THE COMPOSITIONS OF POTASSIUM-BEARING LITHOLOGIES ON THE HED PARENT BODY.

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Introduction: Few howardites contain glassy inclusions which are much richer in K_2O than known eucrites [e.g. 1]. These inclusions are products of impact melting of regolith containing a K-rich component [1]. Accessory orthoclase and fragments of orthoclase-bearing rocks occurring in the HED meteorites [4-10] indicate that KREEP and granitoid rocks could occur on Vesta like to those on Moon, and could be precursors of K-rich impact melts. Known K-rich rock fragments from howardites are insufficient to fully characterize their sources. Here we report on the mineralogy and petrography of two K_2O-bearing clasts found in the NWA 776 and Erevan howardites.

Results and discussion: A clast of medium-grained dolerite (Clast A), 100x300 μm in size, was found in the melt matrix breccia from the NWA 776 howardite. Clast A consists of pyroxene ($En_{38.4}Wo_{2.9}$, Fe/Mn=30.9) with augite lamellae ($En_{30.4}Wo_{42.7}$), and heterogeneous feldspar ($An_{51-86}Or_{0.8-31}$). The feldspar in the breccia matrix is K_2O-poor. A 50 μm clast of fine-grained dolerite (Clast B) was found in the Erevan howardite, and consists of pyroxene ($En_{43}Wo_{3.5}$; Fe/Mn=29) and heterogeneous feldspar ($An_{75-83}Or_{8-18}$).

The Fe/Mn ratios of pyroxenes from Clasts A and B indicate their HED origin. Feldspars in Clasts A and B are rich in K in comparison with the eucritic ones. Both clasts probably are not representative samples of their source rocks. The medium-grained texture and dissolution of pigeonite display that Clast A is a sample of a slowly cooled rock volume that probably had macroscopic size. Clast B is small and fine grained, and could be either a whole-rock sample, or a piece of eucrite mesostasis. The enrichment in K suggests that the source rocks of the dolerites, at least for clast A, were more fractionated members of the HED group than noncumulative eucrites. Their bulk K contents cannot be estimated accurately, but it must be lower than that of K-rich melts from howardites. Therefore, Clasts A and B cannot be the precursors of K-rich melts. The source rocks of these clasts could be intermediate members of a final fractionation sequence of eucritic melts, leading to formation of K-rich rocks similar to the KREEP-like and felsitic fragments which were found in NWA 1664 [7,8]. All K-bearing igneous rocks found in the howardites are different by texture and composition from each other. These differences could be evidence of a complex structure of K-rich region on the HED parent body, or could indicate the occurrence of K-rich rocks as numerous small massifs.

References: [1] Barrat J. A. et al. 2009. *Meteoritics & Planetary Science* 44:359-374. [2] Delaney J. S. et al. 1984. *Journal of Geophisical Research* 89:C251-C288. [3] Warren P. H., Gessler P. 2001. 32nd Lunar & Planetary Science Conference. Abstract #1970. [4] Domanik K. J. et al. 2004. *Meteoritics & Planetary Science* 39:567-579. [5] Mittlefehldt D.W. 1994. *Geochimica et Cosmochimica Acta* 58:1537-1552. [6] Takeda H. (1985) 16th Lunar & Planetary Science Conference:837-838. [7] Lorenz C. A. 2008. 48th Vernadsky/Brown Microsymposium on Comparative Planetology. Αβστραχτ #μ48_25. [8] Barrat J. A. et al. 2009. *Meteoritics & Planetary Science*. 44:A28.