COMMISSION 27 OF THE I.A.U.

INFORMATION BULLETIN ON VARIABLE STARS

Nos. 501-600

1970 December – 1971 December

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Konkoly Observatory
Budapest
1970 December 28

MINIMA OF ECLIPSING VARIABLES

A photoelectric study of the eclipsing binaries U Cep and RZ Cas was carried out in yellow light with the 8-inch refractor of the Kourovka observatory at the Urals University. The comparison stars were HD 6006, $m_V = 7^m.89$, Sp A0 for U Cep and BD 69°171, $m_V = 8^m.0$, Sp A0 for RZ Cas. Two newly observed primary minima are given.

Star	JD hel 2400000+	E	O–C	n	method of obs.
U Cep	36466.6013	11463	$+0^d.1872$[1]		pg
	541.3858	11493	+0.1847		pg
	576.2872	11507	+0.1855		pg
	581.2729	11509	+0.1854		pg
	825.5791	11607	+0.1873		pg
	40273.4695	12990	+0.3959	35	pe
	779.551	13193	+0.419	15	vis
	789.529	13197	+0.426	11	vis
RZ Cas	36816.4975	16282	−0.0172[2]		pg
	37912.5334	17199	−0.0274		pg
	38676.2915	17838	−0.0352		pg
	40274.3375	19175	−0.0410	14	pe
	789.490	19606	−0.042	15	vis
AQ Peg	37882.491	2367	+0.079[3]		pg
	40096.335	2766	+0.108	18	vis
UX UMa	40777.4117	68318	−0.0057[4]	16	vis
	779.3779	68328	−0.0062	9	ivs

n: total number of estimates of brightness;
1. C = Min.hel. JD = 2407890.2957 + $2^d.4929005$E;
2. C = Min.hel. JD = 2417355.4233 + 1.1952519E;
3. C = Min.hel. JD = 2424749.3305 + 5.548408E;
4. C = Min.hel. JD = 2427341.2221 + 0.196671379E;

Photographic moments of minima obtained with sky patrol plates at the Odessa observatory are also presented.

Finally visual observations were made with the 19-inch reflector on UX UMa, AQ Peg, and with a binocular on U Cep and RZ Cas for the determination of minima and for studying their period-variations.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 502

Konkoly Observatory
Budapest
1970 December 31

PHOTOELECTRIC LIGHT-CURVE OF KP Aql

The eclipsing binary KP Aql (BD+15°3667) was observed photoelectrically between August 1 and October 9, 1970 on eleven nights with the 48 cm Cassegrain telescope of the Ege University Observatory. An RCA 1P21 photomultiplier and the filters Corning No.5030+Schott GG 13 for B and Corning No.3384 for V were used.

We have obtained between 1968 August and 1970 October 5 minima. They all show very large O-C's against the elements C_I given in GCVS (1969) (s. Table I, O-C_I) Calculations of new light-elements were made from 15 minima. The weighted least-square solution gives the following new elements:

$$\text{Hel. Min} = \text{JD } 2\,436\,712.4685 + 1^{d}.6837392.E \quad (C_{II})$$
$$\pm 25 \qquad \pm 13 \text{ (m.e)}$$

Table I. shows the observed times of the minima, the values of O-C_I and O-C_{II}, their weights (p) and references to observers. (Gl.= Ömür Gülmen, Ib = Cafer Ibanoglu, Kt = Mehmet Kurutac).

Table I

O		O-C_I	O-C_{II}	p	Obs
2 433 858.549	v	+0.001	+0.018	1	AN 281
34 910.859	pg	-0.018	-0.009	2	AJ 66
35 333.485	v	-0.008	-0.001	1	AN 286
35 355.364	"	-0.017	-0.011	1	"
36 025.507	"	+0.003	+0.004	1	"
36 106.331	"	+0.008	+0.009	1	"
36 451.502	"	+0.015	+0.013	1	"
36 712.465	"	0.000	-0.004	1	"
37 921.377	"	-0.004	-0.016	1	AN 288
37 948.322	"	+0.001	-0.011	1	"
40 098.471	pe	+0.031	+0.003	3	Ib/Kt
40 396.4914	"	+0.0317	+0.0015	5	Ib/Gl
40 822.477	"V	+0.034	+0.001	3	Ib/G1
40 839.3129	"V	+0.0330	-0.0004	5	Ib/G1
40 866.2526	"V	+0.0331	-0.0005	5	Ib/G1

The light-curves are shown in Figures I and II where the magnitude differences between the variable and the comparison star BD+15°366 have been plotted against phase using the new elements. The star varies about $0^m.70$ in both yellow and blue. Both light-curves are similar with some exception in the phase-interval $0^P.825$-$0^P.925$. We have observed some anomalous effect in this interval in V on August 1 and 2, 1970.

We are planning to obtain further observations to fill the phase-interval $0^P.275$ to $0^P.400$, and to re-examine the unexpected behaviour between $0^P.825$ and $0^P.925$. We hope to clarify these points in the coming observing season.

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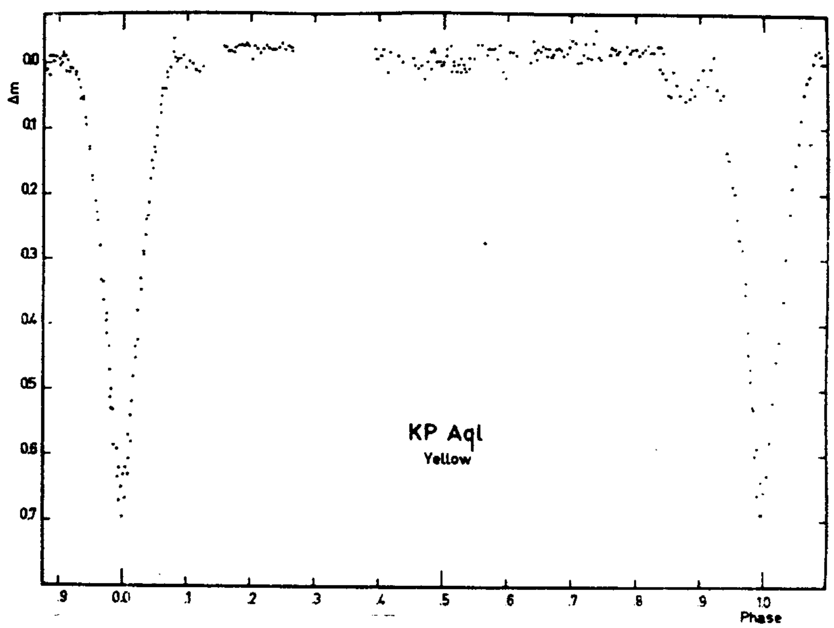
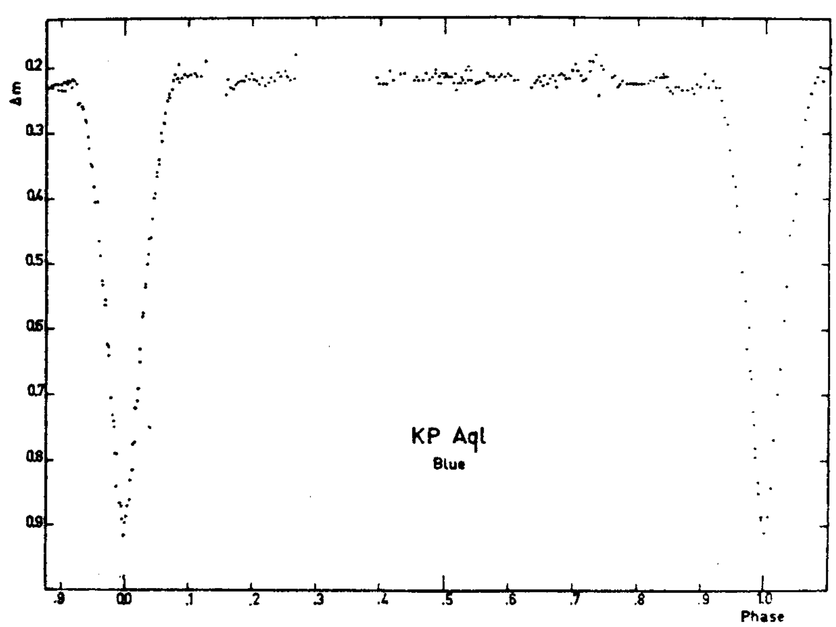


Δm
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
.9
0.0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
Phase
KP Aql
Yellow



Δm
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
.9
0.0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1.0
Phase
KP Aql
Blue

COMMISSION 27 OF THE I. A. U.
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NUMBER 503

Konkoly Observatory
Budapest
1971 January 4

A LIKELY 15.5 YEAR APSIDAL MOTION PERIOD IN HS Her

The purpose of this note is to draw attention to HS Her, an eclipsing binary which seems to have an apsidal motion period of only 15.5 years. A complete discussion will be published later. Times of primary (and secondary) minimum observed in the next very few years could confirm this value. A 15.5 year apsidal motion period would be the shortest known, the shortest until now being the 25-year period of GL Carinae.

HS Her is ideal for observing. It is bright ($V=8^{m}.6$ at maximum); the orbital period is short and convenient ($P = 1^{d}.64$); the eclipses are brief ($D = 5^{h}$); and both minima are reasonably deep (ΔV pri = $0^{m}.50$ and ΔV sec = $0^{m}.15$).

All of the data available at this time can be satisfied only by the following ephemeris for primary minimum, with the sine term attributed to apsidal motion:

$$\text{Hel.JD} = 2\,437\,854.194 + 1^{d}.6374333\,E + 0^{d}.017 \sin(E/3450 - 360^{\circ})$$

These data include spectroscopic orbital elements (Cesco and Sahade 1944) and times of minimum, both published (Martynov 1940, 1951; Hall 1967) and unpublished (Hall and Hubbard 1970; Atkins and Devinney 1970; and Martynov 1970).

The above ephemeris predicts there should be no displacement of secondary minimum with respect to primary in the summer of 1971, when HS Her next becomes observable. But after that, for the next 7 or 8 years, secondary minimum should occur later than $0^{P}.50$.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 504

Konkoly Observatory
Budapest
1971 January 5

ON THE VARIABILITY AND PERIOD OF BH DRACONIS

The star BH Draconis (BV 344, HD 178001, BD+57°1942) was reported by W.Strohmeier and R.Knigge to be an Algol type variable with photographic range 0.6 magnitude and period $1^{d}.817232$. We observed it photoelectrically on 10 nights during June, 1968 with the No.3 16 in. telescope at KPNO. BV 344 is a visual double with separation of approximately 10 seconds of arc. With a small aperture it was possible to observe the two components separately and determine that the brighter of the two is the eclipsing binary. A complete primary and a complete secondary eclipse were observed and the time of primary eclipse has been used along with Strohmeier's initial epoch to determine a refined period.

Observed Minima

Minimum	Epoch	O-C	Observer
2425774,465	-7839	-0.000	Strohmeier
6439.610	-7473	+0.036	Strohmeier
6630.380	-7368	-0.004	Strohmeier
7624.402	-6821	-0.012	Strohmeier
7982.433	-6624	+0.023	Strohmeier
8460.315	-6361	-0.029	Strohmeier
8727.496	-6214	+0.018	Strohmeier
8965.552	-6083	+0.016	Strohmeier
9045.542	-6039	+0.048	Strohmeier
9352.631	-5870	+0.023	Strohmeier
40019.7882	0	+0.000	Burke
0397.7989	+ 208	+0.014	Burke

The elements are:

$$\text{Hel.Min.} = \text{JD } 2440019.7982 + 1^{d}.81723857 \text{ E}$$

During 12 nights of observation in June and July 1969 another primary minimum was observed and preliminary results indicate that the eclipse is total with totality lasting 32 minutes. Changes in the prime comparison star from 1968 to 1969 have delayed the completion of the light curve but work on the star is continuing.

December 23, 1970

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COMMISSION 27 OF THE I. A. U.
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NUMBER 505

Konkoly Observatory
Budapest
1971 January 9

THE SPECTRUM OF THE JULY 1970 SUPERNOVA IN M 101

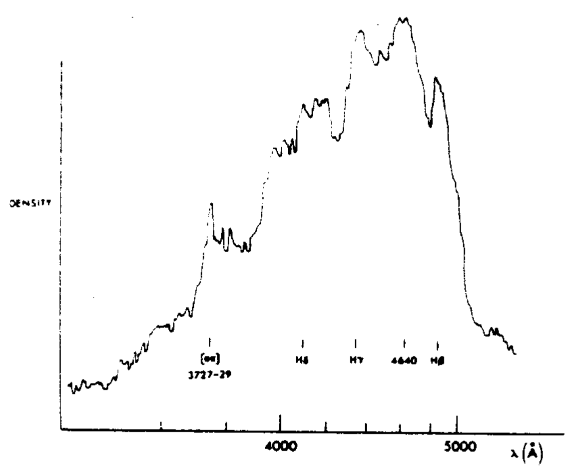
On the nights of August 5th and 6th, 1970, we obtained two well exposed spectra of the supernova in M 101 discovered by Lovas (I.A.U.C.2269). Two underexposed plates were taken later. All of the exposures (see Table for details) were made on blue-sensitive plates taken with the 60-90 cm Burrell Schmidt.

Exposure data for supernova plates

UT date 1970	exposure time	A/mm at Hγ	Remarks
Aug 5.07	12^m	1300	
Aug 6.07	30	580	
Aug 25.11	30	580	badly underexposed
Aug 26.11	30	580	faint

The Figure is a density tracing of the spectrum of August 6, in which the prominent emission features are identified.The spectrum is clearly that of a type II supernova, as all of the bands also appear in the spectra of ordinary novae. Although it is difficult to be quantitative, the gradient of the continuum energy distribution was clearly less than that of an F star used for comparison purposes. Changes in the appearance of the spectrum were not marked over the time interval covered by our data. There was only a general fading of about 0.5 to 1.0 magnitudes between the first and last plates, as estimated from a comparison with neighboring stars.

We have also measured the expansion velocity of the shell from the widths of Hβ and Hγ . Because of the small size of the spectrum and the rather low contrast, we have measured the widths in three ways: with a measuring engine, with an 0.1 mm scale, and with a ruler on the tracings. The results for Hβ are in good agreement, but those for Hγ show a spread of 50μ (out of 200μ). This scatter is no doubt due to the slow change of density on the red side of Hγ seen in the tracing. The seeing disc of the star has a negligible effect upon the true widths of these lines for all reasonable assumptions about the size of the seeing disc and the true line profile. Accordingly we have calculated an expansion velocity by simple averaging of the



measured widths. The mean velocity corresponding to the line half widths is 3700 km/sec with a formal standard deviation of 130 km/sec.

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Case Western Reserve University,
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COMMISSION 27 OF THE I. A. U.
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Konkoly Observatory
Budapest
1971 January 18

HBV 476

By photoelectric observations with the 60 cm reflector the star BD +60.2321 (= AGK_2 +60.1430 = HD 208960 (GO)) formerly suspected to be variable by WACHMANN (unpublished) turned out to be a new bright variable of Delta Cephei type. The derived amplitude is $0^m.6$ in B and $0^m.5$ in V, the maximum brightness being $8^m.3$ and $7^m.4$ in B and V respectively.

The following preliminary elements can be quoted

$$\text{Max} = 244\ 0935.51 + 2^d.11391 \cdot E$$

The UBV observations of HBV 476 will be continued.

P. KLAWITTER
Hamburger Sternwarte
Germany

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 507

Konkoly Observatory
Budapest
1971 January 18

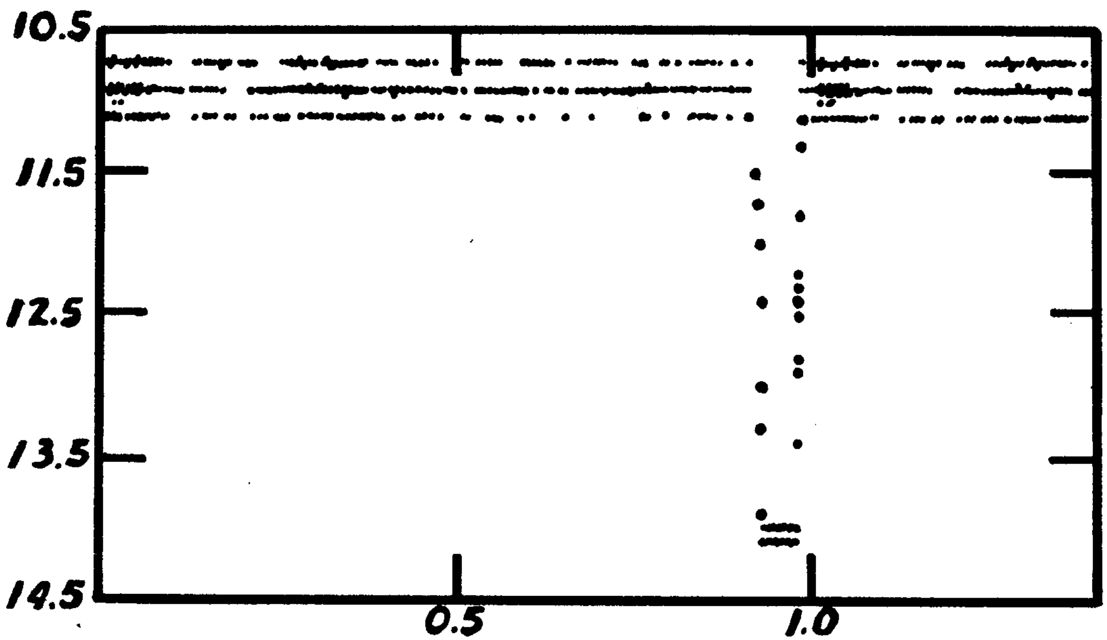
A NEW ECLIPSING BINARY IN SAGITTARIUS

An eclipsing binary at $18^h 01^m 25^s$ and $-28° 25'.1$ was discovered at the Maria Mitchell Observatory using the positive-negative method. Approximately 800 Nantucket and Harvard plates taken between JD 2425847 and JD 2440815 were used to determine the period. MIN = 2430094.536 + 30.636 N satisfied all of the observations (Figure 1). The duration of the eclipse is 1.225 days. No secondary minimum was observed. The star is magnitude 10.9 (pg.) at maximum and 14.1 during an eclipse. The magnitudes were derived from Harvard-Groningen Selected Area 158 and the Harvard variable star sequences in VSF 193.

I am indebted to the U.S. National Science Foundation for the grant to the Maria Mitchell Observatory supporting this work.

January 8, 1971

MARCIA J. KEYES
Nantucket, Massachusetts


10.5
11.5
12.5
13.5
14.5
0.5
1.0

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Budapest
1971 January 20

PHOTOELECTRIC MINIMA OF ECLIPSING VARIABLES

In the table are given minima of eclipsing binaries obtained photoelectrically at the Bucarest Astronomical Observatory in 1970. The (O-C)-s were computed with elements from the "Rocznik Astronomiczny 1969"

Obs. min. J.D.hel	E	O-C	n	Observer
W UMa				
2440652,4104	12111	-0^{d}0006	37	Minti H.
44i Boo				
700,3943	12452	+0,0227	23	Dumitrescu Al.
RX Her				
736,4415	4698	0,0000	29	Dumitrescu Al.
777,3520	4721	-0,0009	16	Hinti H.
566 Oph				
820,3490	13609	+0,0005	24	Dumitrescu Al.
502 Oph				
719,4714	2381	-0,001	46	Minti H.
778.4110	2511	-0,002	17	Dumitrescu Al.
U Oph +				
831.4001	11526	-0,0051	14	Dumitrescu Al.
843,3929	11558	-0,0053	26	Dumitrescu Al.
836 Cyg				
836,3129	21868	-0,0009	31	Dumitrescu Al.
DR Vul				
845,3566	44170	+0,019	26	Ganea M.
AB And				
842,3655	14260	+0,0042	36	Dinescu R.
846,3487	14772	+0,0047	46	Minti H.
855,3094	14299	+0,0043	12	Dinescu R.
WW Aur				
885,4635	1700,5	-0,0027	33	Dumitrescu Al.

\+ (O-C)-s were computed with the elements given by Binnendijk (AJ 74, no.2)

MAXIMA OF RR LYR TYPE STARS

Obs. max. J.D.hel	E	O–C	n	Observer
VZ Cnc				
2440622,3014	10086	+0ᵈ0069	28	Dumitrescu Al.
676,3384	10389	–0,0042	21	Dinescu R.
677,4203	10395	+0,0076	18	Minti H.
686,3272	10445	–0,0037	19	Dinescu R.
694,3473	10490	–0,0100	36	Dumitrescu Al, Dinescu R.
890,5484	11590	–0,0092	51	Dumitrescu Al.
XZ Dra				
769,5196	3690	+0,0370	51	Minti H.
844,3354	3847	+0,0370	42	Dinescu R.
853,3875	3866	+0,0357	28	Minti H.
SZ Lyn				
664,4239	20858	+0,0092	21	Minti H.

January 10, 1971

C. POPOVICI

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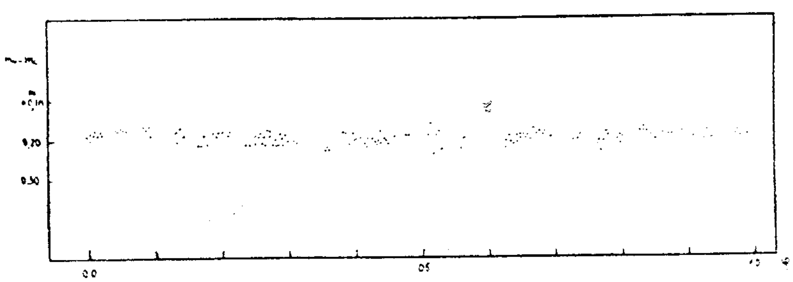
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 509

Konkoly Observatory
Budapest
1971 January 20

ABOUT THE VARIABILITY OF THE ECLIPSING VARIABLE STAR NQ HER

In 9 nights in the period of April-September 1968 observations were obtained on the variability of the eclipsing variable star NQ Her using the photoelectric photometer of the Bucarest Astronomical Observatory. The 277 observations indicated no variability. For comparison the star BD +18°3580 ($7^m_.9$) has been used



The figure presents our observations with the period P = $0^d_.870218$ given in the GCVS.

January 10, 1971

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 510

Konkoly Observatory
Budapest
1971 January 21

PROCEDURAL CHANGES FOR USERS OF THE IAU(27). RAS FILE OF PHOTOELECTRIC OBSERVATIONS OF VARIABLE STARS

As announced by Dr. G.H.Herbig in IAU Information Bulletin No.18, the Library of the Royal Astronomical Society maintains, in cooperation with Commission 27, a file of unpublished photoelectric measurements of variable stars.In brief, the first fourteen files are IAU(27).RAS--

1. 3433 UBV measures of V Sge by Herbig, Preston, Smak, and Paczynski.
2. About 2390 U measures of AE Aqr by Walker.
3. About 990 uby measures of BD+14°341 by Smak.
4. 2726 U measures of Nova WZ Sge by Krzeminski.
5. 508 UBV measures of HD 116994 by Chambliss.
6. About 6500 UBV measures of Nova Z Cam by Krzeminski and Mumford.
7. About 3370 yellow and white measures of EX Hya by Krzeminski.
8. 1191 BV measures of AU Pup by Chambliss.
9. About 1200 uby measures of HR 7484 by Koch.
10. 1167 blue measures of 16 Lac by Walker.
11. Measures of EM Cyg by Mumford and Krzeminski.
12. UBV measures of SX Ari, CU Vir, HD 173650, and χ Psc by Blanco, Catalano, and Godoli.
13. 964 BV measures of TT Lyr, AD Her, and RV Oph by Walter
14. 630 UBV measures of HD 199757 by Chambliss.

A second depository for these files is being instituted in Odessa, for the convenience of Eastern European astronomers. Copies of specific whole files (not partial files) may be obtained at cost by writing to either

Dr. E.W.Maddison, Lobrarian
Royal Astronomical Society
Burlington House
London, W.1., England

or

Dr. V.P.Cesevič
Astronomical Observatory
Park Shevchenko
Odessa, U.S.S.R.

New material for deposit in these archives should not be sent directly to the R.A.S., but rather a duplicate copy should be sent to Dr. Cesevic and the original copy to Dr. W.S.Fitch, Steward Observatory, University of Arizona, Tucson, Arizona 85721, U.S.A. for assignment of the file number and forwarding to the R.A.S. New files may be of any length, but must be typewritten or handwritten in black ink on sheets smaller than 10x15 inches (25.4x38.1 cm). Each copy must have a cover sheet giving a brief description of the tabular contents. Questions regarding the detailed operation of the depository service should be addressed to me, as successor to Dr. Herbig in supervising the file.

January, 1971

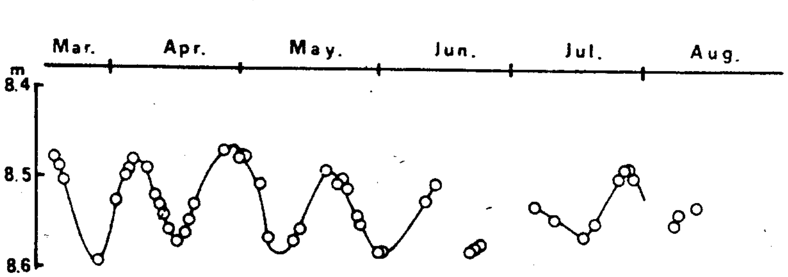
WALTER S. FITCH
Steward Observatory

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 511

Konkoly Observatory
Budapest
1971 January 23

THE LIGHT CURVE OF RU CAMELOPARDALIS DURING THE PERIOD OCTOBER 1969 - AUGUST 1970

These V observations continue the series of photoelectric measures obtained at Merate during the period December 1966 - July 1967 (Merate Contr. 318) and November 1967 - August 1968 (Mem. Soc. Astron. Ital. 39, 533, 1968).



After the recovering of its periodic variation in September 1968 and the subsequent progressive amplitude reduction with the minimum in April, May, 1969 (B.Szeidl, Commission 27 Circular N°385) we see that the cyclical variation of the light amplitude continues. It reaches its maximum in October 1969, afterwards it decreases againt to the minimum during the late summer 1970.

Merate Observatory
January 14, 1971

P. BROGLIA
G. GUERRERO

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 512

Konkoly Observatory
Budapest
1971 January 28

A LONG-PERIOD ECLIPSING BINARY

MMO 705 at $18^h\ 45^m.0$, $-8^\circ\ 35'$ (1900) was observed on 149 24-inch Bruce plates by V.M.Swain and on 47 48-inch Palomar Schmidt plates by L.J.Robinson. These yielded only three minima, indicating an eclipsing star of long period. Several hundred Harvard patrol plates were then examined to establish the period. All minima are given in the table, together with O-C's computed from these elements:

Hel. JD = 2,427,805.94 + $31^d.9384$ E.

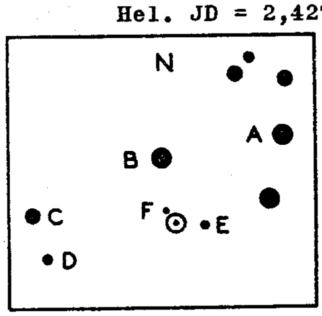


Fig.1

Photographic magnitudes of the comparison stars identified in Fig. 1 (4' by 3½' in size) were derived from photoelectric standards: A, 12.14; B, 13.03; C, 13.91; D, 14.23; E, 15.01; F, 15.60. Means of magnitude estimates are plotted in Fig. 2, the large dots representing more than five observations. In the phase interval 0.57-0.66, some individual estimates are also included.

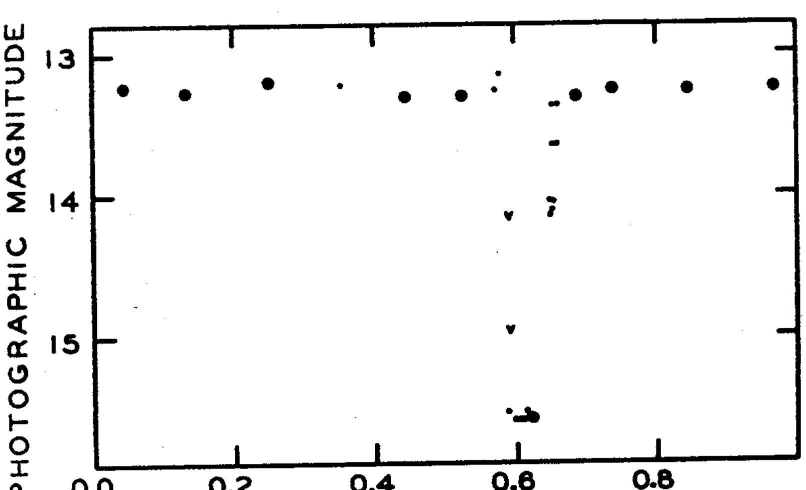


Fig.2

JD	E	O-C	Camera	JD	E	O-C	Camera
2420300.77	-235	+0.35	MC	2429849.64	+ 64	-0.36	BM
25889.53	- 60	-0.11	MC,RH	30521.56	+ 85	-0.14	RB
26177.49	- 51	+0.41	MF	30553.32	+ 86	+0.68	RB
26208.43	- 50	-0.59	MF	30872.62	+ 96	+0.59	A
26240.35	- 49	-0.61	MF	30999.26	+100	-0.52	RB
26815.60	- 31	-0.25	MF,RB	31670.40	+121	-0.09	RB
27933.82	+ 4	+0.13	RH	32021.57	+132	-0.24	RB
28700.74	+ 28	+0.52	BM	32054.24	+133	+0.49	RB
28731.59	+ 29	-0.56	A	32404.66	+144	-0.41	RH
29434.57	+ 51	-0.23	RB	33938.28	+192	+0.17	RB
29466.41	+ 52	-0.33	RB	35279.86	+234	+0.33	PS
29818.68	+ 63	+0.62	BM				

A 24-inch Bruce, BM 3-inch Ross-Lundin, RB 3-inch Ross-Fecker, RH 3-inch Ross-Fecker, MC 16-inch Metcalf, MF 10-inch Metcalf, PS 48-inch Palomar Schmidt.

The photographic range of MMO 705 was found to be 13.3-15.6. The eclipses last about 3¼ days with about 1½ days of constant light at mid-minimum. These durations are somewhat uncertain due to poor distribution in phase of the plates.

For the length of its period, this star is notable for the long duration of primary eclipse and of mid-minimum.

L.J. ROBINSON
M. HARWOOD

Cambridge, Mass. USA

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 513

Konkoly Observatory
Budapest
1971 January 30

TIMES OF MAXIMUM FOR MIRA VARIABLES

During an investigation by one of us (T.G.B.) of the near infrared photometric properties of Mira variables, photoelectric light curves were obtained near maximum for a large number of Miras during the period July 1968 - June 1970. Times of maximum visual light were determined from all suitable light curves. These times of maximum may be useful to others for predicting future maxima as well as for computing phases of observations taken in the recent past. Table I gives the Julian Date of the maximum in the V light curve and the period (1) for each variable. The accuracy of the determinations is typically ±0.03 in phase. A colon denotes those dates reliable between ±0.05 and ±0.10 in phase and a double colon those reliable only to ±0.10 in phase.

Table I

STAR	PERIOD	JD-2440000
T Cas	$445^{d}.0$	600
R And	409.2	229
Y Cep	332.62	466
U Cas	277.59	476
RW And	429.27	469
W Cas	405.0	555:
X Psc	352.6	216
UZ And	314.36	447:
RZ Per	353.52	545
R Psc	344.14	432:
SX And	334.6	234
Y And	220.42	229:
U Per	320.63	252
o Cet	331.62	120
	331.62	465
R Cet	166.23	441:
RR Per	390.14	264
R Tri	266.40	[illegible]
U Ari	371.44	[illegible]
	371.44	[illegible]
Y Per	252.30	239::
R Tau	324.34	125:
T Cam	373.98	150
RX Tau	335.06	647:
X Cam	143.40	218

Table I (Continued)

STAR	PERIOD	JD-2440000
S Boo	270.69 d	87
	270.69	336
R Cam	269.70	478
R Boo	223.34	283
RR Boo	194.62	110
	194.62	324
Y Lib	274.74	703
S CrB	360.68	259
S UMi	326.16	327
X CrB	240.87	95
	240.87	346:
R Her	318.45	315
U Ser	238.2	431:
	238.2	671
RU Her	484.46	96
U Her	406.02	94
S Oph	233.53	379:
T Oph	366.98	391
SS Her	107.30	440
W Her	279.76	340
R Dra	245.55	84
	245.55	330::
S Her	307.40	466
SS Oph	180.14	387
SY Her	116.9	437
	116.9	674
RT Her	298.49	353:
Z Oph	348.49	479
RS Her	219.46	114
	219.46	331
RU Oph	202.39	445
T Dra	421.67	116
RY Her	221.37	340
V Dra	277.63	285:
T Her	165.00	372
	165.00	707
W Dra	262.1	489:
RY Oph	150.49	92
	150.49	393
TV Her	303.49	357
W Lyr	196.40	334
BC Oph	306.97	435
SV Her	239.38	404
T Ser	340.3	424
X Oph	334.22	124
	334.22	458
RY Lyr	325.71	461
ST Sgr	395.21	460
R Aql	300.3	333
V Lyr	373.61	352:
U Dra	317.31	520

Table I (Continued)

STAR	PERIOD	JD-2440000
V Tau	169.^{d}80	217
W Aur	274.46	694
S Ori	416.33	215
	416.33	636
RU Aur	467.70	656
Z Tau	494.13	640
X Aur	163.93	635
V Aur	353.59	[illegible]
V Mon	334.69	231
U Lyn	436.03	319
S Lyn	297.71	221
X Gem	263.47	621
Y Mon	230.90	637
R Lyn	378.61	242
R CMi	337.93	638
RR Mon	393.45	285
S CMi	332.20	220
S Gem	293.63	659
T Gem	287.61	701
R Cnc	362.06	231
V Cnc	272.14	228
U Cnc	304.99	316
	304.99	639
X UMa	248.95	707
S Hya	256.71	665
Y Dra	325.81	230
RS Leo	208.0	637
R LMi	372.34	225
S LMi	234.10	368:
V Leo	273.42	246
S Sex	262.9	619
RU UMa	252.44	383
	252.44	633
R Com	362.20	238:
SU Vir	210.16	326
T Vir	339.24	277
R Crv	316.74	244:
SS Vir	354.66	263
	354.66	653
Y Vir	218.68	339:
T UMa	256.88	481
R Vir	145.61	309
RS UMa	259.59	314
U Vir	206.78	394
V Vir	249.67	664
RR UMa	230.68	382
R CVn	328.17	290
Z Boo	281.23	245
Z Vir	306.64	348
	306.64	661
U UMi	326.48	460

Table I (Continued)

STAR	PERIOD	JD-2440000
R Sgr	268^{d}.56	406
S Sgr	230.71	468
U Lyr	457.34	688
RT Aql	327.13	715
R Cyg	426.32	326
RV Aql	218.72	437:
RT Cyg	190.44	407:
X Aql	347.55	453
Z Cyg	263.77	411
WX Cyg	410.60	480
CN Cyg	198.58	410:
U Cyg	464.69	354:
ST Cyg	336.01	417
S Del	277.22	104
V Cyg	421.27	680
X Del	281.29	423
RS Aqr	214.89	431
T Cep	389.27	255
	389.27	622
WY Cyg	303.90	579
RT Peg	215.49	443
RV Peg	389.0	473
S Lac	239.98	429
SS Peg	416.4	136
	416.4	536
SZ And	343.78	476
RW Peg	208.62	455:
R Peg	377.53	204:
UZ Cep	297.1	654
RY Cep	148.96	648
R Aqr	386.92	467
WY Cas	477.4	472
R Cas	431.2	186
Z Peg	325.43	447

1. Kukarkin, B.V., Parenago, P.P., Efremov, Yu.I., and Kholopov, P.N. 1958, General Catalogue of Variable Stars (2d ed.; Moscow: Academy of Sciences of the U.S.S.R.).

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 514

Konkoly Observatory
Budapest
1971 February 8

NEW FLARE STARS IN THE PLEIADES OBSERVED AT ASIAGO FROM SEPTEMBER 1969 TO FEBRUARY 1970

The systematic searching of flare stars in the Pleiades which is still carried out at the Astrophysical Observatory of Asiago, has brought, in the fall and winter 1969-70, to the discovery of twenty-one flares and sixteen new flare stars. One-hundred and sixty plates (Kodak 103a-O or Oa-O, without filter), each with five successive exposures of five to eight minutes, covering a total time of observation of 93^h43^m, have been taken with the 67-90-215cm Schmidt telescope of Asiago. In Table I the flares are numbered from 32 to 52. Flares 1-13 have been published in a precedent paper by Rosino (Asiago Co. 189, 1966) and flares 14-31 in a paper by Rosino and Pigatto (Asiago Co.231,1969). Circumstances of the flares and identification charts will be reported in a forthcoming paper (Mem.Soc.Astr.Ital. Vol. XLI, No.4). The Table I gives coordinates, pg magnitudes at maximum and normal minimum, date of the flare and Catalogue number of the corresponding star when available. Most of the flare stars have an infrared (Kodak IN hypersens. + RG5) magnitude from 1.5 to 2.5 brighter than the blue.

It must be observed that, while the majority of the flare stars in the Pleiades, including those with large amplitude, have a time of decline not longer than 20-40 minutes or even less, we have found two stars (No.22 of the precedent list, corresponding to H 138) and No.48 of Table I which have shown flares having a time of decline of several hours. We report here the circumstances of the flare No.48, observed on Dec.2, 1969:

<u>Flare No.48</u>	UT 19^h41^m	13.3 pg	20^h42^m	14.7	21^h44^m	15.35
	49	13.5	50	14.8	57	15.45
	57	13.7	58	15.0	22 05	15.6
	20 05	14.0	21 12	15.1	13	15.6
	13	14.0	20	15.1	21	15.6
	26	14.3	28	15.2	29	15.6
	34	14.6	36	15.3	45	15.9
					53	15.9

The star is very weak in blue (m_{pg} 19) and even in infrared.

TABLE I - New Flares in the Pleiades Field observed at Asiago in 1969-70.

N	1900.0 RA	1900.0 D.	Magnitudes (pg)	Date (1969-70)		Ident.
32	3^h36^m 5"	+22° 37'9	13.3-18: ?	Sep	11	
33	40 54	24 54.3	16.8-17,5	"	15	
34	43 3	24 35.7	15.5-19:	"	16	
35	35 4	22 01.6	14.2-17.2	"	21	
36	46 54	25 00.9	16.6-19:	Oct	4	
37	50 15	25 12.1	15.7-(18	"	10	
38	39 16	22 44.2	15.7-18:	"	12	
39	41 42	24 09.1	16.1-19:	"	14	
40	41 2	22 56.6	15.3-16.5	"	15	
41	43 45	24 00.8	14.3-15.7	"	16	HII 2411
42	34 10	24 05.4	15.5-18:	"	17	
43	34 34	24 49.3	15.1-19:	"	17	Haro 102
44	44 00	25 05.8	13.2-14.7	"	19	" 108
45	43 19	23 45.5	13.7-16.5?	"	19	
46	49 42	22 30.8	14.8-16.1	"	21	
47	39 52	25 33.0	14.9-17.0	Dec	1	
48	42 15	26 1.8	13.3-19:	"	2	
49	41 08	23 18.4	14.8-16.4	"	29	HII 1286 Haro 16
50	45 56	23 45.1	13.3-18.5:	Jan	1	
51	43 45	24 00.8	14.5-15.5	Feb	3	HII 2411
52	31 58	22 22.3	14.5-(17.5	"	3	

January, 1971.

L. PIGATTO, L.ROSINO
Astrophysical Observatory of Asiago

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 515

Konkoly Observatory
Budapest
1971 February 8

A POSSIBLE FIFTH SUPERNOVA (1969) IN THE SPIRAL GALAXY NGC 6946

A new stellar object (Fig.1) of magnitude 13.9 pg has been observed by the writer 180" South and 5" West of the nucleus of the spiral galaxy NGC 6946 (RA $20^h33^m.9$; D.+59°58';1950.0) on two photographs taken with the 40-50-100 cm Schmidt telescope of Asiago on Dec.11, 1969 at UT 18^h28^m (Panchro Royal, 15^m) and 18^h46^m (103a-O,10^m). The object was discovered by comparing these plates with a recent pair of photographs, obtained with the same instrument and emulsions, on Dec.20, 1970.

The object was not visible on Dec 1, 1969, neither it was seen in earlier photographs or reproductions of NGC 6946. Schmidt films of Oct 24 and Dec 20, 1970 don't show any trace of it.

In principle, the possibility that the object may be a slowly moving asteroid cannot be ruled out, although its high declination and the absence of elongation or sensible motion on the photographs taken during the night of Dec 11, 1969 weaken this hypothesis. Moreover the star is well inside the galaxy NGC 6946, who is famous for having shown a high rate of appearance of supernovae. The four previously known are:

1917	A	37"	W	105"	S	14.6 pg
1939	C	215	W	24	N	13.0
1948	B	222	E	60	N	14.9
1968	D	45	E	20	N	13.5

The pg magnitude (13.9) of the new object does not disagree therefore with the magnitudes of the other supernovae found in this galaxy. Unfortunately, in the series of Asiago plates centered in NGC 6946 there is a gap of ten months from Dec 11, 1969 to Oct 24, 1970, during which no photographs were taken. Observations made during this period, and particularly on December-January 1969-70 would be of the utmost importance to decide whether a fifth supernova has appeared in this spiral galaxy or whether it was simply a passing asteroid or a field variable star.

NGC 6946

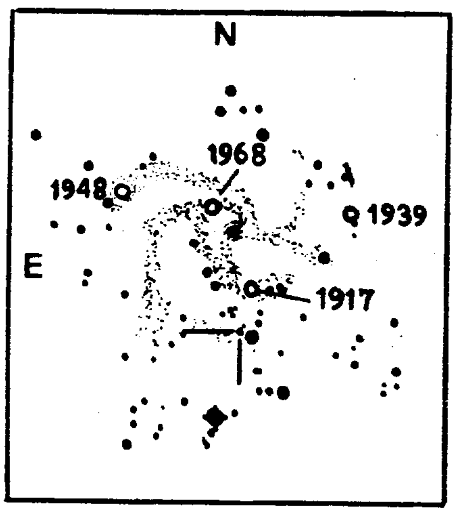

FIG.1

Fig.1 reproduces the identification chart of the object with the approximate positions of the other four supernovae. The new object is situated within the galaxy, over a faint extension of a spiral arm.

L. ROSINO

Astrophysical Observatory of Asiago

COMMISSION 27 OF THE I. A. U.

INFORMATION BULLETIN ON VARIABLE STARS

Number 516

Konkoly Observatory
Budapest
1971 February 8

PROGRAMME OF COOPERATIVE OBSERVATIONS OF FLARE STARS FOR 1971

The Working Group on Flare Stars after consultations with members announces programmes of cooperative optical observations in 1971.

Principal programmes

YZ CMi	January 16 – February 2
AD Leo	February 18 – March 4
EV Lac	September 11 – September 27
UV Cet	October 11 – October 27

Additional programmes

BD + 16° 2708	March 20 – April 2
V 645 Cen	April 18 – May 2
V 1216 Sgr	June 16 – June 30

X-ray observations of flare stars are planned by NASA ASE Group (IBVS 466). Unfortunately, sky coverage is restricted by spacecraft construction therefore it is impossible that periods of X-ray observations correspond to above-mentioned optical programmes where stars under consideration are in opposite to Sun. X-ray observation programmes: Orion flare star region centered on $\alpha = 5^h 34^m$ $\delta = -5°28'$ during February 16, 19 and 23; March 11, 13 and 16; YZ CMi March 15 to 20th; AD Leo April 13 to 18th.

Optical observers are asked to take part in these periods as well. Observatories and personal workers who were not participating in cooperative observations are requested to join our programmes if possible.

A.D. ANDREWS
Armagh Observatory

P.F. CHUGAINOV (Chairman)
Crimean Astrophysical Observatory

V.S. OSKANIAN
Bjurakan Observatory

E.M. KELLOGG
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 517

Konkoly Observatory
Budapest
1971 February 16

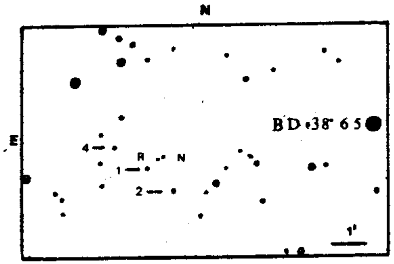
ON A POSSIBLE NOVA AT GREAT DISTANCE FROM THE CENTRE OF M 31.

Last year we reported on a possible nova (our No 5) found at great distance from the centre of M 31 (1). From the inspection of the corresponding region on plates obtained with the 48-inch Schmidt telescope on Palomar Mountain S.Van den Bergh recently concluded that the object No 5, recorded only on our plate of Aug. 19/20 1969, possibly refers to a flare of a faint red star found by him at the position of the suspected nova (2).

Indeed a faint star (evidently that one noticed by Van den Bergh) can be seen on the Palomar Observatory Sky Survey print of the red image plate E 398 of Oct. 3/4 1951 yet its position is slightly different from that shown in the note (1).

To check the suggested identity of these two objects the possible effect of the proper motion of the red star had to be excluded. From the measurements of the position of the red star relative to three neighbouring stars on the POSS print mentioned as well as on two photographs in yellow light obtained on Dec. 23/24 and 25/26, 1970 with the 80/120 cm Schmidt telescope of the Radioastrophysical Observatory of the Latvian Academy of Sciences it turned out that the position of the red star has not changed significantly since 1951. Besides the red star (noted R in finding chart) is situated 9" to the east and 3" to the south of nova No 5. Thus they are different objects.

Considering the great importance of the discovery of novae at enormous distance from the centre of M 31 we appeal once more to other observing astronomers who have obtained photographs about Aug.20 1969 which included the region of nova No 5, R.A. = $0^h29^m,4$, Decl. = $+39°02'$ (1950), to look them through in order to try to solve com-



pletely the question of the nature of the object. The position of the nova is 28" to the west and 19" to the north of the star noted by No 1 on the finding chart.

Sternberg Astronomical Institute
Moscow State University, Moscow
Radioastrophysical Observatory
Latvian Academy of Sciences, Riga
U.S.S.R.

A.S. SHAROV
A.K. ALKSNIS

References

1. A.S.Sharov, A.K.Alksnis. Astron. Circ. USSR, No 560, 1970.
2. S.Van den Bergh. Inform. Bull. Variable Stars, No 478, 1970.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 518

Konkoly Observatory
Budapest
1971 February 14

HBV 477
A NEW ECLIPSING VARIABLE IN THE CYGNUS - CLOUD

HBV 477 = BD + 29°3814 (9.5)
Sp.: BOV M_V = -4.40 (Neckel, Th. Heidelberg Ver. Bd. 19. 1967)

RA $19^h52^m39^s.28$ D +29°43'31".2 (1900.0)

HBV 477 was suspected to be an eclipsing variable by WACHMANN (unpublished) during his survey of the Cygnus-Cloud. All attempts to find the period of its light-changes failed. Therefore HBV 477 was put onto the program for photoelectric observations by the author and a total of 635 observations in B and V each was obtained from May 1969 until now.

Once again it took a year and a half until the period could be found, because only ascending branches of the minima were observed and these showed a large scattering.

The finally derived elements are together with their mean errors:

$$\text{Min.hel.} = 244\ 0371.4095 + 1^d.956\ 692\ 02 \cdot E$$
$$\pm 14 \qquad\qquad \pm 72$$

Table I gives the times of minima, the epochs and the O-C. The observations starting JD = 244 0366 are photoelectric observations while the prior ones are photographic.

Table I

O	E	O-C	O	E	O-C
243 2775.465:	-3882.0	-0.066	244 0371.401	0.0	-0.009
3506.322	-3508.5	- .034	0372.359	+ 0.5	-0.029
4133.479	-3188.0	+ .004	0373.358	+ 1.0	- .008
4134.474	-3187.5	+ .020	0467.263	+ 49.0	- .022
4626.548	-2936.0	- .014	0469.234	+ 50.0	- .010
4627.595	-2935.5	+ .055	0811.680	+225.0	+ .015
4628.522	-2935.0	+ .004	0812.658	+225.5	+ .014
4629.563:	-2934.5	+ .066	0824.405	+231.5	+ .021
5309.456	-2587.0	+ .009	0825.379	+232.0	+ .017
5360.310	-2561.0	- .011	0827.331	+233.0	+ .012
244 0366.493	- 2.5	- .025	0828.308	+233.5	+ .011
0369.435	- 1.0	- .018	0875.273	+257.5	+0.015
0370.415	- 0.5	- .016			

The total of 422 photographic observations obtained by WACHMANN was reduced to one revolution by the above elements. Table II gives the normals formed out of these 422 observations, n giving the number of single observations for each normal.

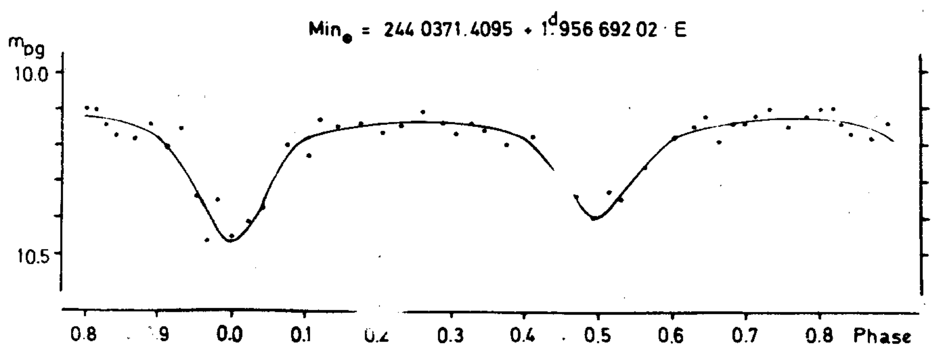
Table II

Phase	m_{pg}	n	Phase	m_{pg}	n	Phase	m_{pg}	n
0.0221	10.41	12	0.4149	10.18	10	0.7587	10.15	7
.0449	10.37	10	.4445	10.29	11	.7828	10.12	9
.0786	10.20	8	.4733	10.34	8	.8009	10.10	11
.1067	10.23	8	.4945	10.40	11	.8155	10.10	8
.1204	10.13	12	.5165	10.33	11	.8292	10.14	9
.1465	10.15	11	.5331	10.35	9	.8436	10.17	10
.1755	10.14	14	.5655	10.26	10	.8693	10.18	11
.2080	10.17	11	.6035	10.18	9	.8910	10.14	9
.2310	10.15	8	.6311	10.15	9	.9123	10.20	9
.2619	10.11	10	.6467	10.12	10	.9337	10.15	7
.2895	10.14	9	.6641	10.19	8	.9547	10.34	8
.3074	10.17	10	.6821	10.14	10	.9673	10.46	7
.3276	10.14	10	.6989	10.14	9	.9819	10.35	6
.3453	10.16	12	.7131	10.12	11	0.9999	10.45	11
0.3776	10.20	11	0.7330	10.10	8			

The mean light-curve is given in the figure.

HBV 477 shows the following light-changes:

Max I: $10^m_.13$ Min I: $10^m_.47$ Type: EB
II: $10^m_.12$ Min II: $10^m_.40$



The normals show a relative large scattering around the mean light-curve. This is caused by:

1. the small amplitude of the overexposed star
and 2. the vicinity to the edge of the plates.

HBV 477 will be further observed at Hamburg Observatory with the 60 cm photoelectric telescope in U, B and V. Orbital elements will be calculated later on.

The photoelectric observations were partly carried out at Stephanion, Greece, where a 38 cm photoelectric telescope was placed by a NATO-grant.

Hamburger Sternwarte
Germany

H. BOSSEN

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 519

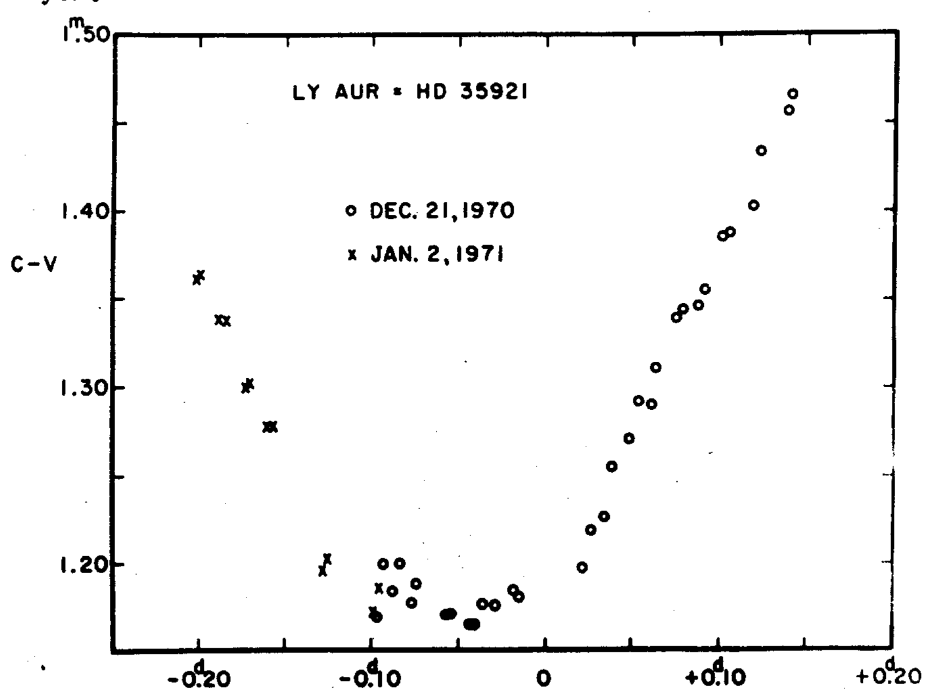
Konkoly Observatory
Budapest
1971 February 18

Rosemary Hill Observatory, Department of Physics and Astronomy, University of Florida, Gainesville, Florida, Contribution No. 20

A NOTE ON LY AURIGAE = 35921

In 1968, Pavel Mayer (1) announced that HD 35921 was an eclipsing variable with two deep eclipses and that both spectra were visible. He pointed out that it had the largest amplitude of light variation among brighter eclipsing stars of spectral-type O and thus would be important for determining absolute dimensions.

This system has now been observed photoelectrically in three colors using the 30-inch reflector of the Rosemary Hill Observatory of the University of Florida. The light curve near the bottom of primary is shown as determined from observations on two nights. The observations shown were taken with a yellow filter on the natural scale of the telescope-photometer combination; they are very close to the usual V system but have not yet been put on that system. The comparison star was HD 35619 which was also used by Mayer.



The most interesting feature is the existence of a total (or annular) phase of approximately three hours duration. Observations on other nights agree with those shown but suggest variation of a few hundredths of a magnitude on a time scale of a few hours. Comparison-check readings suggest that the variations are in the variable rather than the comparison star which has been rather carefully checked by Mayer.

The primary minima occur about one hour earlier than those predicted from Mayer's published elements, JD 243 9061.48 + $4^{d}.0026$, and are much more in accord with unpublished ones supplied by him, JD 243 9061.464+$4^{d}.00251$. For predictions in the near future, I suggest:

Pr. Min. = JD 244 0942.649 + $4^{d}.002521$.

S. Rucinski has called my attention to the fact that the colors published by Mayer indicate the star is appreciably reddened. LY Aur lies only about 1/3 degree from the open cluster NGC 1907. If fitted to the color-magnitude diagram of the cluster as given by Gretchen L.Hagen's "Atlas of Open Cluster Colour Magnitude Diagrams" (2) using Mayer's values of V and B-V, the star falls close to, but slightly to the right of, an extension of the upper main sequence; if we correct the V to allow for the fact that we are dealing with a double star, the agreement as anticipated is much closer. The color excess, E_{B-V} as computed from the measures listed by Mayer is approximately $0^{m}.49$; that listed in the Hagen catalogue is 0.42. The question of its membership in this cluster should be investigated further.

1971, February 9

FRANK BRADSHAW WOOD

Rosemary Hill Observatory
University of Florida

References:

(1) 1968, Publ. Astr. Soc. Pacific 80, 81.
(2) 1970, Publ. of the David Dunlap Observatory, Vol. 4.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 520

Konkoly Observatory
Budapest
1971 February 22

ON THE CAUSE OF PERIODICAL LIGHT VARIATIONS OF SOME RED DWARF STARS

At least three red dwarf stars are at present known which show periodical light variations. Although all three are spectrum binaries the light variations are definitely not due to eclipses. The name of these stars, V magnitude at minimum, amplitude and period of light variation, absolute magnitude M_V and spectral class are given in the Table.

Name	V_{min}	ΔV	Period	M_V	Sp
BY Dra	8.4	0.2	3ᵈ84	7,6	K6Ve
CC Eri	8.7	0.3	1.56	8.4	K7Ve
FF And	10.4	0.06	2.17	8.7	dM0e

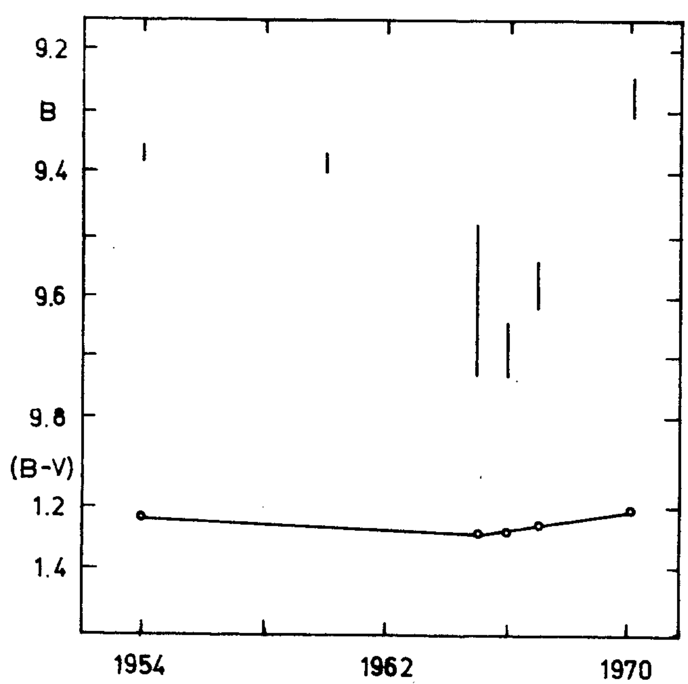
The photometric behaviour of these stars has been studied by Evans, Chugainov and Krzeminski (1-4). It has been found that the essential common features of them are irregular variations of the amplitude and phase of the light curve. Another important feature is the small amplitude of colour variations. The change of the (B-V) colour during one observatiohal season usually does not exceed the errors of observation. Changes of the (U-B) colour are not negligible but these, probably, reflect the presence of some small flare activity not unusual for red dwarfs.

The existence of irregular variations of phase and amplitude is the main argument contra the eclipse hypotheses. Beside these, as was found by Evans and Kraft, the duration of the minimum in the case of eclipse would be much shorter than observed because the separation of the components is at least 10 times their radii.

Krzeminski (4) has shown that the interpretation of light variations by radial pulsations is not acceptable because the periods are two order of magnitude greater than those which were obtained on the base of the theory of red dwarfs.

The interpretation suggested by us (3) and developed by Krzeminski (4) is that the observed light variations are caused by the presence of a spot on the surface of a rotating star. In order to obtain the observed amplitude of light variation it is necessary to suppose that the area of such a spot is about 10 percents of the stellar surface and its effective temperature differs by several hundreds degrees from the temperature of the rest of the surface.

Adopting this interpretation, one wants to know whether the spot is bright or dark. The comparison of light and colour variations in the case of BY Dra is interesting in this respect. Plotted on Figure I for six observational seasons are the upper and the lower limits of the B magnitude connected by vertical lines and the mean values of the (B-V) colour (dots). We have obtained these data from photoelectric observations obtained by us and other observers (3-5) in the period of 1954-1970. One finds from these graphs that the (B-V) measures range from + 1.20 to + 1.24. In 1965-1966 the star was the reddest, the amplitude of light variations the largest and the mean light reached the minimum. In order to explain such a behaviour



of the star it is reasonable to suppose that the non-uniformity of the surface brightness was the largest in 1965-66 and it was due to a decrease of the effective temperature of the disturbed area.

P.F. CHUGAINOV

Crimean Astrophysical Observatory
U.S.S.R. Academy of Sciences

(1) D.S.Evans, Monthly Notices of the RAS, 119, 526, 1959.
(2) D.S.Evans, Monthly Notes of the ASSA, 23, 68, 1964.
(3) P.F.Chugainov, I.B.V.S., No.122, 1966.
(4) W.Krzeminski, In "Low-Luminosity Stars", p.57, Gordon and Breach, 1969.
(5) A.Masani, P.Broglia, E.Pestarino, Contr. dell'Osserv. Astron. di Milano-Merate, Nuov, Ser., No.59, 1955.

Editor's note:

The continuous observation of Chugainov's stars would be extremely important because diagrams like that on the opposite page may reveal the existence of cycles similar to the solar cycle in these stars.

L. DETRE

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 521

Konkoly Observatory
Budapest
1971 February 22

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR YZ CMI DURING THE 1971 JANUARY 15 - FEBRUARY 2 INTERNATIONAL PATROL

The photoelectric observations of the flare star YZ CMi were carried out in the period of January 15 - February 2, 1971. The photometer attached to the 64-cm meniscus telescope and equipped with a blue BG-12 filter and EMI 6256 photomultiplier was used. The total time of continuous monitoring was 52.5 hours.

The moments of the beginning and the end of continuous monitoring are given in Table I. Table II contains the characteristics of the flares observed: time of maximum, durations before and after the maximum, relative errors of observation, integrated intensities and air masses. We follow the notations proposed by Oskanian (IBVS No.488). The light curves of flares are presented on figures.

