DISCUSSION (Adelman; Leckrone; Lanz; Sadakane)

BONIFACIO: Dr. Adelman, you said that a problem for spectral synthesis analysis is the lack of an *ab initio* method to fix microturbulence. I totally agree. You also said that you have some ideas of how to get around the problem. I would like to know what they are.
ADELMAN: Scott Roby, Chuck Cowley and I have discussed the possibility of using some spectral windows which include a range of clean Fe I or Fe II lines, say. We could compute synthetic spectra with a range of microturbulences. For the correct microturbulence the ratio of the observed to synthetic spectra should be a straight line. Rotation and blends are additional problems.
SHORE: (To Adelman) What about using absolute fluxes instead of normalized?
ADELMAN: That is possible in principle for those stars whose parallaxes are known with sufficient accuracy. The synthetic spectrum calculations with Kurucz's program SYNTHE are done with appropriate units for such a comparison.
SHORE: Vega is like β Pic in having a disk with circumstellar material in atomic form. Are any of the other "flat profile weak line" stars *IRAS* sources? Is it possible that these are post-disk evaporative systems?
ADELMAN: I have not checked whether 50 Lib belongs to this class. The other four stars do not show *IRAS* excesses. I cannot propose any reason why these stars could not be post-disk evaporative systems.
MICHAUD: (To Leckrone) Did you suggest that the abundance anomalies in some peculiar stars could be explained by the s-process only and that anomalies in some other peculiar stars could be explained by the r-process? Do you suggest that ^{204}Hg is produced by the s-process?
LECKRONE: My plot of abundance enhancement in χ Lup *vs.* atomic number for Z between 22 and 80 is preliminary and sketchy, yet it is more complete than any abundance information we have had before for a star of this temperature (normal or peculiar). It is perhaps premature to try to draw conclusions about trends, but I can't help noting some interesting features. There is a strong enhancement of the s-process elements Zr, Ru and Ba to abundance values similar to those observed in Ba and S stars (we do not yet have data for Mo or Nb). On the other hand, Pt, Au and Hg are not only the most strongly enhanced elements in terms of overall absolute abundance, they are present in χ Lup's photosphere only in their pure r-process isotopic form: ^{198}Pt, ^{197}Au and ^{204}Hg are all commonly considered to be produced only in a high neutron-flux environment. I am not aware of any previously defined astrophysical scenarios which would produce by nucleosynthesis this complex and bizarre combination of abundance enhancements. That is why I listed in my talk the possibility that diffusion models might produce results that, by coincidence, mimic nucleosynthesis of various kinds. In any event, diffusion theorists might profitably begin to work on elements that we are observing for the first time in very high resolution ultraviolet spectra.
SHORE: (To Leckrone) You can predict, if the Ba-star-like abundances are due to Roche lobe overflow, what the current mass function and period should be. This means you can put some initial limits on the period and velocity amplitude ranges you'd have to search in for these stars.
ADELMAN: (To Lanz) Have you tried to investigate the curve of growth for spotted stars using Fe I or Fe II lines?
LANZ: No. I looked first at Ti II, because Ti shows large abundance contrasts on the surfaces of some magnetic Ap stars. Nevertheless, part of the dispersion on

https://doi.org/10.1017/S0252921100020315 Published online by Cambridge University Press

the observed curves-of-growth is very probably related to gf-values. An inspection of iron abundance values for individual lines suggests that some dispersion would still be present, despite better oscillator strengths. It might therefore indicate that some additional physics is needed to model HgMn stars.

STĘPIEŃ: (To Sadakane) When determining abundances of Hg you used T_{eff} for several Ap stars substantially higher than they most probably are. Would it not alter your determinations?

SADAKANE: In the present analysis, mean effective temperatures obtained in the visual region by Adelman are used for magnetic stars. Yes, some of these might be too high. However, an error of 1000 K in T_{eff} introduces an error in Hg abundance less than 0.2 dex in most cases.

LECKRONE: With regard to the difference in Hg abundance for α^2 CVn that you have derived and that which I published in 1984, I want to point out that the recipe for blending that I used in 1984 is not correct. The iron-peak elements and other lines which are blended with Hg II 1942 Å are not as strong as I originally estimated. This has almost no effect on abundances derived for stars in which 1942 Å is very strong, but in stars with weaker Hg II, such as α^2 CVn and especially the normal B stars, the excessive blending caused me to underestimate the abundance. From our GHRS work on χ Lup and κ Cnc, we now know the identifications and strengths of lines blended at *IUE* resolution with Hg II 1942 Å very accurately. This blending recipe is the one that should now be used.

SADAKANE: Yes, the precise data on blending lines and also for abundance data for blending species are critically important in deriving reliable Hg abundances in magnetic stars. In this sense, my results presented here are only first approximations and have to be improved. Both new observations and new laboratory data are needed.

COWLEY: Does anyone know about the Hg II line in the silicon star HD 191913? As I recall, the wavelength was greater than 3984.0 Å, which could mean that the mercury is fractionated as in χ Lup.

SADAKANE: Unfortunately, with the *IUE* resolution and S/N ratio, nothing can be said on the fine structure of the Hg II 1942 Å line in HD 191913.

POLOSUKHINA: You list Babcock's star (HD 215441) as a mercury star! What data were used for this determination? The 3984 Å line is absent in the spectrum of this star.

SADAKANE: The resonance line of Hg II at 1942.3 Å is used in this study. Because HD 215441 is hot, the line at 3984 Å is expected to be weak even for a large overabundance of Hg.