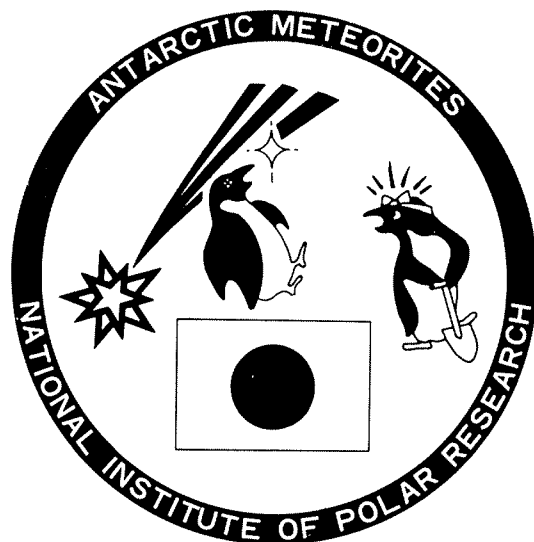


# **METEORITES NEWS**

**JAPANESE COLLECTION OF ANTARCTIC METEORITES**



**Volume 3, Number 1**

**October 1984**

**Compiled by**  
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**and**  
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**National Institute of Polar Research (NIPR)**

**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 Collections of Antarctic Meteorites. This issue constitutes the second 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 1974 field season.

The meteorites news has been prepared by the Department of Meteorites, National Institute of Polar Research (NIPR), Tokyo. We are indebted to Dr. Brian Mason for his discussions and review of our descriptions, and to Mr. H. Haramura, University of Tokyo, for his bulk chemical analyses.

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.

## SAMPLE REQUESTS

The Committee on Antarctic Meteorites (Chairman, Prof. Takesi Nagata), National Institute of Polar Research will meet after next March for the purpose of reviewing requests for Antarctic Meteorites. Requests to samples should be sent to:

Keizo Yanai,  
Curator, Antarctic Meteorites  
Department of Meteorites,  
National Institute of Polar Research,  
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173  
Japan  
Telephone: Tokyo (03) 962-4711  
Cable Address: POLARESEARCH TOKYO  
Telex: 2723515 POLRSC J

## DATA SHEET

Information in data sheets for meteorite specimens include 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 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, Satsuki Ikadai, Kazuko Katase and Akiko Suzuki for their assistance on the compilation of this issue.

## REQUIERMENTS AND PROCEDURES FOR ANTARCTIC METEORITES

### RESEARCH ON JAPANESE COLLECTIONS

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  
Curator, Antarctic Meteorites  
Department of Meteorites,  
National Institute of Polar Research,  
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173  
Japan

## Japanese Collections of Antarctic Meteorites

### Yamato and Belgica meteorites

<u>Collection Names</u>	<u>Meteorite Names</u>	<u>Abbreviations</u>
Yamato-69 meteorites	Yamato-691 to -699.	Y-691 to Y-699
Yamato-73 meteorites	Yamato-7301 to -7312.	Y-7301 to Y-7312
Yamato-74 meteorites	Yamato-74001 to -74663	Y-74001 to Y-74663
Yamato-75 meteorites	Yamato-75001 to -75307.	Y-75001 to Y-75307
Yamato-79 meteorites	Yamato-790001 to -794093.	Y-790001 to Y-794093
Belgica-79 meteorites	Belgica-7901 to -7905.	B-7901 to B-7905
Yamato-80 meteorites	Yamato-8001 to -8014.	Y-8001 to Y-8014
Yamato-81 meteorites	Yamato-81001 to -81113.	Y-81001 to Y-81113
Yamato-82 meteorites	Yamato-82001 to -82211.	Y-82001 to Y-82211

### Victoria Land meteorites

<u>Collection Name</u>	<u>Meteorite Name</u>	<u>Abbreviation</u>
Mount Baldr meteorites	Mount Baldr a and b.	MBR a and MBR b
Allan Hills-76 meteorites	Allan Hills-761 to -769.	ALH-761 to ALH-769
Allan Hills-77 meteorites	Allan Hills-77001 to -77307.	ALH-77001 to ALH-77307
Purgatory Peak-77 meteorite	Purgatory Peak-77006.	PGP-77006
Derrick Peak-78 meteorites	Derrick Peak-78001 to -78010.	DRP-78001 to DRP-78010
Meteorite Hills-78 meteorites	Meteorite Hills-78001 to -78028.	MET-78001 to MET-78028
Bates Nunatak-78 meteorites	Bates Nunatak-78001 to -78006.	BTN-78001 to BTN-78006
Allan Hills-78 meteorites	Allan Hills-78001 to -78262.	ALH-78001 to ALH-78262
Reckling Peak-78 meteorites	Reckling Peak-78001 to -78005.	RKP-78001 to RKP-78005

Japanese Collections of Antarctic Meteorites

National Institute of Polar Research (NIPR)  
Tokyo, 173 Japan

(October 1984)

Meteorite Name	Date of find	Iron	Stony-Iron	Chondrite	Achondrite	*	**	Total	Memo
Yamato-69	1969.12			7	1	1		9	JARE-10
Yamato-73	1973.12			11	1			12	JARE-14
Yamato-74	1974.11-12		2	630	28	3		663	JARE-15
Yamato-75	1975-76	2	1	289	12	3		307	JARE-16
Mt. Baldr	1976.12			2				2	Joint Japan- U.S.A.
Allan Hills-76	1977.1	1		7	1	1		10	
Allan Hills-77	1977-78	6	1	234	4	3		248	
Purgatory Peak	1978.1	1						1	
Derrick Peak-78	1978-79	5						5	
Meteorite Hills-78	1978-79			28				28	
Bates Nunatak-78	1978-79			5				5	
Allan Hills-78	1978-79	2		173	8	1		184	
Reckling Peak-78	1978-79			5				5	
Yamato-79	1979-80	7	1	3,549	79	31	9	3,676	
Belgica-79	1979.12			4		1		5	JARE-20
Yamato-80	1980-81		1	11	1			13	JARE-21
Yamato-81	1981-82			123	2	7	1	133	JARE-22
Yamato-82	1982-83			179	21	10	1	211	JARE-23
Yamato-83	1983.12						42	42	JARE-24
Total		24	6	5,257	158	61	53	5,559	

