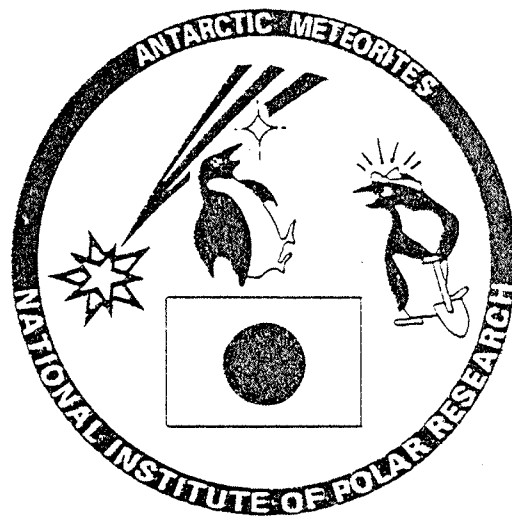


# **METEORITES NEWS**

**JAPANESE COLLECTION OF ANTARCTIC METEORITES**



**Volume 1, Number 1**

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National Institute of Polar Research

Tokyo

## Introduction

The Meteorites News have been planned to be published for the purpose of informing scientists of the basic characteristics of the meteorite specimens in the Japanese Collection of Antarctic Meteorites. This issue constitutes the first of such news, and contains data sheets for a number of meteorites collected from the bare ice area near the Yamato Mountains by the Japanese Antarctic Research Expedition in The 1979 field season, and one large carbonaceous chondrite from the Belgica Mountains. This news provides preliminary descriptions of the hand specimens and thin sections.

The news has been prepared by the Preliminary Examination Team of the Antarctic Meteorite Research Committee at National Institute of Polar Research (NIPR), Tokyo. A similar news will be issued when a sufficient number of meteorites are processed and characterized initially in near future. The periodicity of issue will depend upon the rapidity of initial processing and survey, and/or the relative importance of reporting the information.

The Preliminary Examination Team including cooperative members are composed of the following scientists: Keizo Yanai (NIPR; compilation), Tsutomu Ohta (NIPR; compilation and chondrite description), Yukio Ikeda (Ibaraki University; chondrite description), Hiroshi Takeda (University of Tokyo; achondrite description), Gen Sato (Chiba University; processing and description); Hideyasu Kojima (Akita University; processing and description), Naoki Onuma (Ibaraki University), Hiroshi Nagasawa (Gakushuin University), Ikuo Kushiro (University of Tokyo) and Hiroshi Haramura (University of Tokyo; bulk chemistry). We are also indebted to Drs. Brian Mason and Michael B. Duke for their discussions and review of our descriptions, and to Dr. Harry Y. McSween, Jr. for petrological descriptions of some carbonaceous chondrites.

Copies of sample request form and regulation are enclosed in this issue. Requests for Antarctic meteorite samples for scientific research are welcome from all qualified scientists. In addition, readers are invited to send comments and suggestions on the news to Dr. Hiroshi Takeda, the Preliminary Examination Team of the Antarctic Meteorite Research Committee (Chairman, Prof. Takesi Nagata).

## DATA SHEET

Information in data sheets for meteorite specimens includes inventory data, field data, initial survey data and other pertinent sample information. The inventory data include a sample identification number, specimen weight and specimen dimensions. The field data give the location and the date of the find, and the original sample number assigned to a specimen in the field. Initial survey data consist of a classification by an optical and chemical examination of a specimen (petrographic description) and a description of macroscopic features (physical description), with information about degree of weathering and degree of fracturing.

The scale for apparent degree of weathering and fracturing is like that used in the NASA curatorial facilities.

Degree of Weathering

A - minor      B - moderate      C - severe

Degree of Fracturing

A - slight      B - moderate      C - severe

If you would like to obtain additional copies of the news, please contact Dr. K. Yanai, Secretary of the Antarctic Meteorite Research Committee, Department of Meteorites, National Institute of Polar Research.

We would like to thank Reiko Mitsuda, Miwako Ando, Kumiko Furuno and Haruko Uchida for their assistance on the compilation of this issue.

## Requierments and Procedures for Antarctic Meteorites

### Research on Japanese Collection

Formal requests for Antarctic meteorite samples for scientific research and display should be submitted in writing along with the formal request form to Professor Takesi Nagata, Chairman, Antarctic Meteorite Research Committee, National Institute of Polar Research(NIPR), Tokyo.

Requests are welcome from all qualified scientists in the world and will be reviewed and considered two or three times each year by the Antarctic Meteorite Research Committee of the NIPR in Japan. Consortium-type sample requests may also be submitted. When your proposal is accepted by the committee, the requested samples will be sent to you from the curator, Department of Meteorites of the NIPR.

### Sample Allocation

1. Sample allocation may be limited under few grams for each sample.
2. Sample allocation may be under 10 samples for each research proposed.
3. All samples are provided as a lone.
4. In a case of museum display, it may be provided on an exchange basis.
5. Sample requests should include detailed sample numbers, preferable weight and minimum weight requirements, sites(crust, outer part, inner part and central part, etc.), shaps(powder, grains, fragments, chips, cubes, plates, thin section and polished thin section) etc.

