

ANOMALIES IN THE $uvby\beta$ PARAMETERS OF YOUNG OPEN CLUSTERS

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 N.S.W., 2006, Australia

An investigation has been made of the M_V/c_0 diagrams of six young galactic clusters - three in the north and three in the south, as listed on Figure 1. The $uvby\beta$ photometry of NGC 3293 is from unpublished observations of 42 stars by the author. From the M_V/c_0 parameters of the β Cep stars, which have evolved to the end of core hydrogen burning (Shobbrook 1978), the ages of Lac OB I, NGC 3293 and NGC 4755 were calculated using the models of Cogan to be 18, 10 and from 8.5 to 16 million years, respectively.

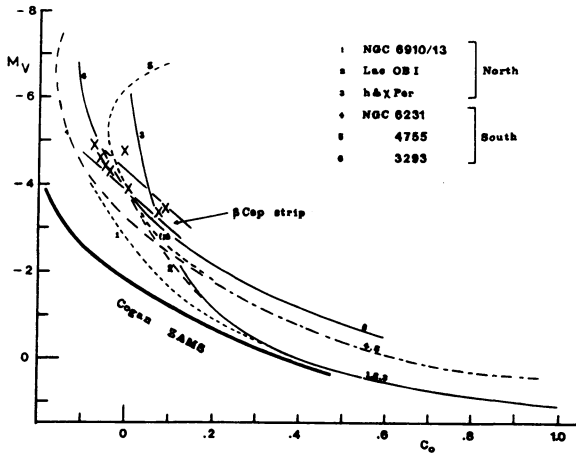


Figure 1. M_V/c_0 diagrams for six galactic clusters (X = β Cep stars)

An important point is that the β Cep stars in these clusters lie in the same instability strip as all the known variables, at $M_V \sim -4$. However, the lower main sequences, at $M_V \sim 0$, which should contain ZAMS stars at these ages, are an average of 0.8 mag brighter for the southern than for the northern clusters (Figure 1). The most likely explanation for this ZAMS difference is probably an abundance variation between the northern and southern clusters.

Further differences between the clusters, perhaps also caused by abundance variations, are found in their $(u-b)_0/c_0$ diagrams [see also Shobbrook (1976)]. For a reddening ratio $E(u-b)/E(b-y) = 1.56$, the $(u-b)_0/c_0$ relations differ in zero point over a range of 0.08 mag in $(u-b)_0$ (Figure 2). This effect is probably intrinsic to the stars rather than to reddening ratio differences; for NGC 3293, where the reddening is variable over the field, the scatter about the relation is 35% smaller for a ratio of 1.56 than it is for one of 1.82 - the ratio required to bring its $(u-b)_0/c_0$ relation into coincidence with that of Crawford (1978).

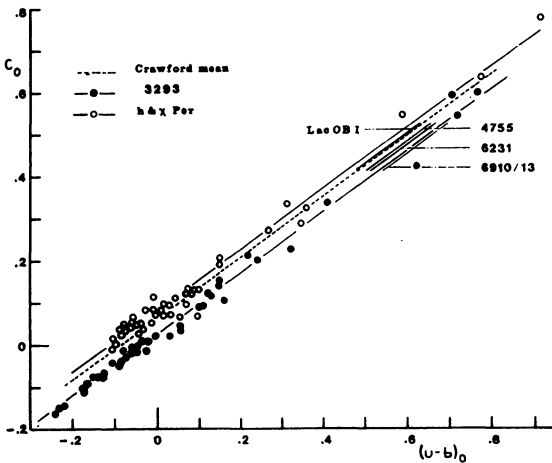


Figure 2. The $(u-b)_0/c_0$ diagrams for six clusters.

REFERENCES

- Crawford, D.L.: 1978, *Astron. J.* **83**, 48.
 Shobbrook, R.R.: 1976, *Mon. Not. Roy. Astr. Soc.* **176**, 673.
 Shobbrook, R.R.: 1978, *Mon. Not. Roy. Astr. Soc.* **185**, 825.