THE OBSERVATIONAL EVIDENCE

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Abstract. The domain in the (U, V) plane of old-disk-population stars is defined by a sample of F- and G-type stars brighter than visual magnitude 6.5 for which luminosities are available from intermediate-band photometry. The majority of these old-disk stars avoid the domain of the young-disk population in the (U, V) plane except for (1) several objects with V near -17 km s^{-1} and (2) a half dozen possible members of a solar group. The sample of stars used to define the old-disk population is confined to distances less than 100 parsec from the Sun and those with V near -17 km s^{-1} may represent several generations of the objects formed in what is now the solar neighbourhood and which keep returning to this neighbourhood because they are isoperiodic (V near -17 km s^{-1}) with the local standard of rest. The half dozen possible members of a solar group indicate an evolutionary age of some 5×10^9 yr. In addition to some of the previously recognized stellar groups in the old-disk population (e.g. Wolf 630 and ζ Her), a new group with $U = +40$ to 50 km s^{-1} and $V = -36$ km s^{-1} is also discussed. The sample of red giants: ($V_E \leqslant 5\overset{m}{.}0$ and $(R-I)_0 > +0\overset{m}{.}42$) contains eight probable members of the halo population of which five are members of the Arcturus group. Possible structure in the old-disk-population giant sequence is discussed on the basis of published narrow-band indices, and the luminosity functions of the old- and the young-disk-population red giants are compared.

Most of the material presented can be found in Eggen, O. J.: 1973, *Publ. Astron. Soc. Pacific* **85**, 542.

DISCUSSION

Demarque: I understand that you mentioned some short period variables in M67, I never heard of such stars.

Eggen: No, all I was saying was that in the old disc population, to which M67 belongs, there are variable blue stragglers, with short periods.

Demarque: But you had some points (on your slide)...

Eggen: Those points on the slide did not all represent variable stars; only the ones that were indicated by filled circles were variables. The only cluster with a known variable amongst the blue stragglers is NGC 7789. The rest of the variables on this slide are members of groups. Also included are a few stragglers not known to be variable but which upon closer examination will undoubtedly prove to be.

Demarque: So you are suggesting that one should look at these particular blue stragglers.

Eggen: That is an obvious thing to do but the magnitudes, especially in the clusters, are rather faint.

Buscombe: Is the proper motion of R Cor Bor really reliable enough that one can talk about its kinematics?

Eggen: R Cor Bor has a long meridian history.

Rodgers: I think that it is a dangerous trap for observers to fall into, to put tags on objects which imply that we know what we are talking about, I think there is certainly point and logic in trying to say short period young disc variables in an attempt to describe β Can Maj stars. It may be a longer-winded title and it may be more explicit, but I think when one has objects like metal-rich RR Lyrae stars, which we do not

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see in old disc clusters at all (at least we do not see them in 47 Tucani), that kind of grey edge between the old disc and the halo which is hardly definable, then we have the old problem of more than one parameter in the colour-luminosity relation of clusters and the stellar populations including the variables. That is why I think it is a good idea to use neutral terms like W Virginis or RV Tauri and tell the theoreticians where these stars are afterwards.

Eggen: I am sure that most people do consider that W Vir stars occur in globular clusters. However, W Vir certainly is no globular cluster Cepheid. It is positioned slightly higher in the halo than the young disc stars and it has the kinematics of stars around 5 to 10×10^8 yr old. It belongs to a population which has a solar composition but it has a low mass, a feature it shares with the halo.

Iben: Can you not have a halo star in the disc?

Eggen: You can have a halo star now positioned in the disc, yes.

Rodgers: If you had a halo star which was only down by a factor of three (you said Ah!) and if metal enrichment was such that, in the genuine kinematic halo, we had stars that were only down by a factor of three, what would you say then?

Eggen: My main point is a very straightforward one. Papers are now being written that mean something different, to some readers, than what the authors intended. There may have been a time, for example, when the term RR Lyrae star meant the same thing (or perhaps nothing) to nearly everyone. Now we know that such short period variables can occur in various populations and we need some designation for this. RR Lyrae is a short period Cepheid of the halo population. AI Velorum is an ultra-short period Cepheid of the old disc population. δ Scuti is an ultra-short period Cepheid of the young disc population. To call all of these RR Lyrae stars is to cause confusion.

Feast: I have got quite a lot of sympathy with you in trying to divide things up. I think we should allow ourselves freedom to divide them up in any way we feel is suitable. What I wanted to say was even if you made this division between red variables and Cepheids, there may be quite a number of different mechanisms of instability within the strip. For instance, in the R Cor Bor stars, a star like RY Sag is pulsating as well as being an R Cor Bor star and it falls over somewhere in the Cepheid region. Yet if I understand correctly the theoretical proposal that has been made for its pulsating, the mechanism is more like a red variable mechanism although it lies in the Cepheid instability strip.

Eggen: I am saved on R Cor Bor because it is outside the Cepheid instability region but I take your point. However, there is no problem in this matter because a Cepheid is a Cepheid. But W Virginis is a Cepheid of the old disc population whereas δ Cephei is a Cepheid of the young disc population and there are known Cepheids of the halo population and the distinction is important.

Bessell: Have you found K stars in the old disc which vary?

Eggen: No, the variability in the red stars starts very suddenly at a $\log T_e$ of about 3.55 (in $R-I$, about 0.9). It is just like the blue edge on the Cepheid instability strip.

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