Life and Work of Hilmar Duerbeck

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THE SPECTRUM OF NOVA CYGNI 1975 AROUND MAXIMUM LIGHT

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42 coudé spectra (12 Å/mm) of Nova Cyg 1975 were taken around maximum light (J.D. 2442654.7, 655.6, 656.6). Radial velocities were determined for the identified lines. The spectrum on J.D. 654.7 is dominated by broad, shallow, violet-shifted absorption lines and much weaker, undisplaced emission lines. On the subsequent two nights, the emissions increased rapidly in strength, and structures in the emission and absorption components of the Balmer lines became evident. On J.D. 2442656.6 the diffuse enhanced spectrum appeared in absorption with a radial velocity of -4000 kms^{-1}. The strengths of the major emission and absorption lines of hydrogen were determined.

On the basis of interstellar lines, the distance of the nova is estimated to be 1.4 ± 0.2 kpc, and the absolute magnitude at maximum is about $M_v = -9^m.8$, leading to a maximum photospheric radius of about 570 $R_\odot$. Some properties of the expanding shell are discussed.

Key words: novae – spectroscopy – expanding envelopes

1. INTRODUCTION

Nova Cyg 1975 (= V 1500 Cyg) is of outstanding importance among the known novae because:

1. It has the largest known range of brightening ($\Delta m > 19^m$),
2. It has the fastest evolution, with a brightness decline of 3^m from maximum in 3.6 days,
3. It is the intrinsically most luminous galactic nova ever observed ($M_{max} \approx -10^m$).

For an understanding of the early phases of the nova phenomenon, spectroscopic observations around maximum light, and especially observations of the pre-maximum spectrum are an important prerequisite. Since Nova Cygni also had a high apparent brightness (brightest nova since CP Pup 1942, which is in some respects similar to it), it was a particularly suitable object for high dispersion spectroscopy.

In the following, high dispersion observations made around maximum light are presented and discussed (section 2). Some conclusions from the early brightness increase and the spectroscopic behaviour of the pre-maximum stage are presented in section 3.

2. OBSERVATIONS

V 1500 Cyg was observed on 1975 August 30.13–30.23, August 31.05–31.14, and September 1.04–1.18 (UT) with the 152 cm spectrographic telescope of the European Southern Observatory, La Silla, Chile. 27 spectrograms covering the blue spectral region (3650–5000 Å, dispersion 12.3 Å/mm, emulsion IIa–O) and 15 spectrograms covering the red spectral region (5200–6800 Å, dispersion 12.3 Å/mm, emulsions 127–05 and 098–02) were obtained with the coudé spectrograph (table 1). Because of the low elevation of Nova Cygni above the horizon of La Silla (18° at culmination), the differential atmospheric refraction was considerable, and the ultraviolet part of the spectrum was greatly weakened. In the second and third night, a field-derotator was used, and the atmospheric spectrum was trailed parallel to the slit of the spectrograph.

The plates were calibrated with the ETA calibration spectrograph, and developed in MWP–2. Intensity tracings of the spectra were obtained with the Schnellphotometer–curve follower equipment of ESO Santiago.

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SPACE SCIENCE REVIEWS

A Reference Catalogue and Atlas of Galactic Novae

by Hilmar W. Duerbeck

Position: 17 50 27 – 30 44 57 (P. Wild, *IAU Circ* 1471 (1954))
359.333 – 2.435 (G.C.)

Range: 13.8p – ? LCT: ? t_3: ?

Identification: no finding chart or precise position is available. Identification is not possible. Field map chart in Appendix.
Classification: poorly known nova.

N Sco 1985 N

Discovered by W. Liller, Viña del Mar, Chile, 1985 September 24, when the nova was $10^{m}.5$. It was [12^{m} on 1984 September 19 (*IAU Circ* 4118).

Position: 17 53 19.01 – 31 49 14.2 (GPO plate, May 1986)
17 53 18.85 – 31 49 14.45 (SRC)
358.720 – 3.506 (G.C.)

Range: 10.5v – 20j LCT: ? t_3: ?

Finding chart: R. Lukas, *IBVS* 2852 (1986).
Spectroscopy: T. Richtler, W. Liller, *IBVS* 2871 (1986) – trac; H. W. Duerbeck, W. C. Seitter, *ApSS* 131 (1987) 467 – descr.
Identification: from GPO plate (nova in decline).
Classification: nova.

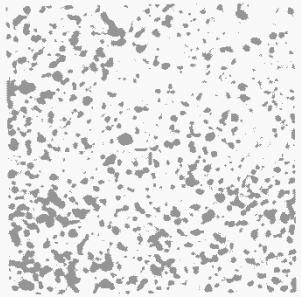
EU Sct NA
(N Sct 1949)

Discovered by C. Bertaud, Observatoire de Paris, 1949 July 31. Maximum was reached on 1949 August 5 (*IAU Circ* 1224).

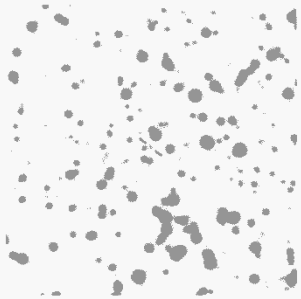
Position: 18 53 34.50 – 04 16 30.4 (POSS)
18 53 34.63 – 04 16 27.7 (3 outburst observations)
29.727 – 2.980 (G.C.)

Range: 8.4p – 18p LCT: Cb t_3: 42^{d}

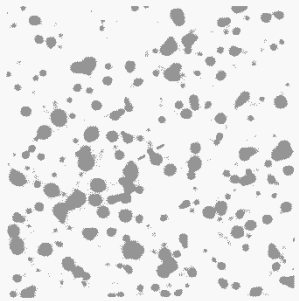
Finding chart: Yu. N. Efremov (1961); N. E. Kurochkin, *ATs* 90-91 (1949) 2.
Light curve: L. Campbell, *Harv Repr* 327 (1949) 29; M. Beyer, *AN* 280 (1951) 273; C. Bertaud, *JO* 36 (1953) 29; M. Harwood, *Leiden Ann* 21 (1962) 404; C. Payne-Gaposchkin (1957) 12.
Spectroscopy: A. Colacevich, *ApJ* 111 (1950) 197 – ident; P. Wellmann, *ZsAp* 29 (1951) 101 – ident, rv; J. F. Heard, *JRAS Can* 47 (1953)



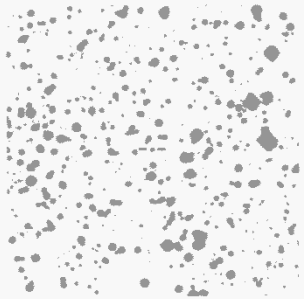
N Sco 1985 J



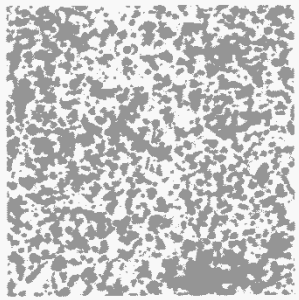
EU Sct O



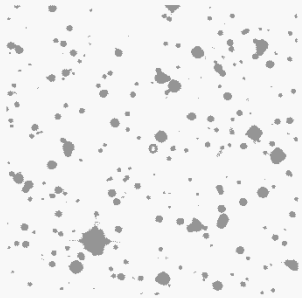
FS Sct O



FV Sct J



GL Sct J



V366 Sct J

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