\* : Carbonaceous Chondrite

\*\* : Unidentified

JARE : Japanese Antarctic Research Expedition

Table. Data on classified Yamato-74 meteorites

Meteorite Name	Weight(g)	Class	%Fa in olivine	%Fs in pyroxene	*	Comments
Yamato-74001	246.1	H5	18.3(17.2-19.5)	16.1(15.5-16.6)	C	with H4 clast
Yamato-74002	69.7	LL4	27.9(26.7-28.4)	22.9(22.5-23.4)	A	
Yamato-74003	15.5	L6	25.2(24.6-25.9)	21.1(20.7-22.2)		maskelynite
Yamato-74004	8.05	H5	19.0(17.1-20.1)	16.7(15.9-17.3)		
Yamato-74005	3.69	Dio(A)	-	24	A	chromite
Yamato-74006	35.83	H6	19.1(18.2-20.7)	16.5(15.0-17.1)		En62.9Fs10.6Wo26.6, En48.9Fs6.1Wo44.9
Yamato-74007	162.3	L6	24.8(24.3-25.7)	20.6(19.9-21.5)	B	Pl(An9.8-11.7, 24.5)
Yamato-74008	14.31	H	18.5(17.3-21.9)	16.2(14.8-19.8)		shocked
Yamato-74009	8.97	L5	24.5(23.4-25.4)	20.6(20.0-21.6)		apatite, merrillite
Yamato-74010	298.5	Dio(A)	-	23.5(22.9-23.6)	A	En73.9-75.2Fs22.9-23.6Wo1.9-2.5, chromite
Yamato-74011	206.0	Dio(A)	-	24.4(23.4-24.9)	A	En72.1-74.6Fs24.4-24.9Wo2.5-3.0, chromite
Yamato-74012	75.4	H5	18.9(18.1-19.9)	15.5(16.1-17.0)	B	
Yamato-74013	2059.5	Dio(A)	-	23.8(23.2-24.8)	A	En72.3-74.8Fs23.2-24.8Wo2.0-2.9, chro.troi.
Yamato-74014	2367.9	H6	18.8(17.8-19.5)	16.3(15.7-16.7)	B	Pl(An10.7-11.6, 24.6)
Yamato-74015	88.0	L6	24.6(23.6-25.9)	20.3(19.4-21.0)	B	Pl(An12.1), merri., maskl.
Yamato-74016	11.54	H6	19.1(18.1-19.9)	16.8(15.8-17.6)		En48.9Fs6.1Wo45.0, merrillite
Yamato-74017	3.23	H6				as same as Y-74016
Yamato-74018	5.25	LL6	29.8(28.8-30.5)	24.1(23.8-24.5)		Pl(An9.6, 9.9), merrillite
Yamato-74019	6.02	H4	18.8(18.0-20.1)	16.1(15.4-18.5)		merrillite, apatite
Yamato-74020	0.56	L5	24.3(23.5-24.9)	20.7(20.2-21.3)		
Yamato-74021	39.3	H5	18.8(17.9-21.8)	16.0(15.3-16.6)	C	merrillite
Yamato-74022	34.7	LL5	26.7(25.7-29.0)	22.1(21.7-22.6)	A	
Yamato-74023	6.30	L6	22.9(21.8-24.7)	19.4(18.4-20.0)		
Yamato-74024	50.0	L3	22.8(0.8-26.0)	10.5(2.4-18.7)	A	
Yamato-74025	14.0	Unique	1.6(1.3-2.3)	2.2(1.7-2.4)		Pl(An15.1-26.8), En53.3Fs1.0Wo45.7
Yamato-74026	5.24	H6	19.4(18.6-20.0)	17.0(16.7-17.5)		
Yamato-74027	35.7	L6	25.4(24.4-26.8)	20.8(20.4-21.4)		granular part (clast)
Yamato-74028	90.2	L6	24.5	22.1	B	En45Fs7Wo46, Pl(An11)
Yamato-74029	4.3	H4	17.9(17.1-18.5)	15.6(14.7-16.2)		angular troilite
Yamato-74030	7.82	L6	25.3(24.5-26.9)	21.2(20.2- )		
Yamato-74031	6.1	Dio(A)	-	24	A	chromite
Yamato-74032	14.1	H4	19.0(18.4-20.4)	16.8(16.1-17.1)		En57.3Fs9.1Wo33.6, merrillite
Yamato-74033	2.9	L3	16.5(4.2-28.1)	22.5(0.7-28.1)		
Yamato-74034	27.6	H4	19.1(18.2-20.0)	16.3(15.9-17.0)		
Yamato-74035	115.7	L6	24.7(22.6-25.7)	20.6(19.6-21.5)	B	Pl(An10.0-10.3), apatite, merrillite
Yamato-74036	201.4	L6	24.7(23.6-25.8)	20.6(19.6-21.4)	B	Pl(An9.5-12.5)
Yamato-74037	591.9	Dio(A)	-	24.2(23.6-24.8)	A	En72.2-74.4Fs23.6-24.8Wo2.0-2.9, chromite
Yamato-74038	208.9	H5	19.0(17.6-20.2)	16.6(16.0-18.0)	B	merrillite
Yamato-74039	47.6	L6	24.6(23.8-25.5)	20.5(18.6-21.3)	A	Pl(An9.1-11.9), merrillite, apatite
Yamato-74040	35.17	L6	24.4(23.8-25.8)	20.5(19.4-21.5)		Pl(An9.6-12.0)
Yamato-74041	1.79	H5	18.6(17.7-20.3)	16.9(15.9-18.2)		
Yamato-74042	3.85	H4	18.1(15.3-22.0)	15.5(14.3-16.3)		
Yamato-74043	5.19	H3-4	19.1(14.7-21.3)	15.4(6.9-24.2)		
Yamato-74044	51.8	Pa1	12.3	-	B	metal(10.6%Ni 0.75%Co), chro.tro.taen.(46.9%Ni)
Yamato-74045	39.82	L6	25.1(24.2-26.3)	21.1(20.9-21.5)		Pl(An9.0, 9.3)
Yamato-74046	2.22	H6	25.0(24.3-26.0)	20.9(20.2-21.6)		
Yamato-74047	2.22	L4	23.2(22.4-25.8)	19.9(17.8-21.1)		
Yamato-74048	67.1	LL6	29.7(28.7-30.4)	24.2(23.2-25.6)	B	Pl(An10.1, 10.4), merrillite, apatite
Yamato-74049	457.9	H4	19.1(17.7-20.1)	17.1(15.6-19.2)	B	to Y-74064 except Y-74063, with Clast
Yamato-74063	35.41	Unique	10.9(10.5-11.4)	10.9(10.3-12.5)		En50.7-52.1Fs4.1-4.7Wo43.4-45.0, Pl(An13.5)
Yamato-74065	24.5	L6	24.4(23.2-24.6)	20.2(19.6-21.1)	A	to Y-74066, with L4 clast
Yamato-74067	4.0	H6	19.2(18.1-20.0)	16.6(15.3-18.0)		Pl(An11.4)
Yamato-74068	5.41	H5	19.0(18.4-21.1)	16.9(15.4-19.5)		merrillite
Yamato-74069	18.57	H6	19.9(19.1-20.5)	17.2(16.2-18.1)		Pl(An10.3, 11.1, 12.2, 12.3)
Yamato-74070	194.4	H5	18.5(17.9-19.6)	16.6(15.9-17.2)	B	to Y-74075
Yamato-74076	20.36	L6	24.5(23.5-25.2)	20.3(19.7-20.9)		
Yamato-74077	5575.1	L6	21.8(20.9-23.2)	18.4(17.5-19.1)	A	
Yamato-74078	15.88	H4	19.5(18.8-20.3)	17.0(16.7-17.6)		Pl(An12.9)
Yamato-74079	620.8	H4-5	17.3(16.4-18.6)	15.6(15.1-16.7)	A/B	Ca-rich cpx, spinel
Yamato-74080	536.9	L6	24.8(23.8-26.8)	20.6(20.3-21.0)	A	En46Fs8Wo46
Yamato-74081	102.5	H4	18.3(17.3-19.6)	15.9(15.4-16.4)	C	En48.3Fs6.0Wo44.7
Yamato-74082	179.8	H4	19.0(18.0-20.1)	16.9(15.8-18.4)	B	merrillite
Yamato-74083	3.31	H4	17.7(16.7-18.2)	15.6(14.5-16.5)		
Yamato-74084	2.26	L6	24.6(23.7-25.6)	20.7(20.3-21.7)		Pl(An10.6, 11.0)
Yamato-74085	30.5	H4	18.2(16.9-19.3)	15.9(14.9-16.9)	B/C	En72.4Fs13.4Wo14.2, En48.4Fs6.4Wo45.1
Yamato-74086	0.97	H4-5	18.2(17.6-19.0)	15.9(15.5-16.2)		
Yamato-74087	0.78	L6	24.9(24.2-25.6)	20.8(19.8-21.2)		
Yamato-74088	14.28	H4	17.6(16.9-18.3)	15.9(14.4-19.3)		shocked
Yamato-74089	43.36	H4	17.6(17.1-18.1)	15.5(15.2-15.9)		
Yamato-74090	1.01	L6	24.9(24.0-25.7)	20.7(20.0-22.4)		Pl(An9.4-10.6), apatite, merrillite

Table (continue)

Meteorite Name	Weight(g)	Class	%Fa in olivine	%Fs in pyroxene	*	Comments
Yamato-74091	2.30	L6	24.5(23.5-25.2)	20.8(20.4-21.6)		
Yamato-74092	3.23	H6	19.3(18.6-20.0)	16.7(16.1-17.3)		P1(An11.6)
Yamato-74093	6.59	L6	24.8(23.6-26.1)	20.8(20.1-21.7)		maskelynite
Yamato-74094	867.2	H6	19.0(17.5-19.8)	16.6(15.9-17.2)	C	with Clast
Yamato-74095	65.92	H6-5	25.2(24.5-26.4)	20.8(19.2-21.7)		P1(An9.5), En47.0Fs8.1Wo44.9
Yamato-74096	16.19	Dio(A)	-	24	A	chromite
Yamato-74097	2193.9	Dio(A)	-	23.9(23.6-24.2)	A	En73.7-74.5Fs23.6-24.2Wo1.8-2.0, chromite
Yamato-74098	9.10	H5	18.9(17.1-19.7)	16.9(16.7-17.0)		
Yamato-74099	27.36	H5	18.6(17.8-19.3)	16.2(15.7-16.7)		
Yamato-74100	15.45	L6	25.8(24.5-26.7)	20.9(19.9-21.5)		
Yamato-74101	9.10	H5	18.9(17.3-20.4)	16.5(15.7-18.0)		
Yamato-74102	2.99	H5	18.8(17.5-19.5)	16.4(15.4-17.1)		with H6 clast
Yamato-74103	21.59	H6	19.3(18.8-20.3)	17.2(16.7-17.7)		P1(An11.5, 12.1, 12.5), merrillite
Yamato-74104	21.8	H6	19.2(18.5-20.1)	16.7(15.0-17.4)		P1(An10.9-12.1)
Yamato-74105	25.66	H6	19.4(18.6-20.2)	16.8(16.2-17.5)		P1(An11.2-12.2), En48.4Fs6.6Wo45.0
Yamato-74106	146.6	H6	17.9(17.1-18.7)	15.8(15.1-16.4)		P1(An12.1)
Yamato-74107	114.0	H5	18.2(17.1-19.1)	16.0(13.7-17.2)		
Yamato-74108	139.3	H5	18.3(17.7-18.8)	15.9(14.0-17.1)		
Yamato-74109	43.67	Dio(A)	-	24	A	chromite
Yamato-74110	90.1	H5	18.5(17.1-19.4)	16.1(15.4-17.4)	C	
Yamato-74111	58.0	H4-5	18.3(17.2-19.4)	16.0(14.6-17.7)	B/C	
Yamato-74112	45.52	H5	18.7(18.2-19.3)	16.5(15.5-18.5)		Brecciated
Yamato-74113	28.21	H5	18.4(17.8-19.3)	16.2(15.6-16.9)		Brecciated, P1(An11.9), merrillite
Yamato-74114	42.28	L4	24.7(23.7-25.6)	20.7(19.8-22.1)		merrillite, En46.8Fs6.5Wo46.7
Yamato-74115	1045.1	H4-5	17.7(16.9-18.8)	15.8(14.2-16.8)	B	merrillite
Yamato-74116	68.9	L5	24.6(23.1-25.5)	20.5(19.9-21.1)	C	P1(An9.9)
Yamato-74117	80.2	L6	24.6(24.1-25.1)	20.4(19.5-21.3)	A	P1(An10.0-12.9), merrillite, chromite
Yamato-74118	845.1	L6	24.5(23.4-25.2)	20.8(19.7-21.6)	A	P1(An8.3, 7.5)
Yamato-74119	4.36	L6	24.9(23.8-27.7)	21.0(20.0-22.6)		P1(An9.3-10.1), maskelynite
Yamato-74120	90.5	L6	24.8(24.4-25.2)	21.1(20.4-22.4)	B	P1(An9.6-12.2), maskelynite
Yamato-74121	8.53	H6	19.7(18.9-20.4)	17.1(16.2-18.3)		P1(An11.8-13.7), En47.4Fs5.6Wo47.0
Yamato-74122	54.89	H4	17.5(16.6-19.1)	15.4(14.6-16.5)		merrillite
Yamato-74123	69.9	Ure	21.6(13-23)	18.2	B	En74.7-75.0Fs18.1-18.2Wo6.9-7.1
Yamato-74124	62.4	H4	18.5(16.9-19.2)	15.8(14.9-16.7)	B	En51.6Fs16.2Wo42.3, P1(An12.1)
Yamato-74125	107.0	Dio(A)	-	24	A	chromite
Yamato-74126	14.52	Dio(A)	-	24	A	chromite
Yamato-74127	19.20	L6	24.7(23.7-25.8)	20.6(19.5-21.2)		P1(An9.0-10.5)
Yamato-74128	40.98	L6	25.0(24.4-26.5)	21.1(20.5-21.6)		P1(An10.3), En45.8Fs8.7Wo45.4
Yamato-74129	6.57	L6				as same as Y-74128
Yamato-74130	17.9	Ure	22	17.9	C	En55.3Fs13.1Wo31.6
Yamato-74131	18.06	H5	19.1(17.8-21.0)	16.6(15.4-17.4)		with H6 clast
Yamato-74132	2.37	H4-5	18.4(17.0-19.9)	16.0(15.3-16.7)		P1(An11.7), merrillite
Yamato-74133	3.36	H4	18.5(17.5-19.1)	16.0(15.3-17.2)		
Yamato-74134	3.08	H4	18.8(17.8-19.5)	16.4(15.3-17.7)		
Yamato-74135	7.75	C03	1.9(0.1-28.2)	5.6(0.5-10.8)		
Yamato-74136	725.0	Dio(A)	-	24.4(24.0-24.8)	A	En72.3-74.2Fs24.0-24.8Wo1.8-2.9, chro. troi.
Yamato-74137	26.32	H6	19.2(18.2-21.0)	16.7(15.8-17.6)		shocked
Yamato-74138	41.87	H3	17.1(0.3-36.9)	14.5(3.0-25.9)	A/B	to Y-74141, tridymite, En48.7Fs5.7Wo45.5
Yamato-74142	29.5	H3	16.9(10.9-27.9)	13.4(1.0-16.9)	A	tridymite
Yamato-74143	4.89	H6	19.0(17.5-20.0)	16.6(15.8-18.2)		shocked
Yamato-74144	141.4	L6	24.8(24.3-26.2)	21.0(19.9-21.8)	B	P1(An11.2), maskelynite, merrillite
Yamato-74145	0.6	H6	18.7(17.4-19.6)	16.5(15.0-17.3)		P1(An12.0), merrillite
Yamato-74146	8.55	H4				as same as Y-74147
Yamato-74147	5.93	H4	17.2(16.3-18.3)	15.1(14.1-15.9)		
Yamato-74148	1.02	H5	18.5(15.3-23.5)	16.2(15.3-17.3)		
Yamato-74149	0.70	H6	18.1(17.4-19.1)	15.8(14.8-16.5)		P1(An13.3, 13.1)
Yamato-74150	33.56	Dio(A)	-	24	A	chromite
Yamato-74151	49.42	Dio(A)	-	24	A	chromite
Yamato-74152	3.92	H4	18.3(17.1-18.8)	16.0(15.2-16.3)		
Yamato-74153	6.17	L4	24.6(23.5-26.5)	20.5(19.8-22.8)		
Yamato-74154	2.83	Ure	(2-16)	(6-13.1)	A	shocked
Yamato-74155	3788.1	H4	18.5(17.6-19.2)	16.0(14.5-17.9)	A	to Y-74156, chromite, Ca-rich cpx.
Yamato-74157	135.81	L6	24.8(23.6-25.7)	20.5(19.7-21.8)	B	to Y-74158, merrillite
Yamato-74159	98.2	Euc(po1)	-	(18.1-65.0)	A	En23.6-54.0Fs18.1-65.0Wo6.5-40.9
Yamato-74160	31.4	LL6-7	29.4(28.2-30.6)	23.1(22.0-24.1)	A	P1(An7-17)
Yamato-74161	42.09	L6	24.9(24.1-25.7)	20.7(20.0-21.2)		
Yamato-74162	3.86	Dio(A)	-	24	A	chromite
Yamato-74163	134.2	H5	17.7(16.7-18.6)	15.8(15.0-16.5)	C	
Yamato-74164	248.8	L6	24.8(24.2-25.5)	20.7(19.9-21.9)	A	P1(An9.3-10.6), En46.6Fs8.1Wo45.3, merri.
Yamato-74165	203.4	L4	24.7(23.9-25.4)	20.4(19.9-20.7)	C	P1(An10.8), maskelynite