### Sample Distribution

1. Sublease of meteorite samples is not permitted to anybody except coinvestigators of the proposed research. If sublease is required to other investigators, a new separate proposal form must be submitted to the Antarctic Meteorite Research Committee prior to the sample transfer.
2. Return of unused meteorite sample to the curator is requested upon completion of the proposed research.

### Reporting Result

1. Any result of your studies is encouraged to be reported promptly. It is desirable to report at the Symposium on Antarctic Meteorites sponsored by the National Institute of Polar Research. The presented papers at this symposium will be published as the Proceedings of the symposium after review by the editorial committee of the NIPR. Two referees will read the paper. Instruction to contribution can be obtained from the Library of the NIPR. The symposium will be held each year, customarily in late February.
2. It is also possible to submit paper to the Antarctic Record and to the Memoirs of the National Institute of Polar Research.
3. Twenty reprints of each article which was published in other journal than those of the National Institute of Polar Research should be sent to the curator by authors.

Please mail to;

Keizo Yanai  
Secretary, Antarctic Meteorite Research Committee  
National Institute of Polar Research,  
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173  
Japan

Yamato-790003

C2 (CM) Chondrite

Weight: 4.29 gms

Location: Yamato Mountains, Antarctica

Dimension: broken

Degree of Weathering: A

Original Number: 79103003

Degree of Fracturing: B/C

Found: Oct. 30, 1979, K. Yanai et al.

Physical Description:

When this brittle specimen was inspected for an initial processing, the stone was broken into five small fragments. Black fusion crust is observed in a small area of one of the fragments. White evaporate deposits are apparent on the exterior surface. In the interior, yellowish white materials, rounded to irregular in shape, are set in a dull black matrix.

Petrographic Description:

This meteorite is a typical C2 chondrite comprised of abundant opaque phyllosilicate matrix containing amoeboid olivine inclusions, chondrule fragments, and isolated grains of olivine and glass. The glass is brown and partly altered. Metal, sulfide, and magnetite are also present.

Yamato-790032

C2 (CM) Chondrite

Weight: 6.08 gms

Location: Yamato Mountains, Antarctica

Dimension: 2.5 x 1.5 x 1.3 cm

Degree of Weathering: A/B

Original Number: 79110213-1

Degree of Fracturing: A/B

Found: Nov. 2, 1979, K. Yanai et al.

Physical Description:

No fusion crust remains except for one surface where a remnant, brown to black fusion crust is present. Spherical chondrules up to 1.5 mm in diameter and light colored inclusions are visible in a dull black matrix. Mineral fragments are also apparent, their crystal faces being well developed. The inside of chondrules is slightly weathered. White accicular crystals which may be evaporite deposits are present on two exterior surfaces. Yamato-790032 (6.1 gms), Yamato-790033 (1.4 gms) and Yamato-790034 (0.3 gms) look similar to one another and were found at the same location; hence these three specimens are probably pieces of a single meteorite.

Petrographic Description:

This meteorite resembles Yamato-790003 closely in structure and mineralogy.

Yamato-790112

Ordinary or CR (like Renazzo or Al Rais) Chondrite

Weight: 23.97 gms

Location: Yamato Mountains, Antarctica

Dimension: 3.1 x 2.6 x 2.5 cm

Degree of Weathering: B

Original Number: 79110601

Degree of Fracturing: A

Found: Nov. 6, 1979, K. Yanai et al.

Physical Description:

This pyramidal stone with rounded corners is nearly complete, covered with polygonally fractured, black to blackish brown fusion crust. Chipping showed a 1.5 mm thick weathering rind is present in the interior. Many chondrules as large as 2 mm in diameter and white materials, rounded to irregular in shape, are embedded in the dull blackish gray matrix.

Petrographic Description:

This meteorite is very similar to Y-793495,91, probably representing a paired fall. It consists of abundant, large chondrules and opaque matrix. The chondrules consist of olivine, polysynthetically twinned clinopyroxene, glass, and metal. Some chondrules are armored by metal. The opaque matrix is normally devoid of metal, but contains disseminated sulfide and some magnetite. The meteorite is weathered. Its texture is similar to that of Renazzo and Al Rais, two carbonaceous chondrites that are difficult to classify. However, it could be an ordinary chondrite with abundant "Huss matrix".

Yamato-790122

Polymict eucrite

Weight: 109.55 gms

Location: Yamato Mountains, Antarctica

Dimension: 5.7 x 5.0 x 3.1 cm

Degree of Weathering: A

Original Number: 79110611

Degree of Fracturing: A

Found: Nov. 6, 1979, K. Yanai et al.

Physical Description:

Two sides broken, and one side covered with shiny black fusion crust. Polymict eucrite with abundant crystalline clasts. Some clasts show laths of plagioclase; other brown to dark brown coarse crystalline clasts are up to about 1 cm in diameter.

Petrographic Description:

This meteorite is clast rich. The thin section examined contains four different clasts ranging in size from 1 mm to 3 mm separated by narrow zones of brecciated matrix. A medium grained ophitic basalt with dark mesostasis contains chemically zoned pyroxenes, but a very fine grained micro-ophitic basalt includes slightly zoned pigeonites ( $\text{Ca}_{12}\text{Mg}_{38}\text{Fe}_{50}$ ). A coarse grained equigranular clast with a cataclastic texture has chemically uniform pigeonites Ca Mg Fe. An aphanitic clast includes subround fine grained pyroxene  $\text{Ca}_{14}\text{Mg}_{35}\text{Fe}_{51}$  and plagioclase clasts in a dark glassy matrix. No inverted pigeonite like that of cumulate eucrites is found in the matrix.