P.F. CHUGAINOV
N.I. SHAKHOVSKAYA
Crimean Astrophysical Observatory

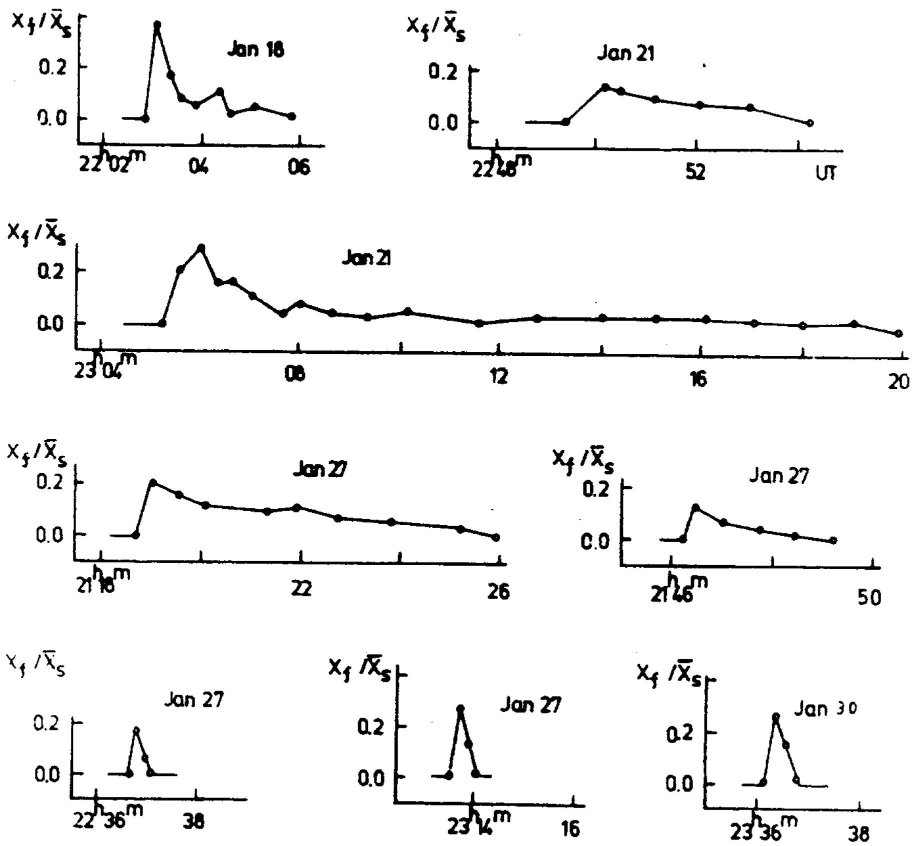
G.N. ALEKSEEV
Rostov State University

Table I

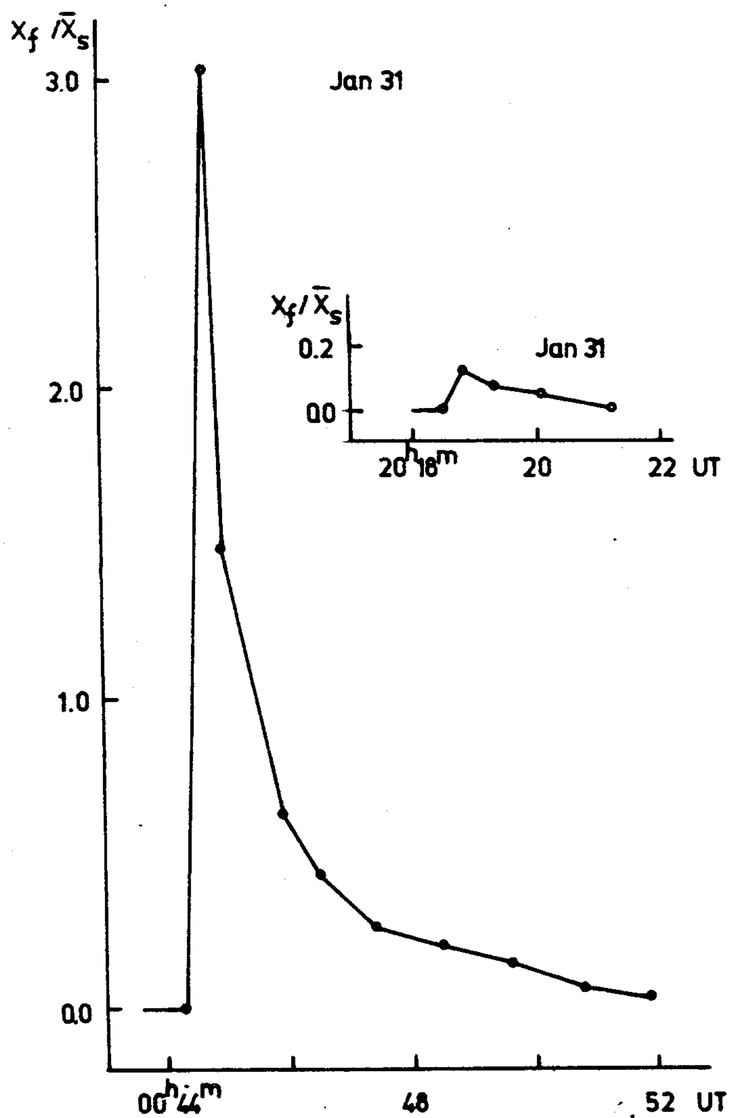
Date	Coverage (UT)
Jan.15	17 07–17 32, 17 48–17 57, 18 00–18 57, 19 13–19 37,
	19 38–19 49, 19 51–20 17, 20 20–21 04, 21 06–22 04,
	22 06–22 31, 22 32–22 41, 22 59–23 30, 23 32–24 00
Jan.16	00 00–00 07, 00 10–00 27, 00 28–02 00, (02 03–03 00),
	17 26–19 37, 19 39–20 08, 20 10–20 44, 20 46–21 24,
	21 26–22 30
Jan.18	18 47–19 52, 19 53–22 50, 22 54–23 27, 23 29–23 32,
Jan.20	22 17–22 56, 23 01–24 00
Jan.21	00 00–00 09, 19 08–19 19, 19 21–19 59, 20 00–20 32,
	20 33–23 21, 23 23–24 00
Jan.22	00 00–01 34, 01 39–01 46, 01 47–01 53, 21 15–21 52,
	22 21–23 38
Jan.25	18 47–19 56, 20 00–20 48, 20 49–21 34, 21 37–22 43,
	22 47–23 47, 23 48–24 00
Jan.26	00 00–01 34
Jan.27	(16 16–16 26, 16 29–18 21), 18 22–18 43, 18 44–19 19,
	19 25–19 51, 19 53–19 59, 20 01–20 17, 20 18–20 53,
	20 58–21 02, 21 10–23 07, 23 09–24 00
Jan.28	00 00–01 14
Jan.30	17 45–17 47, 17 49–18 31, 18 32–19 01, 19 04–19 18,
	19 19–20 43, 20 45–24 00
Jan.31	00 00–01 30, 18 23–18 41, 18 45–20 37, 20 43–22 31,
	22 36–23 40, 23 44–24 00
Feb.1	00 00–00 08

Table II

Date 1971 Jan.	UT_{max}	t_b minutes	t_a minutes	$X_{fm}/\bar{X}_s$	$\sigma/\bar{X}_s$	P minutes	F(z)	Remarks
18	22 03.1	0.2	2.7	0.37	0.042	0.26	1.34	
21	22 50.2	0.8	4.1	0.14	0.037	0.32	1.42	Possible flare
21	23 06.0	0.7	14	0.30	0.037	0.80	1.46	
27	21 19.1	0.3	7.0	0.21	0.030	0.60	1.33	
27	21 46.5	0.2	2.8	0.13	0.042	0.13	1.35	Possible flare
27	22 36.8	0.1	0.3	0.17	0.042	0.03	1.44	
27	23 13.8	0.2	0.3	0.27	0.036	0.06	1.57	
30	23 36.4	0.2	0.5	0.26	0.045	0.09	1.74	
31	00 44.6	0.3	7.3	3.03	0.054	3.39	2.61	
31	20 18.8	0.3	2.4	0.12	0.041	0.16	1.34	Possible flare



Xf/X̄s
Jan 18
0.2
0.0
22h02m
04
06
Xf/X̄s
Jan 21
0.2
0.0
22h48m
52
UT
Xf/X̄s
Jan 21
0.2
0.0
23h04m
08
12
16
20
Xf/X̄s
Jan 27
0.2
0.0
21h18m
22
26
Xf/X̄s
Jan 27
0.2
0.0
21h46m
50
Xf/X̄s
Jan 27
0.2
0.0
22h36m
38
Xf/X̄s
Jan 27
0.2
0.0
23h14m
16
Xf/X̄s
Jan 30
0.2
0.0
23h36m
38



$X_f/\bar{X}_s$
3.0
2.0
1.0
0.0
Jan 31
$X_f/\bar{X}_s$
0.2
0.0
Jan 31
20h18m
20
22 UT
00h44m
48
52 UT

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 522

Konkoly Observatory
Budapest
1971 February 22

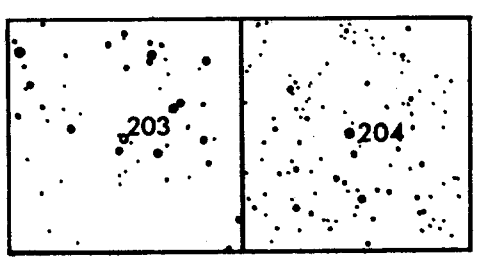
TWO NEW VARIABLE STARS

Two new variable stars have been discovered on plates taken with a 25 cm telescope in Lyra and Lacerta.

GR 203: The coordinates of this variable are:
R.A. (1950) = $18^h\ 51^m\ 45^s$ D.(1950) = +35°52'
This star is probably a cepheid (13.8 - 15.2 mpg).

GR 204: Very likely a Mira star (14.1 - <15.5 mpg) with the following coordinates:
R.A. (1950) = $22^h\ 13^m\ 39^s$ D.(1950) = +40°11'

Fig.1 gives the identification charts for the new variables (North in the top, side 20').



G. ROMANO
M. PERISSINOTTO

Instituto di Astronomia
dell'Università di Padova

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 523

Konkoly Observatory
Budapest
1971 February 23

PHOTOELECTRIC OBSERVATIONS OF YZ CMi

Photoelectric monitoring of YZ CMi was carried out at the Byurakan Observatory with the 50 cm reflector in the time interval January 16 - February 2, 1971, as proposed by the "working group". The observations were made with a standard B Filter.

The observational data are summarized in Table I. They are presented in the form proposed in IBVS 488.

TABLE I

Date UT 1971	Coverage UT	UT_{max}	t_b	t_a	$\frac{X_{fM}}{\bar{X}_s}$	$\frac{\sigma}{\bar{X}_s}$	P	F(z)	Remark
Jan. 21	1740-2019 2021-2100					0.072			1
28	1935-2200 2210-2300	$21^h9^m.3$	0.8	35.5	22.4	0.158	102.0	1.30	2
29	1732-2239					0.080			
Feb. 1	1700-2210	21 29.1	1.6	14.9	2.9	0.103	20.8	1.35	

Total coverage: lolo minutes.

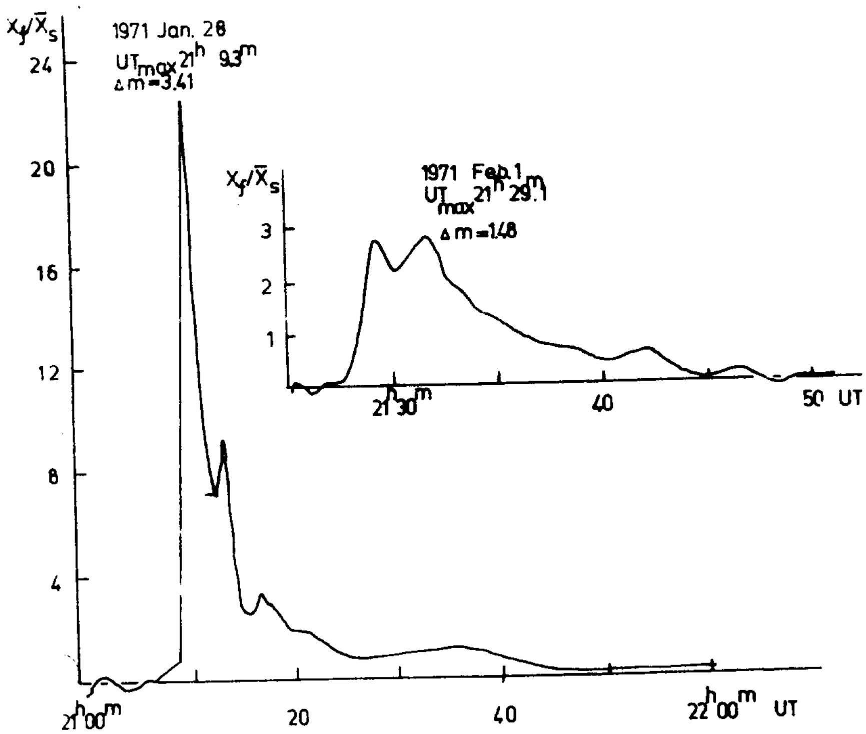
Remarks:

1.- The rather great values of $\sigma/\bar{X}_s$ are due to the fact that all the observations were effectuated under very poor weather conditions.

2.- The light curves of flares are presented in the figures. The ordinate is given in the units of $X_f/\bar{X}_s$.

V.S. OSKANIAN

Byurakan Observatory
USSR



Correction to IBVS No.503 (HS Her):

The last term in the equation should read:

$$+0\overset{d}{.}017 \sin (360° E/3450)$$

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 524

Konkoly Observatory
Budapest
1971 February 26

YZ CMi

A photoelectric monitoring of the flare star YZ CMi was done with the 91^{cm} reflector of the Okayama Station from 20 to 31 January 1971.

During the 34.5 hours of monitoring in the magnitude B, 20 flares were observed as shown in the following Table.

$$\Delta m(B) = 2.5 \log (I_{o+f_{max}}/I_o)$$

$$P = \int (I_{o+f}-I_o)/I_o \, dt$$

$$\sigma(mag) = 2.5 \log (I_o+\sigma)/I_o$$

Tokyo Astronomical Observatory
17 February 1971.

K. OSAWA
K. ICHIMURA
K. OKIDA
H. KOYANO

Flares of YZ CMi observed at Okayama, 20 to 31 January, 1971.

Date 1971	Time of Monitoring(UT)	Time of max.(UT)	Flares $\Delta m(B)$	P	Duration	σ
Jan. 22	13h29m-15h20m	14h07m.2	0.14mag	0.2min	3min	0.05mag
	16 28 -19 07	18 00.4	0.64	2.3	11	0.05
23	10 46 -15 51	11 31.6	0.18	0.14	5	0.05
		14 31.0 14 45.2	0.27 0.37 }	2.6	23	0.05
	16 05 -19 26					
25	13 08 -19 10	14 36.4	0.44	1.3	23	0.05
		16 18.6	0.26	0.5	12	0.04
		17 35.8	0.29	0.3	10	0.04
27	10 08 -18 43	10 27.3	0.21	0.2	3	0.07
		12 53.2	0.16	0.2	4	0.05
		13 24.3	0.39	0.2	4	0.05
		15 23.3 15 24.4	0.34 0.85 }	1.1	5	0.04
		16.10.3	0.22	0.11	1	0.04
		17 09.9	0.63	0.3	3	0.04
29	15 20 -16 07	15 35.1	0.61	1.7	13	0.03
30	10 25 -13 34	12 39.0	0.16	0.1	2	0.03
		12 54.0	0.32	0.5	6	0.03
31	11 48 -12 20	11 49.3	0.12	0.2	2	0.04
	12 50 -13 20	13 01.3	>1.97	>20	>18	cloudy
	15 54 -16 04					0.05
	16 10 -16 37					0.05
	16 43 -17 40					0.05

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 525

Konkoly Observatory
Budapest
1971 February 26

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV Lac DURING THE 1970 AUGUST 23 - SEPTEMBER 9 INTERNATIONAL PATROL

The preliminary results of the EV Lac observations carried out at Catania Astrophysical Observatory during the 1970 campaign arranged by the IAU Working Group on Flare Stars are here reported.

The observations were performed with a 91 cm cassegrain and a 61 cm quasi-cassegrain reflectors. The former fed a single channel photometer equipped with an EMI 6256 A (S13) photomultiplier and UG1/1 Schott filter (u light). The latter fed a simultaneous three colour photometer equipped with an EMI 6256 A (S13) photomultiplier and the Schott filter combinations UG1/1 (u'), BG12/1+GG13/2 (v). The u and u' colours are slightly different because the field lens of the three colour simultaneous photometer at the 61 cm telescope is made of quartz while that of the single channel photometer at the 91 cm telescope is made of glass.

In Table 1 the detailed coverage and in Table 2 the characteristics of the 28 flares observed in 42.2 hours of patrol are presented. The observed intensities have been corrected for the light contribution of the optical companion of EV Lac according to the linear relation $I_0 = \alpha I$ (observed), the α coefficients beeing 0.51 for u and u' lights, 0.70 for b light and 0.83 for v light.

The peaks of a multiple flare are denoted by the order number of the flare followed by an alphabetic small letter. Only for the highest peak the complete set of flare characteristics is given in Table 2, while for lower peaks only the times of maxima are reported. Moreover the values of integrated intensity (P) and of the duration after primary maximum (d_a) are computed including whatever post-maximum activity.

The light curves of the observed flares are shown in the accompanying Figures Nos.1-5.

In addition to the parameter $3\sigma/I_0$, from which the magnitude difference between the quiet star and the smallest detectable flare can be computed, we give the new parameter, σ_{max}, which represents in the I_0.unity the maximum deviation from the mean intensity deflection I_0 near the observed flare. The σ_{max} values are not given in tabular form, but for each flare they are represented graphically in the figures as "uncertainty" bars close at the corresponding flare light curves. Only flare features out of these "uncertainty" bars are to be considered reliable.

R.Barbagallo, S.Cristaudo, C.Lo Presti, S.Sciuto, F.Spinella and V.Stancanelli have collaborated to the present work.

S. CRISTALDI and M.RODONO'

Catania Astrophysical Observatory, Italy
February 12th 1971

Table 1

DATE	Tel	Light	COVERAGE (U.T.)	$\overline{3\sigma/I_o}$
1970.				
Aug.				
23	91	u	22^h48^m-23^h02^m; 2305-2322; 2325-2339; 2341-2359;	
24			0001-0029.	.02
25			2354-2400;	
26			0000-0030; 0032-0100; 0102-0119; 0148-0159; 0201-0228;	
			0230-0240; 0242-0306; 0308-0322.	.03
28			0142-0227; 0229-0257; 0259-0301; 0303-0326.	.03
28	61	u'/b/v	0138-0143; 0206-0218; 0221-0233; 0241-0243; 0246-0252;	
			0309-0314.	.04/.01/.01
29	91	u	2140-2151; 2154-2207; 2209-2223; 2226-2247; 2249-2302;	
			2305-2307.	.03
29	61	u'/b/v	2236-2249; 2250-2302.	.03/.02/.01
		b/v	2329-2335.	
30	91	u	2119-2130.	.03
30	61	u'/b/v	2116-2119; 2121-2125	.05/.01/.01
		b/v	2127-2129.	
31	61	u'/b/v	2038-2048; 2052-2135; 2137-2141; 2143-2150; 2152-2220;	
			2222-2228; 2233-2304; 2317-2331; 2352-2354; 2356-2400;	
Sep.				
1			0000-0004; 0008-0042; 0048-0059; 0104-0115; 0122-0139.	.03/.01/.01
		b/v	0115-0122.	
1	91	u	0057-0129; 0131-0138.	.02
1			2045-2058; 2100-2116; 2119-2154; 2156-2232; 2235-2252;	
			2254-2315; 2318-2332; 2335-2352; 2354-2400;	
2			0000-0010; 0013-0059.	.03
4			2104-2116; 2118-2129; 2131-2149; 2152-2220; 2223-2228;	
			2231-2250; 2253-2327; 2330-2346; 2349-2400;	
5			0000-0012; 0014-0049; 0052-0117; 0120-0150; 0152-0209;	
			0212-0223; 0226-0249; 0252-0308.	.03

Table 1 (cont.)

DATE	Tel	Light	COVERAGE (U.T.)	$\overline{3\sigma/I_o}$
1970 Sep.				
4	61	u'/b/v	19^h49^m-19^h58^m; 2001-2015; 2017-2041; 2044-2057; 2059-2142; 2144-2157; 2217-2303; 2305-2308; 2324-2336; 2338-2349; 2351-2400;	
		b/v	2203-2217.	
5			0000-0038; 0040-0105.	.04/.01/.[illegible]
8	91	u	2250-2343; 2345-2358;	
9			0000-0017; 0020-0027; 0035-0045; 0048-0140; 0142-0157.	.03
8	61	u'/b/v	2112-2143; 2145-2205; 2207-2233; 2235-2238; 2242-2252; 2255-2340; 2355-2400;	
9			0000-0014; 0018-0038; 0041-0119; 0121-0137; 0139-0153; 0155-0210; 0245-0259; 0301-0325.	.04/.01/.[illegible]
9	91	b	2104-2113; 2115-2131; 2135-2149; 2151-2209; 2237-2254; 2257-2312; 2314-2317; 2319-2328; 2331-2400.	
10			0000-0005; 0011-0014; 0016-0023; 0029-0052; 0055-0114; 0116-0119; 0122-0134; 0137-0146.	.03
9	61	u'/b/v	1912-1923; 1925-1955; 1957-2011; 2013-2036; 2038-2049; 2052-2117; 2120-2138; 2207-2233; 2235-2257; 2259-2306; 2324-2338; 2340-2354; 2356-2400.	.06/.02/.0

Date = year, month, day; Tel. = the telescope aperture in cm; Light = the wide band Schott filters utilized: UG1/1 (u), BG12/1 + GG13/2 (b), GG14/2 (v); coverage = the times of effective coverage in U.T. (interruptions longer than one minute are noted); $3\sigma/I_o$ = the ratio between three times the standard deviation of the random noise fluctuation for a night, σ, and the mean intensity, I_o, of the quiet star during the same night.

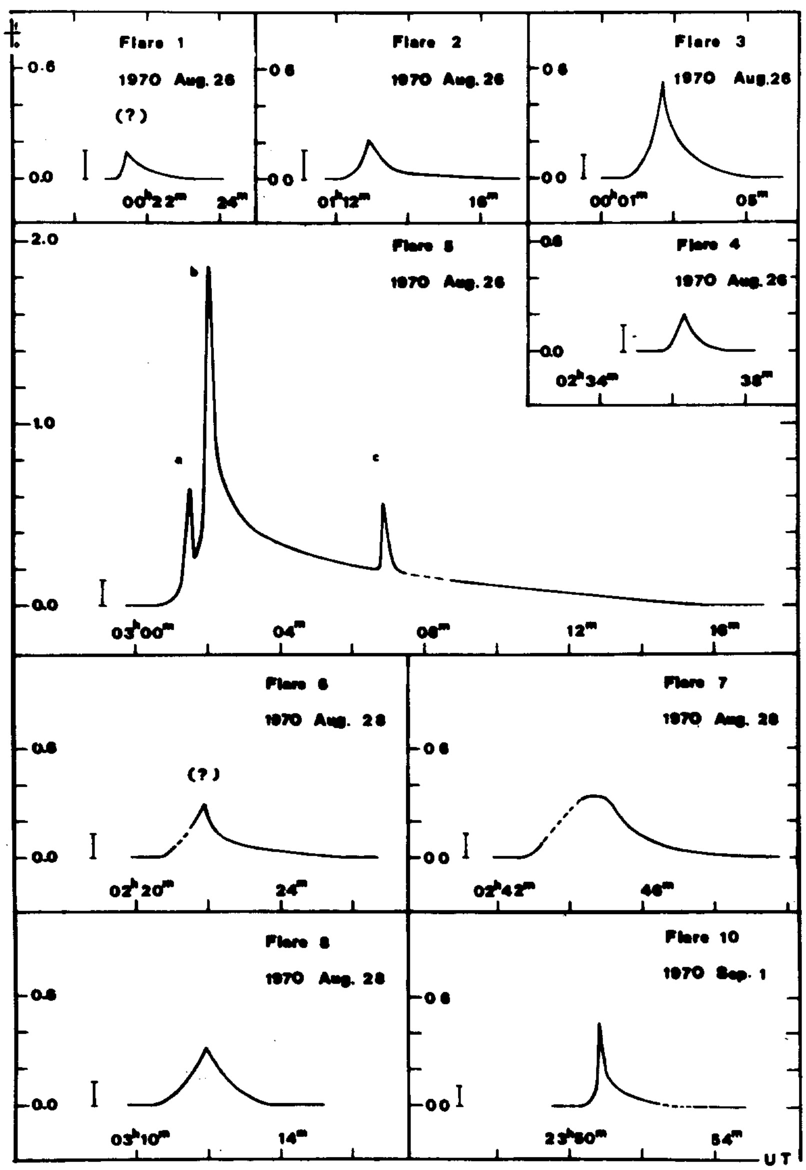
Table 2

no.	Tel.	L	t_{max}(U.T.)	d_b	d_a	$3\sigma/I_o$	$(I_f/I_o)_{max}$	P	a	b
			1970 Aug.							
1	91	u	26:00^{h}21.4^m	0.1^m	1.8^m	.03	0.15	0.14	1	2
2			01 12.9	0.3	3.6	.03	0.22	0.18		2
3			02 02.7	0.5	2.2	.03	0.52	0.37		2
4			02 36.3	0.4	1.1	.03	0.21	0.14		2
5a			03 01.5	(secondary maximum)						
5b			03 02.0	0.2	13.6	.03	1.86	3.11	3	2
5c			03 06.9	(secondary maximum)						
6			28:02 21.9	0.9	3.8	.03	0.29	0.36	1	2
7			02 44.7	1.8	4.3	.03	0.34	0.74		2
8			03 11.9	0.9	1.7	.03	0.31	0.34		2
9a			Sep. 1:21 24.8	0.4	24.3	.03	2.66	5.68	4	1
9b			21 37.8	(secondary maximum)						
10			23 50.8	0.1	2.0	.02	0.45	0.19		1
11a			2:00 47.0	(secondary maximum)						
11b			00 48.2	1.2	4.0	.02	0.36	0.35	2	1
12			4:21 35.2	0.1	7.5	.03	0.33	0.54		2
13			22 39.7	0.1	0.7	.03	0.26	0.07	1	2
14			22 43.4	0.1	1.6	.03	0.21	0.08	1	2
15	61	u'	5:00 04.3	0.3	4.5	.04	2.08	1.15		2
		b	00 04.3	0.1	2.7	.01	0.26	0.11		2
		v	(not detectable)							
	91	u	00 04.3	0.3	6.6	.03	1.41	0.89		2
16			00 54.1	0.8	7.8	.03	0.16	0.34	1	2
17			01 55.0	1.2	13.2	.03	0.37	2.90	4	2
18			02 12.7	0.3	2.0	.03	0.25	0.25		2
19			03 05.5	0.1	0.6	.02	0.46	0.08		2
20	61	u'	8:23 21.9	0.3	6.2	.04	1.42	0.77		1
		b	23 21.8	0.1	1.3	.01	0.15	0.08		1
		v	(not detectable)							
	91	u	23 21.9	0.1	5.7	.03	0.43	0.41		1

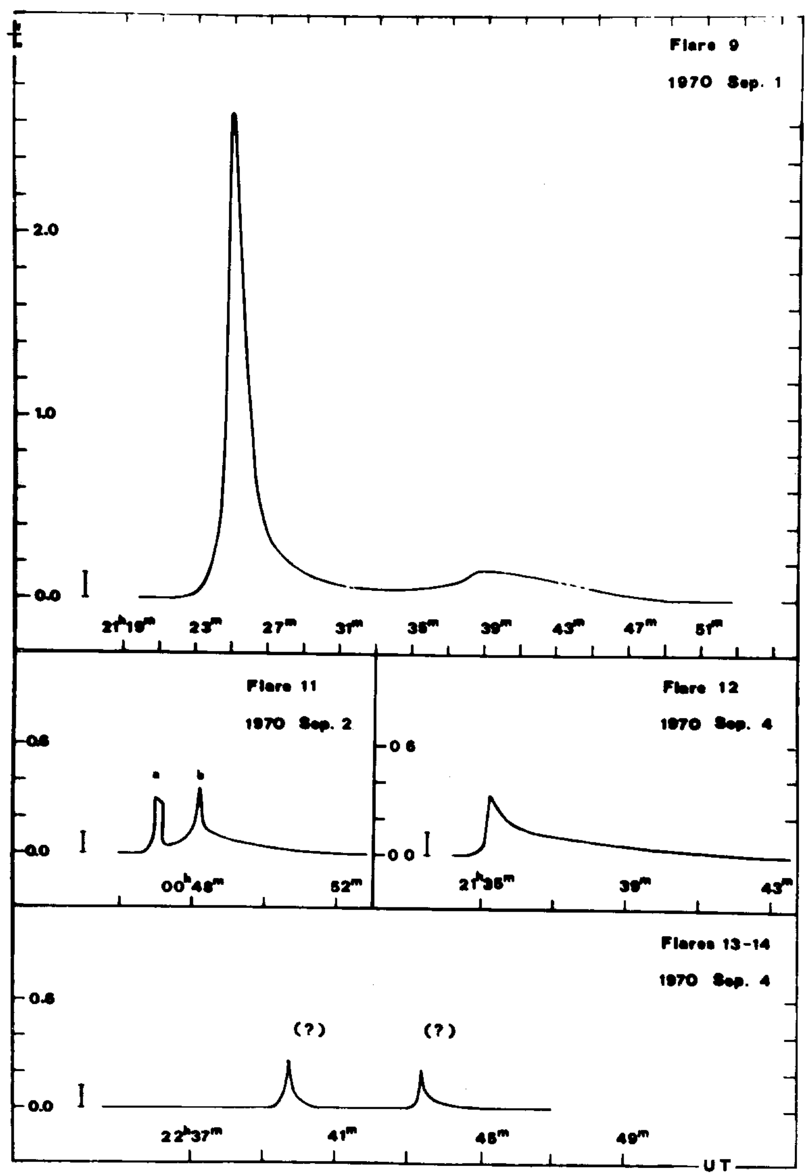
Table 2 (cont.)

no.	Tel.	L	t_{max}(U.T.)	d_b	d_a	$3\sigma/I_o$	$(I_f/I_o)_{max}$	P	a	b
			1970 Sep.							
21	91	u	$9{:}00^h55.4^m$	0.1	4.5	.03	0.30	0.28	4	1
22	61	u'	01 34.3	0.2	4.7	.04	0.61	0.63		1
		b	01 33.9	0.4	0.5	.01	0.15	0.14		1
		v	(n o t d e t e c t a b l e)							
	91	u	01 34.3	0.1	7.8	.03	0.74	0.86	4	1
23	61	u'	20 45.1	0.9	5.0	.04	1.78	2.98		1
		b	20 45.1	1.0	4.5	.01	0.25	0.33		1
		v	20 45.1	0.2	0.4	.01	0.12	0.04		1
24	91	u	21 40.0	2.0	18.6	.03	0.56	3.26	2	1
25			22 03.7	0.8	3.5	.02	0.16	0.31		1
26	61	u'	23 48.9	0.0	0.7	.03	0.70	0.15		1
		b	(n o t d e t e c t a b l e)							
		v	(n o t d e t e c t a b l e)							
	91	u	23 49.0	0.2	1.3	.03	0.59	0.22		1
27	91	u	23 59.9	1.4	4.4	.03	0.30	0.74	2	1
28		u	10:00 20.3	0.2	1.0	.03	0.22	0.10	1	1

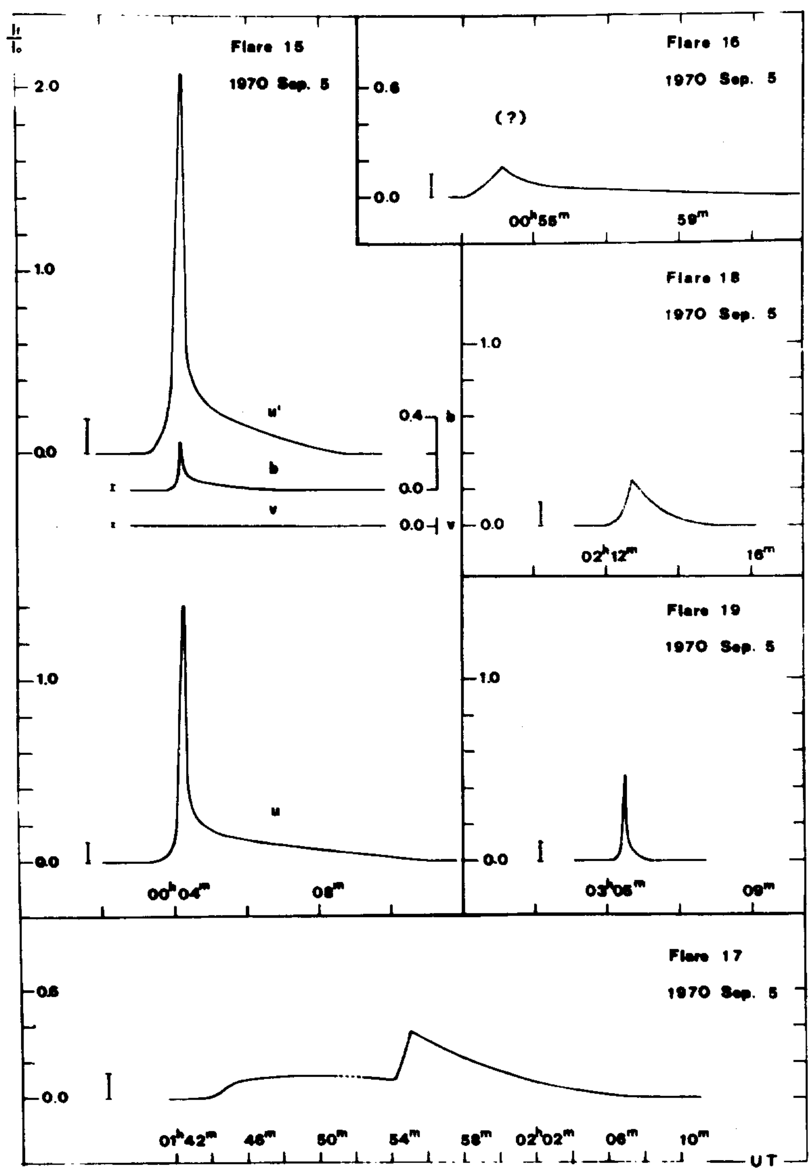
no. = the order number; Tel. = the telescope aperture in cm; L = the wide band Schott filters utilized: UG1/1 (u), BG 12/1 + GG13/2 (b), GG14/2 (v); t_{max} = the U.T. of the flare maximum; d_b = the duration of the flare before maximum, excluding pre-flare phases; d_a = the duration of the flare after maximum, including post-maximum activity whatever; $3\sigma/I_o$ = the ratio between three times the standard deviation of the random noise fluctuation, σ, and the mean intensity, I_o, of the quiet star near the observed flare; $(I_f/I_o)_{max}$ = the relative intensity at the flare maximum; $P = \int(I_f/I_o)dt$, the integrated intensity per minute; the flare feature (1: uncertain, 2: double, 3: multiple, 4: complex structure); b = the sky condition (0: very clear, 1: clear, 2: some cirrus, 3: extended cirrus, 4: some clouds).



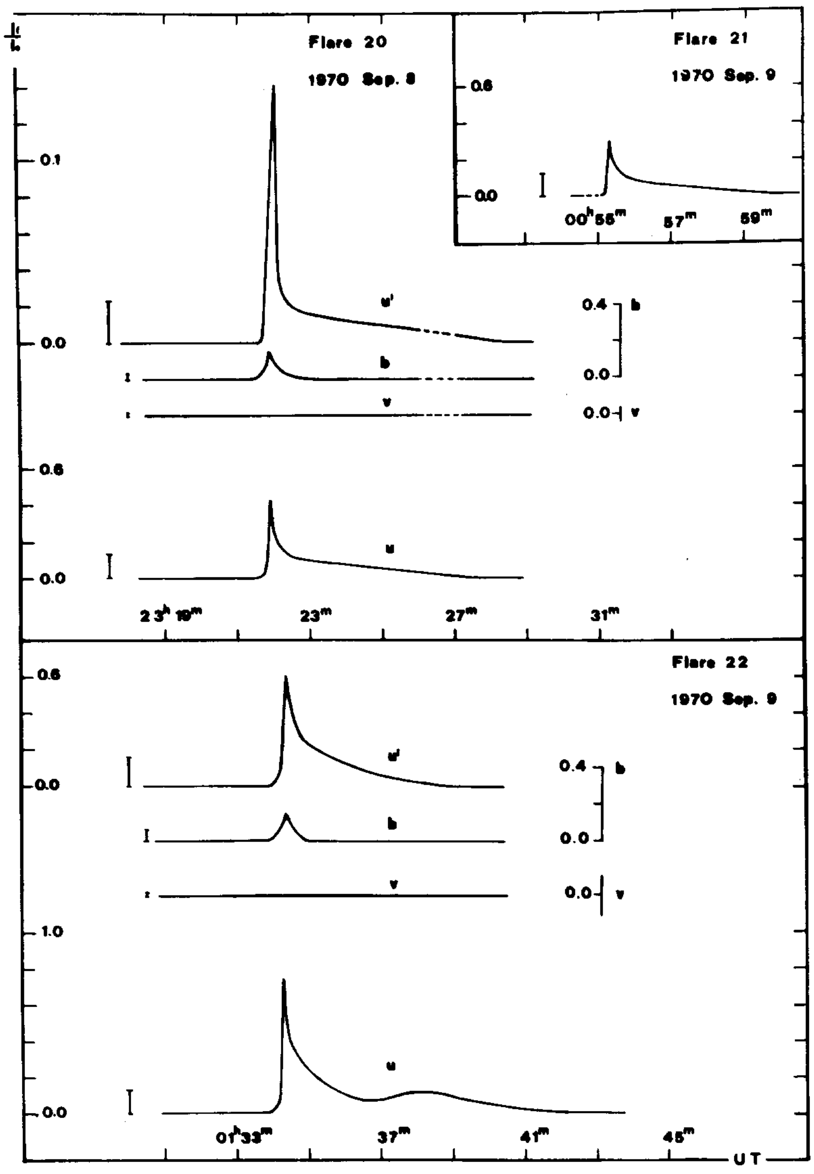
I/I₀
Flare 1
1970 Aug. 26
(?)
0.6
0.0
00h22m
24m
Flare 2
1970 Aug. 26
01h12m
16m
Flare 3
1970 Aug. 26
00h01m
05m
Flare 5
1970 Aug. 26
2.0
1.0
a
b
c
03h00m
04m
08m
12m
16m
Flare 4
1970 Aug. 26
02h34m
38m
Flare 6
1970 Aug. 28
(?)
02h20m
24m
Flare 7
1970 Aug. 28
02h42m
46m
Flare 8
1970 Aug. 28
03h10m
14m
Flare 10
1970 Sep. 1
23h50m
54m
UT



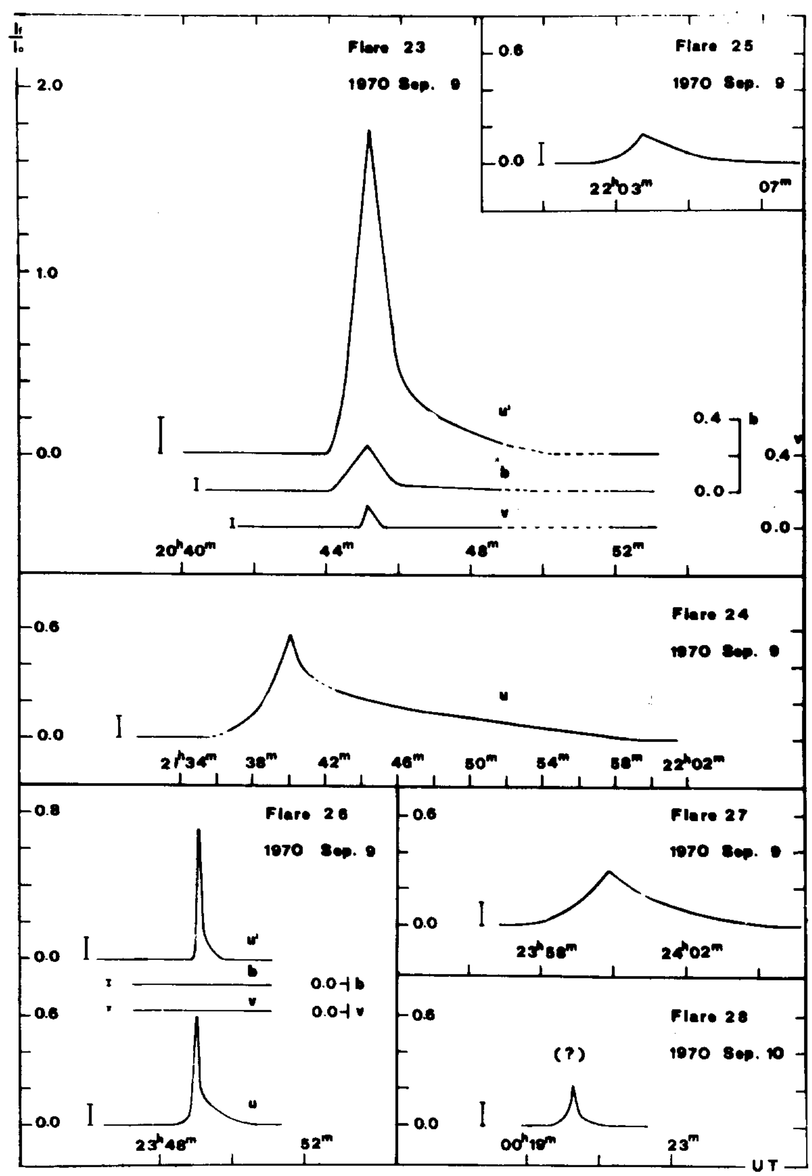
Flare 9
1970 Sep. 1
2.0
1.0
0.0
21h19m
23m
27m
31m
35m
39m
43m
47m
51m
Flare 11
1970 Sep. 2
0.5
0.0
a
b
00h48m
52m
Flare 12
1970 Sep. 4
0.5
0.0
21h35m
39m
43m
Flares 13-14
1970 Sep. 4
0.5
0.0
(?)
(?)
22h37m
41m
45m
49m
UT



Flare 15
1970 Sep. 5
Flare 16
1970 Sep. 5
(?)
Flare 18
1970 Sep. 5
Flare 19
1970 Sep. 5
Flare 17
1970 Sep. 5
2.0
1.0
0.0
0.6
0.4
u'
b
v
u
00h04m
08m
00h55m
59m
02h12m
16m
03h08m
09m
01h42m
46m
50m
54m
58m
02h02m
06m
10m
UT



Flare 20
1970 Sep. 8
Flare 21
1970 Sep. 9
0.1
0.0
0.6
0.0
u'
b
v
u
0.4
0.0
0.0
23h 19m
23m
27m
31m
00h 55m
57m
59m
Flare 22
1970 Sep. 9
0.6
0.0
1.0
0.0
01h 33m
37m
41m
45m
UT



I_f/I_o
Flare 23
1970 Sep. 9
2.0
1.0
0.0
u'
b
v
0.4
0.0
20h40m
44m
48m
52m
Flare 25
1970 Sep. 9
0.6
0.0
22h03m
07m
Flare 24
1970 Sep. 9
0.6
0.0
u
21h34m
38m
42m
46m
50m
54m
58m
22h02m
Flare 26
1970 Sep. 9
0.8
0.0
0.6
0.0
u'
b
v
0.0 b
0.0 v
u
23h48m
52m
Flare 27
1970 Sep. 9
0.6
0.0
23h58m
24h02m
Flare 28
1970 Sep. 10
(?)
0.6
0.0
00h19m
23m
UT

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 526

Konkoly Observatory
Budapest
1971 February 26

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR UV Cet DURING THE 1970 SEPTEMBER 22 - OCTOBER 9 INTERNATIONAL PATROL

The preliminary results of UV Cet observations carried out at the Catania Astrophysical Observatory during the 1970 campaign arranged by the IAU Working Group on Flare Stars are here reported.

The observations were performed in b light with a 91 cm cassegrain reflector which fed a single channel photometer equipped with an EMI 6256 A (S13) photomultiplier and the following combination of Schott filters: RG12/1+ GG13/2.

In Table 1 the detailed coverage and in Table 2 the characteristics of the 59 flares observed in 46.8 hours of patrol are presented. The meaning of symbols used is the same as in I.B.V.S. No.525. Assuming that the observed flares have been produced in the atmosphere of the B component of UV Cet (L 726-8 AB), the observed intensities have been corrected as follows: I_0 = 0.38 I (observed).

The light curves of the observed flares are shown in the accompanying Figures Nos.1 - 16. The meaning of the "uncertainty" bars close at each flare light curve is also explained in I.B.V.S. Nos.525.

R.Barbagallo, S.Cristaudc and C.Lo Presti have collaborated to the present work.

S.CRISTALDI and M.RODONO'

Catania Astrophysical Observatory, Italy
February 13, 1971

Table 1

DATE	COVERAGE (U.T.)	$3\sigma/I_0$
1970		
Sep.		
22	00^h10^m-00^h21^m; 0026-0119; 0121-0158; 0201-0331; 0333-0343.	.07
22	2300-2308; 2314-2329; 2338-2340;	
23	0103-0115; 0208-0222; 0225-0249; 0315-0342.	.07
23	2250-2348;	
24	0007-0015; 0037-0045; 0050-0250; 0252-0310; 0312-0334.	.07
24	2207-2320; 2337-2400;	
25	0000-0013; 0015-0030; 0041-0127; 0129-0132; 0204-0249;	
	0251-0309; 0312-0334.	
26	2201-2213; 2216-2228; 2256-2313; 2315-2327; 2329-2331;	
	2333-2344;	
27	0007-0026; 0028-0046; 0049-0055; 0131-0145; 0149-0305; 0310-0343.	.07
27	2345-2357; 2359-2400;	
28	0000-0014; 0027-0032; 0052-0150; 0207-0212; 0249-0345.	.05
28	2120-2134; 2136-2155; 2157-2159; 2208-2214; 2217-2220;	
	2222-2244; 2247-2306; 2314-2318; 2356-2400;	
29	0000-0037; 0039-0100; 0102-0119; 0121-0137; 0140-0236;	
	0238-0249; 0251-0312; 0315-0324; 0326-0334; 0336-0342; 0345-0347.	.03
29	2329-2335; 2343-2358;	
30	0000-0027; 0029-0032; 0035-0106; 0108-0122; 0124-0149;	
	0150-0205; 0210-0233; 0248-0308.	.03
Oct.		
1	0001-0014; 0016-0017; 0030-0035; 0037-0056; 0058-0103; 0244-0343.	.03
3	0118-0131; 0149-0200; 0202-0230; 0232-0238; 0240-0246;	
	0248-0253; 0304-0335.	.03
4	0102-0120; 0122-0126; 0132-0139; 0145-0148.	.03
4	2130-2212; 2216-2231; 2257-2306; 2309-2324; 2326-2356;	
5	0030-0046; 0049-0100; 0105-0120; 0122-0134; 0135-0148; 0151-0204;	
	0212-0223; 0226-0242; 0244-0257; 0302-0319; 0321-0342; 0344-0348.	.03

Table 1 (cont.)

DATE	COVERAGE (U.T.)	$3\sigma/I_0$
1970 Oct.		
5	21^h27^m–21^h47^m; 2150-2158; 2211-2215; 2253-2308; 2334-2349; 2351-2400;	
6	0000-0006; 0040-0102; 0104-0121; 0125-0138; 0140-0153; 0155-0219; 0221-0235; 0242-0300.	.04
6	2124-2130; 2140-2154.	.05
7	2125-2201; 2205-2238; 2243-2247; 2254-2259; 2300-2305; 2309-2321;	
8	0127-0205; 0216-0250; 0258-0311; 0333-0341.	.04
9	0106-0119; 0121-0128; 0202-0218; 0225-0248; 0250-0302; 0305-0315; 0317-0328; 0330-0344.	.04
10	0037-0052; 0054-0113; 0116-0134; 0136-0156; 0157-0207; 0212-0215; 0217-0220; 0221-0226; 0229-0231; 0236-0244.	.02

For the explanation of symbols see the footnotes to the Tables in I.B.V.S. no.525.

Table 2

no.	t_{max} (U.T.) 1970 Sep.	d_b	d_a	$3\sigma/I_o$	$(I_f/I_o)_{max}$	P	a	b
1	22:00^{h}48.2^m	0.0^m	6.3^m	.08	0.62	0.78		2
2	01 13.4	0.0	0.1	.08	0.82	0.04		2
3	02 20.4	0.1	10.0	.08	4.53	2.88		2
4	23:02 09.3	0.3	5.8	.08	0.75	0.86		3
5	02 16.6	0.1	0.8	.08	1.03	0.42		3
6	02 40.1	0.3	8.9	.08	2.90	3.63	4	3
7a	23 19.1		(secondary maximum)					
7b	23 20.7		(secondary maximum)					
7c	23 21.0		(" ")					
7d	23 24.5		(" ")					
7e	23 26.2		(" ")					
7f	23 31.0	0.2	11.6	.07	6.90	8.72	3	2
8	24:01 29.2	0.1	4.8	.07	0.73	0.66		2
9	02 18.3	0.1	2.4	.07	3.61	1.05		2
10	02 42.6	0.1	1.6	.07	2.76	0.55		2
11	22 16.3	0.2	7.6	.08	1.06	1.12		2
12a	22 24.9	0.2	19.5	.08	2.17	5.84	3	2
12b	22 30.5		(secondary maximum)					
12c	22 31.3		(" ")					
13a	25:02 07.3		(" ")					
13b	02 13.6	0.1	10.6	.04	1.53	5.20	3	2
13c	02 18.9		(secondary maximum)					
14a	02 33.8	0.1	7.4	.05	3.82	4.22	2	2
14b	02 34.7		(secondary maximum)					
15	03 19.9	0.1	7.8	.07	2.58	2.84		2
16a	26:22 57.2	0.1	5.3	.04	1.57	1.82	2	3
16b	22 57.6		(secondary maximum)					
17	23 22.1	0.0	1.0	.07	1.40	0.34		3
18	27:00 43.9	0.0	5.6	.07	0.40	0.60	1	3
19	02 50.0		1.5	.05	2.14			2
20a	23 50.4	0.7	3.7	.08	2.10	1.92	2	2
20b	23 52.0		(secondary maximum)					

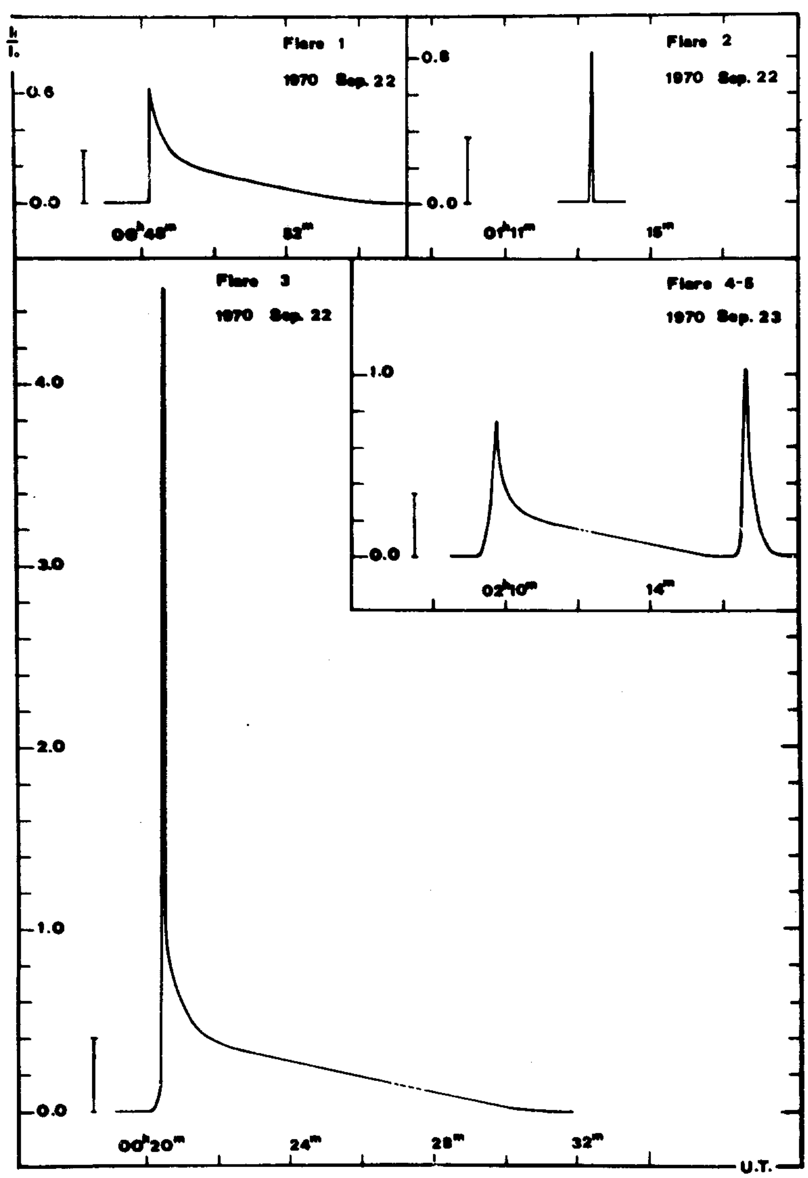
Table 2 (cont.)

no.	t_{max}(U.T.)	d_b	d_a	$3\sigma/I_o$	$(I_f/I_o)_{max}$	P	a	b
	1970 Sep.							
21	$28{:}01^h09.6^m$	0.1	0.1	.03	3.65	20.52	3	2
22	01 22.1	0.4	6.7	.03	7.23	20.52	3	2
23	01 39.8	0.1	9.4	.03	4.54	7.06		2
24	03 24.6	0.2	2.6	.03	0.92	0.56	1	2
25	23 57.4	0.1	1.6	.02	2.24	?	3	2
26	29:00 09.2	0.1	0.6	.02	0.68	0.08		2
27	00 47.1	0.1	1.8	.02	1.23	0.76		2
28	01 23.8	0.0	2.1	.02	0.86	0.34		2
29	02 01.3	0.1	0.9	.02	0.59	0.22		2
30a	02 06.9	0.2	7.2	.02	3.39	3.66	3	2
30b	02 12.5	(secondary maximum)						
31a	02 42.4	(" ")						
31b	02 43.4	0.0	6.1	.03	2.66	1.50	2	2
32	30:00 23.8	0.0	0.6	.04	0.57	0.06	1	2
33	00 29.6	0.1	0.1	.04	0.73	0.07		2
34	00 50.1	0.0	0.5	.04	0.69	0.12		2
35	01 18.2	0.2	0.5	.04	1.17	0.20		4
36	01 50.6	0.1	1.0	.04	2.49	0.55		4
37	03 03.2	0.6	1.1	.04	0.77	0.25		4
	Oct.							
38	1:00 02.1	0.2	5.5	.03	2.69	2.48	4	2
39	02 46.3	0.5	1.6	.07	1.68	1.29		2
40	03 07.5	0.0	1.5	.07	5.00	0.48		2
41	03 09.2	0.0	0.3	.07	1.14	0.15	4	2
42	4:21 42.3	0.1	4.5	.04	2.83	0.68		3
43a	22 03.0	0.1	13.1	.03	5.49	7.54	2	3
43b	22 03.2	(secondary maximum)						
44a	5:01 25.8	(secondary maximum)						
44b	01 28.3	0.0	14.4	.03	6.79	10.40	3	3
44c	01 30.3	(secondary maximum)						
45	02 34.9	0.3	6.2	.04	1.27	1.56		3

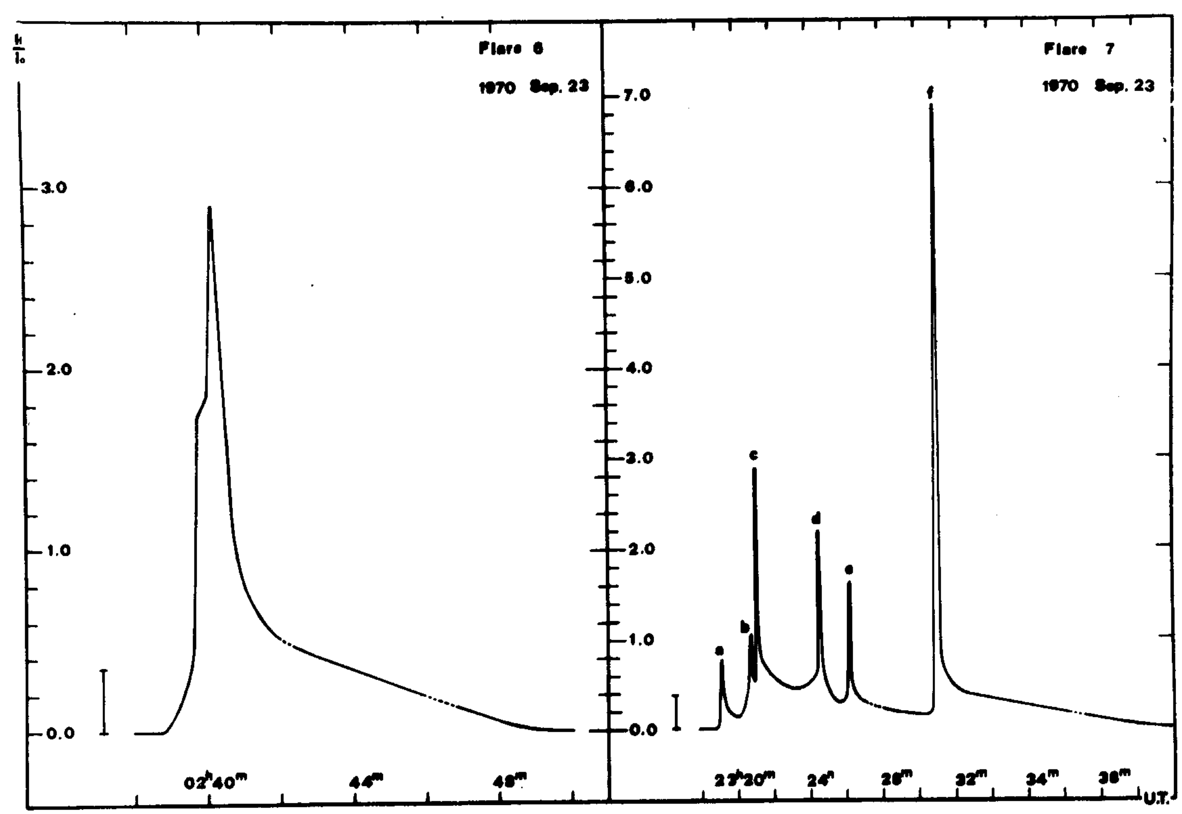
Table 2 (cont.)

no.	t_{max}(U.T.)	d_b	d_a	$3\sigma/I_o$	$(I_f/I_o)_{max}$	P	a	b
	1970 Oct.							
46	$5:02^h54.6^m$	0.2	1.3	.04	0.83	0.40		3
47	03 27.3	0.1	0.4	.04	1.70	0.12		3
48	23 02.1	0.1	3.0	.03	1.50	0.68		4
49a	6:00 56.4	(secondary maximum)						
49b	00 56.8	(" ")						
49c	00 58.1	0.3	6.5	.04	1.69	2.22	3	4
50	01 15.6	0.2	3.4	.04	0.76	0.74		4
51	02 05.9	0.2	1.1	.04	2.11	0.46		4
52	21 52.8	0.1	0.1	.04	0.97	0.10		2
53	8:01 39.0	0.1	1.3	.04	2.18	0.60		2
54	01 42.1	0.2	0.1	.04	1.74	0.22		2
55	02 45.4	0.0	0.8	.07	1.18	0.12		2
56	9:02 43.9	0.1	1.1	.04	3.84	0.66		2
57	03 26.4	0.1	0.4	.07	1.26	0.24		2
58	10:01 02.4	0.0	1.0	.03	0.79	0.14		1
59a	01 21.8	(secondary maximum)						
59b	01 24.6	0.2	13.4	.03	18.11	14.10	3	1
59c	01 28.9	(secondary maximum)						

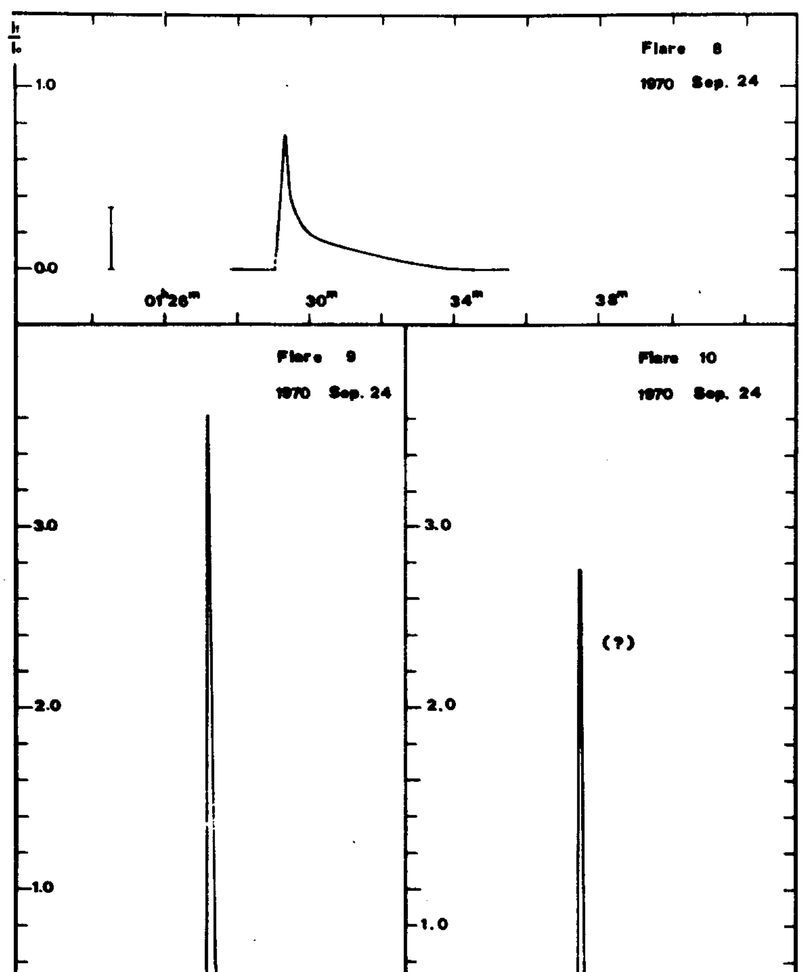
For the explanation of symbols see the footnotes to the Tables in I.B.V.S. no. 525.



