

## 14311/14308

Breccia sample 14311 was collected during EVA 2 at station Dg. Lunar surface photographs were not taken and the orientation is estimated from surface pitting. Sample 14308 consisted of 3 pieces which PET found to have been part of 14311 and are included herein. These three pieces were renumbered 14311,26; 14311,64; and 14311,65 (see model, page 359).

### PHYSICAL CHARACTERISTICS

Mass

3204.4 g

Dimensions

20.0 x 12.5 x 9.1 cm

This sample is a gray coherent breccia which is broken into pieces along fractures. There are only a few fragments > 1 mm (< 5%) and the rock is mostly (95%) crystalline matrix.

### SURFACE FEATURES

Slickensides are present on one face with grooves 3-5 mm apart. Glass lined zap pits range from 0.1 - 1 mm in size with a density of approximately 3 pits per square centimeter. Shock features include fractures and a few shocked lithic fragments. Vugs are present, aligned in a chain like fashion with individual chains spaced 1 cm apart (see also Twedell et al., 1978).

### PETROGRAPHIC DESCRIPTION

This fragmental polymict breccia consists of 5% clasts and 95% crystalline matrix. Mineral fragments and lithic clasts are present in subequal amounts. Some mineral fragments are as large as 5 mm and appear fresh. Plagioclase makes up 70% of the mineral fragments. The other 30% is composed of olivine and a black mineral (probably ilmenite). Lithic fragments are 70% crystalline rock fragments and 30% breccia fragments. Some lithic fragments grade into the matrix and it is probably derived from them. Most are leucocratic. There is an intricate relationship between the vugs and the matrix. The rock appears to be igneous in some respects, but the matrix has clast-like fragments. The single crystal clasts are large, fresh, and abundant. This rock is similar in binocular appearance to 14069.

In an attempt to characterize the nature of sample 14311, a selected group of thin sections with different parents were chosen for modal analysis of the  $\geq 1$  mm clasts.

A total of four thin sections were studied and the clast compositions noted. The samples examined with their proper parents designated were:

<u>Sample</u>	<u>Parent</u>	<u>Dominant Clast <math>\geq 1</math> mm</u>
14311,88	42	Anorthositic breccia, basaltic rock, dark
14311,95		metaclastic, light metaclastic.
14311,90	62	Plagioclase shards, dark metaclastic, basaltic rock, light metaclastic, olivine crystals, anorthositic breccia.
14311,91	31	Dark metaclastic, anorthositic breccia, plagioclase shards.

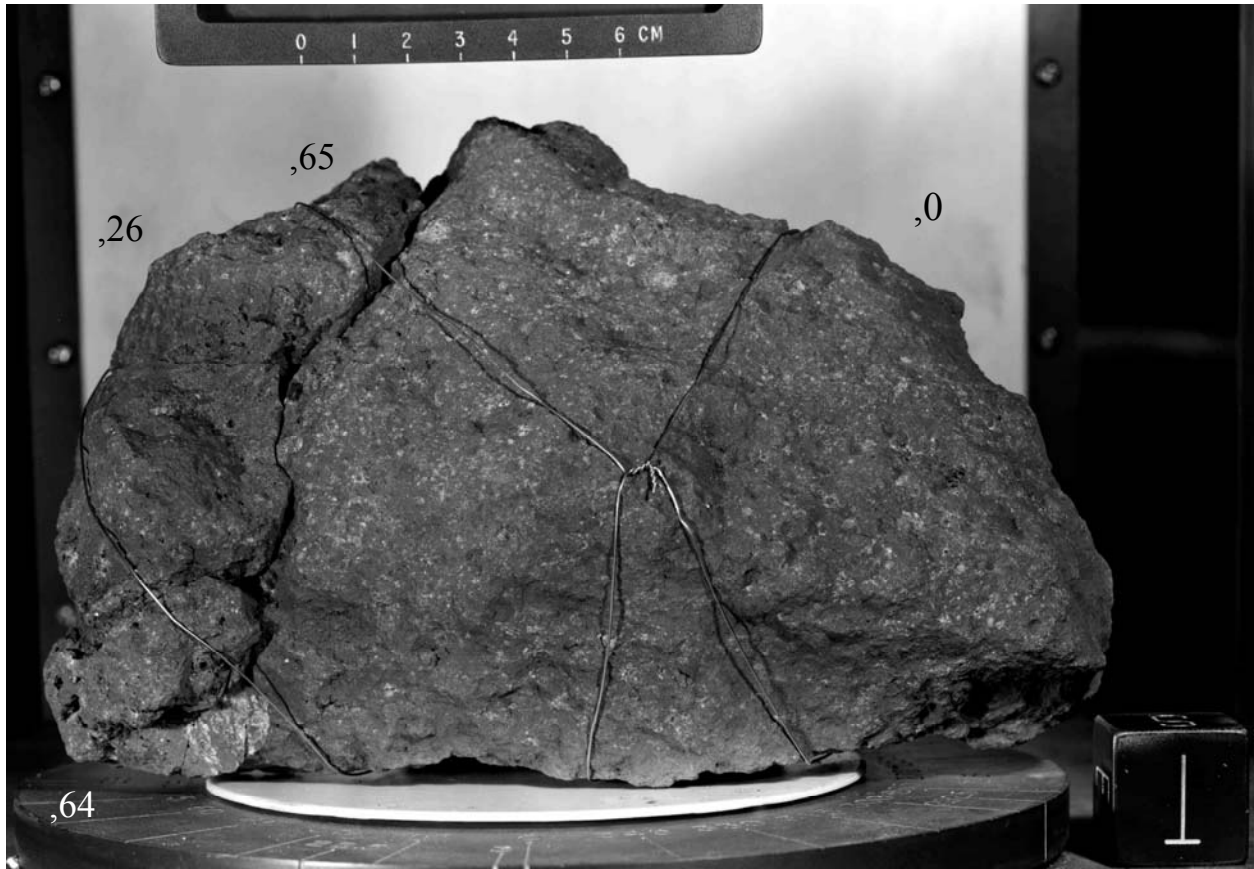
The results of this summary indicate that the predominate rock type in this generic is the dark metaclastic followed by (in order of decreasing abundance) anorthositic breccia, light metaclastic, plagioclase, basalt and olivine crystals.

