

**PETROLOGY AND COMPOSITION OF LUNAR FELDSPATHIC BRECCIAS NWA 2995, DHOFAR 1180 AND DHOFAR 1428** T. E. Bunch<sup>1</sup>, J. H. Wittke<sup>1</sup> and R. L. Korotev<sup>2</sup>, <sup>1</sup>Dept. of Geology, Northern Arizona University, Flagstaff, AZ, [tbear1@cablone.net](mailto:tbear1@cablone.net), <sup>2</sup>Earth and Planetary Sciences, Washington University, St. Louis, MO

A feldspathic breccia from Algeria and two mingled highlands+mare lunar breccias found recently in Oman bring the total number of unpaired lunar meteorites to more than 40.

**Northwest Africa 2995** is a very fresh feldspathic fragmental breccia that contains many highlands fine-grained lithologies: norite (orthopyroxene  $Fs_{26.4}Wo_4$ , FeO/MnO = 66), olivine basalt (olivine  $Fa_{87.2}$ , FeO/MnO = 95; plagioclase  $An_{84.7}$ ), subophitic basalt (augite  $Fs_{25.48}Wo_{37.1-25.9}$ ; pigeonite  $Fs_{27.8-31.7}Wo_{15.4-9.3}$ , FeO/MnO = 53; olivine  $Fa_{36.3}$ , FeO/MnO = 90; plagioclase  $An_{97}$ ), gabbro (olivine  $Fa_{34.7}$ , FeO/MnO = 95; pigeonite  $Fs_{28.2}Wo_{8.9}$ , FeO/MnO = 67; plagioclase  $An_{94}$ ), KREEP-like basalt (plagioclase  $Ab_{50}Or_{17.4}$ ; K-feldspar  $Ab_{14.3}Or_{83.6}$ ; silica, phosphate and Fe-rich pyroxenes), troctolite (olivine  $Fa_{30.8}$ , FeO/MnO = 94; plagioclase  $An_{94.7}$ ), granulitic impact melts (olivine  $Fa_{31}$ ; orthopyroxene  $Fs_{25.2}Wo_{3.4}$ ; plagioclase  $An_{95}$ ); anorthosite ( $An_{92.7-96.8}$ ), glassy impact melts, coarse-grained mineral fragments, and a 0.35 mm-sized grain of meteoritic Ni-Fe metal (Ni = 6.3 wt.%, Co = 1.0 wt %).

**Dhofar 1180 and Dhofar 1428** are clast-rich, crystalline melt breccias that do not appear to be paired stones. Dhofar 1180 is largely populated with anorthositic lithologies, including ferroan anorthosite (plagioclase  $An_{95}$  with up to 1.1 wt.% FeO), anorthositic gabbro (olivine  $Fa_{39}$ , FeO/MnO = 96-101), norite (olivine  $Fa_{18}$ ), troctolite, minor amounts of ophitic to subophitic basalts (evidently with mare affinities) and impact melt breccias. Dhofar 1428 is dominated by plagioclase and xenolithic breccia clasts with subordinate amounts of norite (olivine  $Fa_{36}$ , FeO/MnO = 104; plagioclase  $An_{96.4}$ ; orthopyroxene  $Fs_{28.4}Wo_{4.1}$ , FeO/MnO = 51), troctolite (plagioclase  $An_{95.5}$ ; olivine  $Fa_{25.8}$ , FeO/MnO = 89), and subophitic basalts that contain highly zoned pyroxenes ( $Fs_{14.9}Wo_{5.1}$  to  $Fs_{41.2}Wo_{15.2}$ ).

**Bulk Compositions:** Dhofar 1180 contains 22.6 wt.%  $Al_2O_3$ , 9.3 wt.% FeO and 0.9 ppm Th, and plots at the feldspathic end of the field for mingled highlands+mare lunar breccias [1]. It does not appear to be paired with any other of the known Omani lunar meteorites, and shows compositional similarities to Calalong Creek and Yamato 983885, but with a lower bulk Mg/Fe ratio and lower concentrations of incompatible elements. Analyses of NWA 2995 and Dhofar 1428 are in progress.

**Reference:** [1] Korotev R. L. 2005 *Chemie der Erde* 65: 297-346.