Yamato-790143

LL Chondrite

Weight: 52.26 gms  
Dimension: 4.1 x 3.9 x 2.2 cm  
Degree of Weathering: B/C  
Degree of Fracturing: B

Location: Yamato Mountains, Antarctica  
Original Number: 79110632  
Found: Nov. 6, 1979, K. Yanai et al.

Physical Description:

The specimen is rounded and nearly complete. The fusion crust has been abraded for the most part, but small patches of the fusion crust remain on the S and B surfaces which are dull, black in color and 1 mm in thickness. Other portions of the exterior are light greenish gray, partially stained orange brown. This specimen is remarkably porous and indurated. Irregular voids are distributed on the exterior and in the interior.

Petrographic Description:

Chondrules are sparse and ill-defined. Only one fragment of chondrule is visible in the polished thin section, which consists of polysynthetically twinned pyroxene and is approximately 1.0 mm in diameter. Laths of euhedral pyroxenes and fine-grained fragments are set in a shock-melted dark matrix, which shows fine granoblastic texture. Olivine crystals are fractured and merge with the glassy matrix. Irregular vesicles occupy a large part of the polished thin section. Glassy materials usually surround vesicles. This specimen can be described as an impact-melted, fine-crystalline LL chondrite.

|         | Average            | %MD | Range                   |
|---------|--------------------|-----|-------------------------|
| Olivine | Fa <sub>29.4</sub> | 2.0 | Fa <sub>27.6-31.8</sub> |

Yamato-790175

H5 Chondrite

Weight: 286.9 gms

Dimension: 6.7 x 6.4 x 3.5 cm

Degree of Weathering: B

Degree of Fracturing: A/B

Location: Yamato Mountains, Antarctica

Original Number: 79110661

Found: Nov. 6, 1979, K. Yanai et al.

Physical Description:

Black fusion crust covers the B surface of this stone. The other surfaces are fracture surfaces with a weathered brown color. Chondrules up to 2 mm in diameter are visible on the fracture surfaces. A few cracks run almost parallel to the N surface. The interior material exposed by chipping shows that the stone is less weathered than it was at first glance. Small bits of oxidation are scattered throughout the light gray colored matrix.

Petrographic Description:

The section is moderately chondritic. A variety of chondrules up to 1 mm in diameter is present, the commonest type being porphyritic to granular. The margins of the chondrules are ill-defined. The chondrules and their fragments are set in the groundmass which consists of olivine, pyroxene, nickel-iron and troilite. A few pyroxenes are polysynthetically twinned. Brown limonitic staining is present throughout the section. Microprobe analyses gave the mineral compositions listed below. The meteorite is classified as an H5 chondrite.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>18.3</sub> | 1.6 | Fa <sub>17.4-19.8</sub> |
| Low-Ca pyroxene | Fs <sub>15.9</sub> | 1.5 | Fs <sub>15.4-16.6</sub> |

Yamato-790178

L6 Chondrite

Weight: 234.7 gms

Location: Yamato Mountains, Antarctica

Dimensions: 5.8 x 4.8 x 4.5 cm

Degree of Weathering: B

Original Number: 79110664

Degree of Fracturing: A

Found: Nov. 6, 1979, K. Yanai et al.

Physical Description:

Black fusion crust, 1 mm in thickness, covers 50% of this stone. The fracture surfaces are weathered and yellowish to reddish brown in color. Chondrules up to 2 mm in diameter are observed on the fracture surfaces. The interior materials are gray in color with brown spots of oxidation.

Petrographic Description:

Chondrules are sparse and poorly defined. The groundmass consists of olivine, pyroxene, troilite, nickel-iron and plagioclase, with accessory chromite. Recrystallized plagioclase grains are small in size. The section shows some limonitic staining. Microprobe analyses show olivine and pyroxene of essentially uniform composition. The meteorite is tentatively classified as an L6 chondrite.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>24.4</sub> | 1.5 | Fa <sub>23.1-25.4</sub> |
| Low-Ca pyroxene | Fs <sub>20.3</sub> | 1.5 | Fs <sub>19.6-21.1</sub> |

Yamato-790185

L6 Chondrite

Weight: 222.8 gms  
Dimension: 7.0 x 5.0 x 3.4 cm  
Degree of Weathering: B/C  
Degree of Fracturing: B

Location: Yamato Mountains, Antarctica

Original Number: 79110671-1

Found: Nov. 6, 1979, K. Yanai et al.

Physical Description:

Dull black fusion crust covers most of this stone. A large chondrule, 6 mm in diameter, is seen on a fracture surface at one corner. The chondrule's surface is greenish white in color with brown oxidation associated with metallic minerals. Regmaglypts are present on one surface. A few black veinlets penetrate the interior, and a crack exists on the N surface. The interior is brownish-yellow gray in color with reddish-brown oxidation. A 2 mm thick weathering rind is visible.

