

COMMISSIONS 27 AND 42 OF THE IAU
 INFORMATION BULLETIN ON VARIABLE STARS
 Number 4673

Konkoly Observatory
 Budapest
 25 February 1999
HU ISSN 0374 – 0676

NEW DWARF NOVAE ON MOSCOW PLATES II

S.V. ANTIPIN

Sternberg Astronomical Institute, 13, Universitetskij Prosp., Moscow 119899, Russia,
 e-mail: antip@sai.msu.su

A search for new variable stars on Moscow archive plates was continued, resulting in the discovery of four new UG-type stars (Var 63–66). The coordinates of new dwarf novae, taken from the USNO A1.0 catalogue, are listed in Table 1 and their finding charts are shown in Figure 1.

The stars were estimated by eye on plates taken with the 40-cm astrograph in Crimea. The magnitudes of comparison stars are given in Table 2. Standard sequences in NGC 1027 (Hoag et al., 1961) and in IC 5146 (Walker, 1959) were used to obtain *B*-band magnitudes of comparison stars for Var 64 and Var 66, respectively. Magnitudes of comparison stars for Var 63 and Var 65 are based on the *B*-band standard for 3C 454.3 (Angione, 1971) with the exception of comparison stars *a*, *b*, *c* and *d* for Var 63 whose *B*-band magnitudes were measured photoelectrically by Shugarov (private communication) at the 60-cm reflector in Crimea.

Var 63, 64 and 65 are blue on the Palomar prints. The color of Var 66 is discussed below.

Var 63 Peg. We estimated the star on 176 plates taken in JD 2437176–48893. The range of variability on our plates is 13^m3–[17^m7. A total of seven outbursts have been revealed. The rather large amplitude of variability — more than 4^m4*B* — and long duration of the best-observed outburst (#6, see below) — more than 14 days — allow us to consider Var 63 as a UGSU-subtype dwarf nova candidate. Further observations and search for superhumps are strongly encouraged. Outbursts (JD24...):

#1	38949.461	13.43	#4	46081.234	13.29	#6	47390.407	[17.7
							47396.420	13.48
#2	44521.353	15.25	#5	47035.492	[17.15		47397.440	13.34
	44523.421	[17.7		47041.485	16.45		47398.483	13.38
				47057.391	[16.66		47407.368	15.61
#3	44901.347	[17.7					47410.457	17.70
	44904.307	15.95						
						#7	48566.216	13.48