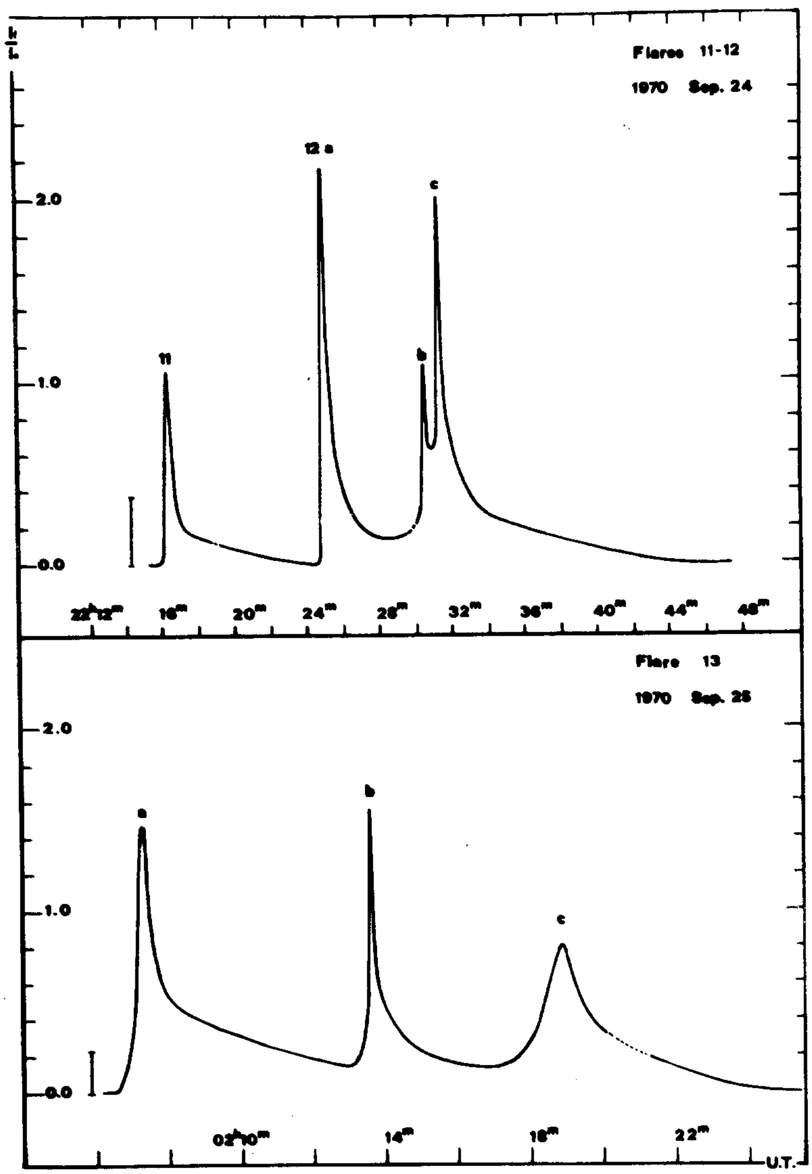
I/I₀
Flare 1
1970 Sep. 22
0.6
0.0
00h48m
52m
Flare 2
1970 Sep. 22
0.8
0.0
01h11m
15m
Flare 3
1970 Sep. 22
4.0
3.0
2.0
1.0
0.0
00h20m
24m
28m
32m
U.T.
Flare 4-5
1970 Sep. 23
1.0
0.0
02h10m
14m



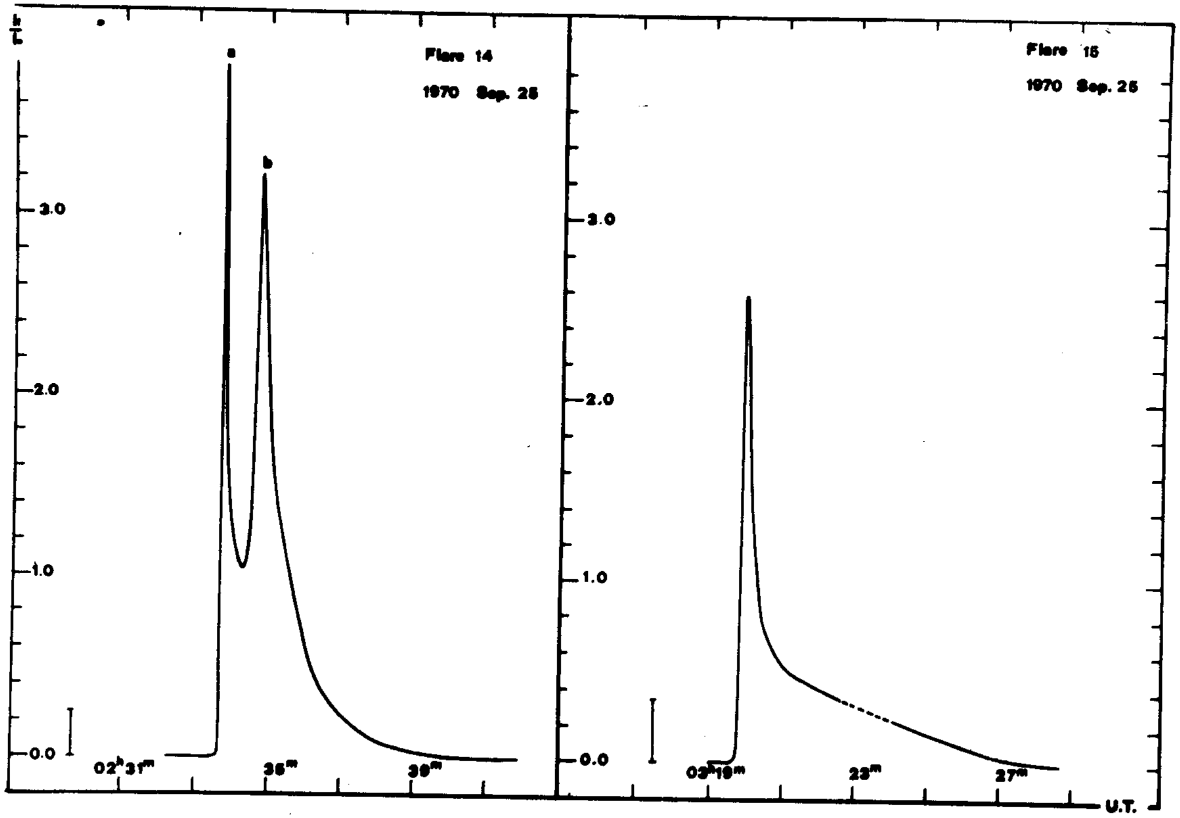
Flare 6
1970 Sep. 23
Flare 7
1970 Sep. 23
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
02h40m
44m
48m
22h20m
24m
26m
28m
32m
34m
36m
U.T.
a
b
c
d
e
f



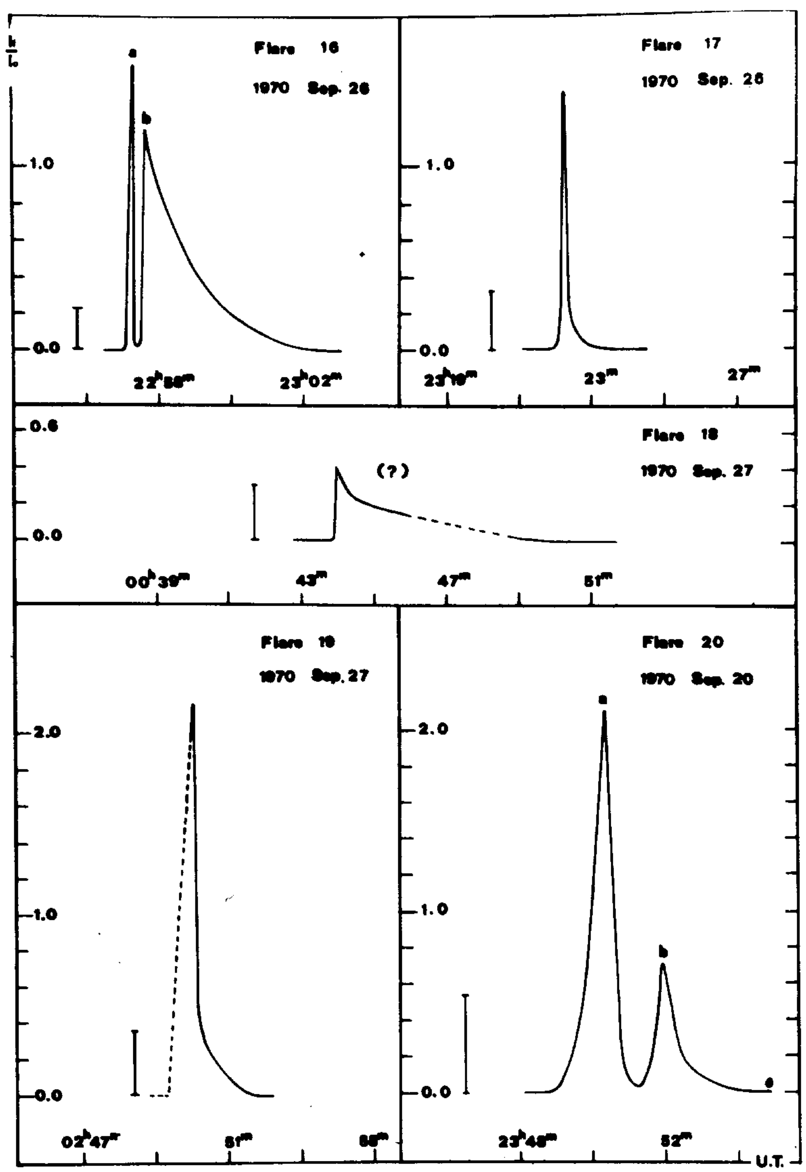
Flare 8
1970 Sep. 24
1.0
0.0
01h26m
30m
34m
38m
Flare 9
1970 Sep. 24
3.0
2.0
1.0
0.0
02h15m
19m
23m
Flare 10
1970 Sep. 24
(?)
3.0
2.0
1.0
0.0
0h41m
45m
U.T.

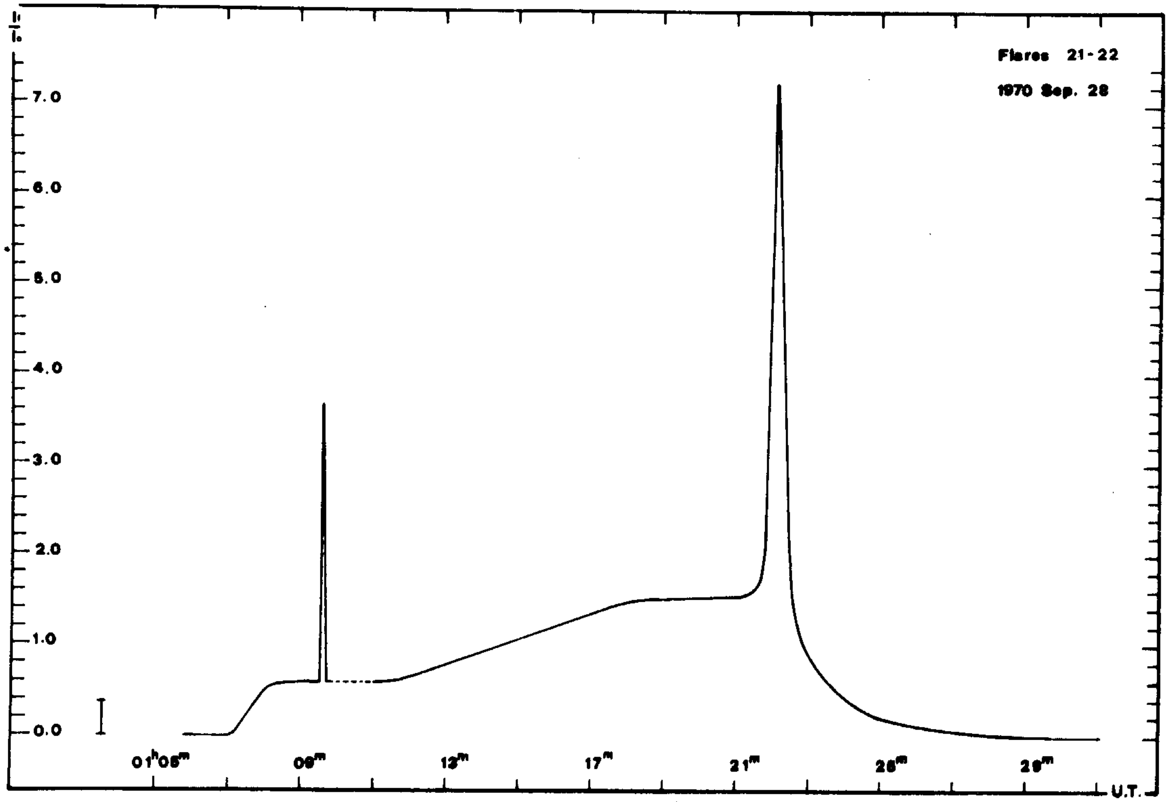


Flares 11-12
1970 Sep. 24
12 a
c
11
b
2.0
1.0
0.0
22h12m
16m
20m
24m
28m
32m
36m
40m
44m
48m
Flare 13
1970 Sep. 25
a
b
c
2.0
1.0
0.0
02h10m
14m
18m
22m
U.T.

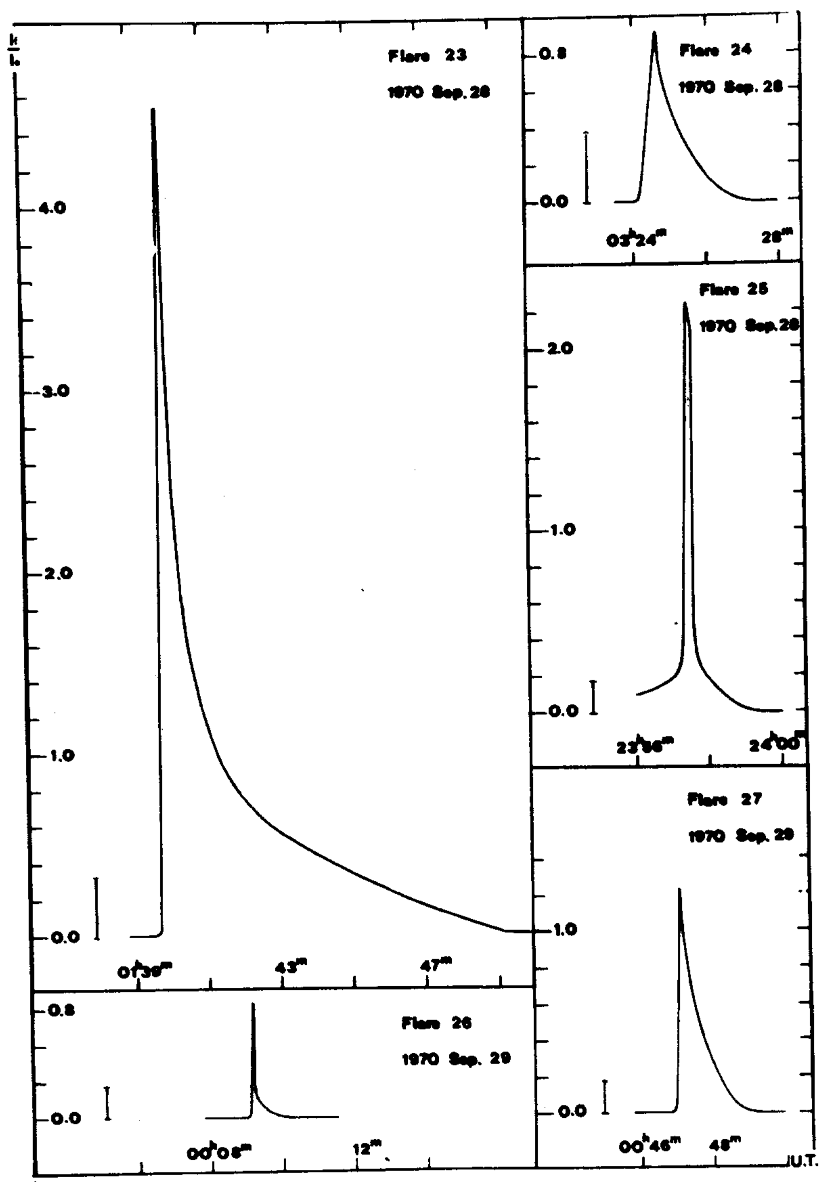


Flare 14
1970 Sep. 25
Flare 15
1970 Sep. 25
a
b
3.0
2.0
1.0
0.0
02h31m
35m
39m
03h19m
23m
27m
U.T.

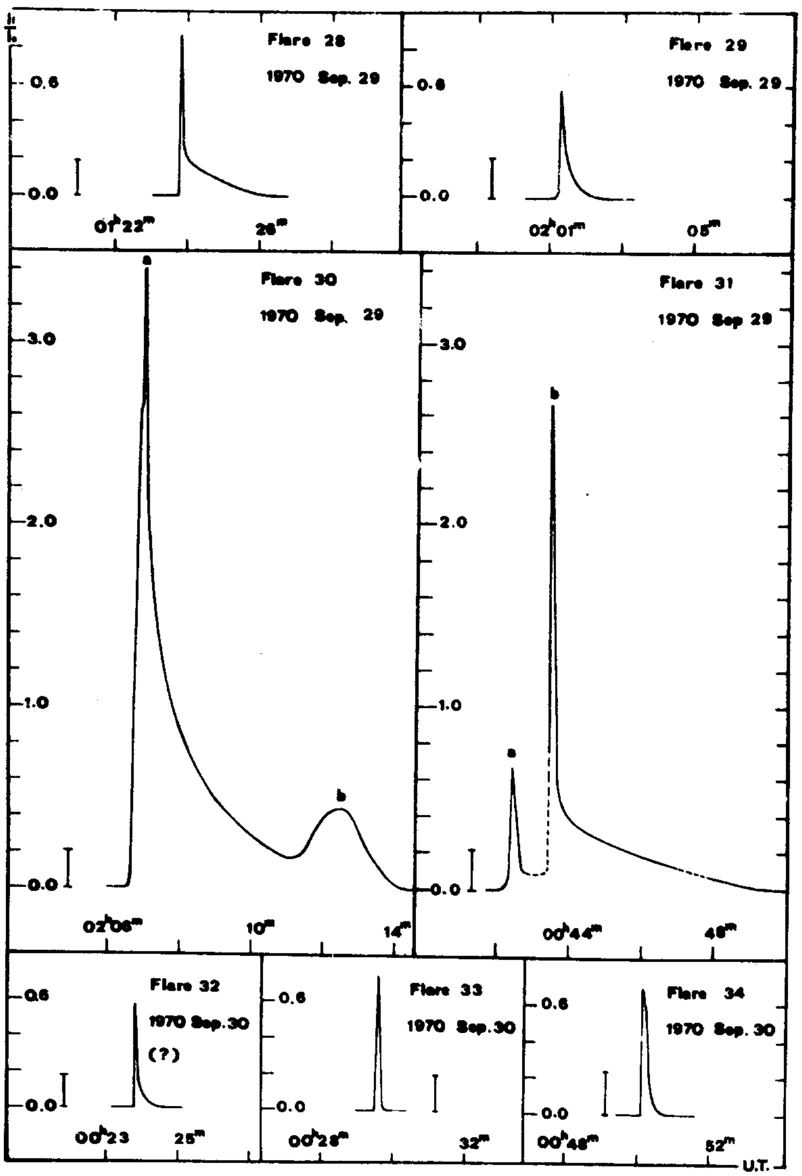

Flare 16
1970 Sep. 26
Flare 17
1970 Sep. 26
Flare 18
1970 Sep. 27
(?)
Flare 19
1970 Sep. 27
Flare 20
1970 Sep. 20
U.T.



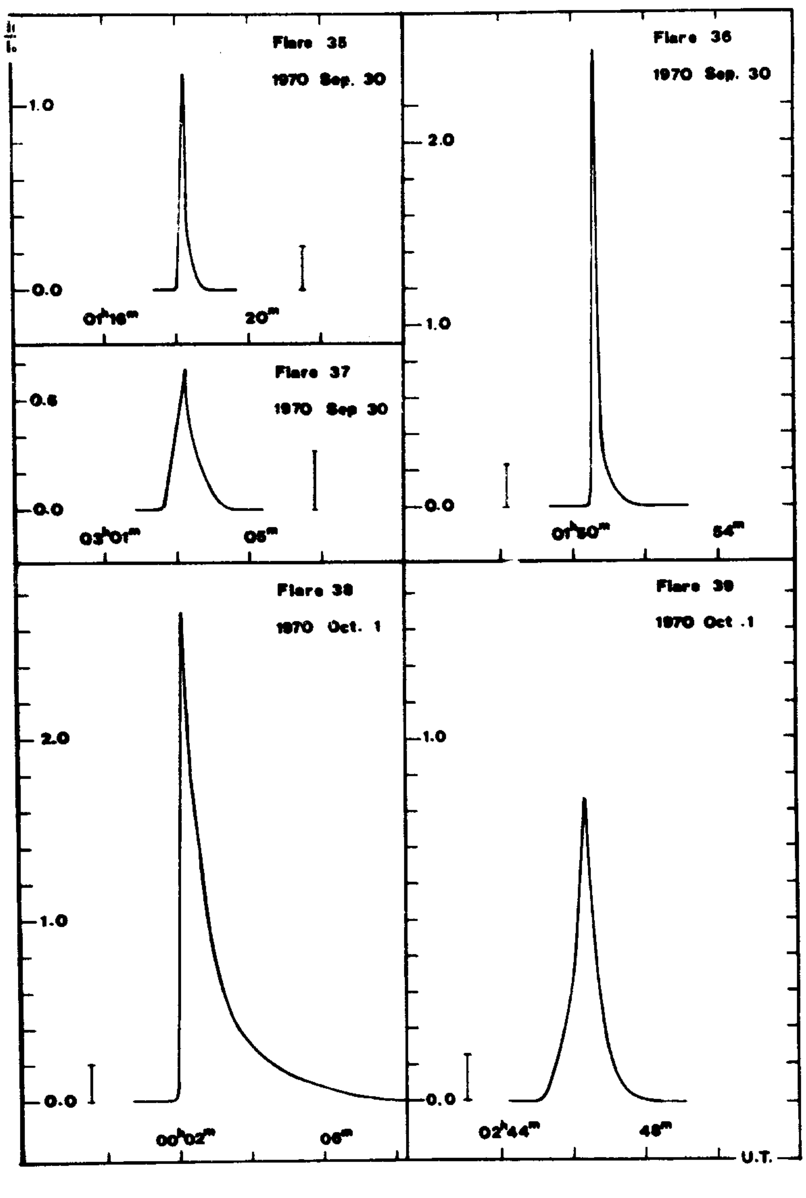
Flares 21-22
1970 Sep. 28
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
01h05m
09m
17m
21m
U.T.

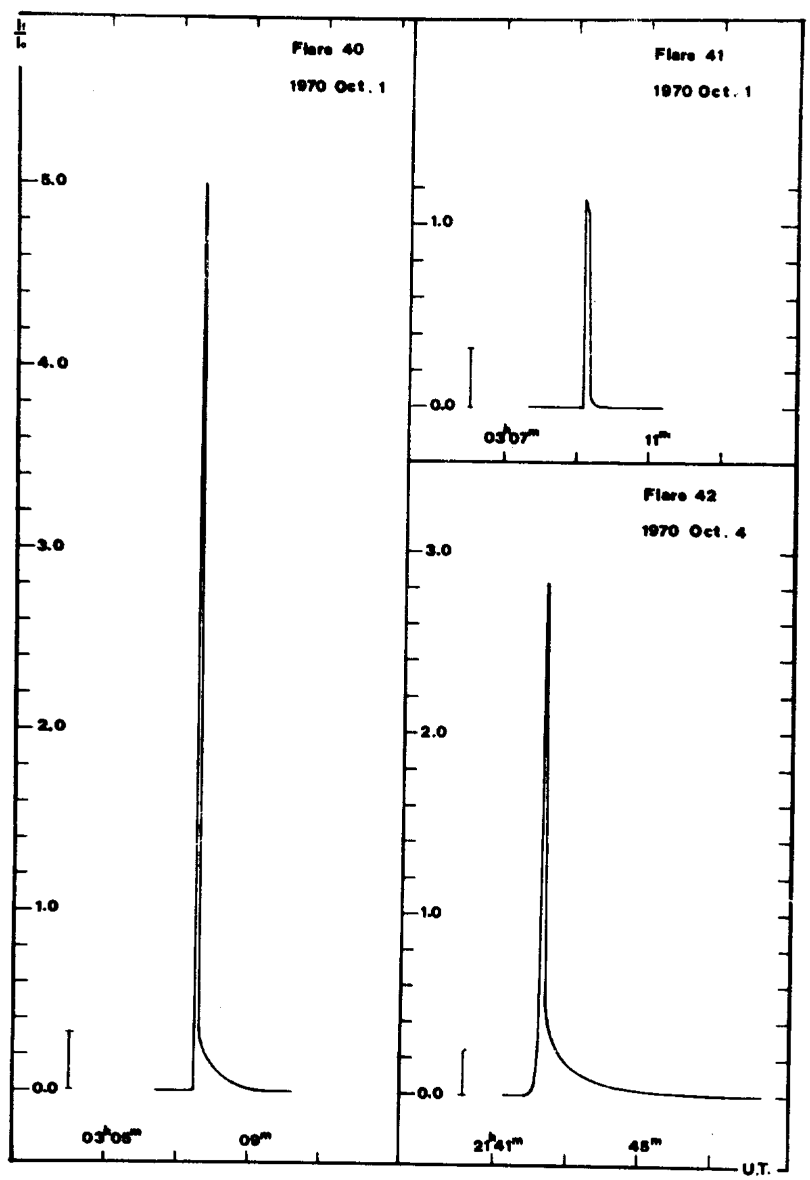


I/I₀
Flare 23
1970 Sep. 28
4.0
3.0
2.0
1.0
0.0
01h39m
43m
47m
Flare 24
1970 Sep. 28
0.8
0.0
03h24m
28m
Flare 25
1970 Sep. 28
2.0
1.0
0.0
23h56m
24h00m
Flare 26
1970 Sep. 29
0.8
0.0
00h08m
12m
Flare 27
1970 Sep. 29
1.0
0.0
00h46m
48m
U.T.

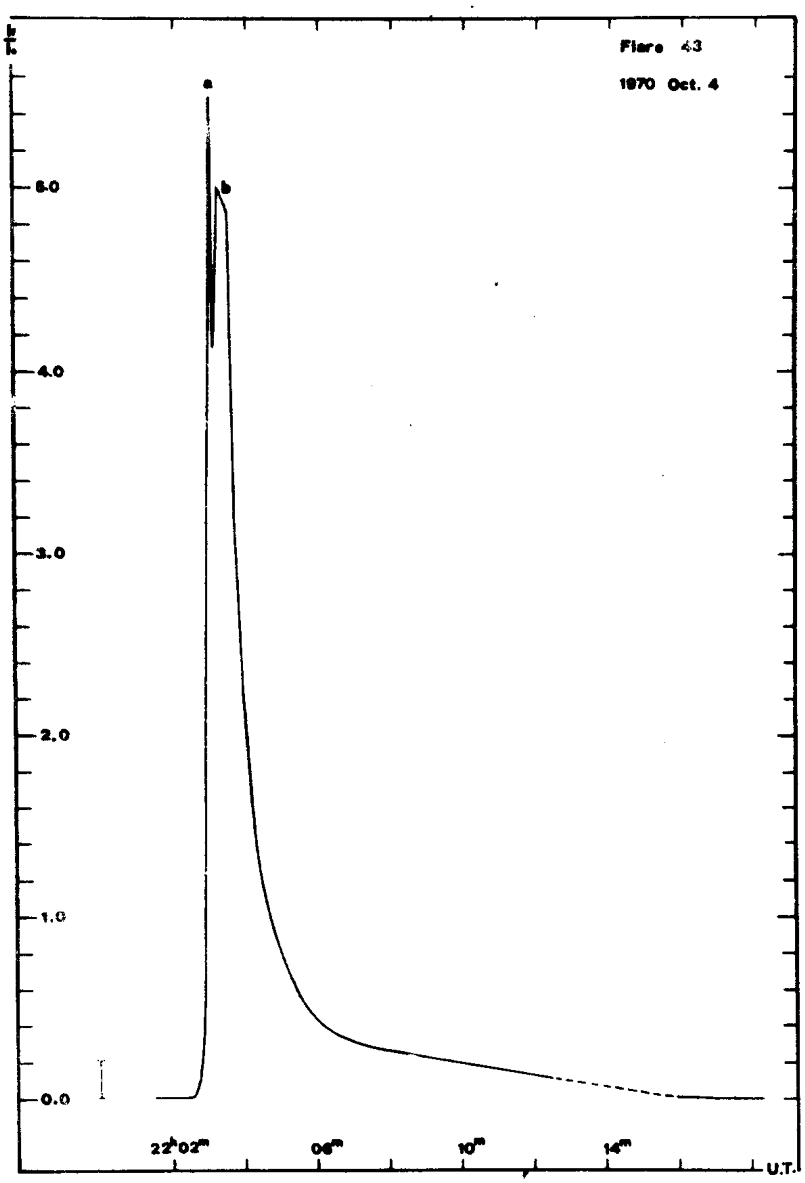


Flare 28
1970 Sep. 29
Flare 29
1970 Sep. 29
Flare 30
1970 Sep. 29
Flare 31
1970 Sep 29
Flare 32
1970 Sep.30
(?)
Flare 33
1970 Sep.30
Flare 34
1970 Sep. 30
U.T.

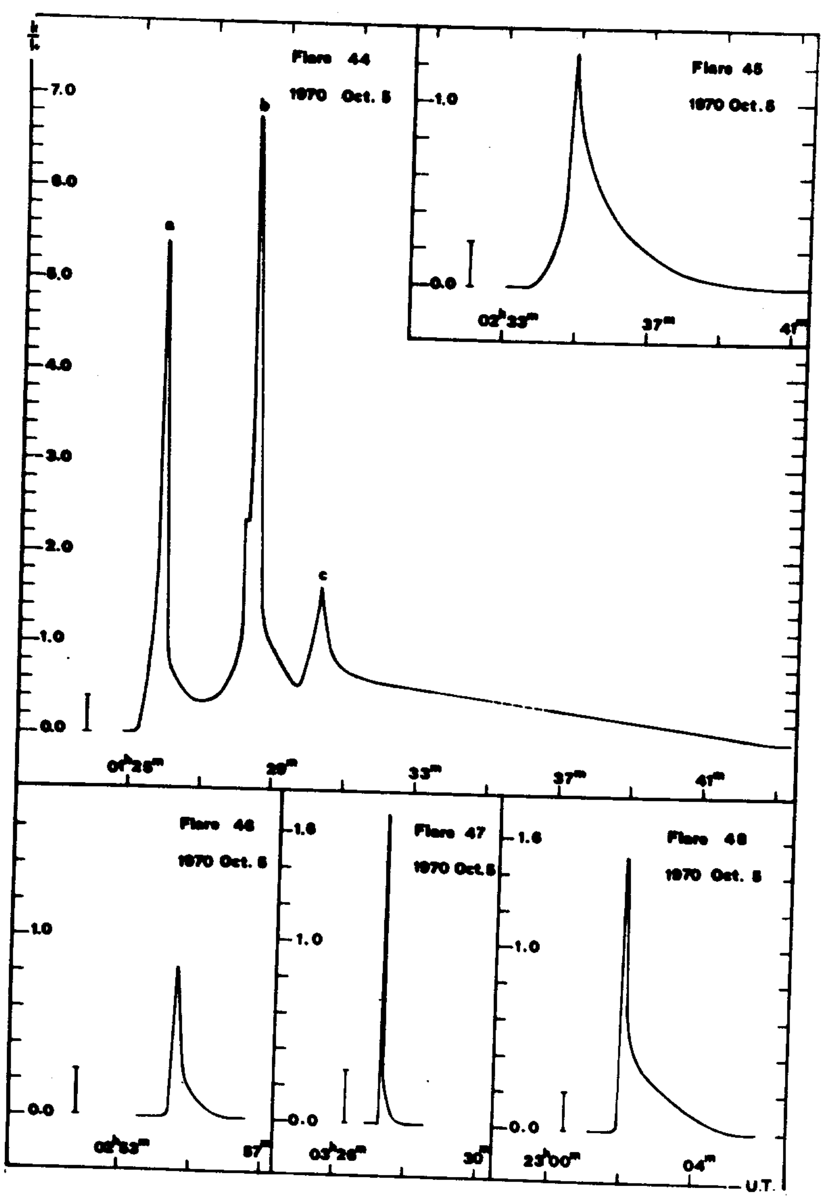

Flare 35
1970 Sep. 30
Flare 36
1970 Sep. 30
Flare 37
1970 Sep 30
Flare 38
1970 Oct. 1
Flare 39
1970 Oct .1
U.T.



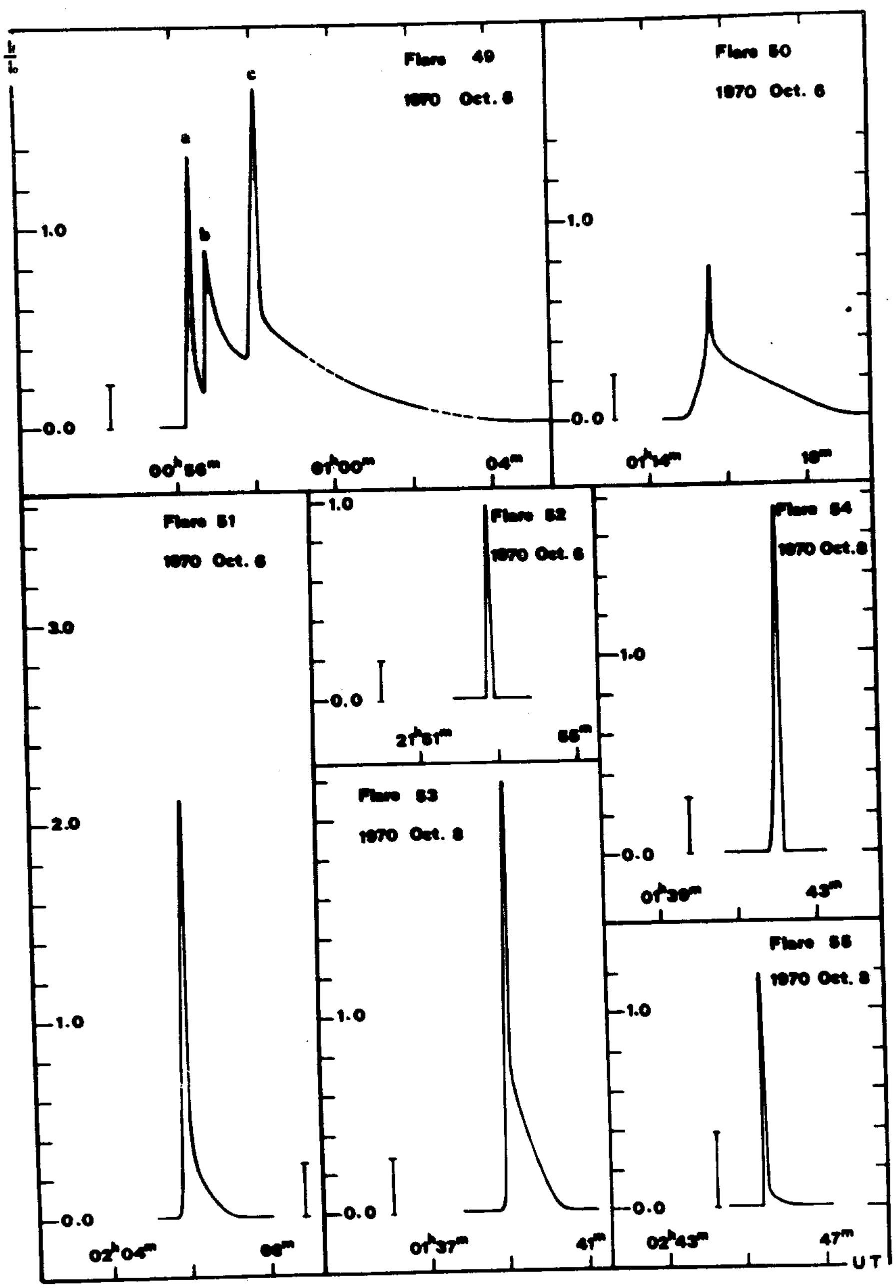
Flare 40
1970 Oct. 1
Flare 41
1970 Oct. 1
Flare 42
1970 Oct. 4
5.0
4.0
3.0
2.0
1.0
0.0
03h06m
09m
03h07m
11m
21h41m
45m
U.T.

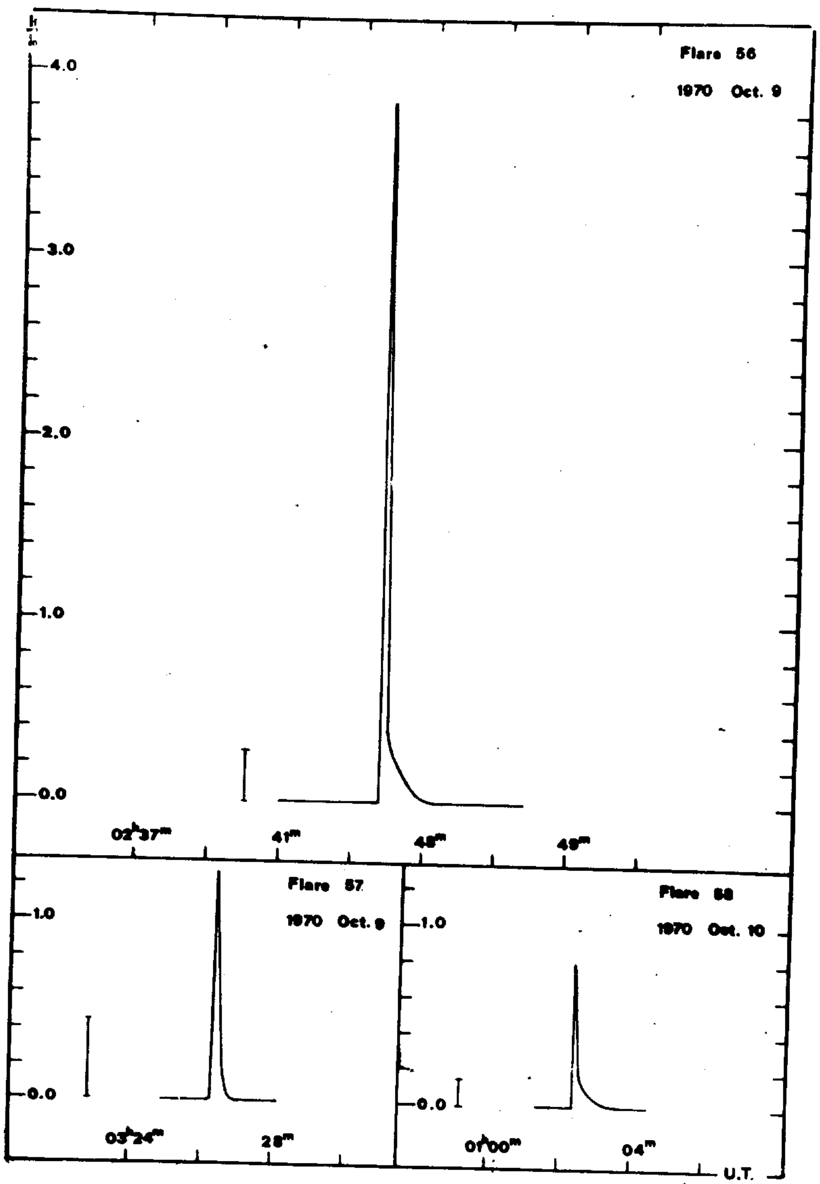


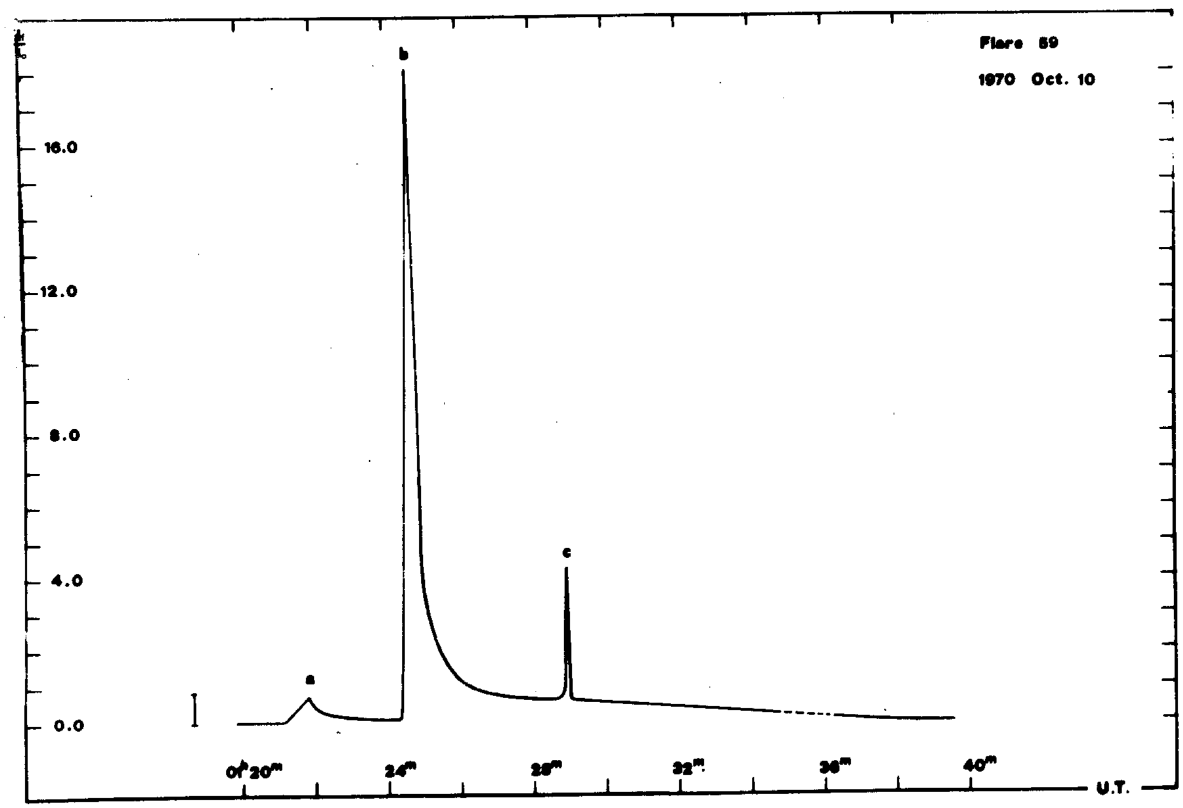
Flare 43
1970 Oct. 4
a
b
5.0
4.0
3.0
2.0
1.0
0.0
22h02m
06m
10m
14m
U.T.



Flare 44
1970 Oct. 5
a
b
c
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
01h25m
29m
33m
37m
41m
Flare 45
1970 Oct. 5
1.0
0.0
02h33m
37m
41m
Flare 46
1970 Oct. 5
1.0
0.0
02h53m
57m
Flare 47
1970 Oct. 5
1.6
1.0
0.0
03h26m
30m
Flare 48
1970 Oct. 5
1.6
1.0
0.0
23h00m
04m
U.T.


Flare 49
1970 Oct. 6
a
b
c
1.0
0.0
00h56m
01h00m
04m
Flare 50
1970 Oct. 6
1.0
0.0
01h14m
18m
Flare 51
1970 Oct. 6
3.0
2.0
1.0
0.0
02h04m
08m
Flare 52
1970 Oct. 6
1.0
0.0
21h51m
55m
Flare 53
1970 Oct. 8
1.0
0.0
01h37m
41m
Flare 54
1970 Oct. 8
1.0
0.0
01h39m
43m
Flare 55
1970 Oct. 8
1.0
0.0
02h43m
47m
UT


Flare 56
1970 Oct. 9
4.0
3.0
2.0
1.0
0.0
02h37m
41m
45m
49m
Flare 57
1970 Oct. 9
1.0
0.0
03h24m
28m
Flare 58
1970 Oct. 10
1.0
0.0
01h00m
04m
U.T.


Flare 59
1970 Oct. 10
16.0
12.0
8.0
4.0
0.0
a
b
c
01h20m
24m
28m
32m
36m
40m
U.T.

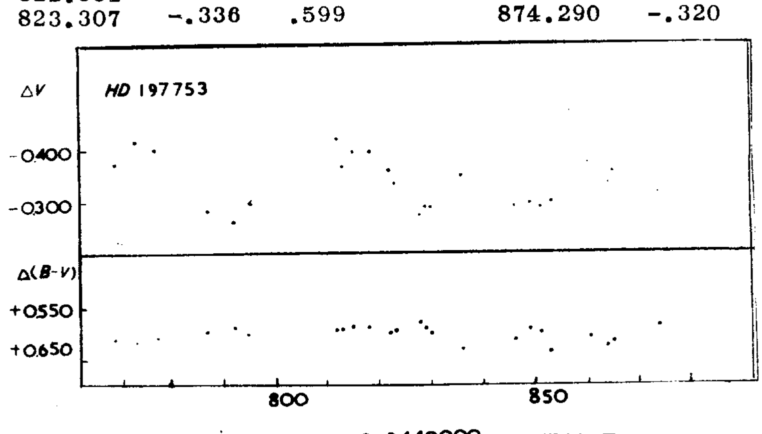
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 527

Konkoly Observatory
Budapest
1971 February 27

HD 197753: A NEW RED VARIABLE?

During the course of photoelectric photometry of U Del it was discovered that HD 197753 ($RA_{1970} = 20^h43^m45^s$, $D_{1970} = +18°8'$), used as comparison star, was variable. The light- and colour-curves have been constructed, using BD +17°4365 ($RA_{1970} = 20^h35^m15^s$, $D_{1970} = +18°7'$) as comparison star (V=8.12, B-V= +1.16, U-B= +1.15). The range of the light variation is about $0^m.15$. HD 197753 is possibly an SR_b type variable.

JD	ΔV	Δ(B-V)	JD	ΔV	Δ(B-V)
2440 769.525	-.375	.612	2440 828.391	-.277	.579
773.445	-.417	.615	829.337	-.293	.589
777.530	-.402	.609	830.320	-.291	.602
788.420	-.286	.600	836.324	-.349	.631
792.384	-.265	.589	846.314	-.296	.616
795.397	-.299	.602	849.308	-.299	.596
812.358	-.424	.596	851.284	-.289	.599
813.334	-.371	.596	853.289	-.300	.638
815.311	-.398	.590	860.298	-.375	.607
818.326	-.400	.592	864.303	-.339	.626
822.334	-.362	.603	865.305	-.363	.618
823.307	-.336	.599	874.290	-.320	.587



M. WISSE
Republic Observatory, Johannesburg

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 528

Konkoly Observatory
Budapest
1971 March 4

UNUSUAL DISTRIBUTION OF FLARE STARS IN PLEIADES

The distribution of stars of different classes in stellar associations and clusters is a source of important information on their evolution. From this point of view the study of the distribution of flare stars in Pleiades is of some interest.

According to the statistics the total number of flare stars in Pleiades exceds 700(1). Due to the intense observations of the Pleiades region carried out in Tonanzintla, Byurakan, Asiago and Budapest Observatories during the recent years 207 of them have been discovered (1-6). The data on these flare stars have been used to determine the distribution of their partial density in the Pleiades system. The main result of this study is the following:

The distribution of the space partial density of flare stars in Pleiades have been determined on the basis of their apparent distribution on the sky. The solution of Abel's equation has been obtained by the method given in (7). It has been supposed that the distribution of the flare stars in the system is a spheric-symmetrical one, the centre of the system being the geometrical centre of the known flare stars. It is almost coinciding with Alcyone.

The calculated distribution of the partial density of flare stars in Pleiades (number of flare stars per pc^3) as a function of the distance from the centre of the system (in pc) is presented in Fig.1. During our calculations the value of 125pc (8) has been taken for the distance of the centre of the Pleiades system. The corresponding radius of the subsystem of flare stars in Pleiades is about 6 pc.

Fig.1 shows that the flare stars are almost fully absent in the central region of Pleiades. The radius of this cavity is 1.4 pc. The density of the flare stars has a maximum near the limit of the cavity, at the distance 1.5 pc from the centre and is then decreasing with the distance more rapidly than $\sim r^{-2}$.

This result concerning the absence of flare stars in the central region of Pleiades we obtained already in summer 1969 using the data on about 100 known flare stars. Some indications on the similar phenomenon have been noticed earlier for the system NGC 7023 (9). But we have been inclined to think that in both cases this result has been due to the scarcity of observational data. Therefore with the discovery of new flare stars in Pleiades this problem has been rediscussed several times using 145,184 and 207 flares stars, respectively. It turned out that the conclusion of the existence of a cavity of flare stars becomes more and more definite with the increase of the statistical material.

It must be noted, that in our calculations we supposed that all observed flare stars in Pleiades belong to the system. If one takes into account the possible existence of background stars among them, then it must be concluded that the real cavity is even greater.

The probable number of flare stars inside the sphere with a radius of 1.4 pc around the centre of the Pleiades system can be 5-8. In order to move away the observed cavity it is necessary to have at least 30 additional flare stars in this sphere. It means that in the circle of the radius of 1.4 pc around Alcyone in projection on the sky we must observe about 80 flare stars instead of 44 observed.

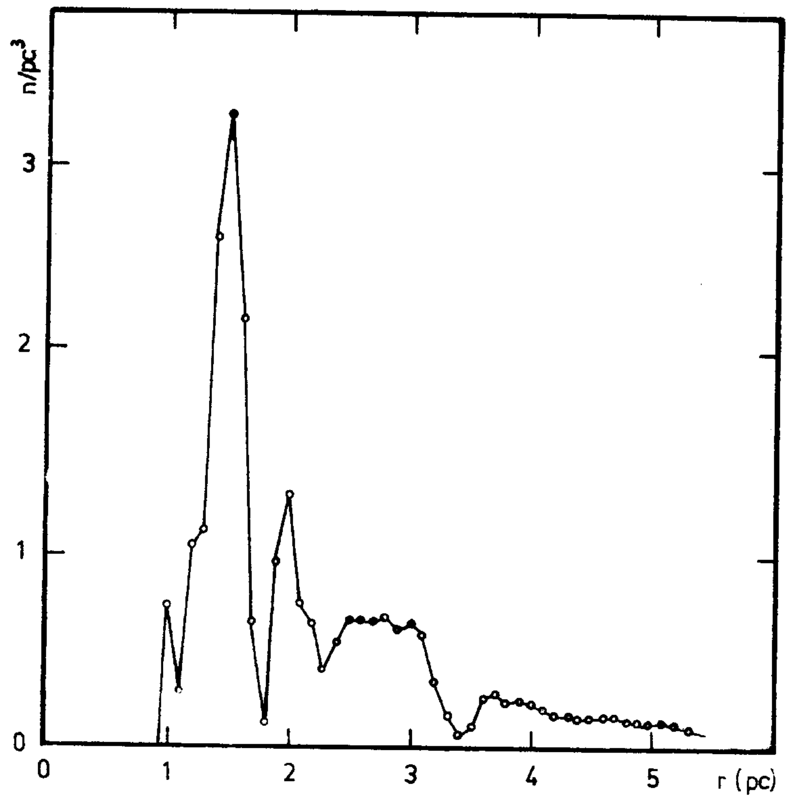
The absence of such a number of flare stars in the central part of Pleiades is unlikely to be the result of the influence of the absorbing matter, which is small and almost uniformly distributed (10), or of serious difficulties in detecting the flare stars on the plates in the nearest neighbourhood of bright stars concentrated in the central region of Pleiades. The calculations show that such a cavity is present in the case of comparatively bright flare stars as well.

The appearance of such a false cavity as a result of fluctuations, connected with the random nature of the detecting process of flare stars is very unprobable. The probability of this event is less than one hundredth.

Here is not a place to discuss all possible interpretations of the existence of the observed cavity of flare stars in Pleiades. It is interesting to note only that the explanation of this unusual phenomenon can perhaps be found in the frames of the idea of expansion of stellar associations (9, 11, 12).

Byurakan Astrophysical Observatory

L.V. MIRZOYAN
M.A. MNATSAKANIAN



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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 529

Konkoly Observatory
Budapest
1971 March 8

AD LEONIS, FEBRUARY 15-21, 1971

A continual photoelectric monitoring of the flare star AD Leo was done with the 91^{cm} reflector of the Okayama Station from 15 to 21 February 1971.

During the 29.4 hours of monitoring in the magnitude B, 2 flares were observed as shown in the following table:

Date 1971	Time of Monitoring (UT)	Time of Max. (UT)	Flares $\Delta m(B)$	P min.	Duration min.	σ mag.
Feb. 15	$11^h42^m-20^h00^m$					0.01
16	17 00 -18 16					0.02
17	10 36 -16 19	$11^h39^m.7$	0.13^{mag}	0.1	0.5	0.02
18	10 43 -19 30	13 02.6	0.97	2.7	26	0.01
19	17 36 -20 02					0.03
20	14 47 -17 41					0.02

$$\Delta m(B) = 2.5 \log (I_{o+f_{max}}/I_o)$$

$$P = \int (I_{o+f} - I_o)/I_o \cdot dt$$

$$\sigma(mag) = 2.5 \log (I_o + \sigma)/I_o$$

Tokyo Astronomical Observatory
25 February 1971.

K. OSAWA
K. ICHIMURA

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 530

Konkoly Observatory
Budapest
1971 March 9

PHOTOELECTRIC MINIMA OF ECLIPSING BINARIES

The following table gives photoelectric Minima obtained during the year 1970 at the Ege University Observatory, Izmir/Turkey and the Nürnberg Observatory/Germany. Minima of eclipsing binaries observed at both Observatories 1960-1969 were published in Astron. Nachr. 288, 69 (1964); 289, 191 (1966); 291, 111 (1968) and IBVS 456 (1970).

The table gives besides the heliocentric minima three different O-C's (see remarks at the end of table), the abbreviations of the names of the observers and the type of the instruments used (Izmir: 48 cm Cassegrain, Nürnberg: 34 cm Cassegrain, both with phototube 1 P 21). No filters were used, except for stars brighter than $7^{m}_{.}0$ (Schott GG 11 = GG 495).

Abbreviations of the Observers' Names

Bz = S.Bozkurt, Izmir
Dn = H.Dönmez, Izmir
En = C.Endres, Nürnberg
Gd = N.Güdür, Izmir
Gl = O.Gülmen, Izmir
Gö = G.Görz, Nürnberg
He = K.Herrmann, Nürnberg
Hl = H.Sengonca, Izmir
Hö.= D.Hölzl, Nurnberg
Hs = H.Karacan, Izmir
Hu = R.Hufnagl, Nürnberg
Ib = C.Ibanoğlu, Izmir
Iy = I.Yildiran, Izmir
Ki = A.Kizilirmak, Izmir
Kt = M.Kurutac, Izmir
Me = M.Meier, Nürnberg
Od = O.Demircan, Izmir
Pl = E.Pohl, Nürnberg
Rk = R.Akinci, Izmir
Ro = B.Both, Nürnberg
Wk = R.Woitok, Nürnberg
Yy = Y.Yildiz, Izmir

Star	Min (hel.)	O-C(I)	O-C(II)	O-C(III)	Obs.	Instr. cm	Remarks
	2440						
AB And	833.4034	+0^d.0173	+0.0031		Dn/Gl	48	
KP Aql	866.2526	+0.0331=	+0.0331	-0.0005	Gl/Ib	"	
OO Aql	811.4152	-0.0185	+0.0017		Dn/Od	"	1/
	817.494	-0.021	-0.001		Hl/Ib	"	1/
	825.3515	-0.0191	+0.0014		Gd/Hl	"	2/
	858.291	-0.021	0.000		Pl	34	2/
RX Ari	859.3944	+0.0186			Dn/Gd/Hl	48	
β Aur	517.485:	+0.026:			Ki/Od	"	
i Boo	661.4273:	+0.0081:	+0.0070:	+0.0061:	En	34	3/
	753.4231	+0.0097	+0.0091	+0.0077	Gl/Hs	48	
	780.471	+0.008	+0.008	+0.006	Hö/Wk	34	
SV Cam	857.5139	-0.0018	+0.0003		Hs/Rk	48	
RZ Cas	519.3669	+0.0002	-0.0010		Od	"	
	746.4607	-0.0030	-0.0051		Ki/Gl	"	
	758.4125	-0.0036	-0.0058		Hs/Od	"	
	819.3702	-0.0035	-0.0059		Od/Rk	"	
TW Cas	534.356	-0.012	-0.013		Od	"	
	751.461	-0.013	-0.014		En/Ro	34	
DO Cas	518.423	+0.002 =	+0.002		Gd	48	
PV Cas	767.3886	+0.0253	-0.0369	-0.0093	Ib	"	3/
	817.314	+0.062	0.000	-0.001	Hl/Ib	"	
	824.316	+0.063	0.000	-0.001	Ib/Rk	"	4/
	824.317	+0.064	+0.001	0.000	Ib/Rk	"	5/
	830.4071	+0.0271	-0.0352	-0.0079	Ib/Yy	"	3/
	831.3168	+0.0616	-0.0008	-0.0024	Dn/Ib	"	
	852.321	+0.060	-0.002	-0.004	Me/Pl	34	
U Cep	809.4802	+0.0068	+0.0193		Od/Yy	48	
	854.3560	+0.0079	+0.0207		En/Ho	34	
	874.3009	+0.0084	+0.0215		Dn/Ib	48	
VW Cep	765.311	-0.066	-0.016	-0.002	Od/Yy	"	
	793.4224	-0.0652	-0.0147	+0.0011	Od/Yy	"	
	829.325	-0.066	-0.015	+0.001	Ib/Yy	"	
	870.379	-0.063	-0.013	+0.004	Hs/Rk	"	
	876.360	-0.066	-0.016	+0.001	Hö/Hu/Wk	34	
XX Cep	520.426	-0.009	-0.021		Gd	48	
ZZ Cep	871.3481	-0.0003=	-0.0003		Hu/Me/Pl	34	
EG Cep	829.263	+0.008 =	+0.008		Ib/Yy	48	
	840.428	+0.009 =	+0.009		Dn/Gl	"	3/
TT Cet	501.421	-0.003	+0.060		Ib	"	
KR Cyg	841.346	-0.005	+0.012		Od/Rk	"	
MR Cyg	847.467	-0.003	+0.001		Gl/Hl	"	
V477 Cyg	781.433:	-0.010:	+0.003:		Me/Ro	34	
V548 Cyg	499.4142	-0.0367	+0.0038		Gd	48	
TW Dra	877.5390:	-0.0193:	-0.0004:		En/Wk	34	
TZ Dra	814.3824	+0.0038	+0.0041		Od/Yy	48	
	852.492	+0.008	+0.008		Dn/Gl	"	

Star	Min(hel.)	O-C(I)	O-C(II)	O-C(III)	Obs.	Instr. cm	Remarks
	2440	d					
AI Dra	848.4444	+0.0049	+0.0056		Hö/Me	34	
	875.415:	+0.002:	+0.003:		Me	"	3/
YY Eri	868.5418	-0.0036	+0.0008		Bz/Gl/Iy	48	
Z Her	740.4884	-0.0007	+0.0252		Hs/Od	"	
	752.4671	-0.0004	+0.0255		HS/Od	"	
	772.4314	-0.0001	+0.0259		Od/Yy	"	
	816.3533	+0.0010	+0.0270		Od/Yy	"	
	832.3241	+0.0006	+0.0266		Dn/Od	"	
RX Her	784.4671	+0.0007	-0.0001		Ib	"	
	849.3824	-0.0019	-0.0027		Hs/Rk	"	3/
TX Her	834.3431	-0.0095	+0.0001		Gl/Yy	"	
UX Her	781.3576	-0.0329	+0.0002		Hs/Kt	"	
AK Her	775.419	-0.007 =	-0.007	+0.009	Me/Pl	34	3/
	859.296:	-0.013:=	-0.013:	+0.003:	Hu/Pl	"	3/
SW Lac	836.4479	-0.0140	-0.0162		Hs/Rk	48	3/
	842.382	-0.013	-0.016		Od/Yy	"	
	843.503	-0.015	-0.017		Od/Yy	"	3/
	848.4758	-0.0134	-0.0156		Iy/Rk	"	
CM Lac	787.3442	-0.0046=	-0.0046		Od/Yy	"	3/
	848.328	+0.001 =	+0.001		Hö/Me	34	3/
	856.3501	-0.0004=	-0.0004		Iy/Hs/Rk	48	3/
AM Leo	683.428	-0.018 =	-0.018		Hs/Ib	"	
TZ Lyr	749.4635:	+0.0150:	+0.0031:		Gl/Ib	"	
	813.4560	+0.0198	+0.0079		Od/Rk	"	
U Oph	845.304	-0.012	-0.004		Me/Pl	34	
V451 Oph	812.398	+0.008	0.000		He/Me	"	
V566 Oph	846.3686	+0.0079=	+0.0079		Hl/Od	48	3/
	853.328	+0.003 =	+0.003		Me/Pl	34	3/
U Peg	511.338	-0.003 =	-0.003		Gd	48	
	835.3337	-0.0067=	-0.0067		Ib/Rk	"	3/
	867.3784	-0.0059=	-0.0059		Dn/Rk	"	
AT Peg	877.3368:	-0.0479:	-0.0044:		En/Hu/Wk	34	
	877.3372	-0.0475	-0.0040		Hl/Rk	48	
DI Peg	837.3269	-0.0061	-0.0024		Od/Rk	"	
	859.393	-0.006	-0.003		En/Gö	34	
IZ Per	871.476	+0.011 =	+0.011		Me	"	
β Per	844.5051	-0.0195	+0.0080		Od/Yy	48	
UV Psc	860.4014	+0.0104=	+0.0104		Gd/Hl	"	
V505 Sgr	818.3492	-0.0284	-0.0020		Gd/Hl	"	
RS Sct	826.376	+0.017	+0.022		Od/Rk	"	
W UMa	718.4707	-0.0499	-0.0007		Gl/Ib	"	
W UMi	820.368	-0.003 =	-0.003		Gd/Rk	"	
DR Vul	774.487	+0.032	+0.026		Pl	34	3/
	827.3553	+0.0049	-0.0012		Ib/Iy	48	
	871.2803	+0.0387	+0.0326		Hs/Rk	"	3/

Remarks:

1/ MinII (O-C I), 2/ MinII (O-C II), 3/ MinII, 4/ B filter, 5/ V filter.

Remarks concerning O-C

O-C (I): GCVS, Moscow 1969, O-C (II): SAC 42, Krakow 1971, O-C (III): new elements, published in IBVS by Ibanoğlu, Gülmen, Kurutac and Pohl:

KP Aql	IBVS 502	(1970)	Ibanoğlu and Gülmen
i Boo	IBVS 209	(1967)	Pohl
PV Cas	IBVS 386	(1969)	Pohl
VW Cep	IBVS 369	(1969)	Ibanoğlu and Kurutaç
AK Her	IBVS 369	(1969)	Ibanoğlu and Kurutaç

The (O-C)'s for secondary minima were calculated on the supposition that they are symmetric between primary minima (if not special data are given). The sign = between O-C (I) and O-C (II) indicates, that the elements (I) and (II) are equal. The sign: means that the time of minimum is uncertain.

