M702.1

DAR AL GANI 262: THE FIRST LUNAR METEORITE FROM THE SAHARA. A. Bischoff and D. Weber, Institut für Planetologie, Westfälische Wilhelms-Universität Münster, Wilhelm-Klemm-Strasse 10, 48149 Münster, Germany.

On April 10, 1997, we received the exciting message that (probably) the first lunar meteorite has been found in the Sahara. The first studies in the days following the discovery revealed that Dar al Gani 262 is indeed the thirteenth lunar meteorite: a polymict anorthositic lunar highland breccia.

Dar al Gani 262 was found March 23, 1997, in the Libyan part of the Sahara. A single fragment weighing 513 g was recovered. Thus, Dar al Gani 262 is one of the largest lunar meteorites.

The surface of a thin slice is shown in Fig. 1. Dar al Gani 262 is a polymict lunar highland breccia containing abundant light-colored clasts embedded in a tough fine-grained matrix. Some of the lithic clasts reach a size of ~1 cm.

Mineralogy: Two polished thin sections were prepared (PL97062, PL97063). The rock is moderately weathered and contains several fractures filled with terrestrial calcite and, occasionally, Ba-sulfate. In addition to these filled fractures, abundant impact melt veins cut across the entire thin sections.

Concerning the clast population, Dar al Gani 262 contains clasts very similar to other lunar highland regolith breccias [e.g., 1,2].

Recrystallized anorthositic rocks and breccias, granulitic lithologies, and feldspathic fine-grained to microporphyritic crystalline impact melt breccias are the most abundant rock types. Dar al Gani 262 contains several glass fragments (partly recrystallized) and two (devitrified) glass spherules. Mafic components like mafic crystalline melt breccias as found in other lunar meteorites are extremely rare. Within the fine-grained matrix of the breccia and within the shock veins, Fe,Ni-metal particles with variable Ni concentrations (5–26 wt%) occur. The matrix of Dar al Gani 262 is well consolidated and the porosity is approximately zero.

Plagioclase in the bulk rock is anorthite (mostly $An_{>95}$). Olivine and low-Ca pyroxene are variable in composition (Fa_{20-71} and Fs_{26-63} respectively). Ilmenite, troilite, and Ti-,Cr-spinel were identified as accessory phases.

Shock Effects: As is the case for all polymict impact breccias, the lithic and mineral clasts belong to an unknown number of shock events and show various degrees of shock. Most of the shock features result from processes that occurred prior to breccia lithification and shock-induced ejection from the Moon (e.g., formation of impact melt breccias, anorthositic breccias, and impact melt spherules). Dar al Gani 262 contains maskelynite-rich clasts (anorthosites) not observed in QUE 93069. However, since these clasts occur close to fragments in which feldspar shows only weak undulatory extinction, *in situ* formation of maskelynite can be ruled out. Most olivines show planar fractures; in several cases mosaics can be observed. These shock features indicate that the bulk rock must have been shocked to 15–20 GPa [3,4]. The impact melt veins that cut across all lithologies were certainly formed after lithification.

Summary: As already indicated by the description of the major lithologies, the rock is highly feldspathic. Preliminary X-ray bulk chemical analysis revealed the following concentrations (in wt%): Mg 2.4, Al 15.2, Si 20.3, Ca 13.1, Fe 3.5. Based on these data Dar al Gani 262 would have the highest Al and Ca concentrations among the lunar meteorites [cf. 2]. The Ca value, however, is probably influenced by the presence of terrestrial calcite that fills several cracks of the meteorite. The mineralogical and (preliminary) chemical data may constrain possible areas of the Moon from which the breccia was derived. The source area of Dar al Gani 262 must be a highland terrain lacking significant mafic impact melts or mare components.

References: [1] Bischoff A. (1996) *Meteoritics & Planet. Sci., 31*, 849. [2] Palme H. et al. (1991) *GCA, 55*, 3105. [3] Stöffler D. et al. (1991) *GCA, 55*, 3845. [4] Bischoff A. and Stöffler D. (1992) *Eur. J. Mineral., 4*, 707.