**GRANULITIC MATRICES IN MONOMICT EUCRITES** Akira Yamaguchi and Hiroshi Takeda, Mineralogical Institute, Faculty of Science, University of Tokyo, Tokyo 113, Japan.

The lunar highland breccias have closer textural affinities to some part of eucritic breccias than are found in other meteoritic breccias. The granulitic breccias are recognized as thermally metamorphosed fragmental breccias in early history of the lunar highland. The texture of granulitic breccias are extremely varied, ranging from granoblastic to poikiloblastic, from homogeneous to heterogeneous, and form coarse- to fine-grained [1]. We found that Yamato (Y) -74356,10 and Stannern have textural similarities to lunar granulitic breccias in addition to Millbillillie [2], [3]. The purpose of this study is to investigate "eucritic granulites" and compared with lunar granulitic breccias (67235,5, 76230,12, and 79215,55) mineralogically and petrographically.

Y74356,10. This meteorite was the first monomict eucrite found in Antarctica [4]. This eucrite is composed of ophitic clasts, granulitic pyroxene clasts, comminuted mineral fragments and granoblastic clastic matrix. The granulitic clasts are composed of fine-grained (< 80 $\mu$m in diameter) polygonal pigeonite, augite, minor minerals such as ilmenite and silica mineral. Microscopic observation shows granoblastic texture similar to lunar granulite 79215,55. The SEM observation indicates that the clastic matrix of Y74356,10 composed of polygonal mineral fragments with high porosity (~10 %) (Fig. 1a). The fragments in the matrix are usually subrounded to rounded, but some are angular. Many grain boundaries show 120° triple points juncture. Pyroxene compositions fall along a single tie line in the pyroxene quadrilateral ranging from $Ca_4Mg_{38}Fe_{58}$ to $Ca_{37}Fe_{31}Fe_{32}$. Pyroxenes in the ophitic clasts show cloudy appearance. Zoning of plagioclase crystals from $An_{86}$ to $An_{94}$ are preserved.

Stannern. Stannern is a typical example of the ordinary eucrites [4]. The specimen we examined is composed of medium-grained clasts to fine-grained subophitic clasts, and comminuted matrix. The large clasts show subophitic texture of pyroxene and plagioclase. The SEM observation revealed that the clastic matrix of Stannern are comminuted, compacted, and partly recrystallized. Minerals in the matrix are polygonal to subround more than 10 $\mu$m (Fig. 1b). Although the pyroxene compositions of the clasts and matrices fall along the single tie line in the pyroxene quadrilateral ranging from $Ca_{2.4}Mg_{36.7}Fe_{60.9}$ to $Ca_{42.8}Mg_{30.1}Fe_{27.1}$, remnant of the Mg-Fe-Ca trend is observed. Plagioclase crystals are zoned from $An_{92}$ to $An_{75}$.

The petrographic textures of Y74356,10 and the matrices of Millbillillie and Stannern is similar to lunar granulitic breccias. Precursors of the both lunar and eucritic granulitic breccias are fragmental breccias which is derived from impact cratering event. However, in contrast to the lunar granulitic breccias, precursor of Millbillillie, Y74356, and Stannern is not polymict breccia but monomict breccias of non-cumulate eucrites. High porosity (~10%) of Y74356,10 indicates that this rock was not suffered from shock compaction before the thermal annealing.

Y74356, Stannern, and Millbillillie can be classified as eucritic granulitic breccias. Recrystallization of the clastic matrix indicates the post-shock thermal annealing. Presence of the eucritic granulitic breccias implies that extensive thermal annealing generated the ordinary eucrites are related to the brecciation event. However, matrix of Y74356 indicates that the impact cratering events which formed Y74356 have been not so strong as the events formed the polymict breccia.

Similarities in both granulitic textured rocks are textures and thermal histories. However, we conclude that, in contrast to the lunar counterparts, impact and thermal event which produced the eucritic granulitc breccias are not so extensive as those of lunar analogues and the ejecta deposits of the eucritic breccias were thinner than those of lunar granulites. It is interesting to note that these rocks represent products of early crustal evolution induced by cratering. However, the temperature must have been as high as the lunar one to make granulitic textures. The lunar granulites lost their original textures by thermal annealing, but eucritic granulites still keep the original crystallization textures. Thermal metamorphism and impact cratering are intimately related and major events for the early history of relatively large planetary bodies such as the HED meteorites parent body and Moon.