Petrographic Description:

Chondrules are sparse and poorly defined, tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron, troilite and plagioclase. The section is cut by a black veinlet. Patches of limonitic staining are present throughout the section. The section shows the texture of type 6, while microprobe analyses show olivine of uniform composition and pyroxene of somewhat variable composition. A pyroxene grain with the composition of En46 Fs8 Wo46 was identified with the microprobe. The meteorite is tentatively classified as an L6 chondrite.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>24.7</sub> | 1.5 | Fa <sub>23.3-26.3</sub> |
| Low-Ca pyroxene | Fs <sub>20.5</sub> | 3.4 | Fs <sub>19.2-22.4</sub> |
| Plagioclase     | An <sub>11</sub>   |     |                         |

Yamato-790256

LL6 Chondrite

Weight: 381.2 gms

Location: Yamato Mountains, Antarctica

Dimension: 7.5 x 6.4 x 5.0 cm

Degree of Weathering: B

Original Number: A79110707

Degree of Fracturing: A

Found: Nov. 7, 1979, K. Yanai et al.

Physical Description:

This is a nearly complete stone covered with 1/3 mm thick, dull black to brown fusion crust which has polygonal fractures. The B surface is especially weathered to a reddish brown color. The areas devoid of fusion crust are seen along edges of the stone and are severely weathered to a yellowish brown color. Weathering rind of 1-7 mm in thickness is present in the stone. Several dark gray clasts as large as 4 x 3 mm in dimensions and oxidation haloes around metallic grains are apparent in the light gray interior material. No chondrules are observed.

Petrographic Description:

Chondrules are sparse and poorly defined, tending to merge with the granular groundmass which consists of olivine and pyroxene with minor amounts of nickel-iron, troilite and plagioclase. Chondrules are 0.3-1.2 mm in diameter. Some of the chondrules are somewhat fragmented. On one edge, 8 mm of fusion crust is present; another edge has 2 mm of fusion crust. Some weathering is indicated by the presence of a moderate amount of brown limonitic staining. Microprobe analyses show olivine and pyroxene of uniform composition. The meteorite is classified as an LL6 chondrite.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>30.1</sub> | 1.1 | Fa <sub>29.0-31.0</sub> |
| Low-Ca pyroxene | Fs <sub>24.2</sub> | 1.1 | Fs <sub>23.5-24.8</sub> |
| Plagioclase     | An <sub>10</sub>   |     |                         |

Yamato-790260

Polymict eucrite

Weight: 433.9 gms

Dimension: 9.2 x 6.7 x 5.0 cm

Degree of Weathering: A

Degree of Fracturing: A

Location: Yamato Mountains, Antarctica

Original Number: A79110711

Found: Nov. 7, 1979, K. Yanai et al.

Physical Description:

An oblong almost complete stone with considerable fusion crust covering most of the meteorite. Two sides have less fusion crust, where abundant lithic and mineral clasts can be seen. The textures of clasts range from fine grained, variolitic to ophitic, to coarse grained, subophitic. The largest clast reaches up to 1.5 cm in diameter. Mineral clasts include white angular plagioclases and honey brown pyroxenes.

Petrographic Description:

A single thin section examined reveals a breccia with plagioclase and pyroxene fragments in a dark matrix which appears to be finely recrystallized. Many pyroxene fragments do not show distinct boundaries and their rims merge into the matrix, making angular plagioclase fragments more predominant. Very large pyroxene fragments up to 3 mm in diameter are common. They have uniform core rich in Mg (Ca<sub>7</sub>Mg<sub>64</sub>Fe<sub>29</sub>), dark brown rims (Ca<sub>9</sub>Mg<sub>45</sub>Fe<sub>46</sub>), and reveal many dark fractures filled with Fe-rich olivines. Pyroxenes with exsolution textures are rare. One clast consists of fine grained irregular aggregates of granulated pyroxenes rich in opaque inclusions and contains elongated patches of plagioclase. One eucrite clast shows a subophitic texture with chemically zoned pyroxenes.

Yamato-790266

Polymict eucrite

Weight: 208.0 gms

Location: Yamato Mountains, Antarctica

Dimension: 7.4 x 5.0 x 5.9 cm

Degree of Weathering: A

Original Number: A79110715

Degree of Fracturing: A

Found: Nov. 7, 1979, K. Yanai et al.

Physical Description:

Angular stone covered with thin fusion crust, which is partly lost. Interior is difficult to observe but it is rich in clasts. About half of this meteorite consists of medium grained crystalline eucrite clasts, with some small clasts with coarse-grained texture and others with fine-grained ophitic texture. The amount of matrix is small. Mineral fragments are not abundant.

Petrographic Description:

The thin section of a matrix-rich portion shows a fine grained breccia of angular fragments of pyroxene and plagioclase, in a matrix of comminuted pyroxene and plagioclase with accessory opaque minerals. The thin section of a medium grained basalt shows subophitic to equigranular texture with laths of plagioclase. Microprobe analyses show pyroxene ranging in composition from core pigeonite  $\text{Ca}_{60}\text{Mg}_{36}\text{Fe}_{58}$  to rim augite  $\text{Ca}_{28}\text{Mg}_{32}\text{Fe}_{40}$ , and plagioclase  $\text{Ab}_{15}\text{An}_{84}\text{Or}_1$ . A few large pyroxenes have a Mg-rich core  $\text{Ca}_{50}\text{Mg}_{67}\text{Fe}_{28}$  and zoned toward Fe-rich pigeonite. The fragments of this type basalt are common in the brecciated matrix. Dark aphanitic clasts are also present.