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Budapest
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NEW OBSERVATIONS OF GAMMA BOOTIS

PREVIOUS OBSERVATIONS

The star Gamma Bootis (BS 5435, A7 III, m_V = 3.03) was identified as a variable in 1914 (P.Guthnick, R.Prager), and has been studied frequently since that time.

a) Its brightness variations, especially observed during the period 1923-1943 by M.Güssow (1928, 1930), P.Guthnick, H.Fischer (1940), P.Guthnick, H.Schneller (1942), show an irregular behaviour: the variations reach 0.05 magnitude, then become no more detectable, and at last reappear with no regularity (N.L.Magalashvili, J.J.Kumsishvili, 1965).

No correlation has been detected between the radial velocity measurements, and the phase of the luminosity variations (G.R.Miczaika, 1952).

b) Gamma Bootis was observed photometricaly by our group (A.Baglin, F.Praderie, M.N.Perrin) in April 1968 and in 1969 with the 60 cm telescope of the Observatoire de Haute-Provence. Instrumental problems (the photomultiplier nearly underwent a fatigue effect owing to bright illumination) or bad weather conditions did not allow us to obtain good light curves. However, one can think the light variations, if they existed, were less than 0.02 magnitude. A simultaneous high dispersion spectrographic study was carried out with the electronic camera: variations in the shape of the line profile, in equivalent width and half width of the K line were clearly shown. (J.M. Le Contel, F.Praderie, A.Bijaoui, M.Dantel, J.P.Sareyan 1970).

OBSERVING CONDITIONS

We could observe Gamma Boo in the night of 6-7th April 1970 for more than two hours, centered on the meridian transit. The instrument was the 76 cm telescope of the Jungfraujoch Observatory (Switzerland).

a) The filters were those of the Geneva photometric system, (U, B, V, B_1, B_2, V_1, G), (F.Rufener, 1970). The photometer was built at the Geneva Observatory, and modified in order to work on bright stars without any fatigue effect, and, moreover, to limit the systematic chromatic errors (J.P.Sareyan, 1970). The photomultiplier was a 20 dynodes of the Lallemand type ("Thierry"). The high voltage was 730 volts, its repartition increasing towards the cathode (140, 86 and 80 volts on the first three dynodes). The photomultiplier temperature was kept at +2°C ±1°.

b) We chose Beta Bootis (BS 5602) as a comparison star, in spite of its distance (6°) to Gamma Bootis: the quality of the night (3600 m height above sea-level) justified this choice, the extinction, being only about

0.01 magnitude for Δ (sec z) = 0.1 in the U filter, and

0.01 magnitude for Δ (sec z) = 0.3 in the V filter,

during the observations.

RESULTS

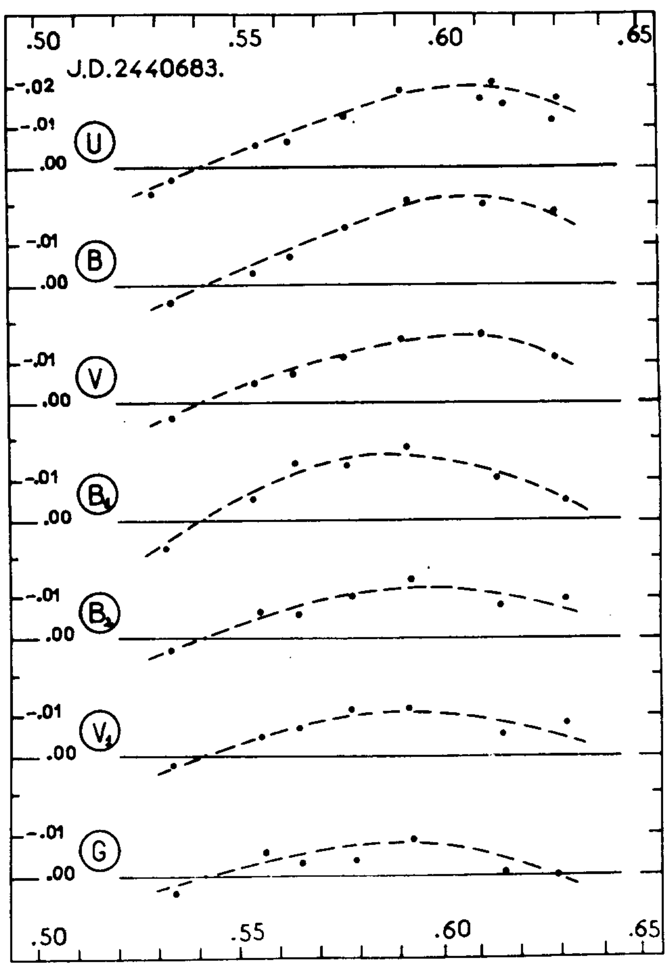
Our observations through the different filters are plotted on the figure. The magnitude difference "Gamma Boo - Beta Boo" increases towards the top of the figure. The difference was chosen equal to 0.00 at 1^h U.T. on 7th April 1970. The spectral sensitivity of the photomultiplier is not yet definitively calibrated in the Geneva Observatory photometric system; so, one cannot consider the origin of the ordinates in the figure as equivalent to the values of the Geneva Observatory catalogue for Gamma Bootis (n°941), in F.Rufener, 1970). However, the shape and amplitude of the light curves would not be greatly affected in the Geneva system itself. The brightness of Gamma Bootis reaches its maximum at J.D. 2440 683.605, i.e. phase .95 ± .05, if one agrees with N.L.Magalashvili and J.J.Kumsishvili (1965):

$$\text{Max.} = \text{J.D.}2437020\overset{d}{.}440 + 0\overset{d}{.}2903137 \cdot E$$

This agreement in phase, good enough for the only maximum observed, allows us to think that no phase alteration has occured in the star pulsation, as previously observed in 1936-1940 (G.R.Miczaika, 1952).

The observed amplitudes seem to decrease rather regularly with increasing effective wavelengths, from .042 ± .004 magnitude in the U filter, to .032 ± .004 in the V filter. I.e., the star is "bluer" at its maximum brightness.

We find a variation $\Delta(V) > \Delta(B-V)$ in agreement with the observations of classical Delta Scuti stars. N.L. Magalashwili, J.J.Kumsishvili (1965) found $\Delta(V) \lesssim \Delta(B-V)$ in



1962 with their own blue and yellow filters. When the light variation of Gamma Bootis can be detected, the amplitudes vary in a very wide range. According to N.L.Magalashvili, J.J.Kumsishvili, and M.Jerzykiewicz' (1968) observations the amplitude varied approximately between $^{m}.01$ (i.e. about the detection limit) and $^{m}.11$ in B. (We obtained .040 ± .004).

REMARKS

a) The amplitude variations are perhaps caused by a beat phenomenon. Gamma Bootis has sometimes been classified as a Delta Scuti star, a type in which many stars present the same phenomenon.

We tried to find out the secondary period which could account for the amplitude oscillations (assuming an amplitude $\leqslant 0^m.01$ when the star presents "no variation"). The secondary period should be about one second longer than the observed one, the "beat period" being probably about 7000 days.

If this result is significant, a large number of further observations should be needed to confirm it. (Especially, an increase in the amplitudes might occur within the next years).

b) From the lack of phase lag in more than 30 years of irregular luminosity variations, one may think, Gamma Bootis is a regular pulsating star, its brightness variations being damped by an episodic photospheric phenomenon accounting for the erratic amplitudes of the observed brightness.

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Groupe Etoiles variables à courtes périodes
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Buda est
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THE SECONDARY PERIOD OF THE VARIABLE STAR SW PISCIUM

The variable star SW Piscium (of RR Lyrae type) has been observed photographically at the Observatory of the University of Cluj (telescope: D=50 cm., F=250 cm.), from September 1964 to October 1966. Fifteen light maxima were obtained showing sensible variations in phase.

In the table below, the first column contains the times of the observed maxima and the second column the O-C values computed with the following elements:

$$\text{Max.hel.} = \text{J.D.}2438652.443 + 0^d\!.521265.E$$

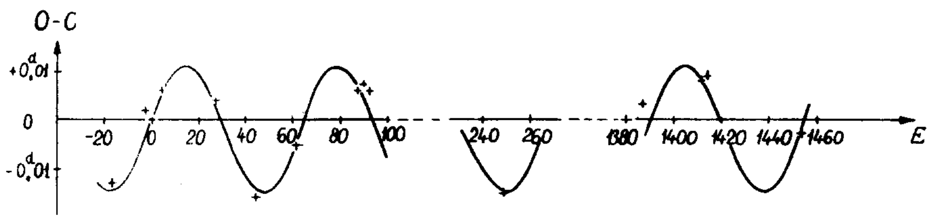
determined by the author, and published in (1)

J.D.max. hel.	O-C
2438643.568	$-0^d\!.013$
38651.402	+0.002
38652.443	0.000
38654.534	+0.006
38666.521	+0.004
38675.363	-0.016
38684.235	-0.005
38698.320	+0.006
38699.364	+0.007
38700.405	+0.006
38782.223	-0.015
39375.441	+0.003
39388.477	+0.008
39389.521	+0.009
39410.359	-0.003

In the Figure the O-C differences (crosses) are plotted against Epoch E. The oscillations of maxima in phase can be represented by a formula (the continuous line in Figure):

$$O-C = 0^d\!.0132 \sin 5^\circ\!.440(E+2) - 0^d\!.002$$

This formula suggests a secondary period $P_b = 34^d\!.5$.



The oscillations in height of maxima may be also present, but the accuracy of the photographic observations does not allow to determine their amplitude.

Further observations will be necessary in order to determine the secondary period more exactly and to study the Blashko-effect.

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Konkoly Observatory
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A PHOTOELECTRIC MINIMUM OF THE ECLIPSING BINARY SZ CAMELOPARDALIS

A secondary minimum of SZ Cam has been observed with the 40 cm reflecting telescope of the Copenhagen University Observatory at Brorfelde. A standard V filter was used. The comparison star was BD +61° 669 (B2) and the check star was BD +61° 673 (AO). The extinction coefficient determined from 52 observations of the comparison star was applied to all observations. A single observation consisted of five integrations of 14 seconds duration followed by two integrations of the light from the night sky. From ten observations of the check star the standard deviation of a single difference, check star minus comparison star, was found to be $0^m.003$. The minimum consists of 49 differences, variable star minus comparison star, fairly evenly distributed within an interval of $0^d.45$. A preliminary determination of the heliocentric julian date of the minimum, made by mirroring the ascending branch on the descending branch, gives $JD_{\odot}$ = 2 440 $897^d.538$. The O-C residual from the ephemeris by Wesselink (1941) is $+0^d.111$ (E=4952.5).

As pointed out by Koch (1970) the spectral type by Morgan et al. (1955) - BOII-III - prompts a conjecture of mass loss and period changes. It should, however, be noted that Murphy (1969) classifies SZ Cam as an O9V star.

Assuming that the secondary minimum is separated from the primary minimum by half the period, as found by Wesselink (1941), a lengthening of the period seems to have taken place. The mean period from 1934 to 1970 has been $2^d.6984390$. An observation of a primary minimum is needed to determine if the secondary minimum is still situated at phase $0^p.5$.

1971 March 17

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1971 April 7

PHOTOELECTRIC OBSERVATIONS OF AD Leo

The photoelectric observations of the flare star AD Leo were carried out at the Crimean Astrophysical Observatory during the period of February 18 - March 4, 1971. The total time of continuous monitoring in the B photometric system was equal to 26.6 hours.

The moments of the beginning and the end of continuous monitoring are given in Table I. Table II contains the time of maximum of the flares observed, duration before and after the maximum, t_b and t_a, relative intensities at maximum $(I_{fl}-I_0)/I_0$, errors of observation σ/I_0, integrated intensities P and air masses F(z). The light curves of flares are presented on figures.

Table 1

Date 1971	Coverage (UT)
Febr. 18	17 01-17 16, 17 34-17 36, 17 37-18 15, 18 16-20 55, 20 59-22 24, 22 28-22 37, 22 42-23 20, 23 21-24 00.
Febr. 19	00 00-00 44.
Febr. 20	17 08-17 28, 17 30-19 29, 19 30-19 46, 19 48-21 33, 21 35-21 45, 21 47-21 53, 21 59-22 03, 22 06-22 15, 22 19-22 34, 22 36-24 00.
Febr. 21	00 00-01 09, 17 35-19 38, 19 39-22 31, 22 32-23 01, 23 03-23 11, 23 12-24 00.
Febr. 22	00 00-03 00, 17 01-17 39, 17 51-18 15.
Febr. 23	17 32-18 02, 18 05-18 19, 18 20-18 29.
Febr. 25	00 57-01 32.

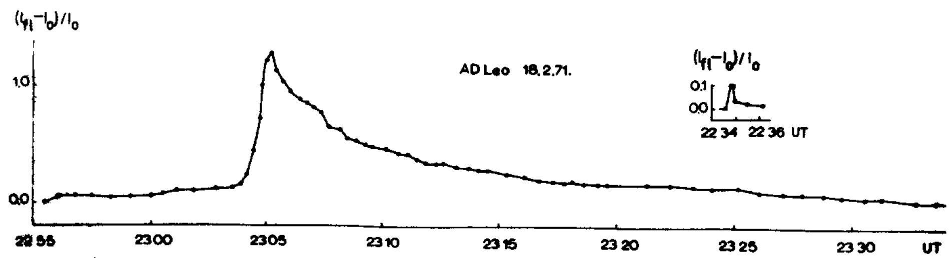

Table 2

Date 1971 Febr.	UT_{max}	t_b minutes	t_a	$(I_{fl}-I_o)/I_o$	σ/I_o	P min.	F(z)
18	22 34.8	0.2	1.4	0.09	0.02	0.04	1.11
18	23 05.3	9.8	29	1.27	0.02	8.47	1.12

P.F. CHUGAINOV
N.I. SHAKHOVSKAYA
Crimean Astrophysical Observatory

Correction to IBVS No. 176

Star name	Printed	Read
RW CMa	28201.83+5.72941 E	27021.68+5.72906 E
RW Cas	37168.23	37158.23
UX Per	4.97247 E	4.56581 E

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INFORMATION BULLETIN ON VARIABLE STARS
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SOME REMARKS CONCERNING THE TIME-DISTRIBUTION OF FLARES OF UV CETI TYPE STARS

In a recent paper of the authors (1) it was shown that the sequences of flares ($\Delta m > 0.15$ mag.) of the stars YZ CMi and UV Cet are near to Poisson series with mean flare frequencies $\nu = 0.00379\ \mathrm{min}^{-1}$ and $\nu = 0.01190\ \mathrm{min}^{-1}$, respectively. This conclusion was based on the consideration of the time-intervals between flares and partly of the number of flares, occurring in a given small time-interval. By such an approach, accounting mainly the small scale structure of flare sequences, the possible excess flare groupings relative to the Poisson law could be detected only indirectly. Therefore, it would be desirable to investigate the flare sequences in a way which would take into consideration the probability of appearance of each given group of flares.

When the time-intervals of continuous observation of a star are small and of different duration, then the simplest approach to this question is to consider the distribution of the quantity N_k, the number of intervals of continuous observation containing a given number, k=0.1.2.... of flares, and to compare the so obtained distribution with the one expected for a Poisson sequence.

In order to find out the above mentioned distribution we employed the same, rather homogeneous set of B colour flare observations of YZ CMi and UV Cet made in 1967-1970, and already used in (1). In the first, second and fourth columns of Table 1 are presented the number of flares (k) and the numbers of time-intervals containing k flares for both stars under consideration.

As it was said above, the different duration of time-intervals of continuous observations should be taken into account when considering the corresponding quantities for a Poisson process. Therefore, let us denote by g(t)dt the part of time-intervals the duration of which lies between t and t+dt, and by $p_k(t)$ the probability of occurrence of k flares during a time-interval t. If the number of flares occurring in non-overlapping time-intervals are mutually independent, then according to the full probability formula, the probability w_k to find k flares in a randomly taken time-interval is given by

$$w_k = \int_0^\infty g(t)\,p_k(t)\,dt \qquad k = 0.1,2..... \qquad (a)$$

Table 1

k	YZ CMi N_k	YZ CMi $N_k^{(p)}$	UV Cet N_k	UV Cet $N_k^{(p)}$
0	209	209.0	120	104
1	46	45.8	24	37.0
2	14	13.8	14	16.3
3	5	4.7	3	8.7
4	2	1.7	7	4.8
5	0	0.55	4	2.8
6	0	0.28	0	1.6
7			1	0.89
8			1	0.53
9			0	0.35
10			2	0.18
11			1	0.09
N	276		177	

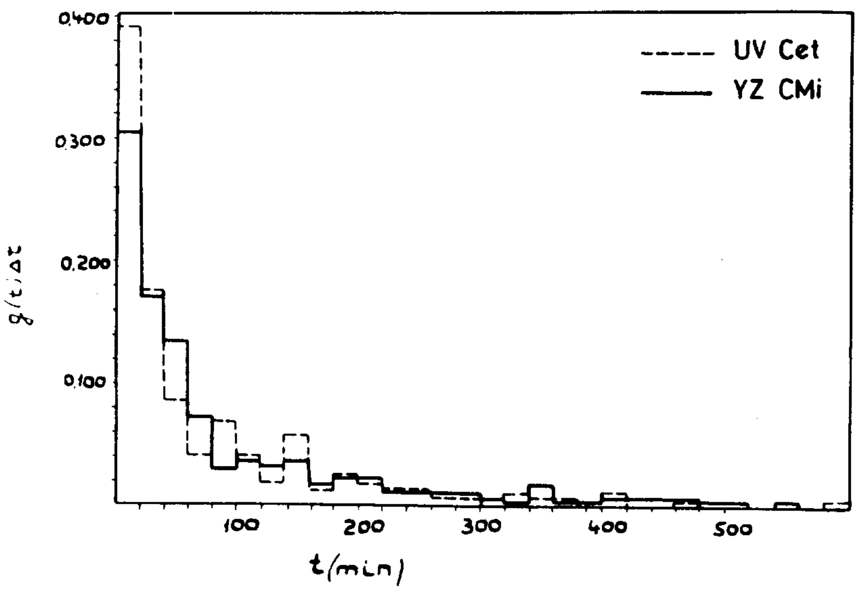
Supposing now that $p_k(t)$ is defined by the Poisson formula we obtain the following expression, giving the expected number of time-intervals containing k flares:

$$N_k^{(p)} = Nw_k = N \int_0^\infty g(t) e^{-\nu t} \frac{(\nu t)^k}{k!} \qquad k = 0,1,2.... \quad (b)$$

where N the whole number of intervals of continuous observation, is equal to 276 for YZ CMi and 177 for UV Cet.

The function g(t) presented on the Figure slightly differs from the one used in (1). This is caused by the fact that in the present case we are not interested in the moments of flare occurrence inside the time-intervals. This difference is, however, not substantial for our further conclusions.

The quantities $N_k^{(p)}$ for a Poisson process are calculated by formula (b) using the above given frequencies and are presented in the third and fifth columns of Table 1. The comparison of these quantities with the corresponding observational ones shows for YZ CMi a very good and for UV Cet a fairly satisfactory, $P(\chi^2 > \chi^2_{obs}) = 0.06$ agreement. It should be stressed, that the number of time-intervals containing relatively large numbers of flares corresponds well to the expected ones. A significant difference could be noticed only for k = 10-11 (this fact was discussed in (1)) but this could mostly be due to fluctuations owing to the small number of events.



The present discussion permits to infer that the observational data do not contradict to the supposition that the flare sequences on the stars YZ CMi and UV Cet are near to the Poissonian one, and in this way confirms the conclusion made in the previous paper.

The authors are indebted to V.A.Ambartsumian for valuable discussion of the questions discussed in this note.

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Reference

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Budapest
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ETOILES DU TYPE BY DRACONIS

Dans une note très récente, P.Chugainov (1) a attiré l'attention sur trois naines rouges, montrant des variations périodiques dues à des "spots" sur la surface de l'étoile en rotation.

Outre ces trois étoiles: FF And, BY Dra et CC Eri, deux autres sont déjà connues comme étant du même type: CM Dra et GT Peg. Ces étoiles qui semblent former un type défini sont présentées ci-dessous. Les valeurs de la parallaxe et de la magnitude absolue sont celles du "Catalogue of nearby stars" de W.Gliese (2).

Gliese	Design	1950 AR	1950 Dec	V	B-V	Sp	π	M(V)
29.1	FF And	$0^h40^m0\overset{s}{.}5$	$+35°16\overset{'}{.}4$	10.38	1.38	M0e	$\overset{''}{.}042$	8.5
103	CC Eri	2 32 28	−44 00 6	8.71	1.39	K7e	.088	8.4
630.1	CM Dra	16 33 29	+57 14 8	12.90	1.60	M4e	.066	12.0
719	BY Dra	18 32 45	+51 41 0	8.6	1.20	K6e	.071	7.9
875.1	GT Peg	22 49 30	+31 29 4	11.8		M4e	.057	10.6

Notes FF And = BD +34°106. Binaire P=3,93j (Kzeminski et Kraft 3) ou P = 2.170j (4) Amplitude Δy = 0.06
CC Eri = CoD −44°775 Binaire spectroscopique P = 1.56145j, ΔV = 0.33 (Evans5)
CM Dra = LP IOI-15. Binaire de période mal déterminée P = 0.63398 ou 1.26796j (Eggen et Sandage 6)
BY Dra = BD +51°2402. Binaire P = 5.981j (Chugainov 7); variations périodiques avec changement de phase P: = 3.836j (3), ΔV = 0.08
GT Peg = AC +31°70565 Binaire P = 4.65j (3), ΔV = 0.08

En outre on peut soupçonner comme étant du même type les quatre étoiles suivantes, connues comme binaires spectroscopiques et présentant des variations d'éclat ou de l'intensité du spectre.

Gl.	Design.	AR 1950	Dec.	V	B-V	Sp	π	M(V)
206	Ross 42	5^h29^m30	+ 9°47'3	11.50	1.62	M1.5e	".070	10.7
268	Ross 986	7 06 39	+38 37 5	11.48	1.71	M5e	.169	12.6
617	+67°935A	16 16 37	+67 21 5	8.62	1.41	M1e	.089	8.4
831	Wolf 922	21 38 34	-10 00 6	11.95	1.64	M4e	.134	12.6

Notes Ross 42 = CSV 6183. Binaire spectroscopique, P non connue. Variabilité suspectée par Weber (8)
Ross 986 = CSV 102544. Binaire spectroscopique de P non connue. Variabilité soupçonnée par Petit (9)
+67°935 = CSV 102797. Binaire spectro probable. Variations suspectées par Beyer (10)
Wolf 922. Presente une variation périodique ou semipériodique P~1500j (Gliese 2)

L.Detre (11) a fait remarquer que la surveillance continue de ces étoiles s'impose, car elles ont probablement des cycles longs, analogues aux cycles solaires. A ce sujet il faut rappeler que Popper (12) avait déjà attiré l'attention sur les variations spectrales de cycle long de cinq naines rouges.

Il est également nécéssaire de préciser l'allure et la durée des variations périodiques courtes.

MICHEL PETIT

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NUMBER 537

Konkoly Observatory
Budapest
1971 April 18

THE SUPERNOVA SERVICE OF THE ABASTUMANI ASTROPHYSICAL OBSERVATORY

In accordance with the discussion which took place in Brighton at the General Assembly of the IAU I give here the data of observations connected with the Supernova Service of the Abastumani Astrophysical Observatory.

We participate in the international Supernova Service since 1962 with our Schmidt Camera 36/44.4/62.5 cm, having a field of 42 square degrees. The magnitude limit is 15.2 on A-600 film with 5-minute exposure time.

The coordinates of the centre of our areas are given in Table 1. In Table 2, separately for each area and year, the following data are given:

Column a: Number of observational night
" b: Net exposure time
" c: Total number of observational night in 1962-70)
" d: Net exposure time for each area obtained in 1962-70
" e: Same as d, but expressed in fractions of a day.

Table 1. Centre of Areas

Area	RA (1950)	D (1950)	Area	RA (1950)	D (1950)
1	00^h04^m	+47°35'	13	10^h45^m	+15°00'
2	11 54	+48 00	14	11 20	+13 00
3	12 00	+50 00	15	11 25	+58 50
4	12 18	+15 00	16	11 38	+47 38
5	12 30	+ 5 00	17	12 27	+ 8 16
6	12 30	+15 00	18	12 30	- 5 00
7	12 30	+25 00	19	12 30	-10 00
8	14 52	+11 30	20	12 30	+ 5 00
9	15 00	+ 2 00	21	12 30	+10 00
10	18 16	+24 00	22	12 30	+15 00
Additional Centres			23	12 45	-10 00
11	8 54	+ 3 08	24	12 45	- 5 00
12	10 45	+13 00	25	16 41	+36 50

Table 2

Area	1962 a	1962 b	1963 a	1963 b	1964 a	1964 b	1965 a	1965 b	1966 a	1966 b	1967 a	1967 b
1	–	–	–	–	–	–	17	4^h50^m	19	2^h10^m	27	3^h35^m
2	–	–	–	–	–	–	18	5 20	22	3 20	33	5 05
3	23	3^h50^m	12	4^h00^m	15	4^h00^m	–	–	–	–	–	–
4	–	–	–	–	–	–	22	5 10	18	2 40	33	4 15
5	29	4 50	11	3 20	14	3 40	4	0 40	–	–	–	–
6	23	3 50	12	4 10	14	3 50	–	–	–	–	–	–
7	–	–	–	–	–	–	–	–	–	–	–	–
8	–	–	–	–	–	–	21	4 50	23	2 55	34	5 05
9	23	3 50	20	6 10	8	2 40	–	–	–	–	–	–
10	–	–	–	–	–	–	16	3 40	24	2 35	36	6 05
11	–	–	–	–	–	–	–	–	–	–	–	–
12	–	–	–	–	1	0 10	12	2 00	2	0 40	17	1 25
13	–	–	–	–	–	–	–	–	–	–	–	–
14	–	–	–	–	1	0 10	12	2 00	2	0 10	–	–
15	–	–	–	–	–	–	–	–	–	–	–	–
16	–	–	–	–	–	–	–	–	–	–	–	–
17	–	–	–	–	–	–	–	–	–	–	–	–
18	–	–	–	–	–	–	–	–	2	0 10	–	–
19	–	–	–	–	–	–	–	–	2	0 10	–	–
20	–	–	–	–	–	–	–	–	3	0 15	–	–
21	–	–	–	–	3	0 30	4	0 40	3	0 15	4	0 20
22	–	–	–	–	–	–	–	–	3	0 15	2	0 10
23	–	–	–	–	1	0 10	11	1 50	–	–	–	–
24	–	–	–	–	1	0 10	14	2 20	–	–	–	–
25	–	–	–	–	–	–	–	–	–	–	–	–

Table 2 (cont.)

Area	1968		1969		1970		c	d	e
	a	b	a	b	a	b			
1	12	1^h20^m	–	–	–	–	75	11^h55^m	$0^d.4965$
2	44	5 00	31	3^h30^m	25	2^h22^m	173	24 37	1.0257
3	–	–	–	–	–	–	50	11 50	0.4931
4	41	4 40	30	3 45	24	2 12	168	22 42	0.9458
5	–	–	–	–	22	1 52	80	14 22	0.5986
6	–	–	–	–	–	–	49	11 50	0.4931
7	–	–	–	–	22	1 52	22	1 52	0.0778
8	24	2 50	8	0 40	–	–	110	16 20	0.6806
9	–	–	–	–	–	–	51	12 40	0.5278
10	29	4 15	–	–	–	–	105	16 35	0.6910
11	5	0 25	–	–	–	–	5	0 25	0.0174
12	8	0 40	–	–	6	0 30	46	4 55	0.2049
13	5	0 25	–	–	–	–	5	0 25	0.0174
14	8	0 40	1	0 50	4	0 20	28	3 25	0.1424
15	–	–	5	0 25	–	–	5	0 25	0.0174
16	–	–	7	0 35	–	–	7	0 35	0.0243
17	–	–	3	0 15	–	–	3	0 15	0.0104
18	5	0 25	–	–	–	–	7	0 35	0.0243
19	4	0 20	–	–	–	–	6	0 30	0.0208
20	6	0 30	–	–	–	–	9	0 45	0.0313
21	6	0 30	1	0 05	5	0 21	26	2 41	0.1118
22	6	0 30	–	–	6	0 28	17	1 23	0.0576
23	4	0 20	–	–	–	–	16	2 20	0.0972
24	5	0 25	–	–	–	–	20	2 55	0.1215
25	5	0 25	–	–	9	1 25	14	1 50	0.0764

Abastumani Astrophysical Observatory

E.K. KHARADZE

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Konkoly Observatory
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1971 April 19

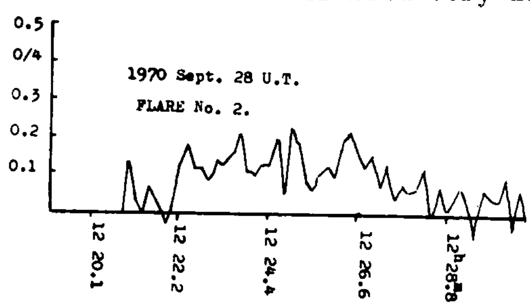
OBSERVATIONS OF THE FLARE STAR UV Cet DURING THE 1970 SEPTEMBER 22-OCTOBER 9 INTERNATIONAL PATROL.

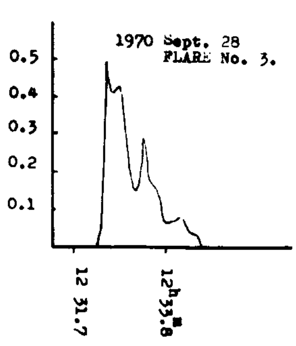
a) PHOTOELECTRIC OBSERVATIONS

The results of UV Cet observations carried out at the Auckland Observatory, N.Z. during the 1970 campaign arranged by the I.A.U. Working Group on Flare Stars are reported.

The observations were carried out in B light, except for September 22 when V filter used, with a 50 cm Cassegrain Zeiss reflector. The photomultiplier tube was an unrefrigerated EMI 9502 used with a capacitor integrating output and a digital readout. Each observation comprised one ten second integrating period.

In Table 1 the detailed coverage is given together with notes on sky conditions. Table 2 lists the characteristics of the six flares observed during 13.4 hours of monitoring. In this table the columns give data as defined in IBVS 326. Flares 2, 3 and 4 are depicted in Figures 1-3. The remaining three flares are considered very doubtful.





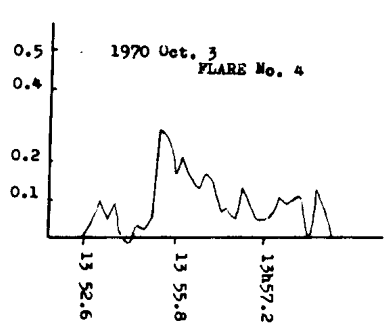


Table 1

Coverage (U.T.)

1970					Total	Sky
Sept	22	1021-1049;	1052-1100;	1108-1132		V. good between
		1142-1224;	1229-1239;	1309-1320;		cloudy
		1334-1409;	1415-1428.		2^h51^m	patches.
	23	1108-1121;	1133-1138		0 18	Fair
	26	1200-1234;	1238-1314;	1318-1331	1 23	Haze and clouds.
	28	1053-1055;	1118-1131;	1137-1157		Odd
		1159-1215;	1220-1252;	1301-1329;		showers
		1348-1401;	1406-1416.		2 14	from S.W
Oct.	2	1041-1045;	1049-1054		0 09	Cloudy
	3	1344-1417;	1418-1434;	1444-1446;		
		1450-1503;	1504-1524;	1540-1542	1 26	Poor
	4	1011-1058;	1105-1149.		1 31	Cloudy; poor
	7	1032-1036;	1038-1039;	1106-1117;		
		1124-1200;	1202-1209;	1214-1222;		Passing
		1224-1237;	1243-1249;	1250-1251;		clouds;
		1255-1256;	1258-1259;	1304-1305	1 30	Poor.
	8	1052-1117;	1120-1127;	1130-1146;		Inter-
		1150-1216;	1217-1306		2 03	mittent cloud; poor.

Table 2

Observed Flares

No.	t Max(UT) 1970		Duration d_b (Mins)	Duration d_a (Mins)	3 S.D.	Max. Magn.	Integr. Intens. mag/min	Air Mas	Notes
	Sept								
1	22	$12^h11^m.4$	-	-	0.045	0.16V	0.003	1.144	(1)
2	28	12 25.0	4.5	5	0.1	0.23B	0.769?	1.089	(2)
3	28	12 32.5	0.3	2.5	0.1	0.47B	0.623	1.082	
	Oct.								
4	3	13 55.6	0.2	3.0	0.1	0.29B	0.474	1.06	
5	3	14 20.6	Very doubtful because of cloud						
6	8	11 24.3	Very doubtful because of cloud.						

Notes:

(1) Doubtful validity. May have been a recorder error.

(2) Multiple activity.

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b) PHOTOGRAPHIC OBSERVATIONS

During the 1970 campaign on UV Cet photographic monitoring was carried out with the Baker Nunn camera of the USAF Tracking Station at Mount John, N.Z. Exposure times varied and each film consisted of exposures of 3.2, 7, 15, 30 and 60 seconds. The periods covered by the monitoring are listed below together with the number of frames taken.

Coverage (U.T.)

1970		U.T.		No. of Frames
Oct.	1	$08^h39^m40^s$ to	$09^h20^m33^s$	78
	1	12 06 39	12 39 29	62
	4	10 42 17	11 29 28	106
	4	13 50 03	14 19 39	58

All observations were obtained under first class conditions with no cloud. A few frames could not be used through over exposure.

One minor flare, estimated at 0.4^m, was recorded on the frame exposed at 1970 Oct. 4 $10^h56^m51^s$ (U.T.). There is a suggestion that flare activity had not completely died down when the succeeding frame was exposed at $10^h57^m25^s$.

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c) VISUAL OBSERVATIONS

Visual monitoring of UV Cet was carried out at the Carter Observatory, Wellington, N.Z. with the 23 cm refractor. Summary of monitoring times is given in Table 1 with notes on sky conditions. Table 2 lists possible flares observed. These should be treated with reserve unless confirmed elsewhere.

Table 1

Coverage (U.T.)

1970					Total	Sky
Sept.	22	1149-1232.			0^h43^m	Some haze.
	26	1108-1335;	1414-1514;	1550-1554;		
		1605-1640			4 06	Good.
	27	0900-0904;	0921-1100;	1130-1230;		
		1245-1345;	1410-1440;	1455-1620;		Cloud at
		1625-1645.			5 58	times.
	28	0905-1305;	1330-1400;	1405-1510;		
		1520-1640.			6 55	Good.
Oct.	7	1010-1045;	1120-1250;	1340-1440;		
		1450-1510.			3 25	Haze.
				Total	21 07	

Table 2

Possible Flares

No.	Flare Max. 1970 (U.T.).			Duration (Minutes) d_b	d_a	Max Mag V
1	Sept	22	$12^h15^m.0$	2.0	3.5	0.6
2		28	10 55.7	1.2	2.3	0.5
3	Oct	7	10 28.5	0.5	0.5	0.3
4		7	11 34.0	1.0	1.0	0.4

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NUMBER 539

Konkoly Observatory
Budapest
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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR YZ CMi JANUARY 1971

YZ CMi was monitored with the 41 cm reflector, using the photoelectric photometer, at R.F. Joyce Memorial Observatory, West Melton, near Christchurch, New Zealand. During 11 hours 41 minutes of monitoring no flares greater than the uncertainty in readings of ±0.05 m, were observed. The times of monitoring were:

1971		U.T;
Jan	16	1013-1027; 1044-1050; 1056-1106; 1125-1222.
	17	1036-1129; 1136-1330. (Haze)
	18	1105-1113; 1123-1124; 1132-1135; 1143-1150; 1155-1244; 1255-1353.
	24	1008-1018; 1024-1026; 1033-1158.
	25	0939-1010; 1021-1117; 1122-1209; 1217-1221; 1225-1347; 1351-1414; 1419-1423.
	29	1010-1024; 1028-1039; 1048-1100.

Observers: M.Clark; K.Dunn; R.W.Evans; J.Hutcheson; B.McMaster and C.H.Rowe.

1971 March 31

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PHOTOGRAPHIC OBSERVATIONS OF NOVA IN L.M.C.

A nova in the Large Magellanic Cloud was reported by J.A.Graham in IAUC 2305 and 2307. The following photographic magnitudes have been communicated by A.Gilmore, Carter Observatory, Wellington.

1971		U.T.	Ptg. Mag.
Feb.	7	15^h53^m	12.8
	8	10 09	12.9
	11	13 29	13.3
	16	11 09	13.0
	17	12 11	13.2
Mar.	8	08 57	14.5

Times are those of the middle of thirty minute exposures and the magnitudes are ± 0.4 mag.

The magnitudes were obtained by comparing the nova with stars on a plate of the Royal Greenwich Observatory Variable Field 1. From plates of this field and the nova taken on 1971 Feb.11, photographic magnitudes were derived for two nearby stars: CPD $-68°$ 299 and the brighter star of the pair 1 arcmin north of the nova. Derived values were respectively 10.94 (RMS error 0.21 m in 5 comparisons) and 13.77 (RMS error 0.23 in 10 comparisons).

Similar comparisons of the other plates with V.S. Field 1 were made, deriving a correction for each plate from the deduced magnitudes of the two reference stars. This combined several errors and gave the RMS error of 0.4 mag for the values of the nova given above.

As part of a regular survey programme, B.Ward, Tirau, N.Z. had photographed the L.M.C. on 1971 January 18. The nova was invisible on his negative and certainly fainter than magnitude 12.0.

1971 April 2.

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Konkoly Observatory
Budapest
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PLANETARY NEBULA FG Sagittae STOPPED BRIGHTENING

The peculiar object FG Sge, which is the central part of a planetary nebula and which had risen rather continuously from m_{pg} = 13.6 in 1894 to B = 9.5 in 1966 stopped brightening in B in the middle of 1967 and in V in 1969.

The following yearly means of photoelectric observations are to continue our table 1 in "Die Sterne" <u>43</u>, p. 24:

Year	$\bar{V}$	$\overline{B-V}$	$\overline{U-B}$	$\bar{B}$	$\bar{U}$	n
1966.6	9.07	+0.42	+0.24	9.49	9.73	29
1967.6	9.01	.44	.33	9.45	9.78	19
1968.6	8.97	.50	.43	9.47	9.90	22
1969.6	8.91	.60	.52	9.51	10.03	14
1970.6	8.91	.76	.51	9.67	10.18	44

(n = number of nights).
For further details see forthcoming number of MVS.

1971 April 11

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NUMBER 542

Konkoly Observatory
Budapest
1971 April 23

PHOTOELECTRIC OBSERVATIONS AND TIMES OF MINIMA OF Y Cygni

UBV observations of the eclipsing binary Y Cygni were made by the writer, between 1967 and 1969, with a 1P21 photomultiplier (cooled) on the 60 cm Zeiss reflector of the Vatican Observatory. The comparison star used was BD +34°4196 (B9), which is conveniently near to the variable in position and colour. The V magnitude and B-V, U-B colours of 34°4196 were determined from comparisons with Johnson-Morgan standard stars on several nights. They are given in Table 1, together with their probable errors. In the table are also given the V magnitude and colours of Y Cygni outside eclipse. The observations outside eclipse were not sufficiently spaced to determine the shape of the light curve, and the values given are simply the means of all the observations made outside eclipse. The probable errors of these values, when compared with those of the comparison star, go to indicate that the light-curve outside eclipse is not flat.

Table 1

	V	B-V	U-B		Number of obs.	nights
BD +34°4196	$7^{m}.948$	$-^{m}.065$	$-^{m}.303$		22	9
	±.003	±.003	±.005	(p.e.)		
Y Cyg- 4196	-0.651	-.007	-.660		19	8
(outside eclipse)	±.004	±.006	±.015	(p.e.)		
Y Cyg- 4196	-0.050	-.006				
(mid-Minimum I)						

The V magnitude and B-V of Y Cygni at the middle of Minimum I are also given in the table, from the only minimum observed, that of the night of November 2/3, 1969.

During that minimum, I made 83 observations of Y Cygni in B and V, each observation being the mean of two measures. The time of minimum was determined as;

Minimum I = JD hel. 2440528.2577 ±.0005 (p.e.)

This is epoch no. 10344 from the elements given by Dugan (Princeton Cont. No.12, p.28, 1931; Dugan's formulae are also given by H.Schneller in Information Bulletin No.61, 1964). The O-C of this minimum from that computed from Dugan's formula, using both sinusoidal terms, is $-0^d.0047$. The smallness of this correction, about seven minutes, goes to show both the regularity of the apsidal motion and the accuracy of Dugan's elements.

The period of Y Cygni is so unfavourable that it is impossible to observe the entire light curve from one observatory within a reasonable interval of time. Accordingly it was decided by IAU Commission 42, during the Brighton meeting, to organize an international campaign, with observers spread over a wide range of longitude. Professor Mario G. Fracastoro, (Director, Osservatorio Astronomico di Torino, 10025 Pino Torinese, Italy) and myself are the coordinators of the campaign.

Table 2

Predicted Minima of Y Cygni, June-November 1971

Epoch	Minimum I JD hel. 2441	Minimum II JD hel. 2441	Epoch	Minimum I JD hel. 2441	Minimum II JD hel. 2441
10540	115.553	117.294	10570	205.446	207.182
541	118.550	120.290	571	208.442	210.178
542	121.546	123.286	572	211.439	213.174
543	124.542	126.283	573	214.435	216.170
544	127.539	129.279	574	217.431	219.167
545	130.535	132.275	575	220.428	222.163
550	145.517	147.256	580	235.410	237.144
551	148.514	150.253	581	238.406	240.140
552	151.510	153.249	582	241.403	243.137
553	154.507	156.245	583	244.399	246.133
554	157.503	159.241	584	247.396	249.129
555	160.499	162.238	585	250.392	252.125
560	175.482	177.219	590	265.374	267.107
561	178.478	180.215	591	268.371	270.103
562	181.474	183.211	592	271.367	273.099
563	184.471	186.208	593	274.363	276.095
564	187.467	189.204	594	277.360	279.092
565	190.464	192.200	595	280.356	282.088

In Table 2 are listed the predicted times of both minima from June to November 1971. The times were computed with Dugan's elements, using both sinusoidal terms. A correction of $-0^d.0047$ (found from my observed minimum) was applied to the computed times of Minimum I. No correction was applied to the computed times of Minimum II; they should not be in error by more than a few minutes, at most.

The epoch numbers given in the table are those of Dugan's elements. Minima around the time of Full Moon were omitted from the table.

During this in erval the mean period of Minimum I may be taken as $2^d.996418$, and that of Minimum II as $2^d.996258$.

12 April, 1971

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V 1057 Cyg

Some preliminary spectroscopic information is now available for the remarkable object V1057 Cygni = LkHα-190. Prior to 1969, the star was known only as one of the faint, slightly variable (m_{pg} =15.5 - 16.5) T Tauri stars associated with the North America Nebula, NGC 7000 (Herbig, Ap.J. 128, 259, 1958). G.Welin discovered recently (Astr. and Ap., in press; private communication) that in late 1969 the star had brightened to about m_{pg} = 10. It is still near that brightness. 120-inch coudé spectrograms obtained in March and April 1971 show an absorption spectrum near type A1, clearly more luminous than class V. The Hα line is rather strongly in emission, with a P Cyg-type absorption component displaced about 420 km/sec to shortward. There is a similarly-shifted component shortward of the K line of Ca II, but without accompanying emission. Hα and the infrared Ca II triplet are the only emission lines detected. A very interesting feature of the absorption spectrum is a rather strong Li I λ6707 line, whose presence at type A1 implies a high total lithium abundance.

The only observation of the pre-outburst spectrum of V1057 Cyg is apparently the low-dispersion Lick plate of 1957 Aug.3, which showed an advanced T Tauri-type emission spectrum, with no detectable absorption lines. If the type then had been KO, an increase in the surface brightness resulting from the change in the spectral type to A1 would account for an increase in birghtness by a factor 30 at 4200 A. Since the observed rise of approximately 5.5 mag. corresponds to a factor of about 150, a radius increase of only a factor 2.2 could account for the remainder. If the original radius had been about 2 ☉ , then in the rise time of about 250 days (Wenzel, Mitt. Ver. Sterne, in press; private communication), the photosphere would have had to expand at a mean velocity of only about 0.1 km/sec. This is much less than the atmospheric ejection velocity of about 420 km/sec suggested by the P Cyg structure.

The absorption-line velocity of V1057 Cyg is now about -60 km/sec, clearly different from the mean velocity of the H II region NGC 7000, which has been measured by Courtes, Cruvellier, and Georgelin (J.d'Obs. 49, 329, 1966) as about -15 km/sec, and by Miller (Ap.J. 151, 473, 1968) as -19 ± 4 km/sec. The large apparent negative shift of the star could be due to radial motion in its atmosphere, but if so, the magnitude of the velocity is again much greater than expected.

Welin also discovered that V1057 Cyg now appears attached to a bright filament of nebulosity that was not present before the outburst. This nebulosity is well seen on recent 120-inch direct plates, and resembles a broken ring about 50" x 90". The star is involved closely in still brighter nebulosity,and is displaced from the center toward the southwest edge of the ring. Presumably this ring, whose appearance is rather like that of a cavity illuminated from within, represents dust near the star that has just recently been lit up as a result of brightening. At a distance of 500 parsecs, a light signal would expand in the plane of the sky at the rate of 1" in 1.9 days. The portion of the ring most distant from V1057 Cyg is about 65" east of the star, and thus its illumination would be delayed by at least 190 days. This is compatible with the observed time of the brightening of the star and the subsequent date of detection of the nebulosity by Welin. It will be interesting to see if still more distant reflection nebulosity appears as the light signal continues to propagate outward.

The outburst of V1057 Cyg is highly reminiscent of the brightening of FU Orionis in 1939 (Herbig, Vistas in Astr., 8, 109, 1966), even to details such as the sudden appearance of a reflection nebula and to the high abundance of lithium. If the two events represent the same basic phenomenon, then V1057 Cyg has established a very important point that could not be settled in the case of FU Ori for lack of a pre-outburst spectrogram. That is, the fact that the spectrum of V1057 Cyg changed fundamentally from minimum to maximum light proves that an intrinsic change in the star took place,and that the explanation is not that it was simply unveiled by the dissipation of a circumstellar dust cloud.

We are very much indebted to Mr.Gunnar Welin for informing us in advance of publication of his very important observations of V1057 Cyg and to Dr. W.Wenzel for information on the light curve.

April 16, 1971

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 544

Konkoly Observatory
Budapest
1971 May 3

A NOTE ON THE ORBITAL PERIOD OF SS Cygni

Smak (1969) has pointed out that the time-distribution of the observed radial velocities of SS Cygni is such that the velocity variation may be represented about equally well by the elements:

$$\text{Zero Phase} = \text{JD hel. } 2430267.770 + 0^{d}.2762440\underline{E} + 9^{d}.54\times10^{-11}\underline{E}^2 \quad (1)$$

derived by Walker and Chincarini (1968), and by

$$\text{Zero Phase} = \text{JD hel. } 2430267.700 + 0^{d}.269483\underline{E} + 1^{d}.5\times10^{-10}\underline{E}^2 \quad (2)$$

derived by himself. The question of which of the above periods is correct is of considerable importance. In 1965, Walker and Chincarini obtained spectroscopic observations of SS Cyg during the rise to maximum of one of characteristic outbursts of this system. Using (1), these observations indicate that the outburst was associated with the hot component of the system. However, if (2) is correct, then the velocity variation observed during rising light would indicate that the outburst originated in the late-type component.

In order to determine which elements are correct, spectroscopic observations of SS Cyg were obtained on July 12 and September 8 and 9, 1970 (UT), using a Spectracon image intensifier tube attached to the focus of the 20-inch camera of the coudé spectrograph of the 120-inch reflector. The dispersion was 48 A/mm. The exposures were made using the single-trail technique described earlier (Walker and Chincarini 1968). The dates of observation were chosen to give a time interval between them such that counting from a common epoch on the first date, the phases predicted by the two values of the period will differ by about 0.5P on the second.

The observed radial velocities are shown in Figures 1 and 2. In Figure 1, the emission line (H and CaII K) velocities are combined using (2) and in Figure 2, the emission and absorption line velocities are combined using (1). In both cases, the observations are plotted against the phase reckoned from an epoch which was the time of the first observation on July 12, 1970.

It is evident from the figures that the observations are represented by the period given by Walker and Chincarini and not by the period given by Smak. Certain complications remain: The time of zero phase observed in 1970 differs by about 0.5P from that predicted by (1). In addition, there appears to be a phase shift of about 0.12P between the velocity curves observed in July and in September, when these are combined using (1). Thus, period changes in addition to that observed by Walker and Chincarini (1968) have clearly occurred. However, since the interval between the observations at minimum and during rising light in 1965 was only 17 days, it appears that despite the occurrence of small changes in the period, the conclusions given by Walker and Chincarini are correct, and that the outburst in SS Cyg originates in the hot star. A more detailed account of these observations will be given at a later date.

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and

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References

Smak,J. 1969, Acta Astronomica, 19, 287
Walker,M.F., and Chincarini, G. 1968, Ap.J., 154, 157.

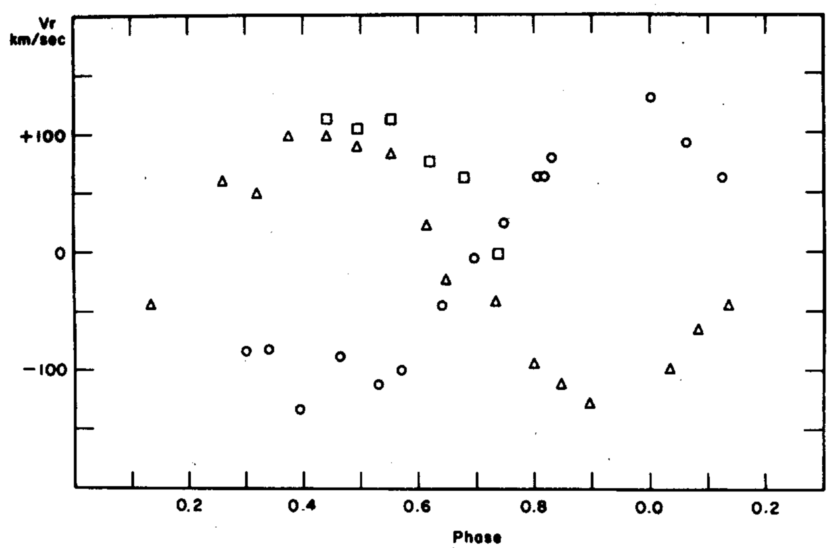

Fig. 1
Emission line radial velocities of SS Cyg observed in 1970, combined using the period given by Smak. Circles denote observations on July 12, triangles observations on September 8, and squares observations on September 9 (UT).

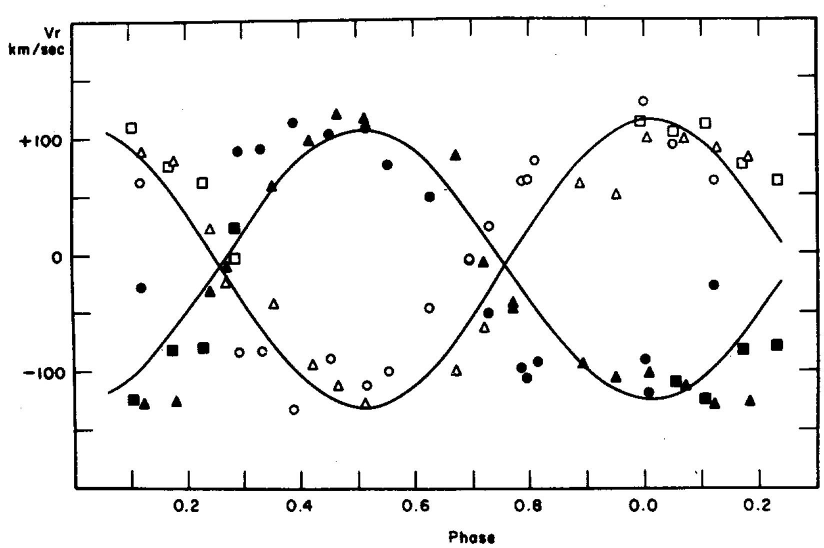

Fig. 2
Emission and absorption line radial velocities of SS Cyg observed in 1970 combined using the period derived by Walker and Chincarini. Symbols as in Figure 1; open symbols indicate emission lines, filled symbols indicate absorption lines.

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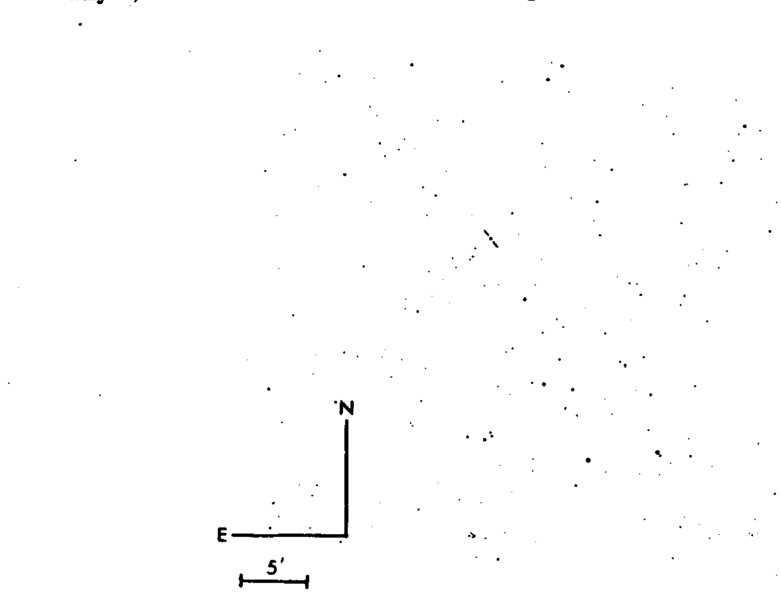
NUMBER 545

Konkoly Observatory
Budapest
1971 May 3

A NEW VARIABLE STAR IN SERPENS

Mr. John Kirszenberg, a student at Case-Western Reserve University, has discovered a new variable star in Serpens. Figure 1 is a finding chart for the variable, whose 1900 coordinates are RA = $18^h 14^m.9$, D = $-10^\circ 14'$. The discovery was made while blinking a pair of objective-prism photographs taken twenty days apart with the 60-90 cm Burrell Schmidt telescope of the Warner and Swasey Observatory. On the earlier plate of the pair, taken August 6.221, 1970, the spectrum shows narrow, moderately strong Balmer emission lines and a strong ultraviolet continuum. The continuum between H-β and H-γ is about three quarters of a magnitude brighter than on the later photograph where the spectrum is that of a late K-type star with m_{pg} = 11.5. There are twenty other photographs of this star in our plate collection, taken between 1948 and 1963, none of which show any detectable variation in brightness or spectrum.



The type of variability which is observed in this case is very puzzling. The disappearance of the emission spectrum suggests a flare type activity, but the vast majority of flare stars are of spectral type dMe while this star is not. Moreover, flare spectra show strong Ca II emission lines, absent in the spectrum of this star. Classification as a U Geminorum or symbiotic variable is highly improbable in view of its non-variability in the past. The possibility that the variable is a fainter star nearly coincident in position with the K star cannot be ruled out, but does not appear likely. I have carefully compared the position of the emission spectrum with that of the K star and conclude that they are coincident within the errors of measurement (approximately two seconds of arc).

The available data suggests that this star may be similar to Popper's (1953) flare star which has been observed to flare only once. Its spectral type is K6V and it is quiescent most of the time, characteristics which agree with what is known about the Serpens variable. Its behavior may also bear some similarity to that of EZ Pegasi, a star which the General Catalog of Variable Stars calls a unique object. EZ Pegasi has a normal spectral type of G5; but on one objective prism photograph from the Leander McCormick Observatory it shows a spectrum of type B. However, EZ Pegasi is also an irregular variable with an amplitude of about one magnitude, a fact which argues against a real similarity with the variable described here. More observations of this star are evidently needed in order to decide between the various possibilities described above.

FRANCIS M. STIENON

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Case-Western Reserve University

Reference: Popper, D.M. (1953) Publ. A.S.P. 65, 278.

Editor's note: Recently S.Cristaldi and M.Rodonò have observed several flares in Popper's star, BY Dra, Sp K6Ve (Astron. and Astrophys, 12, 152, 1971).

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INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 546

Konkoly Observatory
Budapest
1971 May 8

RY TAURI

A mean light-curve of this RW Aur-type star has been constructed from Tsessevich's observations performed on Harvard Sky Patrol plates and from Moscow and Odessa plates (Fig.1). There is one big and slow fluctuation of brightness with a very long cycle, besides there are smaller superposed oscillations. We have determined the length of individual cycles and plotted them in Fig.2. It is clear that the cycles get shorter as the mean brightness of the star increases. The cycles vary within the limits of 500 to 2500 days.

There are also rapid fluctuations. When the star gets brighter we observe short Algol-like weakenings (Fig.3). If the brightness of the star gets fainter, its behaviour changes: we observe rapid flares (Fig.4).

The comparison of photographic and visual observations shows that the visual magnitude is not a simple function of the colour-index. The relationships between the two quantities for different time intervals are given in Fig.5 and in the following Table:

	Interval	Relationship between V and CI
I	2425209-2427358	$m_V = 11.89 - 1.91$ CI
II	2427407-2428170	$m_V = 10.72 - 1.51$ CI
III	2428441-2429326	$m_V = 10.58 - 1.01$ CI
IV	2437254-2438734	$m_V = 12.06 - 1.59$ CI
V	2439022-2439480	$m_V = 15.57 - 4.95$ CI

Odessa Astronomical Observatory
1971 January 30

B.A. DRAGOMIRETSKAIA,
V. TSESSEVICH

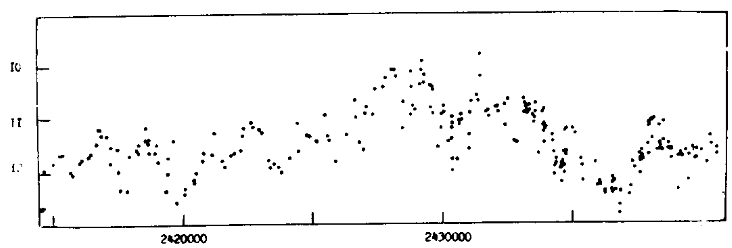

Fig. 1.
General mean light-curve of RY Tauri

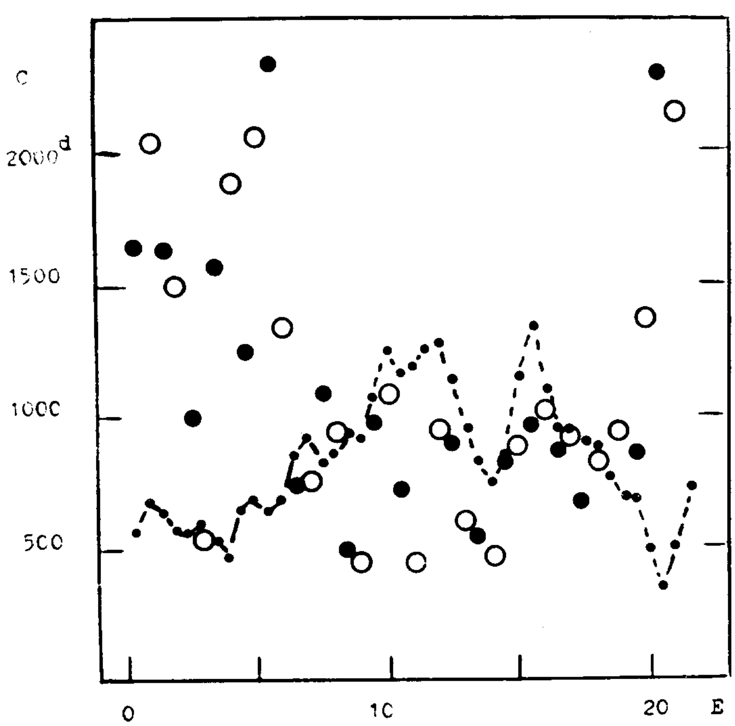

Fig. 2.
C: length of cycle, E: serial number of cycle.
Dotted line: curve of mean brightness.

