 44 31.10	+30 40 39.6	G	2405-0626	05412+3039
S 3946	FS Aur	5 47 48.32	+28 35 11.6	A		
S 3947	FT Aur	5 48 11.13	+32 15 15.9	G	2409-1165	05449+3214
S 3948	FV Aur	5 49 42.04	+31 07 07.2	A		
S 3949	CR Tau	5 51 28.87	+24 03 30.8	T	1862-1633	
S 3950	NSV 2702	5 54 22.47	+32 29 04.3	G	2410-0926	
S 3951	FX Aur	5 54 20.98	+28 36 31.6	G	1875-2119	05511+2836
S 3952	FY Aur	5 55 12.15	+28 43 38.2	A		
S 3953	CT Tau	5 58 50.11	+27 04 41.9	T	1871-0570	
S 3954	EO Tau	6 00 17.32	+23 54 39.3	T	1864-0188	
S 3955	DO Gem	6 01 27.02	+23 51 19.3	A		
S 3956	DQ Gem	6 03 08.59	+26 37 49.6	G	1872-0535	
S 3957	DR Gem	6 03 23.05	+24 03 03.0	A		
S 3958	DS Gem	6 05 19.53	+22 32 52.6	G	1864-1523	
S 3959	FZ Aur	6 06 43.59	+31 55 19.7	A		
S 3960	GG Aur	6 07 00.35	+32 13 10.4	G	2423-0566	06037+3213
S 3961	GH Aur	6 09 27.70	+28 29 44.0	A		06062+2830
S 3962	NSV 2853*	6 10 43.93	+25 10 32.1	A		
S 3963	GI Aur	6 11 36.40	+29 26 42.0	T	1889-0165	
S 3964	V392 Ori	6 11 25.16	+18 32 59.6	T	1318-0945	
S 3965	V668 Ori	6 11 50.64	+19 57 14.2	G	1322-1165	
S 3966	V344 Ori*	6 15 18.96	+15 31 00.0	A		
S 3967	V382 Ori	6 20 09.71	+17 37 02.4	G	1319-1646	06172+1738
S 3968	GR Gem	6 23 20.24	+20 49 58.3	A		
S 3969	GZ Gem*	6 24 06.84	+18 42 11.3	G	1332-1013	
	CC Gem*	6 24 27.00	+18 39 00.1	G	1332-0381	
S 3970	EI Gem	6 25 03.27	+19 12 54.0	G	1336-1240	
S 3971	EK Gem	6 26 36.18	+20 14 41.6	G	1336-1261	06236+2016
S 3972	DU Gem	6 26 40.04	+18 42 13.9	A		
S 3973	DV Gem	6 26 58.34	+18 39 58.8	A		
S 3974	EL Gem	6 29 07.96	+20 48 42.5	G	1340-2008	
S 3975	EM Gem	6 30 22.99	+22 04 29.2	G	1340-1663	06273+2206
S 3976	GT Gem	6 31 33.02	+20 17 24.9	A		
S 3977	EN Gem	6 33 53.90	+18 41 18.2	A		
S 3978	EO Gem	6 34 18.39	+23 23 36.4	G	1880-0742	
S 3979	EQ Gem	6 37 19.80	+18 12 48.7	T	1333-0198	
S 3980	ER Gem	6 38 21.68	+21 57 04.1	A		

Table 1: Variables on *MVS* 291–295 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 3981	ET Gem	$6^h39^m26^s.32$	$+21^\circ00'18''.0$	G	1341-1602	06364+2103
S 3982	EU Gem	6 39 42.03	+17 11 33.6	G	1333-1496	
S 3983	EW Gem	6 44 49.89	+24 18 10.3	A		
S 3984	EX Gem	6 45 26.20	+20 28 14.3	G	1338-0087	06424+2031
S 3985	EY Gem	6 45 32.45	+17 13 31.0	G	1334-0744	
S 3986	FH Gem	6 48 49.50	+17 51 22.7	T	1335-1382	
S 3987	GU Gem	6 50 10.71	+18 46 26.2	A		
S 3988	GM Mon	6 23 21.77	+07 39 54.2	G	0732-1978	
S 3989	GN Mon	6 26 01.06	+08 03 53.3	A		06232+0805
S 3990	V714 Mon	6 29 12.42	+04 44 40.0	T	0141-0638	
S 3991	NSV 3066	6 39 27.00	+03 31 02.4	A		
S 3992	V446 Mon	6 43 17.37	+01 09 39.3	A		
S 3993	V447 Mon	6 44 16.00	+04 29 54.2	G	0155-2719	
S 3994	MR Mon	6 47 11.52	+01 31 45.7	T	0148-1053	
S 3995	V449 Mon	6 47 56.44	+02 47 55.7	A		
S 3996	QR Mon	6 54 06.33	+00 47 36.5	T	0149-0625	06515+0051
S 3997	V631 Mon	7 01 23.28	+06 35 12.5	G	0174-1053	06586+0639
S 3998	HM Mon	7 03 02.89	+00 13 49.1	G	0162-0265	
	GO Mon*	6 34 30.51	+09 24 13.5	G	0737-0633	
S 3999	DY Gem	6 35 57.81	+14 12 46.0	T	0745-1495	
S 4000	ES Gem	6 38 15.95	+17 23 40.0	A		
	EE Gem*	6 39 18.25	+13 13 55.8	A		
	GP Mon*	6 40 41.85	+09 51 45.1	G	0750-0895	
S 4001	IO Mon	6 40 58.83	+09 30 57.6	G	0750-1832	
S 4002	IP Mon	6 41 00.97	+09 32 44.7	G	0750-1777	
S 4003	GR Mon*	6 41 04.96	+09 50 46.7	A		
S 4004	IQ Mon*	6 41 17.24	+09 54 33.1	A		
S 4005	IR Mon	6 43 00.01	+11 13 53.0	A		
S 4006	EZ Gem	6 46 04.47	+13 05 02.4	A		
S 4007	NSV 3215*	6 48 14.40	+08 25 54.5	G	0747-2023	
S 4008	FM Gem	6 50 43.85	+17 53 02.3	G	1335-0959	
S 4009	FN Gem	6 50 54.21	+14 29 37.6	T	0759-2087	06480+1433
S 4010	GX Mon*	6 52 47.0	+08 25 21	S		
S 4011	GZ Mon	6 54 48.45	+08 20 21.0	G	0748-1774	06520+0824

Notes:

FN Aur	SVS 332.
KP Cas	Downes *et al.* (1997) and previous IDs in error; in outburst at $15^m.5$-16^m on POSS-II J plate (JD 2447770.86), identifiable with a 18^m very blue (b–$r = -0.2$) star in USNO-A2.0.
OS Cas	S1* 16.
OU Cas	ID uncertain, blue candidate chosen.
PP Cas	IRC +60045.
PR Cas	near to but outside position error-ellipse of IRAS 01296+5746.
V366 Cas	faint companion on northeast; not IRAS 01053+5829, which is the background HII region [FT96] 125.1-4.0.
V552 Cas	chart rotated so that north is to the upper right.
V555 Cas	CSV 132.
V556 Cas	position also given by Schmidt & Seth (1996).
V588 Cas	GCVS 4.1 position $3'.3$ in error.

Notes (cont'd.):

CC Gem	AN 4.1934.
EE Gem	SV* R 196.
GZ Gem	faint companion $10''$ southwest.
GO Mon	AN 48.1934.
GP Mon	AN 10.1924 = NGC 2264 80.
GR Mon	V359 Mon.
GX Mon	[TVH89] 19 = [PCC93] 113 = [WTM81] OH 205.6+04.1.
IQ Mon	NGC 2264 197.
HI Ori	HK Ori also shown on this chart.
HM Ori	RX J0531.8+1218.
QZ Ori	western component of a close pair.
V338 Ori	southeastern star of a pair.
V344 Ori	GCVS 4.1 position $3\mathrlap{.}'0$ in error.
V460 Ori	GCVS 4.1 position $3\mathrlap{.}'5$ in error.
V516 Ori	southeastern star of a pair.
HS Per	GCVS 4.1 position $5\mathrlap{.}'1$ in error.
IS Per	*not* GSC 3670-0306.
NSV 1559	southern of two similarly-bright stars, variable on POSS-I/II red plates.
NSV 2853	northeastern star of a pair.
NSV 3215	double star; it is uncertain which (if either) is variable.

