CLASSIFICATION OF SEVERAL YAMATO-75 CHONDRITES (III)

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***Abstract*:** All the chondrites from the Yamato-75108 to -75257 have been considered to be originally one single body of meteorite which was broken into many fragments during its passage through the atmosphere. An electron microprobe analyzer was used to determine the chemical compositions of olivines and orthopyroxenes in five chondrites, *i.e.* Yamato-75135,93, -75136,93, -75140,50, -75140,51 and -75146,91. These chondrites are classified on the basis of textural characteristics of chondrule, matrix, igneous glass and secondary feldspar, and on the compositions of olivines and orthopyroxenes. The experimental results show that the chondrites are tentatively assigned to L group and petrologic type 4–5. These chondrites were possibly one single meteorite originally, together with eleven chondrites reported by MATSUMOTO *et al.* (Mem. Natl Inst. Polar Res., Spec. Issue, **12**, 72, 1979), and MATSUMOTO and HAYASHI (*Ibid*, **17**, 21, 1980). An unclassified chondrite, Yamato-75271,91, which was found at 5 km south of the area where the chondrites Yamato-75108 to -75257 were collected, is determined to be of L group and petrologic type 4–5 based on the same analytical method as the above five chondrites. The chemical compositions of plagioclases in these six chondrites show a wide variation from oligoclase to andesine.

1. Introduction

One hundred-fifty meteorites (*i.e.* from Yamato-75108 to -75257 chondrites) were found within a limited narrow area of about 10×50 m, by the 16th Japanese Antarctic Research Expedition, 1974–1976 (JARE-16) (MATSUMOTO, 1978).

As part of the preliminary examination of the Yamato meteorites collected during a period from 1975 to 1976 (MATSUMOTO, 1978), electron microprobe analyses of olivine and orthopyroxene in eleven chondrites have been carried out so far (MATSUMOTO *et al.*, 1979; MATSUMOTO and HAYASHI, 1980).

The first purpose of this study is to compile a catalog of the Yamato meteorites, which will be used as a guidebook in processing allocation and distribution of the meteorites for investigators in various fields. The second purpose is to explore the possibility that the chondrites Yamato-75108 to -75257 represent broken fragments of one single original meteorite. The third purpose is to determine the compositional variation of tiny crystals of plagioclase in type 4–5 chondrites.

In order to keep these many fragments clean which have been preserved at low temperature under an exceptionally clean environment, a polished thin section was made from a small chip near the surface of each meteorite. By means of an electron microprobe analyzer, the SiO_2, FeO, MgO and CaO contents of olivine and orthopyroxene have been determined to obtain the histograms of iron contents in the two minerals, where the analytical method proposed by DODD *et al.* (1967) was used.

For the rapid determination of petrologic subdivision of these chondritic meteorites, VAN SCHMUS and WOOD (1967)'s classification was used in this study.

The chemical compositions of plagioclase previously reported are almost restricted to those of type 6 meteorite, which contains large grains of plagioclase formed by extensive recrystallization. A paucity of reports on the composition of plagioclase in these many fragments of the Yamato-75 chondrites prompted us to investigate the composition.

2. Experimental Method

Among the one hundred-fifty meteorites (*i.e.* from Yamato-75108 to -75257 chondrites), twelve specimens of Yamato-75108 to -75115, -75129, -75131 and -75139 chondrites, of which Yamato-75110 was analyzed twice by electron microprobe analyzers for different areas, were tentatively classified as the petrologic type 4–5 of the moderately equilibrated ordinary chondrites, and the chemical group of these twelve chondrites corresponds to L group (MATSUMOTO *et al.*, 1979; MATSUMOTO and HAYASHI, 1980). Four meteorite fragments of Yamato-75110 chondrite (*i.e.* Yamato-75110,90, 91, 93 and 95 in four different sampling areas) which weighed 35–99 g were then selected to examine the possibility of their meteorite shower origin by MATSUMOTO *et al.* (1981). In order to investigate chemical inhomogeneity in the chondrite, thin sections were also made from two different sampling areas as Nos. 50 and 51 in Yamato-75140 chondrite. Such sampling area designated by the National Institute of Polar Research is indicated with subnumber after the sample number in this study; that is, Yamato-75140,50 and -75140,51, as shown in Table 1.

Compositional data were obtained on the carbon-coated, polished thin sections of about 20–50 mm^2 area by using Japan Electron Optics Laboratory model JXA-50A electron microprobe at the Department of Mineralogical Sciences, Yamaguchi University by one of the authors, MIÚRA. The instrument was operated at 15 kV and 3.0×10^{-8} A specimen current. An expanded electron beam (5 μm diameter) was used to obtain reliable data (especially in plagioclase). Each analytical point is selected sufficiently far from grain boundary to avoid edge effect, and at least four consecutive 10-s periods are counted on the same spot. Among these five specimens of Yamato-75135,93, -75136,93, -75140,50 and 51, and -75146,91 chondrites, the constituent minerals of Yamato-75140 were repeatedly analyzed in each polished thin section from two different parts of the chondrite for standard.

An unclassified Yamato-75271,91 chondrite which was found at 5 km south of the area of collection of the above five chondrites was also studied with the same

Table 1. Petrologic type determined by textural characteristics of several Yamato-75 chondrites.