Table (continue)

Meteorite Name	Weight(g)	Class	%Fa in olivine	%Fs in pyroxene	*	Comments
Yamato-74166	5.16	H3	18.1(17.6-19.4)	15.5(13.8-16.4)	B	to Y-74170 except Y-74168
Yamato-74168	1.59	E5	0.1(0-2.4)	0.5	B	
Yamato-74171	4.65	LL3	10.2(3.2-26.7)	25.3(6.7-30.7)		
Yamato-74172	47.0	L4	24.9(23.1-26.0)	20.1(14.6-22.2)		with L6 clast
Yamato-74173	89.76	L6	24.0(23.1-24.9)	20.3(19.7-22.5)	B	to Y-74181
Yamato-74182	16.62	L6	24.6(24.0-25.4)	20.5(20.3-21.6)	A	to Y-74185, Pl(An10.2-11.1), En46Fs8Wo46
Yamato-74186	5.17	H4	19.0(18.2-19.7)	16.3(15.4-17.4)		
Yamato-74187	13.32	H5	18.0(16-22)	17.1(16-18)	C	to Y-74188, Pl., Cpx.
Yamato-74189	1.54	H6	19.1(17.9-20.0)	16.7(16.0-17.3)		Pl(An11.9-12.4), merrillite
Yamato-74190	3235.7	L6	24.5(23.8-25.5)	20.6(19.7-21.4)	A	Pl(An20), maskl. ap. chro. Ca-rich Cpx.
Yamato-74191	1091.6	L3	18.8(12-25)	(4-25)	A	
Yamato-74192	420.3	H5	18.2(17.7-18.9)	15.8(15.5-16.0)	C	
Yamato-74193	1818.5	H5	19.2(18.3-19.7)	16.7(15.4-19.7)	B	Pl(An11.6, 12.3)
Yamato-74194	728.91	H5	18.8(17.0-22.2)	17.1(16.4-17.7)	C	to Y-74342
Yamato-74343	42.38	H5	18.3(17.1-19.3)	16.8(15.8-18.4)		merrillite
Yamato-74344	1.42	Dio(A)	-	24	A	chromite
Yamato-74345	8.41	H6	19.0(18.3-19.7)	16.1(15.0-16.7)		Pl(An11.3-12.8), merrillite
Yamato-74346	82.35	H5	18.4(17.8-18.9)	16.2(15.6-17.0)		En51.8Fs6.1Wo42.1
Yamato-74347	7.85	Dio(A)	-	24	A	chromite
Yamato-74348	43.67	H5	19.0(18.4-20.1)	16.6(15.9-17.7)	C	to Y-74353, merri. En48.7Fs5.6Wo45.7
Yamato-74354	2721.1	L6	25.3(24.6-25.9)	21.2(20.1-22.1)	A	Pl(An9.9, 10.8) ap. merri. En47.9Fs7.8Wo44.3
Yamato-74355	82.9	L4	24.7(23.3-25.8)	20.8(19.8-21.2)	B	ilmenite
Yamato-74356	10.0	Euc(mono)	-	62	A	
Yamato-74357	13.8	Lod	7.9(7.0-8.5)	13.8(11.5-14.6)		Ab820r3An15, Chr. Diop.
Yamato-74358	2.94	L6	24.6(23.6-25.4)	21.4(20.1-29.3)		Pl(An9.7-10.8)
Yamato-74359	1.53	Unique	19.2(17.4-20.5)	16.7(15.6-18.6)		Clast, Pl(An2.4, 2.8), En73.0Fs18.0Wo9.0
Yamato-74360	3.29	Unique	20.5(19.2-22.5)	15.4(13.7-18.3)		Clast, Pl(An4.9-10.1), En58.4Fs11.6Wo30.0
Yamato-74361	0.4	H	19.4(17.5-21.1)	17.2(15.7-18.8)		shocked
Yamato-74362	4175.0	L6	25.3(24.5-26.0)	21.2(20.1-21.8)	A	Pl(An10.1, 11.8)
Yamato-74363	1.01	H4	19.2(18.5-21.6)	16.6(15.9-17.3)		apatite
Yamato-74364	757.8	H4	17.3(16.9-17.9)	15.5(14.6-18.6)	B	merrillite
Yamato-74365	0.67	H6	19.3(18.6-20.1)	16.9(16.6-17.2)		Pl(An12.0-13.3)
Yamato-74366	0.25	L6	24.8(23.3-26.7)	21.1(20.3-22.7)		merrillite, apatite
Yamato-74367	165.6	L6	24.7(23.8-26.1)	20.5(19.6-21.4)	A	Pl(An9.3-12.2), merrillite
Yamato-74368	4.13	Dio(A)	-	24	A	chromite
Yamato-74369	4.17	H5	18.5(18.0-19.4)	16.2(15.9-16.6)		En49.9Fs5.3Wo44.8
Yamato-74370	42.1	E3-4	0.1	0.9(0-5.1)	B/C	Ab97.00r3, Ab98.4An0.30r1.4
Yamato-74371	5067.9	H4	18.4(17.5-19.2)	16.0(15.2-16.6)	A	apatite, chromite
Yamato-74372	84.6	L6	25.2	21.8	B	
Yamato-74373	0.28	H6	19.6(18.7-20.3)	17.6(16.9-19.1)		Pl(An11.9), maskelynite, shock vein
Yamato-74374	205.2	H4	17.5(16.9-18.0)	15.9(14.5-20.2)	B	Pl(An11.9), merrillite
Yamato-74375	92.7	H4	18.1(17.3-19.3)	15.6(14.7-18.3)	C	clinobronzite
Yamato-74376	120.0	L6	23.9(22.4-24.8)	20.2(19.5-21.4)	B	Pl(An10.4-10.8), maskl. ap.
Yamato-74377	10.51	H5-6	18.6(10.3-19.8)	16.7(15.6-20.7)		
Yamato-74378	18.44	L5	24.6(23.4-26.4)	20.4(19.3-22.2)		
Yamato-74379	66.01	H5	18.0	16.6	C	to Y-74416
Yamato-74417	44.5	L3	13.7(0.2-31.8)	10.9(3.1-27.0)	A	Pl(An62.5)
Yamato-74418	764.03	H6	18.7(17.8-19.8)	16.3(15.1-17.8)	C	to Y-74436, Pl(An18), Ca-rich Cpx. chromite
Yamato-74437	3.22	H4	18.5(17.5-21.3)	15.7(12.9-16.7)		with H6
Yamato-74438	42.24	H5	19.2(18.4-20.1)	16.8(16.5-17.2)		
Yamato-74439	32.74	L6	24.1(23.8-24.6)	19.9(18.8-20.4)		
Yamato-74440	1.61	H4	17.6(16.1-20.1)	15.7(15.1-16.3)		
Yamato-74441	27.4	L3	15.1(1.5-31.3)	11.6(2.0-29.4)	B	
Yamato-74442	173.3	LL4	28.9(28.0-30.2)	20.5(7.1-24.1)	A	Pl(An10.0, Or2.4)
Yamato-74443	6.03	H5	18.6(16.4-20.2)	16.3(15.2-18.0)		merrillite, apatite
Yamato-74444	11.81	LL4	30.0(29.0-31.2)	22.8(20.6-23.8)		with LL6, Pl(An8.6, 10.3, 76.3), maskl.
Yamato-74445	2293.2	L6	24.8(23.7-25.8)	20.8(20.2-22.0)	C	maskelynite
Yamato-74446	7.43	L6	24.7(24.0-25.5)	20.6(20.1-21.2)		
Yamato-74447	14.3	H6	18.0(17.1-18.7)	15.6(14.8-16.2)	B	Pl(An12.5), merrillite
Yamato-74448	17.7	Dio(A)	-	24	A	chromite
Yamato-74449	4.04	H5	18.9(17.8-22.8)	16.4(15.7-17.6)		
Yamato-74450	235.6	Euc(pol)	-	(30-65)	A	
Yamato-74451	0.80	L6	24.2(23.0-25.4)	20.3(19.7-20.6)		Pl(An9.4-9.8), merrillite
Yamato-74452	33.9	L6	24.0(23.1-24.7)	20.8(19.5-20.7)	A	
Yamato-74453	14.56	H4	17.8(23.1-24.7)	20.1(19.5-20.7)		
Yamato-74454	578.8	L6	23.6	20.8	A	
Yamato-74455	114.1	L6	24.7(24.0-25.4)	20.8(20.0-24.1)	A	Pl(An9.8-10.8)
Yamato-74456	56.82	H4	17.4(16.8-18.3)	15.9(14.1-17.9)		
Yamato-74457	120.8	L5	25.3	22	B	
Yamato-74458	37.35	H5	19.1(18.3-20.4)	16.8(15.9-20.5)		

