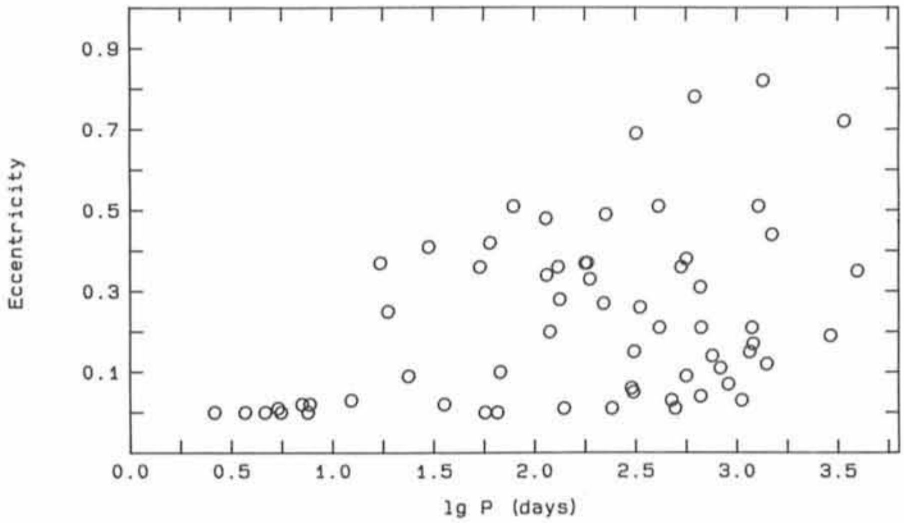

Figure 8: *Orbital eccentricity vs. orbital period, expressed in days, for our sub-sample of binary and multiple systems.*

seems to display considerably smaller radial velocity dispersion than more metal poor stars. Whether this should be interpreted in evolutionary terms is a problem that merits a closer study with more complete data. As judged from Figure 4, the reality of a Population III seems possible, but is not confirmed. More data are necessary, before this question can be addressed in a fully adequate manner. Very tentatively it might be suggested that, if real, Population III is in evolutionary terms rather firmly coupled to Extreme Population II.

From the sample of objects classified as binary and multiple systems (Ardeberg and Lindgren, 1985b, c; Lindgren et al., 1987, 1989; Ardeberg and Lindgren, 1990), we have selected those for which system radial velocities and orbital periods are determined with accuracies which, although not sufficient for definite conclusions, allow some reasonably well-defined statistical conclusions. This gives us a sub-sample of close to 70 binary or multiple systems. In all but a few cases, eccentricities have also been determined to an accuracy that allows tentative statistical conclusions.

For this sub-sample of binary and multiple systems, Figure 5 shows the fractional distribution of system velocity with a bin size of 50 kms^{-1}; a rather wide distribution is noted. In order to compare it to the distribution in radial velocity of the total sample of stars under present study, we have, for the data presented in Figure 1, made a rebinning resulting in the fractional distribution of radial velocities presented in Figure 6.

A comparison of Figures 5 and 6 indicates that the distribution of system radial velocities for binary and multiple systems is as wide as that defined by the distribution of radial velocities for the total sample of stars presently under discussion. This is a result of special interest, in particular with reference to the long-standing controversy about the relative incidence of binary and multiple systems among the oldest stellar generations as compared to the corresponding incidence among younger stars. We refer to studies by Abt and Levy (1969), Crampton and Hartwick (1972), Lucy (1977), Peterson et al. (1980), Griffin (1989), Lucke and Mayor (1982), Mayor and Turon (1982), Lindgren et al. (1987), Carney and Latham (1987) and Latham et al. (1988). The fact that our data, with their low bias, indicate a fractional radial velocity distribution for binary and multiple systems comparable to that of our total sample of stars, speaks clearly in favour of the absence of a significant dependence on galactic age of processes determining stellar multiplicity. At the same time, this is obviously a question that merits a more stringent treatment with a better data base. Given the importance of the topic, we will endeavour to revisit this field as solidly as possible.

In Figure 7, we have displayed the fractional distribution of orbital periods for our sub-sample of binary and multiple systems. In order to interpret such a distribution in an adequate manner, we have to consider effects of selection as well as of other bias. We mention the difficulties to derive non-spurious selections of the systems with the shortest periods, due to the high resolution necessary in the radial velocity data, and, equally, of the systems with longer periods, in this case due to the large time coverage needed for detection and determination of radial velocity variability of systems. Nevertheless, it is of considerable interest to note the presence of systems with very short as well as with rather long periods.

The distribution of orbital eccentricity, versus orbital period has been shown in Figure 8. Except for a general trend of the upper and lower envelopes for periods longer than around 15 days, the existence of a cut-off period seems strongly indicated. This is another topic that needs further study.

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