Sample No.	Texture of chondrule	Texture of matrix	Igneous glass	Development of feldspar	Petrologic type
Yamato -75135,93	Readily delineated	Transparent micro-crystalline	Turbid glass	Microcrystalline aggregates and interstitial glass	4–5
Yamato -75136,93	Well defined and readily delineated	Transparent micro-crystalline	Turbid glass	Microcrystalline aggregates	4–5
Yamato -75140,50	Well defined and readily delineated	Micro-crystalline and weakly re-crystallized	Turbid glass	Microcrystalline aggregates	4–5
Yamato -75140,51	Readily delineated	Micro-crystalline and weakly re-crystallized	Turbid glass	Microcrystalline aggregates	4–5
Yamato -75146,91	Well defined and readily delineated	Micro-crystalline and weakly re-crystallized	Turbid glass	Microcrystalline aggregates	4–5
Yamato -75271,91	Well defined and readily delineated	Micro-crystalline and weakly re-crystallized	Turbid galss	Microcrystalline aggregates	4–5

method.

The quantitative chemical analyses of olivine and orthopyroxene were conducted with the method of BENCE and ALBEE (1968) and ALBEE and RAY (1970), by using the correction factors for 35° take-off angles (JXA-50A probe) generously provided by ALBEE (private communication to one of the authors, MIÚRA, 1977) which were stored to the Sharp-7200 minicomputer having a 12 k bytes word memory. This new calculation system of BENCE and ALBEE's method was checked with the standard specimens of plagioclase which was reported by one of the authors, MIÚRA (*cf.* MIÚRA, 1978; MIÚRA and TOMISAKA, 1978).

Measurements for each thin section were made on about 30 points on the different chondrules of both olivine and orthopyroxene. The grain-size of chondrule is, however, remarkably variable from section to section. The homogeneity of the composition of mineral was checked by monitoring the peak-intensities of nine elements (*i.e.* Na, K, Mg, Fe, Si, Mn, Al, Ca, Ti) with the scanning technique.

Grains with total weight percents (SiO_2+FeO+MgO+CaO) outside the range between 99 and 101 wt% were ascribed to inaccurate analyses and were rejected. Any analyses in which the Si, Fe, Mg and Ca contents were inappropriate for either olivine or orthopyroxene were also discarded. Thus, the total number of measurements was generally less than 20 for each sample. Atomic % of magnesium, calcium and iron in the olivine and pyroxene were calculated with a Sharp PC-7200 minicomputer. Then the "percent mean deviation" proposed by DODD *et al.* (1967) was also calculated by the minicomputer. In this paper, the mean deviation and "percent mean deviation" are shown with the atomic percent of iron, according to the previous work by YANAI *et al.* (1978).

Plagioclase fragments are also found in each specimen, almost about several tens of micrometers square. Some fragments, however, are too tiny to get constant count, especially in Na and Ca elements for four consecutive 10-s counting periods. The Or-Ab-An percentages of each analyzed grain were automatically obtained by the minicomputer.

Although the parameter "percent mean deviation" has been used as an indicator of the heterogeneity of olivine and pyroxene (*cf.* DODD *et al.*, 1967), it is found that the frequency distribution of atomic percent of iron is surely useful in this study.

3. Textural Characteristics

The six chondrites belong to L-group chondrite showing texture of considerably low crystallinity. Some chondrules are easily defined in their shapes and others are hardly defined. Internal textures of chondrules are well preserved and they are classified into barred-olivine (Figs. 1, 2, 3 and 8), porphyritic-olivine (Fig. 4), graphic-olivine (Fig. 5), radial-olivine (Figs. 6, 7, 13 and 14), granular-olivine, porphyritic olivine-orthopyroxene (Fig. 12), barred olivine-orthopyroxene (Figs. 9 and 10) and micro-radiated orthopyroxene-olivine (Fig. 11) chondrules. Cryptocrystalline and microcrystalline textures are also preserved. Some chondrules show several concentric textures (Figs. 5, 8 and 12). Some chondrules contain glass or wholly devitrified glass or extremely fine-grained materials with a small amount of plagioclase (*cf.* Figs. 2, 3, 6, 7, 9, 10, 13 and 14). Some chondrules have glassy of poorly recrystallized rims (*cf.* Figs. 7 and 10).

Barred-olivine chondrules are mainly composed of parallel sets of olivine crystals and glass of weakly devitrified glass. Porphyritic-olivine chondrules consist mainly of medium-grained olivine crystals and glassy or cryptocrystalline materials. Olivine of porphyritic chondrule is rarely rimmed by a narrow Ca-rich clinopyroxene. Radial-olivine chondrules consist mainly of aggregates of fine prismatic olivine crystals and glassy or cryptocrystalline materials. Graphic-olivine chondrule shows a transitional (or an intermediate) texture between radial- and barred-olivine chondrules forming a pseudo-herringbone pattern. Porphyritic olivine-orthopyroxene chondrule consists mainly of olivine and fine orthopyroxene crystals, and glassy or crystalline materials.