Table (continue)

Meteorite Name	Weight(g)	Class	%Fa in olivine	%Fs in pyroxene	*	Comments
Yamato-74459	5148.3	H6	18.9(17.8-22.8)	16.4(15.7-17.6)	C	to Y-74602 except Y-74546
Yamato-74546	7.39	Dio(A)	-	24	A	chromite
Yamato-74603	188.7	L4	21.8(20.2-25.0)	20.4(18.8-22.7)	C	
Yamato-74604	58.57	H4	18.4(17.8-19.3)	16.3(15.4-18.1)		
Yamato-74605	580.8	L6	23.8(22.8-24.9)	20.2(19.4-21.1)	B	maskelynite, merrillite
Yamato-74606	2.95	Dio(A)	-	24	A	chromite
Yamato-74607	0.56	H4-5	17.9(5.5-21.2)	16.1(15.4-16.8)		
Yamato-74608	2.00	L4	22.3(20.5-25.3)	18.8(14.1-27.2)		
Yamato-74609	257.2	H5	18.4(17.2-19.2)	16.0(14.4-17.4)	C	
Yamato-74610	46.8	H4	17.9(17.1-19.1)	15.8(15.1-16.9)	B	clinobronzite
Yamato-74611	7.40	L6	23.1(22.1-24.1)	19.3(18.3-19.9)		Pl(An9.8)
Yamato-74612	2.46	L6	24.3(23.2-25.8)	20.4(19.7-22.6)		
Yamato-74613	145.07	H6	18.0(17.0-18.7)	15.9(15.6-16.1)	C	to Y-74638
Yamato-74639	89.5	L5	24.1(23.3-25.2)	20.4(18.9-22.5)	A	
Yamato-74640	1065.9	H6	19.0	17	C	
Yamato-74641	15.19	CM2	10.1(0.3-55.0)	3.1(0.5-20.3)	A	to Y-74642
Yamato-74643	38.01	H5	18.2(17.3-19.2)	15.9(14.9-16.8)		
Yamato-74644	20.45	H5	18.5(17.1-23.6)	15.9(14.9-16.7)		
Yamato-74645	35.6	H4-L4	21.1(20.0-22.1)	17.9(17.2-18.4)	C	
Yamato-74646	554.7	LL6	29.1(27.6-29.8)	24.8	A	En45.5Fs8.6Wo45.9
Yamato-74647	2323.8	H5	18.3(17.3-19.3)	15.9(15.4-16.7)	A	Pl, Ca-rich Cpx. chro.
Yamato-74648	185.5	Dio(A)	-	24.4(23.2-25.9)	A	En71.3-74.8Fs23.2-25.9Wo2.0-2.8, chro.
Yamato-74649	2.84	L6	24.7(23.7-25.6)	20.6(19.7-21.8)		Pl(An9), apatite
Yamato-74650	163.2	L6	24.6(23.7-25.3)	20.6(19.8-21.2)	A/B	Pl(An9.5, 10.2), merrillite
Yamato-74651	1.07	LL6	28.3(26.2-29.6)	22.4(18.0-24.1)		Pl(An9.7, 11.6)
Yamato-74652	7.9	L6	24.4(23.9-25.1)	20.6(19.7-21.4)	A	
Yamato-74653	1.09	H6	19.1(18.2-20.0)	16.5(16.1-16.9)		
Yamato-74654	45.02	L6	24.6(23.3-26.2)	20.6(19.6-22.4)		
Yamato-74655	10.55	L6	25.1(23.7-25.9)	20.5(20.0-21.1)		Pl(An9.7-10.8)
Yamato-74656	12.52	L4	24.7(24.0-25.7)	20.6(19.7-21.9)		
Yamato-74657	8.94	L5	24.4(22.8-25.9)	20.5(19.6-21.4)		
Yamato-74658	11.07	H6	19.1(17.1-21.2)	16.5(15.6-17.2)		
Yamato-74659	18.9	Ure	8.5	(4.1-8.0)	B	En84.6Fs8.1Wo7.3, En87.7Fs7.8Wo4.5
Yamato-74660	27.2	LL3	10.5(0.4-49.5)	8.9(0.4-34.5)	B	
Yamato-74661	5.31	H6	18.5(17.6-19.8)	16.2(15.1-17.0)		merrillite
Yamato-74662	150.9	CM2	10.9(0.2-52.8)	5.0(0.5-45.3)	A	
Yamato-74663	213.9	LL6	28.1(26.8-28.8)	23.0(21.8-23.8)	B	

Pal: Pallasite, Lod: Lodranite, Dio: Diogenite, Ure: Ureilite, Euc: Eucrite,  
 mono: monomict breccia, pol: polymict breccia, \*: Degree of Weathering

Yamato-74154

Ureilite(strongly recrystallized)

Weight: 2.873 gms

Dimension: 1.7 x 1.3 x 0.7 cm

Degree of Weathering:

Degree of Fracturing:

Location: Yamato Mountains, Antarctica

71°48'52"S 36°06'40"E

Original Number: 74120701

Found: Dec. 7, 1974, K. Yanai et al.

Physical Description:

A fairly complete stone with brownish-black fusion crust which make believe that of most chondrites, but any chondrules can't be seen on the exposed surface. Brown limonitic weathering pervades the fracture surfaces.

Petrographic Description:

The stone consists mainly of olivine (about 90%) which appears as mosaic texture of tiny grains (under 0.1 mm across) of subhedral to anhedral crystals. Pyroxene is less amount about 10% are scattered as porphyritic appearance of euhedral to subhedral crystals up to 1 - 1.5 mm long in fine grained olivine aggregate. They are rimmed partially with dark carbonaceous material which is very small amount about few %. Microprobe analysis show olivine of variable composition  $Fo_{98-84}$ , mean  $Fo_{88}$  and with unusually high

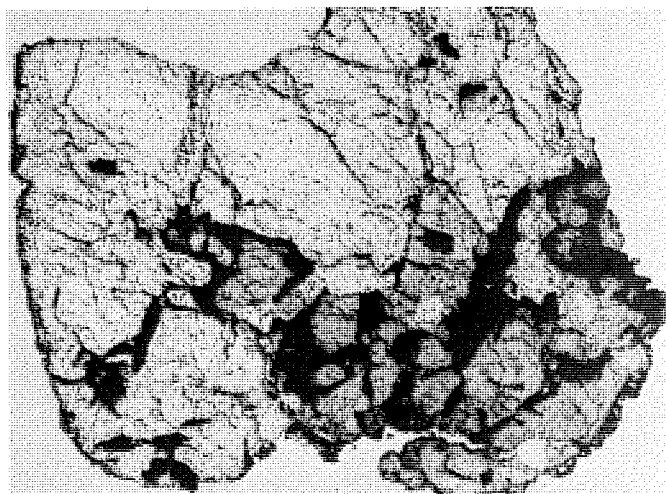
CaO (0.3%) and  $Cr_2O_3$  (0.7%) content. Pyroxenes show variable range of other

composition, high Mg and low Ca pyroxene  $Wo_{2.7}En_{87.3}Fs_{10.0}$ , relatively high

Ca pyroxene  $Wo_{12.5}En_{81.5}Fs_{6.0}$ , low Mg pyroxene  $Wo_{8.1}En_{78.8}Fs_{13.1}$ .

