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A VARIABLE LIGHT-CURVE IN AU MONOCEROTIS

New photoelectric observations in V light of the eclipsing binary AU Monocerotis were carried out during the period September 1976 - April 1977 at the Observatory of Torino with a 45 cm reflector by means of a photoelectric photometer equipped with a photomultiplier 6256 S EMI [1]. These observations, including three minima, show that the cyclic variation of the period suggested in a previous paper (Lorenzi, 1977) and remarked by Todoran (cf. IBVS No. 1217), is not real, but rather the light-curve of this binary is shifted up and down, probably because of long period variations of luminosity of the system as a whole. In order to eliminate any possible fluctuation due to the comparison star, three comparison stars (see Table 1) were used and checked with respect to each other (Fig.1). It turned out that the star

Table 1

No.		m_V (SAO)	SP
1	BD $-1^{\circ}1424$	9.0	B8
2	BD $-1^{\circ}1447$	8.6	K0
3	BD $-1^{\circ}1413$	9.0	B9

No.1, already utilized in the previous work (1977), has shown some instability. Though this instability is very small (see Fig 1a, 1b), star No.3 was preferred as comparison.
A mean value of the extinction coefficient K_V was determined each night and the corresponding corrections applied to all observed points; these have been reduced to the international UBV system with the determination of the instrumental scale factors (Hardie, 1962).

[1] The tables of the individual photoelectric observations are available at the Observatory of Torino (Italy).

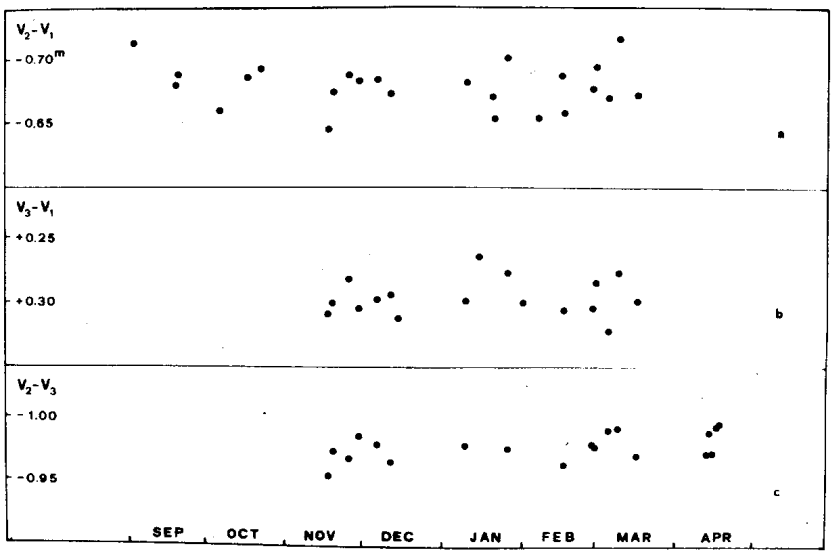

Figure 1: Mean values of the differences in V magnitude, corrected for differential extinction, for each pair of comparison stars obtained during the single nights of observation.

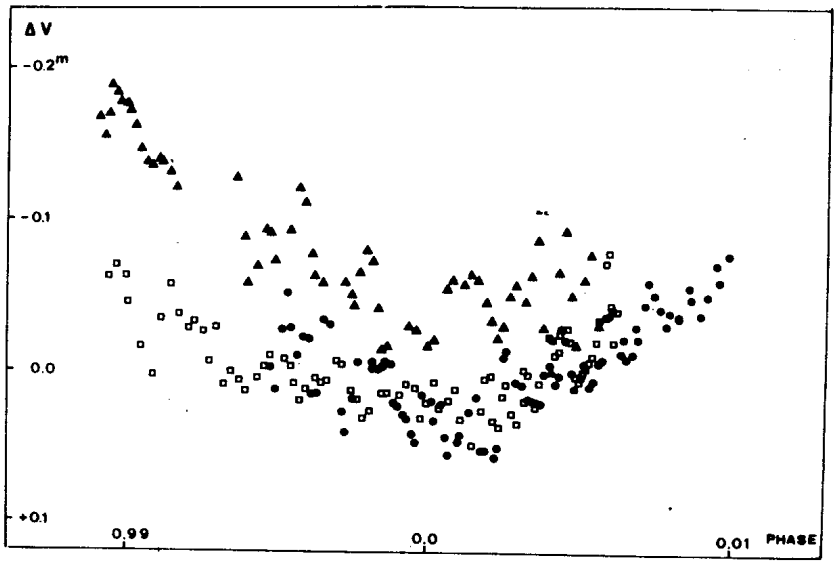

Figure 2: Three observed minima
▲ refer to minimum No.1, • to minimum No. 2,
◘ to minimum No.3.

