REGOLITH EVOLUTION ON THE FAYETTEVILLE PARENT BODY – THE MOBILE TRACE ELEMENT STORY: X. Xiao and M. E. Lipschutz, Dept. of Chemistry, Purdue Univ., W. Lafayette, IN 47907

Operating as part of the BLTN school of the Fayetteville Consortium (led by D. Sears), we report data for Ag, Au, Bi, Cd, Co, Cs, Ga, In, Rb, Sb, Se, Te, Tl and Zn in consortium samples of solar-gas- and track-rich dark matrix, and dark and light inclusions of the Fayetteville H chondrite regolith breccia that were determined by radiochemical neutron activation analysis. Nine matrix samples proved chemically homogeneous at a level never before observed in an ordinary chondrite. Most elements are present in Fayetteville matrix at levels similar to those of non-Antarctic H chondrites [1]. However, Cs and highly labile Bi, In, Tl and Cd are enriched by factors of 10-100x (Fig. 1), obviously signalling some thermal (genetic) difference. Most dark inclusions had mean trace element concentrations similar to matrix but were compositionally much more heterogeneous. Our data suggest that homogeneous matrix represents compacted soil produced isochemically from "typical" heterogeneous dark inclusions by comminution.

Two dark inclusions that we studied were unique, one having apparently formed from impact-melted soil, the other being a mixture of 90% matrix – 10% C2M chondrite. The single light inclusion proved compositionally similar to H4-6 chondrite falls except for its higher contents of labile Bi, Cd, In, and Tl (Fig. 1).

Relative to matrix, all other samples were Cs-deficient. Other H chondrite regolith breccias studied in the past had shown peculiar Cs and/or Rb contents so that these alkalis seem diagnostic of such breccias [2]. Dark matrix portions of such breccias apparently represent compacted regolith soil, produced by isochemical comminution of pre-existing "typical" dark inclusions, plus – at times – inclusions of local and exotic provenance. The "typical" dark inclusions, in turn, likely represent primordial nebular condensate although it remains conceivable that they represent planetary "cold traps" that garnered labile elements generated elsewhere in the parent body [3].

REFERENCES

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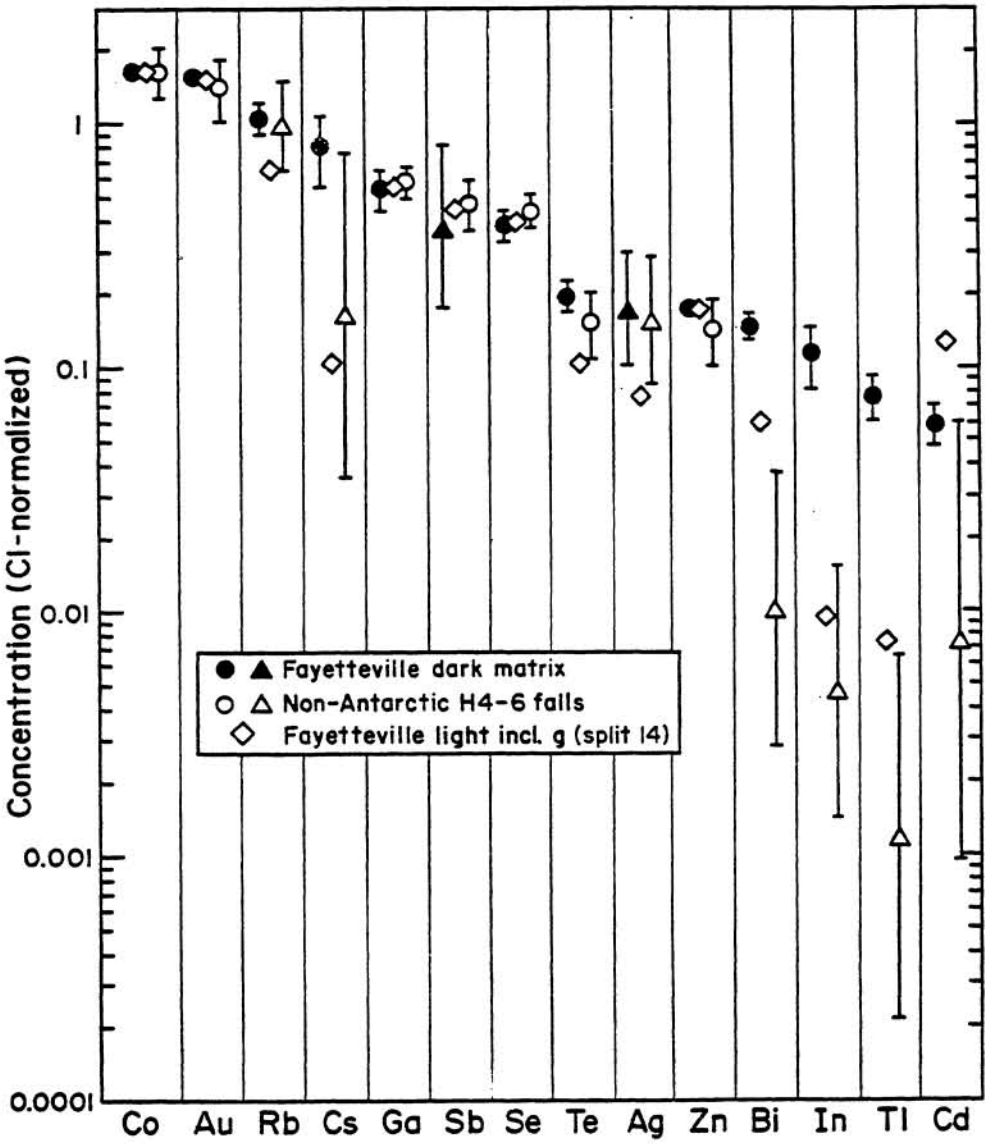

Comparison of trace element concentrations (Cl-normalized) in 9 Fayetteville matrix samples and light inclusion g, and up to 48 H4-6 chondrite falls [2]. Means for Fayetteville matrix and falls are arithmetic (circles) or geometric (triangles): error bars are one population standard deviation associated with the particular mean. If no error bars are shown, the standard deviation is smaller than the symbol size. Elements are ordered by decreasing Cl-normalized concentration: this generally corresponds with the order of elemental mobility determined in laboratory heating experiments at moderate temperatures. The low compositional variability of Fayetteville matrix is remarkable for an ordinary chondrite. Compositional trends indicate that Fayetteville matrix and H4-6 chondrite falls differ in thermal histories. The composition (and thermal history) of Fayetteville light inclusion g is closer to that of falls than to its host matrix.