Yamato-790269

H4 Chondrite

Weight: 1269.2 gms

Dimension: 11.1 x 10.9 x 7.2 cm

Degree of Weathering: C

Degree of Fracturing: A/B

Location: Yamato Mountains, Antarctica

Original Number: A79110718-1

Found: Nov. 7, 1979, K. Yanai et al.

Physical Description:

Some large cracks are developed on all but W surface of this tetrahedral stone. Patches of thin, dull black fusion crust cover the surfaces with the exception of the basal plane (S surface), which is a bumpy fracture surface with black fusion crust remaining in a few places. The interior exposed by chipping has a weathered, orange brown color and a 2 mm thick weathering rind. Chondrules are hardly visible on the outer surfaces due to oxidation stain, while chondrules up to 1.5 mm in diameter were observed on the weathered broken surface under stereoscope.

Petrographic Description:

The section is highly chondritic with chondrules ranging from 0.2-1.0 mm in diameter; a variety of chondrules is present, the commonest being of granular to porphyritic type. Some chondrules are fragmented. Polysynthetically twinned pyroxenes are visible in a few places. Opaque minerals are nickel-iron and troilite. Limonitic staining is common, and patches of red-brown limonite are associated with nickel-iron grains. Microprobe analyses gave the mineral compositions listed below.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>18.0</sub> | 2.0 | Fa <sub>16.7-19.2</sub> |
| Low-Ca pyroxene | Fs <sub>15.7</sub> | 2.3 | Fs <sub>14.6-16.7</sub> |



Yamato-790345

LL Chondrite

Weight: 233.6 gms

Location: Yamato Mountains, Antarctica

Dimension: 6.9 x 5.2 x 3.4 cm

Degree of Weathering: B/C

Original Number: B79110702

Degree of Fracturing: A

Found: Nov. 7, 1979, K. Yanai et al.

Physical Description:

The specimen is well rounded on all faces. Very small areas of the fusion crust remain in patches only on the N surface. The overall color is black and partially stained brown. The sample is highly coherent and difficult to chip. No obvious chondrules or lithic clasts are observed on the surface.

Petrographic Description:

This specimen is finely brecciated. The fragments of chondrules can be recognized, but the margins of chondrules are indistinct and tend to merge with the comminuted matrix, consisting largely of olivine and pyroxene. Shock veins are observed, but a shock-melted matrix is not obvious and a few vesicles are seen. Euhedral pyroxenes are rarely observed. This specimen can be classified as a heavily shocked LL-chondrite.

|         | Average            | %MD | Range                   |
|---------|--------------------|-----|-------------------------|
| Olivine | Fa <sub>27.8</sub> | 1.6 | Fa <sub>26.4-29.2</sub> |

Yamato-790964

LL Chondrite

Weight: 3335 gms  
Dimension: 21 x 12 x 10 cm  
Degree of Weathering: A  
Degree of Fracturing: A

Location: Yamato Mountains, Antarctica  
Original Number: B79111314  
Found: Nov. 13, 1979, K. Yanai et al.

Physical Description:

The specimen is rounded and nearly complete. Small patches of fusion crust remain on the surface which is dull black in color. Both light-colored and black inclusions are observed on the surface. This stone is indurated and full of voids, with elongated channels in irregular orientation.

Petrographic Description:

This specimen is very porous and shows very fine-grained crystalline texture. Chondrules are poorly defined, tending to merge with the matrix. Chondrule types include barred olivine and fine-grained pyroxene. The largest chondrule still visible in the polished thin section has a maximum diameter of approximately 2mm. In the matrix, small amounts of brown glass and fine-grained glassy materials fill interstices between euhedral pyroxene crystals, coarse remnant olivine crystals, and mineral fragments. Most of large olivine and pyroxene grains show undulose extinction. Numerous closely spaced fractures in some mineral grains are also apparent. Margins of these minerals are fractured into fragments and integrated with glass. Euhedral pyroxene crystals imbedded in an extremely comminuted and vitreous matrix usually show chemical zoning with Ca-enrichment at the rim (En50Fs18Wo32). Slight enrichment of Al-content toward the rim is also observed (0.68 wt% at the core, 1.82 wt% at the rim). Small euhedral olivine crystals, a few microns in size, also scatter in the glass. They may have been formed by rapid crystallization from melt produced by partial melting of matrix and chondrules by an impact. Some olivine grains have high Fa-component, exceeding the LL-group range. This specimen can be described as an impact-melted, fine-crystalline chondrite.

|         | Average            | %MD | Range                   |
|---------|--------------------|-----|-------------------------|
| Olivine | Fa <sub>31.1</sub> | 3.5 | Fa <sub>28.5-33.8</sub> |

Yamato-790981

Ureilite

Weight: 213.01 gms  
Dimension: 6.3 x 5.5 x 4.0 cm  
Degree of Weathering: B  
Degree of Fracturing: A

Location: Yamato Mountains, Antarctica

Original Number: B79111325

Found: Nov. 13, 1979, K. Yanai et al.

