SUMMARY

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The old populations of galaxies are particularly vital for understanding the formation and chemical evolution of galaxies. As in any field, ideas come and go, and today's discussion has given us a valuable assessment of current knowledge and thinking on many topics.

The problems of star formation and the IMF are basic to many aspects of work on old populations. The discussion included some interesting ideas on star formation, and a useful warning that there are probably different modes of star formation which may give different IMFs: for example the mode of star formation that is widely studied now (in spiral arms) is probably different to the mode of star formation that was active in forming the stars of the galactic bulge.

Here is a brief summary of the contributions and ideas presented:

(1) The abundance scale for the more metal-rich globular clusters is still uncertain. There are systematic errors which need to be understood.
(2) The ages of globular clusters now appears to be about 16 to 18×10^9 yr, with no significant age-metallicity relation.
(3) We heard a comprehensive overview of the systematics of abundances for CNO, light metals and heavier metals in the halo field stars.
(4) The [C/Fe] and [N/Fe] distributions for halo field stars and globular globular cluster stars are significantly different (except for the cluster M3), in the sense that the cluster distributions have a wider spread. It is not yet known whether this difference results from processes occurring within the individual cluster stars or from the cluster environment itself.
(5) The nuclei of at least some Sc galaxies contain significant numbers of relativley young stars. Some nuclei appear to have nuclei with globular-cluster-like spectra for $\lambda\lambda$ 3700 - 4400 Å. More work is needed on this problem: how does one separate the effects of age and chemical abundance?
(6) Elliptical galaxies, and the bulges of spirals, show systematic variations of Mg b and Fe λ 5270 with absolute magnitude. The abundance range may not be as large as it was previously believed to be.
(7) The UV upturn in the spectra of old stellar systems may be due to the hot stars of the old population itself, rather than to the

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young stars resulting from recent star formation in these systems. The arguments for recent star formation, based on the supernovae and the low gas content observed in these systems, are in conflict with better UV spectra and UV fluxes from IUE.

(8) The apparent absence of population III stars is a serious problem which probably needs a yet more serious and systematic approach. The absence of these population III stars is often used in discussions of cosmology and galaxy formation, but it is not clear that this absence is really well established.

(9) We heard useful discussions of the stellar content of dwarf spheroidal and dwarf elliptical galaxies, and the evidence for a relatively young age for the disk of the LMC. There were some interesting comments on the stellar content of ellipticals and spirals, including evidence that elliptical galaxies in clusters contain more globular clusters per unit luminosity than the ellipticals in the field.

Each person working on old stellar populations has his own list of important problems. Here are two that I see as particularly interesting:

(1) We know little about the underlaying old population in the late-type disk galaxies. How old is it? What are its chemical properties? Was there a significant burst of star formation initially and then a residual low rate up to the present? Or has the star formation rate in the disk been more or less constant over the whole life of the system? I would also like to know about the stellar dynamics in these type disks. Are they stablished by a halo or by anisotropic velocity dispersion?

(2) I would like to know more about the abundance distribution for the halo field stars. Almost everything we know now is for halo stars within about 1 kpc from the sun. This is a very selected sample, particularly for the metal-weaker stars: most of these come to the solar neighborhood in highly eccentric orbits from the outer parts of the galaxy. There are undoubtedly many stars in these outer parts whose orbits do not enter the solar neighborhood. It would be very interesting to know the true *in situ* abundance distribution (and stellar kinematics) in the outer halo: Ratnatunga is working on this problem at Mt Stromlo.