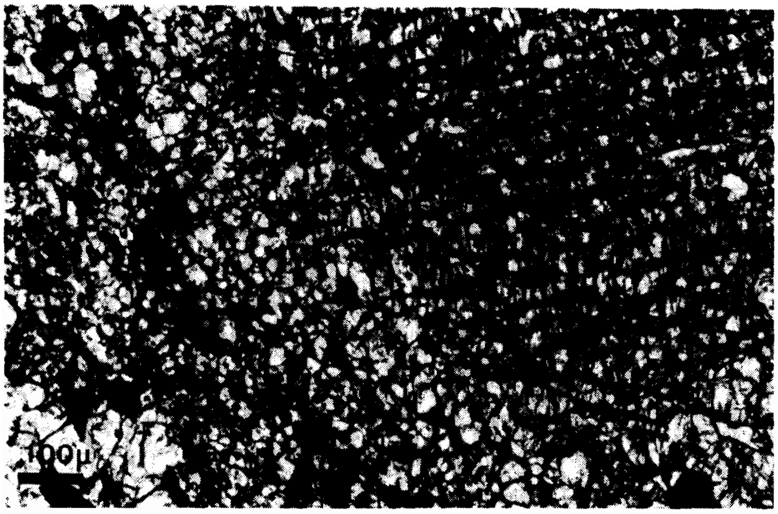

Fig. 1. A relic texture of barred-olivine chondrule composed of alternate layers of olivine crystals in Yamato-75135, 93. The interstices between olivine bars are filled with cryptocrystalline materials and devitrified glass. One nicol.

Fig. 2. A relic texture of barred-olivine chondrule composed of parallel sets of olivine crystals, microcrystalline and cryptocrystalline materials (in upper-middle part) and the clear large crystal aggregates of 500 μm in total long width which might be a calcium magnesium phosphate with minor amounts of Mg, Na, Si, K, Fe and Al (shown by arrow) in Yamato-75135, 93. One nicol.

Fig. 3. The photograph with crossed nicols of the same area as in Fig. 2. A calcium magnesium phosphate is shown by arrow. Yamato-75135,93.

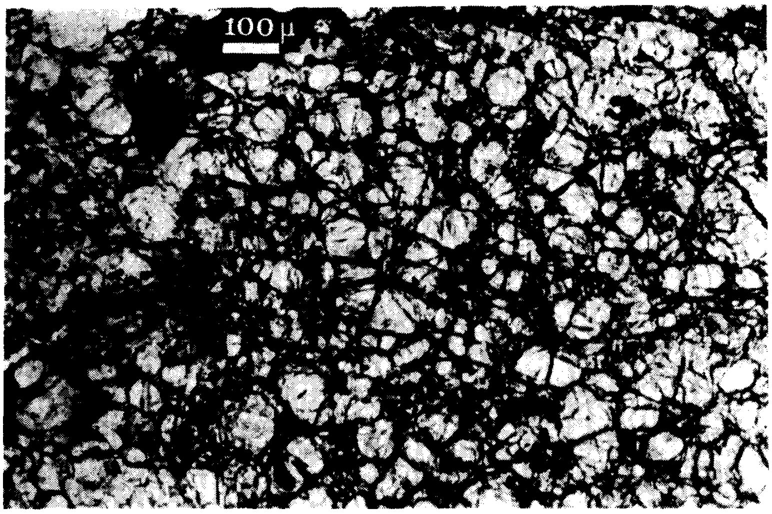

Fig. 4. A relic texture of porphyritic-olivine chondrule consisting of medium-grained olivine, microcrystalline aggregates of plagioclase and cryptocrystalline materials in Yamato-75136, 93. One nicol.

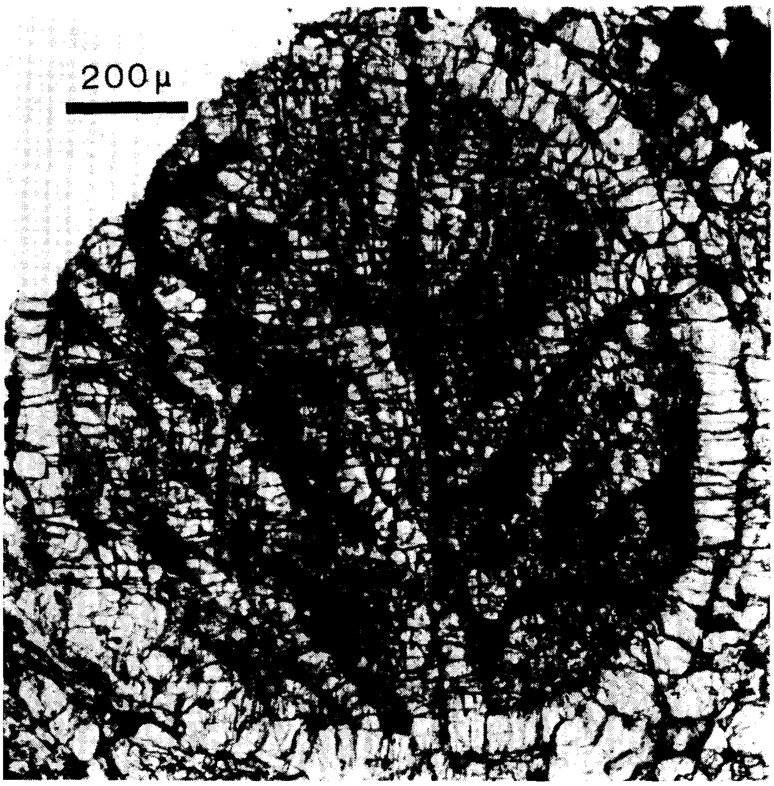

Fig. 5. A relic texture of graphic-olivine chondrule showing a transitional texture between radial and barred chondrules forming pseudo-herringbone pattern in Yamato-75136,93. One nicol.

Barred olivine-orthopyroxene chondrules are largely composed of parallel sets of olivine and orthopyroxene crystals, and glassy or devitrified glass. Microradiate orthopyroxene and olivine chondrules consist mainly of very fine prismatic orthopyroxene and olivine crystals, and glass or cryptocrystalline materials.

