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NEW CEPHEIDS IN AQUILA

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We have continued our search for new variable stars at low galactic latitudes. As announced in the previous paper (Antipin, 1998), the main goal of this work is discovery of new classical Cepheids or related objects. Our study is based on Moscow archive plates taken with the 40-cm astrograph in Crimea.

Tables 1 and 2 contain data on two new variable stars discovered in the course of this research. The tables present for each star: GSC identifications, equatorial (J2000) and galactic coordinates, number and interval (JD) of observations, maximum and minimum brightness in B band, and light-curve asymmetry $(M - m)$. Finding charts are shown in Figure 1. Magnitudes of comparison stars (Table 3) were obtained on the base of the B-band standard sequence in NGC 6755 (Hoag et al., 1961).

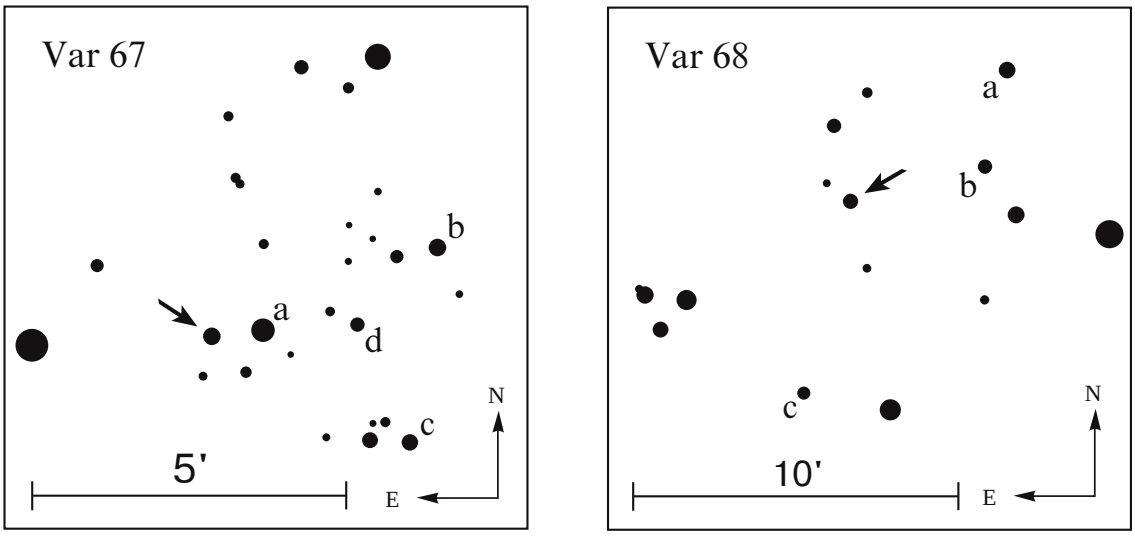

Figure 1. Finding charts

Table 1: Coordinates and Identifications of New Variables

Var	GSC	α (J2000.0)	δ (J2000.0)	l	b
Var 67	5115.0919	$18^{\rm h}53^{\rm m}17\overset{\rm s}{.}8$	$-0°06'27''$	$33\overset{\circ}{.}05$	$-0\overset{\circ}{.}46$
Var 68	5115.1270	$18^{\rm h}54^{\rm m}59\overset{\rm s}{.}5$	$-0°04'37''$	$33\overset{\circ}{.}27$	$-0\overset{\circ}{.}83$

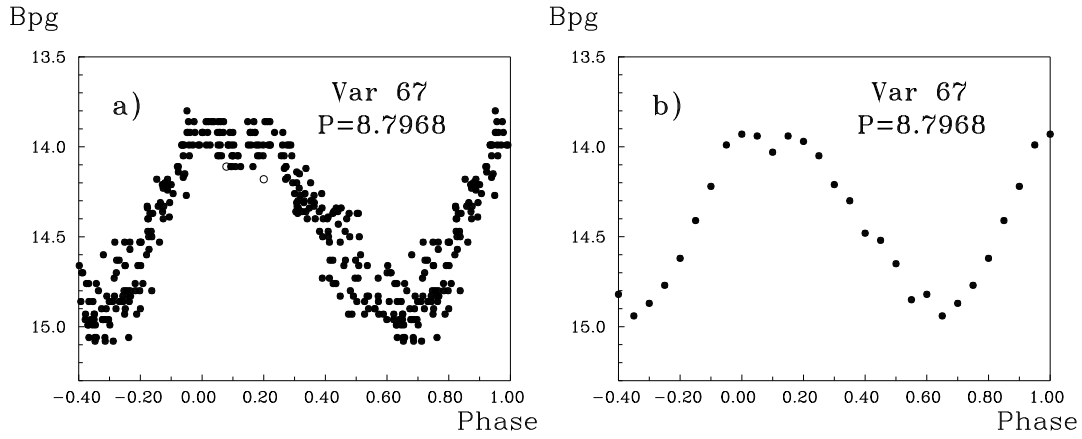

Figure 2. Var 67. Phased light curve (a) and mean phased light curve (b). Uncertain estimates are shown as open circles