Physical Description:

The stone is bounded by three intersecting flat fracture faces and one round face with partly weathered black fusion crust, which shows polygonal fractures characteristic of ureilites. Round relatively coarse grained dark crystals can be seen on the fracture surface with some space between the crystals. White needle crystals are found in cavities on the surface. This fragment may be about 1/8 of the original meteorite.

Petrographic Description:

This meteorite is predominantly composed of anhedral to euhedral olivine (87%) and pigeonite (8%) and dark carbonaceous (C) matrix (5%) at grain boundaries. The veins of matrix are partly replaced by oxidized iron. Fine grained metal particles are distributed in and along the matrix veins. The olivine crystals display fracturing and undulatory extinction and subgrain boundaries. Average olivine core composition is Fa21, and where in contact with C matrix, the composition is enriched in Mg by reduction. The pigeonites have some tiny inclusions. The pigeonite compositions Ca<sub>8</sub>Mg<sub>74</sub>Fe<sub>18</sub> are similar to those of common eucrites such as Y74123 and are rich in Al O (1.1 wt.%) and Cr O (1.1 wt.%). In some crystals there are inclusions of diopside Ca<sub>37</sub>Mg<sub>58</sub>Fe<sub>5</sub> more Mg-rich than that expected for a coexisting pair.

Yamato-791001

L5 Chondrite

Weight: 289.83 gms  
Dimension: 7.2 x 6.3 x 4.0 cm  
Degree of Weathering: B/C  
Degree of Fracturing: B

Location: Yamato Mountains, Antarctica

Original Number: A79111411

Found: Nov. 14, 1979, K. Yanai et al.

Physical Description:

Patches of shiny black fusion crust are distributed on all surfaces except the B surface which is a fracture surface. Areas devoid of fusion crust are weathered to a brown color. Chipping exposed only a small amount of interior material, greenish gray in color. Some small clasts as large as 1.5 x 2 mm in dimensions are visible.

Petrographic Description:

The section is moderately chondritic. Chondrules tend to merge with the fine-grained granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite, and with accessory chromite. Microcrystalline plagioclase grains are present. Brown limonitic staining pervades much of the section. Microprobe analyses gave the mineral compositions listed below.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>23.8</sub> | 1.6 | Fa <sub>22.7-24.7</sub> |
| Low-Ca pyroxene | Fs <sub>19.9</sub> | 2.4 | Fs <sub>19.1-20.7</sub> |

Yamato-791004

H6 Chondrite

Weight: 225.09 gms

Location: Yamato Mountains, Antarctica

Dimension: 7.8 x 4.7 x 4.1 cm

Degree of Weathering: C

Original Number: A79111414

Degree of Fracturing: A

Found: Nov. 14, 1979, K. Yanai et al.

Physical Description:

Orthogonal photographs and reconstruction of splits revealed that this sub-rounded to angular stone is nearly complete. A thin, shiny black fusion crust covers the stone with the exception of some small areas devoid of fusion crust. The interior is extremely weathered and has an orange brown color. Oxidation haloes are common around metal grains which are scattered throughout the interior.

Petrographic Description:

Chondrules are present but are poorly defined and tend to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron, troilite and plagioclase. Fusion crust is present on one edge. The specimen is weathered with brown limonitic staining throughout the section. Microprobe analyses show olivine and pyroxene of essentially uniform composition.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>17.6</sub> | 1.9 | Fa <sub>16.5-18.4</sub> |
| Low-Ca pyroxene | Fs <sub>15.5</sub> | 1.1 | Fs <sub>15.0-15.9</sub> |
| Plagioclase     | An <sub>12</sub>   |     |                         |

Yamato-791106

H6 Chondrite

Weight: 409.89 gms  
Dimension: 8.2 x 6.1 x 3.8 cm  
Degree of Weathering: C  
Degree of Fracturing: B

Location: Yamato Mountains, Antarctica  
Original Number: 79111901  
Found: Nov. 19, 1979, K. Yanai et al.

Physical Description:

This irregular, but somewhat tabular, stone contains three broken surfaces out of six. Thin fusion crust is dull black; the broken surfaces are heavily weathered to a reddish brown color. The stone has many fractures along which oxidation is extensive. The interior is brownish gray in color.

Petrographic Description:

Chondritic structure is almost absent. The granular texture is constructed of olivine, pyroxene and plagioclase with equant grains of Fe-Ni metal and troilite, several tens to one hundred microns in size. Clear recrystallized plagioclase occurs commonly and Ca-poor pyroxene is orthopyroxene. Chromite is also common. Weathering is extensive, with staining and patches associated with Fe-Ni metal. Microprobe analyses gave the mineral compositions listed below.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>18.5</sub> | 1.5 | Fa <sub>17.5-19.3</sub> |
| Low-Ca pyroxene | Fs <sub>16.1</sub> | 2.1 | Fs <sub>14.9-17.0</sub> |

Yamato-791107

L6 Chondrite

Weight: 283.55 gms  
Dimension: 7.6 x 5.0 x 3.3 cm  
Degree of Weathering: B/C  
Degree of Fracturing: B

Location: Yamato Mountains, Antarctica  
Original Number: 79111902  
Found: Nov. 19, 1979, K. Yanai et al.

