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TWO PULSATING VARIABLES WITH PERIODS CLOSE TO ONE DAY

The stars were found and estimated on plates taken mainly by the writer with the 10"Metcalf telescope of the Boyden Observatory. They both provide classical examples of spurious periods brought in by making the observations near the meridian.

1. - The first variable is a new one, discovered with the Zeiss-blinkmicroscope of the Astronomical Institute of the University of Louvain. Its position is

$$\text{R.A. } (1875) = 12^h59^m29^s.4 \qquad \text{D. } (1875) = -68^\circ13'.3$$

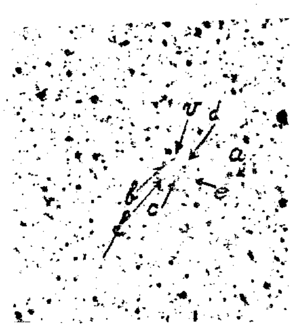

Fig. 1

Var. No. 1
The square measures about $1/2^\circ \times 1/2^\circ$

Further identification is made easy by the environment chart Figure 1.

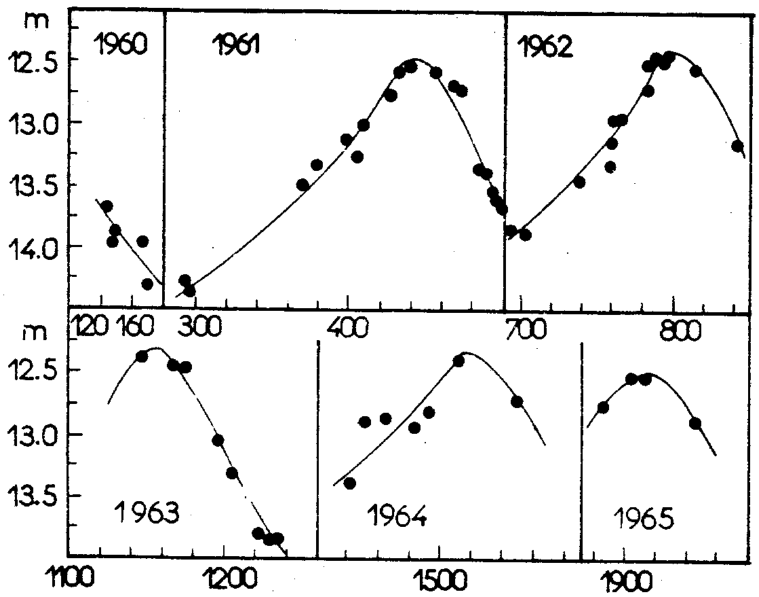

Fig. 2

Abscissae = J.D. -2437000

Figure 2 shows the "observed" changes in brightness, which would suggest a long period variation of $P \sim 355^d$ were it not that the difference in slope between the ascending and descending branches had the wrong sign. This is indicative of a period slightly longer than one day and of a lightcurve with the normal skewness, which has been scanned backward by observations made at one day intervals. The apparent period is then the "beat" period P_b between the real period P of the variation and the one day period of the observations. The three are related by the formula

$$\left| \frac{1}{P} - \frac{1}{1} \right| = \frac{1}{P_b} \qquad (1)$$

In this way the correct period was found to be $P = 1^d.00282 \pm 0^d.00003$.

Control plates taken afterwards over a seven hours run have shown a variation in agreement with a period of this order.

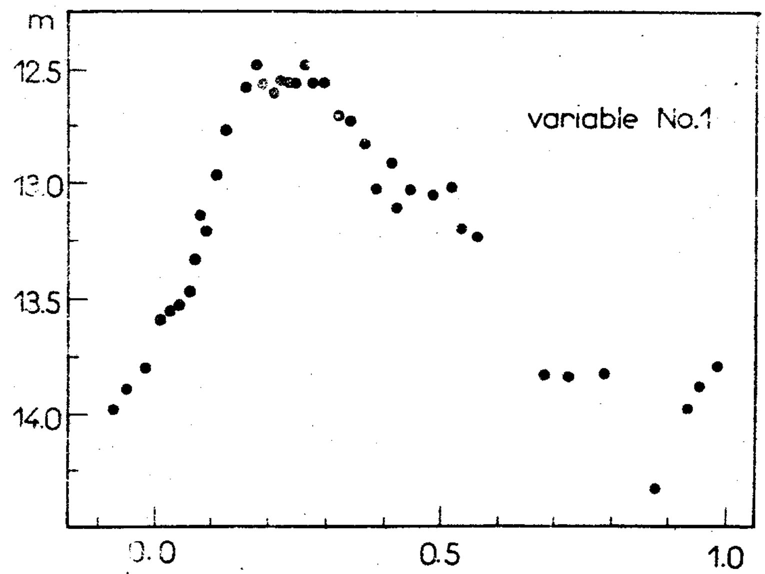

Fig. 3

The corresponding lightcurve is given in numerical form in Table 1 and shown graphically in Figure 3. Phases were reckoned from JD 2436000^{d}000 and magnitudes have been derived from star counts and their comparison with the Tables in Groningen Publication N^{o} 43.

