DISCUSSION (North; Schneider)

ABT: (To Schneider) Very nice data. A comment is that the fraction of any particular peculiarity in one cluster is small, and the number of clusters available to us is small, so we are usually working with statistically small samples.
SCHNEIDER: That's right, especially in the case of CP3 stars, which can only be detected by means of spectroscopy, often only with very high dispersion. For faint cluster stars this work can be very time consuming.
DWORETSKY: An example of a CP3 star without strong Mn II or Hg II is 46 Aql. It is clearly a HgMn star (or closely related) but would be very difficult to notice even at higher classification dispersions (e.g., 40 Å mm^{-1}).
COWLEY: If we assume that chemical anomalies in CP stars develop over time, we must also recognize that mixing currents (turbulence) are necessary in order to prevent extreme overabundances. These mixing currents may be different from one cluster to the next, and if this were so, it could spoil the expected correlation with age. To put this another way, the chemical maturity is expected to be related to age, but it may develop at different rates because of different mixing. We know that rotations are not the same from one cluster to another. Perhaps the mixing currents also vary.
KROLL: How do the frequencies of CP stars at the poles compare to those found in clusters?
SCHNEIDER: You can not compare clusters with field stars; even clusters can not be compared with each other. Generally the frequencies at the North Galactic Pole look all right to me, but the South Galactic Pole distributions look very puzzling.
ABT: (To North) The evidence that the Am stars in the Orion Association lie high in an HR diagram may be due to their duplicity, rather than to their being pre-main-sequence objects.
NORTH: Yes, but a few of them are more than 0.75 mag above the ZAMS, and are furthermore in a mass range where most stars are still on their way towards the ZAMS.
ABT: If that is true, then some Am stars must be such before they reach the ZAMS.
NORTH: That is the point I wanted to make.
MICHAUD: In so far as I can remember, the Am stars in Orion fitted the peculiarity criteria of Am stars but seemed to be of higher T_{eff} and log L than "usual" Am stars.
ABT: In response to Dr Michaud, there are two kinds of Am star: the Sirius type and the late A-type stars.

Dr Schneider said something very important, namely that the fraction of CP stars in clusters is substantially less than in the field. We would expect cluster stars to be generally younger than escapees from clusters. This sounds like a pronounced evolutionary change.
GRAY: (To North) Two comments: First, in our study of the Lacerta OB1 Association, Chris Corbally and I have found two fully fledged Am stars, so this result must be set beside the Orion Association result. Secondly, as you know, many Ap stars are classified (on the basis of the Stark broadening of the hydrogen lines) as III (giant), and I know of two classified independently by Bob Garrison and myself which are bright-giant or supergiant. Since you have concluded that

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Ap stars are main-sequence objects, does this mean that something, perhaps the magnetic field, is drastically altering the atmospheric structure of these stars?
NORTH: Maitzen has also mentioned some cases of stars classified as, e.g., B9 III, but being rather B9p Si according to his Δa photometry. I have not examined especially the Ap giants you speak about, and I think Dr Lodén would be more competent than me to comment on that, since he looked specifically for Ap giants.
ALECIAN: (To both speakers) Is there any indication if, in a given cluster, the variety of the abundance anomalies pattern for Am stars having the same T_{eff} is as large as among field stars?
NORTH: I don't know, it is a point I have not examined. Furthermore, not many cluster members have been studied at high dispersion.