RATIO OF EARLY TO LATE TYPE STARS IN SMC CLUSTERS

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Spectral classification of stars in SMC clusters provide useful information on the evolutionary history of this galaxy and permit us to test the theory of stellar evolution.

For a large number of SMC clusters the bright stars were classified using the 1.2m U.K. Schmidt Telescope objective prism plates (Dapergolas et al. 1986; Kontizas et al. 1986). All classified stars are situated within the tidal radius of each cluster (Kontizas 1984). The plates and the classification criteria used for this investigation are described by Dapergolas et al. (1986). Stars in adjoining fields of each cluster were also studied for comparison . The field stars normalized to the cluster area were subtracted from the cluster stars and the observed ratios (R) of early (B+A) to late (K+M) spectral type stars were found for each cluster.

For a number of young and old clusters with known ages (Hodge 1982; Mould and Aaronson 1982) the derived ratios of early to late type stars are plotted versus their age in Fig. 1. The solid line in this diagram represents the best fit of the ratio of the blue supergiants plus the stars within 2.0 mag of the top of the main sequence to the red supergiants plus the rising giants as given by Schlesinger (1969, 1971) in his theoretical models, whereas the dashed line represents the best fit of the ratio of the blue supergiants to the red supergiants for the very young cluster.

The oldest SMC clusters with a small number of early type stars are located in the left upper part of the diagram. For the younger clusters there is a very good agreement with theory. In this diagram there are two exceptions, the cluster L83 and the cluster L54. L83 shows an unusually large number of early type stars for its adopted age based on the turn-off point of its CM diagram. It has been suggested that these early type stars are either blue stragglers or represent continuous star formation. For the cluster L54 with a photometric age of 1.2×10^7 yr (Carney et al. 1985) only the very bright stars are

detected (blue and red supergiants) and the theoretical CM diagrams (Schlesinger 1969, 1971) suggest an age of the order $3-7 \times 10^7$ yrs for the observed ratio. Assuming this age the observed ratio coincides with the theoretical ones as can be seen in Fig. 1.
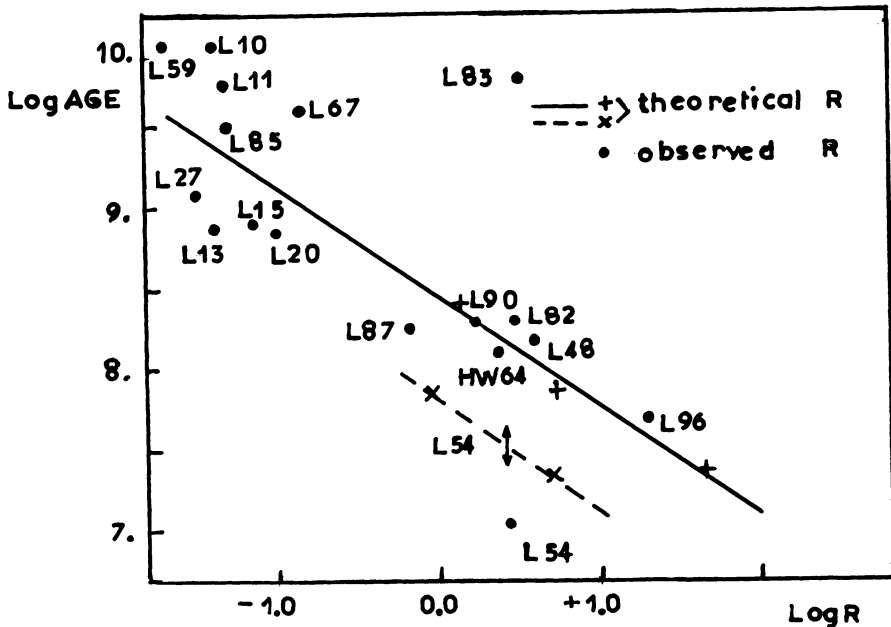

Fig. 1   Age versus ratio (R) of early to late type stars in SMC clusters. The arrow shows the new position of L54 assuming an age $3-7 \times 10^7$.

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REFERENCES

Carney, B. W., Janes, K. A., Flower, P. J. 1985 Astron. J. 90, 7.
Dapergolas, A., Kontizas, E., Kontizas, M. 1986 Astron. Astrophys. Suppl., 65, 283.
Hodge, P. W. 1982 IAU Colloq. No. 68, p. 295.
Kontizas, E., Dapergolas, A., Kontizas, M. 1986 Astron. Astrophys. Suppl., 66, 51.
Kontizas, M. 1984 Astron. Astrophys. 131, 58.
Mould, J., Aaronson, M. 1982 Astrophys. J. 263,629.
Schlesinger, B. M. 1969 Astrophys. J. 157, 533.
Schlesinger, B. M. 1971 Astrophys. J. 166, 447.