Queen Alexandra Range 93069, 94269

Anorthositic regolith breccia

21.4, 3.1 g

Figure 1: QUE93069 as found in the Queen Alexandra Range of the Transantarctic Mountains, in 1993.

Introduction

On the 1993 to 1994 ANSMET expedition, a small 21.4 lunar meteorite, Queen Alexandra Range (QUE) 93069 (Fig. 1), was discovered in the southern part of the Walcott Neve area, during foot search of a moraine deposit called Footrot Flats (Figs. 2 and 3). Although immediately recognized as a possible lunar meteorite, it was not until later more careful studies revealed it to be a feldpsathic or anorthositic regolith breccia. The next search season, 1994-1995, another paired 3.1 g piece of this breccia was discovered in the same morainal deposit – QUE 94269. At the time these were the 13th and 15th lunar meteorites known.

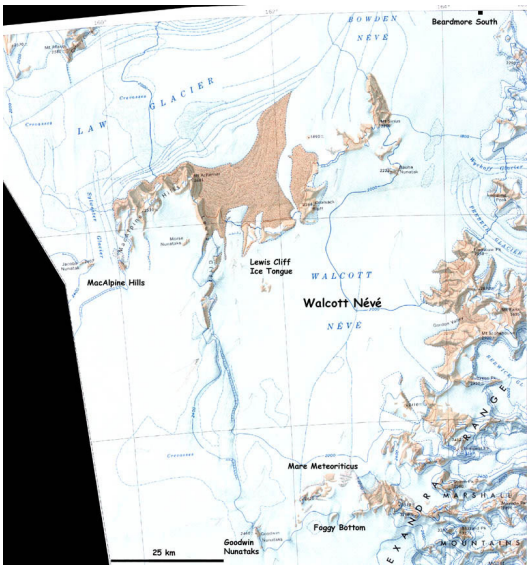


Figure 2: The Walcott Neve region of the Queen Alexandra Range, home of QUE meteorites. Foggy Bottom region is shown in the southern part of the map.

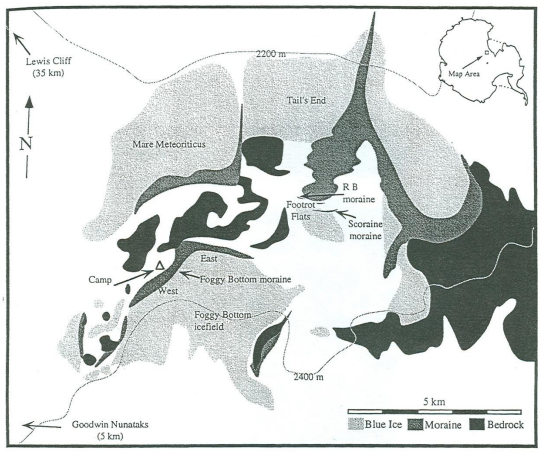


Figure 3: Footrot Flats region where QUE 93069 and QUE 94269 were discovered.

Petrography and Mineralogy

QUE 93069 is a polymict feldspar-rich regolith breccia. This classification is based on the presence of abundant glass spheres, fine grained granulitic breccias, and with few to none preserving original igneous textures (Fig. 4 and Table 1). Also, metallic flakes are distributed throughout the matrix, and inhomogeneously between clasts (Lindstrom et al., 1995).

Mineral fragments include plagioclase feldspar (An_{96-98}), olivine (Fa_{25-45}), and two pyroxenes with unexsolved, finely exsolved, and coarsely exsolved occurrences, as well as clasts of orthopyroxene and pyroxferroite (Fig. 5; Korotev et al., 1996).

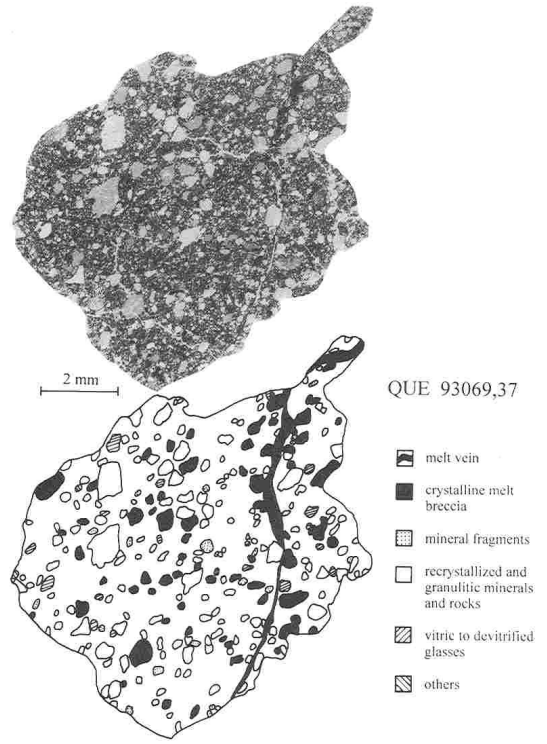
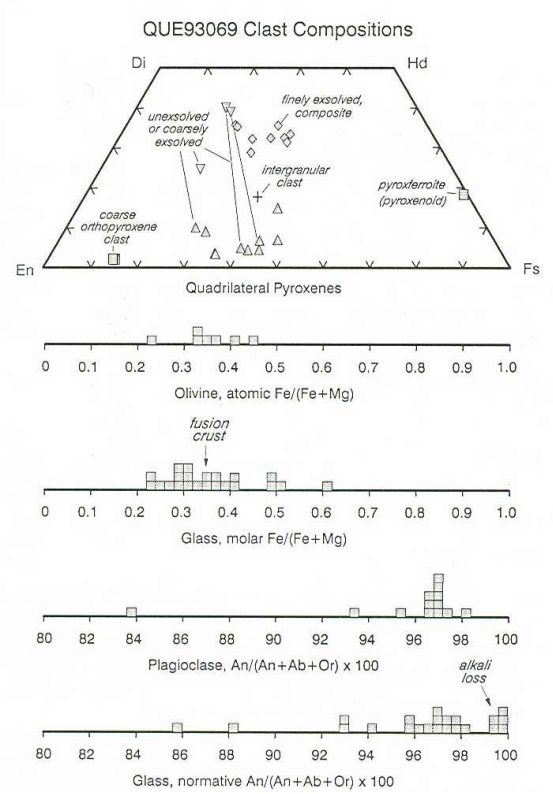


FIG. 1. Transmitted light photograph of the entire thin section of QUE 93069,37 and a sketch map showing the distribution of mineral and lithic clasts. An impact melt vein cuts across the entire thin section.

Figure 4: Photomicrograph and sketch of section ,37 from the study of Bischoff (1996).


QUE93069 Clast Compositions
Di
Hd
En
Fs
unexsolved or coarsely exsolved
finely exsolved, composite
intergranular clast
pyroxferroite (pyroxenoid)
coarse orthopyroxene clast
Quadrilateral Pyroxenes
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Olivine, atomic Fe/(Fe+Mg)
fusion crust
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0
Glass, molar Fe/(Fe+Mg)
80 82 84 86 88 90 92 94 96 98 100
Plagioclase, An/(An+Ab+Or) x 100
alkali loss
80 82 84 86 88 90 92 94 96 98 100
Glass, normative An/(An+Ab+Or) x 100

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ERROR: stackunderflow
OFFENDING COMMAND: ~

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