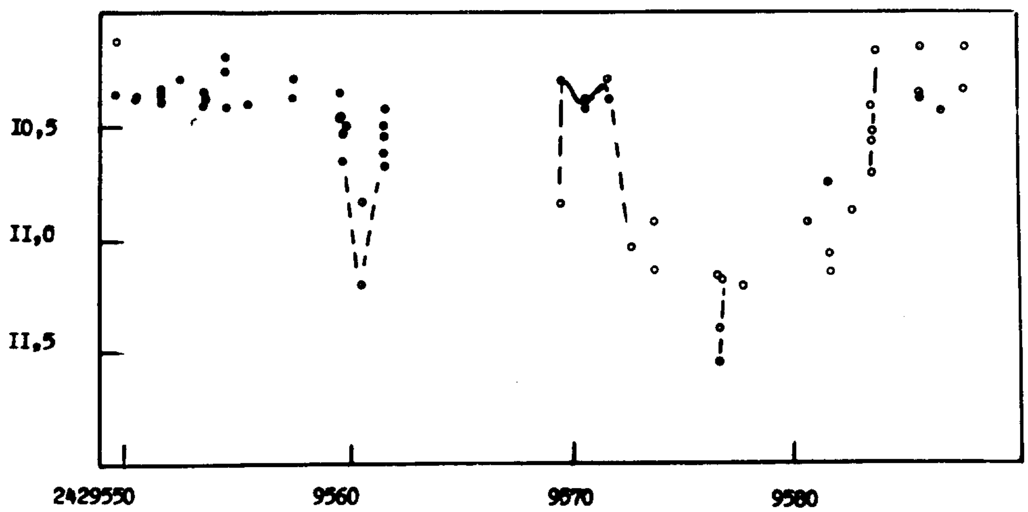

Fig. 3

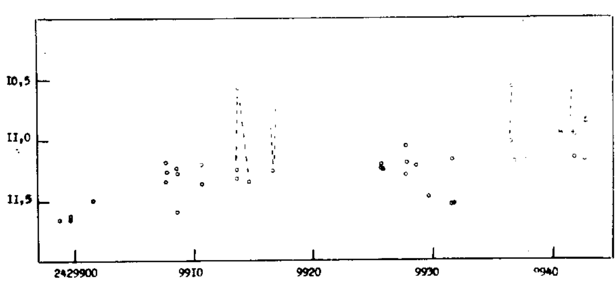
Fig. 4

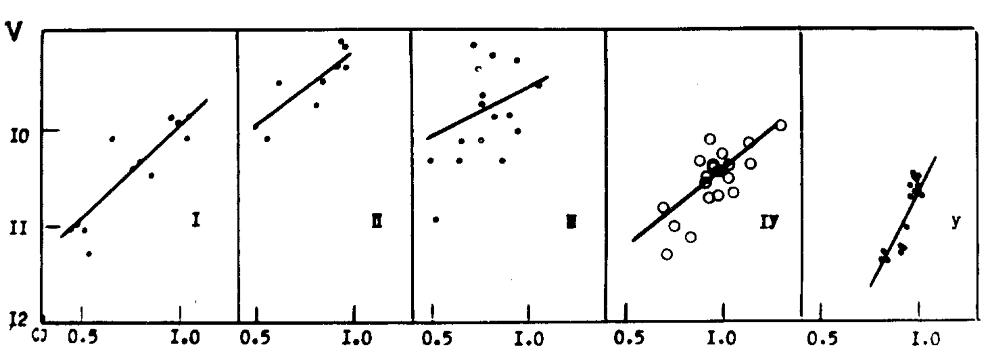

Fig. 5

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Konkoly Observatory
Budapest
1971 May 7

UBV PHOTOMETRY OF THE COMPOSITE STAR DELTA SAGITTAE

A few differential UBV observations were made of the composite star Delta Sge (M2II? + B?) in an attempt to detect an atmospheric eclipse which, as Koch (1969) pointed out, might have occurred at the end of the calendar year 1969.

The comparison star was Zeta Sge ABC, and all three components were included in the diaphragm. The differential magnitudes were corrected for differential extinction, both principal and second-order, and transformed to the UBV system. The telescope was a 24-inch reflector and a refrigerated 1P21 photomultiplier was used. The observations are listed in Table I, where the last three columns are the differential UBV magnitudes in the sense variable minus comparison.

TABLE I

Differential UBV Observations
(Delta Sge minus Zeta Sge ABC)

Date	JD hel. 2,440,000+	ΔV	ΔB	ΔU
26-27 Sept. 1969	491.60	$-1^m_.19$	$+0^m_.13$	$+0^m_.99$
	.61	-1.19	+0.13	+0.98
	.62	-1.20	+0.13	+0.98
28-29 Sept. 1969	493.57	-1.19	+0.13	+0.99
	.58	-1.19	+0.13	+1.00
1-2 Dec. 1969	557.53	-1.23	+0.13	+1.04
	.54	-1.22	+0.12	+0.98
	.55	-1.21	+0.10	+1.02
	.56	-1.22	+0.13	+1.02
20-21 Feb. 1970	638.96	-1.19	+0.15	+1.02
	.97	-1.18	+0.16	+1.03
	.98	-1.18	-	-

There is no indication that Delta Sge changed significantly in brightness in any color, but these few observations should perhaps be combined with any others which were obtained during the 1969-70 season before it is decided whether or not an atmospheric eclipse did occur.

April 26, 1971

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REFERENCES:

Koch,R.H. 1969, I.A.U. Central Bureau for Telegrams, Circ. No.2165.

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

NUMBER 548

Konkoly Observatory
Budapest
1971 May 14

PHOTOGRAPHIC LIGHTCURVE OF HBV 476

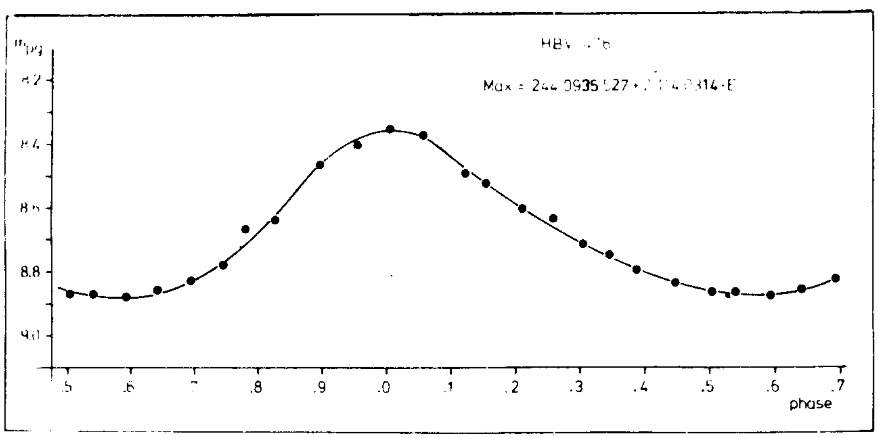
A total of 144 plates was measured in order to establish the lightcurve of this Cepheid variable. Using the preliminary light elements quoted in an earlier paper (IBVS no.506) a mean lightcurve was obtained. From this and the individual measurements 12 epochs of maximum brightness could be determined. They are given in the following table together with 4 epochs of maximum derived in the same way from photoelectric observations obtained with the 60 cm reflector at Hamburg.

Max. hel.		E	O–C
242 8335.908	pg	– 5 960	+0.005
8338.035	pg	– 5 959	+ .017
9515.512	pg	– 5 402	– .017
243 0373.783	pg	– 4 996	– .043
0515.497	pg	– 4 929	+ .030
0517.612	pg	– 4 928	+ .031
0591.582	pg	– 4 893	+ .011
0703.620	pg	– 4 840	+ .005
1029.160	pg	– 4 686	– .016
1031.282	pg	– 4 685	– .008
1033.399	pg	– 4 684	– .005
1060.878	pg	– 4 671	– .008
244 0943.971	pe	+ 4	– .012
0954.547	pe	+ 9	– .006
0963.023	pe	+ 13	+ .013
0965.132	pe	+ 14	+0.008

A least-square-solution of all times of maximum gave the following elements together with their mean errors

$$\text{Max} = 244\ 0935.527 + 2^{d}.114\ 0314\ E$$
$$\pm 9 \qquad\qquad \pm 21$$

leading to the residuals "O – C" in the above table. Using these light elements and forming normal points, a lightcurve shown in the Figure could be established.



Normal points:

Phase	m_{pg}	n	Phase	m_{pg}	n	Phase	m_{pg}	n
0.005	8.36	7	0.347	8.75	5	0.693	8.83	5
.056	8.38	9	.391	8.80	6	.745	8.78	6
.122	8.50	6	.448	8.84	11	.778	8.67	4
.154	8.53	7	.503	8.87	8	.824	8.64	5
.211	8.61	9	.541	8.87	5	.896	8.47	7
.259	8.64	6	.593	8.88	15	.955	8.41	9
.305	8.72	6	.642	8.86	8			

I am indebted to Professor Dr. A.A. Wachmann for having lead my interest to this variable and for putting his photographic and photoelectric observations at my disposal.

P. KLAWITTER

Hamburger Sternwarte
Deutschland

COMMISSION 27 OF THE I. A. U.
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NUMBER 549

Konkoly Observatory
Budapest
1971 May 14

PHOTOELECTRIC OBSERVATIONS OF ETA CARINAE

Following reports from visual observers of the VSS, RASNZ, that Eta Carinae appeared to have brightened slightly and be fluctuating, the Auckland Observatory were requested to obtain photoelectric observations. W.S.G. Walker has advised the observations below of Eta Carinae:

1971 U.T.	V	B-V	U-B
March 23.455	6.024	+0.577	-0.360
23.464	6.008	0.585	0.358
24.406	6.005	0.591	0.354
26.611	6.028	0.603	0.321
April 25.543	5.996	0.590	0.333
28.365	6.004	0.606	0.374
28.372	5.993	0.612	0.371

The observations were made with the 50 cm Zeiss Cassegrain reflector. Comparison star was HD 93695 (V=6.47; B-V=-0.13). The measures of Eta Car are considered to be better than $\pm 0^m.02$ in V and include the whole of the nebulosity visible in a 31" diaphragm. An arbitrary value, from measurements, for HD 93695 was adopted of -0.60 for U-B.

1971 May 6

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 550

Konkoly Observatory
Budapest
1971 May 20

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR AD Leo DURING THE 1971 FEBRUARY 18 - MARCH 4 INTERNATIONAL PATROL

The preliminary results of AD Leo photoelectric observations carried out at the stellar station of the Catania Astrophysical Observatory according to the observing schedule proposed by the IAU Working Group on Flare Stars (Andrews, et al. 1971) are here reported.

In Table 1 the detailed coverage is given. During the 4.8 hours of observations no flare activity was detected.

Table 1 Detailed coverage

Date of observation	Tel.	Light	Coverage (U.T.)	Total coverage	$\widetilde{3\sigma/I_o}$
1971 Feb. 22	91	b	01^h17^m-0155; 0157-0241; 0255-0303; 0320-0407; 0426-0442	153^m	0.03
"26-27	61/3c	u'-b-v	2131-2144; 2148-2153; 0042-0046; 0048-0055; 0057-0106; 0110-0112; 0115-0130; 0133-0138; 0144-0159; 0203-0207; 0210-0227; 0315-0325; 0327-0330; 0332-0339; 0343-0348; 0351-0355; 0358-0409	136	0.03(u') 0.01(b) 0.01(v)

The explanations of symbols used and details of the observing equipment can be found in a preceeding Bulletin (Cristaldi and Rodonó, 1971).

Catania Astrophysical Observatory, Italy S. CRISTALDI and M. RODONO'

References

Andrews, A. D., Chugainov, P. F., Kellogg, E. M., Oskanian, V. S. 1971, Comm. 27 IAU, Inf. Bull. Var. Stars No. 516

Cristaldi, S., Rodonó M. 1971, Comm. 27 IAU, Inf. Bull. var. Stars No. 525

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 551

Konkoly Observatory
Budapest
1971 May 20

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR BD + 16°2708 DURING THE 1971 MARCH 20 - APRIL 2 INTERNATIONAL PATROL

The preliminary results of BD + 16°2708 photoelectric observations carried out at the stellar station of the Catania Astrophysical Observatory according to the IAU Working Group on Flare Stars (Andrews, et al. 1971) are here reported.

In Table 1 the detailed coverage is given. During the 16.1 hours of observations no flare activity was detected.

Table 1 Detailed coverage

Date	Tel.	Light	Coverage (U.T.)	Total coverage	$3\overline{\sigma}/I_o$
1971					
Mar. 21	91	b	01^h12^m-0122; 0133-0141; 0200-0216; 0218-0359	135^m	0.02
23-24	"	"	2307-2317; 0005-0032; 0034-0056; 0108-0154; 0156-0219	128	.03
25	"	"	0127-0210; 0218-0227; 0234-0247; 0249-0257; 0315-0339	097	.02
26	"	"	0059-0116; 0130-0242; 0244-0351	156	.02
29	"	"	0204-0335; 0343-0347	095	.03
30-31	"	"	2211-2242; 2245-2353; 2355-2400; 0000-0001; 0028-0146; 0148-0201; 0211-0220; 0226-0328; 0331-0340	276	.01
Apr. 1	"	"	0000-0013	013	.02
1	"	"	2230-2247; 2249-2308; 2310-2313; 2320-2325; 2330-2349	063	.07
1	61/3c	b-v	23^h20^m-2333; 2334-2345	024	0.03(b) 0.02(v)

The explanations of symbols and details of the observing equipment can be found in a preceeding Bulletin (Cristaldi and Rodonó, 1971).

Catania Astrophysical Observatory, Italy
May 5th, 1971

S. CRISTALDI and M. RODONO

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Andrews, A. D., Chugainov, P. F., Kellogg, E. M., Oskanian, V. S. 1971, Comm. 27 IAU, Inf. Bull. var. Stars No. 516

Cristaldi, S., Rodonó, M. 1971, Comm. 27 IAU, Inf. Bull. var. Stars No. 525

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 552

Konkoly Observatory
Budapest
1971 May 24

PHOTOELECTRIC OBSERVATIONS OF BD + $16^{\circ}2708$

Continuous photoelectric monitoring of the red dwarf star BD + + $16^{\circ}2708$ was made at the Crimean Astrophysical Observatory during the period of 19 March to 29 April 1971. The observations were made with the 64-cm meniscus telescope in the photometric system B. No flares were detected. The coverage is given below.

D. Ptizin has collaborated these observations.

Date	Coverage (U. T.)
19 March	22 10-22 11, 22 15-22 40, 22 45-23 04, 23 07-23 16, 23 21-23 30
21 March	21 10-21 55, 21 56-22 20, 22 22-22 35, 22 43-23 22, 23 26-23 36, 23 42-23 55
22 March	00 04-00 26, 00 28-00 39, 00 41-01 04, 01 06-01 12, 01 17-01 47, 01 54-01 58, 02 00-02 19, 02 20-02 25, 02 28-02 29
28 March	18 55-18 56, 18 58-19 00, 19 05-19 20, 19 22-19 30, 19 45-20 00, 20 02-20 18, 20 25-20 30, 20 37-20 45, 20 46-21 07, 21 08-21 27, 21 31-21 36, 22 33-23 06, 23 08-23 21
29 March	00 00-00 07, 00 09-00 22, 00 23-00 34
1 April	(18 25-19 53), 19 56-20 37
19 April	18 53-20 08, 20 11-20 44, 20 47-21 00, 21 03-21 09, 21 13-23 10
20 April	18 26-18 39, 18 43-18 57, 19 00-20 14, 20 16-20 37, 20 42-22 52, 22 56-23 42, 23 43-24 00
21 April	00 02-01 30, 18 30-19 52, 20 00-21 30, 21 35-23 42, 23 43-24 00
22 April	00 01-01 08, 01 10-01 25, 18 08-18 19, 18 22-18 55, 18 56-19 39, 19 42-20 00, 20 03-20 25
25 April	18 17-19 36
26 April	18 24-20 03, 20 09-23 33
27 April	18 10-20 04, 20 06-20 42, 20 44-21 30, 21 39-24 00

(Cont.)

Date	Coverage (U.T.)
28 April	00 00-01 14, 18 59-20 03, 20 07-21 24,
29 April	18 16-19 34

P.F. CHUGAINOV

N.I. SHAKHOVSKAYA

Crimean Astrophysical Observatory

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 553

Konkoly Observatory
Budapest
1971 May 24

PHOTOELECTRIC OBSERVATIONS OF YZ CMi AND AD Leo

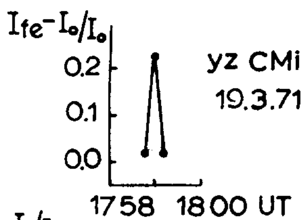
Continuous photoelectric monitoring of the flare stars YZ CMi and AD Leo was made at the Crimean Astrophysical Observatory with the 64-cm meniscus telescope in the photometric system B during the planned periods of X-ray observations of the same stars by the NASA ASE Group. The coverage, characteristics of the observed flares and their light curves are given below.

A. Kulapova has collaborated these observations.

Star	Date, 1971	Coverage (U. T.)
YZ CMi	19 March	17 55 - 21 10, 21 13 - 21 17, 21 18 - 21 19, 21 21 - 21 25, 21 27 - 21 44
	10 March	17 16 - 17 44, 17 45 - 21 26
AD Leo	15 April	18 34 - 18 35, 18 36 - 19 44, 19 46 - 20 16, 20 17 - 20 53, 20 57 - 21 11, 21 13 - 21 45, 21 47 - 22 07, 22 09 - 22 22

Star	Date, 1971	UT_{max}	t_b (minutes)	t_a (minutes)	$\frac{I_{fl}-I_o}{I_o}$	σ/I_o	P min.	F(z)
YZ CMi	19 March	$17^h59^m.0$	0.2	0.2	0,23	0.05	0.04	1.33
	19 March	18 26 .7	0.3	4.3	0.18	0.05	0.42	1.35
	20 March	17 23 .4	0.4	10.0	0.47	0.05	0.86	1.33
	20 March	18 30 .1	2.5	50.0	4.81	0.05	16.2	1.36
AD Leo	15 April	20 50 .6	0.1	1.4	0.08	0.02	0.04	1.27

P.F. CHUGAINOV, N.I. SHAKHOVSKAYA
Crimean Astrophysical Observatory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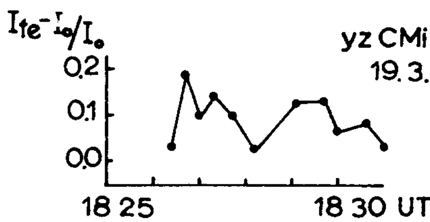
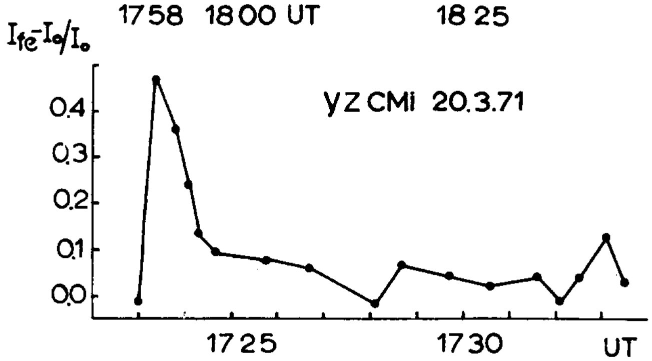
0.2
0.1
0.0
1758
1800 UT
yz CMi
19.3.71


Ife-Io/Io
0.2
0.1
0.0
18 25
18 30 UT
yz CMi
19.3.7'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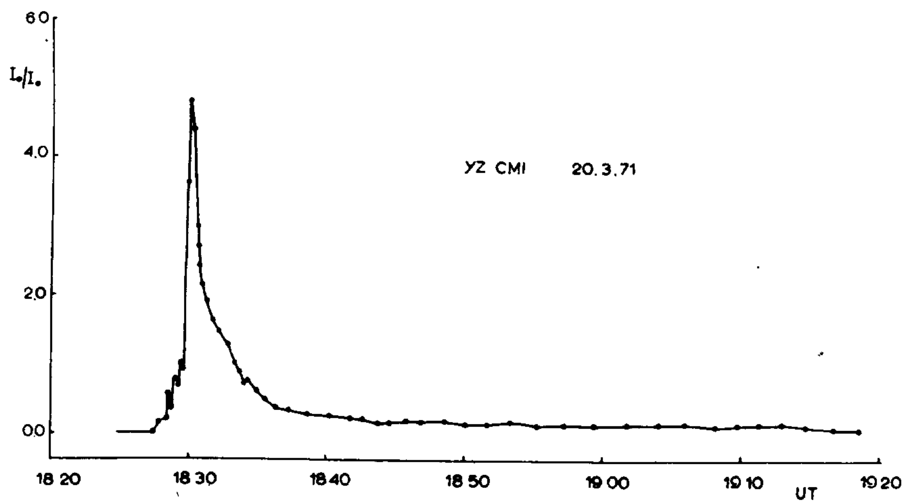
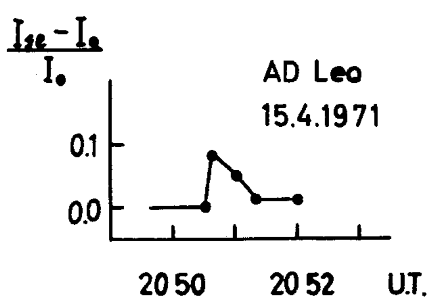
0.3
0.2
0.1
0.0
yz CMi 20.3.71
17 25
17 30
UT


6.0
Io/Io
4.0
2.0
0.0
yz CMI
20.3.71
18 20
18 30
18 40
18 50
19 00
19 10
UT
19 20


Ife - Io
Io
AD Leo
15.4.1971
0.1
0.0
20 50
20 52
U.T.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 554

Konkoly Observatory
Budapest
1971 May 24

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR YZ CMi DURING THE 1971 JANUARY 16 - FEBRUARY 2 INTERNATIONAL PATROL

The preliminary results of YZ CMi photoelectric observations carried out at the stellar station of the Catania Astrophysical Observatory according to the observing schedule proposed by the IAU Working Group on Flare Stars (Andrews, et al. 1971), are here presented.

Table 1 Detailed coverage

Date	Tel.	Light	Coverage (U.T.)	Total coverage	$3\sigma/I_o$
1971 Jan. 27-28	61/3c	u'-b-v	20^h26^m-2042; 2044-2109; 2111-2117; 2129-2158; 2204-2216; 2237-2301; 2303-2316; 2318-2330; 2332-2345; 2347-2400; 0000-0001; 0003-0019; 0021-0037; 0039-0130; 0133-0149; 0151-0211	283^m	0.15(u') 0.15(u') 0.02(v)
28-29	"	u'-b-v	2157-2209; 2212-2221; 2231-2303; 2305-2332; 2335-2400; 0000-0149; 0154-0208	228	0.16(u') 0.02(b) 0.01(v)
Feb. 12-13	"	b-v	1950-2001; 2008-2017; 2028-2039; 2044-2101; 2104-2116; 2122-2135; 2213-2224; 2314-2318; 2327-2336; 2341-2353; 2356-2400; 0000-0004; 0012-0023; 0026-0030	132	0.14(b) 0.04(v)
22	91	b	2239-2310	031	
Mar. 20	61	u'-b-v	1926-1936; 1952-2005; 2007-2020; 2024-2040; 2101-2115; 2117-2139; 2145-2153; 2200-2211; 2222-2240; 2250-2256; 2304-2311; 2317-2326; 2330-2337	154	0.10(u') 0.02(b) 0.02(v)

Table 2 Charasteristics of Observed Flare (Tel. 61 cm)

Light	t_{max}(U.T.)	d_b	d_a	$3\sigma/I_o$	$(I_f/I_o)_{max}$	P	Air mass	sky
u'	1971	-	-	0.17	-	-	1.10	0
b	Jan. 29 $00^h04^m.4$	0.8	35.5	0.03	3.31	7.44	1.10	0
v	00 04 .3	0.5	28.8	0.02	0.79	2.00	1.10	0

In Table 1 the detailed coverage and in Table 2 the characteristics of the observed flare are given. The w, b and v light curves of the observed flare are shown in Figure 1.

The explanations of symbols used and details of the observing equipment can be found in a preceeding number of this Bulletin (Cristaldi and Rodonó, 1971).

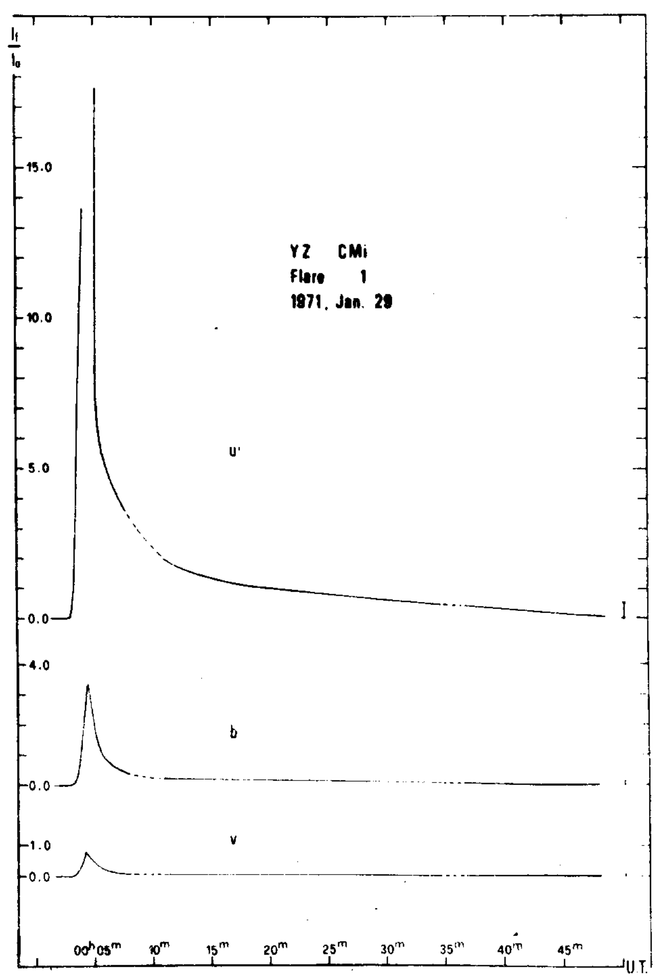
Catania Astrophysical Observatory, Italy
May 5, 1971

S. CRISTALDI and M. RODONO'

References

Andrews, A. D., Chugainov, P. F., Kellogg, E. M., Oskanian, V. S. 1971, Comm. 27 IAU, Inf. Bull. var. Stars No. 516

Cristaldi, S., Rodonó, M. 1971. Comm. 27 IAU, Inf. Bull. var. Stars No. 525



$\frac{I_f}{I_o}$
15.0
10.0
5.0
0.0
4.0
0.0
1.0
0.0
YZ CMi
Flare 1
1971, Jan. 29
u'
b
v
00h05m
10m
15m
20m
25m
30m
35m
40m
45m
U.T.

COMMISSION 27 OF THE I. A. U.

INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 555

Konkoly Observatory
Budapest
1971 May 26

PHOTOELECTRIC LIGHT CURVES OF PV CASSIOPEIAE

We have observed the eclipsing binary PV Cas (=BV72=BD+58^{o}2554) during eleven nights between June 7 and September 1, 1970 with the 48 cm Cassegrain telescope of the Ege University Observatory. In these observations an unrefrigerated RCA 1P 21 photomultiplier was used with B and V of the UBV system.

Actually the light curves of this star were obtained by GEYER (1) eleven years ago. But in these light curves the secondary minimum was not seen and he proposed that this star had no secondary minimum.

Then POHL (2) has determined new light elements for this star as follow:

$$C: \text{Min JD } 2428\ 796.8142 + 1^{d}.75047346.E \quad (1)$$

The period obtained by Pohl is nearly double of that given by Geyer, and it is in good agreement with our observations. Table 1 shows the observed times of primary minima, O-C values against the elements given by Pohl, and the names of the observers. (Ib = C. Ibanoglu, Kt = M. Kurutac, Al = A. Caliskan, Od=O. Demircan, Hl = H. Sengonca, Rk=R. Akinci, Dn=H. Dönmez, Me=M. Meier, Pl=E. Pohl, Yy=Y. Yildiz.)

Table I

	O	O-C	Observers
2 440	129.381 pe	+0.002	Ib
	227.4061 "	+0.0002	Ib/Kt
	416.456 "	-0.001	Ib/Al
	479.475 "	+0.001	Ib/Od
	817.314 "	-0.001	Ib/Hl
	824.317 "	0.000	Ib/Rk
	831.3168 "	-0.0024	Ib/Dn
	852.321 "	-0.004	Me/Pl

Pohl has also proposed the following equation for the secondary minimum:

$$\text{Min I} - \text{Min II} = 0.516\ .\ P \quad (2)$$

We obtained from our light curves:

$$\text{Min I} - \text{Min II} = 0.522 \cdot P \qquad (3)$$

Table II gives the observed times of the secondary minima, O-C values according to (2) and (3) respectively. The O-C residuals are decreasing.

Table II

O		$O-C_I$	$O-C_{II}$	Observers
2 436	851.5916	+0.0018	+0.0123	Geyer
	895.3523	+0.0006	+0.0111	Geyer
440	515.320	-0.011	0.000	Ib
	767.3886	-0.0103	+0.0002	Ib
	830.4071	-0.0089	+0.0016	Ib/Yy

The light curves of PV Cas are shown in Figures 1 and 2, where the magnitude differences variable minus comparison star BD+58°2562 are plotted against phase using Pohl's elements. The star varies about $0^m.6$ in both blue and yellow. It is seen that both light curves and minima are similar. Probably the components are of the same spectral type and their diameters are approximately equal. The secondary minimum is displaced from 0.5 P. Hence PV Cas has an eccentric orbit. We need more observations to proof whether the decrease of the O-C values in Table II is caused by apsidal motion.

May 20, 1971

CAFER IBANOGLU
Ege University Observatory
P.K.21
Bornova-Izmir, TURKEY

References:

(1.) GEYER, E.H.: Zeitschrift für Astrophysik 51, 79, (1960)

(2.) POHL, E.: Information Bulletin on Variable Stars. 386, (1969)

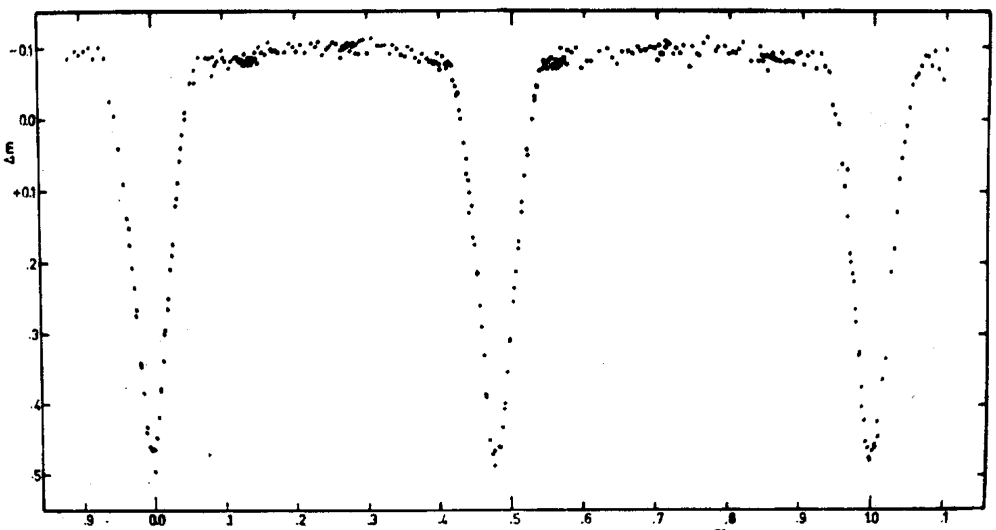


Fig.1. Blue light curve

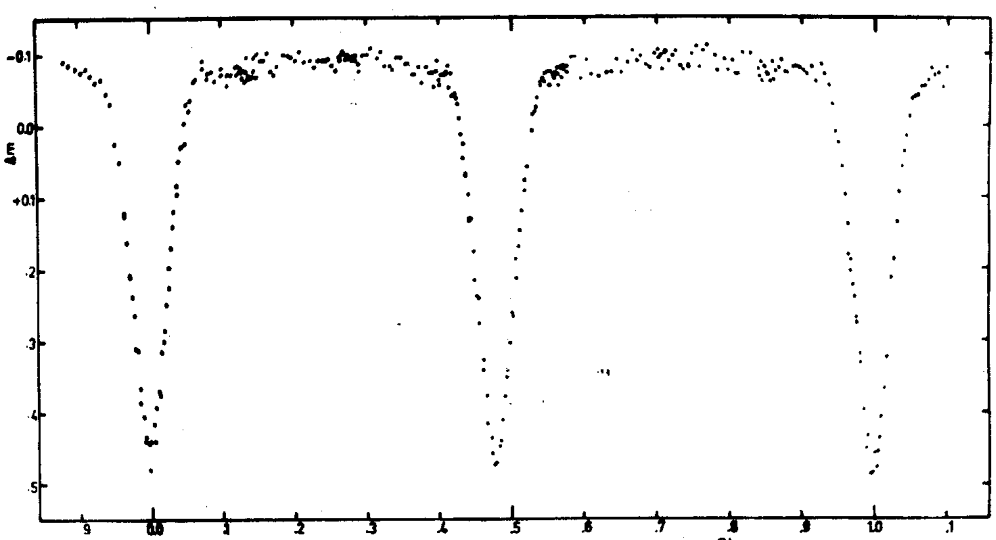


Fig.2. Yellow light curve

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 556

Konkoly Observatory
Budapest
1971 May 26

PHOTOMETRY OF DELTA SCUTI VARIABLES HR 2107 and HR 5005

In the course of a survey on Delta Scuti stars observations of HR 2107 and HR 5005 were made at the Pic-du-Midi Observatory in January and April 1970.

We used a refrigerated photomultiplier associated with the one-meter telescope, the measurements were made with pulse counting technique. The interference filters are

filter I	λ eff = 4220 A	width = 50 A
filter II	λ eff = 4700 A	width = 30 A

HR 2107 = 1 Monocerotis (m_V = 6, 28)

The comparison star was HR 2001 (m_V = 6, 02), the root square standard deviation of the observations was less than 0. 004 m_V, each data point was the mean of eight or nine observations using an integration time of ten seconds.

Table 1

Photometric results Δm = (HR 2001 - HR 2107)
Night of 6 - 7 January 1970

J. D. hel. 2440593	Δm_1	J. D. hel. 2440593	Δm_2
.449	0. 558	.449	0. 446
.457	0. 565	.459	0. 477
.497	0. 327	.466	0. 448
.511	0. 189	.495	0. 259
.525	0. 165	.510	0. 129
.536	0. 200	.523	0. 095
.544	0. 259	.535	0. 103
.555	0. 350	.542	0. 154
.566	0. 399	.554	0. 231
		.565	0. 276

The results are in Table 1, the light curves in Figure I. The measured period is p = 0.139 day which is nearly the same as that found by DANZIGER and DICKENS (0.137 day). Amplitudes are 0.19 for filter I and 0.18 for filter II.

max light filter I = J.D. hel. 2440593.525

and 0.002 days later for filter II observations.

A second observation was made seven nights later and although it was short, it is interesting, because it contains the minimum of the light curve. The results are in Table 2.

Table 2

Photometric results m = (HR 2001 - HR 2107)
Night of 13-14 January 1970

J.D. hel.	Δm_1	J.D. hel.	Δm_1
2440600 .375	0.397	2440600.412	0.551
.387	0.456	.429	0.443
.401	0.500		

The time of minimum intensity for filter I was

J.D. hel. 2440600.408

The addition of 49,5 periods of 0.139 day onto the maximum observed on the 6th January gives the minimum at 2440600.4055 J.D. hel which agrees well with the observed minimum, the period of 0.137 days measured by DANZIGER and DICKENS would give a phase error of about $\pi/2$.

HR 5005 (m_V = 6, 49)

The comparison star was HR 5014, the light curve is in Figure II. The time covered by observations is four hours and forty minutes. No significant variations in the light curve were found during this night, DANZIGER and DICKENS' observations on this star were too short to determine a period and our observations are not conclusive.

In conclusion, the similitude of the two measured periods of HR 2107 seems to be a good first approximation. In the case of HR 5005 it seems necessary to make more obsevvations before we may conclude that it is really a Delta Scuti star.

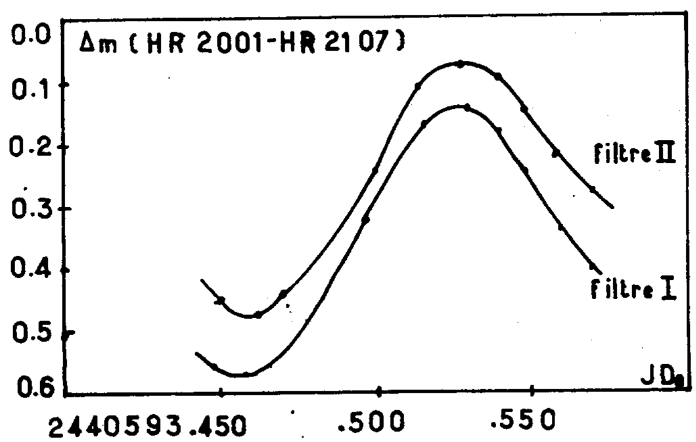
Groupe "Etoiles Variables à Courtes Périodes"
PARIS, France
May 1, 1971

J.-C. VALTIER
Observatoire de Nice
Le Mont-Gros
06-NICE
France

Reference:

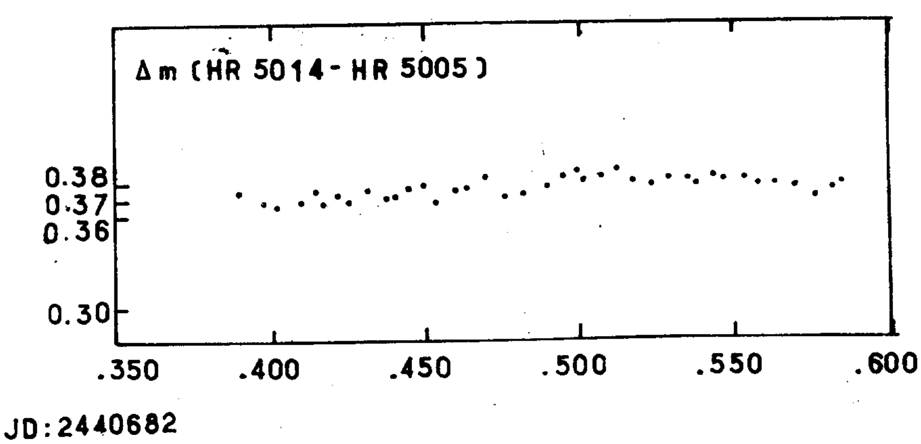
DANZIGER, I.J., and DICKENS, R.J., 1967, Astrophys. Journal, 149, 55

FIG I



0.0
0.1
0.2
0.3
0.4
0.5
0.6
Δm (HR 2001-HR 2107)
filtre II
filtre I
JD
2440593.450
.500
.550

FIG II



Δm (HR 5014- HR 5005)
0.38
0.37
0.36
0.30
.350
.400
.450
.500
.550
.600
JD:2440682

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 557

Konkoly Observatory
Budapest
1971 May 29

PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR YZ CMi

The results of photoelectric observations of the flare star YZ CMi, made through a standard B filter with the 22" reflector of the Uttar Pradesh State Observatory, Naini Tal are given. During 22.8 hours of monitoring spread over eight nights, during the period 27 December 1970 - 24 February 1971, 3 major flares were recorded. The details are given in Table I. Excluding one observation, all others were made during the clear dark moon-periods.

The light curves of the observed flares are presented in Fig. 1-3. The preliminary results showing the flare characteristics viz. time of flare maximum, duration before and after maximum, relative errors of observations, integrated intensities and air masses are drawn out, following the notations proposed by OSKANIAN (IBVS No. 488) are given in Table II.

We would like to mention that a few flarelike effects that appear on the tracings have been left over at this stage, pending verification.

Uttar Pradesh State Observatory
Manora Peak
Naini Tal, INDIA

T.R. BHATT
S.D. SINVHAL

Table I

Coverage of YZ CMi

(Times are rounded to the hearest minutes of U. T.)

U. T. of Coverage in hours and minutes

Date 1970.					
27 Dec.					
	19^h55^m-56^m,	20 01-15,	20 19-23,	20 24-31,	20 34-41,
	20 43-50,	20 52-2100,	21 02-6,	21 09-15,	21 17-20,
	21 20-26,	21 27-38,	21 39-42,	21 43-47,	21 48-51,
	22 04-12.				
1971					
17 Jan.					
	16 47-53,	16 54-57,	17 11-18,	17 19-25,	17 26-33,
	17 34-36,	18 46-57,	18 58-19 04,	19 09-16,	19 19-30,
	19 31-35,	19 36-47,	19 48-54,	20 28-44,	20 53-21 07,
	21 22-15.				
29 Jan.					
	14 31-32,	14 35-39,	14 40-41,	14 49-53,	14 54-15 06,
	15 07-10,	15 11-15,	15 17-21,	15 25-43,	15 44-53,
	15 54-16 01,	16 08-12,	16 13-16,	16 20-30,	16 32-33,
	17 16-17,	17 19-26,	17 33-42,	17 43-53,	17 54-18 01,
	18 05-20,	18 21-22,	18 27-37,	18 40-53,	19 01-13,
	19 14-20,	19 27-35,	19 37-53,	19 54-20 05,	20 06-22,
	20 27-39,	20 41-47,	20 48-53,	20 54-21 00,	21 05-17,
	21 20-21 23.				
30 Jan.					
	14 44-51,	14 54-55,	14 56-59,	15 02-04,	15 05-07,
	15 08-12,	15 19-25,	15 26-34,	15 35-41,	15 42-58,
	15 59-16 04.				
31 Jan.					
	14 31-40,	14 44-15 02,	15 03-14,	15 17-32,	15 34-43,
	15 44-45,	15 52-16 08,	16 08-15,	16 16-24,	16 25-29,
	16 34-43,	16 44-52,	16 53-58,	17 48-18 04,	18 05-09,
	18 13-24,	18 25-41,	18 42-51,	18 52-19 04,	19 05-07,
	19 09-16,	19 18-32,	19 33-47,	19 49-50,	19 53-20 11,
	20 12-17,	20 19-31,	20 33-41,	20 46-58,	10 59-21 08
	21 18-25,	21 28-31.			

Table I (Cont.)

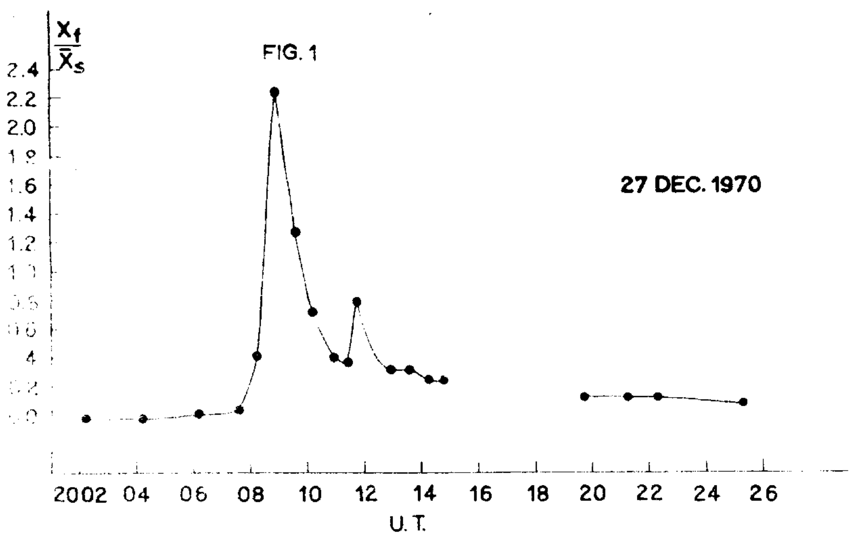
2	Feb.				
	14 17-20,	14 31-34,	14 39-44,	14 45-57,	14 58-15 04,
	15 05-13,	15 14-26,	15 27-33,	15 34-40.	
23	Feb.				
	16 33-35,	16 36-42,	17 09-10,	17 11-23,	17 25-41,
	17 43-18 01,	18 03-22,	18 24-41,	18 48-49,	18 50-58,
	18 59-19 11,	19 13-29,	19 30-38,	19 39-46,	19 51-56.
24	Feb.				
	14 17-18,	14 20-37,	14 39-41,	14 46-47,	14 49-52,
	14 53-15 01,	15 02-05,	15 06-20,	15 22-32,	15 33-36,
	15 37-40,	15 41-48,	15 49-16 10,	16 11-12,	16 13-28,
	16 30-39,	16 39-46,	16 48-56,	16 57-17 07,	17 09-27,
	17 28-33,	17 34-42,	17 43-45,	17 47-49,	17 51-55,
	17 56-18 02,	18 04-20,	18 21-36,	18 38-44,	18 45-55,
	18 57-19 09,	19 29-36,	19 39-49,	19 50-20 08,	20 10-20,
	20 21-32,	20 33-36,	20 37-38.		

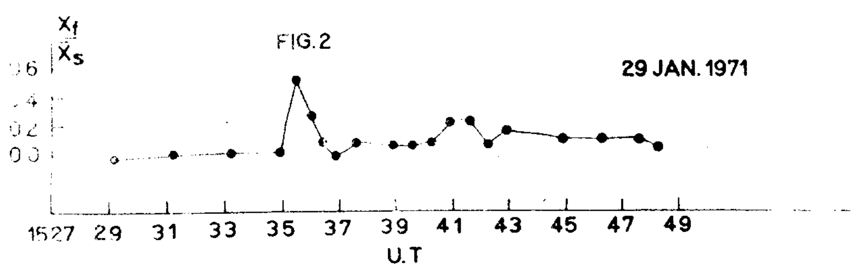
Table II

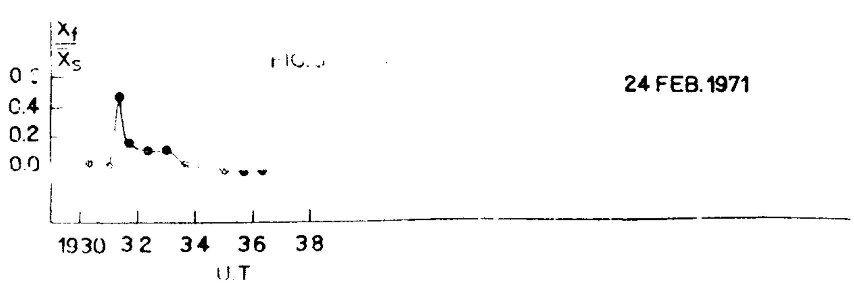
Flares of YZ CMi
Observed at Uttar Pradesh State Observatory, Naini Tal
27 December 1970 - 24 February 1971

Date	UT_{max}	Duration of flare before and after maximum t_b (Minutes)	t_a (Minutes)	$\frac{X_{fm}}{\overline{X}_s}$	$\frac{\sigma}{\overline{X}_s}$	P	F(z)
1970 27 Dec.	$20^h08^m52^s$	1.33	50.11	2.24	0.026	8.30	1.11
1971 29 Jan.	$15^h35^m30^s$	0.38	12.75	0.51	0.040	1.78	1.33
24 Feb.	19 31 21	0.35	2.35	0.45	0.013	0.31	1.71

YZ CMi FLARES







COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 558

Konkoly Observatory
Budapest
1971 June 7

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen - Nürnberg
Band VIII, Nr. 94

NEW BRIGHT SOUTHERN VARIABLE STARS

On sky patrol plates taken at the Southern Station of the Remeis Observatory Bamberg and the University of Florida Gainesville further at Mount John University Observatory, Lake Tekapo, New Zealand, the following stars catalogued in the Cordoba or the Cape Catalogues have been found to be variable. For stars fainter than 8^m0 finding charts are given on the pages following the list.

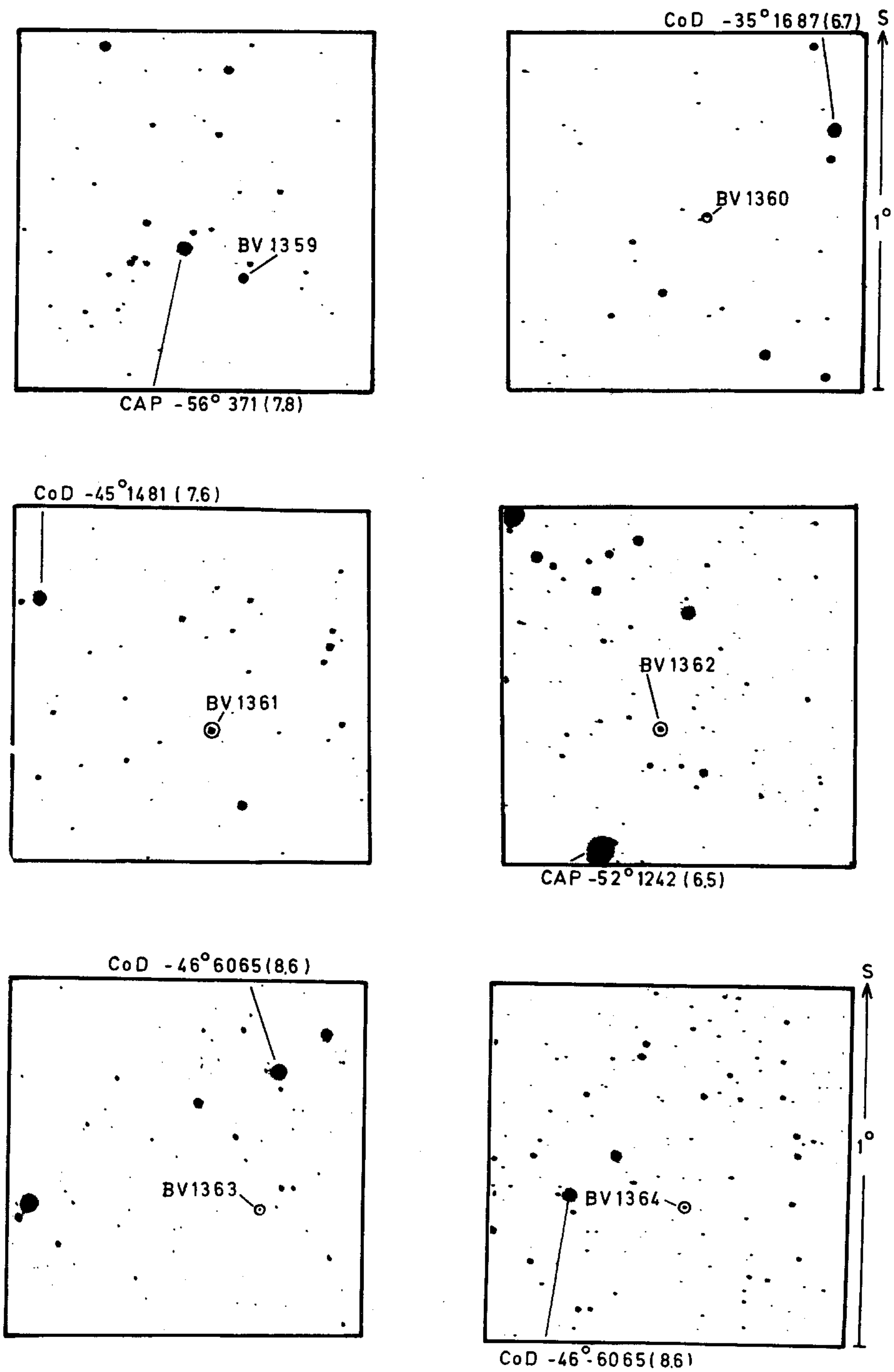
Star	Identification	A_{pg}
BV 1359 Eri	= CoD -56°0419 (10 3/4)	0^m4
BV 1360 Eri	= CoD -35°1672 (10) = CSV 404 = S 4834	0.6
BV 1361 Cae	= CoD -45°1497 (9.2)= CAP -45°0437 (8.8)	
	= HD 27756 A_2	0.4
BV 1362 Car	= CoD -53°1951 (9.2)= CAP -53°1399 (8.8)	
	= HD 62177 A_5	0.5
BV 1363 Vel	= CoD -45°6020 (10) = CSV 1605 = HV 8282	0.5*)
BV 1364 Vel	= CoD -46°6095 (9.9)= CAP -46°4500 (10.4)	
	= HD 90424 Mb	0.6
BV 1365 Vel	= CoD -48°5661 (10) = CAP -48°3312 (9.6)	0.6
BV 1366 Vel	= CoD -46°6381 (10) = CAP -46°4778 (10.2)	0.8
BV 1367 Cen	= CoD -36°7028 (9.0)= CAP -36°4850 (8.8)	0.3
BV 1368 Cen	= CoD -48°6529 (10) = CSV 1745 = HV 8368	0.8*)**
BV 1369 Cen	= CoD -58°4100 (5.3)= CAP -58°3692 (7.2)	
	= HD 100261 F_8	0.2
BV 1370 Cen	= CoD -43°7183 (9.9)	0.6*)
BV 1371 Cen	= CoD -35°7454 (7.1)= CAP -35°4990 (7.8)	
	= HD 102608 Mb	0.3
BV 1372 Cen	= CoD -49°6858 (10) = CAP -49°4922 (9.8)	1.0*)
BV 1373 Cen	= CoD -41°7154 (9.9)= CAP -41°5858 (10.3)	0.4
BV 1374 Cru	= CoD -57°4653 (10) = CAP -57°5646 (9.6)	
	= HD 110338 Mb	0.3
BV 1375 Cha	= CoD -78°0544 (10.1) = CAP -78°0812(9.5)	0.4
BV 1376 Cen	= CoD -43°8394 (10)	1.5*)
BV 1377 Mus	= CoD -71°0963 (7.6) = CAP -71°1498 (9.1)	
	= HD 118685 Mb	0.4
BV 1378 Cen	= CoD -38°8902 (10)	1.0

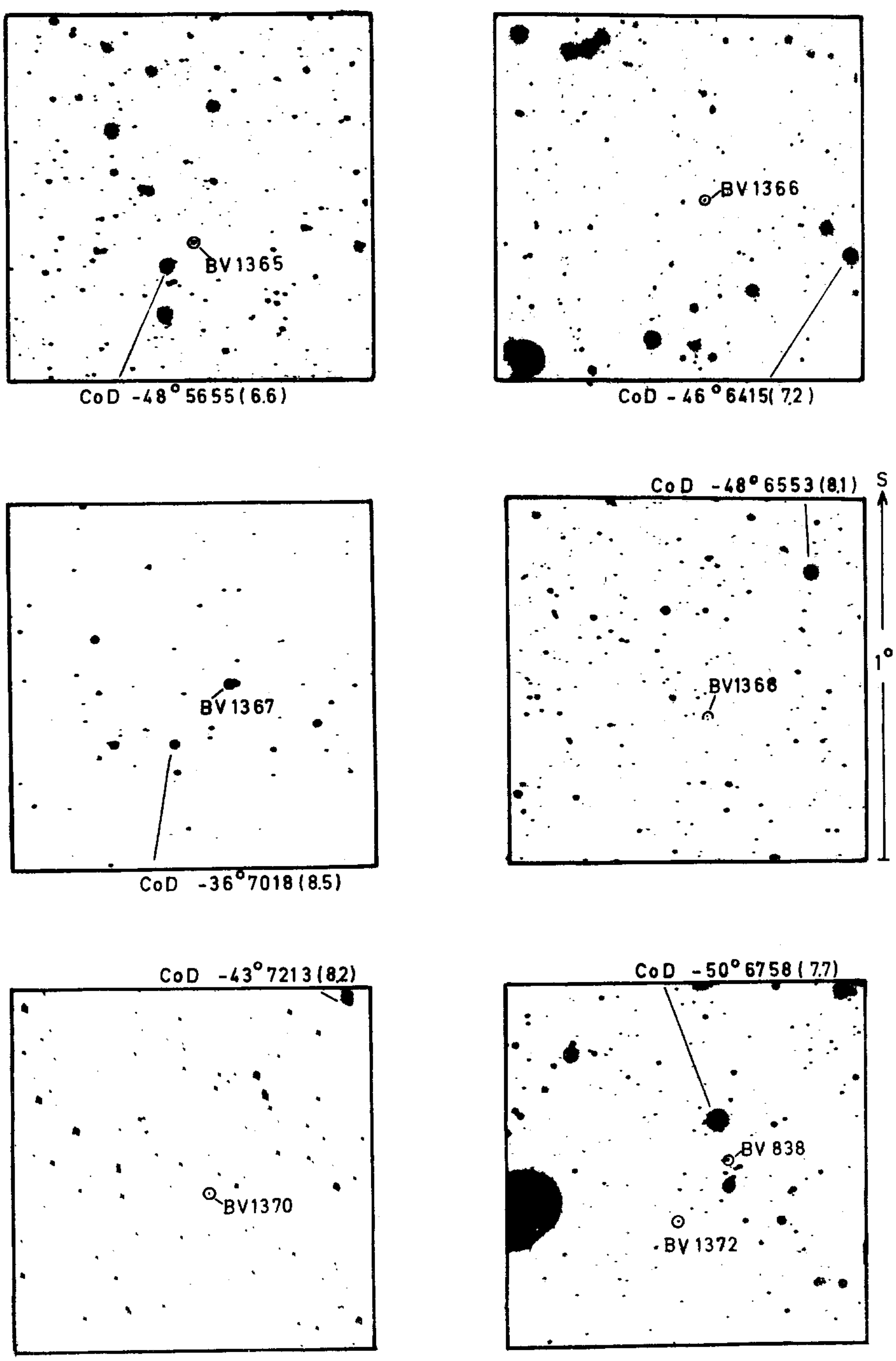
		A_{pg}
BV 1379 Cen	= CoD −51°7870 (9.9) = CAP −51°6466 (9.0) = HD 121715 F_5 = CSV 2086 = HV 2949	0.5
BV 1380 Cen	= CoD −38°8974 (9.1) = CAP −38°5679 (9.4) = CSV 101420 = Zinner 1044	0.8
BV 1381 Cen	= CoD −41°8991 (9.9)	0.3
BV 1382 Lup	= CoD −53°5755 (10.7)	0.5
BV 1383 Cén	= CoD −34°10090 (8.5) − CAP −34°6282(10.2) = CSV 2227 = S 5002	1.0
BV 1384 Lup	= CoD −37°9917 (9.3) = CAP −37°6378 (9.6)	0.5
BV 1385 Lup	= CoD −33°10348 (9.5) = CAP −33°3777(9.4)	0.4
BV 1386 Lup	= CoD −43°9674 (10)	0.4
BV 1387 Lup	= CoD −35°10525 (10)	1.0*)
BV 1388 Sco	= CoD −36°10857 (10)	1.0
BV 1389 TrA	= CoD −69°1564 (10.2) = CSV 7426 = S 7635	0.5
BV 1390 Sco	= CoD −37°11118 (7.5) = CAP −37°6811 (7.5) = HD 152901 B_5	0.4
BV 1391 Ara	= CoD −48°11445 (10) = CSV 2939 = S 5030	1.0
BV 1392 Ara	= CoD −52°8252 (11) = CAP −52°10753 (9.8)	0.4
BV 1393 CrA	= CoD −45°12401 (9.2) = CAP −45°9242(9.4) = HD 168031 Ma	0.4
BV 1394 Tel	= CoD −47°12414 (10) = CAP −47°8965 (10.4)	0.5
BV 1395 Tel	= CoD −49°12435 (9.8) = CAP−49°10808(10.6)	0.4
BV 1396 Tel	= CoD −47°12766 (10) = CAP −47°9193 (10.2)	0.6
BV 1397 Tel	= CoD −46°12968 (10)	0.6
BV 1398 Sgr	= CoD −45°13251 (10) = CSV 4672 = S5068	1.0
BV 1399 Tel	= CoD −51°12279 (8.6)= CAP −51°11367 (8.6) = HD 187846 F_8	0.4
BV 1400 Tel	= CoD −50°12825 (9.8)	0.8
BV 1401 Ind	= CoD −47°13487 (9.9)= CSV 5229 = HV 3340	0.7
BV 1402 Gru	= CoD −46°14144 (7.7)= CAP −46°10327 (7.6) = HD 208614 A_2	0.5
BV 1403 Gru	= CoD −55°9176 (7.2)= CAP −55°9907 (7.8) = HD 215985 Ma = CSV 8795	0.4
BV 1404 Tuc	= CoD −65°2919 (9.5) = CAP −65°4140 (9.4) = CSV 5732 = S 5161	0.5

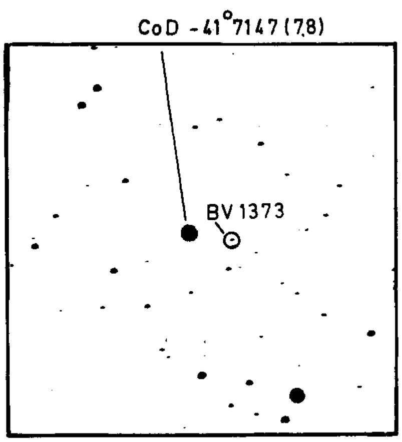
*) brightness above plate limit
**) two stars with distance 30" in declination. The variable seems to be the CoD-star. Probably the CSV-star.