Physical Description:

Thick, dull brown fusion crust covers about 50% of this subrounded stone. The B surface is a large broken surface, where a few thick black veins and some thin fractures are present. An aggregate of troilite, 4 mm across, is visible in the greenish gray interior matrix. Weathering is extensive on the broken surfaces but not so much in the interior.

Petrographic Description:

Chondrules are sparse and poorly defined, tending to merge with recrystallized granular matrix consisting of olivine, pyroxene, plagioclase, Fe-Ni metal, troilite, chromite. Plagioclases grow up to several tens of microns in size and the groundmass of chondrules is recrystallized to holocrystalline texture. Ca-poor pyroxene is orthopyroxene. A large troilite grain more than 2 mm long is observed on one edge. Small amounts of limonite are associated with Fe-Ni metal grains. Microprobe analyses show olivine of essentially uniform composition and pyroxene of somewhat variable composition. The meteorite is tentatively classified as an L6 chondrite.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>24.1</sub> | 1.8 | Fa <sub>22.0-25.7</sub> |
| Low-Ca pyroxene | Fs <sub>20.5</sub> | 3.1 | Fs <sub>19.0-22.6</sub> |

Yamato-791144

H4 Chondrite

Weight: 144.92 gms  
Dimension: 4.8 x 4.2 x 4.2 cm  
Degree of Weathering: C  
Degree of Fracturing: A/B

Location: Yamato Mountains, Antarctica  
Original Number: 79111905  
Found: Nov. 19, 1979, K. Yanai et al.

Physical Description:

Black fusion crust covers most of this stone. Small fracture surfaces are present at the corners of the triangular E surface. The E and W surfaces are concave. A few chondrules up to 2/3 mm in diameter are visible on the fracture surfaces which are weathered to a reddish brown color. Chipping showed the interior material is also extensively weathered and has a yellowish brown color. A continuous crack is present on the S and W surfaces but does not seem to penetrate deeply the inside of the stone.

Petrographic Description:

Chondrules are well defined, their size ranging from 0.1 to 1 mm across. A variety of chondrule types is observed, the commonest being porphyritic to granular types. Barred-olivine chondrules are also common whereas radial pyroxene chondrules are not so. Glasses in chondrules are more or less devitrified. Recrystallized plagioclase is not observed but clean plagioclase occurs in Fe-Ni metal grains. Polysynthetically-twinned pyroxene is common. Troilite, Fe-Ni metal, and minor chromite are present. Thin fusion crust less than 40 microns in width is discernible on one edge. The veins and patches of limonite are associated with Fe-Ni metal grains. Microprobe analyses show olivine of uniform composition and pyroxene of variable composition.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>18.0</sub> | 1.9 | Fa <sub>16.7-18.6</sub> |
| Low-Ca pyroxene | Fs <sub>15.9</sub> | 4.4 | Fs <sub>14.4-19.0</sub> |



Yamato-791145

L6 Chondrite

Weight: 136.82 gms  
Dimension: 5.4 x 4.5 x 3.4 cm  
Degree of Weathering: B/C  
Degree of Fracturing: A

Location: Yamato Mountains, Antarctica

Original Number: 79111906

Found: Nov. 19, 1979, K. Yanai et al.

Physical Description:

This subrounded stone is nearly complete, covered with patches of thin, somewhat shiny, black fusion crust. Areas devoid of fusion crust are extensively weathered to a brown color. The interior material is also weathered and has a yellowish to reddish brown color.

Petrographic Description:

Chondrules are sparse and poorly defined, tending to merge with recrystallized granular matrix consisting of olivine, pyroxene, plagioclase, and troilite, with minor amounts of Fe-Ni metal and chromite. Patches of limonite are associated with Fe-Ni metal grains. Microprobe analyses gave the mineral compositions listed below. Pyroxene with the chemical composition of En47 Fs8 Wo45 was identified with the microprobe.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>24.3</sub> | 2.1 | Fa <sub>23.2-25.8</sub> |
| Low-Ca pyroxene | Fs <sub>20.5</sub> | 2.2 | Fs <sub>19.2-21.9</sub> |
| Plagioclase     | An <sub>10</sub>   |     |                         |

Yamato-791209

H5 Chondrite

Weight: 3288 gms

Dimension: 21.1 x 12.7 x 8.4 cm

Degree of Weathering: C

Degree of Fracturing: B

Location: Yamato Mountains, Antarctica

Original Number: A79112014

Found: Nov. 20, 1979, K. Yanai et al.

Physical Description:

One third of this large stone is covered with dull black fusion crust. Several large, deep cracks penetrate the interior of the stone. The sample was almost broken into several pieces due to the cracks. Areas devoid of fusion crust are heavily weathered to a brown color and pitted. Chondrules as large as 2 mm in diameter are visible on the weathered surfaces. The interior material is brownish gray in color. Oxidation haloes are commonly observed.

