TRACE ELEMENT ABUNDANCES IN MINERALS OF TWO NEW AND DISTINCT BASALTIC SHERGOTTITES, NWA 856 AND NWA 1068. M. Wadhwa[1] and G. Crozaz[2], [1]Dept. of Geology, The Field Museum, 1400 S. Lake Shore Dr., Chicago, IL 60605, USA (mwadhwa@fieldmuseum.org), [2]Dept. of Earth and Planetary Sciences and Laboratory for Space Sciences, Washington University, St. Louis, MO 63130, USA.

Introduction: Two new basaltic shergottites, NWA 856 and NWA 1068, were recently recovered from the Moroccan Sahara. NWA 856 is comprised mostly of mm-sized grains of pyroxenes (pigeonites and augites) and laths of plagioclase (converted by shock to feldspathic glass) [1]. NWA 1068 consists of olivine megacrysts surrounded by a fine-grained groundmass of pyroxenes and feldspathic glass [2]. However, despite the obvious petrologic differences, the whole rock REE patterns of both of these new shergottites are almost flat and similar to those of Shergotty and Zagami [1,2]. This is not unexpected for NWA 856, as it is also texturally similar to Shergotty and Zagami. However, for NWA 1068, the relatively high LREE concentrations in the whole rock is an unusual characteristic since all the other known olivine-bearing basaltic shergottites (e.g., EETA79001A) have extremely LREE-depleted bulk rock patterns. Given this, constraints on the petrogenesis of these two new basaltic shergottites could provide a unique insight into the relationship between the basaltic shergottites that contain olivine megacrysts and those that do not. With this goal in mind, we have made ion microprobe analyses of trace and minor element concentrations in minerals of NWA 856 and NWA 1068.

Results: As is typical of all basaltic shergottites, merrillite dominates the whole-rock REE budget in NWA 856 and NWA 1068 (La ~500 × CI). In NWA 856, we also analyzed chlorapatite; it has a REE pattern similar to that of merrillite but abundances that are lower by an order of magnitude. Feldspathic glass has a steeply LREE-enriched pattern with a positive Eu anomaly (Eu/Eu* >20) in both meteorites. As in the other basaltic shergottites, pyroxenes are extensively zoned in their major, minor and trace element concentrations. In pigeonites of NWA 856, abundances of Ti vary by a factor of ~4, while those of Y and Zr vary by a factor of ~10-20; the variations of these elements in pigeonites of NWA 1068 are somewhat smaller. Nevertheless, these pigeonite compositions lie along the same trend as that defined by pigeonites of Shergotty, Zagami and the EETA79001A groundmass [3]. Analysis of an olivine megacryst in NWA 1068 shows a V-shaped pattern, which is likely to have resulted from the addition of LREE during terrestrial weathering. We also analyzed a glassy melt inclusion within an olivine grain, the REE pattern of which is parallel to that of the NWA 1068 whole rock [2].

Inferences: As for other basaltic shergottites, closed system crystal fractionation appears to have been the dominant process during crystallization of NWA 856 and NWA 1068. Furthermore, the REE compositions of the parent melts of these shergottites were most similar to those of Shergotty and Zagami. Although textural evidence supports a xenocrystic origin for olivines in NWA 1068 [2], the REE abundances in the glassy melt inclusion indicate that if these olivines are not phenocrysts, they nevertheless formed from a magma with a REE composition similar to that of the NWA 1068 parent melt.

References: [1] Jambon A. et al. (2001) *Meteorit. Planet. Sci.*, 36, Suppl., A90. [2] Barrat J. A. et al. (2002) *LPS XXXIII*, #1538. [3] Wadhwa M. et al. (1994) *Geochim. Cosmochim. Acta*, 58, 4213-4229.