Dhofar 1428

Anorthositic regolith breccia

213 g

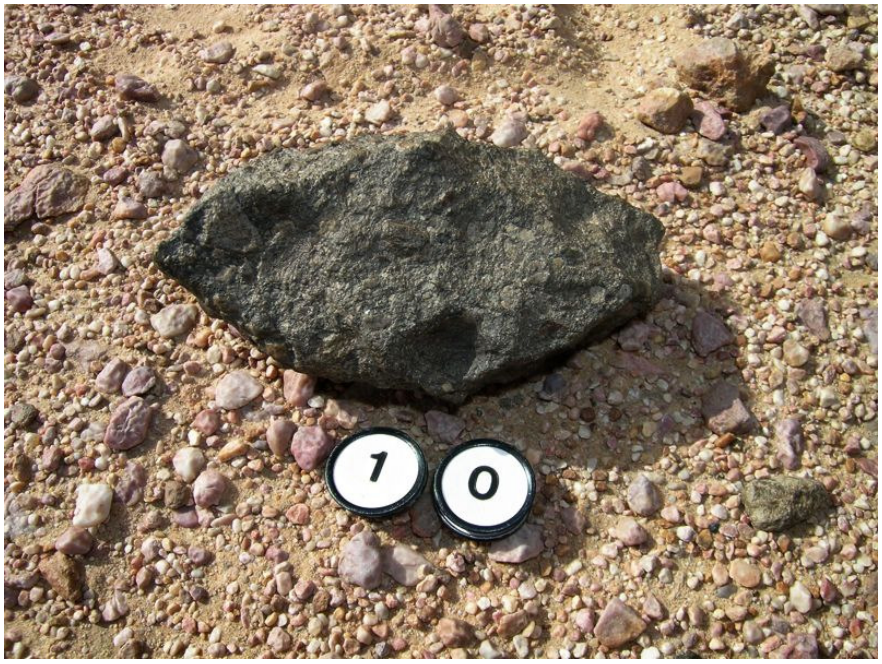

Figure 1: Photo of Dhofar 1428 with ~ 1 inch diameter disks for scale (photo from R. Korotev and M. Farmer).

Introduction

Dhofar 1428 (Fig. 1) was found in the Dhofar region of Oman (Fig. 2) in March, 2006 (Connolly et al., 2006). The 213 g brownish gray stone lacks fusion crust, and has feldspathic clasts in a fine grained dark matrix (Fig. 3).

Petrography and mineralogy

Dhofar 1428 is mainly an anorthositic breccia consisting of many mineral fragments and lithic clasts in a fine grained matrix. Plagioclase feldspar has a narrow compositional range between An_{93} and An_{98}, and olivine between Fa_{25} and Fa_{36} (Connolly et al., 2006; Bunch and Wittke, 2006; Hidaka et al., 2009). In addition to the anorthosite clasts, there are norites, anorthositic gabbros, troctolites, granulites, and ophitic to subophitic basalts (Zhang et al., 2009). The groundmass consists of plagioclase, pyroxene, opaques, glass, and a vesicular glassy melt (Hidaka et al., 2009).

Glassy fragments have two major compositions (Zhang et al., 2009). One contains moderate Al_2O_3 and FeO + MgO contents (15.9–17 wt% and 16.4–18.9 wt%, respectively) and has an Mg# value of 0.5. The other group of glass fragments contains high Al_2O_3 contents (26.1–29.7 wt%) and low FeO + MgO contents (8.3–14.4 wt%). The glassy matrix is feldspathic, with high Al_2O_3 (25.6–33.3 wt%, avg. = 31 wt%) and low FeO + MgO (3.91–13.1 wt%) (Zhang et al., 2009).

