DAR AL GANI 962: A LIBYAN SILICATED IAB IRON WITH SIMILARITIES TO LANDES. S. M. Kuehner[1], A. J. Irving[1,6], T. E. Bunch[2,6], D. Rumble, III[3], G. A. Jerman[4] and P. P. Sipiera[5,6] [1]Dept. of Earth & Space Sciences, University of Washington, Seattle, WA 98195 (kuehner@ess.washington.edu), [1]Dept. of Geology, Northern Arizona University, Flagstaff, AZ 86011, [3]Geophysical Laboratory, Carnegie Institution, Washington, DC 20015, [4]NASA Marshall Space Flight Center, Huntsville, AL 35812, [5]Field Museum of Natural History, Chicago, IL 60605, [6]Planetary Studies Foundation, Galena, IL 61036.

Introduction: A dense 130 gram stone found on the Dar al Gani plateau, Libya in 1999 was previously thought to be an ungrouped anomalous mesosiderite [1], but new analyses show that it is instead a silicated IAB iron very similar to Landes (from West Virginia).

Figure 1. *Discovery image of DaG 962 imbedded in desert pavement. Photo © R. and R. Pelisson.*

Petrography: Dar al Gani 962 consists of angular clasts of a silicate-rich lithology (~45 vol.%) within a metal-rich matrix (see Figures 2, 3). Our new electron microprobe studies have essentially confirmed the findings of [1] about the compositions of the major phases, but we have now identified daubreelite, schreibersite and magnesiochromite as accessory phases.

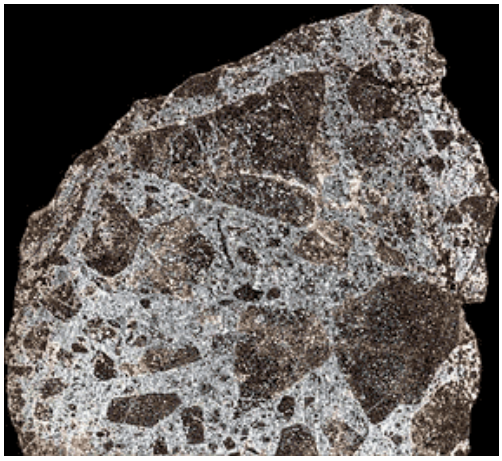
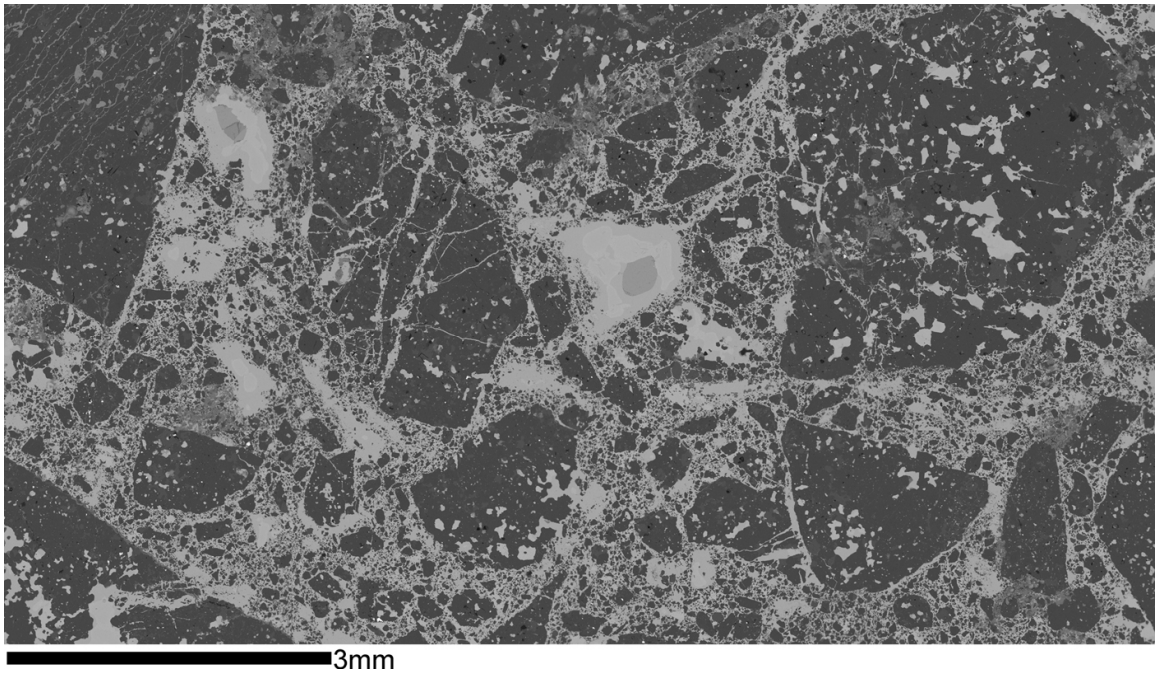


