DHOFAR 287: A NEW LUNAR MARE BASALT FROM OMAN. Lawrence A. Taylor[1], Mikhail A. Nazarov[1], S. I. Demidova[2], and Allan Patchen[1]; [1]Planetary Geosciences Institute, University of Tennessee, Knoxville, TN 37996, USA (lataylor@utk.edu), [2]Vernadsky Institute of Geochemistry and Analytical Chemistry, Kosygin, 19, Moscow 117975. Russia (nazarov@geokhi.ru).

Introduction: Dhofar 287 is a new lunar mare basalt meteorite found recently in the hot desert of Oman. We report the first results of our mineralogic and petrographic studies of this meteorite and discuss its possible relationships with lunar mare basalts sampled by the Apollo and Luna missions.

Results: Dhofar 287 is a dark-gray stone weighting 154 g. A fusion crust is practically absent. The main portion (95%) of the meteorite is a basalt; a minor, adjacent portion (<5%) is a regolith breccia. The basalt (Dh 287A) consists of phenocrysts (up to 1mm) of olivine (Fo70-45) and minor augite (Wo30-40 En38-45), set within a subophitic, fine-grained (50-100 µm) groundmass, composed of plagioclase (An85-75) and pyroxene (Wo10-25 En2-50). Elongate pyroxene and plagioclase crystals occur radiating from common nucleation sites. Accessories are pyroxferroite, K-Ba feldspar, apatite, ilmenite, Ti-rich chromite, ulvöspinel, baddeleyite, silica, tranquilityite, troilite, FeNi metal, and a fayalite + K-rich glass mesostasis. The rock is strongly shocked with impact-melt veins and pockets; plagioclase is totally converted to maskelynite (a rare occurrence for mare basalts). Terrestrial weathering features are mainly iron staining and oxidation along with invading carbonate veins. Mineral modes (vol.%) of the basalt are pyroxene = 49%, maskelynite = 26%, olivine = 18%, opaques 4%, impact melt = 2%. The bulk composition of Dh 287A, estimated from mineral modes and chemistry, is SiO_2 43.9%; TiO_2 2.86; Al_2O_3 8.10; Cr_2O_3 0.62; FeO 22.2; MnO 0.30; MgO 12.3; CaO 8.38; Na_2O 0.50; K_2O 0.11 (wt.%). The LREEs are enriched (La/Yb = 3.5), and a prominent negative Eu anomaly is present (Sm/Eu = 4.4).

The regolith breccia (Dh 287B) is clast-rich and contains numerous lithic fragments and mineral grains (up to 1 mm), cemented by fine-grained, mineral fragments (<100 µm) and minor impact melt. The lithic clasts are fine-grained, vitrophyric, granular to ophitic, basaltic rocks and impact-melt breccias. Mineral fragments are dominated by pyroxene (Wo5-40 En2-80), olivine (Fo80-25), and plagioclase (An98-66). Glass fragments and spherules also occur. Accessories include silica, fayalite, pyroxferroite, K-rich glass, apatite, ilmenite, Ti-chromite, ulvöspinel, troilite, and FeNi metal.

Discussion: Dhofar 287A is classified as a low-Ti mare basalt. In mineral modes and bulk chemistry, the rock is most close to Apollo 12 olivine basalt [1,2]. In contrast to Apollo 12 and 15 low-Ti basalts, Dhofar 287A is distinctly enriched in Na, K, and incompatible elements, similar to high-Ti mare basalts. Crystallization modeling suggests that Dhofar 287A is a cumulate formed by olivine accumulation from a parent melt at near-surface conditions. It was derived from a low-Ti basalt source region and possibly contaminated with a KREEP component, probably during magma rise and extrusion.

On the Moon, Dhofar 287A may have been a large clast within a regolith breccia, like that attached as Dhofar 287B, although this breccia is only present in minor amount. The mineral chemistry in this breccia indicates that the Dhofar 287A litho logy is abundant in the breccia. However, the breccia contains also low-Ti pyroxene mare basalt clasts; VLT basalt material; an Apollo 15 green-glass component; and Mg-rich cumulates. Minor highland material (e.g., An98 plag) is also present, but the regolith breccia is apparently dominated by mare basalt lithologies. This breccia is distinctly different from the Dhofar 025 regolith breccia [3] found only 400 m away from the Dhofar 287 site. Dhofar 025 is a lunar highland meteorite, which does not contain obvious mare material. There is no petrologic evidence for pairing of Dhofar 025 and Dhofar 287.

References: [1] Neal C.R. and Taylor L.A. (1992) *GCA 56*, 2177-2211; [2] Papike J.J. and Vaniman D.T. (1978) In *Mare Crisium: The view from Luna24*, 371-401; [3] Cahill et al., (2001) LPSC XXXII, CD-ROM #1840.