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NEW VARIABLE STARS FOUND IN SOUTHERN OPEN CLUSTERS

In this note we report the variability detected photoelectrically in sixteen stars located in the vicinity of the southern open clusters NGC 2323, NGC 2567, IC 2395, NGC 5460, and NGC 5662. We are studying all these clusters using new photometric and spectroscopic material obtained at Cerro Tololo (CTIO) and Las Campanas (LCO) observatories. The project, initiated a couple of years ago, consists in obtaining UBV photometry and classification of spectra as basic data to investigate the fundamental properties of the selected clusters. A total of 1040 stars in the cluster fields have been measured photoelectrically during various observing runs in 1984-1985, using the 60 cm telescope of the David Dunlap Observatory at LCO, and the CTIO 91 cm and 1 m telescopes. Several red stars in the cluster fields have also been observed in the DDO intermediate-band system (McClure and van den Bergh 1968; McClure 1976) and the $CMT_{1,2}$ broad-band system (Canterna 1976). A large number of standard stars, taken from the lists of Cousins (1973, 1974), McClure (1976), and Canterna (1976), were observed each night for conversion to the standard UBV, DDO, and Washington systems, respectively. Pulse-counting electronics was used for all measurements. Photometric errors are similar to those quoted in previous papers (e.g., Clariá and Rosenzweig 1978; Clariá and Lapasset 1983). The mean internal error is about $0^m.02$, a value which is practically independent of the V-magnitude and the telescope used.

We have considered a star to be photometric variable when its individual V measures during different nights displayed variations greater than five times the mean internal error, i.e., $\Delta V \geq 0^m.1$. Among the new photometric variables detected there are nine which are members or probable members of the clusters (Clariá and Lapasset 1985), while the other seven are almost certainly non-member field stars. Four of the new variables exhibit ΔV variations greater than $0^m.20$, while the other twelve stars have ΔV variations in the interval $0^m.10 \leq \Delta V \leq 0^m.20$.

The individual UBV observations of the new variables are listed in Table I. The references for star identifications are given at the head of each section of the table. Column (2) of Table I lists the heliocentric Julian Date. The magnitude and colours in the UBV system are given in columns (3)-(5), while

column (6) gives the spectral type as estimated from the UBV colours. The last column of Table I indicates if the star is considered to be cluster member (m), a probable member (pm), or a non-member (nm) field star. Finding charts for the variable stars are shown in Figures 1 to 4. The new variables found in NGC 2567 are shown in the finding chart published by Lindoff (1968).

Table I: Individual UBV observations of new variable stars found in southern open clusters.

STAR	HJD 2440000 +	V	B-V	U-B	Sp. Type	Membership
NGC 2323 (Clariá and Lapasset 1985)						
58	6111.6149	12.541	0.279	0.281	A1	m
	61112.5583	12.432	0.379	0.279		
	6167.5106	12.475	0.349	0.302		
	6168.4912	12.480	0.333	0.276		
100	6111.6499	12.826	0.674	0.179	F8	pm
	6112.5121	12.926	0.603	0.139		
	6167.5167	12.891	0.610	0.178		
	6168.4937	12.868	0.640	0.150		
160	6111.6880	12.561	0.616	0.124	F8	nm
	6112.6138	12.557	0.522	0.187		
	6167.5614	12.453	0.594	0.052		
	6168.5420	12.524	0.577	0.121		
NGC 2567 (Lindoff 1968)						
19	6112.6995	13.111	0.396	0.091	A7	pm
	6113.6127	13.310	0.275	0.173		
	6115.5762	13.240	0.365	0.122		
	6168.5774	13.305	0.316	0.124		
35	6112.7591	12.947	0.468	0.091	F6	nm
	6113.6760	12.900	0.525	-0.033		
	6115.7382	13.030	0.451	0.000		
40	6112.7669	13.841	0.264	0.176	A7	m
	6113.6760	13.730	0.336	0.195		
	6114.6406	13.782	0.304	0.147		
58	6112.6825	13.057	0.257	0.085	A5	m
	6113.6026	12.912	0.352	0.100		
	6115.5584	12.930	0.266	0.123		
	6168.5295	13.016	0.251	0.132		