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COORDINATES AND IDENTIFICATIONS FOR SONNEBERG VARIABLES ON MVS 295–301

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The list below is a continuation of a series providing accurate positions and identifications for variables appearing on the *MVS* charts (Hoffmeister 1957). The variables here were first described by Hoffmeister (1949). Details about the identification procedure and table layout are contained in the first report of our series (Kinnunen & Skiff 2000). We note that coordinates have been previously published by Lopez (1993) for many of the southern NSV stars, by Skiff (1999) for Wachmann's variables in the region of SA 98, and by Henden & Stone (1998) for FASTT variables along the near-equatorial strip. The positions in the present list are to be preferred over those of Lopez and Skiff either because source catalogues of higher accuracy were used or because they are given to higher precision. For stars in common we have adopted the FASTT positions since they have the highest accuracy and most recent epochs. The USNO-Flagstaff PMM pixel-server (Levine 2000) was again useful in making several identifications.

Table 1: Variables on *MVS* 295–301

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 4012	IU Mon	$6^h55^m06\overset{s}{.}20$	$+10°12'41\overset{''}{.}7$	A		
S 4013	FQ Gem	6 56 24.13	+17 58 12.9	G	1348-0334	
	IW Mon*	6 56 34.27	+08 20 07.6	A		
S 4014	HK Mon	6 57 08.16	+11 40 54.5	A		
S 4015	FU Gem	6 57 46.98	+17 44 25.4	A		06548+1748
S 4016	FV Gem	6 57 38.77	+12 31 50.0	A		
S 4017	FX Gem	6 58 12.86	+17 14 49.3	G	1348-0558	06553+1718
S 4018	GV Gem	6 59 57.44	+14 16 35.0	A		
S 4019	NSV 3335	7 01 45.49	+14 24 56.4	A		
S 4020	MU Mon	7 02 50.18	+11 31 08.4	A		
S 4021	NSV 3037	6 35 17.91	–15 22 50.2	G	5948-0574	06330–1520
S 4022	NSV 3042	6 35 46.89	–13 05 02.3	G	5373-1957	06334–1302
S 4023	GK CMa*	6 36 15.57	–16 54 50.5	G	5952-2340	
S 4024	NSV 3184	6 43 14.20	–15 56 11.6	T	5949-1722	
S 4025	DI CMa	6 47 22.63	–12 39 48.5	G	5387-1093	06450–1236

Table 1: Variables on *MVS* 295–301 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 4026	DM CMa*	$6^{h}52^{m}47^{s}.16$	$-14^{\circ}21'26''.9$	A		
S 4027	GT CMa	6 59 44.73	−16 10 17.5	G	5963-1454	
S 4028	NSV 3329	7 00 18.56	−18 36 51.8	G	5967-0642	
S 4029	NSV 3354	7 03 30.48	−15 32 36.1	G	5963-1286	
S 4030	NSV 3389	7 06 22.12	−14 04 20.7	A		
S 4031	NSV 3430	7 09 22.53	−16 20 31.0	G	5964-3133	
S 4032	NSV 3489	7 15 18.25	−16 16 12.0	T	5965-2026	
S 4033	V372 Mon*	6 41 26.13	−04 35 45.7	T	4807-1456	
S 4034	GS Mon	6 42 15.31	−09 39 43.9	A		06398–0936
	GT Mon*	6 42 44.60	−01 43 31.4	G	4799-1482	
S 4035	NSV 3208	6 46 52.33	−07 16 27.2	G	4812-2254	
S 4036	V374 Mon	6 47 09.85	−03 58 46.6	A		
S 4037	V375 Mon	6 47 12.42	−08 26 57.7	G	5379-2542	06448–0823
S 4038	V376 Mon	6 48 48.02	−03 36 17.0	G	4804-2990	
S 4039	GW Mon	6 49 44.31	−09 35 41.4	A		06473–0932
S 4040	V378 Mon	6 50 36.16	−01 29 00.7	A		
S 4041	V379 Mon	6 51 27.07	−02 45 48.0	A		
S 4042	V380 Mon	6 52 09.21	−01 37 23.0	G	4800-2481	
S 4043	NSV 3258*	6 53 13.58	−07 20 53.6	G	4813-0764	
S 4044	V381 Mon	6 56 32.83	−07 46 25.8	G	5380-0662	
S 4045	V382 Mon	6 56 57.71	−08 09 12.0	A		
S 4046	HL Mon	7 02 51.97	−01 44 25.9	A		
S 4047	MV Mon	7 03 38.18	−03 11 11.1	T	4818-3022	
S 4048	V383 Mon	7 04 37.89	−01 55 46.3	A		
S 4049	HN Mon	7 04 29.90	−08 57 09.6	A		
S 4050	V384 Mon*	7 06 51.50	−00 41 01.8	*	4814-0367	
S 4051	V385 Mon	7 09 11.34	−05 50 49.0	G	4827-2080	
S 4052	V386 Mon	7 12 31.69	−03 43 44.1	A		
S 4053	MX Mon*	7 12 33.03	−04 27 13.8	T	4823-0688	
S 4054	NSV 3460	7 12 47.67	−08 58 57.2	G	5394-3242	
S 4055	V388 Mon	7 14 33.13	−09 20 30.7	G	5394-1459	
S 4056	V389 Mon	7 15 35.93	−01 55 53.5	A		
S 4057	V390 Mon	7 17 28.81	−05 41 04.9	A		
S 4058	NSV 3529*	7 19 15.3	−06 01 33	S	4828-1748	
	HU Mon*	7 19 38.65	−02 00 21.4	G	4820-2606	
S 4059	NO Mon	7 20 10.73	−04 12 46.4	A		
S 4060	HV Mon*	7 20 35.72	−06 29 01.2	G	4828-2318	
S 4061	CS CMa	7 18 04.85	−18 37 25.6	T	5969-2503	
S 4062	DU CMa*	7 18 25.23	−17 15 30.5	T	5969-0785	
	HW Mon*	7 23 26.9	−10 03 31	S		07210–0957
S 4063	NQ Mon	7 25 11.82	−09 17 10.5	A		
S 4064	DQ CMa	7 25 02.90	−16 19 41.9	A		
S 4065	NSV 3593	7 26 28.75	−19 34 49.0	G	5974-1128	07242–1928
S 4066	NSV 3602	7 28 11.98	−09 55 33.9	A		
S 4067	GU Pup	7 28 41.06	−16 35 02.1	T	5979-3207	
S 4068	KO Mon*	7 30 07.67	−09 23 17.3	T	5400-0470	07277–0916
S 4069	CL Pup*	7 30 02.98	−19 29 54.2	A		
S 4070	NZ Pup*	7 30 20.11	−19 41 16.7	A		