## DISCUSSION

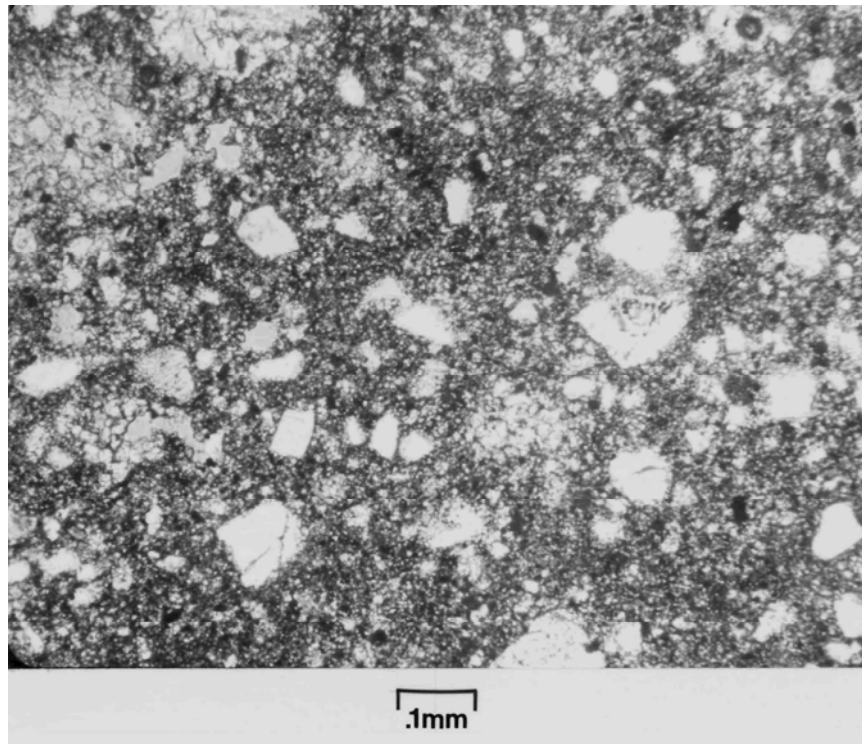
Sample 14311 was investigated by Wilshire and Jackson (1972) and classified as a coherent breccia with dark clasts and placed in their F<sub>4</sub> category. Warner (1972) lists it as a grade 5 metamorphic, and Chao et al. (1972) list 14311 as an unshocked, strongly annealed, Fra Mauro breccia, and 14308 as a strongly annealed, Fra Mauro breccia. Quaide and Wrigley (1972) classify it as an annealed breccia. Von Engelhardt et al. (1972) and Simonds et al. (1977) describe it as being glass poor with a crystalline matrix and a CMB, respectively.

Hart et al. (1972) list the exposure age of 14311 as  $3.4 \times 10^6$  years using particle tracks, Morrison et al. (1972) point out that a portion of 14311 without microcraters was buried at the time of collection, and that the cratered surface represents a single exposure interval. The surface residence time was calculated by them as being  $4.5 \times 10^5$  to  $2 \times 10^6$  years. Sample orientation of breccia 14311/14308 was determined by Horz et al. (1972).

Olivine clasts, with mantles formed by the reaction of the olivine with the breccia matrix, are noted by Cameron and Fisher (1975). They are also present in samples 14304 and 14319. Kesson (1975) attributed these reaction rims to metamorphism during burial in a hot ejecta blanket, using the breccia formation model of Warner (1972). Kesson believed, on the basis of her experimental model, that reaction rims can be formed over a period of years.