Using our mean epoch the times of maximum brightness can be predicted from the ephemeris

$$t \text{ (max. light) hel} = \text{JD } 2438156^{d}.063 + 1^{d}.002282\ E$$

Table 1

n	phase	$\bar{m}$	n	phase	$\bar{m}$	n	phase	$\bar{m}$
10	0^{P}.011	13.58	10	0^{P}.218	12.56	10	0^{P}.447	13.02
10	.026	13.56	10	.231	12.56	10	.483	13.05
10	.040	13.54	10	.241	12.56	5	.514	13.01
10	.055	13.48	10	.255	12.49	4	.535	13.20
10	.071	13.32	10	.271	12.56	3	.558	13.24
10	.081	13.13	10	.293	12.56	1	.682	13.83
10	.093	13.21	10	.318	12.70	3	.725	13.83
10	.104	12.98	10	.341	12.73	3	.790	13.83
10	.126	12.77	10	.361	12.83	2	.876	14.33
10	.154	12.59	10	.376	12.85	3	.931	13.98
10	.174	12.49	10	.390	13.02	10	.950	13.88
10	.191	12.58	10	.406	12.93	10	.980	13.79
10	.206	12.61	10	.423	13.11	6	-	-

2. - The other star proved to be the already named variable CE Oph, with coordinates R.A. (1900) = $16^h47^m28^s$, D. (1900) = $-26^{\circ}07'.4$ according to Kukarkin and Paranago's GCVS, but of unknown type and period.

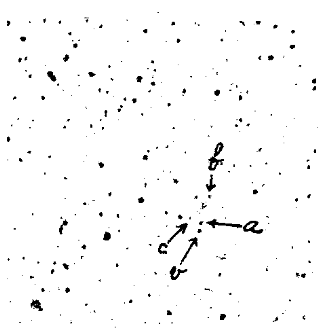

Fig. 4

Var. No. 2
The square is about
$1/2^{\circ} - 1/2^{\circ}$

Here a treatment by least squares of the 12 best observed minima led to a period P = $15.^d3873$ with no more than normal scatter of the observations around the resulting mean lightcurve. But that lightcurve very similar to the one represented in Figure 5, is of a quite uncommon shape for the period in question. For periods around 16^d one expects indeed to find, not a fairly symmetric lightcurve of rather small amplitude, but a lightcurve with a hump on its ascending branch, followed by a very steep rise to a sharp maximum and then a slow descent. For this reason the period found was again believed to represent but the "beat" period between the real period of the star and the one day period of the observations.

By applying again formula (1) and by treating by least squares the 19 minima listed in Table 2, we found the final period P = $1.^d067159 \pm 0.^d000032$ (m. e.).

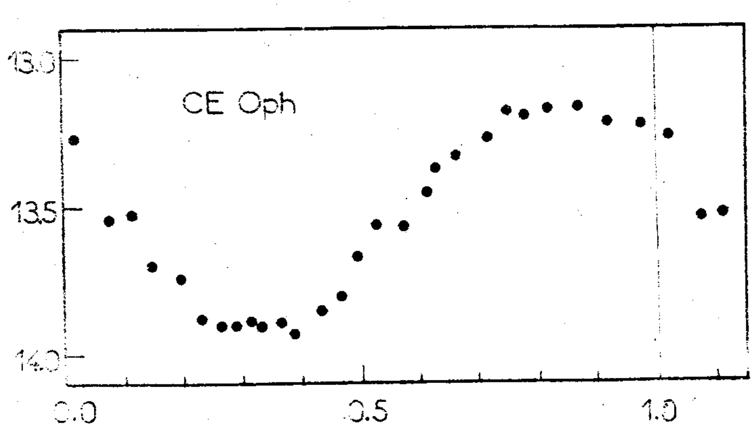

Fig. 5

Table 2

JD_{min}	E	O - C	JD_{min}	E	O - C
2437144.333	0	$+0^{d}.093$	$2437526^{d}.219$	358	$-0^{d}.063$
145.312	1	+ .005	527.247	359	- .103
146.297	2	- .077	8178.416	969	+ .099
162.284	17	- .098	195.401	985	+ .010
462.321	298	+ .068	257.263	1043	- .023
464.374	300	- .014	529.486	1298	+ .074
493.355	327	+ .155	941.406	1684	+ .071
494.342	328	+ .075	989.275	1729	- .082
495.303	329	- .032	9020.220	1758	- .085
496.331	330	- .071			

Table 3

n	Phase	$\bar{m}$	n	Phase	$\bar{m}$	n	Phase	$\bar{m}$
10	$0^{P}.022$	13.26	10	$0^{P}.359$	13.90	10	$0^{P}.708$	13.27
10	.074	13.54	10	.387	13.93	10	.750	13.17
10	.109	13.53	10	.430	13.84	10	.779	13.19
10	.157	13.70	10	.467	13.80	10	.813	13.17
10	.203	13.73	10	.495	13.67	10	.861	13.17
10	.231	13.87	10	.530	13.56	10	.920	13.20
10	.258	13.90	10	.569	13.56	11	.977	13.21
10	.288	13.90	10	.602	13.45			
10	.313	13.89	10	.626	13.36			
10	.338	13.90	10	.661	13.32			

Table 3 and Figure 5 give the corresponding lightcurve resp. in numerical and in graphical form. Just as in the case of the first variable phases were reckoned from JD $2436000^{d}.000$ and magnitudes derived from star counts.

The final ephemeris proposed is

t (max. light) hel. = JD 2437794.802 + $1^{d}.067159$ E

The pronounced difference in shape between the lightcurves of stars having so nearly the same period deserves a mention.

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