Table 1: Variables on *MVS* 295–301 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 4071	MO Pup*	$7^{\rm h}30^{\rm m}49^{\rm s}.44$	$-12^{\circ}02'52''.3$	T	5404-0593	
S 4072	NSV 3621	7 30 51.23	–17 00 47.4	T	5983-0400	
S 4073	V469 Mon	7 33 19.32	–10 29 19.7	G	5401-2478	
S 4074	HX Mon	7 36 47.13	–10 49 40.5	G	5401-0274	
S 4075	PR Mon	7 38 21.49	–10 04 46.2	T	5401-1649	
S 4076	GG Pup*	7 38 21.10	–16 03 18.9	T	5980-1785	07360–1556
S 4077	GI Pup*	7 41 06.83	–14 58 21.1	*	5422-0575	
S 4078	EL Pup	7 42 22.83	–14 33 54.1	A		
S 4079	HK Pup	7 44 46.81	–13 05 56.3	T	5418-0876	
S 4080	II Mon	7 46 24.93	–09 40 30.3	A		
S 4081	GR Pup	7 50 11.22	–13 33 30.5	T	5423-2371	07478–1325
S 4082	V716 Mon	7 52 43.59	–10 42 45.4	G	5415-0892	
S 4083	KZ Pup	7 52 36.51	–17 23 00.6	T	5986-0018	
S 4084	NSV 3793	7 53 35.92	–12 58 07.1	A		
	ES Pup*	7 54 03.10	–19 20 17.5	G	5990-0405	07518–1912
S 4085	NSV 3809	7 54 50.56	–10 38 19.9	T		07524–1030
S 4086	KT Pup	7 45 04.11	–22 40 36.3	G	6540-0518	
S 4087	NSV 3764	7 51 12.02	–20 46 38.6	A		
S 4088	NSV 3810	7 54 52.84	–20 02 08.2	G	5990-1746	
S 4089	LO Pup	7 55 26.31	–22 18 24.7	A		
S 4090	DI Pup	7 56 40.59	–19 29 12.3	T	5990-0492	
S 4091	FI Pup	8 08 14.75	–20 17 14.9	G	6004-1894	
S 4092	DN Pup	8 08 20.94	–19 31 23.8	G	6004-0585	
S 4093	NSV 4007	8 19 57.02	–20 27 20.3	G	6005-4335	
S 4094	NSV 4027	8 21 17.24	–22 44 36.5	G	6556-1603	
S 4095	NSV 4028	8 21 19.50	–22 24 37.0	G	6009-0700	
S 4096	FR Pup*	8 21 19.99	–22 18 44.3	*	6009-0807	
S 4097	NSV 4036	8 22 02.77	–22 25 55.6	G	6009-0833	08198–2216
S 4098	NSV 3714	7 44 27.63	–24 17 19.3	G	6540-3858	
S 4099	NSV 3749	7 48 48.09	–26 14 25.0	A		
S 4100	KX Pup*	7 52 00.51	–26 22 39.8	T	6561-3110	
S 4101	KY Pup	7 52 03.38	–26 45 18.6	T	6561-2170	
S 4102	NSV 3774	7 52 24.24	–23 19 55.4	A		
S 4103	NSV 3802	7 53 57.63	–28 22 03.7	G	6565-1580	
S 4104	DH Pup*	7 55 17.89	–25 09 44.6	G	6557-0116	
S 4105	HU Pup*	7 55 40.18	–28 38 54.7	T	6565-0335	
S 4106	NSV 3832	7 57 49.88	–29 23 02.7	T	6566-2267	
S 4107	LS Pup	7 58 59.22	–29 18 28.5	T	6566-1131	
S 4108	EW Pup	7 59 16.03	–23 58 53.1	A		07571–2350
S 4109	LT Pup	7 59 42.33	–23 44 26.3	G	6554-0069	
S 4110	NSV 3895	8 04 58.79	–28 51 39.3	G	6566-1018	
S 4111	IN Pup	8 06 39.99	–27 39 39.9	A		
S 4112	NSV 3912	8 07 35.57	–26 29 48.9	G	6563-0821	
S 4113	FH Pup	8 07 59.04	–24 36 09.8	A		
S 4114	NSV 3939	8 11 40.98	–28 35 50.7	G	6567-0531	
S 4115	MM Pup	8 14 57.46	–24 06 16.4	A		

Table 1: Variables on *MVS* 295–301 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 4116	MN Pup	$8^h15^m19^s.57$	$-24^\circ08'44''.2$	G	6556-3996	
S 4117	FQ Pup	8 18 10.55	−23 48 40.8	A		
S 4118	NSV 4011	8 20 07.56	−26 16 32.2	T	6564-4539	08180–2607
S 4119	NSV 4032	8 21 38.08	−25 36 09.7	A		
S 4120	NSV 4073	8 25 39.67	−24 52 29.3	A		
	FT Pup*	8 25 42.71	−23 37 14.2	G	6569-3910	
S 4121	NSV 4101*	8 28 48.32	−28 58 46.9	G	6581-1094	
S 4122	NSV 4112	8 30 14.52	−25 18 30.9	G	6573-1711	
S 4123	V452 Her	17 02 36.10	+25 51 30.4	G	2064-0479	17005+2555
S 4124	V453 Her	17 04 10.38	+22 51 55.3	A		
S 4125	V454 Her	17 04 12.83	+26 20 19.6	G	2068-0163	
S 4126	V455 Her	17 06 34.03	+20 08 06.2	G	1543-0337	
S 4127	V459 Her	17 09 08.33	+27 44 30.9	G	2068-1317	
S 4128	V460 Her	17 10 20.66	+17 58 22.5	G	1539-1720	17081+1802
S 4129	V464 Her*	17 11 34.42	+23 36 30.9	T	2061-0709	
S 4130	V466 Her	17 12 38.62	+20 28 13.3	T	1544-1004	17104+2031
S 4131	V470 Her	17 14 14.92	+24 02 20.4	G	2061-1035	
S 4132	V474 Her	17 18 17.88	+27 28 00.6	A		
S 4133	V478 Her*	17 21 05.63	+23 39 37.2	A		
S 4134	V350 Her	17 21 41.63	+24 46 03.8	T	2078-1186	
S 4135	V480 Her	17 22 20.55	+20 56 41.0	A		
S 4136	V481 Her*	17 24 15.61	+18 41 42.4	G	1541-0365	
S 4137	V483 Her	17 25 14.25	+18 20 19.4	G	1541-0921	
S 4138	V485 Her	17 25 30.44	+21 44 42.2	G	1549-1703	
S 4139	V487 Her*	17 26 42.84	+25 55 01.7	A		
S 4140	V489 Her	17 29 02.86	+20 38 16.2	G	1550-0252	
S 4141	V351 Her*	17 32 52.62	+25 25 18.7	T	2079-1638	17308+2527
S 4142	V498 Her	17 34 57.32	+22 49 50.6	A		
S 4143	V499 Her	17 35 03.31	+26 35 07.6	A		
S 4144	V504 Her*	17 37 45.21	+19 48 06.5	A		
S 4145	V505 Her	17 37 40.59	+25 22 24.5	G	2080-0014	17356+2524
S 4146	V507 Her	17 38 28.41	+18 15 24.4	G	1555-0419	
S 4147	V511 Her	17 39 37.82	+19 55 02.4	A		
S 4148	V512 Her	17 40 20.07	+21 43 41.4	A		
S 4149	V515 Her*	17 41 00.74	+23 51 46.7	A		
S 4150	V517 Her	17 41 34.94	+19 24 56.4	A		
S 4151	NW Her*	17 41 47.51	+19 03 04.3	G	1559-0040	
S 4152	V520 Her	17 42 57.40	+20 08 09.4	G	1559-0327	17407+2009
S 4153	V521 Her*	17 43 44.05	+23 00 12.9	G	2077-2976	
	NX Her*	17 45 26.00	+19 23 33.7	A		17432+1924
S 4154	V501 Her	17 35 43.45	+30 38 35.0	T	2606-1905	
S 4155	V502 Her	17 35 49.32	+32 20 54.0	G	2610-2223	
S 4156	NSV 9333	17 37 19.61	+32 41 22.8	T	2610-0047	17354+3243
S 4157	NV Her	17 41 18.65	+29 36 06.3	A		
S 4158	V519 Her	17 42 39.97	+26 05 10.4	G	2080-2456	
S 4159	NY Her	17 52 52.60	+29 22 18.8	A		
S 4160	V523 Her*	17 53 26.33	+31 42 47.2	G	2608-1052	