Rarely, secondary feldspar occurs in both chondrule and matrix as microcrystalline aggregates (*cf.* Figs. 2, 3, 4, 6, 9, 10, 13 and 14). A clear large crystal of calcium

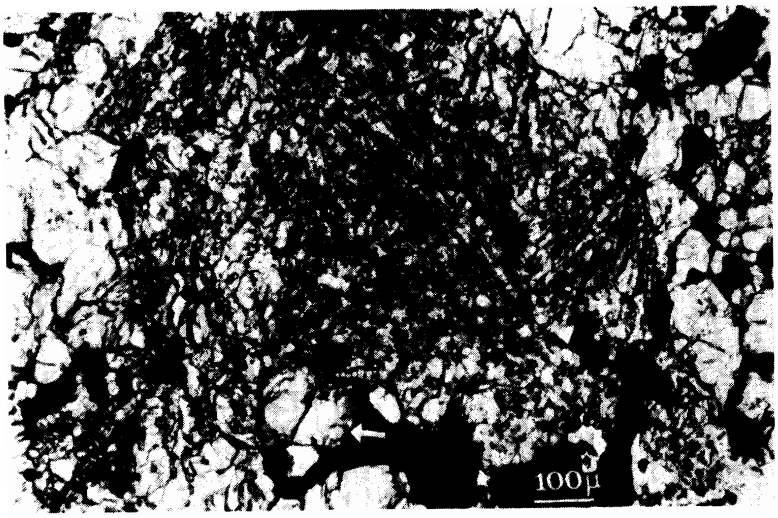

Fig. 6. Radial chondrule consisting of aggregate of fine olivine crystal, plagioclase and weakly crystallized glass in Yamato-75140,50. One nicol. A weakly crystallized glass is shown by arrow.

Fig. 7. The photograph with crossed nicols of the same area as in Fig. 6. A weakly crystallized glass shown by arrow in Fig. 6 cannot be observed in this figure, as shown by arrow. Yamato-75140, 50.

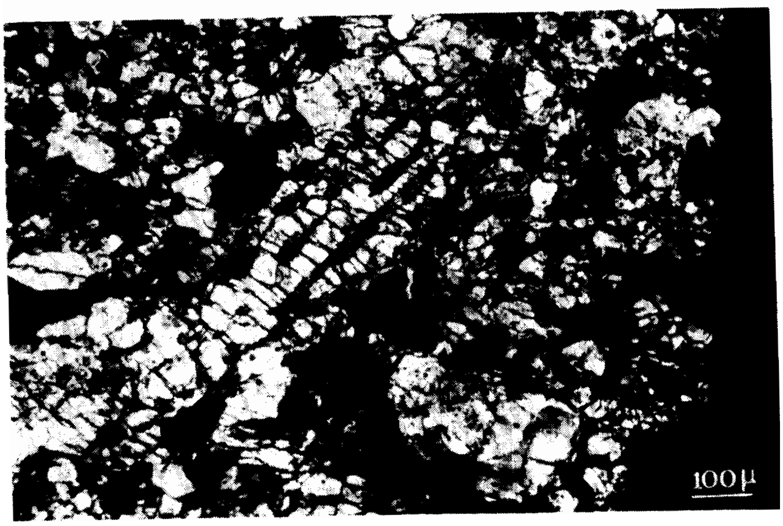

Fig. 8. A relic texture of barred-olivine chondrule composed of parallel sets of olivine crystals, microcrystalline and cryptocrystalline materials in Yamato-75140,50.

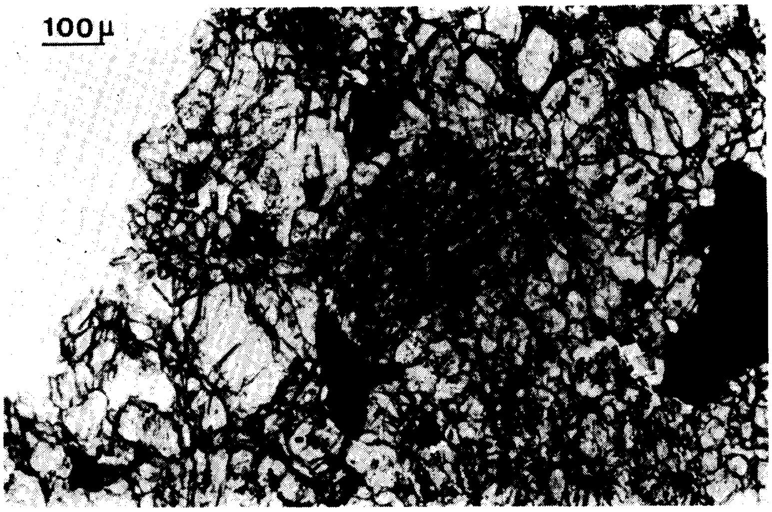

Fig. 9. Weakly recrystallized barred olivine-orthopyroxene chondrule in a glassy matrix in Yamato-75140,51. One nicol.