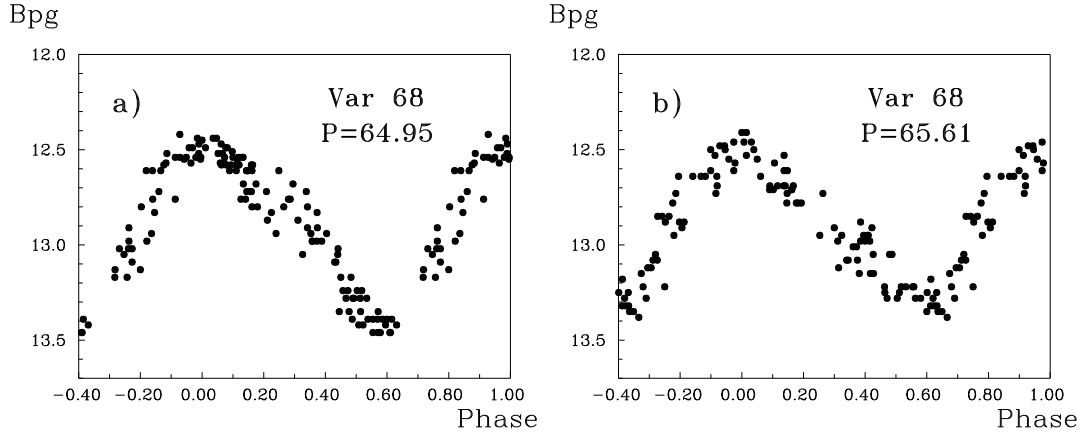

Figure 3. Var 68. Phased light curves for two intervals of observations: a) JD 2436000–2438700 and b) JD 2443700–2448200. Strong period changes are clearly seen

Table 2: Data on New Variable Stars

Var	N	JD 24...	Max	Min	$M-m$
Var 67	292	32740–49931	$13\overset{m}{.}95$	$14\overset{m}{.}95$	0.35
Var 68	299	32740–49931	$12\overset{m}{.}5$	$13\overset{m}{.}4$	0.41

Table 3: Comparison Stars

Var	a	b	c	d
Var 67	12.87	14.11	14.40	15.06
Var 68	12.32	12.61	13.45	

Var 67. The results of frequency analysis enable us to classify the variable as a new classical Cepheid with light elements:

$$\mathrm{JD_{max}} = 2442990.34 + 8\overset{d}{.}7968 \times E.$$

The phased light curve (Figure 2a) shows a two-humped shape, in agreement with the Hertzsprung progression for this value of period. The secondary maximum (hump) at the phase ~ 0.15 is almost equal in magnitude to the primary one. The mean phased light curve is given in Figure 2b.

Var 68. The variable is identical to the Tycho object TYC 5115 1270 1 (ESA, 1998). Our photographic observations show periodic light variations typical of a Cepheid with $P \sim 65^{\mathrm{d}}$. Strong period changes have been found. The following light elements are good only for comparatively short time intervals:

$$\mathrm{JD_{max}} = 2438167.44 + 64\overset{d}{.}95 \times E, \quad \mathrm{JD}\,2436000 - 2438700;$$

$$\mathrm{JD_{max}} = 2444456.39 + 65\overset{d}{.}61 \times E, \quad \mathrm{JD}\,2443700 - 2448200.$$

The corresponding phased light curves are presented in Figure 3ab.

Having plate estimates only, it is very difficult to determine the star's type of variability for certain. Two possible classifications – RVA and DCEP – could be suggested. The colour index of the star from Tycho catalogue ($B-V = 1.869$, $\sigma = 0.314$) does not contradict any of these two classifications. But the shape of the light curve looks stable during all observations. Moreover, the changes in period caused by fast evolution of a massive star through the instability strip are characteristic of long-period Cepheids (Berdnikov, 1994). So, attributing the new variable to classical Cepheids seems preferable. In this case, Var 68 would belong to the group of Galactic classical Cepheids with the longest periods.

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