THE MAIN SEQUENCE OF NGC 6231 AND THE CALIBRATION OF ABSOLUTE MAGNITUDES

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It is fitting to mark the Centennial of Henry Norris Russell's birth with a discussion of a new approach to the calibration of absolute magnitudes for MK spectral types. With the addition of the NGC 6231 main sequence down to A0, the material for the cluster fitting method using very carefully determined MK types is complete. The data will be published elsewhere (Garrison and Schild 1978).

The use of NGC 6231 (nucleus of I Sco), the southern hemisphere's answer to the Perseus double cluster, allows access in the calibration scheme to numerous supergiants of all types, peculiar stars of early type, and O-type stars above the main sequence. If similar, high accuracy data could be obtained for the double cluster, the grid would be considerably strengthened.

Garrison (1973) discussed the use of the three well known moving clusters in a cluster-fitting procedure for determining the calibration of MK types. The Hyades and the Alpha Persei cluster diagrams overlap over the entire F-star range, giving good opportunity for comparison of rotations and metallicities in the two clusters. No differences were found. The Alpha Persei and the II Sco diagrams overlap over the entire A-star range, allowing comparison of rotation and abundances there. No significant differences were found. The new data for NGC 6231 (I Sco) overlap with the II Sco data over the entire B-star range. It is not possible to compare metallicities in B stars at classification dispersion in the blue-violet region of the spectrum because of the lack of sensitive lines, but it is unlikely that they differ significantly. The rotations are very similar.

A. G. Davis Philip and D. S. Hayes (eds.), The HR Diagram, 147-150.

To complete the cluster fitting, the composite main sequence was extended to 04 V by adding the diagrams of NGC 2244 and NGC 2264. The data are from Morgan et al. (1965), but R = 3 was used (Turner 1976). The clusters were assumed to be at different distances and thus were considered separately.

Fig. 1 was constructed by forming means for each spectral type for each cluster and drawing a line with only a small amount of smoothing. Spectroscopically peculiar stars, stars with luminosity classes of IV-V and brighter, and stars which are obvious two-line binaries at MK resolution were left out of the means.

The random errors, considerably reduced by the above procedures, are further reduced in the fitting by the long overlapping segments. It is obvious that a shift of even a few tenths of a magnitude in any of the cluster sequences would produce a considerably poorer fit. Thus, the new calibration should be good to a few tenths of a magnitude or better. Since the range of values for the Hyades distance modulus, which forms the foundation of this procedure, is of the same order of magnitude, it is unlikely that we will be able to do much better.

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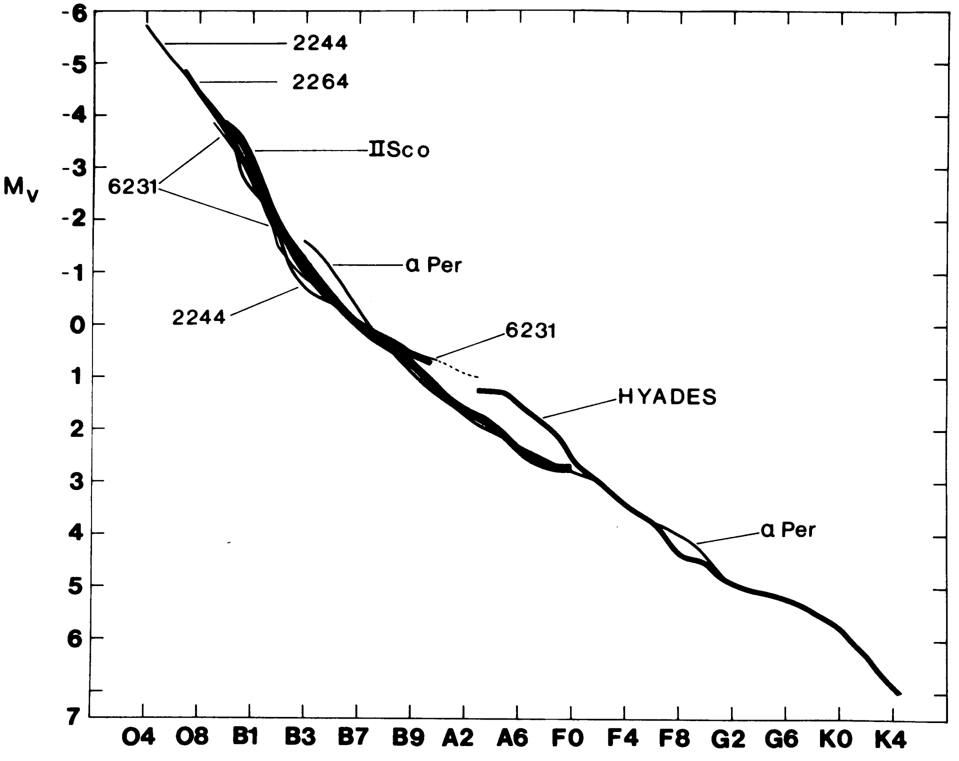

Fig. 1. Composite HR diagram for calibration of MK types.

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DISCUSSION

MORGAN: In NGC 6231 you have a super-supergiant, ζ^1 Sco. In your experience, is this star unique, or are there other associations containing such an object?

GARRISON: I haven't taken any photographs or spectra of stars similar to ζ^1 Sco.

MORGAN: This points up our lack of knowledge about such cases. We need investigations of rich O-associations, in the greatest detail possible, because we see such a great variety in the brightest objects present.

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