Table 1: Variables on *MVS* 295–301 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 4161	V524 Her	$17^{h}57^{m}04^{s}.90$	$+32^{\circ}33'34''.8$	A		
S 4162	V525 Her*	17 57 47.13	+31 53 14.7	A		
S 4163	V527 Her*	18 02 34.57	+28 32 44.1	A		
S 4164	V528 Her	18 06 49.17	+32 44 08.0	G	2625-0748	
S 4165	V530 Her	18 10 47.53	+25 00 59.4	G	2096-0585	18087+2500
S 4166	V531 Her*	18 10 39.61	+28 18 25.0	A		
S 4167	V532 Her	18 11 56.21	+28 03 57.9	A		
S 4168	MW Lyr	18 19 53.82	+31 58 54.6	G	2627-0599	
S 4169	V866 Oph	17 41 09.82	−00 09 32.7	G	5081-1230	
S 4170	V867 Oph	17 41 08.82	+00 29 46.0	A		17386+0031
S 4171	V932 Oph	17 41 15.54	+01 14 18.3	G	0415-1821	
S 4172	V2056 Oph	17 41 34.84	−00 35 40.0	G	5081-1694	
S 4173	V933 Oph	17 41 27.30	+04 12 27.0	A		
S 4174	V976 Oph	17 41 56.48	−01 13 16.6	G	5081-1005	
S 4175	V811 Oph	17 41 31.90	+05 47 19.0	G	0427-0732	
S 4176	V2288 Oph	17 41 53.63	+05 16 31.0	G	0423-0549	
S 4177	V868 Oph	17 42 31.07	+03 03 41.2	G	0419-0352	
S 4178	V816 Oph*	17 42 37.66	+04 57 30.2	G	0423-0966	
S 4179	V934 Oph	17 43 54.52	−00 42 52.3	A		
S 4180	V935 Oph*	17 44 45.19	−01 31 47.7	*	5081-1805	
S 4181	V870 Oph	17 46 03.91	+05 55 00.1	A		
S 4182	V936 Oph	17 46 30.41	+06 01 11.2	T	0428-1402	
S 4183	V871 Oph	17 48 54.62	+04 45 20.1	G	0424-0354	
S 4184	V937 Oph*	17 51 37.38	−00 17 57.1	*		17490–0017
S 4185	V939 Oph	17 52 55.03	+01 13 50.1	A		
S 4186	V938 Oph	17 52 46.54	+02 48 50.4	A		
S 4187	V982 Oph	17 52 36.27	+07 32 20.9	A		
S 4188	V940 Oph	17 53 06.21	+07 41 20.2	A		
S 4189	V941 Oph	17 53 30.87	+07 41 27.4	A		
S 4190	V942 Oph*	17 54 38.51	+02 45 34.2	A		
S 4191	V872 Oph	17 55 17.81	+08 13 42.9	A		
S 4192	V943 Oph	17 56 02.62	−01 42 59.1	A		
S 4193	DS Ser*	17 58 11.21	−01 20 44.8	A		
S 4194	V984 Oph*	17 58 38.82	+01 26 20.6	*	0417-1208	
S 4195	V944 Oph	17 58 53.65	+07 19 20.4	A		
S 4196	V945 Oph	18 00 24.11	+04 12 49.9	A		
S 4197	V946 Oph	18 01 04.35	+01 38 45.0	A		
S 4198	DT Ser	18 01 52.18	−01 26 17.6	G	5096-1722	17592–0126
S 4199	V947 Oph	18 02 05.34	+05 52 45.8	G	0442-1895	
S 4200	V948 Oph*	18 02 27.69	+02 30 34.5	A		
S 4201	V950 Oph	18 03 08.46	+01 23 59.3	A		
S 4202	V985 Oph	18 04 16.64	+07 29 57.4	G	0442-0160	
S 4203	V951 Oph	18 05 01.08	+04 05 32.0	G	0438-2647	
S 4204	V952 Oph	18 08 16.08	+05 40 31.2	A		
S 4205	V953 Oph	18 08 17.32	+06 28 14.4	G	0443-2835	

Table 1: Variables on *MVS* 295–301 (cont'd.)

Sonne.	GCVS	RA (2000)	Dec	s	GSC	IRAS
S 4206	V954 Oph	$18^{\mathrm{h}}09^{\mathrm{m}}23\overset{\mathrm{s}}{.}03$	$+01^{\circ}23'04\overset{''}{.}6$	G	0431-1935	
S 4207	V955 Oph*	18 09 53.78	+06 26 15.5	G	0443-1468	
S 4208	V957 Oph	18 10 46.35	+02 57 04.6	A		
S 4209	V956 Oph	18 10 36.36	+06 37 15.3	G	0443-1872	
S 4210	V958 Oph	18 10 47.00	+04 34 43.1	G	0439-1079	
S 4211	V959 Oph	18 11 02.27	+03 10 46.4	G	0435-0926	
S 4212	V875 Oph	18 11 06.98	+04 09 57.8	A		18086+0409
S 4213	V960 Oph	18 11 31.99	+06 10 48.0	A		
S 4214	V961 Oph	18 12 44.48	+04 19 35.2	A		
S 4215	V962 Oph	18 13 33.75	+01 49 11.1	G	0431-0480	
S 4216	V987 Oph	18 14 36.98	+02 23 01.0	G	0435-2745	
S 4217	V963 Oph	18 15 18.38	+06 47 12.9	A		
S 4218	V876 Oph*	18 15 21.5	+05 23 35	S		
S 4219	V964 Oph	18 15 56.46	+03 50 59.7	A		
S 4220	V965 Oph	18 16 21.43	+04 13 49.9	G	0440-0188	
S 4221	V878 Oph	18 16 39.84	+00 22 28.0	A		
S 4222	V966 Oph	18 16 41.23	+04 45 13.6	G	0440-2154	18142+0444
S 4223	V967 Oph*	18 16 51.06	+04 13 17.2	A		
S 4224	V880 Oph	18 18 20.78	+05 20 54.4	G	0440-1073	18158+0519
S 4225	V881 Oph*	18 18 46.09	+05 01 00.4	A		
S 4226	V968 Oph	18 19 21.72	+03 22 12.2	G	0436-0161	
S 4227	V882 Oph	18 19 14.85	+04 56 14.2	G	0440-2163	
S 4228	V969 Oph	18 20 17.87	+03 30 31.9	G	0436-3475	
S 4229	V558 Oph	17 45 43.02	+02 27 46.2	G	0420-0436	
S 4230	V568 Oph*	17 59 44.07	+04 59 55.9	G	0425-0448	
S 4231	V569 Oph*	18 00 31.11	+05 36 58.5	T	0438-0075	
S 4232	V571 Oph	18 02 54.45	+01 38 42.0	A		F18003+0138
	AU Oph*	18 02 59.50	+01 37 29.7	A		18004+0137
S 4233	V572 Oph*	18 04 18.35	+02 06 18.9	G	0434-5156	
S 4234	V573 Oph*	18 06 05.38	+02 05 43.7	G	0434-3484	
S 4235	NZ Her	17 54 07.53	+39 24 33.9	G	3093-1663	17524+3925
S 4236	OO Her	17 56 21.27	+31 07 36.6	T	2608-1779	
S 4237	OQ Her	17 57 54.72	+31 25 29.2	T	2608-0598	
S 4238	OR Her	17 58 10.71	+38 39 49.6	G	3089-1880	17565+3840
S 4239	OS Her	18 00 14.05	+34 39 24.9	G	2629-1196	
S 4240	OT Her*	18 02 08.84	+40 13 03.5	A		
S 4241	OV Her*	18 02 50.35	+40 07 43.5	A		
S 4242	OX Her	18 03 26.41	+38 41 41.3	G	3102-0835	
S 4243	OY Her*	18 04 42.10	+38 01 06.3	A		
S 4244	OZ Her	18 04 55.84	+35 25 12.7	G	2629-1633	
S 4245	PP Her	18 07 34.66	+36 21 54.3	A		
S 4246	PQ Her	18 07 32.54	+40 15 27.0	G	3106-0264	
S 4247	PR Her*	18 08 04.44	+38 46 17.1	*		
S 4248	PU Her*	18 09 52.4	+32 00 33	S		
S 4249	PX Her	18 11 20.42	+31 19 08.2	A		
S 4250	PZ Her	18 12 16.82	+31 14 55.8	G	2622-1208	
S 4251	PY Her	18 12 11.11	+32 51 25.0	A		
S 4252	QR Her	18 12 54.46	+33 35 34.5	A		
S 4253	QQ Her	18 12 44.80	+38 48 03.3	G	3103-0750	
S 4254	QU Her	18 14 38.52	+33 23 54.6	A		
S 4255	QV Her*	18 15 11.15	+32 29 26.2	G	2626-0919	

Notes:

DM CMa	variable on overlapping SRC blue plates.
DU CMa	IRC –20127.
GK CMa	CSV 792.
NW Her	GCVS 4.1 position $4\overset{\prime}{.}2$ in error.
NX Her	AN 356.1933.
OT Her	GCVS 4.1 position $3\overset{\prime}{.}0$ in error.
OV Her	eastern star of a pair; GCVS 4.1 position $3\overset{\prime}{.}6$ in error.
OY Her	southeastern star of a pair.
PR Her	ID and position of Henden (1999) adopted.
PU Her	recovered via outburst at B $\sim16^{\rm m}$ on a Lowell ‘Pluto Camera’ plate taken on 1940 June 4.3 UT (JD 2429784.8). B $\sim21^{\rm m}$ in quiescence.
QV Her	*MVS* chart mislabelled as QV Lyr.
V351 Her	BD+25°3286.
V464 Her	GCVS 4.1 position $3\overset{\prime}{.}1$ in error.
V478 Her	Downes *et al.* (1997) ID adopted (but not their position).
V481 Her	southeastern star of two.
V487 Her	GCVS 4.1 position $3\overset{\prime}{.}6$ in error.
V504 Her	eastern star of a pair.
V515 Her	southwestern star of a pair; GCVS 4.1 position $3\overset{\prime}{.}4$ in error.
V521 Her	GCVS 4.1 position $3\overset{\prime}{.}5$ in error.
V523 Her	GCVS 4.1 position $3\overset{\prime}{.}6$ in error.
V525 Her	GCVS 4.1 position $3\overset{\prime}{.}2$ in error.
V527 Her	southwestern star of a pair.
V531 Her	northwestern star of a pair.
GT Mon	AN 84.1933.
HU Mon	SV* R 161; position by Gombert (1998) is not for this star, but evidently for another variable.
HV Mon	in a small group.
HW Mon	SV* R 145.
IW Mon	AN 474.1934.
KO Mon	IRC –10167; southern star of a pair.
MX Mon	eastern star in a trio (northwestern star is a close pair).
V372 Mon	BD–04°1617 = S1* 166; southwestern star of a pair.
V384 Mon	faint companion very close on north; FASTT position adopted.
AU Oph	AN 55.1924.
V569 Oph	*MVS* chart has north down.
V568 Oph	*MVS* chart has north down. near to but outside the position error-ellipse of IRAS 17572+0500.
V572 Oph	*MVS* chart has north down.
V573 Oph	*MVS* chart has north down; northern star of a pair.
V816 Oph	misidentified in SIMBAD: *not* GSC 0423-0179.
V876 Oph	very bright on POSS-II N plate.
V881 Oph	ID confirmed on chart given by Rodin (1987).
V935 Oph	FASTT position given.
V937 Oph	FASTT position given; GCVS 4.1 position $3\overset{\prime}{.}0$ in error.
V942 Oph	GCVS 4.1 position has $-3\overset{\prime}{.}0$ Dec error.
V948 Oph	near to but outside position error-ellipse of IRAS 17598+0230.
V955 Oph	eastern component of a close pair.
V967 Oph	probably the northwestern component of a very close pair.
V984 Oph	FASTT position given.

Notes (cont'd):

CL Pup	variable on POSS-I/SRC blue plates.
DH Pup	southwesternmost star of a line of three.
ES Pup	AN 21.1934
FR Pup	AC2000 position (epoch 1920.12) for northeastern component of a close pair.
FT Pup	AN 849.1936.
GG Pup	PPM 714351.
GI Pup	AC2000 position (epoch 1902.16) for southern component of a close pair.
HU Pup	RAFGL 4646 = [NHO98] 07536–2830.
KX Pup	NGC 2467 6.
NZ Pup	northern component of a close pair.
MO Pup	Hoffmeister –1° Dec error, corrected by Kroll (1993) and Baldwin *et al.* (1999).
DS Ser	southwestern of two stars.
NSV 3258	southern of two stars.
NSV 3529	northern component of a close pair; GSC and USNO-A2.0 positions skewed.
NSV 4101	western star of a pair.

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NEW VARIABLE STARS IN LYRA AND CYGNUS

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This report summarizes the results of a variable-star search in the 20°×15° area centered at $19^{\rm h}00^{\rm m}/+45^\circ$ (1950).

Eighteen yellow/blue plate pairs (Kodak 103a-D + GG11 filter and 103a-O unfiltered) were exposed between 1967 and 1982, and forty-three films (Kodak TechPan 4415 + GG495 filter) taken in the years 1987 to 2000. Four exposures with a 200/210/300mm Schmidt camera taken 1995–1999 on TechPan without a filter were also examined and used to prepare finding charts. Ten plate or film pairs were scanned for variables with a blink comparator and with four stereo comparators used in tandem. Magnitudes were determined in a stereomicroscope using comparison stars taken from the Guide Star Catalogue (Lasker *et al.* 1990) and the Guide Star Photometric Catalogue (Lasker *et al.* 1988). The yellow-light magnitudes '$\rm m_{\it v}$' shown in Table 2 are thus tied to the GSC (northern) magnitude scale and will be systematically somewhat brighter than standard Johnson V.

In this field twenty-five new variables were found. Five previously published variables without elements (Dahlmark 1982, Skiff & Williams 1997) were also examined to assess their lightcurves. Finally seven designated but poorly-studied stars were included in the work. Table 1 shows positions and identifications for the new stars. The coordinates were drawn either from the GSC-ACT (Gray 1999) or USNO–A2.0 catalogue (Monet *et al.* 1998); two appear in no catalogue and were estimated ($\pm 2''$) using the Digitized Sky Survey via the Goddard SkyView facility. The source of the positions is coded in column 's' as follows: A = USNO–A2.0, G = GSC-ACT, S = SkyView.

About half the variables have been recently identified by the ROTSE survey (Akerlof *et al.* 2000), and these names are given as well. The ROTSE positions are not as good as those given below. Except for one short-period variable, no lightcurve information was supplied, so the present results extend our knowledge of these variables.

The elements of variation are collected in Table 2. An asterisk by the star name indicates a note at the bottom of the table. The lightcurve determinations are based usually on sixty-five magnitude estimates for each star. From these the magnitude range, provisional variability type, epoch of maximum, and period have been determined. The column 'b–r' shows star colors from USNO–A2.0; these are not well calibrated to any standard system, but serve to indicate in a qualitative way the sorts of stars involved.

Table 1: Positions and identifications

Name	RA (2000)	Dec	s	GSC	IRAS	ROTSE1
LD 342	$18^{\mathrm{h}}02^{\mathrm{m}}28\overset{\mathrm{s}}{.}09$	$+50^\circ46'27\overset{''}{.}8$	G	3536-0110		
LD 343	18 17 24.60	+42 36 16.2	A		18158+4235	J181724.82+423614.8
LD 344*	18 21 48.43	+51 24 20.6	G	3537-1908	F18206+5122	J182148.31+512419.2
LD 345	18 31 13.83	+46 58 34.7	G	3530-2757		
LD 346*	18 49 43.41	+40 57 49.6	G	3122-2898	18480+4054	
LD 347	19 05 33.82	+39 20 04.3	G	3120-1794		
LD 348*	19 15 20.63	+39 58 49.2	G	3125-1819	F19136+3953	J191520.86+395900.7
LD 349*	19 18 54.46	+43 49 26.0	G	3133-0385		J191853.61+434930.0
LD 350	19 19 55.01	+40 52 40.1	G	3125-0632		
LD 351*	19 28 38.98	+45 05 51.9	G	3543-1107	19271+4459	J192838.56+450547.1
LD 352	19 30 32.95	+48 03 25.4	A		19291+4757	J193032.71+480327.0
LD 353	19 31 43.56	+41 25 38.3	A			J193143.45+412537.9
LD 354*	19 33 10.56	+38 58 33.6	A		19314+3851	J193310.27+385830.6
LD 355	19 35 23.09	+48 03 00.8	G	3560-1804		
LD 356	19 37 38.50	+49 07 50.8	G	3564-2375	19362+4900	J193738.09+490751.9
LD 357*	19 39 08.50	+43 23 49.6	G	3147-1366	19375+4316	J193908.32+432345.2
LD 358	19 42 06.64	+38 03 37.1	A		19403+3756	
LD 359*	19 42 08.44	+47 22 57.3	A		19406+4715	
LD 360	19 43 08.74	+41 34 14.1	G	3144-0947	19414+4126	
LD 361*	19 44 15.69	+39 11 12.2	A			
LD 362	19 47 15.81	+44 27 07.0	A			
LD 363*	19 47 58.82	+38 45 54.5	A		19462+3838	
LD 364*	19 49 26.3	+37 31 59	S		19476+3724	
LD 365	19 52 06.73	+43 31 08.1	G	3149-1648		
LD 366	19 59 38.99	+47 31 33.1	A		19581+4723	
V352 Lyr	18 52 17.06	+42 09 49.0	A		18507+4206	
V396 Lyr	18 59 50.68	+45 21 39.9	G	3541-1654		
EQ Lyr	19 19 02.63	+41 06 34.5	A			
V1253 Cyg	19 18 57.04	+44 57 24.5	A			J191857.81+445729.8
V1503 Cyg	19 19 53.33	+43 45 44.1	G	3133-0201	19183+4340	J191953.20+434541.0
V754 Cyg	19 42 49.75	+51 52 50.8	G	3569-0766	19415+5145	J194249.75+515247.1
IR Cyg	19 47 15.7	+37 50 43	S			

Notes:

LD 344	StM 431 (M7).
LD 346	StM 439 (M7e).
LD 348	ROTSE1 Dec in error; in a line of four stars.
LD 349	ROTSE1 RA in error; also 1RXS J191854.7+434927; eastern star of two.
LD 351	east-northeastern star of two.
LD 354	northeastern component of a close pair.
LD 357	southern of two stars.
LD 359	northwestern of two stars.
LD 361	southern star of a pair.
LD 363	westernmost star of a trio.
LD 364	eastern of pair.