GRANULITIC MATRICES IN MONOMICT EUCRITES: A. Yamaguchi and H. Takeda

We thank to NIPR, NASA, and the Planetary Materials Database Collections of Mineralogical Inst., Univ. of Tokyo for the samples.

*REFERENCES.* [1] Lindstrom M.M. and Lindstrom D.J. (1986) *Proc.Lunar Planet. Sci. Conf. 16th, in J. Geophys Res..* 91, D263-D276. [2] Bobe K.D. et al. (1989) *Meteoritics.* 24, 252. [3] Yamaguchi A.et al. (1994) *Meteoritics.* in press. [4] Takeda H. (1979) *Icarus.* 40, 455-470. [5] Takeda H. et al. (1983) *Mem. Natl. Inst. Polar Res. Spec. Issue.* 20, 81-99.

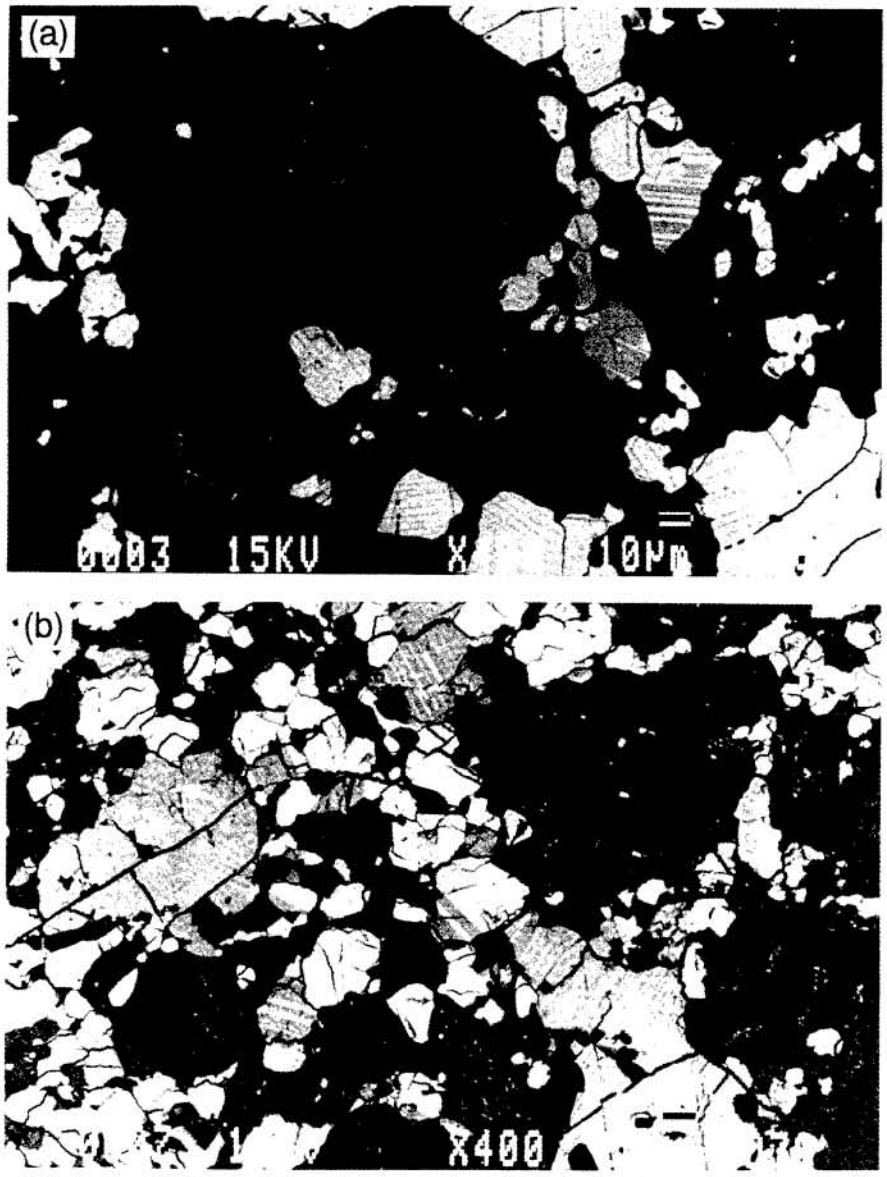


Fig. 1. Back scattered electron images of recrystallized clastic matrix. Dark grey: plagioclase, light grey: pigeonite; back: epoxy.