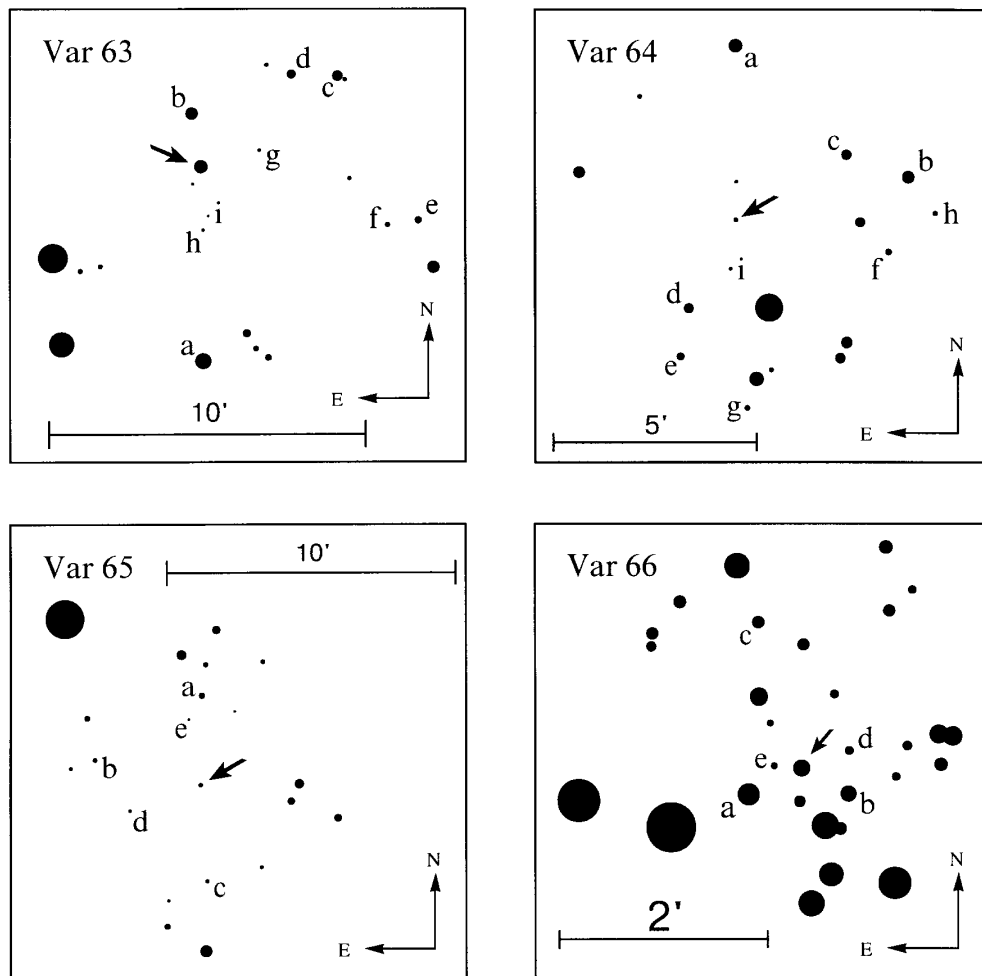


Figure 1. Finding charts

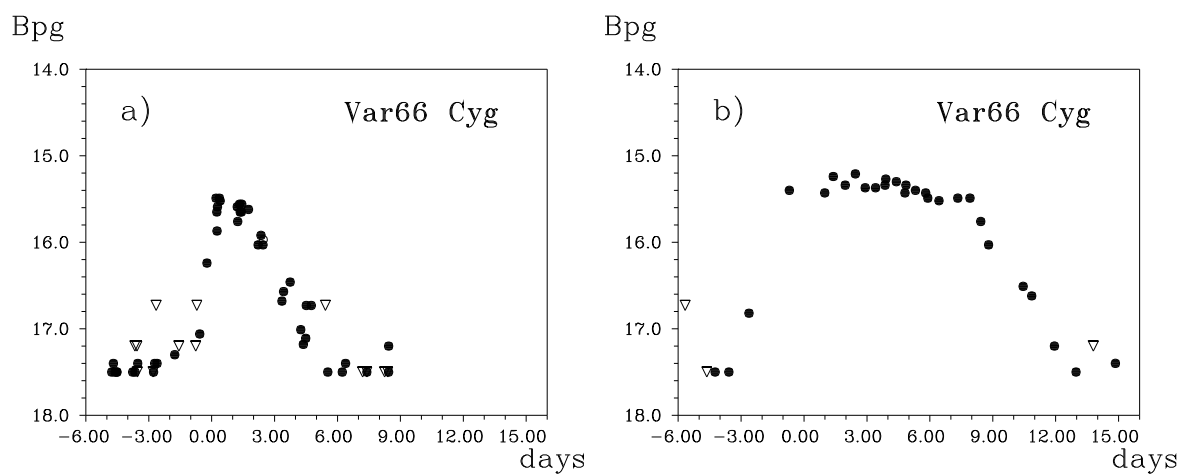


Figure 2. Var66 Cyg. Summary light curves of the short-lasting outburst (a) and the long-lasting one (b)

Table 1: Coordinates of New Variables

Var	α (J2000.0)	δ (J2000.0)
Var 63	22 ^h 58 ^m 43 ^s .5	+11°09'13"
Var 64	03 ^h 21 ^m 14 ^s .4	+61°05'26"
Var 65	22 ^h 45 ^m 00 ^s .6	+16°55'15"
Var 66	21 ^h 44 ^m 03 ^s .7	+44°39'02"

Table 2: Comparison Stars

Var	a	b	c	d	e	f	g	h	i
Var 63	12.63	13.57	14.12	14.39	15.83	16.66	17.15	17.4	17.7
Var 64	13.74	14.18	14.71	15.07	15.59	16.07	16.69	16.94	17.6
Var 65	15.53	16.22	16.80	17.4	17.6				
Var 66	15.02	15.65	16.73	17.2	17.5				

Var 64 Cam. The UG-type variability was suspected on the basis of 223 estimates (JD 2433150–48627). The *B*-band magnitude changes in the range 14^m0–[17^m6. However, the star was in the bright state on two plates only. Confirmation was needed for the classification.