Table 2: Elements of variation

Name	max	min	$b-r$	type	epoch	period	Remarks
	(m_v)				JD 2400000+	(days)	
LD 342	13.5	14.4	−0.2	Ia			
LD 343	11.1	15.8	1.3	M	51444	270	
LD 344	10.8	12.6	2.8	Lb			
LD 345*	11.4	>14.8	2.5	E			
LD 346	12.2	14.2	2.7	Lb			
LD 347*	12.3	13.4	0.6	E	51101	307?	
LD 348	11.0	>16.0	2.5	M	51069	247	
LD 349	12.2	14.0	1.3	RS?			
LD 350	12.5	14.0	2.7	M:	51456	221	
LD 351	12.1	>16.0	3.1	M	50596	320	
LD 352	11.6	15.2	3.7	M	50691	313	
LD 353	12.4	15.0	3.0	M	51500	191	
LD 354	11.9	14.2	1.5	M:	51450	361	
LD 355*	13.8	14.6	0.3	E	51513.3	25.81?	
LD 356	11.8	16.0	4.3	M	51158	404	
LD 357	12.2	13.9	2.9	SR	51542	189	
LD 358	12.2	14.2	2.6	SR	51101	305?	
LD 359	11.8	15.5	5.0	M	51287	455	
LD 360	12.6	14.7	2.8	SR	51406	292	
LD 361	12.0	14.8	5.9	M	51406	339	
LD 362	13.2	14.7	2.8	Lb			
LD 363	11.8	13.7	5.8	M:	51570	405	
LD 364*	12.5	14.0		L			
LD 365	11.5	13.5	3.0	L			
LD 366	12.0	>16.1	5.0	M	51285	435	
V352 Lyr*	12.0	>15.0	3.9	M	51406	351	
V396 Lyr*	12.5	15.3	2.3	SR	51432	229	
EQ Lyr	11.5	15.0	2.6	M	51418	305	
V1253 Cyg*	11.8	>15.0	2.5	SR			
V1503 Cyg	11.4	15.5	2.7	M	51542	311	
V754 Cyg	11.3	13.4	3.0	Lb			
IR Cyg	12.0	15.5		L			
NSV 24916	11.8	14.8		M	51456	253	LD 8
NSV 24928	11.8	13.5	1.5	Lb			LD 9
NSV 24935*	11.4	14.6	1.6	M	51158	301	LD 10
NSV 24955	11.0	15.0	1.4	M	51608	212	LD 11
NSV 24962	11.4	15.2	1.5	M	50637	324	LD 12
NSV 24994	13.2	>16.0		L			LD 14

Notes:

LD 345	constant on all plates at m_v=11.4 except >14.7 on: JD 2441512.5, 2441892.5, and 2442210.5.
LD 347	five minima observed.
LD 349	‘cepheid’ with $4\overset{\mathrm{d}}{.}123$ period and full amplitude of $0\overset{\mathrm{m}}{.}63$ in ROTSE1 list, but only larger, irregular variations seen here. The x-ray detection suggests this is probably an RS CVn type star.
LD 355	five minima observed.
LD 364	as faint as B ∼19 on three overlapping POSS-II J plates.
V352 Lyr	range 14.0 < mb < 17.5, period $331\overset{\mathrm{d}}{.}43$ (Gushchin 1994).
V1253 Cyg	$188\text{-}226^{\mathrm{d}}$?
V396 Lyr	mode-switching $176/318^{\mathrm{d}}$?
NSV 24935	CSS 1172.

I would like to thank Gerhard Klaus (Grenchen, Switzerland), who has provided me for many years with finding charts and magnitudes from the GSC for each of my variables. Brian Skiff (Lowell Observatory) has checked the coordinates and identifications, and has prepared the material for publication. The ROTSE stars were located via Taichi Kato's handy 'newvar' list (Kato 2000).

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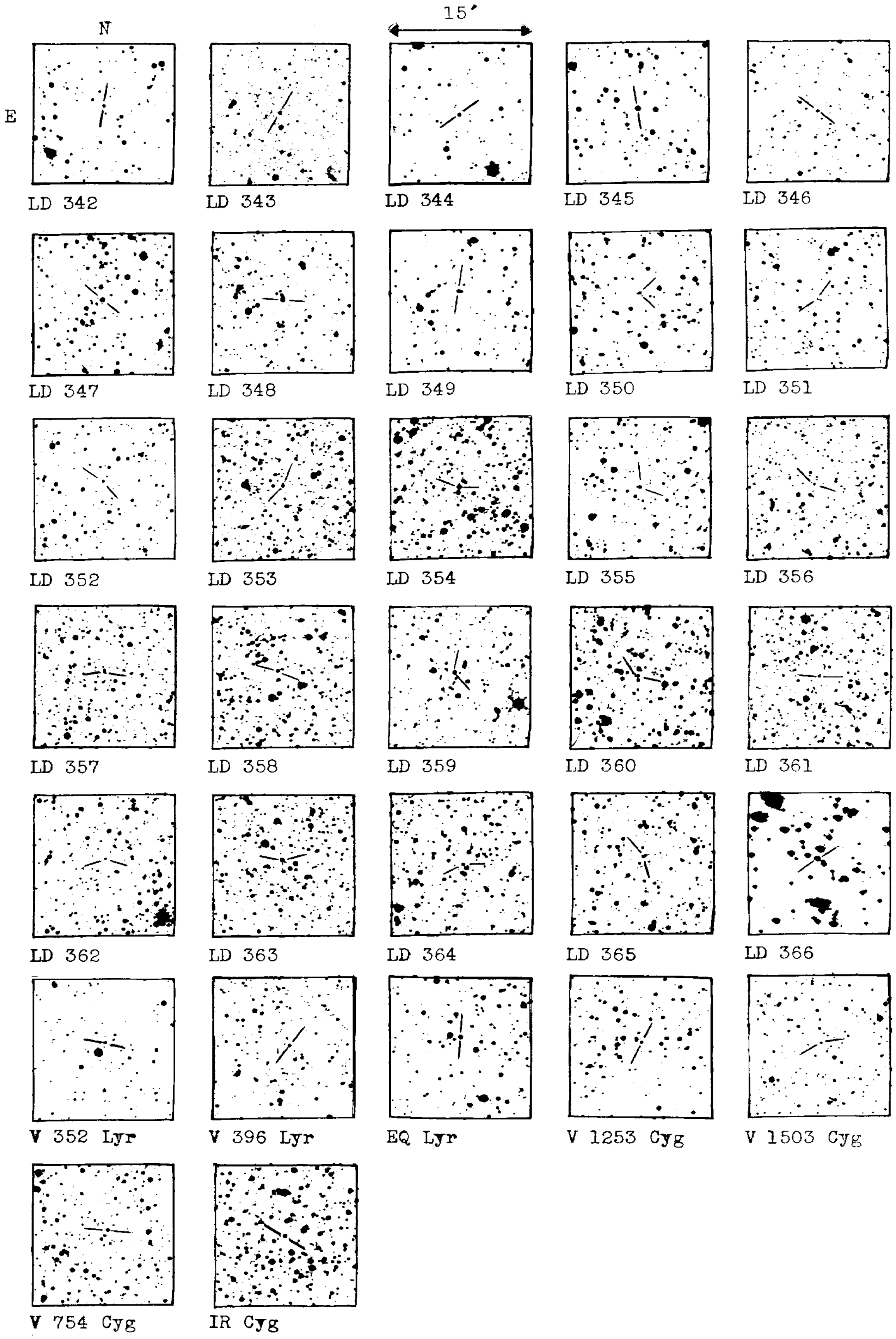
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LD 362
LD 363
LD 364
LD 365
LD 366
V 352 Lyr
V 396 Lyr
EQ Lyr
V 1253 Cyg
V 1503 Cyg
V 754 Cyg
IR Cyg

Figure 1.

