ANOMALOUS HIGHLY FERROAN EUCRITE NORTHWEST AFRICA 11729: EVIDENCE FOR WIDER COMPOSITIONAL VARIATION WITHIN ONE OF THE SEVERAL KNOWN EUCRITE PARENT BODIES OR YET ANOTHER DISTINCT EUCRITE PARENT BODY

A. J. Irving[1], S. M. Kuehner[1], K. Ziegler[2] and R. J. Falls, [1]Dept. of Earth & Space Sciences, University of Washington, Seattle, WA, USA, irvingaj@uw.edu; [2]Inst. of Meteoritics, University of New Mexico, Albuquerque, NM, USA

Introduction: Although igneous-textured achondrites called eucrites composed predominantly of relatively ferroan pigeonite and calcic plagioclase have been known for some time, it is now recognized that not all of these specimens can be related to a single parent body. In fact, based particularly on significant differences in oxygen isotopic composition, as many as ***six*** different parent bodies have now been proposed [1]. The most abundant group of eucrites (including such well-studied examples as Juvinas, Millbillillie, and many others) have been claimed to represent samples from the asteroid 4Vesta, yet without a sample return from that body we have no definitive evidence whether other specimens (e.g., Ibitira or Bunburra Rockhole) might be the ones ejected from 4Vesta (or indeed whether the answer is "none of the above"). In the meantime the compositional variety among recovered specimens dubbed eucrites continues to expand, and here we describe yet another puzzling example found in Mauritania.

Northwest Afrcia 11729: This 345 gram orange-brown stone coated in black fusion crust is unusual particularly because it contains such highly ferroan pyroxenes. It is a breccia composed of closely-packed microgabbroic eucrite clasts plus some genomict breccia clasts within a sparse matrix of related debris. Constituent minerals are exsolved ferroan pigeonite, calcic plagioclase ($An_{82.3\text{-}84.3}Or_{0.7\text{-}0.5}$), silica polymorph, ilmenite, Ti-chromite, fayalitic olivine ($Fa_{73.9\text{-}74.1}$, FeO/MnO = 47) and minor zircon. Exsolved pigeonite grains consist of either clinopyroxene exsolution lamellae ($Fs_{33.2}Wo_{42.1}$, FeO/MnO = 30) in host orthopyroxene ($Fs_{69.6}Wo_{1.7}$, FeO/MnO = 29) or orthopyroxene exsolution lamellae ($Fs_{69.5}Wo_{1.9}$, FeO/MnO = 36) in host clinopyroxene ($Fs_{30.9}Wo_{43.5}$, FeO/MnO = 32). The ferrosilite contents in orthopyroxene are 7-10 mol.% greater than found in any other eucrites [e.g., 2]. Terrestrial weathering has resulted in extensive alteration of primary troilite to iron hydroxides and some cross-cutting hydroxide veinlets.

Figure 1: Cut NWA 11729 stone showing glossy fusion crust, brecciated texture and secondary orange staining.

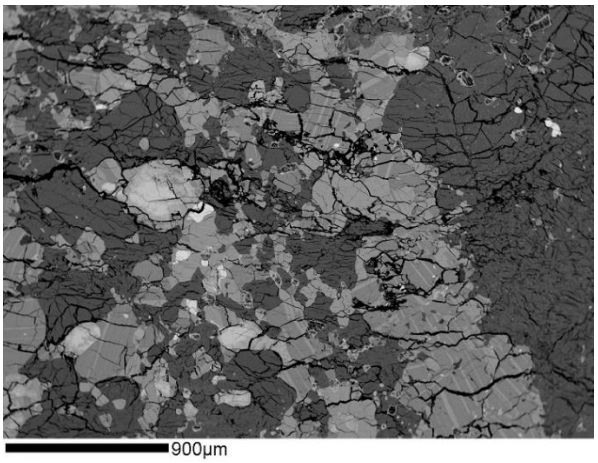

Figure 2: Back-scattered electron image showing exsolved pigeonite, calcic plagioclase (dark gray), oxides and fayalitic olivine (bright).

Oxygen Isotopes: Analyses of acid-washed subsamples by laser fluorination are in progress and will be reported. If these results differ significantly from those for other eucrites, then NWA 11729 may be a sample from a new parent body. Alternatively, oxygen isotopes may permit the inference of a much wider compositional range within one of the already proposed eucrite parent bodies.

References: [1] Irving A. *et al.* (2018) *Lunar Planet. Sci.* **XLIX**, #2247. [2] Mittlefehldt D. et al. (1998) *In* Planetary Materials, *Reviews in Mineralogy* **36**, p. 4-103-4-130.