ACHONODRITE BINDA; ORDINARY EUCRITE OR THE ONLY CRYSTALLINE HOWARDITE? Keizo Yanai, Dept. of Env. Planetary Geosci., Faculty of Engineering. Iwate University, 4-3-5, Ueda, Morioka Iwate 020, Japan

Binda meteorite, originally classified as howardite (Hey, 1966), was re-classified as eucrite of monomict breccia (Duke and Silver, 1967). Binda was recognized as the most Mg-rich eucrite (or most Fe-rich diogenite) with crystalline-unbrecciated texture for long time. Therefore Binda is believed to have genetic significance in relation to eucrites and diogenites, because in howardite group Binda is the only specimen with unbrecciated or monomict and crystalline texture. Re-examination of Binda was carried out by EPMA, microscope analysis and wet chemical analysis. Binda is the most common (ordinary) encrite showing crystalline texture with slightly brecciatd.

Specimen of the Binda meteorite was provided by the Australian Museum to auther, the Antarctic meteorite curator of National Institute Polar Research, Tokyo. Binda shows a crystalline rock that is slightly coarse-grained and light-gray fresh interior with a lot of thin veinlets in black color. The thin section shows clearly igneous texture of pyroxene and plagioclase assembledge as similar to dolerite, with brecciated texture of numerous shoched black veins. The composition range of pyroxene are very limited on the mixing line of Opx ($\sim En_{37}Fs_{60}Wo_{3}$) and Cpx ($\sim En_{30}Fs_{26}Wo_{44}$). Plagioclase is also common type in eucrite group and its compositional range is $An_{80\text{-}93}$ with peak of An_{90}.

The new chemical analysis give the data for bulk sample (1.173g) of the Binda using method of the standard wet chemical analysis by H. Haramura. The new data contains 14.02% Al_2O_3 and 11.9% CaO and quite differ from the previous data by Anderson and Mingaye (1913), and McCarthy *et al.*, (1973). Fig. 1 shows chemical dada(CaO vs Al_2O_3) of all eucrites-howardites-diogerites with some other achondrites. In this figure, an inconsistency in their chemical data is distinct in Binda, such as some angrite and lunar meteorite. The inconsistency is cause by the difference of analytical method, heterogeneity of specimen, sample value and analyst. Fig. 2 shows the compositional data of Antarctic eucrites-howardites-diogenites analyzed by H. Haramura, together with the results of classification based on mineralogical and petrological studies. In the Fig. 2, the chemical data correspond completely with the their classified data, and indicate that Binda meteorite is one of the common type of eucrite.

The Binda meteorite is the common and ordinary eucrite. Mineralogical and petrological data supported this result. However, sample homogeneity or hetrogeneity of the Binda meteorite remain as ever.

Reference

Anderson, C. A. and Mingaye, J. C. H. (1913) Rec. Aust. Mus. 10, 49-52.
Duke, M. B. and Silver, L. T. (1967) Geochimica et Cosmochimica 31, 1637-1665.
Hey. M. H. (1966) British Museum (Natural History), p637.
McCarthy, T.S., Erlank, A.J. and Willis, J.P. (1973) Earth Planet. Sci. Letters, 18, 433-442.

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Table Chemical compositions of the Binda meteorite in weight percent.

	1	2	3
SiO_2		50.41	47.28
TiO_2		0.23	0.75
Al_2O_3	8.8	6.95	14.02
Fe_2O_3		-	0
FeO		16.83	17.50
MnO		0.54	0.48
MgO	16.2	17.75	7.31
CaO	6.2	5.82	11.90
Na_2O		0.20	0.06
K_2O		-	0.04
$H_2O(-)$		-	0.00
$H_2O(+)$		-	0.0
P_2O_5		0.04	0.15
Cr_2O_3		0.75	0.18
FeS		-	0.95
Ni(ppm)		-	22
Co(ppm)		-	<30
Total		99.52	100.62

1: Anderson and Mingaye, (1913)
2: McCarthy *et al.*, (1973): X-ray fluorescence spectromtry.
3: Analyst: H. Haramura, (1993):Standard wet chemical analysis.

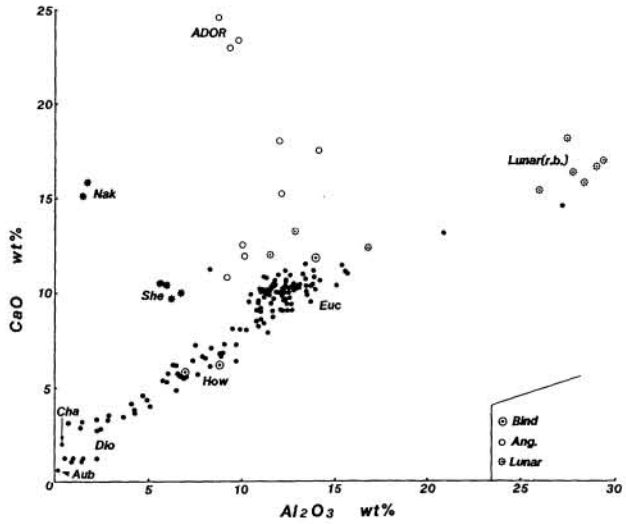

Fig.1. The correlation between Al_2O_3 and CaO of all analyzed previously eucrites-howardites-diogenites with some other achondrites, including Antarctic achondrites.

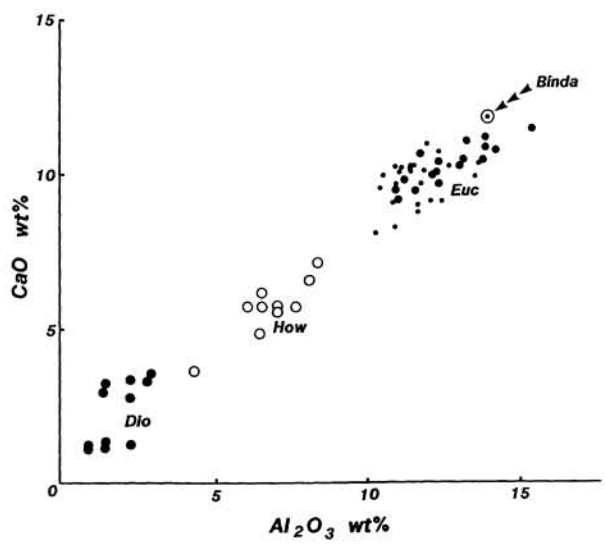

Fig.2. An excellent correlation between Al_2O_3 and CaO by mixing between eucrites and diogenites. The correlation correspond with the results of classification.
In this figure, only Haramura's data were selected.