The meteorite is extremely resistant to sowing and grinding, which probably indicated the presence of diamond as in other ureilites. The meteorite is similar to Gopalpare ureilite in the mosaic texture of the olivine except its large amount of carbonaceous material.

The meteorite is identified and classified as one of the strongly recrystallized ureilites.



Yamato-74348 - 353

H4 Chondrite

Weight: 43.5 gms

Dimension:

Degree of Weathering: C

Degree of Fracturing:

Location: Yamato Mountains, Antarctica

71°45'45"S 35°54'00"E

Original Number: 74121907

Found: Dec. 19, 1974, K. Yanai et al.

Physical Description:

An irregular fragment partly covered with dull black fusion crust; fracture surfaces are heavily coated with brown limonite, obscuring the internal structure. Yamato-74349 - 353 are similar fragments, and were grouped in the field as probably part of a single fall.

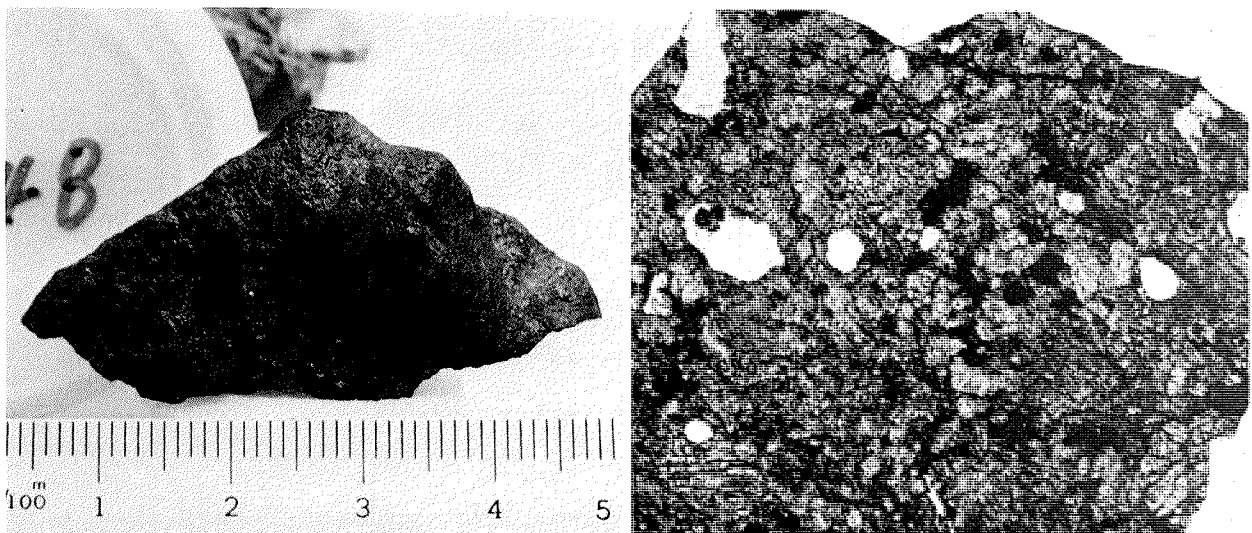
Petrographic Description:

Chondrules and chondrule fragments are abundant, and are set in a fine-grained groundmass consisting largely of olivine and pyroxene and minor amounts of nickel-iron and troilite. Some of the pyroxene is polysynthetically twinned clinobronzite. Fusion crust borders part of the section. Weathering is extensive, with brown limonitic staining throughout the section.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>19.0</sub>	1.8	18.4-20.1
Low-Ca pyroxene	Fs <sub>16.6</sub>	2.3	15.9-17.7

The meteorites are classified as an H4 chondrite.



Bulk chemical composition of the Yamato-74354,93,94 meteorite is shown as follow:

SiO <sub>2</sub>	38.80
TiO <sub>2</sub>	0.09
Al <sub>2</sub> O <sub>3</sub>	2.62
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	15.15
MnO	0.31
MgO	25.58
CaO	1.86
Na <sub>2</sub> O	0.94
K <sub>2</sub> O	0.12
H <sub>2</sub> O(-)	0.10
H <sub>2</sub> O(+)	0.2
P <sub>2</sub> O <sub>5</sub>	0.24
Cr <sub>2</sub> O <sub>3</sub>	0.57
FeS	6.11
Fe	6.04
Ni	1.16
Co	0.04
-----	
Total	99.93

(Analyst: H. Haramura)

Yamato-74354

L6 Chondrite

Weight: 2721 gms  
 Dimension: 14.0 x 11.0 cm  
 Degree of Weathering:  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°46'10"S 35°45'40"E  
 Original Number: 74121908  
 Found: Dec. 19, 1974, K. Yanai et al.

Physical Description:

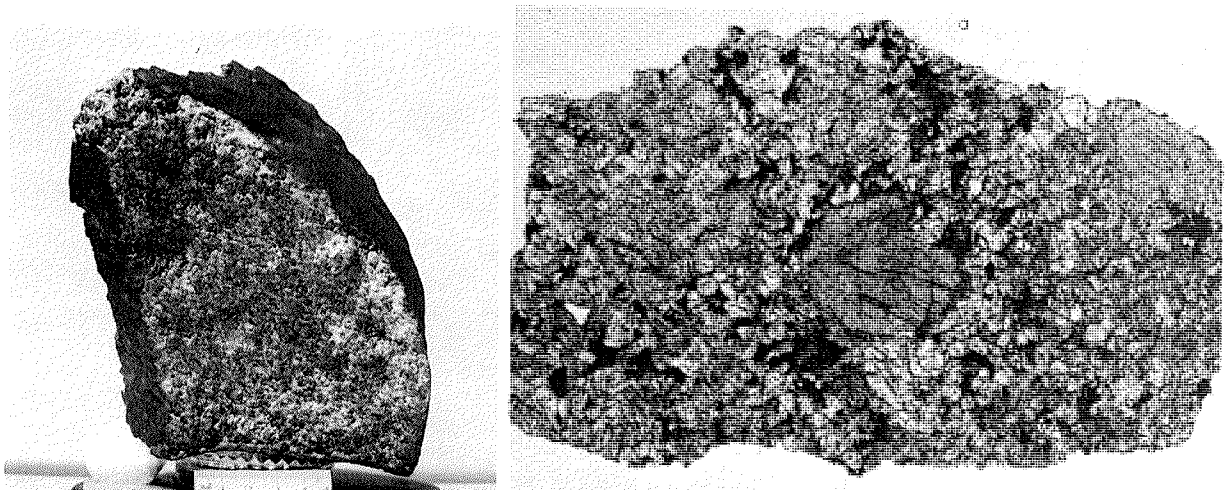
A thick sliced like stone, largely surfaces except S and N surface covered with dull black fusion crust. Brown limonitic staining is present on exposed surfaces a little, and the interior is bright grey with few visible chondrules and with minor limonitic staining around metal grains.

Petrographic Description:

Chondritic structure is poorly developed, the outlines of the chondrules, and chondrule fragments being obscured by recrystallization and integration with groundmass. The granular groundmass consists of a lot of olivine and pyroxene, with minor nickel-iron, troilite and a little plagioclase. Some limonitic staining is present, especially around nickel-iron grains. Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>25.3</sub>	0.9	24.6-25.9
Low-Ca pyroxene	Fs <sub>21.2</sub>	2.1	20.1-22.1
Clinopyroxene	En <sub>47.9</sub> Fs <sub>7.8</sub> Wo <sub>44.3</sub>		
Plagioclase	An <sub>9.9</sub> , 10.8		

The meteorite is classified as an L6 Chondrite.



Yamato-74355

L4 Chondrite

Weight: 82.9 gms  
 Dimension: 7.5 x 3.2 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°45'25"S 35°46'50"E  
 Original Number: 74121909  
 Found: Dec. 19, 1974, K. Yanai et al.

Physical Description:

A complete stone with dark brown fusion crust; the interior is pale gray and shows chondritic structure. Brown limonitic staining is present around metal grains.

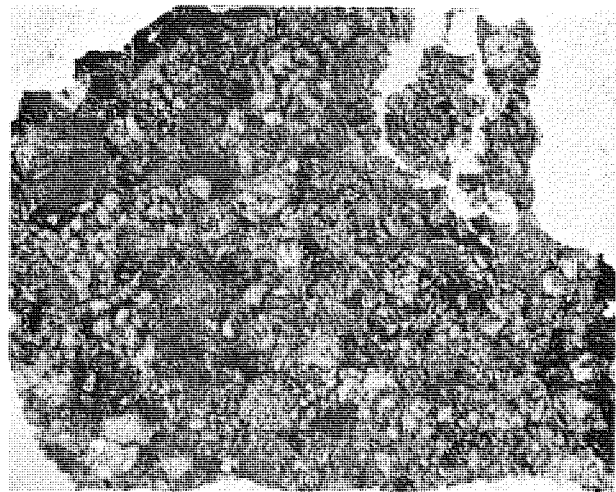
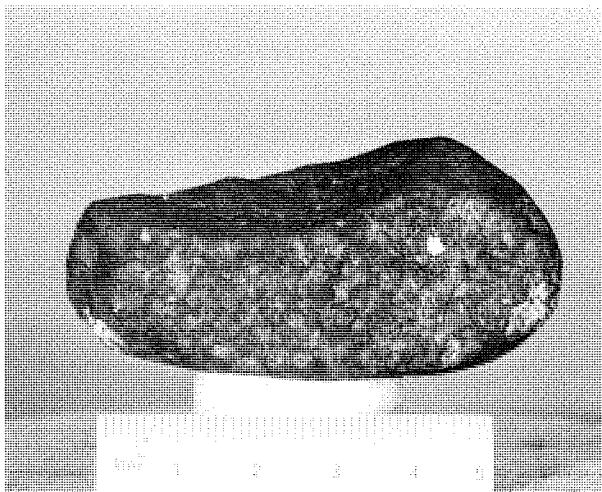
Petrographic Description:

Chondritic structure is well developed, the section showing a close-packed aggregate of chondrules with relatively little fine-grained matrix, and minor amounts of nickel-iron and troilite. The commonest types of chondrules are granular or porphyritic olivine and olivine-pyroxene; the pyroxene is polysynthetically twinned clinobronzite. Minor weathering is indicated by brown limonitic staining around metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>24.7</sub>	1.4	23.3-25.8
Low-Ca pyroxene	Fs <sub>20.8</sub>	1.1	19.8-21.2

The meteorite is classified as an L4 chondrite.



