Concluding Remarks Part II

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In research in the galactic polar caps we may roughly distinguish two categories:

I. Research on problems concerning the galactic population at large distances from the plane, including the density and velocity distribution and the field of force at large z.

II. Research on problems concerning the population in the immediate neighbourhood of the sun; at high galactic latitudes it is easier to discriminate the nearest stars than at low latitudes - see, for instance the investigations of the M dwarf population.

Most of the papers presented in part II of this Joint Discussion deal with the first category, and of these, the distances reached are mostly within a few Kpc. Classical investigations, some of them dating from more than thirty years ago, have provided our current knowledge of the force K(z) perpendicular to the galactic plane up to about 1500 pc and the large scale features of the density distribution. What emerges from recent and current work, is attempts to improve the knowledge of K(z) and to extend it to greater distances; and refinement of the density and velocity investigations by more and more detailed discrimination of population types. The dominating problem is that of the separation of the stars according to two basic parameters: age and chemical composition. Kinematic and space distributional properties for subgroups according to these two parameters will be the necessary elements on which a theory of the (local) evolution of the Galaxy is to be built. The vague notion, that metal abundance may be taken to be an equivalent of age is abandoned and replaced by the recognition that at any epoch, star formation may have occurred with a considerable spread in the resulting stellar metal abundances.

The investigations reported show that insight in these aspects is now building up, but it is in most cases limited to the layers within a few Kpc. These investigations therefore may hopefully lead to understanding of the later stages of the local galactic evolution. For the earlier stages, comprising most of the lifetime of the galaxy, we need much more information about the stars beyond a few Kpc. Here, for instance, the exploratory work of W. Becker and his associates for stars down to 19th photographic magnitudes would require precise photoelec-

Edith A. Müller (ed.), Highlights of Astronomy, Vol. 4, Part II, 95-96.

https://doi.org/10.1017/S1539299600003166 Published online by Cambridge University Press

tric follow-up, as a first step toward the finer segregation of age and abundance groups, pending the measurement of kinematic properties which for the moment still seems hard to attain. But we have already heard about interesting probes to very large distances like those reported by Kron et al on the basis of B, V, R photometry down to V = 19 m and by Davis Philip on very distant faint Horizontal Branch stars. With the coming into operation of the new generation of large telescopes (Kitt Peak, CTIO, ESO, AAT, FCH) a breakthrough to these distant domains in space and time may well be within reach.

https://doi.org/10.1017/S1539299600003166 Published online by Cambridge University Press