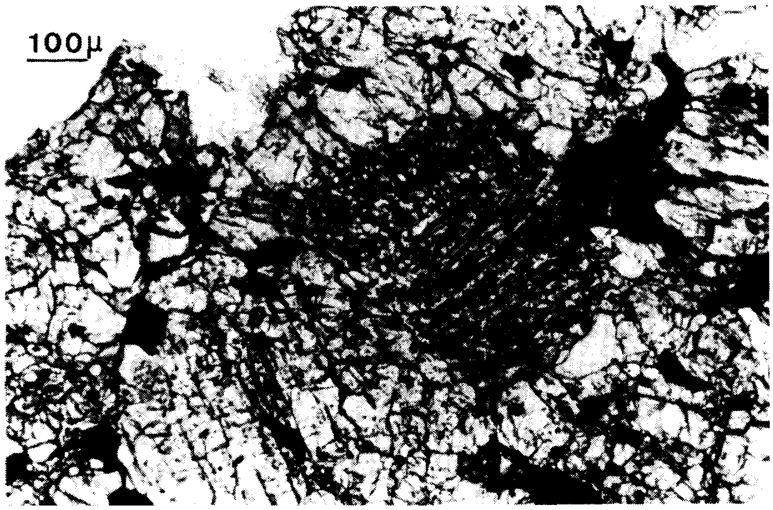

Fig. 10. Recrystallized barred olivine - orthopyroxene chondrule in a glassy matrix in Yamato-75140,51. One nicol.

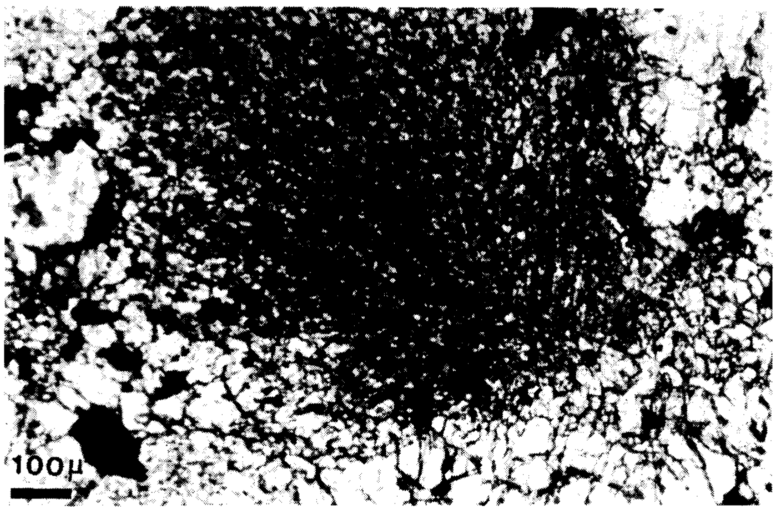

Fig. 11. Weakly recrystallized orthophyroxene-olivine chondrule in a glassy matrix in Yamato-75146,91. One nicol.

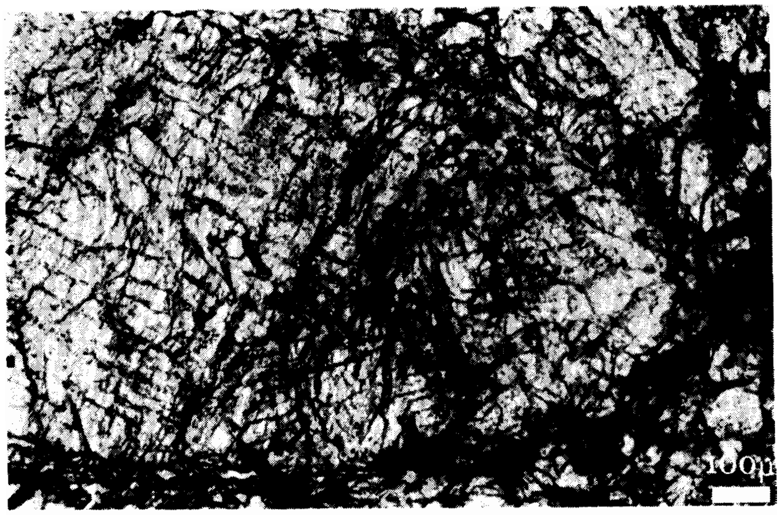

Fig. 12. *Porphyritic olivine chondrule with orthopyroxene crystals in Yamato-75271,91. One nicol.*

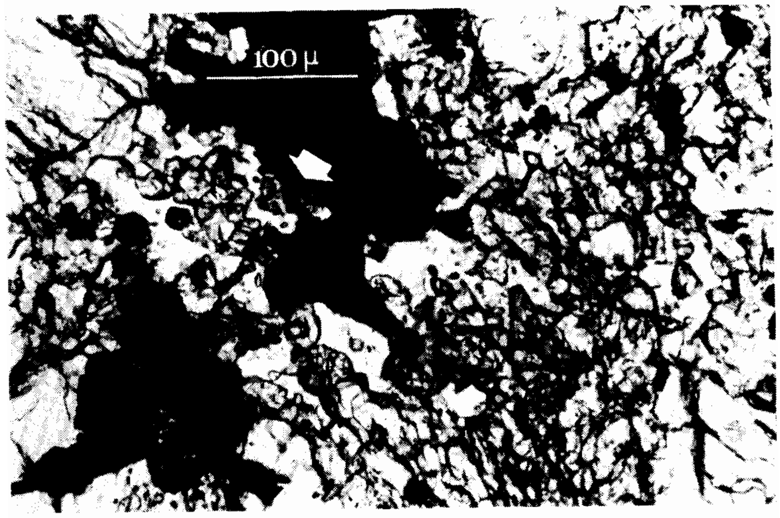

Fig. 13. *A relic texture of radial-olivine chondrule composed of olivine crystals, turbid igneous glass, orthopyroxene, and aggregates of plagioclase feldspar (shown by arrow) in Yamato-75271,91. One nicol.*