Petrographic Description:

Chondrules and their fragments are closely packed, with spherical chondrules ranging from 0.2 to 1 mm in diameter. Granular to porphyritic types are the commonest. Clear glass has been devitrified, however no plagioclase is observed in chondrules and the poorly recrystallized matrix. Weathering is extensive, with patches of limonite associated with Fe-Ni metal. The staining is intense except for the area of chondrules. Microprobe analyses show olivine and pyroxene of essentially uniform composition.

|                 | Average            | %MD | Range                   |
|-----------------|--------------------|-----|-------------------------|
| Olivine         | Fa <sub>17.6</sub> | 1.7 | Fa <sub>16.5-18.9</sub> |
| Low-Ca pyroxene | Fs <sub>15.5</sub> | 2.0 | Fs <sub>14.6-16.3</sub> |

Yamato-791824

C2 Chondrite

Weight: not measured(about 150gms) Location: Yamato Mountains, Antarctica

Dimension: not measured

Degree of Weathering:

Original Number: A79120402

Degree of Fracturing:

Found: Dec. 4, 1979, K. Yanai et al.

Physical Description:

This specimen is still kept in a cold storage room and has not yet been processed. A small chip which was used for a thin section is a fragment collected together with the main portion of the stone.

Petrographic Description:

Section is too small for description.

Yamato-793321

C2 Chondrite

Weight: not measured (about 200gms)    Location: Yamato Mountains, Antarctica  
Dimension: not measured  
Degree of Weathering:                      Original Number: A80010504  
Degree of Fracturing:                      Found: Jan. 5, 1980, K. Yanai et al.

Physical Description:

This specimen has not yet been processed. The specimen is placed in a cold storage to be kept in the same condition as recovered. A small chip which had been collected together with the main portion of the specimen was taken for a polished thin section.

Petrographic Description:

An extremely fresh sample consisting of chondrules and chondrule fragments, amoeboid olivine inclusions, CAI, and isolated olivine grains embedded in opaque matrix. The chondrules contain abundant glass. One end of the thin section contains a "xenolith" of altered C2 chondrite containing brown inclusions, in contrast to the unaltered white inclusions of the host meteorite. This region is surrounded on three sides by unaltered host meteorite.

Yamato-793495

Unusual Ordinary or CR Chondrite

Weight: 45.01 gms

Location: Yamato Mountains, Antarctica

Dimensions: 4.4 x 3.3 x 2.6 cm

Degree of Weathering:

Original Number: B80010701

Degree of Fracturing:

Found: Jan. 7, 1980, K. Yanai et al.

Physical Description:

Dull black to brownish black fusion crust covers two thirds of this stone. Some parts of the fusion crust have polygonal fractures. Areas devoid of fusion crust show the presence of large amounts of reddish brown oxidation staining. Extensively weathered chondrules and many spots of light colored inclusions are set in a dull blackish gray matrix. The stone has been unpacked and labeled but not yet chipped; therefore the interior of the stone has not yet been characterized. A small fragment found in the sample bag for this stone was picked up for a thin section.

Petrographic Description:

The meteorite consists of large chondrules embedded in opaque matrix material. The matrix comprises at least 25 vol. % of the meteorite. The chondrules exhibit a range of sizes and consist of olivine, polysynthetically twinned clinopyroxene, metal, and some devitrified glass. The matrix contains disseminated magnetite and sulfide grains, but no metal. This meteorite appears to represent a mixture of two different kinds of materials formed under radically different conditions. The large metal-bearing chondrules are similar to those in the Renazzo carbonaceous chondrite. This may be an ordinary chondrite with an unusually high proportion of "Huss matrix", but additional work is required to classify this meteorite. Its textural similarity to Renazzo suggests that it could be a CR chondrite.

Belgica-7904

C2 (CM) Chondrite

Weight: 1234 gms

Dimension: 13.6 x 9.6 x 7.7 cm

Degree of Weathering: A

Degree of Fracturing: A

Location: Belgica Mountains, Antarctica

Original Number: 79121901

Found: Dec. 19, 1979, K. Yanai et al.

Physical Description:

This subrounded stone is nearly complete and large relative to other carbonaceous chondrites recovered in Antarctica by the Japanese Antarctic Research Expedition. The stone has regmaglypts and is covered with dull black fusion crust except for areas along edges where the crust has been removed. Areas devoid of fusion crust show the presence of chondrules and light colored inclusions in the dark gray matrix. Green colored olivine fragments are also visible. This carbonaceous chondrite has a high proportion of matrix. Reddish brown staining is observed on limited areas of exterior surfaces. Most parts of areas devoid of fusion crust are fresh, suggesting interior materials may be fresh. Chipping or sawing this specimen has not yet been done. A polished thin section for a preliminary examination of this stone has been made from a small chip which was collected together with the main part of the stone.

Petrographic Description:

The meteorite consists of abundant dark phyllosilicate matrix containing chondrules, inclusions, and mineral fragments. Chondrules consist mostly of olivine and brown glass. Glass is especially abundant in this meteorite relative to other C2 chondrites. Also present are amoeboid olivine inclusions and small Ca, Al-rich inclusions. Angular isolated olivine grains are abundant and many contain glass insets. Small grains of metal and troilite are disseminated throughout the meteorite. Little evidence of weathering is apparent. This meteorite appears to be a typical C2 chondrite, possibly with a higher proportion of matrix than most chondrites of this type.

I        wish,                do not wish to continue receiving the Meteorites  
News for Japanese Collection of Antarctic Meteorites.

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