Figure 2. *Polished cut face of DaG 962, showing angular silicate-rich clasts within a metal-rich matrix. Width = 5 cm. Photo © R. and R. Pelisson.*

Figure 3 (below). *Back-scattered electron image of DaG 962 showing darker silicate clasts (mostly Mg-rich olivine and pyroxenes with accessory metal and sulfides) surrounded by metal-rich matrix. Grayer veinlets are iron hydroxides resulting from terrestrial weathering of primary metal.*



The silicate-rich clasts have a relatively equigranular (metamorphic) texture, and consist of forsterite ($Fa_{0.2\text{-}1.9}$), enstatite ($Fs_{0.1\text{-}2.3}Wo_{0.6\text{-}1.8}$), diopside ($Fs_{0.3}Wo_{46.0}$) and sodic feldspar ($An_{2.0\text{-}14.1}Or_{2.1\text{-}3.0}$), with accessory kamacite, taenite, troilite (containing 0.4 wt.% Cr), daubreelite and schreibersite. The presence of chromian troilite, daubreelite and schreibersite suggests that this specimen has affinities to IAB irons and winonaites rather than any type of mesosiderite (which additionally do not contain such very magnesian silicate phases). The matrix regions consist mainly of kamacite and taenite with accessory vanadian magnesiochromite [Cr/(Cr+Al) 0.861-0.886, Mg/(Mg +Fe) 0.925-0.903, V_2O_3 1.0-1.1 wt.%].

Oxygen Isotopes: Replicate analyses of acid-washed silicate-rich material by laser fluorination gave, respectively: $\delta^{18}O$ = 7.08, 8.31; $\delta^{17}O$ = 3.42, 4.12; $\Delta^{17}O$ = -0.307, -0.252 per mil. These data plot very close to the broad trend for IAB/IIICD irons and winonaites established by previous analyses (Figure 4).

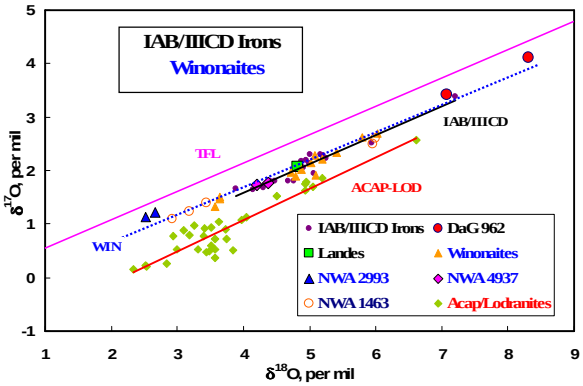


Figure 4 . *Oxygen isotopic compositions of DaG 962, Landes, other IAB/IIICD irons, winonaites and related meteorites, and acapulcoites/lodranites. Note that plotted points for NWA 1463 include data for paired winonaite-related chondrites NWA 725, NWA 1054 and NWA 1058. Lines are regressions through each of the datasets for IAB/IIICD irons and silicate-rich specimens (mostly highly equilibrated, but some chondrule-bearing) related to winonaites and acapulcoites. Data from [2], [3], [4] and unpublished laser fluorination analyses.*

Comparison with Landes and other IAB irons: Dar al Gani 962 shares many similarities with the Landes silicated IAB iron [5]. Both specimens consist of angular silicate-rich clasts in a metal-rich matrix, and have similar mineralogy; both contain accessory daubreelite and vanadian chromite, although the chromite in Landes is much less magnesian that that in DaG 962. Among other silicated IAB irons, Woodbine has some similarities[6] but Lueders differs in overall texture [7].

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References: [1] *Meteorit. Bull.* **86** (2002); Cole K. et al. (2002) *65th Met. Soc. Mtg.*, #5066 [2] Clayton R. and Mayeda T. (1996) *Geochim. Cosmochim. Acta* **60**, 1999-2017 [3] Bunch T. et al. (2007) *Lunar Planet. Sci. XXXVIII*, #2211 [4] Irving A. et al. (2007) *Lunar Planet. Sci. XXXVIII*, #2254 [5] Bunch T. et al. (1972) *Meteoritics* **7**, 31-38 [6] Mason B. (1967) *Mineral. Mag.* **36**, 120-126 [7] McCoy T. et al. (1996) *Meteorit. Planet. Sci.* **31**, 419-422.