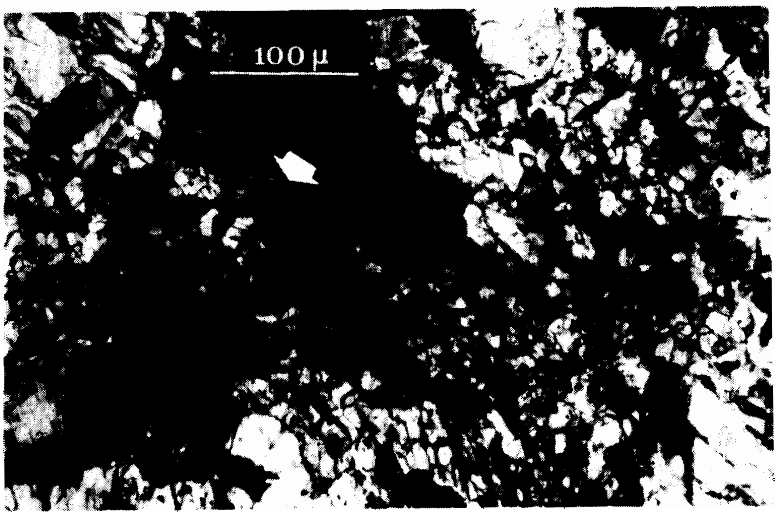

Fig. 14. *The photograph with crossed nicols of the same area as in Fig. 13. Turbid glass and plagioclase feldspar aggregates are hardly observed as shown by arrow, compared with those in Fig. 13. Yamato-75271,91.*

magnesium phosphate is observed in the Yamato-75135,93 chondrite. The crystal consists essentially of Ca and P with small amounts of Mg, Na and F, and with trace amounts of Si, K, Fe, Al and Cl. The detailed study on the Na-rich calcium magnecium phosphate will be reported on the next issue. A small crystal of oligoclase ($An_{12}Or_4$) occurs in contact with the calcium magnesium phosphate. In Yamato-75135,93 the crystal coexists with a barred-olivine chondrule (Figs. 2 and 3). Metal with Fe and Ni occurs not only in the matrix, but also within chondrules.

Table 1 shows petrologic types of the specimens determined by the textural characteristics of chondrule, matrix, igneous glass and secondary feldspar (*cf.* VAN SCHMUS and WOOD, 1967).

4. Classification of Yamato-75 Chondrites

Histograms of iron contents (atomic percent; $=100\,Fe/(Mg+Fe)$) of olivines and orthopyroxenes for the investigated samples are shown in Table 2 and Figs. 15a and 15b. The ranges of iron content (atomic %) for the average H6, L6 and LL6 chondrites are shown at the top of Figs. 15a and 15b (VAN SCHMUS and WOOD, 1967; VAN SCHMUS, 1969). The numerals in Figs. 15a and 15b are the sample numbers of the studied Yamato meteorites. The mean compositions (for Mg, Fe and Ca) of olivines and orthopyroxenes, the number of measurements, the mean deviations of iron contents and the percent mean deviations (% M.D.) of iron contents in their olivine and orthopyroxene are listed in Tables 3 and 4, respectively. The data of chondrites in the first to twelfth rows in Table 2 (*i.e.* Yamato-75108 to -75115, -75129, -75131 and -75139) are quoted from MATSUMOTO *et al.* (1979), and MATSUMOTO and HAYASHI (1980) for comparison.

All of the mean compositions of the olivines and orthopyroxenes in the studied chondrites fall within the compositional range of the relevant mineral determined for the equilibrated L chondrites. This observation indicates that all these chondrites belong to L group.

The chemical compositions of plagioclase feldspars in recrystallized (type 6) chondritic meteorites from L, LL, H and E groups are reported by VAN SCHMUS and RIBBE (1968). Their compositional cluster has a narrow range in anorthite (*i.e.* An) content up to An_{16} (mol %). The chemical compositions of the plagioclase of the above Yamato chondrites vary from oligoclase to andesine, as shown in Table 5, where the data of the total weight percents ($SiO_2+FeO+CaO+Na_2O+K_2O+Al_2O_3$) are lying within 98–102 wt%. In Yamato-75135,93 plagioclases are sodic less than An_{21}(mol %). On the other hand, An contents of the plagioclases of Yamato-75110, -75140 and -75271 are more than An_{25} (mol %). A detailed investigation is being planned. It is no wonder that the compositional modulation in a small domain is commonly observed in the lunar and terrestrial plagioclases which were formed under the subsolidus conditions.

Table 2. Frequency distribution of iron contents of olivines and orthopyroxenes in sixteen Yamato-75 chondritic meteorites.