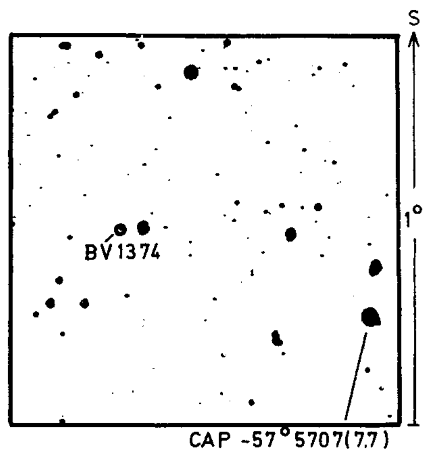
Bamberg, May 1971

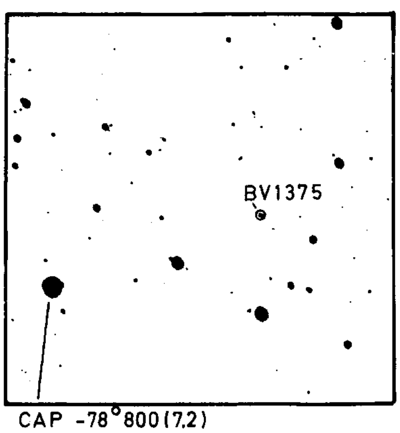
D.FRIEDRICH − E. SCHÖFFEL

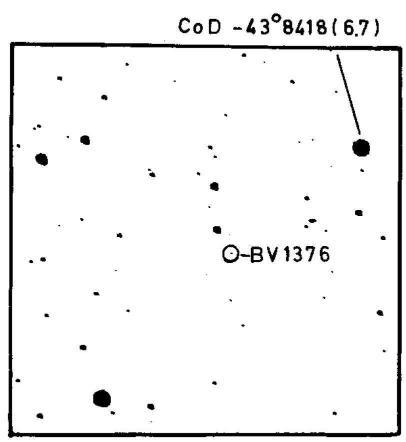

BV 1359
CAP -56° 371 (7.8)
CoD -35° 1687 (6.7)
S
BV 1360
1°
CoD -45° 1481 (7.6)
BV 1361
BV 1362
CAP -52° 1242 (6.5)
CoD -46° 6065 (8.6)
BV1363
S
1°
BV 1364
CoD -46° 6065 (8.6)

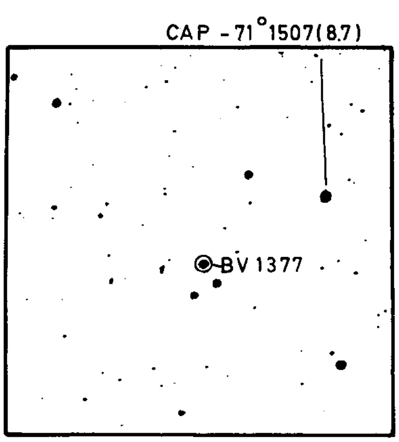

BV 1365
CoD -48° 5655 (6.6)
BV 1366
CoD - 46° 6415 (7.2)
BV 1367
CoD -36° 7018 (8.5)
CoD -48° 6553 (8.1)
S
1°
BV1368
CoD -43° 7213 (8.2)
BV1370
CoD -50° 6758 (7.7)
BV 838
BV 1372

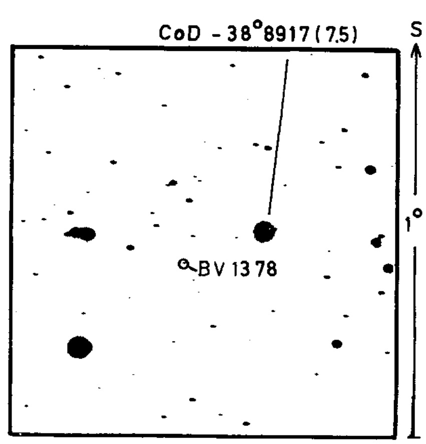

CoD -41°7147 (7.8)
BV 1373

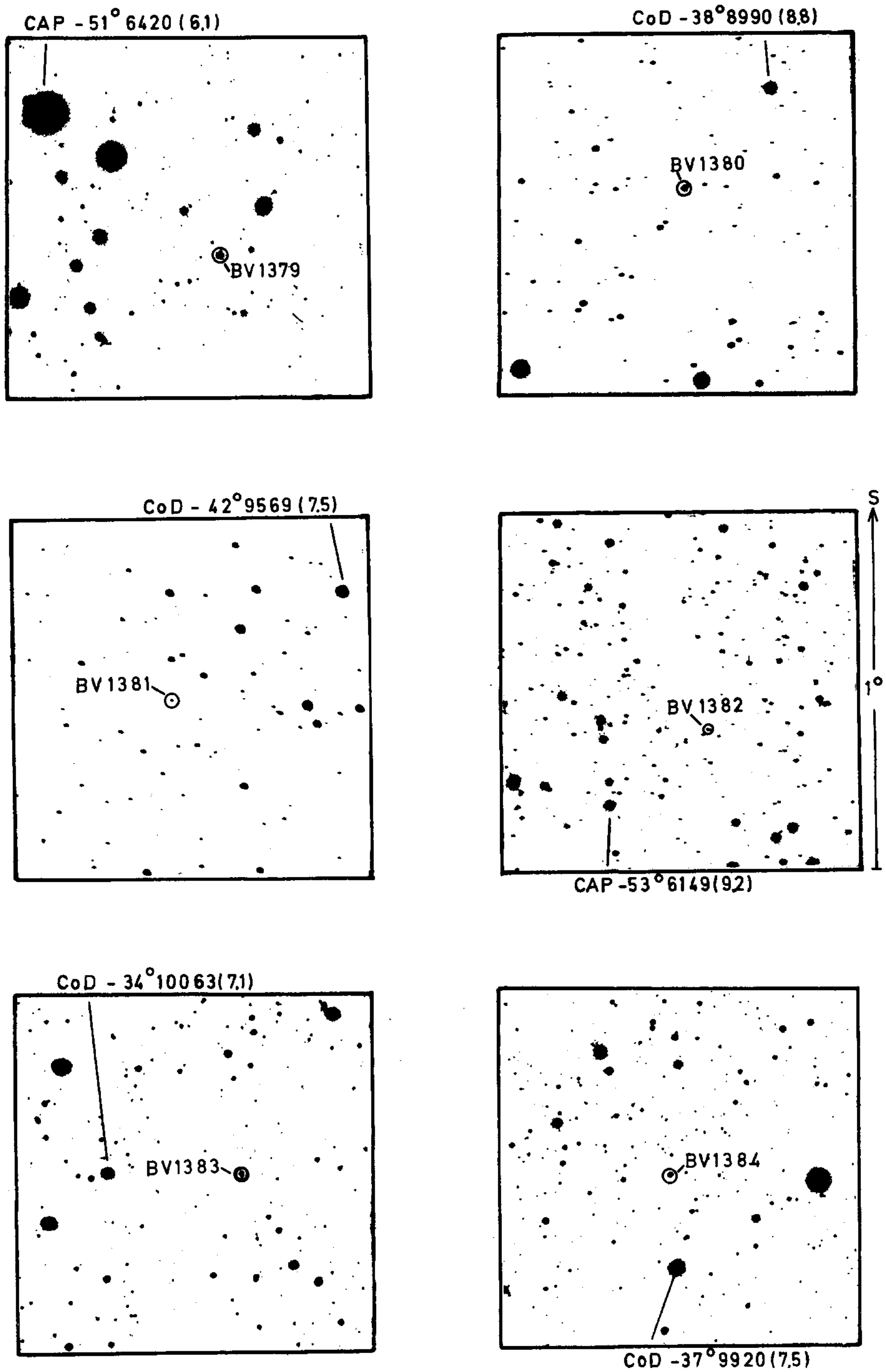

S
1°
BV 1374
CAP -57°5707(7.7)

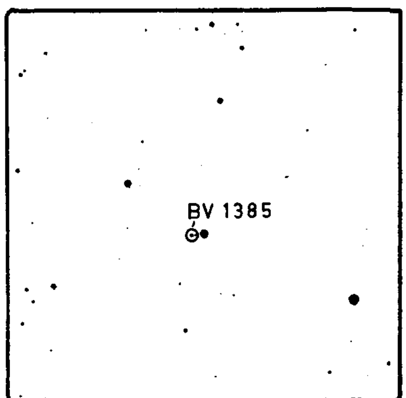

BV1375
CAP -78°800(7.2)


CoD -43°8418(6.7)
BV 1376

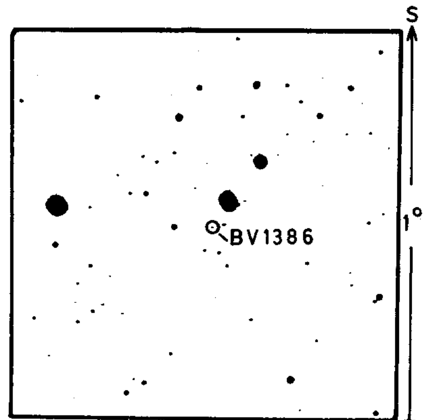

CAP -71°1507(8.7)
BV 1377


CoD -38°8917(7.5)
S
1°
BV 1378


CAP -51° 6420 (6,1)
BV1379
CoD -38°8990 (8,8)
BV1380
CoD - 42°9569 (7,5)
BV1381
S
1°
BV1382
CAP -53° 6149(9,2)
CoD - 34°10063(7,1)
BV1383
BV1384
CoD -37°9920 (7,5)

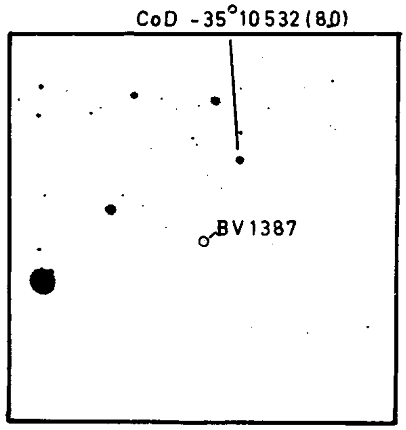


CoD -33°10368 (7.3)

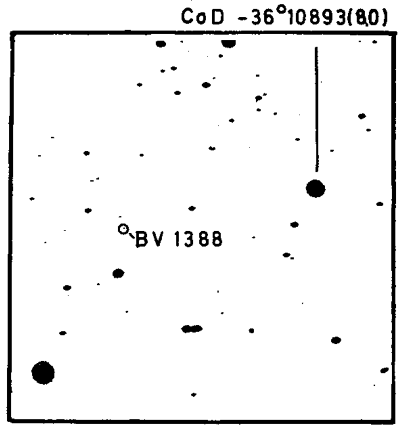


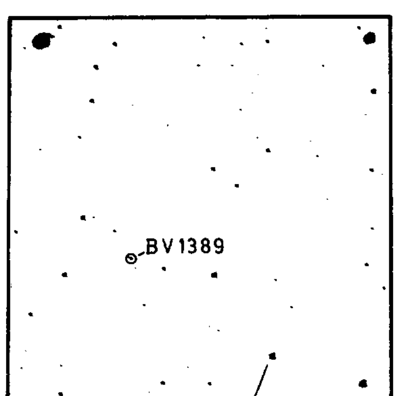
CoD -43°9641 (7.3)

CoD -35°10532 (8.0)

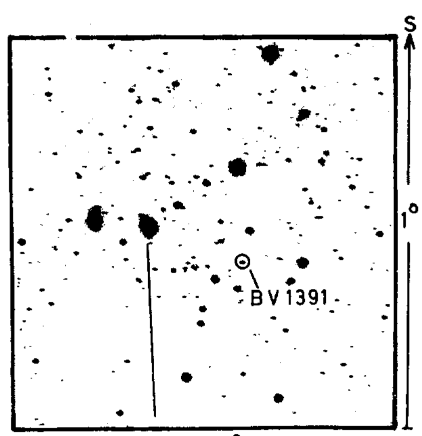


CoD -36°10893 (8.0)

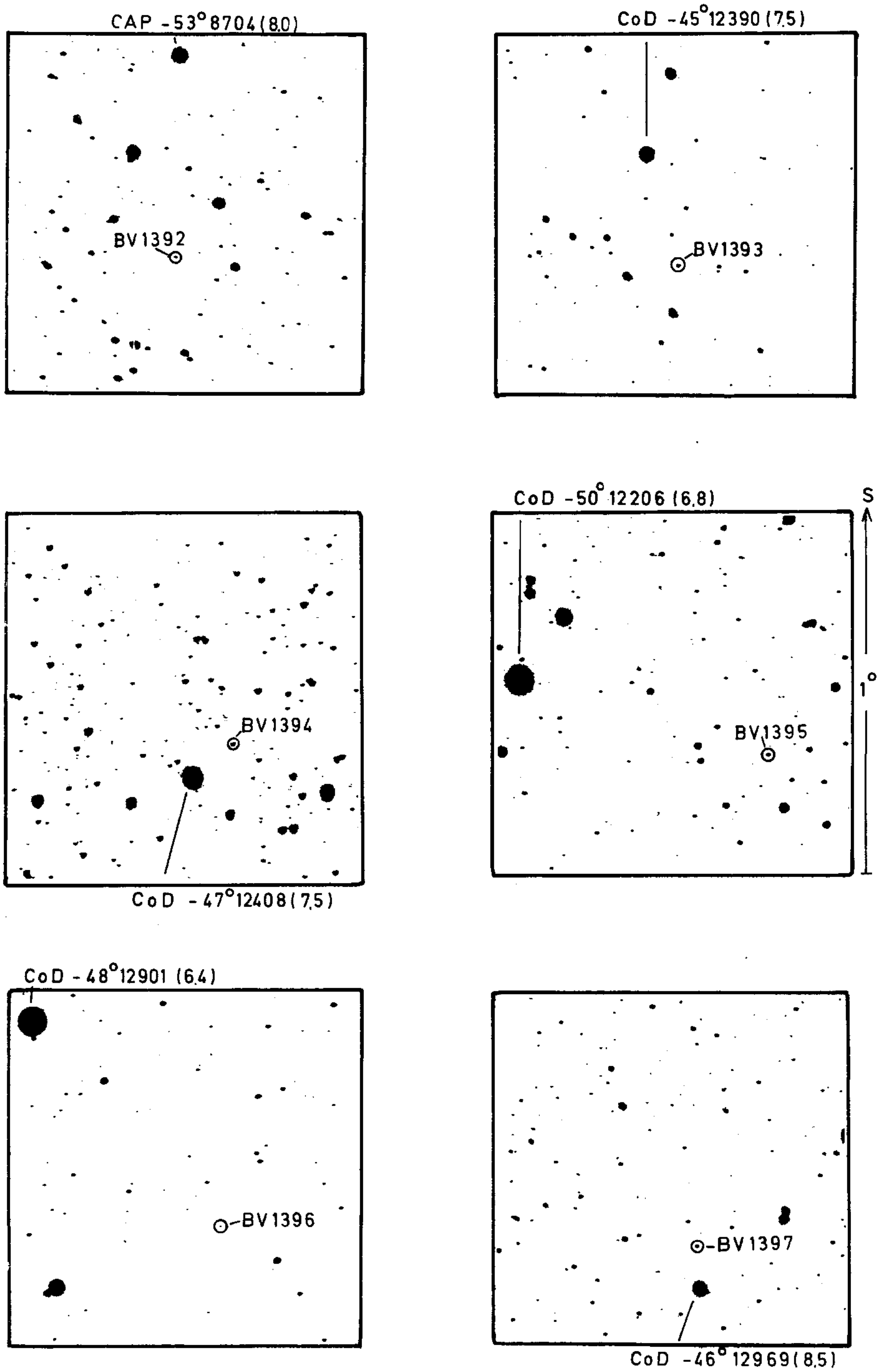




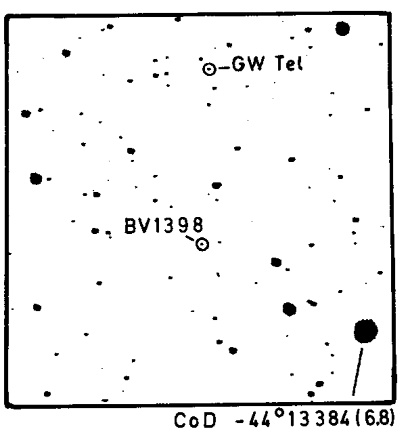
CAP -69°2630 (8.6)

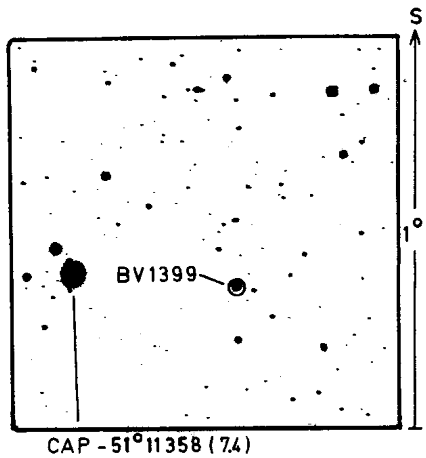


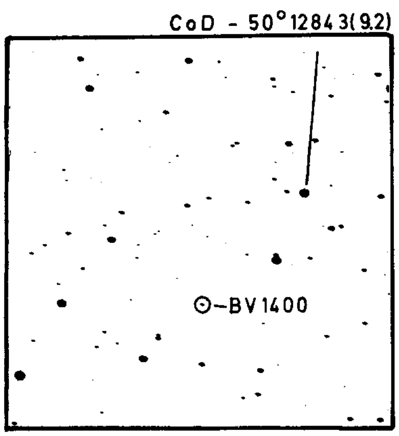
CoD -48°11424 (8.6)

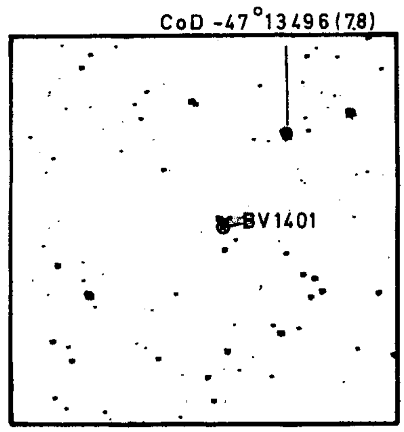


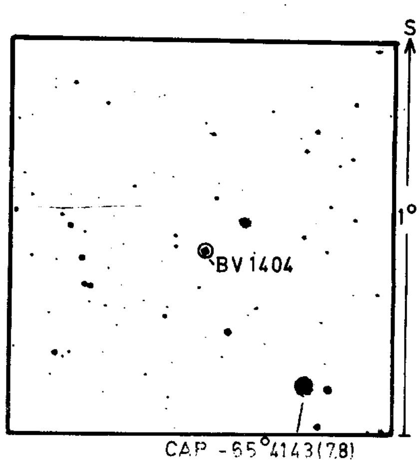
CAP -53° 8704 (8.0)
BV1392
CoD -45° 12390 (7.5)
BV1393
BV1394
CoD -47° 12408 (7.5)
CoD -50° 12206 (6.8)
S
1°
BV1395
CoD -48° 12901 (6.4)
BV1396
BV1397
CoD -46° 12969 (8.5)


GW Tel
BV1398
CoD -44°13384(6.8)


S
1°
BV1399
CAP -51°11358 (7.4)


CoD - 50°12843(9.2)
BV1400


CoD -47°13496 (7.8)
BV1401


S
1°
BV1404
CAP -65°4143(7.8)

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

NUMBER 559

Konkoly Observatory
Budapest
1971 June 8

ON THE SPECTRUM OF THE SERPENS VARIABLE

Stienon (1971) has reported the finding of a peculiar variable star in Serpens. In the past the star has not shown any variability in its brightness as well as in its spectrum. Therefore, several alternatives with regards to its nature has been put forward by Stienon.

On the Bosscha Schmidt plates that were taken for purposes of spectral classification of stars in Serpens, we can easily identify the spectrum of the variable. The purpose of this report is to outline the appearance of the spectrum taken on IIa-O plates which were exposed for 60 minutes. The 6°-objective prism yields a disperision of 312A/mm at H-gamma. A limiting magnitude of 12.6 (photographic) was reached in the surveys that were carried out on 3 different nights in May 1971 (May 22, UT=17: 57; May 24, UT = 22:04; May 26, UT = 19:20). In addition to these plates, an 1N plate was exposed behind an RG 8 filter for 15 minutes (May 26, UT = 20:05) to record the infrared spectral regions.

A visual inspection of the plates reveals the following information: At the given position of the variable, the spectrum that was observed on May 22 shows a trace of emission lines at H-delta and H-epsilon. The absorption features suggest that the spectrum belongs to the spectral class later than K5. On the other plates these features, but the emission lines, remained the same. The brightness, as can be judged from their spectral densities on various plates, does not indicate any variation. In addition, there is no indication that the star can be later than M 1 (on Mt. Wilson scale), as otherwise the TiO bands should be easily recognized on our infrared plate.

As Stienon has suggested, more observations of this star are needed, but the present observation suggests that the star is similar to Popper's flare star, in the sense that it may be a flare star whose spectrum does not belong to the dM group.

May 29, 1971

BAMBANG HIDAJAT
Bosscha Observatory
Lembang, Indonesia

Reference:

Stienon, Francis M. 1971, Inf.Bull.Var.Star no.545.

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

NUMBER 560

Konkoly Observatory
Budapest
1971 June 9

UBV PHOTOMETRY OF BM Cas

The supergiant eclipsing binary BM Cassiopeiae ($P = 197^{d}.3$) is of considerable interest, especially since Thiessen (1956) has suggested that one component is a classical Cepheid ($P = 27^{d}$).

In the fall of 1967 fourteen UBV observations were obtained which covered the rising branch of primary eclipse. Because no further observations of BM Cas are planned at this observatory, the results are presented here for others to use. According to the IAU Program Notes for Eclipsing Binaries, Numbers 9 and 18, respectively, Chao at Harvard and Kalv at Tallinn have been observing BM Cas photoelectrically.

The three-color observations, obtained with the Dyer Observatory 24-inch reflector and a refrigerated 1P21 photomultiplier, were made differentially with respect to the comparison star BD +63°101. The differential magnitudes were corrected for differential extinction and transformed differentially to the UBV system in the usual way. The results are presented in Table I, where the first column lists the heliocentric Julian date and the last three columns list ΔV, Δ(B-V), and Δ(U-B), respectively.

Table I
Differential UBV Magnitudes
(BM Cas minus BD +63°101)

JD (hel.) 2,439,000+	ΔV	Δ(B-V)	Δ(U-B)
783.847	+0.885	+0.898	+0.598
.858	.889	.899	.594
784.947	.839	.915	.567
785.780	.815	.902	.612
.791	.815	.909	.603
791.826	.625	.923	.561
.839	.623	.899	.557
797.608	.483	.858	.534
799.577	.452	.861	.521
800.816	.437	.849	.483
802.875	.453	.849	.471
803.841	.437	.856	.497
804.767	.432	.859	.493
807.911	+0.421	+0.878	+0.481

The comparison star BD +63°101 was tied in to the UBV system, the resulting magnitudes being $V = 8^{m}.45 \pm 0^{m}.02$, $B-V = +0^{m}.18 \pm 0^{m}.01$, and $U-B = +0^{m}.14 \pm 0^{m}.02$. This makes it possible to convert the differential magnitudes in Table I to actual magnitudes.

May 31, 1971

DOUGLAS S. HALL

Dyer Observatory
Vanderbilt University
Nashville, Tennessee 37203
U.S.A.

Reference:

Thiessen,G. 1956, *Z. Astrophys.* 39, 65.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 561

Konkoly Observatory
Budapest
1971 June 9

PHOTOMETRIC OBSERVATIONS OF YZ CANIS MINORIS AND AD LEONIS

YZ CMi

The flare star YZ Canis Minoris was monitored at Boyden Observatory for a total time of 10^h49^m during the recent International Co-operative period from the 16th January to 2nd February, 1971. Unfortunately adverse weather conditions prevented extensive observations. During the brief runs that were possible, no flare activity was detected with the 40cm aperture Nishimura Reflector.

Monitoring Table of YZ Canis Minoris

Date 1971	U.T.	Total Hours per Night	
Jan			
21	20^h49^m – 22^h26^m	1^h37^m	
22	18 35 – 22 12	3 37	No flare activity observed
25	20 56 – 21 41	0 45	
27	18 31 – 23 21	4 50	
	Total	10^h49^m	

AD Leo

During the recent International Co-operative period from the 18th February to 4th March, 1971, observations were carried out from Boyden Observatory on the flare star AD Leo. The 40cm aperture Nishimura Reflector was used with an EMI 6256 cooled photomultiplier tube along with a Johnson B Filter.

The table gives details of the monitoring and it will be seen that three low intensity flares were recorded during the period.

The total monitoring time was 38^h52^m. Flare No.1 is particularly interesting in that it had a relatively long duration of $15^m.2$ with a fairly gradual decline after a flash phase. This is similar in features to other long duration flares from AD Leo previously reported at Boyden (A.H. Jarrett and J.P. Eksteen, 1969, 1970).

Monitoring Table of AD Leo

Date 1971	U.T.	Total Hours per Night	Flare No.	U.T. of Flare	Duration	Δm
Feb.						
17	19^h09^m - 20^h40^m	1^h31^m	1	$19^h54^m.8$	$15^m.2$	0.21
18	19 44 - 21 45	2 01				
21	18 25 - 22 28	4 03				
23	18 24 - 21 35	3 11				
24	18 08 - 23 08	5 00				
25	18 14 - 21 29	3 15				
28	18 06 - 22 14	4 59	2	$19^h38^m.0$	6.0	0.15
	22 32 - 23 23					
March						
1	18 02 - 22 40	4 38	3	21 59.6	1.4	0.18
2	18 27 - 23 16	4 49				
3	19 15 - 22 54	3 39				
4	21 21 - 23 07	1 46				
	Total	38^h52^m				

25th May, 1971.

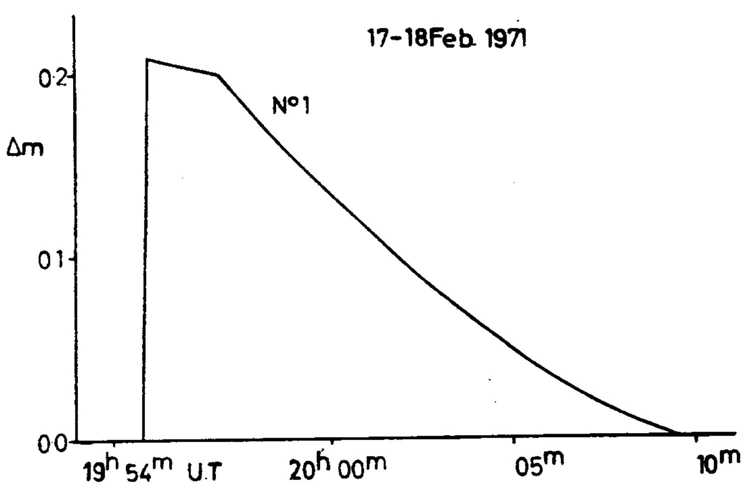
A.H. JARRETT and J.P. EKSTEEN

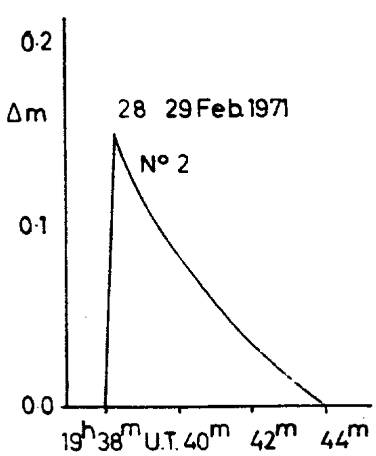
Boyden Observatory,
Department of Astronomy,
University of the Orange Free State,
Bloemfontein Rep. of South Africa

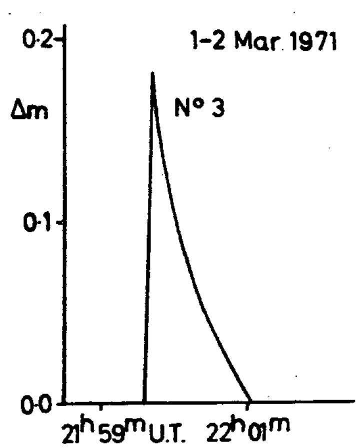
References:

Jarrett, A.H. and Eksteen, J.P. 1969 MNASSA 28, 70.
Jarrett, A.H. and Eksteen, J.P. 1970 MNASSA 29, 78.

AD Leo


17-18Feb. 1971
N° 1
0·2
Δm
0·1
0·0
19h 54m U.T
20h 00m
05m
10m


0·2
Δm
28 29 Feb. 1971
N° 2
0·1
0·0
19h 38m U.T. 40m
42m
44m


0·2
1-2 Mar. 1971
Δm
N° 3
0·1
0·0
21h 59m U.T.
22h 01m

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 562

Konkoly Observatory
Budapest
1971 June 26

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen-Nürnberg
Band VIII, Nr.39

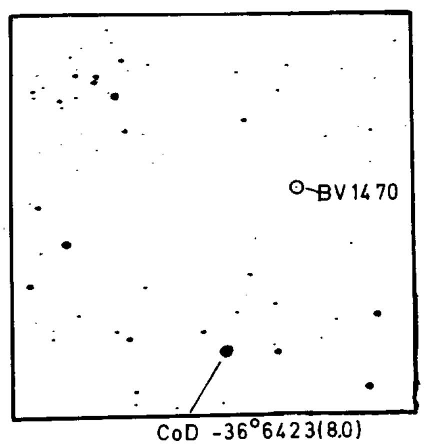
NEW BRIGHT SOUTHERN VARIABLE STARS

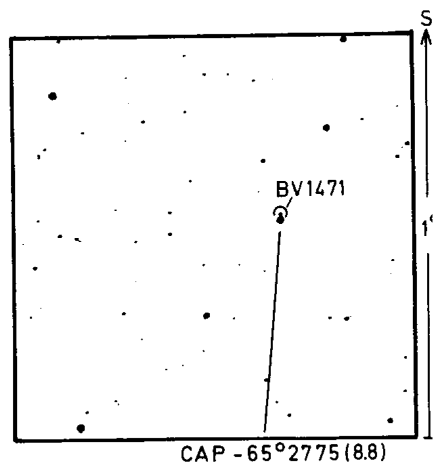
On sky patrol plates of the Southern Station of the Dr. Remeis-Sternwarte Bamberg and the University of Florida Gainesville, further at Mount John University Observatory, Lake Tekapo, New Zealand, the following variable stars were found:

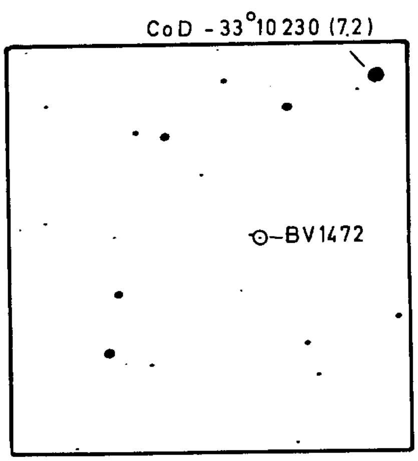
		A_{pg}
BV 1470 Ant	= CAP -36°4374(10.0) = CSV 1616 = S 4933	0.6
BV 1471 Cir	= CoD -65°1723(9.8) = CAP -65°2776 (9.3)	0.4
BV 1472 Cen	= CoD -32°10517(9.9) = CSV 2229 = S 5003	0.8
BV 1473 Nor	= CoD -48°10745(8.2) = CAP -48°8377(7.9) = HD 147069 A0	0.4
BV 1474 Nor	= CoD -43°10964(7.6) = CAP -43°7637(7.2) = HD 149779 B3	0.3
BV 1475 Oct	= CoD -77°0919(9.2) = CAP -77°1292(9.1) = CSV 3824 = HV 3298 = HD 166329 Ma	0.5
BV 1476 Sgr	= CoD -35°12442(9.8) = CAP -35°7850(9.2)	0.4
BV 1477 Sgr	= CoD -42°14615(8.8) = CAP -42°8972(7.6) = HD 189306 F2	0.3
BV 1478 Tel	= CoD -54°8610(9.2) = CAP -54°9644(9.4) = HD 19256 Ma	0.5
BV 1479 Sgr	= CoD -37°13682(8.0) = CAP -37°8766(8.4) = HD 193258 Mb	0.3
BV 1480 Mic	= CoD -34°14474(8.0) = CAP -34°8762(8.8) = HD 195 812 Mb	0.3

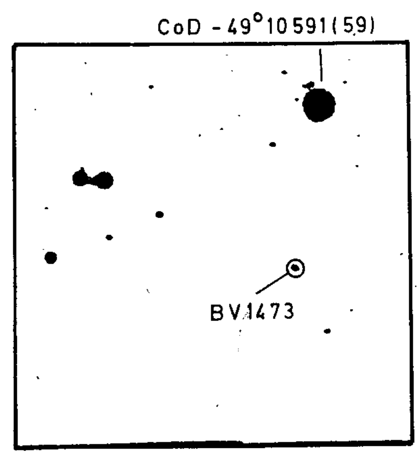
Bamberg, June 1971

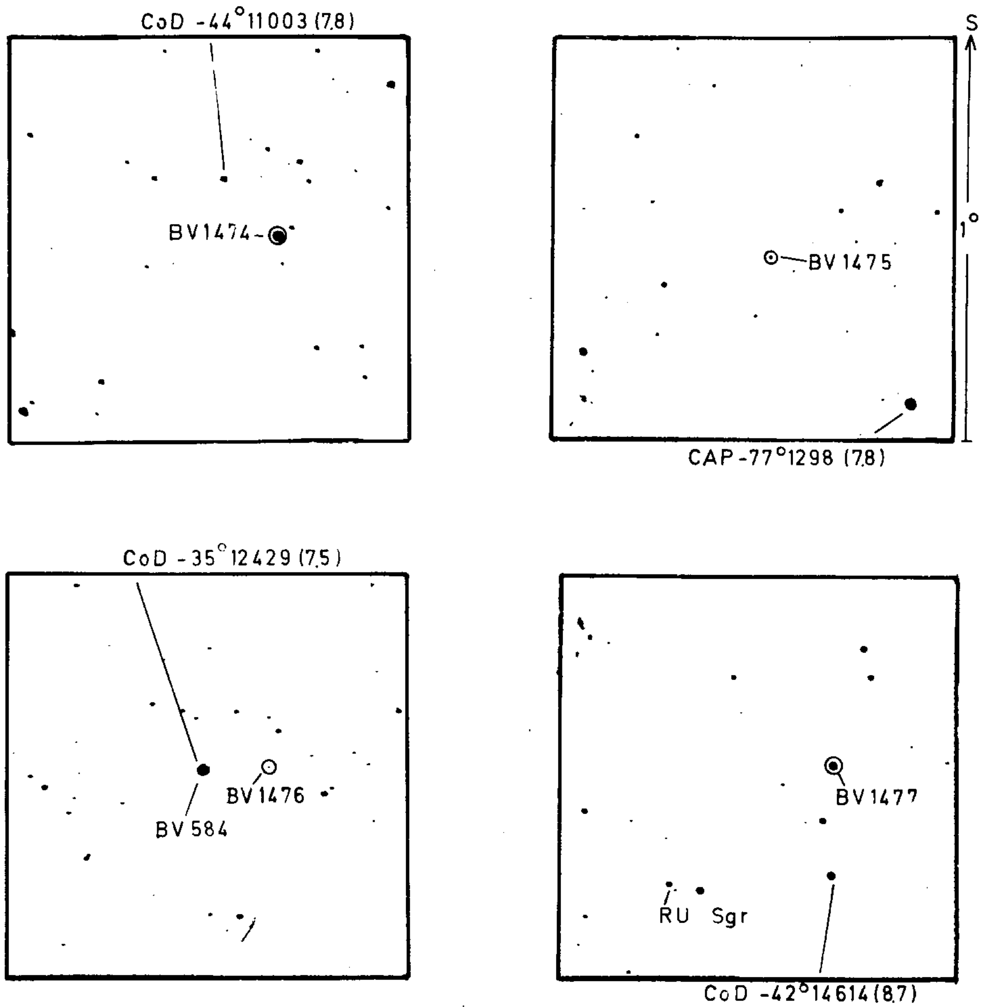
W. STROHMEIER

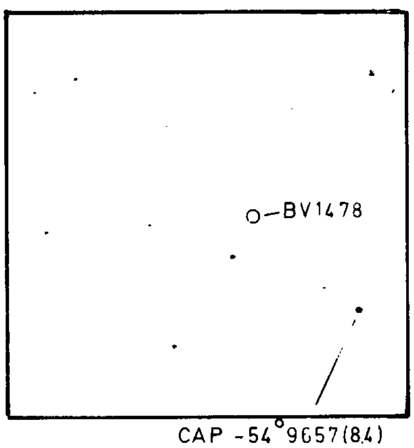

BV 1470
CoD -36°6423(8.0)

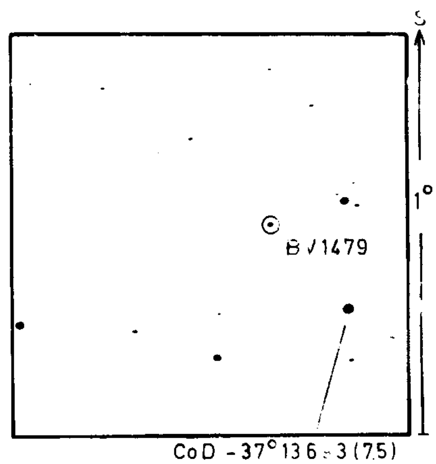

S
BV1471
CAP -65°2775 (8.8)

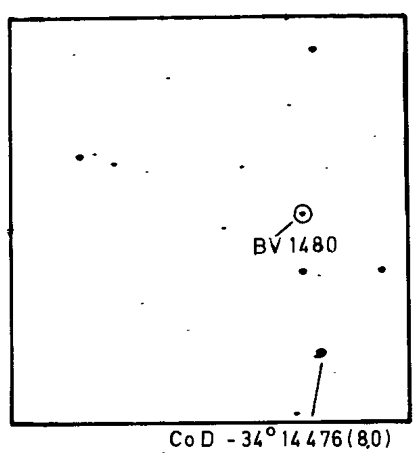

CoD -33°10 230 (7.2)
BV1472


CoD -49°10 591 (5.9)
BV 1473


CoD -44°11003 (7.8)
BV1474
S
1°
BV 1475
CAP-77°1298 (7.8)
CoD -35°12429 (7.5)
BV 1476
BV 584
BV 1477
RU Sgr
CoD -42°14614 (8.7)


BV1478
CAP -54°9657(8.4)


S
1°
BV1479
CoD -37°136 3(7.5)


BV 1480
CoD -34°14476(8.0)

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 563

Konkoly Observatory
Budapest
1971 June 26

VARIABLE 14 IN THE GLOBULAR CLUSTER M5

This note is to call attention to an interesting feature of Variable 14 in the globular cluster M5 = NGC 5904 (Bailey, 1917). The period of this star has been given by Coutts and Hogg (1969) as 0.49 days, a period characteristic of an RR Lyrae variable. However, from the UBV colors of the star obtained by Arp (1962, where it is star II-51) its position in the H-R diagram of the cluster is not in the region of the RR Lyrae varables but rather somewhat redder and brighter, in the neighborhood of the Asymptotic Branch. This has recently been confirmed by measurements with the David Dunlap Observatory intermediate-band photometric system from which were determined an effective temperature of the star of around 5200° and a surface gravity of Log g = 0,8 in CGS units (Osborn, 1971). These data would be more consistent with the star being a W Virginis type variable, and in view of the comments concerning the period by Coutts and Hogg (1969) and Bailey (1917) it is possible that the period is in error. In any event, however the unusual position in the H-R diagram makes the star an interesting candidate for further study.

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 564

Konkoly Observatory
Budapest
1971 June 26

ON THE APPARENT NON-VARIABILITY OF ADS 9975

The variability of one component of the visual binary ADS 9975 (BD +47°2317 = HD 146327) has been suggested recently (Dommanget and van Dessel 1970). The separation of the components has always been found to be less than 0.6 seconds of arc. The Henry Draper Catalogue lists a spectral type of G0. The above authors, via a literature search, found that the Δm between the two components varied widely, and so suspected a possible variation of one of the components. They determined the absolute magnitudes to be $M_V(A) = 5.64$ and $M_V(B) = 6.64$. The color estimates that one can make, the approximate spectral types, and the apparent change in Δm of the visual double cause one to suspect a system similar to ADS 9537 (Batten and Hardie 1965), where the components of the binary are both W Ursae Majoris systems.

To test whether a W Ursae Majoris-type eclipsing binary might be one component of ADS 9975, differential photoelectric observations were undertaken at Kitt Peak National Observatory with the 16-inch and 36-inch telescopes in October, 1970 on nights only good enough for differential photometry. The nearby star HD 146450 was used as the comparison star. Nineteen observations on five nights (14 of the observations being on one night) indicate a constant difference between ADS 9975 and HD 146450 of 1.522 ± 0.008 magnitudes. During this 5 day interval, then, ADS 9975 seems to have been constant in brightness. It would seem that any variation in brightness would be of a long term nature.

This work was supported in part by the National Science Foundation.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 565

Konkoly Observatory
Budapest
1971 June 28

PRELIMINARY NOTE ON V 1057 CYGNI AND SOME OTHER SIMILAR OBJECTS

The remarkable object V 1057 Cygni = LkHα190, known to be a small amplitude variable (15.5 - 13.5), was found by G.Welin (1) to show in late 1969 a long-term flare-up of about 6 photographic magnitudes. At the time of writing this note the star still is at a maximum brightness of about 10th photographic magnitude. Previously this star was recognized by Herbig (2) at minimum light as an advanced T Tauri type star but the absorption line spectral type was not given. In August 1950 the first Schmidt camera objective prism plate containing this object was taken at the Tonantzintla Observatory, using a 103aE emulsion and a Wratten filter No.29. The Hα emission line was moderately strong and it was then marked as one of the Hα emission stars associated with the North America Nebula. Several red spectral plates were taken in 1950 and 1951, and the red continuum (from λ5900 up to Hα) did not show the characteristics of an M type star. In our collection of direct blue plates taken from 1943 through 1965, the star showed small light variations but it never appeared as bright or brighter than the neighboring Be star LkHα 192. Two direct plates obtained in succession the night of November 24, 1965, in red and near infrared emulsions (Eastman-Kodak 103aE and IN plates behind Wratten filters No.29 and No.89b, respectively) showed that the R-I color of V 1057 Cygni was larger by about 0.4 magnitudes than the R-I color of the KO Type star LkHα 188. Based on our small dispersion spectral red plates, the B-R and the R-I colors, the comparison with the red spectra and colors of the two KO stars LkHα 188 and LkHα 191, and the Be type star LkHα 192 plus Herbig's original spectroscopic observation of LkHα 190, we are led to believe that this star probably was of spectral type later than KO bat earlier than MO.

Slit spectrograms obtained by Mr.Rafael Costero during the last part of May, 1971, with our spectrograph attached to the Tonantzintla 1 meter telescope and with a dispersion of 125 A/mm, revealed that V 1057 Cygni has a spectral type A 1-2 of luminosity class III-IV at maximum with Hα in emission. This last spectroscopic observation almost coincides with Herbig's results (3).

Although we have been unable to measure quantitatively the R-I colors of the star at minimum and maximum, it seems that the infrared color is larger now than when the star was at minimum. At the present time, V 1057 Cygni has a V-I color excess of the order of 2.5 magnitudes. The quantitative values of the near infrared colors at minimum and maximum will be given later.

What I wish to emphasize in this note is that the brightening-up of FU Orionis and V 1057 Cygni represents entirely the same kind of phenomenon that makes some advanced T Tauri type stars evolve rapidly in an identical way as these two stars have evolved. There is a significant number of objects in the sky that most probably have passed through this kind of rapid evolution. Besides FU Orionis and LkHα 190, good examples of this kind of objects are: MWC 1080, LkHα 233, Z CMa, LkHα 208, RR Tau, AB Aurigae, BD +61°154, LkHα 198, V 380 Ori and possibly some of the additional objects contained in Herbig's paper (Ap.J.Supplement, Vol.4, p.337, 1960), as well as many others satisfying the conditions which are enumerated below.

In my working hypothesis I have chosen the stars that meet the following conditions, slightly modifying and extending the ones established by Herbig in the above mentioned article: i) the spectra are peculiar (absorption features due to a weak overlying shell and/or emission lines and line structure of the P Cygni type), of types F5 or earlier and with emission lines; ii) the stars lie in a remarkably obscure area; iii) the stars illuminate bright nebulosities in their immediate vicinity and in many instances (especially the ones that I have mentioned before) a bright, well defined and curved filament starts out from the stars like a tail or a jet; iv) the infrared excesses, particularly in micron wave lengths, are conspicuously larger than the corresponding to the spectral class observed photographically.

At the present time the similarities of FU Orionis and LkHα 190 with the other objects listed above are really amazing and, as stated, I am convinced that such objects have evolved in a similar way. Most probably they have rapidly evolved from an advanced T Tauri stage into a long-term flare, just as the case of FU Orionis and the new Cygnus star. Of course, in my working hypothesis I do not assume that all the young and advanced T Tauri type stars have evolved so rapidly or would do so. It appears almost certain that the great majority of the T Tauri stars evolve in a more gentle manner, in a succession of rather short-time flares and by ejecting mass through different processes.

In the past I have stressed - based on results obtained especially in Orion and in the Pleiades - a) that the different photometric and spectroscopic features observed in the "fast" and "slow" flare stars can be due to the fact that the phenomenon which produces the outburst takes place at different layers or depths of a given star, and b) that the younger the stellar aggregate and therefore the younger the flare stars involved, the more propitious the internal physical conditions of a late type star will be in order to give place to a "slow" and more permanent outburst. Thus, for instance, in extreme cases the appearance in one Herbig-Haro object of the two emission nebulous nuclei discovered by Herbig may be a sample of such a long-term outburst at the source where the ionizing radiation originates - or perhaps, more significantly, the other very conspicuous case represented by FU Ori, to which we can now add V 1057 Cygni. From these last two rapidly evolved stars we can make a preliminary guess that within 1 kpc from the Sun one would expect at least 4 or 5 similar rapidly evolving advanced T Tauri stars per century like V 1057 Cygni. A more extended and comprehensive study on the subject will be published later.

I would like to thank Dr. N.J.Woolf for informing me, in advance of publication, about the infrared observations of FU Orionis and LkHα 190 made by Martin Cohen and by him.

June 10, 1971

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 566

Konkoly Observatory
Budapest
1971 July 6

ON THE DISTRIBUTION OF FLARE STARS IN THE PLEIADES CLUSTER

In the paper entitled "Unusual Distribution of flare stars in Pleiades" L.V.Mirzoyan and M.A.Mnatsakanian (1) affirmed that there are no flare stars in the central volume of the Pleiades cluster within the radius 1.4 pc. They suggested that the existence of such a "cavity" might be explained "in the frames of the idea of expansion of stellar associations". However, there is no need to such an idea as the phenomenon treated by the above mentioned authors is only an apparent one.

In Fig.1 the curve of radial distribution of the surface density (per square degree) for flare stars brighter than $18^{m}.5$ in the Pleiades region is given. It is taken from our paper (2) with somewhat more details. The sample of flare stars considered here was taken from papers (3) and (4). The vertical lines correspond to the possible errors of surface densities F(r) determined by the formula $F(r)/\sqrt{n}$, where n is the number of stars used for the calculation of the given value of F(r). Within the range of these errors we must use the curve of distribution F(r) which shows the increase of flare stars density to the very centre of the cluster (curve above). The curve below represents the corresponding spatial density distribution $f(r)$.

The fainter flare variables are also concentrated to the centre of the cluster, and further discoveries of new flare stars in the Pleiades region (5) do not change this conclusion.

The density distribution of flare stars in the Pleiades cluster is the same as that of brighter members of the cluster. The only difference (the less concentration) is due to smaller masses of the flare stars.

Fig.1 contradicts the picture given in paper (1). Results announced in paper (1) are evidently explained by using too narrow zones for star counts and by neglecting the natural uncertainty of the F(r) values derived.

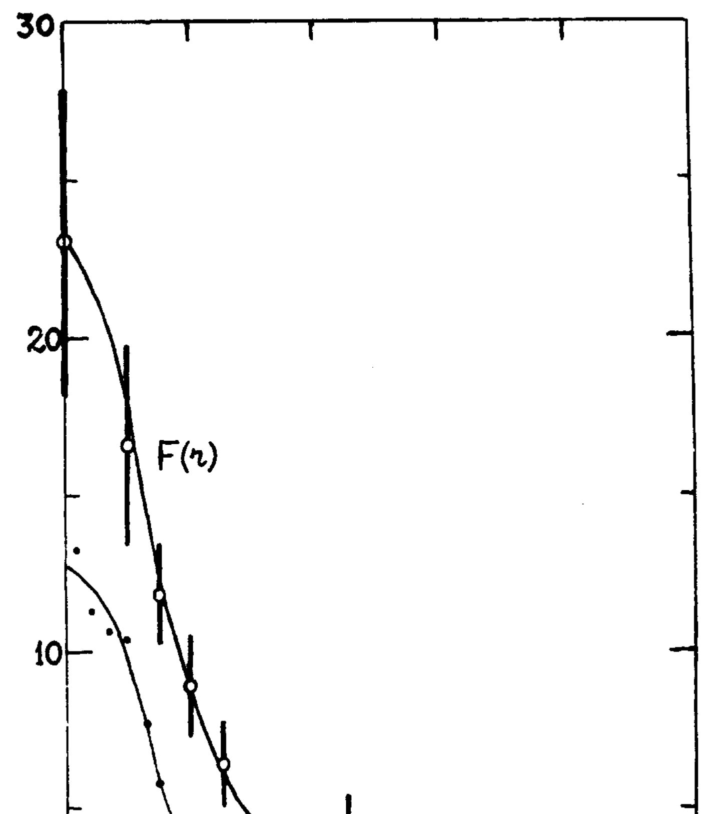

Fig.1

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

NUMBER 567

Konkoly Observatory
Budapest
1971 July 8

PHOTOELECTRIC OBSERVATIONS OF TX CANCRI

The eclipsing variable TX Cancri was observed with the 36 inch reflectors at the Okayama Astrophysical Observatory and the Dodaira Station of Tokyo Astronomical Observatory on sixteen nights during the winters of 1962-63, 1964-65, 1965-66, 1967-68 and 1970-71. BD +19°2067 was used as the comparison star. The standard UBV colour filters and three narrow-band filters (λ_{eff} = 4870, 4110, 3940A) were used. The observed dates are shown in the following table.

Date		Observing Place	Filters used: Colour	Filters used: Interference
1962	Dec. 12	Okayama	V	
	Dec. 13	Okayama	UBV	
1965	Jan. 13	Dodaira	BV	
	Jan. 14	Dodaira	BV	
	Nov. 30	Dodaira	UBV	
	Dec. 21	Dodaira	UBV	
1966	Jan. 15	Dodaira	UBV	4870, 4110, 3940A
	Jan. 17	Dodaira	UBV	4870, 4110, 3940A
	Jan. 27	Dodaira	UBV	4870, 4110, 3940A
	Feb. 17	Dodaira	UBV	
1968	Mar. 4	Dodaira	(without filter)	
	Mar. 5	Dodaira	(without filter)	
	Mar. 6	Dodaira	(without filter)	
	Mar. 7	Dodaira	(without filter)	
1971	Feb. 4	Okayama	BV	
	Feb. 5	Okayama	BV	

Times of the observed minima and the corresponding O-C residuals from the elements JD 2434426.4773+$0^d.38288057$E (Catalogue of Variable Stars 1971) are as follow:

J.D. Hel.	E	O-C
2438011.200	9362.5	+0ᵈ003
8012.156	9365	0.002
8774.0915	11355	0.0053
8774.2809	11355.5	0.0033
8775.0463	11357.5	0.0029
8775.2385	11358	0.0037
9095.3310	12194	0.0080
9141.0843	12313.5	0.0061
9141.2748	12314	0.0059
9142.9995	12318.5	0.0079
9143.1885	12319	0.0054
9153.1450	12345	0.0070
9920.0547	14348	0.0070
9921.9703	14353	0.0082
9922.1600	14353.5	0.0064
2440986.9551	17134.5	0.0107
0987.1453	17135	+0.0095

28th June, 1971

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 568

Konkoly Observatory
Budapest
1971 July 15

V1057 CYGNI

At the suggestion of Paris Pismis and George H. Herbig, this unusual variable was observed on Harvard photographs taken earlier than 1934, thus extending the light curve of W. Wenzel (1). At least one plate was examined for each year back to 1889, and a single plate was also found for 1885 that showed stars as faint as 11th-magnitude.

From this material it seems certain that V1057 Cygni never became as bright as it did during the sudden rise to 10th magnitude in 1969 (2,3). The faintest observable images on the best Harvard plates were usually about photographic magnitude 12-13 previous to 1900, magnitude 13-14 thereafter.

Only three definite images of V1057 Cygni were found, all on plates taken with the 16-inch Metcalf refractor: JD 2422923 (magnitude 16.3), 2423289 (16.3), and 2427603 (16.1). Hence, V1057 Cygni had about the same intensity as early as 1921 as observed by Wenzel in later years.

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(2) G.Welin, Astr. and Ap., May 1971, 312.
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 569

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Budapest
1971 July 15

HD 34409 - A SUSPECTED NEW VARIABLE STAR

Between January 1968 and January 1970, three-colour photo-electric photometry of the eclipsing binary AS Cam was carried out at the University Observatory, St Andrews, using the 40 cm Nishimura reflector. The star HD 34463 was adopted as comparison star, and no evidence was found for variability. However, the secondary comparison star HD 34409 (BD +69°315) was found to vary in brightness on four out of a total of fourteen nights. Graphs of the yellow observations (λ_{eff}=5350 A) on these four nights are presented in Fig.1. Differential magnitudes were formed in the sense (HD 34409 minus HD 34463) and running means of two observations were then taken. Correction for differential extinction of the yellow observations was unnecessary since the differential air mass never exceeded 0.001.

Estimates of the (B-V) and (U-B) colour indices of HD 34463 and HD 34409 were obtained on only one night (JD 2440261) as follows:

Star	(B-V)	(U-B)	HD spectral Type
HD 34463	+0^m.19	+0^m.08	A5
HD 34409	+0.39	+0.18	F2

The mean errors are ±0^m.02 in (B-V) and ±0^m.04 in (U-B). The colours of HD 34463 correspond well with the HD spectral type of A5 (Johnson 1963). The (B-V) colour index of HD 34409 is in agreement with the HD spectral type of F2 but its (U-B) value indicates an apparent ultraviolet depression.

During November 1970, five spectrograms of HD 34409 were obtained at Haute Provence Observatory using the 152 cm telescope and coudé spectrograph. Three of the spectrograms have dispersions of 20A/mm and the other two were taken at 12A/mm. The spectral type of F2 is confirmed. There is no sign of doubling of the absorption lines and no indication of emission components. The rotational velocity is estimated from the profile of MgII λ4481 (Slettebak 1955) to be v sini = (165±30) km sec^{-1}.

The light variations closely resemble Delta Sct variability in appearance and duration, and the spectral type is certainly within the appropriate range. The rotational velocity is, however, at the upper limit for Delta Sct variables (Dickens 1967) but this could be compatible with the small light amplitude.

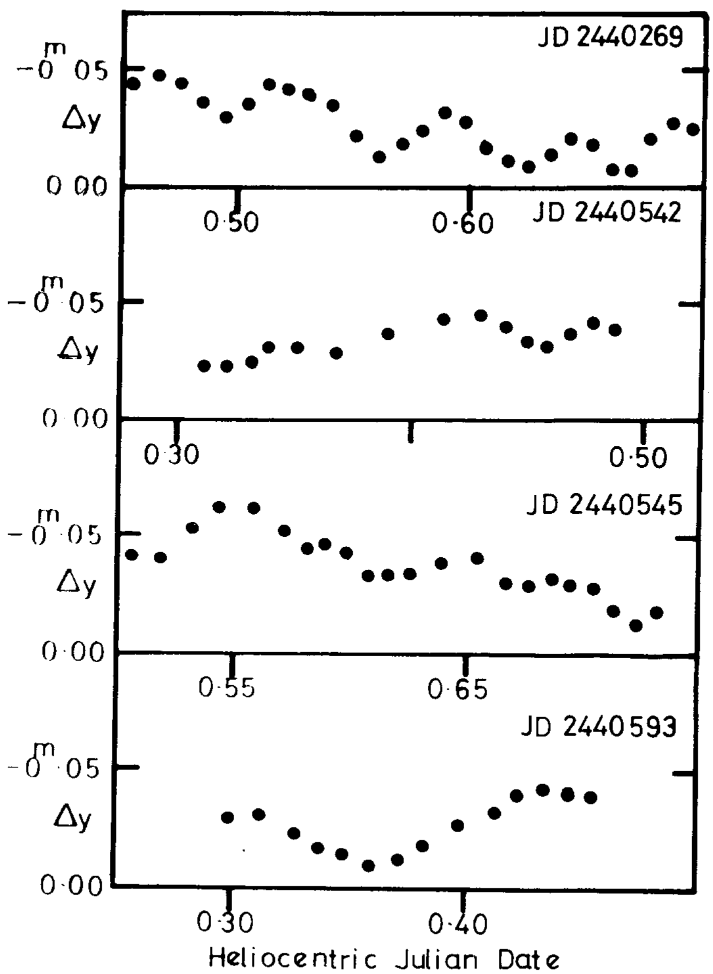

Fig.1

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Slettebak, A. 1955 Astrophys. J. 121, 653.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 570

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Budapest
1971 July 15

IDENTIFICATION AND SPECTRUM OF THE NEW VARIABLE IN SERPENS

Stienon (1971) has reported finding a peculiar new emission-line variable of type K, and Hidajat (1971) has described its spectrum on objective-prism plates taken at Bosscha Observatory. It is clear from the coordinates and finding chart given by Stienon that the variable is identical to the star BD-10°4662. We have a short-exposure direct plate which confirms the identity of the variable as marked in Stienon's finding chart with the BD star.

Four objective-prism plates are aviable here taken with the Curtis Schmidt-type telescope of The University of Michigan. Two of these are in the red region (dispersion of 420 A/mm at $H\alpha$) with dates of 1965 July 21 and 1969 July 24, and both show the presence of moderately strong $H\alpha$ emission on a non-banded spectrum. The third plate is on IN emulsion behind a W89B filter at very low dispersion (about 3500 A/mm at the A-band) and shows only that there are no molecular bands in the near-infrared spectrum as was pointed out by Hidajat. The fourth plate is IIa-O with a dispersion of 110 A/mm at $H\gamma$ and a limiting m_{pg} of about 11; the plate was taken on 1969 June 19. The spectrum of the variable is weakly exposed, and the blueward portion ($\lambda < 4100$A) is contaminated by the spectrum of a faint M star 11' north of the variable. The absorption spectrum of the variable is that of a dwarf star of type about K5, and $H\beta$ is weakly present in emission. It is not possible to tell whether CaII is in emission. The star is not present in the catalogues of stars of large proper motion nor in the catalogues of nearby stars.

Stienon has pointed out the possible similarity this star to Popper's flare star, BY Dra. Other possibly similar stars are AS 216 (Merrill and Burwell 1950; =CoD-27°11363) and AS 292 (=HD319139=CoD-32°13906). Bidelman (1954, Table 11) gives types of dK0e and dK5e, respectively, for these stars. Neither of these stars is known to vary in light. BY Dra, AS 216, and AS 292 show bright lines of CaII; a well-exposed slit spectrogram of BD-10° 4662 might also reveal emission at H and K.

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Stienon, F.M. (1971) Inf. Bull. Var. Stars No.545.

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INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 571

Konkoly Observatory
Budapest
1971 July 30

ABOUT THE VARIABILITY OF THE ECLIPSING VARIABLE STAR NQ Her

The eclipsing variable star NQ Her (HD 166801; $8^m.0$; A0) was observed in 1965 from May to July, for 10 nights in the u light, 10 nights in b and 16 nights in v light. The observations were carried out at the stellar station of the Catania Astrophysical Observatory with a 30 cm Cassegrain reflector. The telescope was equipped with an EMI 6256 photomultiplier and with the Schott filters u (UG12, 1mm); b (BG12, 1mm + GG13, 2mm) and v (GG14, 2mm).

HD 165507 ($8^m.5$; A0) and HD 166157 ($7^m.9$; A0) were used as comparison and check star respectively. During the observing period the magnitude difference between comparison and check star did not show any significant variation.

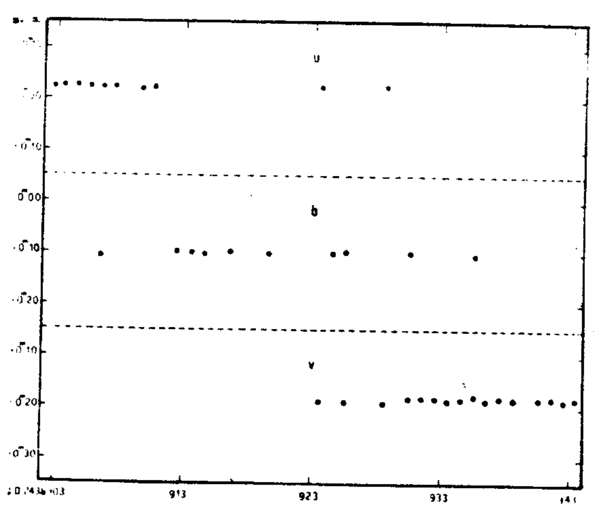

Fig.1 u, b and v normal points of $m_v - m_c$, for each night of observations plotted versus J.D.

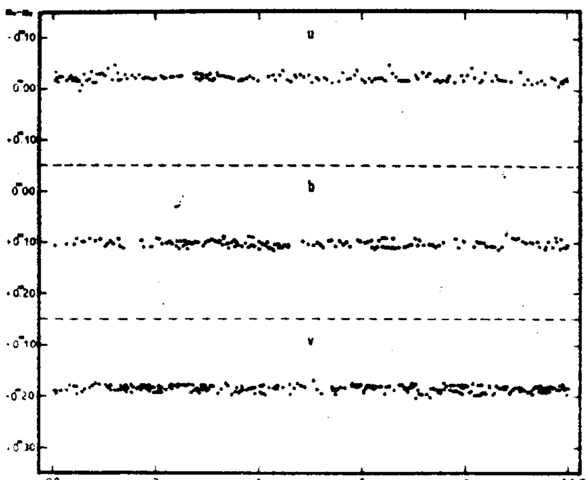

Fig.2 u, b and v light curves of NQ Her. The phases are computed according to the elements J.D.2426894.433+ +0^{d}870218 E

In figure 1 u, b and v normal points of NQ Her, as mean values of each observing night, are plotted versus J.D. date. In figure 2 the observations in u, b and v light are plotted varsus phase, which was computed according to the elements (Kukarkin et al. 1958).

J.D. 2426894.433 + 0^{d}870218 E

From these figures it is evident that NQ Her did not show any variability either with period P = 0^{d}870218 or with the period P = 20^{d}815 (Sanding 1948). This agrees with the results obtained by Rossati (1964) in v light during 1963 and by Popovici (1971), still in v light) for the observational period April-September 1968.

The individual observations (m_V-m_C) versus J.D. will be sent to the I.A.U. Comm.27 depository of observations on variable stars c/o Dr. W.S.Fitch, Steward Observatory, University of Arizona, Tucson, Arizona 85721, U.S.A.

Osservatorio Astrofisico
Catania - Italia
July 24, 1971

CARLO BLANCO

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INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 572

Konkoly Observatory
Budapest
1971 July 30

CONCERNING VARIABLE 14 IN M5

There has been some recent confusion concerning the identification of variable 14 in M5. This has arisen because of a misprint in an article by Bailey (1917). The star labelled as variable 14 in his photograph of the cluster is not, in fact, variable. Variable 14 lies about 20 seconds of arc to the east of it. Oosterhoff (1941) has noted this error.

Therefore Arp's (1962) standard star II-51 is not the same star as V14 and so the remarks of Osborn (1971) not apply.

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OBSERVATIONS OF VARIABLES ON SONNEBERG PLATES

HP Aur Minima

243 7345.361	12.99	Comparison stars
9028.557	12.75	Perowa, VS.12,5,371, 1960
9142.366	12.55	

AE Boo Maximum from 30 exposures of the same night
244 1057.382
Probably an RR Lyrae-type variable.

HI Gem Minima

243 6163.588	12.50	Comparison stars
9827.538	12.50	Rigollet, J.O.Vol.36.22 1953
244 0531.512	12.34	

E. SPLITTGERBER

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 573

Konkoly Observatory
Budapest
1971 August 12

MINIMA OF ECLIPSING VARIABLES

The eclipsing variables were observed visually by the writer in Fort Skala Observatory near Cracow with the Expedition Refractor 0 = 203 mm, f = 227 cm, except Beta Per. The heliocentric moments of minima were determined by tracing - paper method. "n" behind moments of minima denotes normal minima and column "N" denotes number of observations. Column O - C was computed with elements given in "Rocznik Astronomiczny Observatorium Krakowskiego 1971".