This confirmation came from Pietz (1998) who found the outburst on September 23, 1998. T. Kinnunen suspected short-term variations close to the maximum of this outburst (Kato, 1998). This is very interesting because our plate estimates show Var64 to be definitely variable during the minimum of brightness (16^m5–[17^m6).

We measured the accurate position of Var64 on our plate (in outburst, JD2442719) relative to 18 neighbouring GSC stars. Our measurements yielded coordinates 3^h21^m14^s.33, +61°05'26".0 (J2000), which are accurate to about $\pm 0''.3$. The variable is thus identical to the USNO A1.0 object at 3^h21^m14^s.41, +61°05'25".7 (J2000).

According to available data (Moscow estimates and *vsnet* observations), all observed outbursts are short-lasting. Outbursts on Moscow plates (JD24...):

#1	42719.417	14.00	#2	48240.309	[16.69
				48244.363	14.40
				48246.210	15.83

Var 65 Peg. We investigated this star on 153 plates (JD 2444076–47477) and revealed a total of seven outbursts. The range of variability on our plates is 15^m8–[17^m6. Two best-observed outbursts are short (#1 and #3, see below). Outbursts (JD24...):

#1	44873.397	[17.6	#3	45552.391	[17.4	#6	46768.250	[16.8
	44875.366	15.81		45553.518	15.94		46769.174	16.08
	44876.355	15.94		45558.381	17.45			
	44877.356	15.77		45562.487	[17.6	#7	47410.457	16.01
	44880.383	16.65					47417.364	17.04
	44883.430	[17.4	#4	45666.233	[17.6		47421.440	[17.4
				45674.205	16.36			
#2	45199.526	16.15						
	45200.510	16.08	#5	46376.269	16.71			
	45205.469	[17.4		46382.394	16.15			

Var 66 Cyg. We estimated this star on 208 plates taken in JD2433483–49634 and found its *B*-band magnitude to vary from 15^m25 to [17^m5. Moscow photographic observations show that the light curve of Var 66 is typical of dwarf novae. We observed two types of outbursts: the long-lasting ones with 15^m25*B* at maximum and a duration of about 15 days and the short-lasting ones with 15^m5*B* at maximum and a duration of about 6 days. We used three “long” best-observed outbursts and five “short” ones to construct the summary light curves (Figure 2). It is significant that the star spends little time in a quiescent state with the outbursts following one after another almost immediately.

The only problem is the color of the new variable. The color index (blue minus red) is 1^m3 in the USNO A1.0 and 0^m7 in the USNO A2.0. It is not blue enough for a UG-type variable, especially if compared to the colors of neighbouring stars. The issue remains open and all observers are welcome to resolve the uncertainty.

The author would like to thank Drs. S.Yu. Shugarov, N.N. Samus and A.K. Dambis for their help and attention to this investigation, and to express gratitude to Mr. J. Manek for the software to visualize the USNO A1.0 and A2.0 catalogues. I acknowledge the very useful *vsnet* Data Base maintained by Drs. D. Nogami, T. Kato, S. Masuda and H. Baba. This study was supported in part by the Russian Foundation for Basic Research and the Council of the Program for the Support of Leading Scientific Schools through grants Nos.99-02-16333 and 96-15-96656.

References:

- Angione, R.J., 1971, *AJ*, **76**, 412
Hoag, A.A., Johnson, H.L., Iriarte, B., Mitchell, R.I., Hallam, K.L., Sharpless, S., 1961, *Publ. of the US Naval Obs.*, vol. **XVII**, part VII, Washington
Kato, T., 1998, *vsnet-alert* **2232**
Pietz, J., 1998, *vsnet-alert* **2218**
(available on <http://www.kusastro.kyoto-u.ac.jp/vsnet/Mail/vsnet-alert/msg02232.html>,
.../msg02218.html)
Walker, M.F., 1959, *ApJ*, **130**, 57