	Olivine						Orthopyroxene					
Atomic % Fe	22	23	24	25	26	27	19	20	21	22	23	24
Sample No.	Percent of measurements††						Percent of measurements††					
Yamato-75108*	—	—	18.2	**63.6**	18.2	—	—	—	**57.1**	28.6	14.3	—
-75110*†	10.0	—	18.2	**45.5**	18.2	9.1	11.1	11.1	22.2	**33.4**	11.1	11.1
-75109**	7.1	35.7	**57.2**	—	—	—	—	**92.9**	7.1	—	—	—
-75110**†	13.3	**60.0**	20.0	6.7	—	—	40.0	**53.3**	—	6.7	—	—
-75111**	—	6.7	**46.6**	40.0	6.7	—	—	28.6	**64.3**	7.1	—	—
-75112**	6.7	**79.9**	6.7	6.7	—	—	**68.8**	31.2	—	—	—	—
-75113**	—	35.3	**64.7**	—	—	—	—	**100.0**	—	—	—	—
-75114**	7.1	**57.2**	35.7	—	—	—	6.7	**86.6**	6.7	—	—	—
-75115**	—	35.7	**64.3**	—	—	—	6.7	20.0	**73.3**	—	—	—
-75129**	13.3	**46.7**	33.3	—	6.7	—	11.8	**52.9**	29.4	5.9	—	—
-75131**	—	28.6	**64.3**	7.1	—	—	46.7	**53.3**	—	—	—	—
-75139**	—	7.1	42.9	**50.0**	—	—	14.3	**71.4**	14.3	—	—	—
-75135,93	—	11.7	**76.6**	11.7	—	—	9.0	**45.5**	**45.5**	—	—	—
-75136,93	—	9.1	**36.4**	**36.4**	18.1	—	—	—	**81.8**	9.1	9.1	—
-75140,50	—	—	33.3	**66.7**	—	—	8.3	33.4	**50.0**	8.3	—	—
-75140,51	—	—	**66.7**	26.7	—	6.6	—	7.7	**53.8**	23.1	15.4	—
-75146,91	—	16.7	**75.0**	8.3	—	—	—	16.7	**66.6**	16.7	—	—
-75271,91	10.0	30.0	**40.0**	20.0	—	—	12.5	**50.0**	37.5	—	—	—

* MATSUMOTO *et al.* (1979).
** MATSUMOTO and HAYASHI (1980).
† Yamato-75110 chondrite was analyzed twice by electron microprobe analyzers for different areas.
†† Maximum value is indicated by Gothic.

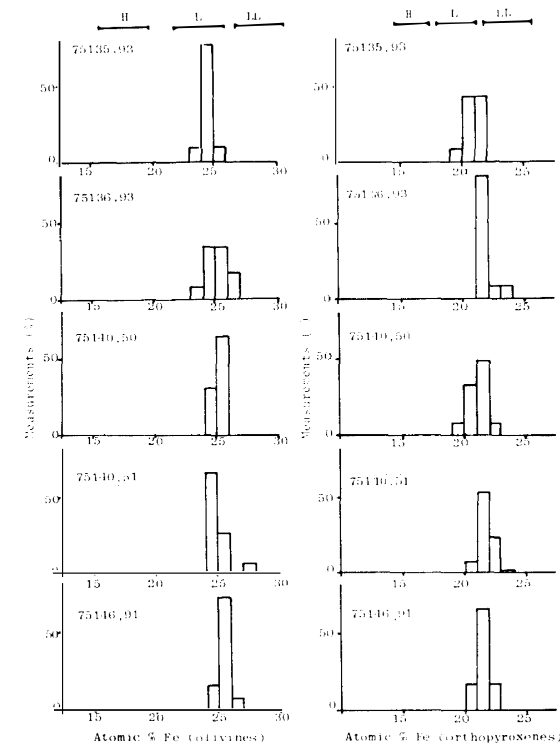

Fig. 15a. Histograms of iron contents of olivines and orthopyroxenes in the analyzed Yamato-75 chondrites.

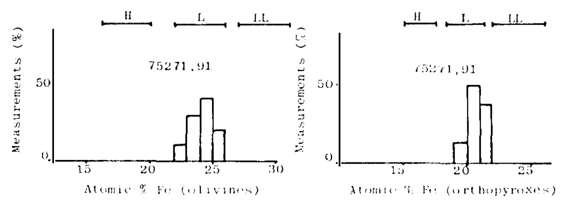

Fig. 15b. Histograms of iron contents of olivines and orthopyroxenes in the Yamato-75271,91 chondrite.

Tables 3 and 4 show that the five chondrites, Yamato-75135,93, -75136,93, -75140, 50, -75140,51 and -75146,91, have 1–2 percent mean deviation (*i.e.* % M.D.) for olivine, but that those chondrites contain more than 2% M.D. for orthopyroxene except Yamato-75146,91 containing 1.86% M.D. It is interesting that the compositional ranges of both olivine and orthopyroxene are different between Nos. 50 and 51 of Yamato-75140: Yamato-75140,50 has % M.D. of 1.19 for olivine and 2.72 for orthopyroxene, whereas Yamato-75140,51 has 1.85 for olivine and 3.52 for orthopyroxene. Such chemical varieties within the Yamato-75140 chondrite are also observed clearly in Yamato-75110 reported by MATSUMOTO *et al.* (1981). The % M.D.

Table 3. Mean compositions of olivines and percent mean deviations of their iron contents in the analyzed Yamato-75 chondrites.