14311: .26 ,64 ,65 were originally 14308, the cube is 1 inch, S-71-22900



14311,93

## SAMPLE MODELS AND GENELOGIES

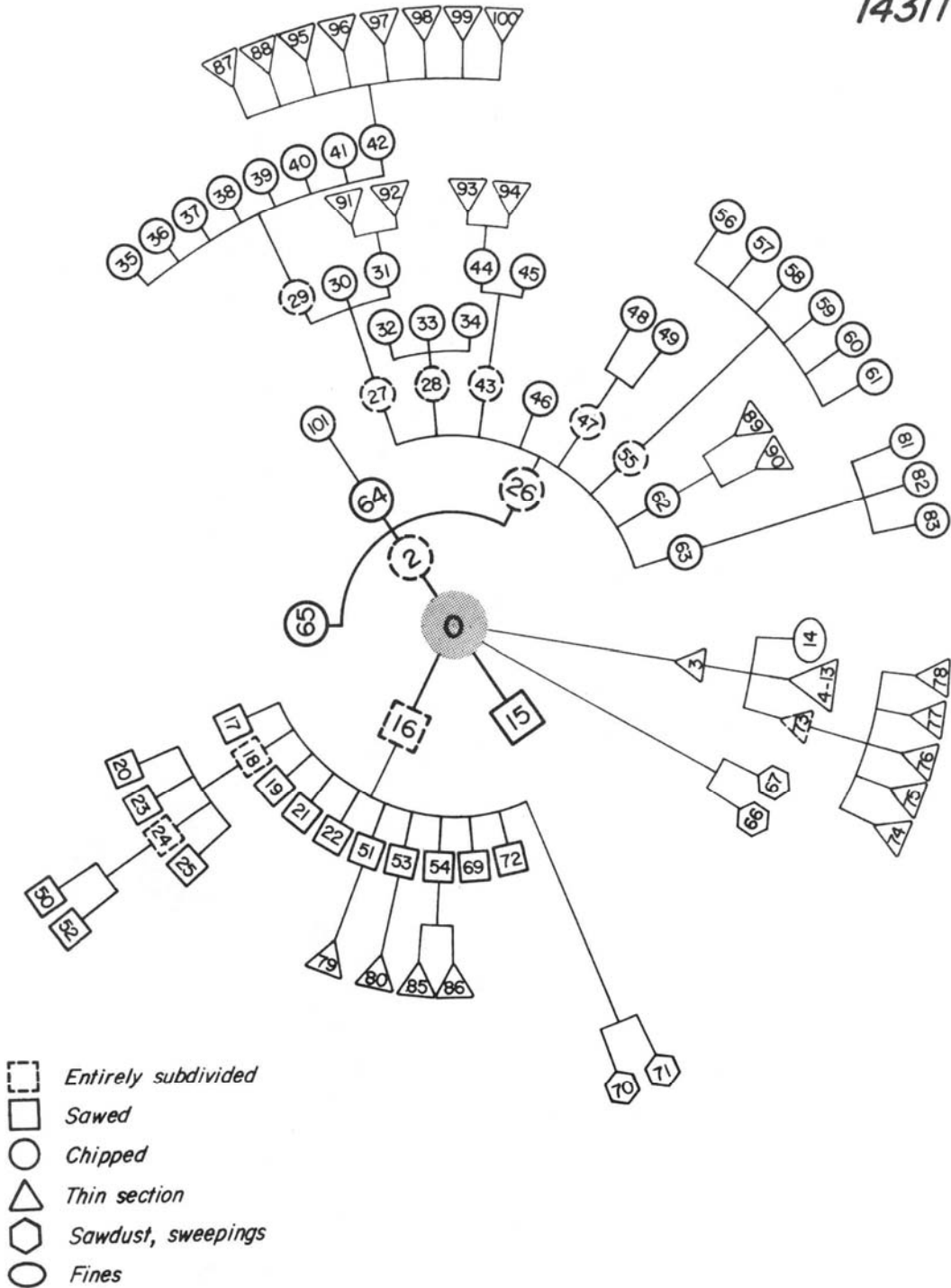
In order to facilitate the job of determining specific sample orientation and orientation within the parent, as well as for historical interest, models of the larger lunar samples have been constructed by the curatorial staff. Photographs of the models made of Apollo 14 samples are included in this section to acquaint the scientific community with their availability and to help lunar scientists identify the original location of their sample within the parent within the parent rock.

Genealogies of several Apollo 14 samples have been made and are also included. These genealogies do not reflect any processing which has taken place since the first thin section was made of each sample. It is hoped that these methods of illustrating samples will prove useful, and will become a routine part of sample documentation procedure.



Model of 14311, S-78-26754

14311



Sample Genealogy