F KNS The CP phenomenon

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We briefly summarize the chemical and magnetic peculiarities of upper main sequence stars, referring to numerous, and more detailed reviews.

The gross chemical anomalies in the magnetic (CP2) and non-magnetic (CP1, CP3) stars differ but there are similarities among the details. For example, Hg, Pt, and Mn excesses, typical of CP3 stars are found among CP2's, and REE excesses do occur in CP3's. While magnetic fields have been invoked to provide the stability for chemical differentiation, the non-magnetic CP3 stars show the most obvious evidence of chemical differentiation from a nuclear abundance pattern (Oddo-Harkin's odd-even abundance alteration). Examples, are yttrium more abundant than its even-Z congeners, strontium and zirconium, and manganese more abundant than chromium or iron (53 Tau). The temperature depencence of manganese excesses in CP3 stars has been one of the great successes of the diffusion theory.

Magnetic (CP2) stars and also the cooler CP1's or Am's have not yet shown unambiguous non-nuclear abuncance patterns. So far, this is the case for the CP2's with the most extreme abundance anomalies (HR 465, HD 101065). Why?

New observations and new ideas about the origin of abundance anomalies of CP stars offer insights into the puzzling observational complexities. We cannot overemphasize the significance of new, high-quality observational material. It can no longer be maintained that *all* CP stars are slow rotators with otherwise normal atmospheres, and that magnetic fields and effective temperatures alone provide the adjustable parameters necessary to explain the full chemical complexity. The cool CP2 stars, notably the oscillating (roAp's) show anomalous ionization and excitation abnormal Balmer profiles, indicative of stratification. How can chemical stratification be maintained in a pulsating atmosphere? Do we observe transient phenomena, possibly prominence activity, suggested by Babcock? What role may be played by circumstellar material, including the possible ingestion of metal-rocky planetesimals?

Our review will enlarge on some of these questions and provide some tentative answers.