Sample No.	Mean composition (%)			No. of measure-ments	Mean deviation	Percent mean deviation (% M.D.)	Remarks
	Ca	Mg	Fe				
Yamato-75108*	0.00	74.49	25.51	11	0.409	1.61	L4–5
-75110*	0.00	75.69	24.31	11	0.878	3.61	L4–5
-75109**	0.00	76.09	23.91	14	0.440	1.84	L4–5
-75110**	0.00	76.42	23.58	15	0.546	2.32	L4–5
-75111**	0.00	75.08	24.92	15	0.396	1.59	L4–5
-75112**	0.00	76.44	23.56	15	0.293	1.24	L4–5
-75113**	0.01	75.81	24.18	17	0.269	1.11	L4–5
-75114**	0.00	76.16	23.84	14	0.385	1.62	L4–5
-75115**	0.01	75.77	24.22	14	0.319	1.32	L4–5
-75129**	0.00	75.99	24.01	15	0.479	2.00	L4–5
-75131**	0.00	75.80	24.20	14	0.357	1.48	L4–5
-75139**	0.00	76.08	23.92	14	0.290	1.21	L4–5
-75135,93	0.01	75.58	24.41	17	0.318	1.30	L4–5
-75136,93	0.05	74.81	25.14	11	0.466	1.85	L4–5
-75140,50	0.00	74.86	25.14	12	0.299	1.19	L4–5
-75140,51	0.03	74.87	25.10	15	0.465	1.85	L4–5
-75146,91	0.01	75.55	24.44	12	0.322	1.32	L4–5
-75271,91	0.16	75.59	24.25	10	0.726	2.99	L4–5

* MATSUMOTO *et al.* (1979).
** MATSUMOTO and HAYASHI (1980).

for olivine of Yamato-75271,91 shows a large value of 2.99, and that for orthopyroxene is 2.01.

The textural characteristics of chondrule, matrix, igneous glass and secondary feldspar in these chondrites as listed in Table 1, suggest that all the chondrites correspond to petrologic type 4–5.

It is desired to establish an unbiassed and rapid determination method of classification of chondritic meteorites, especially in type 4, 5 and 6 chondrites, by the use of an automated digital image analytical technique in the near future which could be accessible to every investigator.

5. Conclusion

A preliminary classification of six Yamato-75 chondrites (*i.e.* Yamato-75135,93, -75136,93, -75140,50, -75140,51, -75146,91 and -75271,91 chondrites) from East Antarctica was performed, based on the textural characteristics and electron microprobe analyses of olivine and orthopyroxene. These chondrites are five out of the

Table 4. Mean compositions of orthopyroxenes and percent mean deviations of their iron contents in the analyzed Yamato-75 chondrites.

Sample No.	Mean composition (%)			No. of measure-ments	Mean deviation	Percent mean deviation (% M.D.)	Remarks
	Ca	Mg	Fe				
Yamato-75108*	0.21	77.77	22.02	7	0.479	2.17	L4–5
-75110*	0.00	77.96	22.04	9	1.161	5.27	L4–5
-75109**	0.81	78.73	20.46	14	0.196	0.96	L4–5
-75110**	1.20	78.47	20.33	15	0.453	2.23	L4–5
-75111**	0.95	77.72	21.33	14	0.486	2.28	L4–5
-75112**	0.81	79.44	19.75	16	0.225	1.14	L4–5
-75113**	1.35	78.29	20.36	15	0.171	0.84	L4–5
-75114**	0.77	78.71	20.52	15	0.274	1.34	L4–5
-75115**	1.13	78.64	20.23	15	0.441	2.18	L4–5
-75129**	1.42	77.91	20.67	17	0.555	2.68	L4–5
-75131**	0.96	78.95	20.09	15	0.249	1.24	L4–5
-75139**	0.93	78.50	20.57	14	0.296	1.44	L4–5
-75135,93	1.16	78.07	20.77	11	0.475	2.29	L4–5
-75136,93	1.00	77.25	21.75	11	0.485	2.23	L4–5
-75140,50	1.16	77.76	21.08	12	0.573	2.72	L4–5
-75140,51	1.40	76.71	21.89	13	0.771	3.52	L4–5
-75146,91	1.25	77.37	21.38	12	0.398	1.86	L4–5
-75271,91	0.83	78.51	20.66	8	0.416	2.01	L4–5

* MATSUMOTO *et al.* (1979).
** MATSUMOTO and HAYASHI (1980).

Table 5. Chemical compositions of plagioclase feldspars in the analyzed Yamato-75 chondrites.

Sample No.	Or	Ab	An (mol %)
Yamato-75110,90*	4.3	53.6	42.1
	9.7	55.0	35.3
-75110,93*	5.8	53.7	40.5
-75135,93	1.2	85.1	13.7
	12.5	67.1	20.4
-75140,51	6.3	65.4	28.3
-75146,91	3.4	78.5	18.1
-75271,91	1.8	55.3	42.9
	19.5	55.2	25.3

* Unpublished data obtained by one of the authors, MATSUMOTO.

one hundred-fifty meteorites (*i.e.* Yamato-75135,93, -75136,93, -75140,50, -75140,51 and -75146,91) which were found in a limited narrow area, and the rest one (*i.e.* Yamato-75271,91) at 5 km south of the limited narrow area. It might be considered that those chondrites were product of the single meteorite shower as a whole. Further researches in detail are desired to discuss the possibility of the meteorite shower.

On the basis of the histogram of iron contents of olivine and orthopyroxene, and the microscopical characters, these chondrites are classified as L group and petrologic type 4–5.

Chemical inhomogeneity is revealed in the Yamato-75140,50 and 51 chondrites of which % M.D. is 1.19 and 1.85 for olivine, and is 2.72 and 3.52 for orthopyroxene, respectively. Such chemical inhomogeneity might be common in the Yamato-75 chondrites, as also in the Yamato-75110,90, 91, 93 and 95 chondrites reported by MATSUMOTO *et al.* (1981).

Compositional variation of plagioclase feldspars in the Yamato-75 chondrites is also observed; that is, their composition varies from oligoclase to andesine as shown in Table 5.

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