The results obtained till now suggest that the light-curve might be subject to long period variations.

For three minima (Fig.2) the times of minimum light and their mean error are computed by the KW method (Kwee and van Woerden, 1956). The results are listed in Table 2. These epochs are in quite good agreement with the linear ephemeris (Lorenzi, 1977):

$$M(E) = 2442801.3602 + 11^{d}.11306 \cdot E. \qquad (1)$$

Table 2

	J.D. Hel	σ_{KW}
1	2443123.6530	$\pm 0^{d}.0006$
2	3190.3323	.0005
3	3201.4495	.0011

Observations carried out in other phases apparently confirm the variability of the light-curve. Consequently, in order to ascertain the reality of this phenomenon, observations in the same ranges of phase were repeated. The results of this research are collected in Table 3.

Table 3

	N	Phase	$\overline{\Delta V}$	$s_{\overline{\Delta V}}$
19/9/1976	46	0.5303	-0.715	+0.001
25/11/1976	21	.5390	- .799	.003
5/12/1976	34	.5315	- .770	.004
4/ 3/1977	21	.5307	- .650	.003
15/ 3/1977	42	.5232	- .627	.003
2/ 9/1976	14	.0019	+ .048	.002
19/11/1976	18	.0019	- .037	.002
11/12/1976	15	.0019	- .046	.004
15/ 2/1977	18	.0019	+ .029	.005
26/ 2/1977	16	.0019	+ .022	.003
11/12/1976	18	.9958	- .079	.006
15/ 2/1977	13	.9958	- .013	.007
26/ 2/1977	16	.9958	+ .004	.002
17/10/1976	26	.0400	- .657	.005
12/ 4/1977	33	.0400	- .508	.005
28/11/1976	26	.9023	- .815	.002
8/ 3/1977	14	.8942	- .643	.012

All data refer to normal points. The columns contain respectively: date, number of single observations used to form a normal point, phase according to ephemeris (1), $\overline{\Delta V}$ according to comparison star No.3, mean error $s_{\overline{\Delta V}}$. Their analysis suggests a long-term displacement of the whole light-curve.

A series of observations carried out at maximum during consecutive nights, compared with those of December 1976, seem to confirm the slow variation of the light-curve. Table 4 summarizes these results, following the same scheme as Table 3.

Table 4

	N	Phase	$\overline{\Delta V}$	$s_{\overline{\Delta V}}$
13/12/1976	14	0.2462	-0.873	±0.004
13/ 4/1977	17	.1312	- .615	.004
15/ 4/1977	15	.3107	- .665	.003
16/ 4/1977	15	.4006	- .651	.005

Now we should like to recall that the conclusions drawn in a previous paper were based on the assumed hypothesis (Lorenzi, 1977; see footnote 2) that the light-curve would be constant with time. This assumption was justified by the sole existing photographic light-curve (Wachmann, 1954); as a matter of fact, it was built up collecting observations spread through a period of about fifteen years and the probable fluctuations were smoothed by plotting the mean values.

This possible shift of the whole light-curve alongside the vertical axis, due to a long period fluctuation in the luminosity of the system, rules out the procedure of deducing the minimum epochs from parts of the ascending or descending branches through an extrapolation alongside the phase axis. Consequently, the epochs Nos. 16-18-19 reported in Table 1 of the previous paper (Lorenzi, 1977) are not real, since they were deduced from the remarkable shifting of the ascending branches with respect to the minimum No.17. Possibly, owing to the great difficulties in the observation of this system, some previous epochs of minimum have also been deduced in the same way or from normal minima, originating the scattering of the (O-C)'s.

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