Chemistry

Dhofar 1428 contains 28.7 wt. % Al_2O_3, 4.30 wt. % FeO and 4.67 wt. % MgO, which are within the range of Apollo FAN rocks (Hidaka et al., 2009). Dhofar 1428 is mostly composed of FAN materials. However, compared to FAN, Dhofar 1428 has a slightly high content of K, which is consistent with the presence of K-rich plagioclase. The REE abundances of Dhofar 1428 are slightly higher than those of typical FANs. These data indicate that Dhofar 1428 contains small amounts of KREEP materials, and thus this meteorite may be derived from a location in or close to the Procellarum KREEP Terrane.

Siderophile element contents of Dhofar 1428 are 185 ppm Ni, 6.3 ppb Ir and ~2.9 ppb Au, which are among concentration levels for feldspathic lunar meteorites. The Ni/Ir ratio is almost the same as that for CI-chondrite, while the Ir/Au ratio is lower than CI values, suggesting that the projectile was relatively enriched in Au compared with CI chondrite, like enstatite chondrites (Hidaka et al., 2009).

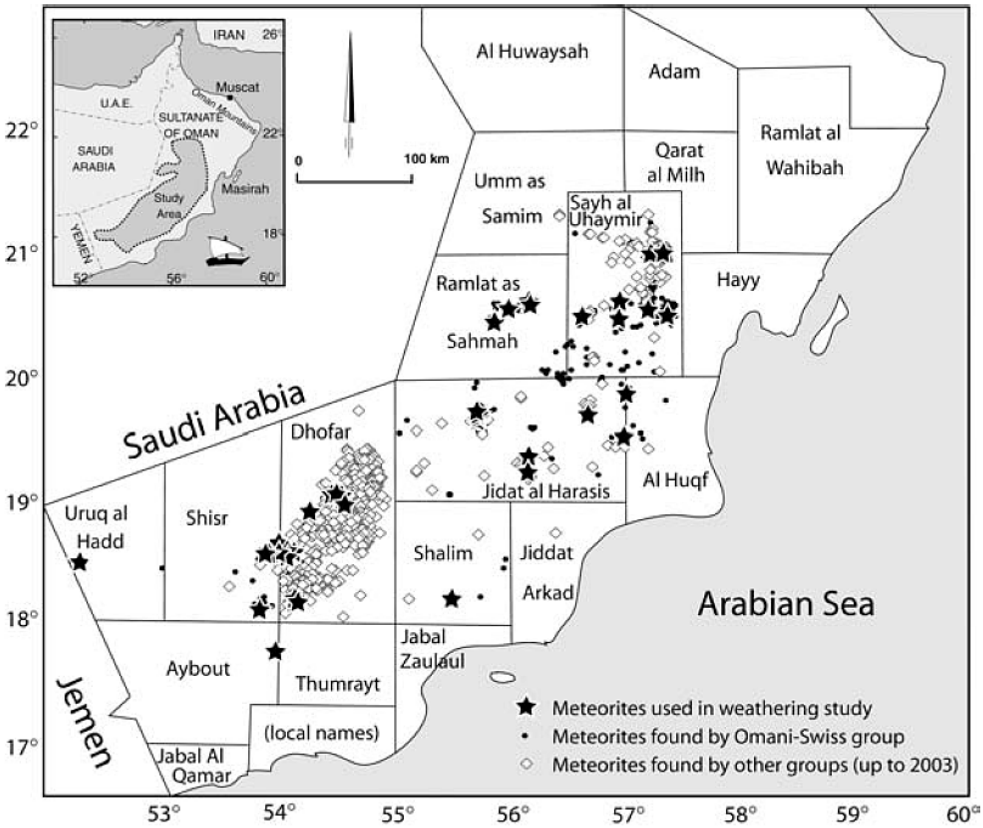

Figure 2: Map showing location of regions within Oman where meteorites have been recovered, such as Dhofar 1428.

Figure 3: Photo of a slab of Dhofar 1428, illustrating the variety of feldspathic clasts in a dark grey interior (photo by M. Farmer).

Radiogenic age dating

None yet reported.

Cosmogenic isotopes and exposure ages

None yet reported.

K. Righter, Lunar Meteorite Compendium, 2010.