Yamato-74356

Eucrite (monomict)

Weight: 10.0 gms  
Dimension: 2.2 x 2.1 cm  
Degree of Weathering: A  
Degree of Fracturing:

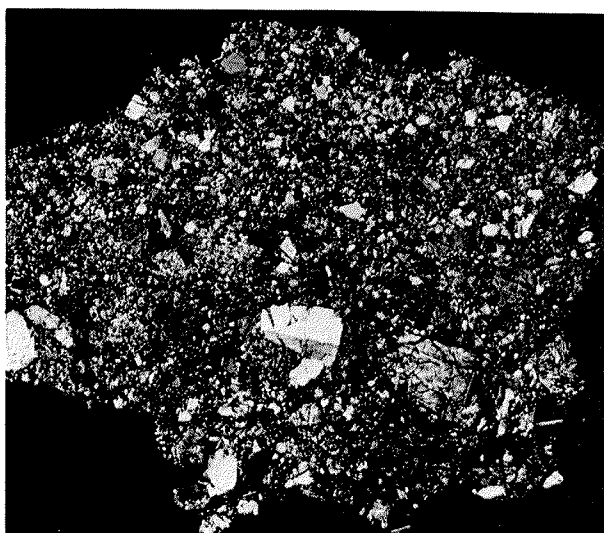
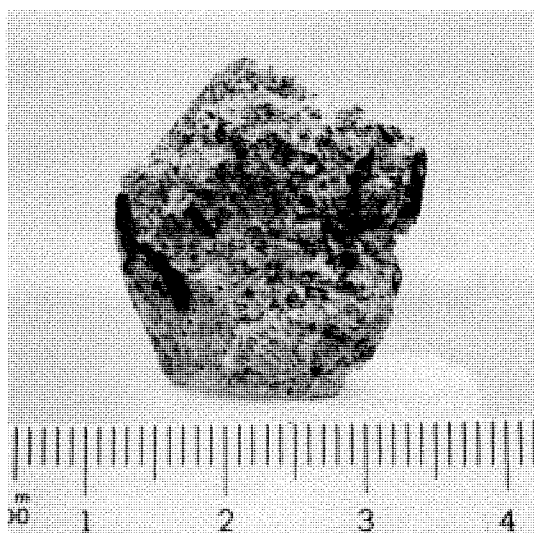
Location: Yamato Mountains, Antarctica  
71°44'55"S 35°46'50"E  
Original Number: 74121910  
Found: Dec. 19, 1974, K. Yanai et al.

Physical Description:

An irregular fragment with a few remnants of shiny black fusion crust; the interior shows a granular aggregate of mm-sized grains of olive-yellow pyroxene and white plagioclase, and small lustrous black grains of an accessory mineral, probably chromite.

Petrographic Description:

Takeda et al. (1979) have described Yamato-74356 as follows: The interior is pale brown to pale gray. It is a common eucrite like the Juvinas eucrite. This meteorite is unique among the Antarctic achondrites because most of the other Antarctic eucrites are polymict breccias. This eucrite contains a pigeonite-augite pair with uniform compositions, but it is shocked. The grain size was too small to do any other work. Single crystal diffraction study indicates that the pigeonite exsolves augite with (001) plane in common.





Bulk chemical composition of the Yamato-74356,53 meteorite is shown as follow:

SiO <sub>2</sub>	47.11
TiO <sub>2</sub>	0.66
Al <sub>2</sub> O <sub>3</sub>	10.94
Fe <sub>2</sub> O <sub>3</sub>	1.06
FeO	20.29
MnO	0.62
MgO	8.16
CaO	9.46
Na <sub>2</sub> O	0.36
K <sub>2</sub> O	0.04
H <sub>2</sub> O(-)	0.03
H <sub>2</sub> O(+)	0.59
P <sub>2</sub> O <sub>5</sub>	0.03
Cr <sub>2</sub> O <sub>3</sub>	0.34
FeS	0.42
Fe	0
Ni	0.0048
Co	under 0.003

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Total 100.11

(Analyst: H. Haramura)

Yamato-74357

Lodranite

Weight: 13.8 gms  
 Dimension: 2.8 x 2.3 x 1.1 cm  
 Degree of Weathering:  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'50"S 35°48'20"E  
 Original Number: 74121911  
 Found: Dec. 19, 1974, Yanai et al.

Physical Description:

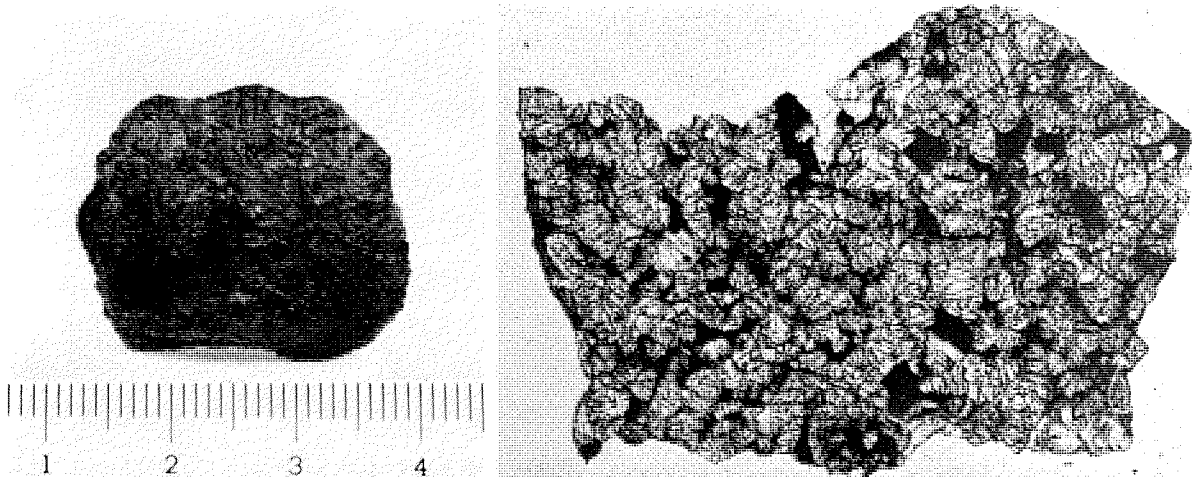
This meteorite is a small, nearly complete mass about 14 grams in weight, plate to lense like shape with a radial flow lines on dark brown-partly greenish fusion crust, and shows coarser-grain granular appearance with dark metal and brown pyroxene with brown limonitic staining around the surface and interior.

Petrographical Description:

This section is a coarser-grained, an almost equal granular, shows granoblastic texture and consists mainly of olivine and lesser orthopyroxene, clinopyroxene and metal with trace of troilite. Modal analyses under the polarizing microscope give 71.7% olivine, 9.0% orthopyroxene, 5.5% clinopyroxene, 13.6% nickel-iron, 0.3% of chromite and trace of sulfide. Phosphate and alkali-Al silicate were not identified in the section. Olivine is euhedral grain up to 1.5 mm across with a little of pyroxene inclusion, and shows many fractures of parallel and irregular, with dirty of very fine-grained black material. Both orth- and clinopyroxene are almost same in size and in occurrence of olivine grain, but there are unremarkable fractures in pyroxene grains. Most of pyroxene are clean crystals. Nickel-iron grain are moderate, similar grain size of olivine and pyroxene, with brown limonitic staining around the grains. Microprobe analyses give uniform of olivine composition  $Fo_{91.5-93.0}$  mean

$Fo_{92.1}$ , orthopyroxene averages  $Fs_{13.8}$ , range  $Fs_{11.5-14.6}$ . Clinopyroxene give chromian diopside composition  $En_{51-54}Fs_{6-8}Wo_{38-43}$ , mean  $En_{53.7}Fs_{6.2}Wo_{43.3}$ ,  $Cr_2O_3$  (1.5% weight) content the metal composition ranges 4.2 to 4.9%

Ni. The meteorite is classified as lodranite meteorite, but the occurrence of olivine is quite difference in other lodranite.



Bulk chemical composition of the Yamato-74357,61 meteorite is shown as follow:

SiO <sub>2</sub>	37.66
TiO <sub>2</sub>	0.09
Al <sub>2</sub> O <sub>3</sub>	0.20
Fe <sub>2</sub> O <sub>3</sub>	7.55
FeO	4.00
MnO	0.37
MgO	26.98
CaO	3.65
Na <sub>2</sub> O	0.10
K <sub>2</sub> O	under 0.02
H <sub>2</sub> O(-)	0.16
H <sub>2</sub> O(+)	0.5
P <sub>2</sub> O <sub>5</sub>	0.26
Cr <sub>2</sub> O <sub>3</sub>	0.96
FeS	1.85
Fe	15.15
Ni	0.98
Co	0.083
<hr/>	
Total	100.56

(Analyst: H. Haramura)

Yamato-74362

L6 Chondrite

Weight: 4175.0 gms  
 Dimension: 15.0 x 13.0 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°47'20"S 35°48'10"E  
 Original Number: 74122007  
 Found: Dec. 20, 1974, K. Yanai et al.