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HD 49015: A NEW LOW-AMPLITUDE γ DORADUS STAR?

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We find HD 49015 to be a new low-amplitude variable star, based on one season of photometric observations with a 0.80 m automatic photoelectric telescope (APT) located at Fairborn Observatory in Arizona. The star was on our observing program as a photometric comparison star.

Very little has been published on HD 49015. Karlsson (1969) gives a spectral type of F0 IV. Olsen (1983) derives $V = 7.038$, $b - y = 0.222$, $m_1 = 0.176$, and $c_1 = 0.646$ from his Strömgren photometry. Nordstroem et al. (1997) included the star in their survey of 595 nearby F dwarfs and found $v \sin i = 44.0$ km s^{-1} and a radial velocity of 43.9 km s^{-1}. The *HIPPARCOS* catalogue gives $V = 7.04$ and $B - V = 0.375$ (both from ground-based measurements), $\pi = 14.37$ mas, and does not classify the star as either photometrically variable or constant (Perryman et al. 1997). From these results, along with the $T_{\rm eff}$ calibration of Flower (1996), we compute $(B - V)_0 = 0.354$ and $M_V = 2.76$. When plotted on an HR diagram, these values suggest a spectral type around F2 V. *HIPPARCOS* detected a visual secondary star 0.4 arcseconds away from HD 49015, so the magnitudes and colors given above refer to the combined light of these two stars. However, the secondary is 4 magnitudes fainter than the primary and so has little effect on our derived $(B - V)_0$ and M_V.

From 2000 January 9 through April 13, the 0.80 m APT acquired 63 measurements of HD 49015 through Strömgren b and y filters. The observations were reduced differentially with respect to two comparison stars, HD 43856 ($V = 7.96$, $B - V = 0.51$, F6 V) and HD 46558 ($V = 6.90$, $B - V = 0.40$, F0), corrected for extinction with nightly extinction coefficients, and transformed to the Strömgren system with long-term mean transformation coefficients. The standard deviation of the HD 43856 minus HD 46558 differential magnitudes is 0.0012 mag, which indicates both comparison stars are constant to the limit of precision for this APT. Differential magnitudes in the sense HD 49015 minus HD 43856 are analyzed in this paper. Details of the observing and data-reduction procedures can be found in Henry (1999). The individual photometric observations are available at http://schwab.tsuniv.edu/t8/hd49015/hd49015.html.

Periodogram analysis shows HD 49015 to be a short-period variable. The periodogram between $0\overset{\rm d}{.}01$ and $1\overset{\rm d}{.}0$ of the Strömgren b differential magnitudes is shown in the top panel of Figure 1. The strongest period occurs at $0\overset{\rm d}{.}3452 \pm 0\overset{\rm d}{.}0002$, but periods nearly as strong occur at $0\overset{\rm d}{.}5277 \pm 0\overset{\rm d}{.}0002$ and $0\overset{\rm d}{.}2565 \pm 0\overset{\rm d}{.}0001$. The window function for the $0\overset{\rm d}{.}3452$ period is plotted in the bottom panel of Figure 1 and indicates that the other significant dips in the periodogram match the expected aliases of the $0\overset{d}{.}3452$ period. Analysis of the Strömgren y differential magnitudes gives identical results except that the periods at $0\overset{d}{.}3452$ and $0\overset{d}{.}5275$ have identical strength. Because the amplitude in b is significantly larger than in y (see below), we adopt the $0\overset{d}{.}3452$ period preferred by the b observations as the one most likely to be correct.

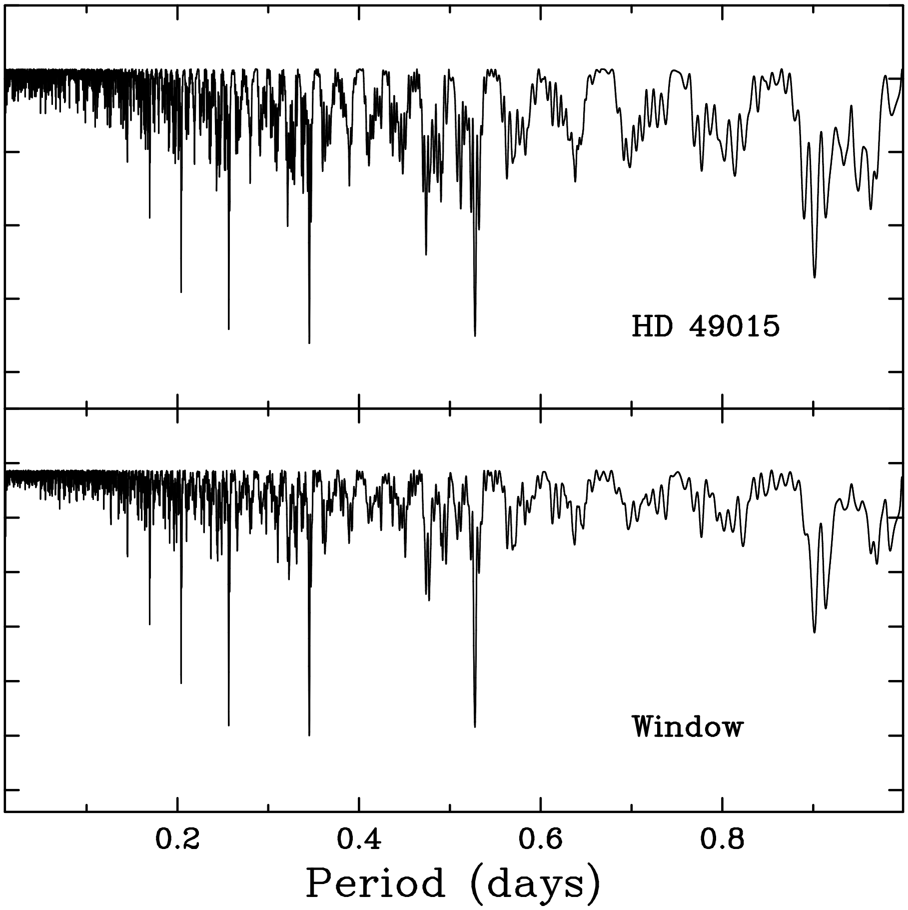

Figure 1. Periodogram analysis of HD 49015. The top panel plots the periodogram of the Strömgren b differential magnitudes and shows the strongest periodicity at $0\overset{d}{.}3452 \pm 0\overset{d}{.}0002$. The bottom panel plots the window function for the $0\overset{d}{.}3452$ period and shows that the other significant dips match the expected aliases of the $0\overset{d}{.}3452$ period.

The 63 Strömgren b differential magnitudes are plotted in Figure 2 against phase computed with the ephemeris

$$\mathrm{HJD} = 2,451,552.0 + 0\overset{d}{.}3452E, \tag{1}$$

where the epoch is chosen arbitrarily at the beginning of the data set. A least-squares sine-fit to these data gives a full amplitude of $0\overset{m}{.}0072 \pm 0\overset{m}{.}0006$. The rms of the residuals from the sine-curve fit is $0\overset{m}{.}0015$. A similar analysis of the y data on the same period gives a full amplitude of $0\overset{m}{.}0053 \pm 0\overset{m}{.}0007$ with an rms of $0\overset{m}{.}0018$. Since the rms residuals closely match the precision of the observations, the light curve is adequately modelled by a single period with constant amplitude.

