COMPARISON OF YAMATO AND VICTORIA LAND POLYMICT EUCRITES: A VIEW FROM MINERALOGY AND ISOTOPIC STUDY. Hiroshi Takeda[1,3] and Hiroshi Mori[1], J.L. Wooden[2], L.E. Nyquist[4], J.S. Delaney[3] and M. Prinz[3]. [1]Mineralogical Institute, Faculty of Science, Univ. of Tokyo, Hongo, Tokyo 113, Japan, [2]Lunar and Planetary Institute, 3303 NASA Road One, Houston, TX 77058, [3]Dept. of Mineral Sci., American Museum of Natural History, Central Park West @ 79th St., New York, NY 10024, and [4]SN4/NASA Johnson Space Center, Houston, TX 77058.

Polymict breccias of eucritic bulk composition, which are now called as 'polymict eucrite' have been recovered from the Yamato Mountains, Antarctica, by Japanese(JARE) teams(1,2), and from Victoria Land(Allan Hills, the Elephant Moraine), almost 3000 km from the Yamato Mountains by a joint U.S.-Japan team (1), and by the U.S. team in 1979(3). Because polymict eucrites are rare among the known meteorite collections, the new findings of many such eucrites from Antarctica, cast doubt on that some of them could be pieces from a single fall. To give better understanding of this problem, and their origin and evolution, we carried out comparison of the chemical compositions and exsolution textures of their pyroxenes in terms of microprobe and X-ray investigations on thin sections, which were produced from the same chips used for the isotopic study by the NASA group. Descriptions of previously known polymict eucrites from Yamato(4,5) Allan Hills(6,7,8) and Elephant Moraine(9) have been reported. ALH78006(8), Yamato790007(10), EET79004, and EET79011(11) have distinct features from others.

One of the new findings of this Consortium study is that several grains of inverted pigeonites with blebby inclusions of augite similar to those in Binda(BD-type) have been identified in thin sections of Y74450, Y74159, and Y75011. Their chemical compositions(Fig.1) are almost identical and are same as those in Y75015, which are intermediate between those in Binda and Moama (5). The host is an orthopyroxene inverted from pigeonite. Y790007 contains (10) a small lithic clast of the BD-type, which includes pyroxene $Ca_3Mg_{64}Fe_{33}$ and plagioclase An_{94}. Examination of new thin sections of Allan Hills polymict eucrites ALH76005, 77302, 78040, 78158, 78165 revealed that no fragment of such Binda-type pyroxene is present in the sections.

Another feature that is useful to distinguish identical fall is the chemical zoning of pyroxene, first identified(12) in a large lithic clast in Y75011(Fig,1). Two similar clasts about 4 mm in diameter have been found in Y75015,20(Fig.1). The clasts have coarse-grained subophitic textures with pigeonite crystals up to 1.5 mm in length. The clasts are characterized by dark mesostasis, and veinlets of Fe-rich olivine filling fractures in the pigeonites. The chemical variation from core to rim is from Mg to Fe side and extends to very Fe-rich end(Fig.1). This trend and the unique textures were interpreted to preserve the least altered state after crystallization and record combination of several unique shock and thermal events(13). One porphyritic clast 4 mm in diameter in Y74450,63 has large hollow pigeonite phenocrysts(2.6x0.4mm) in a variolitic matrix, which show chemical zoning from $Ca_4Mg_{70}Fe_{26}$ to the Fe-rich side.

Sr and Nd isotopic data have been determined for a variety of whole-rock, mineral, and clast samples from five Yamato, six Allan Hills, and three Elephant Moraine polymict eucrites. The majority of the Sr isotopic data for all samples lies along a 4.56 Ga reference isochron having an initial Sr ratio of 0.69898. The Nd isotopic data also scatter closely along a 4.56 Ga isochron with an initial Nd ratio very close to that of Juvinas. The Nd and Sr isotopic systematics of a few of these eucrites, particularly those from Elephant Moraine, have been affected by terrestrial weathering. Of the three

geographic groups of eucrites, the Yamato samples show the tightest grouping of Rb/Sr and Sm/Nd ratios, have the highest average Rb, Sr, Sm, and Nd concentrations, and therefore are most likely to be subsamples of a single population. The compositionally more diverse Allan Hills samples probably represent several distinct magmas and possibly two source regions with different initial Sr ratios. The compositional relationships among most of the Allan Hills samples, however, suggests that they developed on the same planetary surface and might also represent a single fall.

In summary, although similarities exist between Yamato and Victoria Land polymict eucrites, important differences result from differences in depth of excavation, local rock types and subsequent thermal reheating events. Many Allan Hills polymict eucrites do not contain fragments of cumulate eucrites of the BD-type, which are found uniformly in the Yamato group. In addition to the presence of the BD-type pyroxene in the Yamato group, a unique clast with Fe-Mg chemical zoning and olivine veinlets in pyroxenes in Y75011 and Y75015, and tightest grouping of Rb/Sr and Sm/Nd ratios, and similar modal composition(14) all indicate that they are most likely to be pieces from a single fall, and distinct from the Allan Hills group.

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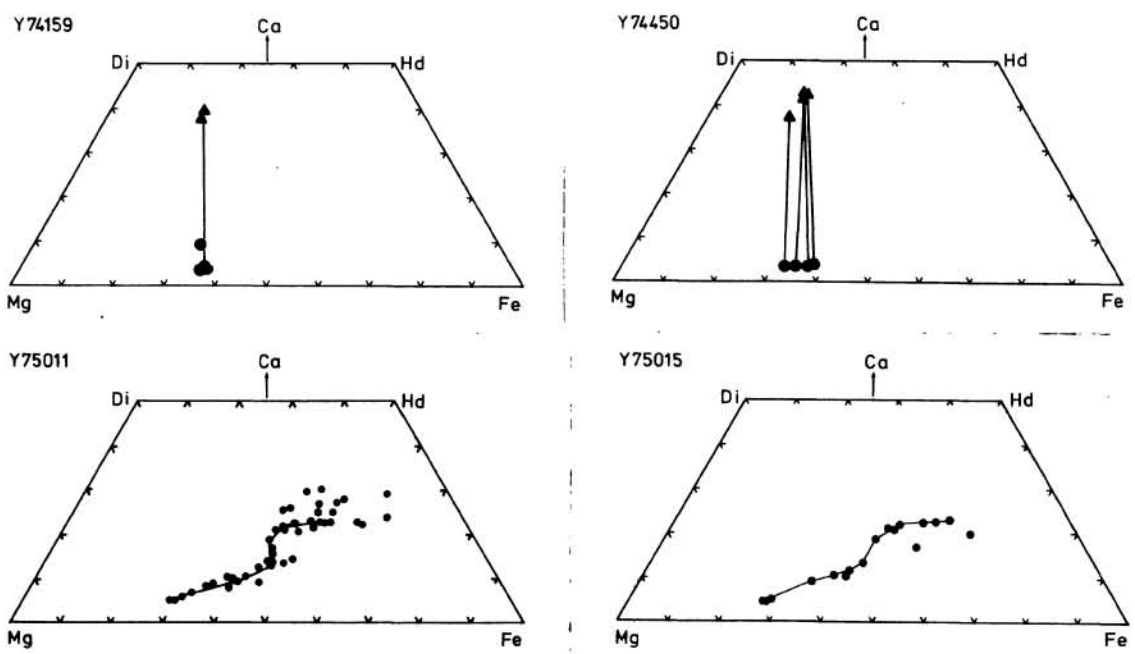

Fig.1. Selected pyroxene quadrilaterals of the Yamato polymict eucrites.