Physical Description:

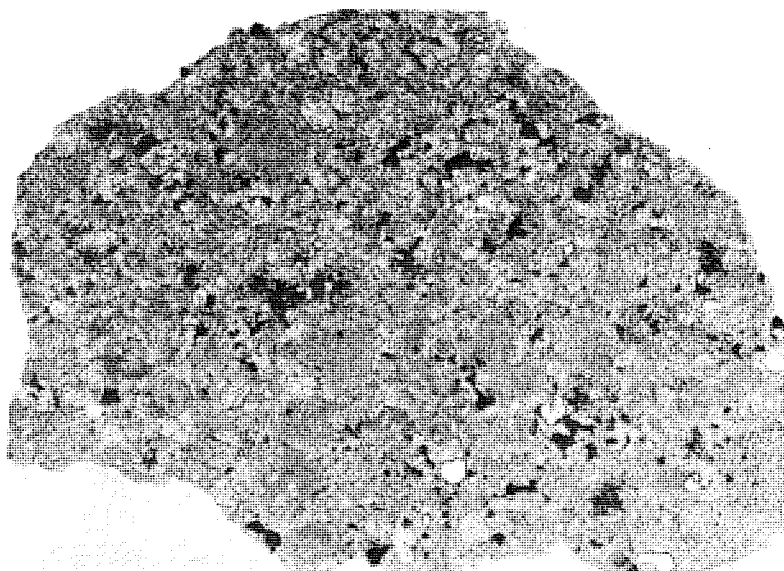
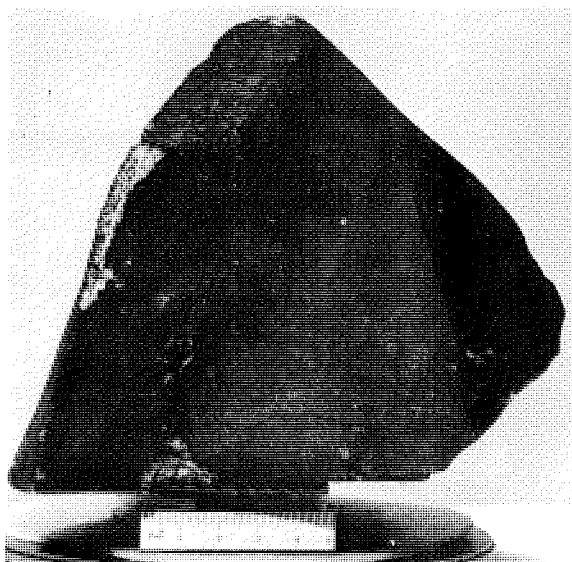
An almost complete wedge-shaped stone, largely covered with dull brownish-black fusion crust; traces of a white mineral have developed along polygonal fractures in the fusion crust. The interior is pale gray, granular, without visible chondrules. Weathering is limited to minor limonitic staining on exposed surfaces.

Petrographic Description:

Chondrules are shape and poorly defined, their margins merging with the granular groundmass, which consists of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite. Weathering is minimal, indicated by a little brown limonitic staining around some metal grains. Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>25.3</sub>	1.3	24.5-26.0
Low-Ca pyroxene	Fs <sub>21.2</sub>	1.3	20.1-21.8

The meteorite is classified as an L6 chondrite.



Bulk chemical composition of the Yamato-74362,75,85 meteorite is shown as follow:

SiO <sub>2</sub>	38.63
TiO <sub>2</sub>	0.14
Al <sub>2</sub> O <sub>3</sub>	2.38
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	15.62
MnO	0.32
MgO	25.38
CaO	1.73
Na <sub>2</sub> O	0.88
K <sub>2</sub> O	0.12
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0.1
P <sub>2</sub> O <sub>5</sub>	0.25
Cr <sub>2</sub> O <sub>3</sub>	0.43
FeS	6.03
Fe	6.65
Ni	1.08
Co	0.04
<hr/>	
Total	99.78

(Analyst: H. Haramura)

Yamato-74364

H4 Chondrite

Weight: 757.8 gms  
 Dimension: 9.7 x 9.5 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°47'30"S 35°47'40"E  
 Original Number: 74122009  
 Found: Dec. 20, 1974, K. Yanai et al.

Physical Description:

A complete stone in the form of a flattened cone, almost entirely covered with brownish-black fusion crust; where the fusion crust has flaked off, the surface is stained brown with limonite and shows numerous chondrules. The interior is medium gray with some rusty halos around metal grains.

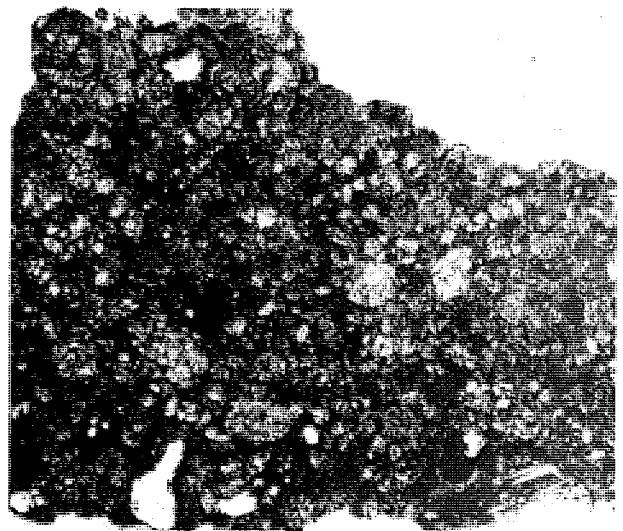
Petrographic Description:

Chondrules are abundant and well defined, and are set in a finely granular groundmass of olivine and pyroxene, with coarser grains of nickel-iron and troilite. Some of the pyroxene in the chondrules is polysynthetically twinned clinobrookite. Weathering is moderate, being confined to brown limonitic staining around metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>17.3</sub>	1.2	16.9-17.9
Low-Ca pyroxene	Fs <sub>15.5</sub>	3.3	14.6-18.6

The meteorite is classified as an H4 chondrite.



Yamato-74367

L6 Chondrite

Weight: 165.6 gms  
 Dimension: 7.0 x 3.5 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°47'35"S 35°43'40"E  
 Original Number: 74122020  
 Found: Dec. 20, 1974, K. Yanai et al.

Physical Description:

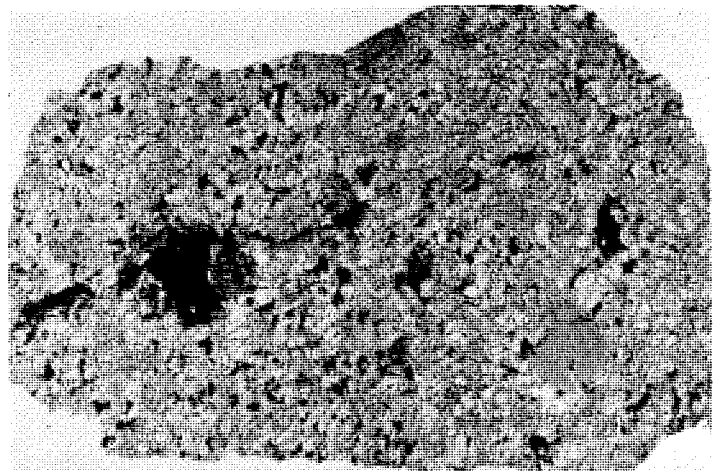
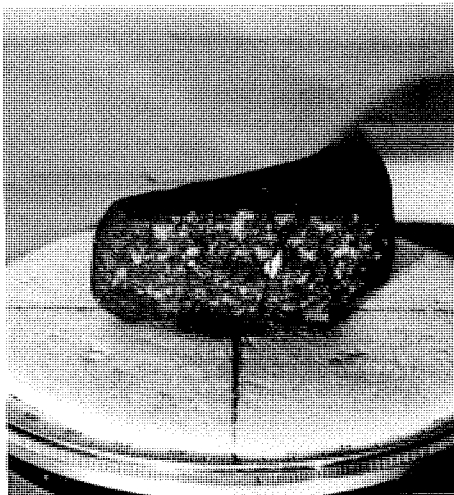
A fairly complete stone partly covered with dull brownish-black fusion crust; where fusion crust is absent the surface is stained with brown limonite, and occasional chondrules can be seen. The interior is pale gray, granular, and relatively unweathered.

Petrographic Description:

Chondritic structure is poorly defined, the few chondrules merging with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite. Weathering is minimal, being limited to brown limonitic staining around some metal grains. Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>24.7</sub>	1.6	23.8-26.1
Low-Ca pyroxene	Fs <sub>20.5</sub>	1.7	19.6-21.4
Plagioclase	An <sub>9.3-12.2</sub>		

This meteorite is classified as an L6 chondrite.



Yamato-74370

Enstatite chondrite (EH4)

Weight: 42.1 gms  
 Dimension: 4.0 x 3.5 x 2.3 cm  
 Degree of Weathering: B/C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°46'55"S 35°40'40"E  
 Original Number: 74122023  
 Found: Dec. 20, 1974, K. Yanai et al.

#### Physical Description:

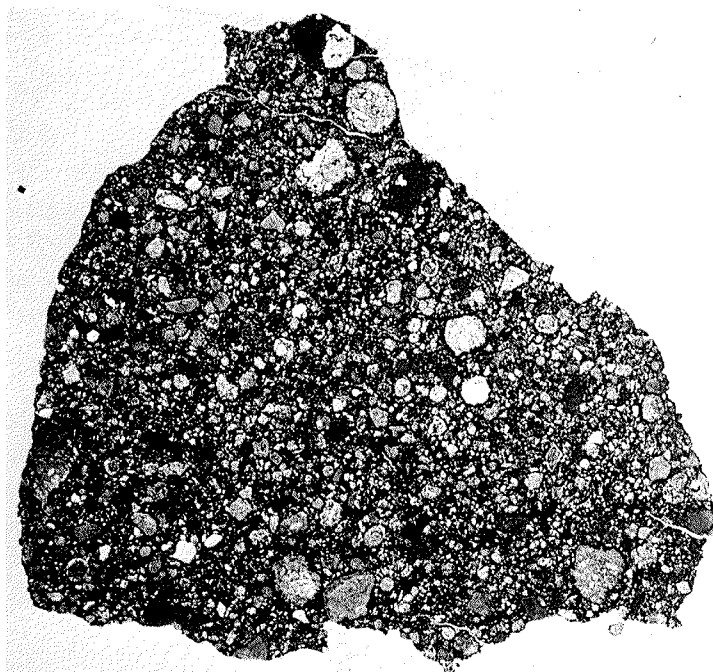
This meteorite is an almost complete stone and covered with brownish-black fusion crust. A chipped surface shows a well developed chondritic structure in a dark gray interior. Rusty brown weathering is concentrated below the fusion crust.