Breger (1979) defines the δ Scuti variables as stars of spectral type A or F with pulsation

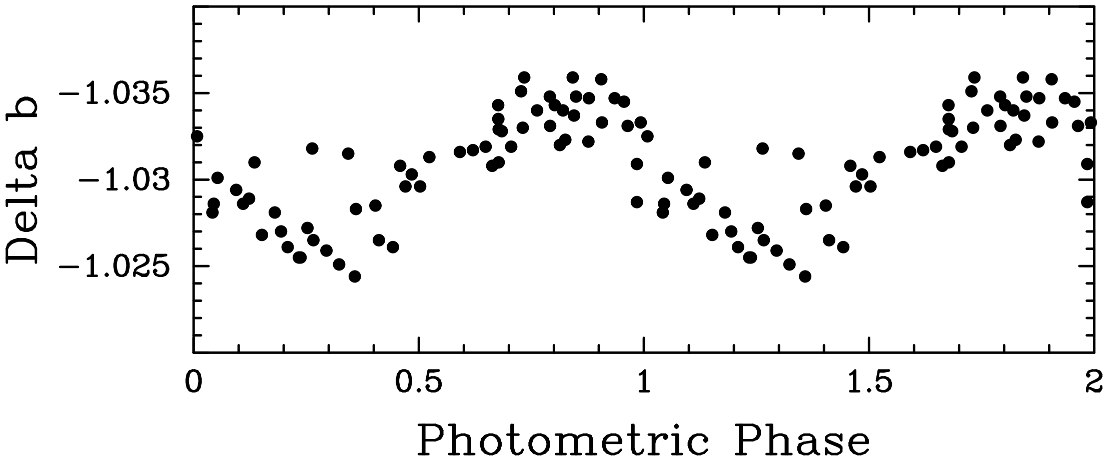

Figure 2. Strömgren *b* differential magnitudes plotted versus photometric phase computed with the ephemeris in Equation 1.

periods less than $0\overset{d}{.}3$. He lists 130 δ Scuti stars in his Table I, and all have periods under this limit. Kaye et al. (1999) describe the γ Doradus stars as early-F variables with one to five periods in the range $0\overset{d}{.}4$ to 3^{d}. Thus, if our $0\overset{d}{.}3452$ period for HD 49015 is correct, it falls above the upper period limit of the known δ Scuti variables and below the lower limit for known γ Doradus variables. When HD 49015 is plotted in the color-magnitude diagram of Handler (1999, Figure 1), it lies outside the cool edge of the δ Scuti instability strip but falls comfortably within the distribution of γ Doradus variables. Its absolute magnitude is fainter than nearly all of the δ Scuti stars in Breger (1979) but is near the mid-range of the γ Doradus absolute magnitudes in Kaye et al. (1999). We conclude that HD 49015 may be a new γ Doradus variable with a period shorter than any other known γ Doradus star. Further observations are desirable to confirm the photometric period.

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DISCOVERY OF δ SCUTI PULSATIONS IN HD 98851

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We report a new pulsating δ Scuti variable, HD 98851, discovered during the "Naini Tal-Cape Survey for Pulsations in Chemically Peculiar Stars". The main aim of the survey is to search for rapidly oscillating Ap (roAp) stars in the northern hemisphere. Therefore, the candidates are selected on the basis of Ap and Am spectral classifications and/or peculiar photometric colours. HD 98851 has Strömgren indices corresponding to high metallicity found in the Am and Ap stars, *viz.* $b-y=0.199$, $m_1=0.222$, and $c_1=0.766$ (Olsen, 1983). The Johnson colour indices for HD 98851 are $V=7.41$, $B-V=0.33$ and $U-B=0.12$ (Oja, 1985). Abt (1984) classified HD 98851 as 'Am(F1/F1 IV/F3)' on the basis of its Ca K, hydrogen and metallic lines. Although the Ca and metallic line types do not differ by more than 5 subtypes as required by the classical Am definition, the spectrum has several other indicators of Am character.

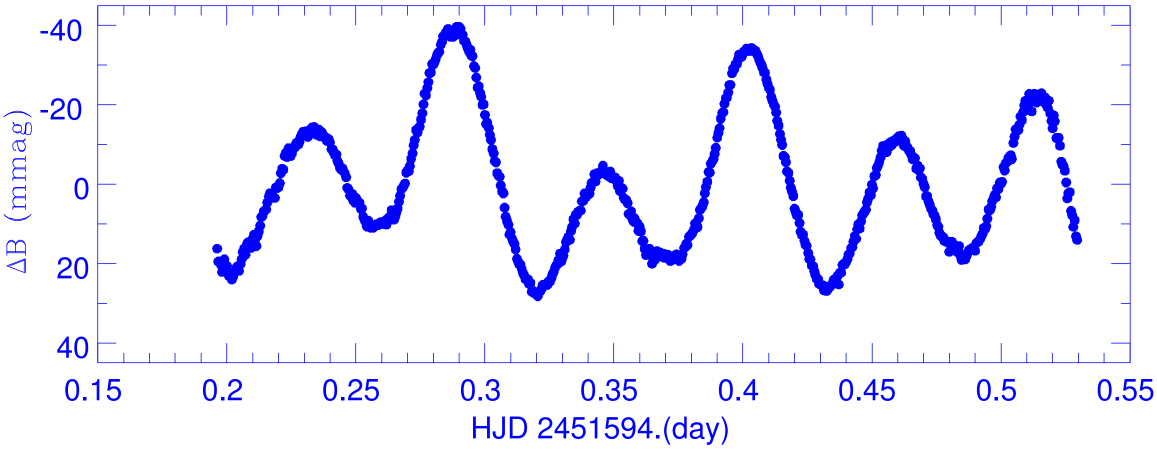

Figure 1. Light curve of HD 98851 on HJD 2451594.

On the basis of these peculiar colours we decided to search for rapid oscillations in HD 98851 on the night of 28 January 2000, JD 2451572. The data were acquired as continuous 10-s integrations in Johnson B light using a high-speed photometer attached to the 104-cm Sampurnanand telescope of Uttar Pradesh State Observatory (UPSO), Naini Tal.

These observations revealed a peak-to-peak variation of 0.04 mag on a time-scale of about 80 min. Subsequent observations were made on nights HJD 2451594, 2451596, 2451623 and 2451627 to confirm the presence of these pulsations and to define better the period. Figure 1 shows the light curve obtained on night HJD 2451594. The data shown here have been corrected for coincidence counting losses, sky background and atmospheric extinction, and then binned to 40-s integrations.

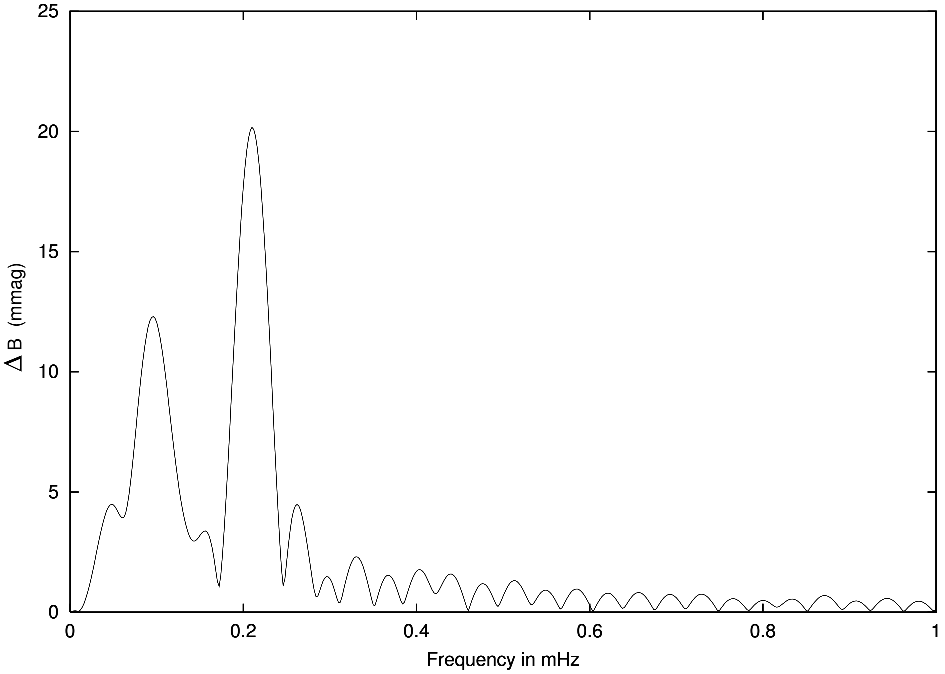

Figure 2. The amplitude spectrum of HD 98851 on HJD 2451594.

The reduced data were then Fourier analysed to identify the component frequencies using Deeming's (1975) discrete Fourier transform. Fig. 2 shows the amplitude spectrum of the HJD 2451594 data. The amplitude spectrum peaks strongly at 0.21 ± 0.02 mHz (79.4 minutes) and 0.10 ± 0.03 mHz (167 minutes). The peak at 0.10 mHz appears in the other light curves also, but we caution that contamination at low frequences by sky transparency variations is significant in these single-channel measurements. In order to confirm this frequency additional two-channel data or differential data are required. A detailed analysis of the pulsations in this star will be published elsewhere.

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