Star	J.D. hel.	O - C	N
U CrB	244 1089.445	-0^d013	6
UW Cyg	1098.513n	+0.042	22
Z Dra	1083.488	+0.002	16
	1098.418	0.000	19
TU Her	1089.506n	-0.003	20
Y Leo	1064.388	+0.012	15
UZ Lyr	1089.443	+0.017	7
Beta Per	0998.343n	+0.011	22
TX UMa	1089.477n	+0.020	11
BE Vul	1098.483	+0.006 1)	13

1) O-C = -0^d002 with elements given by Semeniuk Act. Astr. 20, 130

Cracow Astronomical Observatory
August 1971

ZBIGNIEW KLIMEK

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

NUMBER 574

Konkoly Observatory
Budapest
1971 August 14

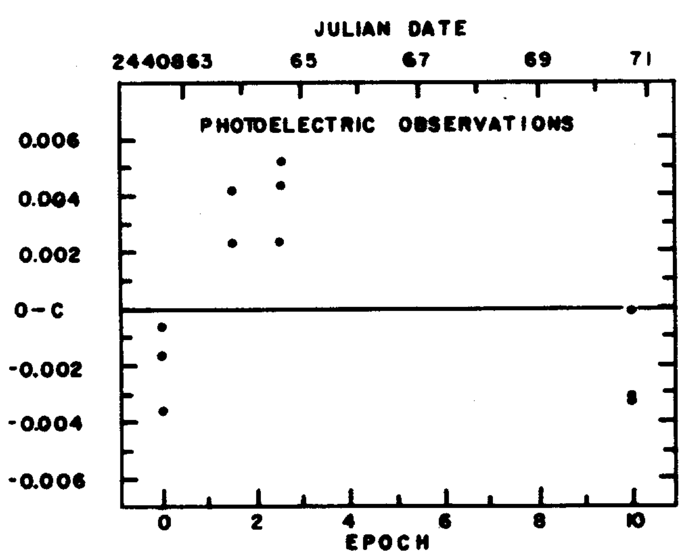
Rosemary Hill Observatory, Department of Physics and Astronomy, University of Florida, Gainesville, Florida
Contribution No.24

THE PERIOD OF MW PAVONIS

The eclipsing binary MW Pavonis (BV 894) was observed by the author on five nights during October, 1970, at the Cerro Tololo Inter-American Observatory. These observations were obtained with the 16-inch (40.64 cm), number 1 telescope and a 1 P 21 photoelectric photometer. Observations were made in three colors with the use of standard UBV filters.

Eggen and Strohmeier in IBVS no.308 (1968) published a list of observed times of minima and obtained a period of $0^d.562979$. After reducing the Cerro Tololo data, however, this period was found to be incompatible with my observed times of minima. A compatible set of light elements was found to be:

$$\text{JD } 2440862.6117 + 0^d.79499080 \text{ E}$$
$$\pm 3 \qquad\qquad \pm 50$$



	Minima	Epoch	O-C
243	8204.542 (S)	-3343.5	-0.018
	8228.465	-3313.5	+0.055
	8263.395	-3269.5	+0.006
	8267.336	-3264.5	-0.028
	8295.222	-3229.5	+0.033
	8314.276	-3205.5	+0.007
	8316.278	-3203.0	+0.022
	8555.549	-2902.0	+0.001
	8641.402	-2794.0	-0.005
	8649.311	-2784.0	-0.046
	8992.401	-2352.5	+0.005
	8994.412	-2350.0	+0.029
	9029.333	-2306.0	-0.030
	9374.375	-1872.0	-0.014
	9376.374	-1869.5	-0.002
	9378.372	-1867.0	+0.008
	9404.252	-1834.5	+0.051
	9654.198	-1520.0	-0.028
	9656.198 (S)	-1517.5	-0.015
244	0120.058 (E)	- 934.0	-0.032
	0120.083	- 934.0	-0.007
	0120.933	- 933.0	+0.048
	0122.888	- 930.5	+0.015
	0124.005	- 929.0	-0.060
	0124.010	- 929.0	-0.055
	0124.016 (E)	- 929.0	-0.049
244	0862.6111(W)	0.0	-0.0006
	0862.6080	0.0	-0.0037
	0862.6100	0.0	-0.0017
	0863.8065	1.5	+0.0023
	0863.8084	1.5	+0.0042
	0863.8065	1.5	+0.0023
	0864.6035	2.5	+0.0043
	0864.6043	2.5	+0.0051
	0864.6015	2.5	+0.0023
	0870.5585	10.0	-0.0031
	0870.5584	10.0	-0.0032
	0870.5615(W)	10.0	-0.0001

The light curves of MW Pavonis show a primary eclipse and a total secondary eclipse of almost equal depth. In addition, asymmetry is incurred in that the light at the .25 phase is greater than at the .75 phase. As shown in the figure, each time of primary minimum has a negative (o-c) and hence occurs early whereas each time of secondary minimum has a positive (o-c) and hence occurs late. The analysis of the light curves is presently underway.

1971 August 5

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

NUMBER 575

Konkoly Observatory
Budapest
1971 August 23

Rosemary Hill Observatory, Department of Physics and Astronomy,
University of Florida, Gainesville, Florida
Contribution No. 25

THE PERIOD OF AQ TUCANAE

The eclipsing binary AQ Tucanae (BV 423) was observed by the author on six nights in September, 1969, with the number 1 16-inch telescope at the Cerro Tololo Inter-American Observatory. The observations were made in three colors with the use of standard UBV filters and a refrigerated 1P21 photoelectric photometer.

Minima	Epoch	O-C
2438 257.502 (K&S)	-3732.5	-0.022
263.490	-3722.5	+0.018
297.364	-3665.5	-0.014
309.322	-3645.5	+0.047
314.322	-3637.0	-0.010
314.367	-3637.0	+0.035
339.293	-3595.0	-0.022
641.497	-3087.0	+0.002
695.294	-2996.5	-0.034
695.340	-2996.5	+0.012
701.258	-2986.5	-0.019
2440 477.7731 (C)	0.0	-0.0012
477.7737	0.0	-0.0006
477.7761	0.0	+0.0018
478.6656	1.5	-0.0010
478.6658	1.5	-0.0008
478.6686	1.5	+0.0020
480.7482	5.0	-0.0003
480.7483	5.0	-0.0002
483.7230	10.0	+0.0003
483.7223	10.0	-0.0004
483.7229	10.0	+0.0002
485.8040	13.5	-0.0007
485.8052	13.5	+0.0005

Koehler and Schoeffel published a list of minima in IBVS no.91 (1965) and obtained a period of $0^d.59480$. After reducing the Cerro Tololo data a refined, compatible set of light elements was found to be:

$$\text{JD } 2440477.7743 \underset{\pm 2}{} + 0^d.59484267 \underset{\pm 27}{}$$

The two minima of AQ Tucanae are nearly equal and about $0^m.50$ in V. The primary is about $0^m.48$ and the secondary is about $0^m.45$ in B. Because of this, identification of primary and secondary eclipses is a problem. The identities of primary and secondary of the observations of Koehler and Schoeffel (or the authors) had to be reversed in order to get a compatible set of light elements. The light curves are currently being analyzed.

1971, August 9

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

NUMBER 576

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Budapest
1971 August 24

HD 101799, A COMPLETELY ECLIPSING W UMa SYSTEM

The eclipsing character of HD 101799 was discovered by Bond (1970) on Curtiss-Schmidt prism-objective plates and confirmed by y-photoelectric observations.

We report in this Note the first results of 1350 U, B, and V observations secured at Cerro Tololo Inter-American Observatory. They were made with the 16 inches (No 1) Observatory's telescope through a UBV set of standard filters and an RCA 1P21 photomultiplier refrigerated in a thermoelectric cold box. The variable star was observed differentially in relation to the comparison star HD 101834. The observations show the system to be a W UMa star with stationary light within the minima, i.e., the system undergoes total eclipses. Figure 1 displays the V-observations obtained on April 16, 1971.

We derived eleven times of minimum for each light curve in U, B, and V. They are listed in Table I; the residuals (O-C) and cycles are from the linear least squares ephemeris:

$$\text{P.M.} = \text{JD hel. } 2441060.12322 \underset{\pm 12}{} + 0^{d}.37022894 \underset{\pm 25}{} \cdot E$$

including the first time of minimum computed from the y-observations kindly supplied by Dr Bond.

The light curve analysis will be further published.

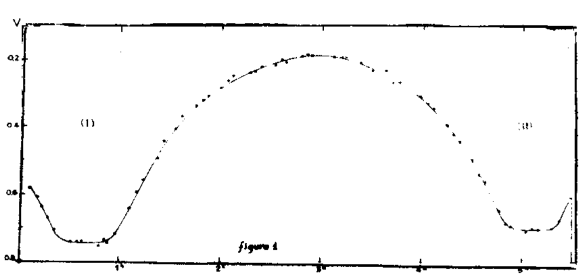


figure 1

Table I: Times of minimum of HD 101799.

Min.	Color	JD. hel 2440000+	W	Cycles	O-C
II	V	0648.98393	2	-1110.5	-0ᵈ00005
II	V	1056.60640	2	-9.5	+0.0004
	B	.60633	2	-9.5	+0.0003
	U	.60652	1	-9.5	+0.0005
I	V	1057.53220	2	-7.0	+0.0006
	B	.53191	2	-7.0	+0.0003
	U	.53144	1	-7.0	-0.0002
II	V	1057.71742	2	-6.5	+0.0007
	B	.71732	2	-6.5	+0.0006
	U	.71749	1	-6.5	+0.0008
I	V	1058.64279	2	-4.0	+0.0005
	B	.64242	2	-4.0	+0.0001
	U	.64353	1	-4.0	+0.0012
II	V	1059.56809	2	-1.5	+0.0002
	B	.56798	2	-1.5	+0.0001
	U	.56740	1	-1.5	-0.0005
I	V	1059.75328	2	-1.0	+0.0003
	B	.75350	2	-1.0	+0.0005
	U	.75370	1	-1.0	+0.0007
I	V	1060.49285	2	+1.0	-0.0006
	B	.49273	2	+1.0	-0.0007
	U	.49292	1	+1.0	-0.0005
II	V	1060.67834	2	+1.5	-0.0002
	B	.67877	2	+1.5	+0.0002
	U	.67820	1	+1.5	-0.0004
I	V	1061.60395	2	+4.0	-0.0002
	B	.60383	2	+4.0	-0.0003
	U	.60298	1	+4.0	-0.0012
II	V	1063.63973	2	+9.5	-0.0007
	B	.63972	2	+9.5	-0.0007
	U	.63958	1	+9.5	-0.0008
I	V	1064.56504	2	+12.0	-0.0009
	B	.56545	2	+12.0	-0.0005
	U	.56676	1	+12.0	-0.0008

August, 1971

Observatorio Astronomico and I.M.A.F., CORDOBA, ARGENTINA

R.F. SISTERÓ
M.E. CASTORE DE SISTERÓ

Reference

Bond, H.E. 1970, Pub.A.S.P., 82, 1065.

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

NUMBER 577

Konkoly Observatory
Budapest
1971 September 6

A RESEARCH PROGRAM ON SOUTHERN RED DWARFS

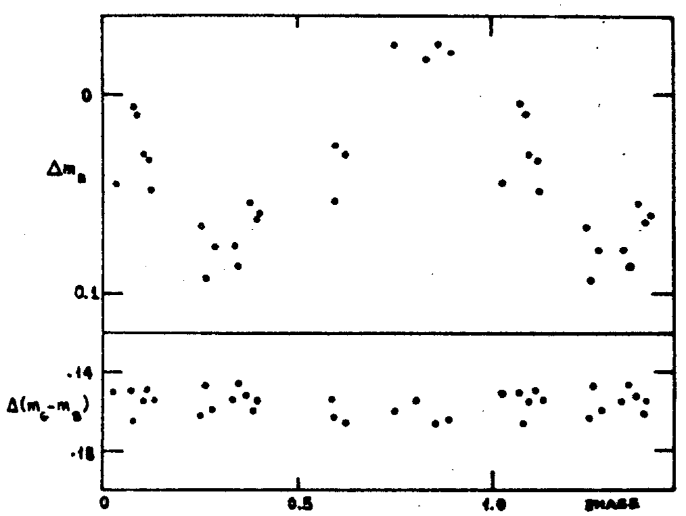
The present observing season is being devoted, at the I.T.A. Astronomical Observatory, to a survey on some red dwarfs, in order to make a search for variable stars which could present the same characteristics as BY Dra, CC Eri and FF And (1). A preliminary list has been set up involving almost 30 stars of spectral types dK4 or later whose apparent magnitudes are below $9^m_.5$ in order to be observed by a 20-inch telescope. In a first survey these stars have been studied in the colors B and G of the 6-color system of Stebbins and Whitford, and only one comparison star has been taken for each program star. The amount of stars which had shown some variability was far greater than expected, and soon check stars became necessary. So, far some stars whose relative measures show some variability it has not yet been possible to decide among the red dwarf or the comparison star. The low rate of elimination has lead to survey times longer than former previsions. An important factor in postponing the first stage of this program has been the bad weather conditions this winter in our region.

Nevertheless, one of the observed stars has soon been classified as variable, showing a light-curve close to that expected for BY Dra stars. It is the star HD 118100 = BD -7°3646, sp dK5e, V = $9^m_.34$. This star has shown light changes of $0^m_.10$ in both colors. The light variations show good regularity, the period being close to 4 days (between 4.0 and 4.1 days). In the light curve shown in fig.1 magnitudes and color index are referred to the star BD -8°3586, and zero phases have been calculated by the formula

$$\text{JD } 2441068{,}00 + 4^d_.03 \text{ E}.$$

The star has been observed 16 times from April 27 to June 1, and 5 times more at the very end of June. The star BD -7°3652 has been served as check star.

For the other program stars almost 50 percent have been dropped after 5 to 10 photoelectric measures in different nights. Besides the star HD 118100 there are at least 3 more which relative magnitude varied for more than $0^m_.1$. Bad weather conditions had impaired the work last month so we cannot decide which one varied, the comparison or the program star, except for one case in which light



variability has been shown to be due to the comparison star (HD 99619 - probably a long period variable; its measures show slow variation of about $0\overset{m}{.}2$ in 50 days). Three more stars have shown variations with smaller magnitude ranges, but require further observations before some conclusion can be drawn.

The criteria employed to set up the working list seem to be good. The list has been revised and could be published in a future issue of the IBVS.

S. FERRAZ MELLO and C.A.O.TORRES

The I.T.A. Astronomical Observatory
São José dos Campos, SP - Brazil

(1) P.F.Chugainov, IBVS No. 520 (1971).

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

NUMBER 578

Konkoly Observatory
Budapest
1971 September 6

UBV PHOTOMETRY OF THE SUSPECTED VARIABLE BD +18°4586

Recently Moore (1969) has suspected that the star BD +18°4586 is a variable with an amplitude of about 0ᵐ5 and a semi-regular period of a few weeks. We therefore added this star to our program during an observing session at the Kitt Peak National Observatory in June 1970.

Altogether we obtained 22 observations on eight nights during a two week interval, using the No.4 16-inch reflector equipped with a 1P21 photomultiplier which was refrigerated with dry ice. The three-color observations were made differentially with respect to the comparison star BD +18°4602. In addition we observed this comparison star differentially with respect to the check star BD +19°4489. All magnitudes were corrected for differential extinction and transformed differentially to the UBV system.

Nightly averages for each color were formed and the resulting rms deviations are listed in the table below.

	V	B	U
18°4586 vs. 18°4602	±0ᵐ02	±0ᵐ02	±0ᵐ04
19°4489 vs. 18°4602	±0.01	±0.02	±0.03

From these results it is obvious that, although the scatter is about 0ᵐ01 larger for the suspected variable than for the check star, there is certainly no evidence for the large variability suspected by Moore. Although it is always impossible to be certain in cases like this (for instance the star could be an eclipsing binary which Moore occassionally observed inside eclipse and we always observed outside eclipse), our data lead us to believe that BD +18°4586 is not a variable star.

R.C. TATE and E.W.BURKE, Jr.

King College Observatory
Bristol, Tennessee
U.S.A.

Reference:

Moore,P. 1969, I.A.U. Inf.Bull.Var.Stars, No 385.

NOTES ON VARIABLES

WX Hydri: Estimations on Sonneberg patrol plates of the southern sky confirm the statements given in IAU Circular No.2348. Two maxima were observed (J.D. 242 8846 and 243 4240). The rise to maximum is rather steep:

242 8841.3	[13^{m}47 phg.
42.4	12.81
43.3	12.78
44.4	12.46
45.3	12.43

For details see forthcoming number of MVS.

Star No.9 in the Region of Cygnus XR-2: The variability of star no.9 of Giacconia's note (ApJ 148, L 129) is confirmed on Sonneberg photovisual patrol plates. The character of variability remains as yet unknown.

V 1057 Cygni: The star is still near maximum light (10^{m}8 phg.) on Sonneberg patrol plates of J.D. 244 1134.4, 1155,5, 1179.5, and 1180.4 (1971 July-August).

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 579

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Budapest
1971 September 9

ORION FLARE STARS IN FEBRUARY 1971

According to shedule (1) during the Orion region X-ray monitoring the region has been observed photographycally. Observations have been carried out at the 40 cm astrograph of the Sternberg Institute South Station; ZU-2 plates have been used. Multiple exposure method has been used to search for flares of stars. Data of observations fulfilled are gathered in Table I. Total monitoring time is about 10^h.

Table I

Date 1971 Febr.	Time of observation (UT)	Exposure numbers	Duration of exposures
18	16^h45^m–18^h16^m	7	12^m
	18 28 –19 11	7	5^m
19	17 46 –19 01	6	12^m
	19 39 –20 44	5	12^m
20	18 09 –19 19	7	9^m
22	17 19 –18 23	5	12^m
23	17 00 –18 15	6	12^m
	18 20 –18 37	2	12^m, 5^m
	20 00 –20 38	4	6^m, 6^m, 12^m, 12^m

The plates obtained have been measured at the iris photometer using Andrews' standards (2) for calibration curves. The known flare stars listed in (3,4) have been measured. Data for two flares found are given in Table II.

Table II

Number of star in (3,4)	Date of observ.	R.A. 1900.0	D. 1900.0	m_B	Δm_B
206	18	$5^h29^m.1$	$-5°41'$	$15^m.5$	$>1^m$
231	23	$5^h31^m.3$	$-5°16'$	$16^m.2$	$0^m.8$

Number of star in (3,4)	Time of flare maxima (UT)	Duration of flares
206	$17^h51^m-18^h03^m$	$>40^m$
231	$17^h37^m.5-17^h49^m.5$	$> 1^h$

In both cases the following stellar images - the exposure $18^h04^m-18^h16^m$ for star N 206 and the exposure $17^h50^m-18^h02^m$ for star N 231 - are overlapped by neighbour stars and therefore they cannot be measured.

1. IBVS, 1971, N 516.
2. Andrews A. D., 1970, Bol.Obs.Tonantzintla y Tacubaya, 34, 195.
3. Haro G., 1968, Stars and Stellar Systems, Vol. VII, "Nebulae and Interstellar Matter", eds. Middlehurst, B.M., and Aller, L.H., (Univ.Chicago Press) p.141.
4. Haro G., 1969, Bol.Obs.Tonantzintla y Tacubaya, 32, 79.

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A.N. KULAPOVA

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 580

Konkoly Observatory
Budapest
1971 September 15

HDE 302013 - A NEW SHORT-PERIOD VARIABLE STAR

HDE 302013 is at $11^h49^m.8$, $-55°38'$ (1971), about 8' S and 5' E of the open cluster NGC 3960; a finding chart is given in Figure 1. Variability was detected during a programme of photoelectric UBV observations of the cluster. Magnitudes range from V=10.24, B-V=0.20, U-B=0.22 at maximum to V=10.64, B-V= 0.34, U-B=0.21 at minimum. These colours are compatible with the HDE spectral type of A5, which is confirmed on a spectrogram by M.S. Bessell, the analysis of which will be published elsewhere. It therefore appears very unlikely that the star could be a member of NGC 3960, which has a reddening of E(B-V)~ 0.35 and brightest red giants at V~11.6.

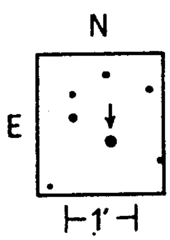

Fig. 1

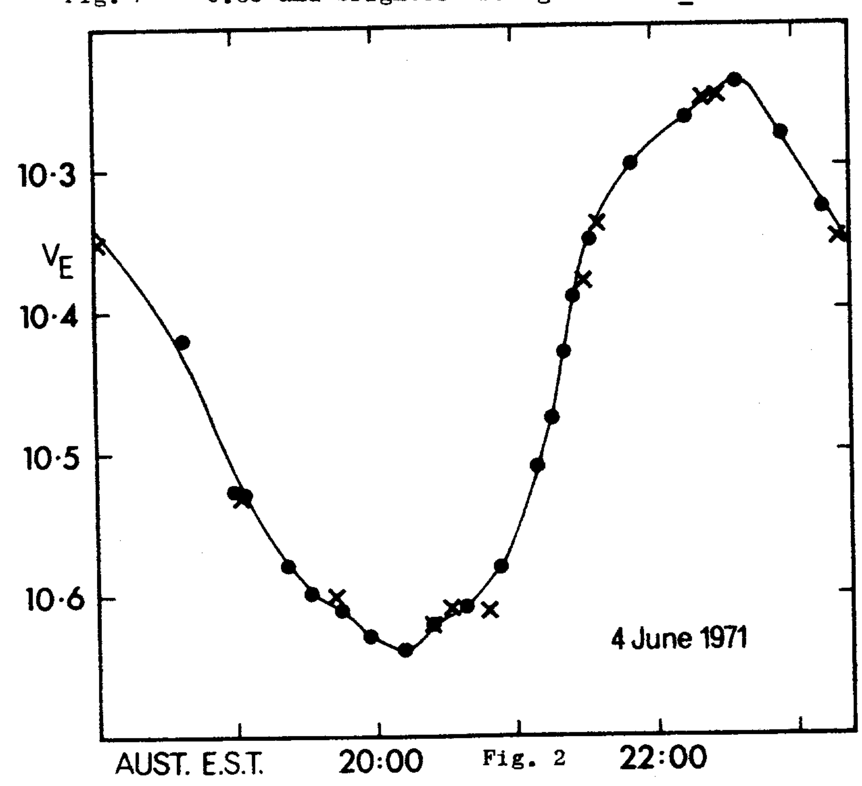

Fig. 2

A light curve is shown in Figure 2, derived only from observations made on one night (filled circles). The star seems to be a short-period cepheid (RRc) of the halo population. The variability is apparently regular; scattered observations made between March and August 1971 can all be fitted to the above light curve with a uniquely determined period of $0^{d}.22135$, the maximum of Figure 2 occurring at HJD = 2441107.028. The isolated observations are shown as crosses in Figure 2.

The nearly sinusoidal shape of the light curve, and the suggestion of a bump shortly before maximum, favour the interpretation that the star is a short-period halo cepheid (RRc) with the very short period of 5.3124 hours. Further observations will be required next season to confirm this. We are indebted to M.S.Bessell and R.S.Stobie for valuable discussion, and to K.C.Freeman and B.A.Peterson for some of the observations used to determine the period.

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Mount Stromlo and Siding Spring Observatories
Research School of Physical Sciences
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 581

Konkoly Observatory
Budapest
1971 September 18

V 1057 CYGNI

In a further search for early photographs of this star (cf. Robinson and Harwood, IBVS 568, 1971), it was found on the "Photographische Sternkarten", Vol.X, Blatt 198 (Palisa and Wolf, Wien 1931), from a plate taken 1905, July 26 by Wolf. The star then was slightly fainter than m_{pg}=16.5. The plate contains what is obviously a plate fault just to the east of the star, resembling a small bright nebula, that is not seen on another plate, taken 1901, July 12 by Wolf (Die Milchstrasse und die kosmischen Nebel, Bild 12, Potsdam 1925). On this latter plate the magnitude of the star also appears to be around 16.5, rather somewhat fainter.

The star was also found, with a magnitude definitely fainter than 16.5, on the reflector plate covering regions 44 and 46 in Isaac Roberts' Atlas of 52 Regions, a Guide to Herschel's Fields (D. Klumpke Roberts, Paris 1929). The plate was taken 1896, October 10, and shows some coma, but not the probable plate fault.

Thus V 1057 Cygni seems to have brightened just slightly between 1896 and 1921, when its magnitude was 16.3 (Robinson and Harwood, op. cit.). It then remained as a low-amplitude T Tauri variable (16.0±0.3, Meinunger and Wenzel, MVS 5:9, 1971) up to the brightening of about 6 magnitudes and spectral change in 1969 (Welin, Astr. and Ap. 12, 312, 1971, Herbig and Harlan, IBVS 543, 1971).

The comparison stars used are h and k in Meinunger and Wenzel, op. cit.

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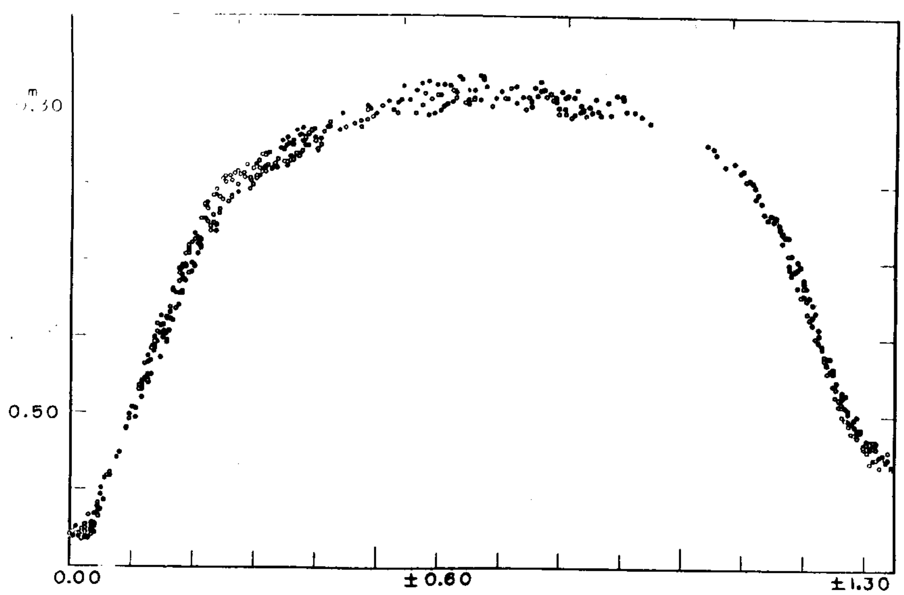
COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 582

Konkoly Observatory
Budapest
1971 September 21

PHOTOELECTRIC AND SPECTROGRAPHIC OBSERVATIONS OF THE ECLIPSING VARIABLE SZ CAMELOPARDALIS

The UBV photometry of the eclipsing variable SZ SZ Camelopardalis (the northern component of BD+61°676) was carried out with the 36 inch reflectors at the Dodaira Station of Tokyo Astronomical Observatory and the Okayama Astrophysical Observatory on twenty-two clear nights during the winter of 1970-71. Some coudé spectrograms were also taken with the 74 inch reflector at Okayama.



BD+61°669 was used as the primary comparison star in the photoelectric observations, which was the same one as used in the recent observation by Olsen (1971). The light of the southern component of BD+61°676 was observed occasionally for detection of its suspected small light variation (Guthnick and Prager 1930), but it was confirmed from our observations that the light of the southern component is constant within observational errors of the order of $0^m.004$ - $0^m.006$.

The figure shows our photoelectric light curve in B, where dots stand for observations with phases between 0 and 1/2 P and small circles for observations with phases between 1/2 P and P. We obtained the residual O-C=$0^d.1052$ for the primary minimum from Min. = JD 2427533.5191+ +$2^d.6984166$ E (Wesselink's ephemeris 1941). Therefore, the phases in the above figure were corrected by the value +$0^d.1052$. This O-C value is in good agreement with Olsen's result from observation of the secondary minimum.

1971 September 13

M. KITAMURA and A. YAMASAKI

Tokyo Astronomical Observatory,
Mitaka, Tokyo

References:

Olsen, Erik Heyn 1971, IAU Bulletin of Commission 27, No. 533.
Olsen, Erik Heyn 1971, June, private communication.
Guthnik, P. and Prager, R. 1930, Astr. Nachrichten 239, 14.
Wesselink, A.J. 1941, Ann. Sterrew. Leiden 17, part 3.

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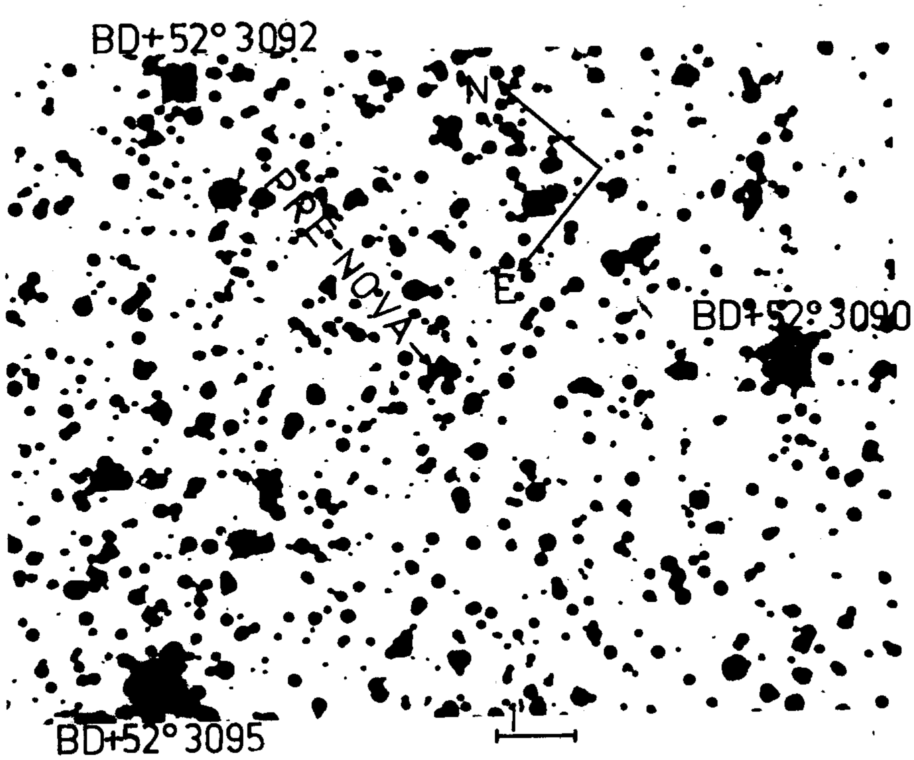
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 583

Konkoly Observatory
Budapest
1971 September 22

ACCURATE POSITION AND PRE-NOVA IDENTIFICATION FOR NOVA CEPHEI 1971

Nova Cephei 1971 was observed with the 26-inch refractor at Leander McCormick Observatory. A plate was taken on July 29 for a position determination, and a plate of one hour exposure was taken to aid in identifying the pre-nova star in the Palomar Sky Survey. The position was determined to be R.A. (1950.0) = $22^h02^m46^s.85 \pm 0^s.01$ Dec. (1950.0) = $+53°15' 48''.2 \pm 0''.1$.



The accompanying enlargement of the Palomar Sky Survey shows the location of the pre-nova star. The photographic magnitude of the pre-nova star was found to be 17.4 ± 0.2 as determined by measurement of its image diameter on the blue Palomar print (1).

September 2, 1971

GARY K. WALKER and MARCIA J. KEYES

Leander McCormick Observatory
Charlottesville, Virginia 22903
U.S.A.

Reference:

(1) Perek,L. 1958, Bull. Astron. Inst. Czech. 9, 39.

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

NUMBER 584

Konkoly Observatory
Budapest
1971 September 28

MINIMA OF ECLIPSING VARIABLES

In July 1971 the following eclipsing variables were observed visually by members of Polskie Towarzystwo Milosnikow Astronomii, Centralna Sekcja Obserwacji Gwiazd Zmiennych Zacmieniowych (Polish Amateur Astronomical Society, Central Section of Observations of Eclipsing Variables) during a special 10 day meeting in Lanckorona near Cracow.

The minima observed in earlier years were published in Acta Astr. 17, 59 (1967), 18, 331, (1968), 19, 173, (1969).

The heliocentric moments of minima and limits of errors were determined by tracing-paper method. The (O-C)-s were computed using the elements given in "Rocznik Astronomiczny Obserwatorium Krakowskiego 1971". Letter n after moments of minima denotes normal minima. N Denotes number of observations.
Observers' names are given in the last column.

	J.D. hel.			N	O - C	Observer
CX Aqr	2441160.532		±0.ᵈ002	8	+0.ᵈ005	L.Frasinski
OO Aql	2441152.487		0.002	21	+0.006	L.Frasinski
	2441152.491		0.006	12	+0.010	L.Krzanik
	2441153.500	n	0.006	13	+0.005	A.Letkowski
	2441153.503	n	0.006	18	+0.008	A.Soska
	2441153.505	n	0.006	18	+0.010	L.Frasinski
	2441155.524	n	0.006	16	+0.002	A.Soska
ZZ Cas	2441158.577	n	0.008	12	+0.006	P.Flin
WZ Cyg	2441154.528		0.004	8	-0.001	A.Soska
	2441157.449		0.004	10	-0.003	L.Frasinski
	2441157.449		0.004	11	-0.003	A.Soska
	2441157.450		0.007	11	-0.002	P.Flin
V 401 Cyg	2441156.480		0.009	16	+0.045	P.Flin
	2441156.481	n	0.007	24	+0.046	L.Frasinski
	2441156.489		0.008	9	+0.054	Z.Zembaty
TT Del	2441152.579	n	0.008	18	+0.065	P.Flin
	2441155.438	n	0.004	13	+0.052	A.Soska
SZ Her	2441157.465		0.002	9	+0.005	P.Flin
	2441157.469		0.004	9	+0.009	L.Frasinski
TZ Lyr	2441152.421		0.005	14	-0.003	P.Flin
	2441152.426	n	0.005	15	+0.002	A.Soska

	J.D. hel.		N	O – C	Observer
DI Peg	2441155.502	$\pm 0\overset{d}{.}004$	9	–0.010	L.Frasinski
	2441155.506	0.004	9	–0.006	P.Flin
RS Sct	2441156.496	0.006	12	+0.016	P.Flin
	2441156.496 n	0.007	14	+0.016	A.Soska
	2441156.500	0.004	10	+0.020	L.Frasinski
	2441156.503 n	0.006	15	+0.023	L.Krzanik
BE Vul	2441157.455	0.006	10	–0.001	P.Flin
	2441157.457	0.002	14	+0.001	L.Frasinski
	2441157.459	0.004	11	+0.003	A.Soska
	2441157.462	0.003	7	+0.006	L.Krzanik

Cracow, September 1971

PIOTR FLIN

Polish Amateur Astronomical Society
Central Section of Observations
of Eclipsing Variables
and
Cracow Astronomical Observatory

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

NUMBER 585

Konkoly Observatory
Budapest
1971 October 18

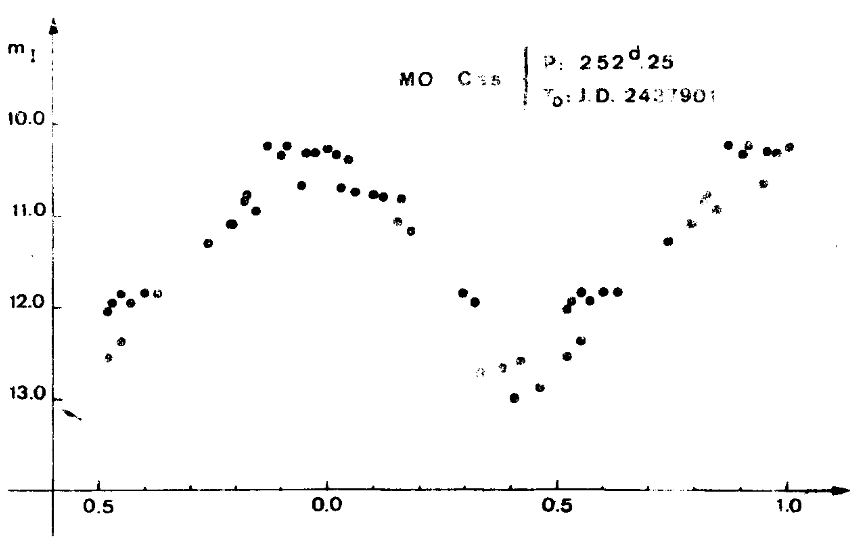
ELEMENTS AND CURVES OF THE TWO INFRARED VARIABLES MO AND MP CASSIOPEIAE

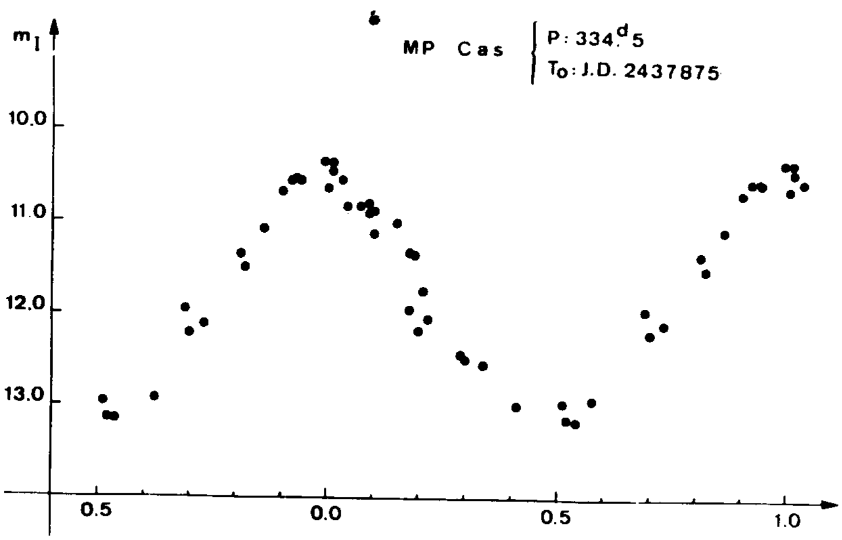
The variable stars MO and MP Cas have been discovered by Rosino (1953) as infrared stars of variable brightness within the nebulosity surrounding the peculiar nebula NGC 7635. In the recent General Catalogue of Variable Stars of Kukarkin et al. (1970) they are both classified as irregulars type I_n.

In the course of a research on the field of NGC 7635 which is carried out at the Astrophysical Observatory of Asiago, we have had the possibility of examining a series of infrared photographs (IN + RG5) taken from 1962 to 1971. Both MO and MP Cas are Mira variables. Their mean infrared light curves are reproduced in Figs. 1 and 2. The following elements have been derived:

<u>MO Cas:</u> T_0= 243 7901; P = 252^{d}25; Infrared amplitude 2.75 between 10.25 and 13.0.

<u>MP Cas:</u> T_0= 243 7875; P = 334^{d}5; Infrared amplitude 2.80 between 10.35 and 13.15.





The light curves are typical of the Mira Variables, with a very moderate dispersion. Rough estimates of objective-prism spectra taken near maximum show that they are not earlier than M4-M5. Both stars are invisible in the blue, even at maximum.

L. ROSINO
D. DI MARTINO
Astrophysical Observatory, Asiago

References: L.ROSINO, 1953, Bologna Pubbl. Vol. VI. No.3.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 586

Konkoly Observatory
Budapest
1971 October 19

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen-Nürnberg
Band VIII, Nr. 97
Florida Contribution Nr. 27

NEW BRIGHT SOUTHERN VARIABLE STARS

On sky patrol plates taken at the Southern Station of the Remeis-Observatory Bamberg at the Boyden Observatory, South Africa and at the Southern Station of the University of Florida Gainesville at the Mount John Observatory, New Zealand, the following stars were found to be variable:

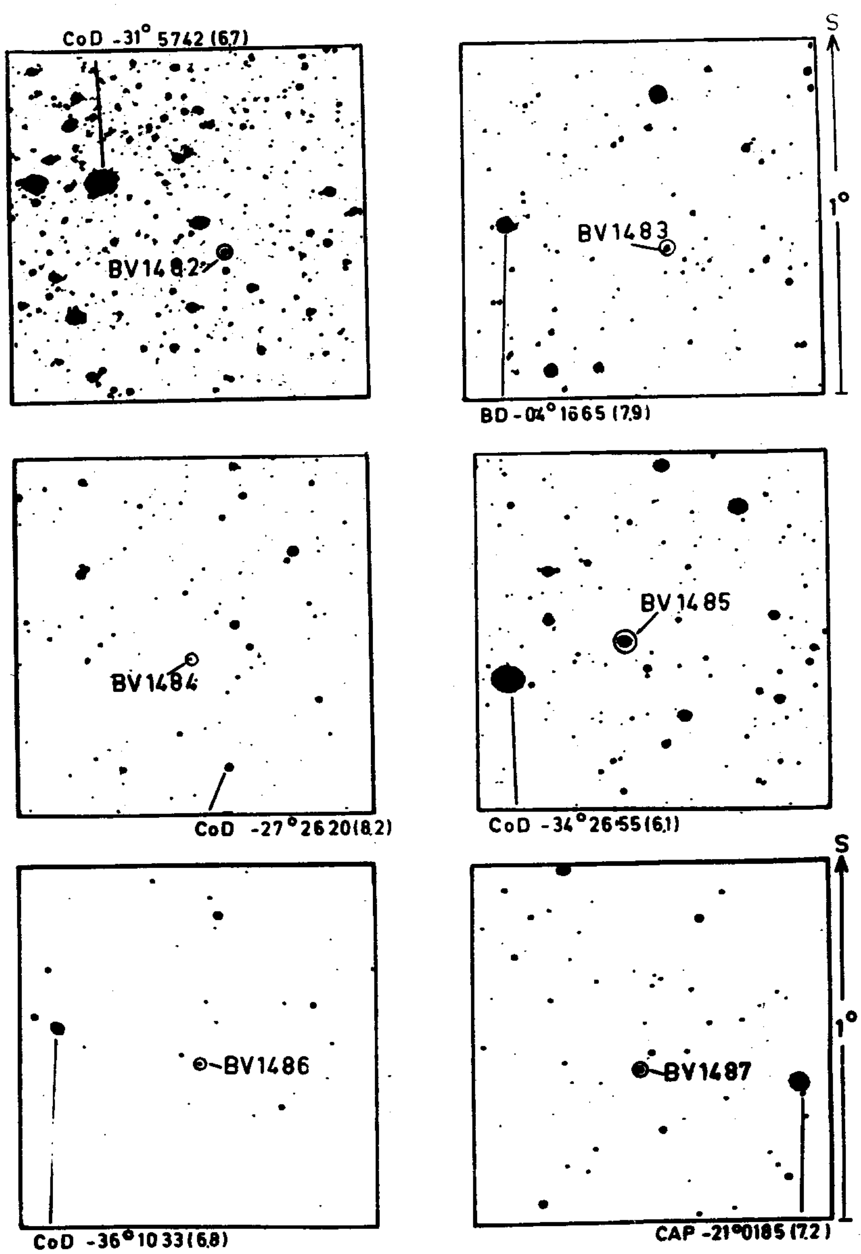
		A_{pg}
BV 1481 Cet	= CoD $-23°0737(7\overset{m}{.}5)$ = CAP $-23°0227(6\overset{m}{.}2)$ = HD 12180 F_2	$0\overset{m}{.}5$
BV 1482 Pup	= CoD $-31°5782(9\overset{m}{.}3)$ = CAP $-31°2241(9\overset{m}{.}4)$ = CSV 1254 = S 4849	$0\overset{m}{.}4$
BV 1483 Mon	= BD $-04°1680(9\overset{m}{.}3)$ = CSV 100771 = P 2920	$0\overset{m}{.}2$
BV 1484 Col	= CoD $-27°2615(9\overset{m}{.}7)$ = CSV 701 = S 4853	$0\overset{m}{.}5$
BV 1485 Col	= CoD $-34°2680(8\overset{m}{.}3)$ = CAP $-34°0844(8\overset{m}{.}2)$ = HD 42373 F_0	$0\overset{m}{.}3$
BV 1486 For	= CoD $-36°1043(9\overset{m}{.}9)$	$0\overset{m}{.}4$
BV 1487 Cet	= CAP $-21°0181(9\overset{m}{.}4)$ = BD $-21°0344(9\overset{m}{.}2)$	$0\overset{m}{.}4$

On the following page you will find identification charts for the stars fainter than $8\overset{m}{.}0$.

September 1971

R. BLOOMER

Remeis-Sternwarte Bamberg
and University of Florida
Gainesville


CoD -31° 5742 (6.7)
BV1482
BV1483
BD -04° 1665 (7.9)
S
1°
BV1484
CoD -27° 2620 (8.2)
BV1485
CoD -34° 2655 (6.1)
BV1486
CoD -36° 1033 (6.8)
BV1487
S
1°
CAP -21° 0185 (7.2)

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

NUMBER 587

Konkoly Observatory
Budapest
1971 October 19

Veröffentlichungen der Remeis-Sternwarte Bamberg
Astronomisches Institut der Universität Erlangen-Nürnberg
Band VIII, Nr. 98
Florida Contribution Nr. 28

ELEMENTS FOR TWO BAMBERG VARIABLES

The derivation of periods of variable stars from sky patrol plates can lead to spurious periods due either to insufficient data to obtain a unique period or the distribution of exposure times as a result of observing conditions. One such example would appear to be BV 626. Although the originally published elements were that of a Cepheid with a period of $6^{d}_{.}61$ (IBVS Nr.100), it has recently been suggested by J.GRAHAM (private communication) that the star may have a much shorter period. With a larger number of sky patrol plates from the Southern Station of the Remeis Observatory Bamberg at the Boyden Observatory, South Africa and from the Southern Station of the University of Florida Gainesville at the Mount-John-Observatory, New Zealand, the following elements have been found:

BV 626 = CoD $-28°0307(10^{m})$

Min = JD 244 0553.285 + $0^{d}_{.}463$ 113 . E

Maxima	E	O–C
243 8297.452(1/2)	−4871	−0.010
8621.566	−4171	−0.054
8641.494	−4128	−0.061
8707.347(1/2)	−3985	+0.067
8728.274(1/2)	−3941	+0.117
8979.598(1/2)	−3398	−0.029
9006.504	−3340	+0.016
9383.463(1/2)	−2526	+0.001
9389.458	−2513	−0.024
9435.307	−2414	−0.023
9436.309(1/2)	−2412	+0.052
9442.319(1/2)	−2399	+0.042
9443.316(1/2)	−2397	+0.113
9767.436(1/2)	−1697	+0.054
244 0527.347	− 56	−0.004
0554.277(1/2)	+ 2	+0.066

Ampl. $0^{m}_{.}85$; RR Lyrae

BV 1481 = CoD −23°0737(7^{m}5) = CAP −23°0227(6^{m}2) = HD 12180 F_2

Min = JD 244 0566.652 + 0^{d}733 282 . E

	Minima	E	0−C
243	8369.313(1/4)	−2996.5	−0.059
	8728.319	−2507.0	+0.005
	8995.594(3/4)	−2142.5	−0.001
	9006.549(3/4)	−2127.5	−0.045
	9060.417(1/2)	−2054.0	−0.073
	9361.579(1/4)	−1643.5	+0.076
	9383.507(3/4)	−1613.5	+0.006
	9404.392	−1585.0	−0.007
	9414.367(1/4)	−1571.5	+0.067
	9444.359(3/4)	−1530.5	−0.005
	9761.491	−1098.0	−0.018
	9768.483(1/2)	−1088.5	+0.009
	9771.463(1/2)	−1084.5	+0.055
	0526.391(1/4)	− 55.0	+0.070
	0530.392(1/2)	− 49.5	+0.038
	0566.285	− 0.5	+0.000

Amplitude 0^{m}5 with a deep secondary minimum, EB

R. BLOOMER

Remeis-Sternwarte Bamberg
and University of Florida
Gainesville

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

NUMBER 588

Konkoly Observatory
Budapest
1971 October 20

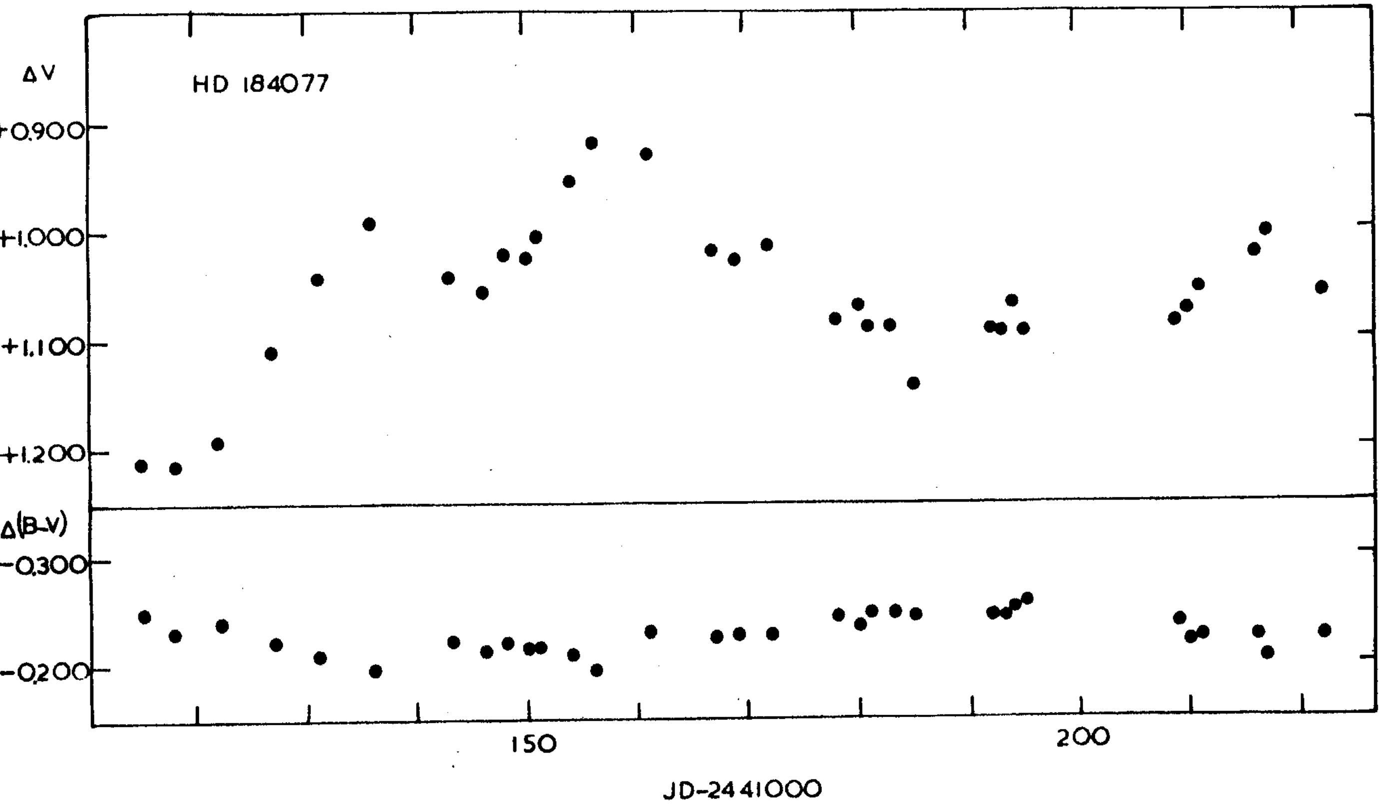
HD 184077: ANOTHER RED VARIABLE

During the course of photoelectric photometry of AQ Sgr, it was discovered that HD 184077 (RA1970=$19^h31^m40^s$, D=1970-16°41'), used as comparison star, was variable. The light- and colour-curves have been constructed, using HD 184201 (RA1970=$19^h31^m40^s$, D1970=+4°58') as comparison star, of which preliminary magnitude and colours are V=$6^m.32$, B-V=$1^m.91$, U-B=$2^m.03$. The range of the light variation is $0^m.30$ (s. Figure).

J.D. 2441...	ΔV	Δ(B-V)	J.D. 2441...	ΔV	Δ(B-V)
115.502	1.208	-0.248	172.327	1.013	-0.228
118.464	1.216	-0.231	178.392	1.083	-0.246
122.523	1.192	-0.239	180.303	1.071	-0.235
127.440	1.110	-0.222	181.297	1.090	-0.248
131.466	1.042	-0.211	183.294	1.090	-0.248
136.442	0.993	-0.198	185.292	1.145	-0.246
143.419	1.043	-0.222	192.311	1.093	-0.246
146.453	1.054	-0.213	193.298	1.095	-0.246
148.455	1.022	-0.220	194.348	1.068	-0.252
150.457	1.024	-0.215	195.250	1.096	-0.257
151.366	1.005	-0.218	209.316	1.084	-0.237
154.416	0.954	-0.211	210.256	1.075	-0.220
156.418	0.920	-0.196	211.261	1.053	-0.226
161.335	0.929	-0.231	216.308	1.023	-0.224
167.337	1.021	-0.226	217.243	1.003	-0.204
169.324	1.028	-0.228	222.248	1.058	-0.226

M. WISSE

Republic Observatory
Johannesburg


HD 184077
ΔV
+0.900
+1.000
+1.100
+1.200
Δ(B-V)
-0.300
-0.200
150
200
JD-2441000

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

NUMBER 589

Konkoly Observatory
Budapest
1971 October 22

OBSERVATIONS OF BV 1041

During August and September, 1970, some observations of the RR Lyrae-type star BV 1041 (Strohmeier, 1967) were made with the 1 meter photometric telescope of the European Southern Observatory on La Silla (Chile). The observations are given in the Table. The comparison stars were
CPD−74°215, B=8.96, V=7.51 CPD−73°175, B=9.15, V=7.68
Phases were computed by

$$\text{phase} = 3^{d-1}.48273\ (\text{J.D. hel.} -2440000).$$

The instrumental magnitudes b and v were converted to B and V by means of standard stars from the E regions (Cousins and Stoy, 1962). The mean error of a single observation is estimated to be ± 0.02.

J.D. hel. 2440...	phase	B	V
0814.887	.032	12.66	12.28
0816.800	.696	12.22	11.96
.816	.785	12.26	11.99
.832	.807	12.39	12.07
868	.932	12.57	12.14
.886	.992	12.66	12.22
.901	.045	12.67	12.22
.918	.103	12.67	12.25
0820.787	.580	12.07	11.82
.804	.640	12.14	11.90
.821	.698	12.22	11.96
.838	.758	12.30	12.01
.883	.912	12.53	12.19
.897	.964	12.60	12.24
0822.831	.699	12.23	11.94
.847	.754	12.30	12.00
.863	.810	12.38	12.06
0829.827	.064	12.63	12.32
.845	.125	12.62	12.30
0831.762	.803	12.37	12.09
.781	.868	12.47	12.17
.869	.174	12.60	12.31
.888	.242	12.55	12.22
0836.798	.341	12.13	11.90
828	.447	12.10	11.86

Kapteyn Laboratorium Groningen, 8002

L. PLAUT

Cousins,A.W.J., Stoy,R.H. 1962, Royal Observatory Bull. no.49, Strohmeier,W., 1967, Information Bull. Comm. 27., no.216.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
Number 590

Konkoly Observatory
Budapest
1971 October 26

NOTE ON LMC VARIABLE STARS

Paul W. Hodge and Frances W. Wright

September 1971

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NOTE ON LMC VARIABLE STARS

Of the 53 LMC variables studied by us in Region 35 (Hodge and Wright 1969, Paper 1; Wright and Hodge 1971, Paper 2), 36 have also appeared in the massive study published by Payne-Gaposchkin (1971). It is unusual to have so many stars common to different studies in the Magellanic Clouds, and it is particularly important, therefore, that a comparison be made so that previous suspicions of systematic errors – those due, for example, to selection effects – be checked. This note compares results and draws what conclusions seem reasonable.

1. Cepheids

Periods. Table 1 compares data for the 24 Cepheids common to the two surveys and gives period differences, which are quite small except for 3 cases (Fig. 1). The differences are probably due primarily to the fact that our study includes additional, more recent series of plates, the 1958-59 AHD and the 1969 CTIO series. Furthermore, we had plates in two colors, which provided additional aid in the photometry. The differences (Fig. 1) have a mean of 0.043×10^{-3}; three-quarters of the cases are less than this mean value. Three others are less than twice this value, while three have a larger difference. In the case of HV 5684, Wright and Hodge (1971) could obtain a fit of all observations only with a changing period.

Amplitudes. The differences in amplitudes for the Cepheids are plotted in Fig. 2. There is a tendency for our data to show larger amplitudes than do the Payne-Gaposchkin data, by as much as 0.5 mag for a few cases. The reason apparently lies in the methods of measurement and reduction. An amplitude that is too small can result from a slightly incorrect period from less precise measurements or from an averaging interval that is too large; an amplitude that is too large can result from an averaging interval that is too small. Future photoelectric measures will surely demonstrate which of these factors is responsible for the differences. In the meantime, it is clear that amplitudes from either survey should be used with reservation.

Mean magnitudes. Fig. 3 shows the differences found in the mean B magnitudes for the Cepheids. To transfer our magnitudes to the Payne-Gaposchkin system, we have applied her absorption corrections before plotting our data in Fig. 3. The differences show no significant systematic trends and are not inconsistent with the quoted absolute photometric uncertainties of the two studies. There is some indication of her magnitudes being somewhat (~ 0.1 mag) fainter at the faint end (around 16.5) and brighter for the two brightest variables (around mag 13).

2. Other Variables

For four of the non-Cepheid variables, our conclusions were significantly different. We have assembled these in Table 2.

We reported HV 2379 as "semiregular," while Payne-Gaposchkin termed it a long-period variable of 355 days. We have reviewed our 524 measures of this variable and still classify it as semiregular. As we noticed previously, it does show cyclic variation over 200 or 300 days, with irregularity. Its $\langle B \rangle - \langle V \rangle$ of ~ 3.7 indicates an N variable typical of the semiregular type. It might even be classified as irregular. It is certain that 355 days does not fit all our observations reasonably.

No period was given by Payne-Gaposchkin for HV 5715. Our period of 421 days fits our observations well, although there is more scatter in magnitude than usual;

a slightly longer period, of 422.9 days, fits all the earlier observations more exactly. Hence, there seems to be some irregularity, either in period or in magnitude. The mean light curve is shown in Wright and Hodge (1971, Fig. 12).

Classified as red irregular by Payne-Gaposchkin, HV 5654 is, according to our analysis, a V Hydrae-type variable, with one period around 2400 days and another of about 400 to 600 days. Individual observations are shown in Fig. 13 of Wright and Hodge (1971).

For HV 2360, our observations and analysis show more irregularity than indicated by Payne-Gaposchkin in her classification "long period of 790 days." Except for one instance where the interval between successive maxima is 500 days (from JD 2423000 to 2433000), the period of HV 2360 varies between 600 and 900 days, with an accompanying variation in range, as shown in our individual observations (Wright and Hodge 1971, Fig. 14).

For the W Virginis variable HV 2351, we have a changing period (Hodge and Wright 1969), while Payne-Gaposchkin has a constant one.

For the R Coronae Borealis variable HV 5637, there is reasonable agreement in magnitude.

Finally, for the four eclipsing stars common to the two studies, the period differences (listed at the end of Table 1 and shown graphically in Fig. 1 by triangles) are extremely small.

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Cambridge, Massachusetts

and

Frances W. Wright
Smithsonian Astrophysical Observatory
and
Harvard College Observatory
Cambridge, Massachusetts

References

Hodge, P. W., Wright, F. W. 1969, Studies of the Large Magellanic Cloud. X. Photometry of variable stars, Astrophys. J. Suppl. Ser. 153, 17, 467-490.

Payne-Gaposchkin, C. H. 1971, The variable stars of the Large Magellanic Clouds, Smithsonian Contr. Astrophys., No. 13, 41 pp.

Wright, F. W., Hodge, P. W. 1971, Further studies of variable stars of the Large Magellanic Cloud, Astr. J., 76 (in press).

Table 1

Differences in period

HV no.	Period (to 3 decimal places) (days)	Differences (Hodge and Wright − Payne-Gaposchkin) ($\times 10^{-6}$)	Differences as % of period ($\times 10^{-3}$)
		24 Cepheids	
2315	2.413	+125	+0.052
2391	2.482	00	000
5684	2.788	~ +360	+0.129
5567	2.794	− 27	−0.010
W48	3.113	− 13	−0.004
12972	3.165	+ 02	+0.001
W47	3.193	+ 32	+0.010
2355	3.622	− 26	−0.007
2375	3.636	− 63	−0.017
11987	3.665	+ 51	+0.014
5656	3.727	00	000
2287	3.784	− 29	−0.008
5591	3.968	+ 55	+0.014
5643	4.112	− 01	−0.000
5586	4.317	+373	+0.086
5579	4.461	− 63	−0.014
12979	4.510	+ 21	+0.005
12974	4.654	− 83	−0.018
2420	9.035	+ 10	+0.001
5543	9.048	+ 50	+0.006
2299	12.063	− 60	−0.005
5594	17.202	−1180	−0.069
2294	36.536	+5000	+0.137
2369	48.387	+20020	+0.415
		4 Eclipsing Stars	
2374	28.494	0	000
2401	2.945	+ 4	+0.001
2403	1.312	+ 6	+0.012
5549	6.066	− 73	−0.012

Table 2

Four non-Cepheid variables

HV no.	Hodge and Wright period (days)	Payne-Gaposchkin period (days)	Hodge and Wright amplitude	Payne-Gaposchkin amplitude	Hodge and Wright average B mag.	Payne-Gaposchkin range in mag.
5715	~ 421	omitted	1.13		16.90	
2379	Semiregular with cyclic variation over 200-300 days, with irregularity	355 long period	~ 3+?	2.56	17.4? or fainter	15.89 -18.45
5654	V Hydrae type; ~2400 ~400-600	very red irregular	1.4	1.99	14.9 deepest min.	14.44 -16.43
2360	600-900	790 long period	2.88	3.26	~15.5	13.85 -17.11

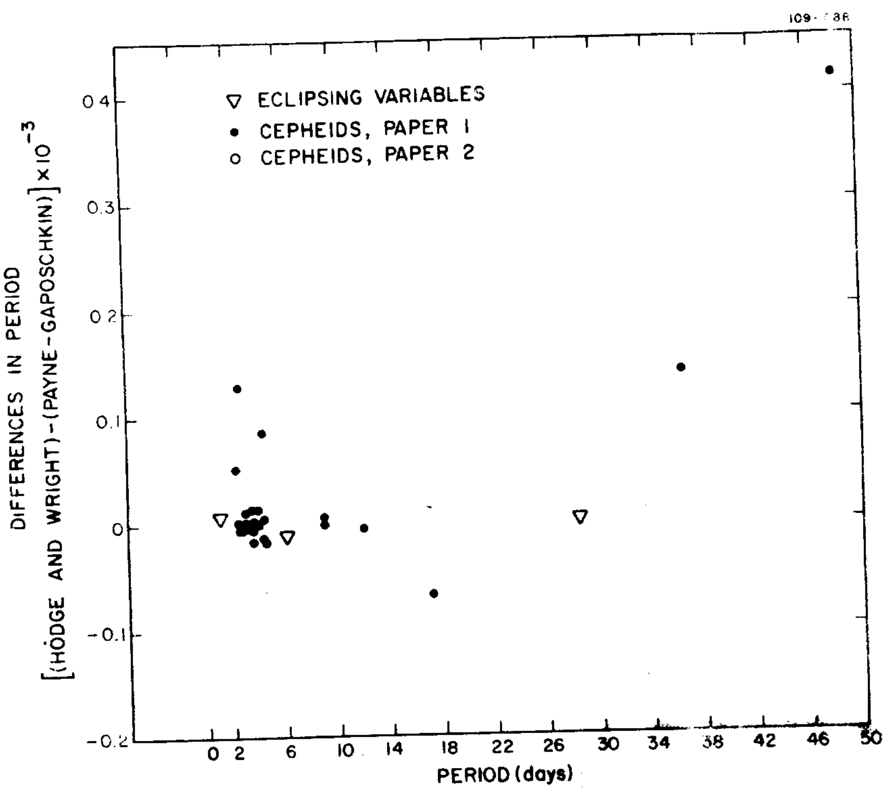


Fig. 1. Comparison of periods.

