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

Number 2968

Konkoly Observatory
Budapest
22 December 1986

HU ISSN 0374-0676

TWO-COLOUR PHOTOMETRIC STUDY OF NOVA CYGNI 1986

Nova Cygni 1986 was discovered by Wakuda (1986). Penhallow and Tatum (1986) presented the precise coordinates of this object ($\alpha = 19^h52^m45^s.89$, $\delta = +35^o34'18''.7$, 1950.0). Wenzel and Fuhrmann (1986) gave photographic magnitudes of the star near maximum, and since that time about thirty visual estimates have been published (IAU Circ. 4249, 4257, 4259, 4260).

In this paper we present photographic and photovisual observations of Nova Cyg 1986 derived from 21 pairs of Sonneberg Sky Patrol plates. The finding chart is shown in Fig. 1. By cat's eye photometry we derived the magnitudes of comparison stars (Table I) on 17 photographic and 12 photovisual plates using the magnitudes of stars near CI Cyg (Howard and Bailey, 1980): the magnitudes of our comparison stars a, b, c, f were linked to SAO catalogue data. For photographic magnitudes we used B values and for photovisual magnitudes the relation (Rendtel, 1976) $m_{pv} = V - 0.22\ (B-V)$.

The values of σ show the mean quadratic deviation of individual determinations from the mean value. The stars l and m are possibly variable, and they were not used at Sonneberg Observatory.

Because of the two disturbing neighbouring stars the brightness of the nova was determined on the plates by visual estimates. The results (rounded to the nearest half tenth) are listed in Table II and are shown in Figs. 2 and 3 (filled circles). The internal accuracy of the magnitudes in the instrumental system is believed to be in the range 0.05 to 0.1 mag.

The small systematic difference between the magnitudes presented in this paper and by Wenzel and Fuhrmann (1986) is due to the accuracy of the zero-point determination. The rise time from $13^m.2$ to 9.3 (pg) is of about four days, and then a minimum was observed before the main maximum. The amplitude of this minimum was larger in pg ($\simeq 1.0$) than in pv ($\simeq 0.3$ mag), and its duration of 5^d is larger than the duration of the pre-maximum standstill of some hours frequently observed in novae (see e.g. Pskovskij,1974). This and other features of the light curve resemble those observed in Nova Pictoris 1925 (RR Pic). During this secondary minimum the star appears to be redder ($CI = m_{pg} - m_{pv} \simeq 1^m.0$ in our instrumental system) compared with the nearby maxima ($CI \simeq 0^m.3$).

Table I

Comparison stars of Nova Cygni 1986

Star	m_{pg}	σ_{mpg}	mpv	σ_{mpv}	BD
	$8^m.1$	-	$8^m.28$	$0^m.05$	+35° 3851
a	8.7	-	8.57	.07	3867
b	9.6	-	8.53	.08	3857
c	9.62	$0^m.10$	9.53	.11	3854
d	9.63	.11	9.40	.14	3858
e	9.80	.12	8.45	.09	3852
f	10.55	.08	10.43	.15	
g	10.84	.11	10.30	.10	
h	10.96	.14	10.02	.10	
i	11.23	.16	10.70	.16	
j	11.36	.12	10.74	.12	
k	11.76	.15	11.15	.21	
l	11.97	.17	10.80	.17	
m	12.94	.31	-	-	
n					

Table II

Pg and pv observations

HJD 244 6000+	m_{pg}	m_{pv}	HJD 244 6000+	m_{pg}	m_{pv}
613.462	$>15^m.0$	-	685.410	$10^m.75$	$10^m.15$
641.429	13.2	$>11^m.15$	704.318	11.25	10.2
642.427	11.65	10.8	705.315	10.95	10.2
644.416	10.35	9.6	.346	11.2	10.2
645.426	9.6	8.8	706.300	10.55	9.6
646.433	9.3	9.0	707.310	10.55	9.9
648.425	10.2	9.05	708.315	10.4	9.9
649.426	10.25	9.05	709.306	10.55	9.9
650.430	9.45	8.75	711.293	10.4	9.7:
651.433	8.7	8.5	713.325	10.9	10.15
679.361	10.35	10.0			

Unfortunately, there is a gap in our observations in August and September and the visual observations published in IAU Circ. are rather sparse (x in Fig.3). However, ≈ 40^d after maximum a second local minimum was observed, which was also more pronounced in the blue spectral region than in the visual one. At that time the colour index increased as well. After this " transition stage", which is characteristic for novae (Pskovskij, 1974), see also the observations of Nova Vul 1984 I (PW Vul) by Kudashkina and Andronov (1985), a short local maximum with an overall duration of ≈ 10^d was observed.

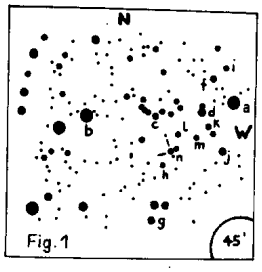

Figure 1

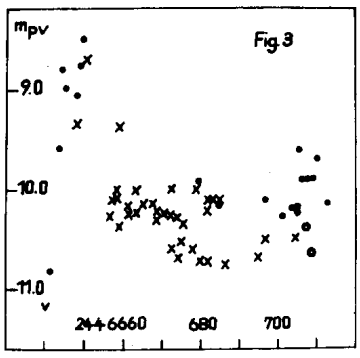

Figure 2

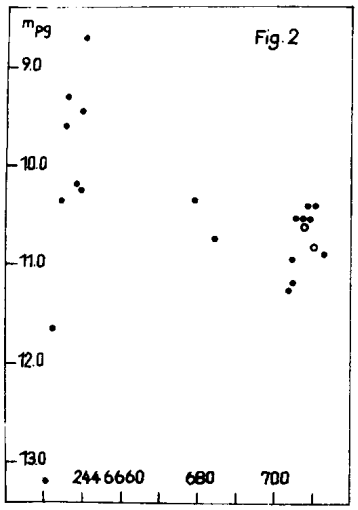

Figure 3

As one may see from Fig. 2 our m_{pg} estimates agree sufficiently well with the photoelectric observations of Monella (1986) (o in Fig. 2 and 3), and so we assume that the systematic deviation of our instrumental m_{pg} system from the standard B system is not larger than 0.1 to 0.15 mag. There is, however, a systematic deviation of our m_{pv} data from other visual magnitudes of the nova. Obviously in this colour range the nova photometry is much more sensitive against differences in the instrumental systems.

The comparison of the details of the light curve of Nova Cyg 1986 with the curves of other novae shows that it is probably a slow nova similar to Nova Pictoris 1925.

I.L. ANDRONOV
Friedrich-Schiller-Universität Jena,
Sektion Physik, Universitäts-Sternwarte,
DDR,
permanent address:
Odessa State University, Faculty of Physics,
Department of Astronomy, USSR;

B. FUHRMANN
W. WENZEL
Sternwarte Sonneberg
Zentralinstitut für Astrophysik der
Akademie der Wissenschaften der DDR

References:

Howard, I.D., Bailey, J., 1980, J. Brit. Astron. Assoc. 90, 3, 265
Kudashkina,L.S., Andronov, I.L., 1985, Astron. Tsirk. 1365, 6
Monella, R., 1986, IAU Circ, 4265
Penhallow, W.S., Tatum, J.B., 1986, IAU Circ. 4246
Pskovskij, Yu.P., 1974, Novye i sverkhnovye zvezdy (in Russian), Moscow, Nauka
Rendtel, R., 1976, unpublished
Wakuda, M., 1986, IAU Circ. 4242
Wenzel, W., Fuhrmann, B., 1986, IAU Circ. 4246