Table I (continued)

STAR	HJD 2440000 +	V	B-V	U-B	Sp. Type	Membership
IC 2395 (Clariá and Lapasset 1985)						
169	5762.7436	11.811	0.568	0.088	F8	nm
	5763.6896	11.919	0.449	0.058		
	5764.7196	11.759	0.558	0.051		
215	5762.6901	13.575	0.698	0.129	G0	pm
	5766.5873	13.688	0.665	0.124		
	5767.6165	13.632	0.682	0.127		
220	5781.6215	13.014	0.853	0.628	K1	nm
	5782.6795	13.331	0.580	0.583		
NGC 5460 (Clariá and Lapasset 1985)						
330	5760.8987	13.056	0.625	0.079	G0	pm
	5765.8063	13.175	0.599	0.041		
	5768.7884	13.178	0.570	0.075		
337	5764.7675	12.935	0.384	0.038	F6	pm
	5767.7932	12.787	0.452	-0.002		
	5768.8055	12.785	0.494	0.002		
366	5761.8073	12.449	1.200	0.975	K3?	nm
	5762.8267	12.048	0.782	0.289		
	5767.8523	12.537	1.131	1.079		
375	5764.8179	13.006	0.426	0.063	F7	pm
	5765.8722	12.846	0.549	0.099		
	5767.7982	12.912	0.527	0.018		
NGC 5662 (Clariá and Lapasset 1985)						
17	6112.8627	11.476	0.362	0.088	F2	nm
	6113.7821	11.364	0.415	0.214		
	6118.7769	11.465	0.378	0.160		
166	6111.8559	12.775	0.582	0.360	F8?	nm
	6113.8883	12.713	0.606	0.440		
	6118.8843	12.664	0.686	0.348		
	6167.8197	12.703	0.601	0.403		



Figure 1: Finding chart for the variables found in NGC 2323.

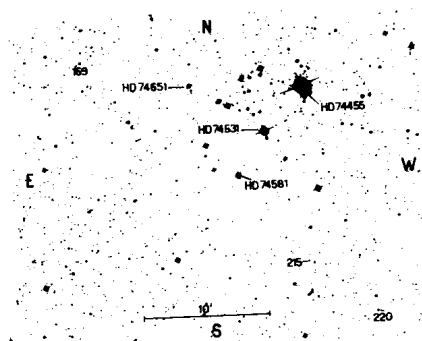


Figure 2: Finding chart for the variables found in IC 2395.

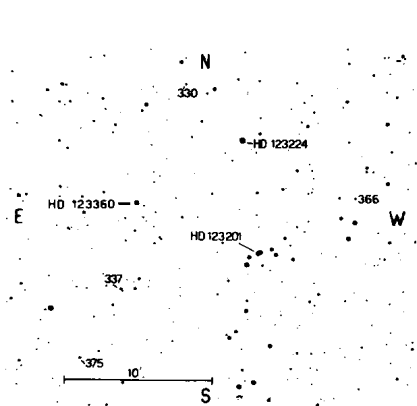


Figure 3: Finding chart for the variables found in NGC 5460.

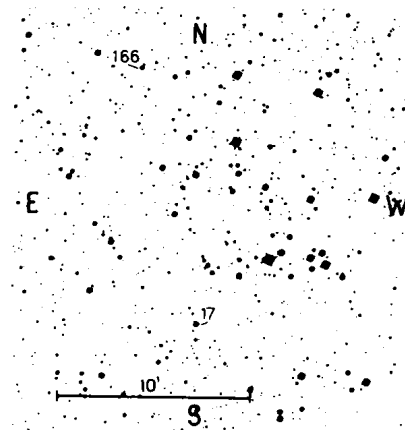


Figure 4: Finding chart for the variables found in NGC 5662.

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