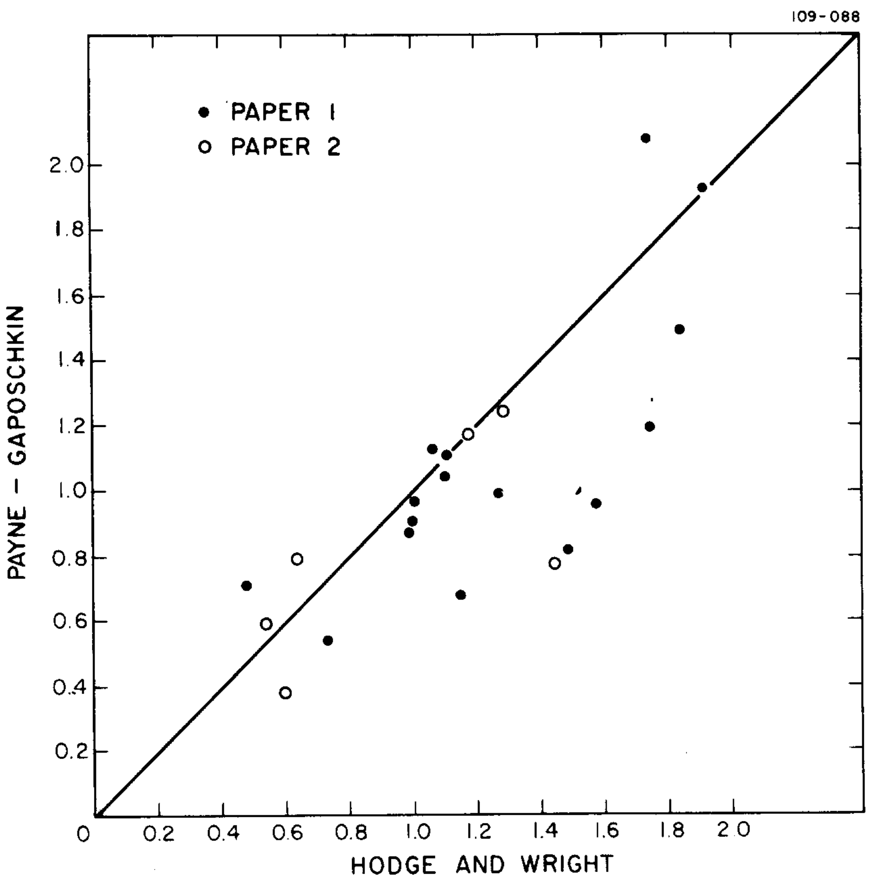


Fig. 2. Comparison of amplitudes for Cepheids.

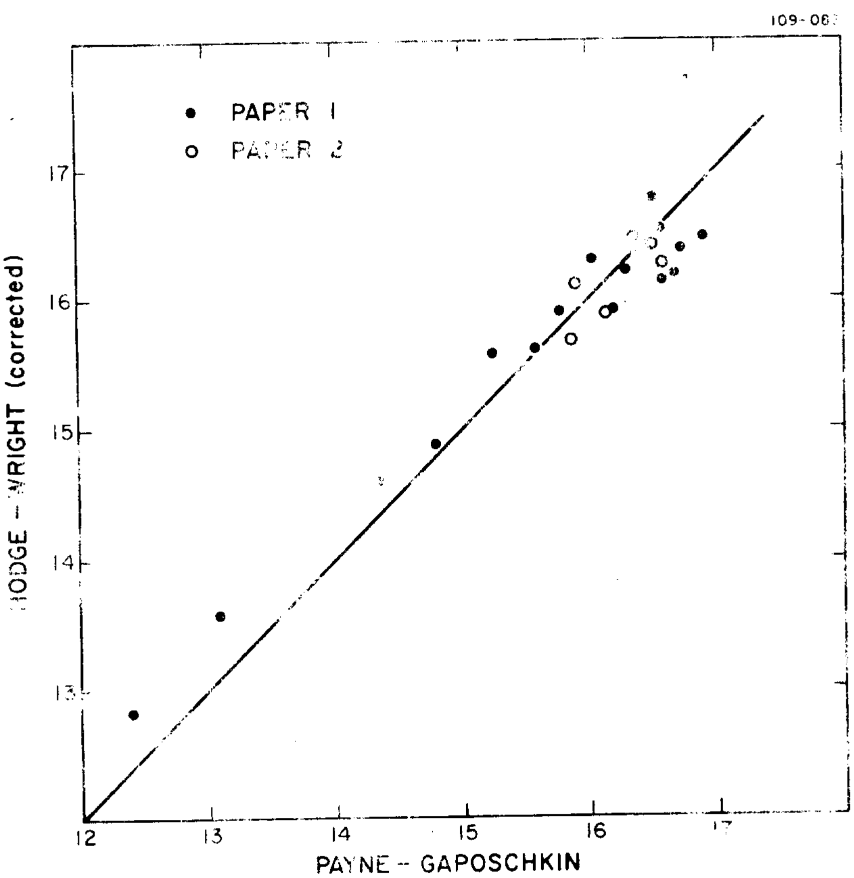


Fig. 3. Comparison of B magnitudes for the Cepheids.

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 591

Konkoly Observatory
Budapest
1971 October 30

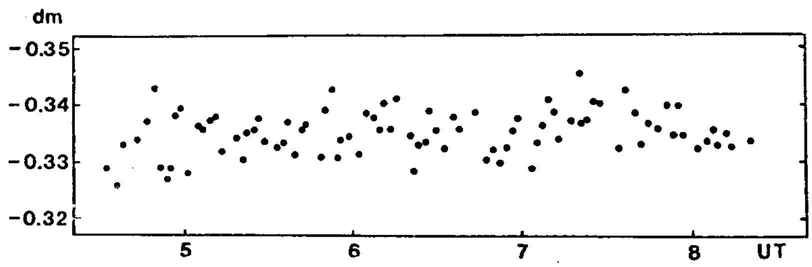
TESTS OF TWO SUSPECTED VARIABLES

During the testing and calibration of the newly installed photoelectric photometer in the Joseph R. Grundy Observatory, two suspected variable stars were monitored and found to show no variation larger than 0.01 magnitudes. The observations were made with a Spotz-Ridell photometer on the 40.5 cm. telescope. The current from the dry ice cooled 1P21 was amplified by a Keithley 416 Picoammeter and recorded on a chart recorder. A 4 mm Schott OG-4 filter approximated the V magnitude of the UBV system. The standard error of a single differential observation was 0.005 magnitudes.

The star Nu Herculis (HD 164136) has been included in a list of probable Delta Scuti stars (Frolov 1970) but observations on 3 nights for a total of 13 hours failed to reveal any variation in excess of 0.01 magnitudes. The comparison star was Rho Herculis.

The star Iota Herculis (HD 160762) has been suggested as a possible Beta Canis Majoris star (Underhill 1966) due to its spectral type B3V (Hoffleit 1964), and its variable radial velocity. The period of the radial velocity variation is $0^{d}.1434$ (Edwards 1937) with an amplitude of about 15 km/sec (Petrie and Petrie 1939). Comparison of this amplitude with the relation between light amplitude and 2K obtained by Leung (1968) indicates that Iota Herculis should have an amplitude of from 0.01 to 0.06 magnitudes in the blue and visual. The star was observed on six nights for a total of 17 hours using Rho Herculis as a comparison star and 88 Herculis as a check star. The data were corrected for differential extinction. No variation was found greater than 0.01 magnitudes.

This must mean that either the star is no longer pulsating, or it is still pulsating but does not display variations in luminosity of the amplitude we would expect for a Beta Canis Majoris star. The latter possibility seems more likely although the radial velocity variation certainly deserves further study. The low amplitude of the radial velocity variation, the short period, and the lack of any light variation above 0.01 magnitudes, are strikingly similar to the behavior of Beta Centauri (Breger 1967), although the stars are of different spectral types. The star Iota Herculis should be classified as a probable Beta Canis Majoris star, or, like Beta Centauri, as an intermediate type between normal B stars and the Beta Canis Majoris stars.



Representative Observations in the Sense Iota Her-Rho Her from May 19, 1971

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ANNOUNCEMENT

"FLARES OF RED DWARF STARS"
(VSPISHKI KRASNIKH KARLIKOVIKH ZVEZD)
by
R. E. GERSHBERG
Crimean Astrophysical Observatory

This book was published by Izdatel'stvo Nauka, Moscow, 1970, 168 pages, 29 figures, 13 tables, 240 bibliographical entries. The Russian edition is now out of print. An English translation has been prepared by D.J.Mullan, Armagh Observatory. The translation has 185 typed quarto pages, and has been edited by R.E.Gershberg.

The book includes a comprehensive summary of all visual, photoelectric, photographic (including searches of plate collections), polarimetric, spectrographic, and radio observations of flare stars up to the autumn of 1969, including world-wide co-operative observations organized by the IAU Working Group on Flare Stars (of which R.E.Gershberg is a member) since the XIII General Assembly of the IAU in 1967. The book also summarizes ten hypoteses for the origin of stellar flares, with a special chapter of 25 pages devoted to the nebular model. Photocopies of the translation (unbound) are available at a price of one pound sterling (£1), or U.S. $ 2.50. This price covers photocopying and postage. Orders may be sent to

The Secretary
Armagh Observatory
Armagh, N.Ireland

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 592

Konkoly Observatory
Budapest
1971 November 12

ONE NEW AND FOUR UP-DATED VARIABLE STARS

Among the results obtained by the summer students at the Maria Mitchell Observatory are the up-dating of observations of three long period variables and one RR Lyrae type.

V734 Cygni was estimated by Miss Karen Kwitter on over 1280 Nantucket plates taken between 1916 and 1971. The best constant period she was able to obtain, 310 days, showed pronounced systematic deviations of observed from computed times of maximum. By fitting a cosine term to the deviations, I find the following relation to hold over the 68 cycles represented:

$$\text{Max} = \text{JD } 26590 + 310E - 5.5 \cos 6^{\circ}.8\,(E-16).$$

MM Sgr was rediscovered by Miss Kwitter with the Rodman Blink Microscope. On the basis of 640 observations on Harvard and Nantucket plates dating back to 1928, she was able to improve the period given in the General Catalogue of Variable Stars (1970 ed) from 203 to 202.3 days.

NW Sgr was similarly rediscovered by Miss Esther Hu, who made estimates of its brightness on 440 plates 1957-71, but did not attempt to verify the period. I find that her observations, embracing 32 cycles, satisfy both the 1948 zero point (J.D.32710) and period of 161.5 days given in the General Catalogue so precisely that it almost seems wrong to classify the star as semi-regular!

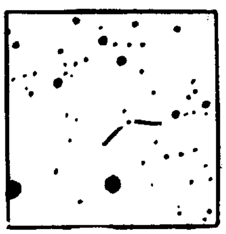
S Comae is an RRab type star that has been suspected of having a changing period. Miss Pamela Bonnell redetermined the period from 100 Nantucket plates taken 1964-71 and one earlier plate taken in December 1934. She obtains,

$$\text{Max} = \text{JD } 40654.641 + 0^{d}.5865907\,E$$

This differs by only $6^{d}.10^{-7}$ from the period given in the General Catalogue; however, the new and the previously published epochs of maximum are more consistent with the new period. The new observations give no indication that the period is changing.

A New Variable at $18^h38^m24^s$, $-20°22'.2$ 1900, mag. 14.2–15.5 pg, which I had discovered on Harvard plates, is type RRab. In 1970 Miss Linda Lucignani examined it on 114 Harvard and 355 Nantucket plates for 1924–70. From her magnitude estimates I deduce,

S



Max = JD 33858.392 + $0^d.5633812$ E.

The chart is approximately 10'x10'.

October 1971

DORRIT HOFFLEIT

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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS
NUMBER 593

Konkoly Observatory
Budapest
1971 November 12

VARIABLE RADIO OBJECT 20.08.01

The object's optical variability announced by KUROTSCHKIN (IAU Circ. 2365) is confirmed on numerous Sonneberg plates. The maximum of September - October 1971 mentioned l.c. lasted at least until October 15. The object was continuously active from 1930 to 1971.

Pronounced maxima:

1933	February	$14\overset{m}{.}0$	orthochromatic plates
1936/37	winter	13.5	orthochromatic plates
1957	March	13.3	
1959	February	13.3	
1962	January	13.2	
1963	March	13.1	
1965	April	13.1	
1968	spring	13.3	double maximum
1968	December	13.0	
1970	November	13.0	
1971	October	]13.0	

Pronounced minima:

1933	January	[15.3	orthochromatic plates
1933	March	15.2	orthochromatic plates
1966	February	15.4	
1967	February	[15.4	

The apparent scarceness of the minima is caused by the fact that they can only be ascertained on the 14-cm-Triplet plates.

For further details see forthcoming number of MVS.

1971 November 3

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Deutsche Akademie der Wissenschaften
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COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

NUMBER 594

Konkoly Observatory
Budapest
1971 November 24

7 NEW VARIABLE STARS IN NGC 1261

Fourcade and Laborde (1) discovered 6 variable stars in the globular cluster NGC 1261. On 11 plates taken with the 40" telescope of Siding Spring Observatory from August 14 to September 11, 1970, we have discovered 7 new variable stars. B magnitudes were determined using Alcaino and Contreras (2) standards. Coordinates x, y were measured using Fourcade and Laborde's system of reference.

Var. No.	x	y	range max	range min	Alcaino No.
7	+ 55".4	+ 70".0	16.17	17.43	172
8	+ 89.1	+ 9.1	16.35	17.42	-
9	-135.7	-134.4	16.13	17.48	-
10	- 78.4	- 92.8	16.79	17.35	30
11	- 53.9	- 68.2	16.22	17.23	56
12	- 85.0	+ 92.7	16.85	17.29	189
13	-109.3	+133.3	15.21	15.86	9 red giant

In the last column is given the number of the star in the list published by Alcaino and Contreras (2).

C. BARTOLINI (Bologna Observatory)
F. GRILLI (Bologna Observatory)
J.W. ROBERTSON (Mount Stromlo Obs.)

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

NUMBER 595

Konkoly Observatory
Budapest
1971 November 29

I.A.U. COLLOQUIUM (No.21) ON VARIABLE STARS IN GLOBULAR CLUSTERS AND IN RELATED SYSTEMS

This colloquium will be held at the University of Toronto, Toronto, Ontario, Canada on 29, 30, 31 August, 1972 at the invitation of the David Dunlap Observatory. The colloquium is sponsored by I.A.U. Commission 27 (Variable Stars) and the intention is that the meeting will honour the lifelong work in this field by Prof.Helen Sawyer Hogg. The Scientific Organizing Committee approved by the I.A.U. Executive consists of: L.Rosino, B.V.Kukarkin, H.S.Hogg, L.Detre, N.Baker, S. van Agt and M.W.Feast (Chairman).

It is hoped to cover both observational and theoretical aspects of this problem including the relationship of variables to non-variable cluster members, the position of the variables in the HR diagram and their importance for problems of stellar evolution and mass loss, empirical data on the variables, periods and period changes, and the relevant parts of pulsation theory. Provisionally a division has been made into the following four main topics.

(1) RR Lyrae variables in clusters; observational work
(2) Slow Variables ($P>1^d$) in clusters; observational work
(3) Population II variables in dwarf spheroidal galaxies
(4) Population II variables; theoretical work.

There will be a number of invited introductory lectures to be followed by contributed papers. Those wishing to present papers should write to M.W.Feast, Radcliffe Observatory, P.O. Box 373, Pretoria, South Africa, as soon as possible and not later than July 1, 1972.

The local Organizing Committee consists of S.P.S. Anand, D.A.MacRae and J.D.Fernie (Chairman). A small amount of money is available for travel grants and this will be allocated about May 1972. Any application for travel funds should be made in duplicate to M.W.Feast and J.D.Fernie (David Dunlap Observatory, University of Toronto, Richmond Hill, Ontario, Canada).

M.W. FEAST
(Chairman of the Scientific Organizing Committee
and President ad interim of Commission 27)

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

NUMBER 596

Konkoly Observatory
Budapest
1971 December 2

THE ECLIPSING BINARY AB CASSIOPEIAE AS A DELTA SCUTI STAR

The eclipsing binary AB Cas has been observed in several nights from 1967 to 1971 with the 40-cm refractor of the Teramo Observatory; an E.M.I. 9502 photomultiplier coupled with a Schott GG14 filter assured a response very close to the V magnitude system.

The light curve derived by these observations is shown in Fig.1; the phases have been computed according to the elements

$$\text{Hel. Minimum} = \text{J.D. } 2439771.580 + 1^d.3668755$$

and the magnitude differences are referred to an anonymous star whose V magnitude resulted $10^m.50$.

A $0^m.10$ deep secondary minimum is detectable, but the most interesting feature is the presence of brightness fluctuations of amplitude $0^m.05$ and period $1^h\ 24^m$; the incommensurability with the eclipsing period causes the cancelling out of these fluctuations in the most part of the composite light curve, but they are clearly apparent in the phase interval $0^P.08$ - $0^P.20$ where almost all the observations belong to the same night. Some single-night runs are reported on a larger scale against the phase of the binary period (in minor panel of Fig.1 and in Fig.2).

The average period derived from several cycles observed in 1970 and 1971 results to be $0^d.058$ but the single cycles show deviations reaching $0^d.007$. The brightness fluctuations seem to be enhanced during the secondary

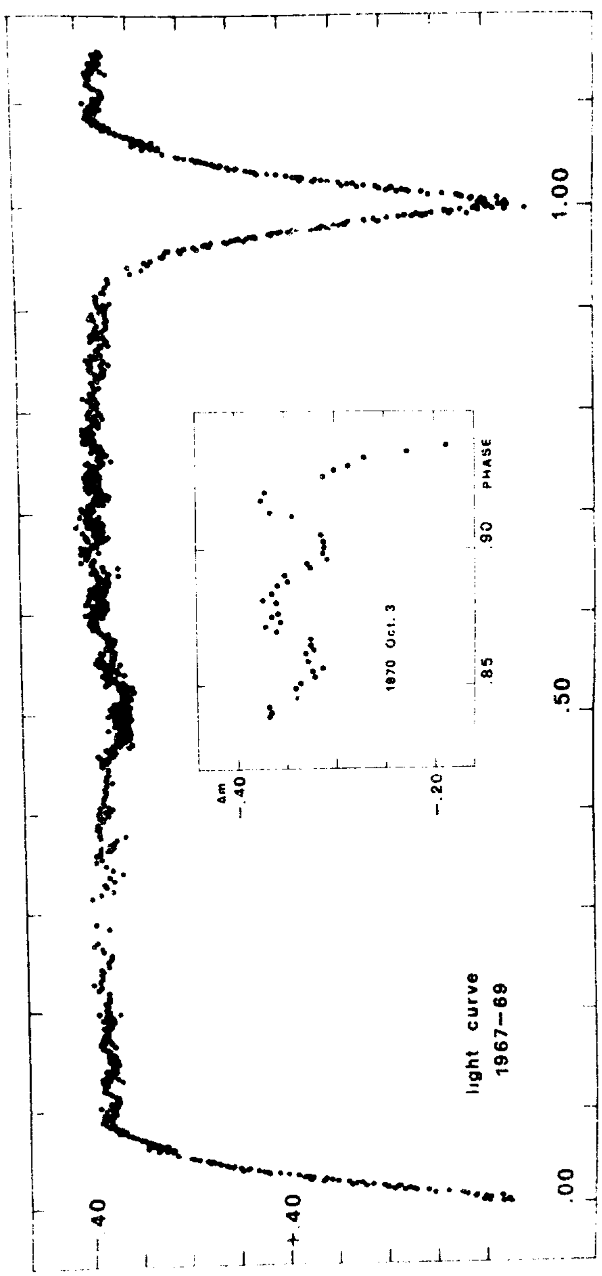

Figure 1

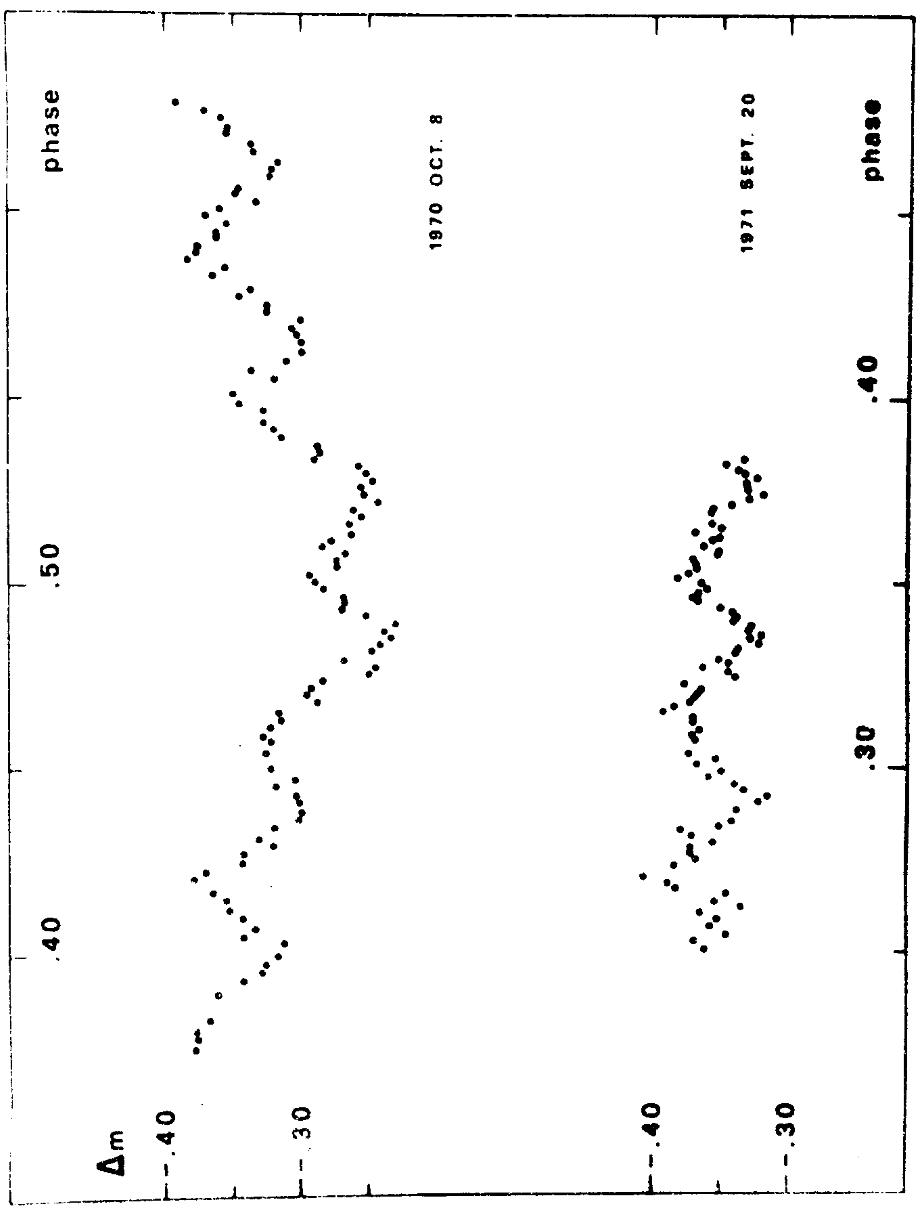

Figure 2

minima and disappear near the central phase of the primary minima: a behaviour to be expected in the case of an intrinsic variability of the warmer star which is almost totally eclipsed. The photometric patterns and the spectrum and luminosity of the primary component - an A3 star of absolute visual magnitude $+2^{m}.2$ - allow to classify the star as a Delta Scuti variable.

AB Cas is a detached system consisting in an A3 and an early K main sequence stars; the mass of the A3 star has been evaluated in 2 solar masses (Gaposhkin, 1940): a typical value for a Delta Scuti variable. Furthermore, the star fits well the period-luminosity relation found for this class of variables (Kam-Ching Leung, 1970).

A detailed study of AB Cas will be published elsewhere.

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

NUMBER 597

Konkoly Observatory
Budapest
1971 December 2

FLARE MONITORING OF AD Leo

One flare was recorded during 7.61 hours of ultraviolet monitoring within the scheduled April 1971 period for cooperative X-ray and optical observations (IBVS 516). A night in March was spent tracing possible instrumental causes for the fact that three of the six AD Leo "flares" reported in IBVS 499 occurred at the same telescope position. No instrumental causes were confirmed, and, in fact, the reality of one of the flares in question has been supported by the independent observations of Cristaldi and Rodono, IBVS 498. They were not observing at the times of the other flares.

Table I shows the actual monitoring times rounded to the nearest minute of UT. In all cases, an EMI 6256S photomultiplier with d.c. amplification (Keithley 416) and direct strip-chart recording (Speedomax W) was used with the 61-cm diameter Cassegrain at Mt. Cuba Observatory. On April 15 and 16 a standard U filter (Corning 7-54) was used with the f/16 secondary mirror. On March 25, in order to duplicate the 1970 observing conditions, the calcium K-line filter was used with the f/32 secondary.

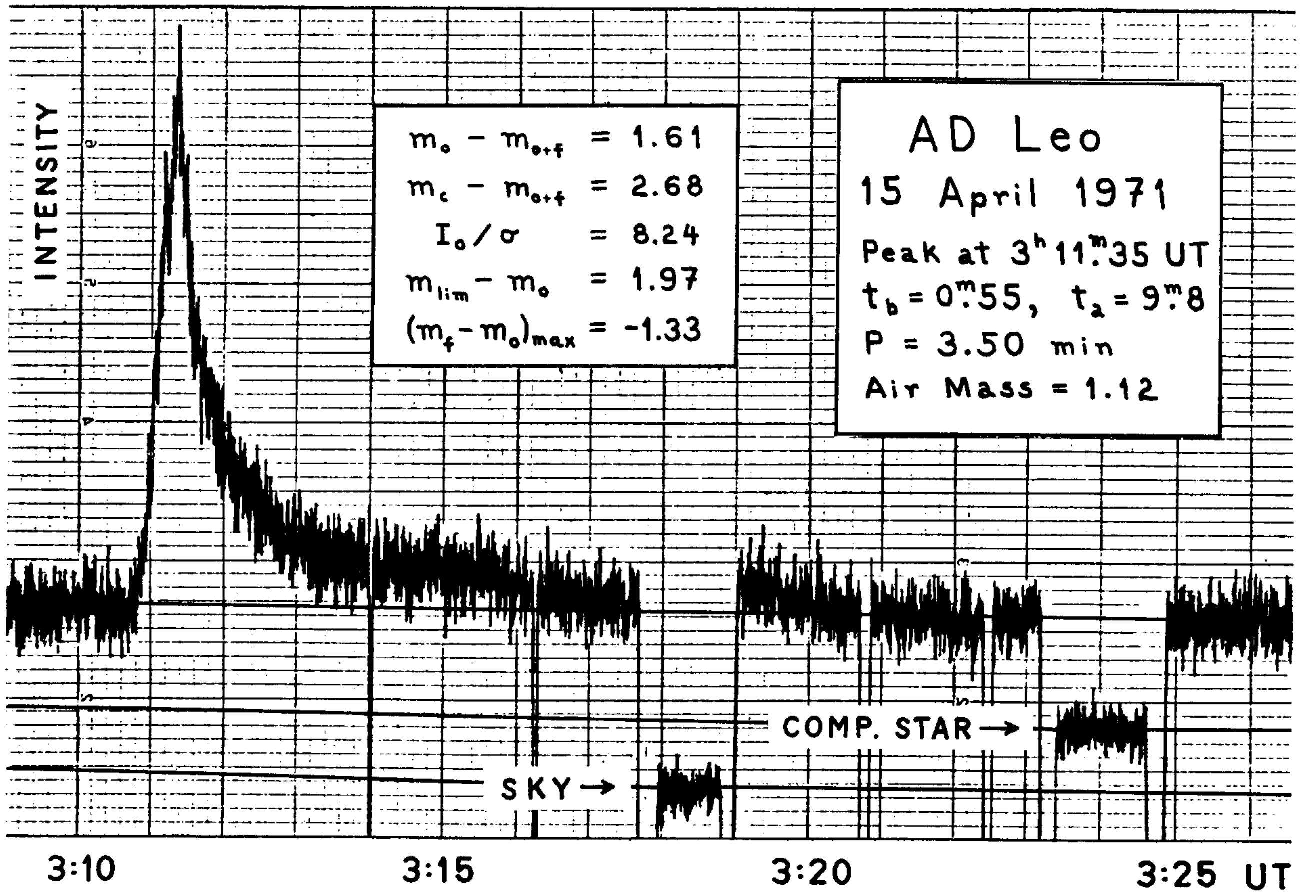
Although all lighting and physical settings on March 25 were made to agree as closely as possible with the 1970 conditions, there was no sign of a brightened signal occurring between hour angles - 1:56 and - 1:36 (or at any other time during that night). Of the suspected flares reported in IBVS 499, flare No. 3 was the most dubious. This, however, is the only one for which I know of simultaneous monitoring having been done elsewhere. It has the same time of maximum (1970 March 8, $2^h\ 27^m\!.3$ UT) as the second of the four flares reported by Cristaldi and Rodono in IBVS 498. They also noted it to be uncertain and gave the blue-light brightness and duration as several times smaller than my estimate at the K line. This is a reasonable degree of dissimilarity for the difference between the filters used. That there remain two unconfirmed flares at nearly the same hour angle is no longer a basis for regarding them as probably spurious.

Table I. Coverage of AD Leo during 1971.

Date	UT Coverage
March 25	1^h09^m - 13^m, 1:17-37, 1:43-58, 2:01-19, 2:23-43, 2:47-3:03, 3:06-36, 4:23-57, 5:02-16.
April 15	2:30-42, 2:44-53, 2:57-3:18, 3:19-23, 3:25-35, 3:37-43, 3:46-4:03, 4:07-21, 4:23-40, 4:42-59, 5:03-25, 5:29-47, 5:49-6:21.
April 16	2:12-31, 2:43-3:06, 3:10-11, 3:16-29, 3:38-54, 3:56-4:12.

Table II. Photometry of AD Leo during quiescence.

1971 Date	Filter	UT	$m_c - m_o$	$\frac{I_o}{\sigma}$	$m_{lim} - m_o$
March 25	Ca-K	1:11	1.31	6.8	1.77
		2:33	1.32	6.7	1.75
		4:46	1.26	6.2	1.66
April 15	U	3:08	1.09	8.6	2.01
		3:40	0.99	8.7	2.03
		5:18	1.10	6.8	1.76
April 16	U	2:51	1.25	5.9	1.61
		4:01	1.23	5.5	1.52



INTENSITY
$m_o - m_{o+f} = 1.61$
$m_c - m_{o+f} = 2.68$
$I_o/\sigma = 8.24$
$m_{lim} - m_o = 1.97$
$(m_f - m_o)_{max} = -1.33$
AD Leo
15 April 1971
Peak at $3^h 11^m.35$ UT
$t_b = 0^m.55$, $t_a = 9^m.8$
P = 3.50 min
Air Mass = 1.12
COMP. STAR →
SKY →
3:10
3:15
3:20
3:25 UT

Quantities descriptive of the single flare observed this year are given in the figure, along with an unsmoothed reproduction of the raw data from the photometer chart. All of these quantities are as defined in IBVS 499, although the optical filter is different. Signal to noise is estimated both for the instrumental time constant (I_o/σ) and for a five-times-longer time constant (appropriate to the mental smoothing that is done in looking for flares) to approximate the minimum detectable flare magnitude ($m_{lim} - m_o$).

Table II provides a sample of the variability (with respect to the comparision star identified in IBVS 449) of AD Leo at times devoid of identified flares.

Mt. Cuba Observatory
1971 November 23

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REFERENCES

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S. Cristaldi and M. Rodono, IBVS No. 498, 1970.

R. B. Herr, IBVS No. 499, 1970.

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

NUMBER 598

Konkoly Observatory
Budapest
1971 December 6

FURTHER REMARKS CONCERNING VARIABLE 14 IN M5

In a recent note in this Bulletin (Osborn, 1971) the results of a surface gravity and effective temperature determination were presented for the M5 star Arp II-51 (Arp, 1955) which, based on Bailey's (1917) chart of the variables in M5, had been identified as Variable 14 of the cluster. It was noted that from Arp's (1962) UBV colors of the star its position in the cluster H-R diagram was inconsistent with that of an RR Lyrae type variable as the period indicates Variable 14 is. However, Coutts (1971) and Kukarkin (1971) have pointed out that Variable 14 is marked incorrectly on Bailey's chart, and rather that II-51, the star marked, the variable is the star 20 seconds of arc to the east. Because of this confusion the following additional information concerning my observations is presented.

Star II-51 was observed as part of a program of measuring the surface gravities, effective temperatures, and metal abundances of a number of late-type globular cluster stars by use of intermediate-band photoelectric photometry. The star was observed with the David Dunlap Observatory (DDO) intermediate-band system on four nights in 1969 at the Kitt Peak National Observatory. The reduction of these observations gave consistent values for the DDO colors but yielded magnitudes of (DDO system) 15.42, 15.44, 15.54 and 15.56 for the four nights. Both this range of 0.14 magnitudes and the standard deviation of the measures were the largest of any of the stars on the observing program, including several objects over a magnitude fainter and hence considerably more difficult. These facts suggested that II-51 might be a variable and thus its position in the cluster was compared with those of the known variables using Bailey's chart, which led to the mis-identification.

It is noted that the observing notes and the reductions have been re-examined and confirm both the derived magnitudes and that it was indeed II-51 that was observed and not the variable. Whether or not II-51 is in fact also a variable as indicated by the DDO observations should be investigated.

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

NUMBER 599

Konkoly Observatory
Budapest
1971 December 7

THREE SOMEWHAT OVERLOOKED FACETS OF VY CANIS MAJORIS

1. SECULAR CHANGES IN LIGHT?

The first record of VY Canis Majoris seems to be in the star catalogue of Lalande, which contains a measurement on March 7, 1801, of its position and an estimate of its magnitude as 7. My search of the literature has uncovered 24 additional magnitude estimates made during the following century. Though most were by meridian observers and were incidental to the positional determinations, the work was carried out with similar instruments (typically about six inches in aperture). This is fortunate, since visual magnitude estimates of red stars are particularly sensitive to changes in apparent brightness. For this reason, the magnitudes cited by double star observers - who used large telescopes at high power - are excluded from the following discussion. The 19th-century magnitudes, together with 14 later ones, are collected in Table I.

Of course, no uniform photometric system prevails, yet rough transformations to the Harvard Photometry are possible. The original observations were adjusted in two ways: by using the transformation curves and tables cited by Lundmark (2,3,9) and/or by applying a correction based on the individual observer's magnitudes for nearby stars.

In Table I, the third column contains the original magnitude estimate. If is a mean value, the total number of observations is given in parentheses, and the results is plotted as a large dot in Fig.1. Robinson's results are from Harvard yellow-sensitive patrol plates. In the fourth column are magnitudes reduced to the Harvard Photometry. If two independent reductions were made, as described in the previous paragraph, the mean is given. The last two columns contain references to the source of the original magnitudes and to the reduction procedure, respectively.

TABLE I

Date	Observer	Obs. Mag.	Red. Mag.	References	
1801/3/7	Lalande	7	6 1/2	1	2,3
1830+	Herschel	7	6 1/2	4	5
1847/12/6	Major	6	6 1/2	6	5
1848/1/22	Major	6	6 1/2	6	5
1848/1/29	Beecher	7	6 1/4	6	5
1851/2/18	Argelander	6 1/2	6 1/4	7	3
1872/12/12	Gould	7 1/2	7 1/4	8	5,9
1873/1/23	Thome	7 1/2	7 2/3	10	5,9
1873/3/14	Birmingham	7.0	6 1/4	11	12,3
1873/4/3	Gould	7 1/2	7 1/4	13	5,9
1875/2/3	Bigelow	7 3/4	7 2/3	14	5,9
1875/2/5	Bachmann	7 1/4	7	14	5,9
1875/2/6	Bachmann	7 1/4	7	14	5,9
1875/2/7	Thome	7 1/4	7 1/3	14	5,9
1875/2/18	Bachmann	7 1/4	7	14	5,9
1875/2/20	Bachmann	6 3/4	6 1/3	14	5,9
1875/2/21	Bachmann	7 1/4	7	14	5,9
1876/3/10	Copeland	8.0	7 3/4	15	12,3
1879/1/8	Dreyer	7±		15	
1879/3/1	Dreyer	7.0	6 1/2	15	12,3
1880/2/21	Bachmann	8	7 3/4	16	5,9
1880/2/22	Davis	7 1/2	8	16	5,9
1880/2/23	Bachmann	7 3/4	7 2/3	16	5,9
1890+	CD	7.7	7.4	17	5,9
1893.7	Cordoba A	7.5	7.4	18	5,9
1914.2	Robinson	7.8(11)	8.5		
1917.2	Guerin	< 8-8 1/2	< 8 1/4	19	5,9
1917.3	Perrine	< 8 1/2	< 8 3/4	19	5,9
1917.7	Robinson	7.5(35)	8.2		5
1920.4	Robinson	7.7(3)	8.4		5
1932.0	Florja	9.1(20)	9.1	20	5
1933.0	Florja	8.8(35)	8.7	20	5
1935.1	Florja	9.3(11)	9.3	20	5
1937.7	Robinson	8.3(3)	9.0		5
1959.0	Cragg	8.6(9)	8.6	21	5
1961.9	Cragg	8.5(13)	8.5	21	5
1967.1	Cragg	8.8(21)	8.8	21	5
1970.4	Cragg	9.0(2)	9.0	21	5
1971.1	Locher	8.7(55)	9.4	21	5

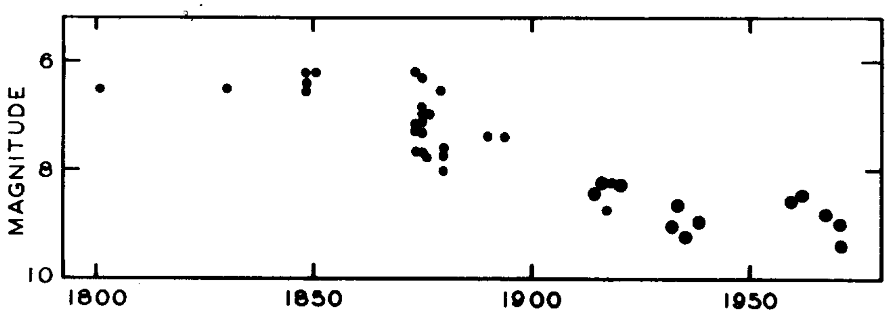

Fig. 1

The transformation of the older observations tended to increase the brightness of VY Canis Majoris slightly.But wether the original or adjusted magnitudes are examined, a definite fading is evident since at least 1850. The average decline is about two magnitudes per century, though there is the suspicion that the rate has slackened during the last several decades. Earlier, the interpretation of the light curve is ambiguous, though the average rate of change could not have persisted or VY Canis Majoris would have been seen as a conspicuous naked-eye object.

Some of the scatter in Fig.1. is due to intrinsic variation. The cluster of points in the 1930's, for example, lies below a regression line because the average brightness of VY Canis Majoris was less during those years, as found by Robinson (22).

The possibility of a long-term fading had previously been suggested by Perrine (19) and by Herbig (21).

2. AS A MULTIPLE STAR

For about three quarters of a century double-star observers have measured several discrete components of VY Canis Majoris. The general characterristics of the six components that have been observed since 1897 are given in Table II, compiled from (23-39, 46).

TABLE II

	Max.	Min.	Obs.	Seen	Not seen	θ(A–)	ρ(A–)
A	7.0	8.8					
B	8.0	10.5	1927–1970	to 1970.0	1971.0	0.4–0.8	165–210
C	11.0	14+	1897–	1897–	1932.8–		
				1932.1	1932.9	2.0–2.8	290
				1933.2–			
				1958.2	1958.3		
				1968–			
D	9	15	1897–1937	1897–	1930.3–		
				1928.2	1932.9	2.6–3.6	10–345
				1936.1–			
				1937.3	after 1937		
E	10	12.4	1897–1917	1897.8–			
				1917	after 1917	6.8	30
F	10.8	12.5	1936–1971	1936.1–			
				1937.0	1944.1	1.2	105
				1946.2–			
				1971			

In Fig.2 the primary is marked A, and the small enclosures represent the domains of the other components. The measures of position angle are quite consistent, but the separations scatter considerably. Further, the companions visible through the 1960's seem to have become increasingly illdefined and difficult to measure.

There is now general agreement that the companions of VY Canis Majoris are bright "knots" in the nebulosity that shrouds the entire system. From observations with telescopes from 36 to 120 inches aperture, Herbig found (38): "The image of the variable is neither stellar nor round, and attached to this elongated blob is a curved nebulous tail extending toward p.a. 290°, as well as lesser extensions in 9o° and 200°."

Arrows marking the directions of these wisps are shown in Fig.2. Note that Herbig's main "tail" lies in the same direction as the C component. The lesser wisps match the position angles of B and F quite nicely, and together perhaps define one curving nebulous filament. It is interesting that only B, C, and F, which have been visible in relatively recent times (see Table II), correspond to the three wisps identified by Herbig.

Unlike the other components, the position angle of B varies erratically. The position angle of C and E did not change during 73 and 35 years, respectively, while D had only a constant westward drift from 10° to 345° between 1897 and 1937.

F. Not seen previous to 1936, this component was conspicucos 12th-magnitude companion at the time of its discovery by van den Bos. In 1944 it was not visible but seems to have persisted since 1946.

The light changes of some of these components can be quite spectacular. For example, C must have faded by at least 2.5 magnitudes in less than 0.7 year, for it was visible to Finsen (24) at magnitude 12.5 on 1932.11 but invisible to Voute (33) on 1932.85. (The derived range assumes the magnitude limit to have been 15 in the large refractors used by both observers.)

Even more dramatic was the subsequent rise 1932.85-1933.16, from invisibility to magnitude 11.0, as recorded by these same observers. It is improbable that Voute could have missed C had it been brighter than 14th magnitude, since he remarked: "Though atmospheric conditions (were) perfect, I could never see (on four nights) the 3 companions C. D. and E."

Another example of rapid variability is described by Wallerstein (39): Star C was visible from October (1957) to February (1958) but was not seen in early March at the coudé focus of the 200-inch telescope .... confirmed at the Newtonian focus of the 100-inch telescope."

Finally, observations with relatively small telescopes shed some light on this facet of VY Canis Majoris. In 1917 Guerin was uring the new 7.5-inch meridian circle at Cordoba Observatory, which replaced the 5-inch that had been in operation for several decades, when he noticed "three nuclei, the preceding of which is the brighter and the point ... observed for position," as recounted by Perrine (19). In (44) we further learn that it was the south nucleus that was measured. Hence, the "preceding", "brightest," and "south" references must be to AB, indicating that the other two nuclei must have been D and E, if we restrict ourselves to the six aforementioned components.

The implication is that C was so faint as to be invisible, but more important that D and E were unusually conspicuous. That a pronounced change occurred is further suggested by an observation of Innes (26). In 1900 he found D and E to be 9th and 10th magnitude, respectively, whereas See in 1897 (27) had called them 12 and 12.4! (Though Cogshall (25) also observed in 1900 he makes no mention of magnitude.)

Such a dramatic change could explain why the lesser components had escaped Herschel and many other 19th century observers. It should be recalled that VY Canis Majoris had been known as a red star since 1847 and accordingly was carefully scrutinized by several experienced observers in the late 1870's, using apertures similar to Guerin's. Since

1957 T.A. Cragg (21) has observed VY Canis Majoris with the 6-inch visual refractor at Mt. Wilson and has "never seen it as anything but a single star". Unfortunately, the history of this system between 1900 and 1917 is impossible to reconstruct, since no observation of any kind appears to have been made.

3. THE EXTENDED NEBULA

On the night in 1917 when Guerin observed the three bright objects described in the previous section he also called attention to the fact that they were embedded in a small (8" by 12") red or scarlet nebula (dotted outline in Fig.2) that pointed toward the east (19). Even more remarkable was his discovery of a faint red sinuous tail that extended southward 2'. Perhaps it is apropos to note here that Guerin was regarded by M.L. Zimmer (40) as "one of the best meridian circle observers."

Like the secondary components, why had this inner nebulosity not been reported earlier? And what about the 2' extension, which is indirectly confirmed by H-alpha photographs? In the Mt. Stromlo atlas (41) VY Canis Majoris is seen situated on the western side of a bright arc that extends northsouth roughly 1° along the eastern part of RWC 15. (A fuller description of the surrounding nebulosity is given by Herbig (38)).

Except for Guerin's observation, there is no other visual record of his extended nebula, which indicates that it too must have been extraordinarily conspicuous around 1917. It seems that D and E also perticipated in this singular happening. But by 1927 van den Bos (28) stated: "With low power the nebulous look was plainly seen, but no extended nebula could be perceived." Neither the integrated yellow nor blue light curves have any pronounced features around 1917 (22).

The inner portion of the nebulosity is likewise enigmatic. As already mentioned, Guerin likened it to a comet with an eastward-pointing tail. Yet in 1926 and 1927 (presumably) van den Bos (42) described the nebula as: "the most striking feature, fan-shaped like a comet with the close pair (AB) as nucleus." Finsen and Klerk (23) add the fact that the tail extended to the northwest and involved C and D.

In the 1930's van den Bos continued to describe the nebula as pointing toward the northwest. But in 1956, after a decade hiatus in his observations, he remarked (34): "tail now looks more towards 270°, or even slightly south preceding." In other words, between 1917 and 1927 the tail swung

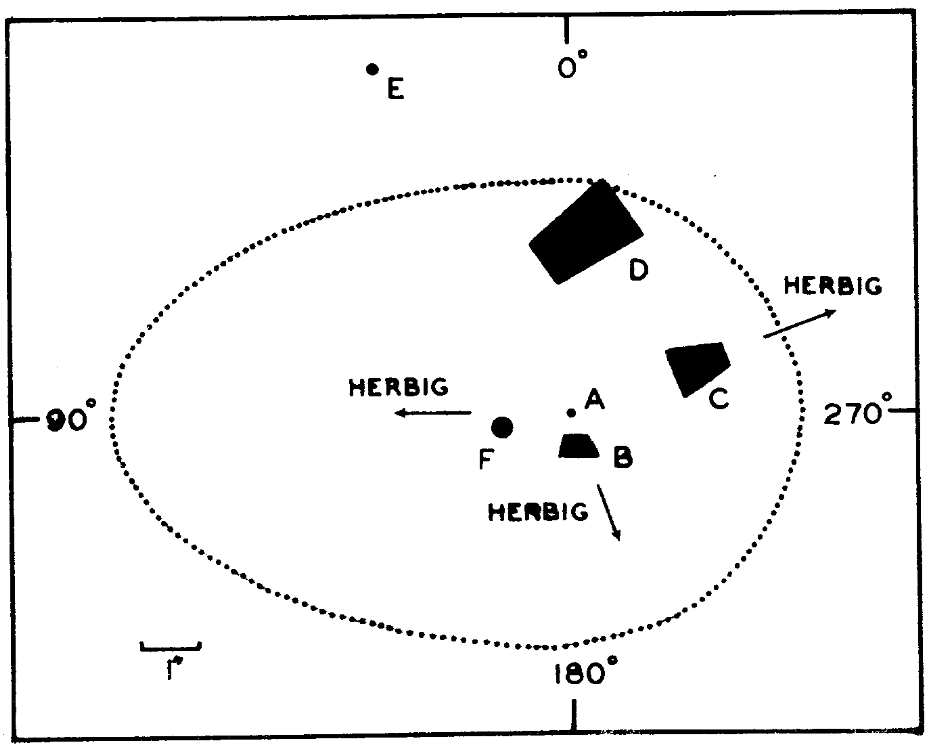

Fig. 2

Plotted in Fig.3 are the measured separations of AB (top) and position angles. There seems to be a mutual dependence, as if B were a bright spot moving along a discrete filament of nebulosity. The correlation is surprisingly good, considering the difficulty of the measurements.

Following are brief historical resumes of the well-documented companions.

B. The primary was itself discovered to be a close double (0".5) by van den Bos late in 1926 (28, 45), using the 26.5-inch refractor at Union Observatory. Until recently, the magnitude difference between these components had been about one, so it is surprising that B had not been found earlier, especially since See, the first person to catalogue this object as a multiple star, had discovered

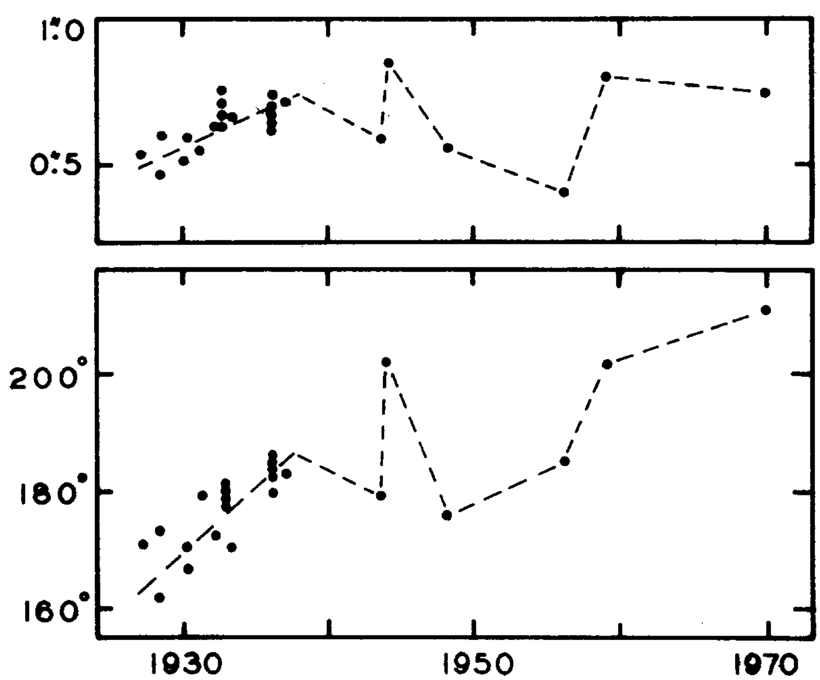

Fig. 3

many comparable doubles. This opinion was shared by Voute (33), who measured the AB pair in 1932 with the 24-inch refractor at Bosscha Observatory. In 1931 the pair was even measured by Dawson with the 17-inch refractor at La Plata Observatory (36).

Therefore, previous to van den Bos' discovery, B must have been substantially fainter than A or nearer to it. Perhaps, a similar situation has existed during the past decade, since even the Lick 120-inch failed to resolve the pair regularly (38, 46).

C. This companion as well as D and E were discovered by See (27) in 1897. As Table II shows, C is very erratic, having completely disappeared twice.

D. About 1930 this component disappeared, was glimpsed in 1936 and 1937, and has not been seen since.

E. This object was observed with large apertures for only two years at the end of the 19th century, but probably persisted at least to 1917.

clockwise from east of the AB pair to the northwest, and by 1956 it has moved onward to the west.

Recently, Herbig (38, 46) described a curved nebulous tail extending toward the west-northwest. This is confirmed by Serkowski (43) in 1969, who also depicts a cloud approximately 8" by 6". Apparently, any rapid angular motion had ceased by the last decade.

I thank Dr. George Herbig for calling my attention to this wonderful object and for his continuing interest. Dr. Joseph Ashbrook was an excellent guide to the early literature.

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PHOTOELECTRIC OBSERVATIONS OF THE FLARE STAR EV LAC DURING THE 1971, SEPTEMBER 11-27 INTERNATIONAL PATROL

The preliminary results for the photoelectric observations of EV Lac carried out at the Catania Astrophysical Observatory during the observing period proposed by the IAU Working Group on Flare Stars (Andrews et al. 1971. IBVS 516), are given. The observations were made with a synchronous three colour photometer fed by a 61 cm universal type reflector.

The patrol intervals in U.T. are given in Table 1. During the 20.5 hours of patrol time four flares were observed, the characteristics of which are given in Table 2. The U,B,V data were computed by means of mean transformation coefficients to the standard system. The light curves of the observed flares in the instrumental, u,b,v colours are shown in Figures 1-3.

The explanation of symbols and details of the observing equipment can be found in a preceeding number of this Bulletin (Cristaldi and Rodonò, 1971, IBVS 525).

Catania Astrophysical Observatory, Italy
December 6, 1971

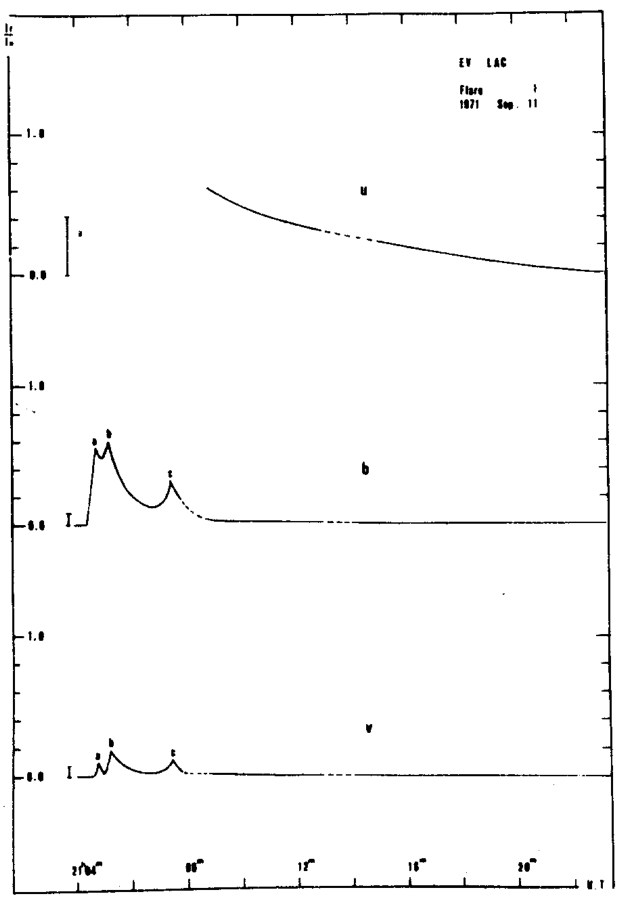
S. CRISTALDI and M.RODONÒ

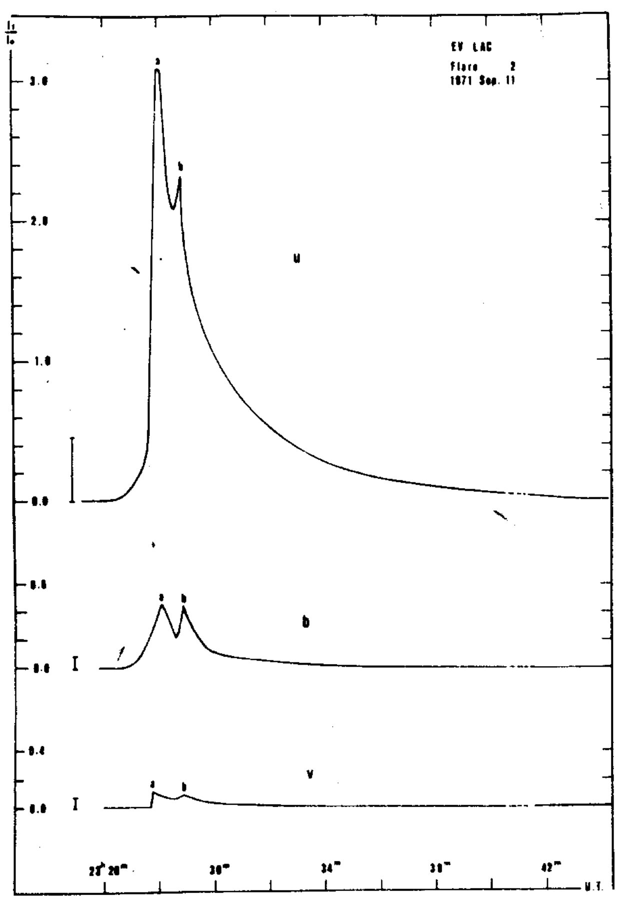
Table 1. Detailed Coverage

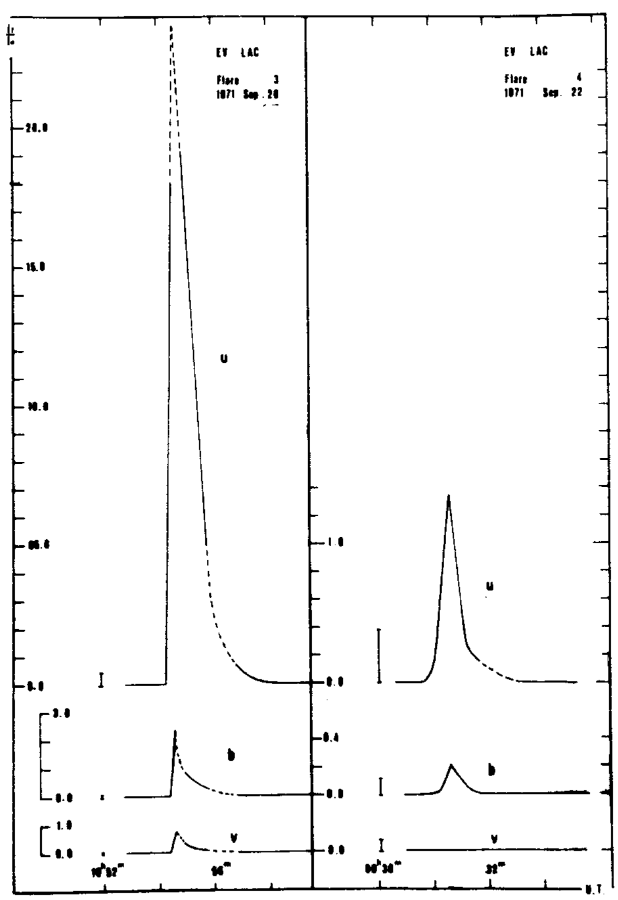
Date 1971 Sept.	Light	Coverage (U.T.)	Total coverage	$\overline{3\sigma/I_0}$
11-12	b-v	21^h02^m-2109.	7^m	.04/.04
	u-b-v	2109-2140; 2152-2213; 2233-2312; 2313-2400; 0000-0042; 0105-0242; 0244-0252; 0258-0322; 0325-0330	314	.22/.04/.04
12	u-b-v	2015-2027; 2034-2048; 2112-2137; 2157-2208; 2214-2226	74	.20/.04/.04
17	u-b-v	1912-1925	13	.16/.04/.04
18	u-v	2057-2114; 2116-2126	27	.20/ /.04
19	u-b-v	2006-2052; 2119-2251; 2255-2339	182	.19/.04/.04
20-21	u-b-v	1900-1941; 1952-2036; 0008-0050; 0114-0246; 0302-0336	253	.20/.05/.03
21-22	u-b-v	2141-2224; 2250-2303; 2309-2400; 0000-0101; 0104-0130; 0149-0152	197	.17/.04/.03
24	b-v	00^h14^m-0033; 0035-0054	38	.04/.03
	u-b-v	0054-0132	38	.21/.04/.03
25	u-b-v	0039-0206	87	.17/.04/.03

Table 2. Characteristics of Flares

no.	Light	t_{max}(U.T.) September	JD. 244...	d_b	d_a	$\frac{3\sigma}{I_{or}}$	$(\frac{I_f}{I_o})_{max}$	Energy P	Energy erg	Air mass	f	sky
1/71b	b	11, 21 05.2	1206.3822	0.9	9.8	0.04	0.59	1.22		0.85	3	0
	v	21 05.2		0.2	4.8	0.04	0.18	0.21				
	B						0.53	1.09	$2.41x10^{31}$			
	V						0.13	0.13	$6.80x10^{30}$			
2/71a	u	11, 23 28.0	1206.4814	0.4	15.0	0.22	3.10	8.18		0.84	2	0
	b	23 28.1		0.7	7.0	0.04	0.45	0.98				
	v	23 27.8		0.1	5.0	0.04	0.11	0.20				
	U						2.81	7.51	$2.37x10^{31}$			
	B						0.40	6.88	$1.94x10^{31}$			
	V						0.10	0.13	$6.71x10^{30}$			
3/71	u	20, 19 54.6	1215.3334	0.3	3.6	0.20	23.64	23.92		0.88	0	1
	b	19 54.6		0.2	2.4	0.05	2.38	1.34				
	v	19 54.6		0.2	2.4	0.03	0.76	0.46				
	U						20.44	20.41	$6.45x10^{31}$			
	B						2.12	1.21	$2.68x10^{31}$			
	V						0.63	0.37	$1.88x10^{31}$			
4/71	u	22, 00 32.6	1216.5265	0.6	2.5	0.17	1.34	1.14		0.96	0	2
	b	00 32.6		0.4	1.1	0.04	0.21	0.13				
	v	(not detectable)				0.03						
	U						1.23	1.05	$3.35x10^{30}$			
	B						0.18	0.11	$2.63x10^{30}$			


EV LAC
Flare 1
1971 Sep. 11
1.0
0.0
u
b
v
a
b
c
08m
12m
16m
20m
U.T


EV LAC
Flare 2
1971 Sep. 11
3.0
2.0
1.0
0.0
U
0.8
0.0
B
0.4
0.0
V
a
b
30m
34m
42m
U.T.


EV LAC
Flare 3
1971 Sep. 20
EV LAC
Flare 4
1971 Sep. 22
20.0
15.0
10.0
1.0
0.0
3.0
0.4
1.0
u
b
v
U.T.