#### Petrographical Description:

A thin section shows a close packed of chondrules, a variety of clasts and their fragments embeded in fine-grained minor amount of dark-gray matrix. A variety of chondrules types is present as granular, porphyritic, radial or glassy, among which porphyritic ones are most abundant. Most of pyroxene is polysynthetically twinned. Turbid devitrified glass is present, however scarce within some chondrules. The matrix consists of fine-grained pyroxene with some coarser-grained nickel-iron and troilite, the metal being fairly weathered.

Microprobe analyses give the following results: Olivine  $Fa_{0.1}$ , Low-Ca pyroxene  $Fs_{0.9}$ , %M.D. 62.3, Range  $Fs_{0-5.1}$ .

This meteorite was classified preliminarily as an E3-4 chondrite. But after detail studies this specimen was classified as an EH4 chondrite by Nagahara and Goresy (Lunar Planet. Sci. VX 583-584, 1984).





Bulk chemical composition of the Yamato-74370,52 meteorite is shown as follow:

SiO <sub>2</sub>	34.14
TiO <sub>2</sub>	0.12
Al <sub>2</sub> O <sub>3</sub>	2.51
Fe <sub>2</sub> O <sub>3</sub>	0
FeO	3.9
MnO	0.23
MgO	18.20
CaO	1.10
Na <sub>2</sub> O	0.74
K <sub>2</sub> O	0.09
H <sub>2</sub> O(-)	1.05
H <sub>2</sub> O(+)	5.9
P <sub>2</sub> O <sub>5</sub>	0.46
Cr <sub>2</sub> O <sub>3</sub>	0.43
FeS	12.77
Fe	16.6
Ni	1.51
Co	0.051

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Total	99.80
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(Analyst: H. Haramura)

Yamato-74371

H4 Chondrite

Weight: 5067.9 gms  
 Dimension: 18.0 x 12.0 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°48'15"S 35°29'40"E  
 Original Number: 74122024  
 Dec. 20, 1974, K. Yanai et al.

Physical Description:

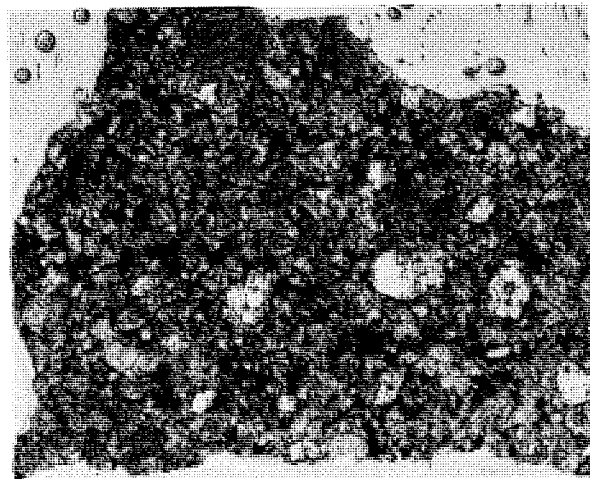
An almost complete, approximately cuboidal? stone, covered with dull brownish-black fusion crust; much of the fusion crust is coated with a white powdery efflorescence. The interior is pale gray and shows chondritic structure. Weathering is limited to minor limonitic staining around metal grains.

Petrographic Description:

Chondrules are abundant, but their margins are indistinct and merge with the granular groundmass, which consists largely of olivine and pyroxene with minor amounts of nickel-iron and troilite. Slight weathering is indicated by some brown limonitic staining around metal grains. Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>18.4</sub>	1.7	17.5-19.2
Low-Ca pyroxene	Fs <sub>16.0</sub>	2.1	15.2-16.6

This meteorite is classified as an H4 chondrite.



Bulk chemical composition of the Yamato-74371,77 meteorite is shown as follow:

SiO <sub>2</sub>	35.70
TiO <sub>2</sub>	0.12
Al <sub>2</sub> O <sub>3</sub>	2.08
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	11.35
MnO	0.27
MgO	24.03
CaO	1.52
Na <sub>2</sub> O	0.74
K <sub>2</sub> O	0.09
H <sub>2</sub> O(-)	0.05
H <sub>2</sub> O(+)	0.1
P <sub>2</sub> O <sub>5</sub>	0.27
Cr <sub>2</sub> O <sub>3</sub>	0.47
FeS	5.21
Fe	15.93
Ni	1.69
Co	0.07

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Total	99.69
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(Analyst: H. Haramura)

Yamato-74372

L6 Chondrite

Weight: 84.6 gms  
Dimension: 5.0 x 3.0 cm  
Degree of Weathering: B  
Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°44'30"S 35°38'30"E  
Original Number: 74122025  
Found: Dec. 20, 1974, K. Yanai et al.

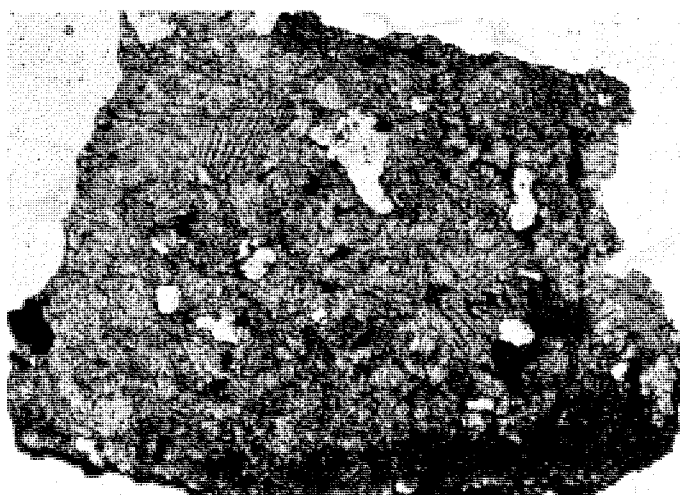
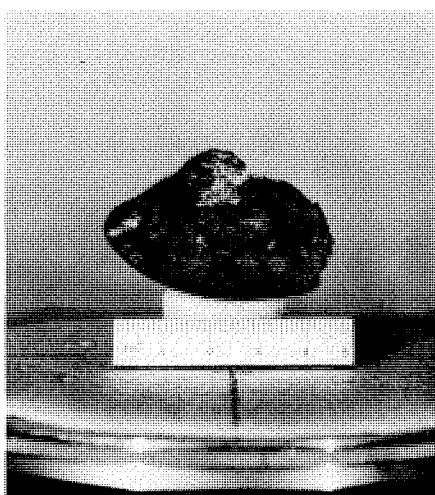
Physical Description:

An almost complete pyramidal stone, largely covered with dull brownish-black fusion crust; where fusion crust has been lost, the interior is seen to be pale gray with traces of chondritic structure. Brown limonitic staining is present, concentrated around metal grains.

Petrographic Description:

Chondrules are few and difficult to recognize, since they merge with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron and troilite. Well-preserved fusion crust is present along one edge. Weathering is moderate, with some limonitic staining and occasional areas of red-brown limonite. The meteorite is classified as an L6 chondrite.

Microprobe analyses give the following results: the mean of olivine  $Fa_{25.2}$ , low-Ca pyroxene  $Fs_{21.8}$ .



Yamato-74375

H4 Chondrite

Weight: 92.7 gms  
 Dimension: 4.5 x 3.2 cm  
 Degree of Weathering: C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'15"S 35°48'20"E  
 Original Number: 74122028  
 Found: Dec. 20, 1974, K. Yanai et al.

Physical Description:

An irregular fragment, partly coated with dull brownish-black fusion crust; The stone shows several deep fractures. Brown limonitic staining pervades the specimen and obscures the internal structure.

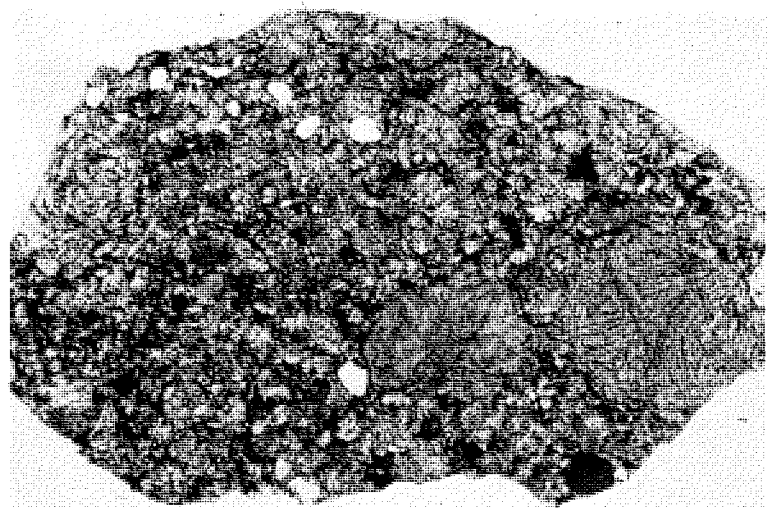
Petrographic Description:

Chondrules are abundant and a variety of types is present, including granular olivine and olivine-pyroxene, barred olivine, and fine-grained radiating pyroxene. The groundmass consists of fine-grained olivine and pyroxene, with minor amounts of coarser-grained nickel-iron and troilite. Weathering is extensive, with veins and small areas of red-brown limonite throughout the section.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>18.1</sub>	2.1	17.3-19.3
Low-Ca pyroxene	Fs <sub>15.6</sub>	3.3	14.7-18.3

The meteorite is classified as an H4 chondrite.



Yamato-74376

H5 Chondrite

Weight: 120.0 gms  
Dimension: 6.0 x 5.0 cm  
Degree of Weathering: B  
Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°44'20"S 35°48'30"E  
Original Number: 74122029  
Found: Dec. 20, 1974, K. Yanai et al.

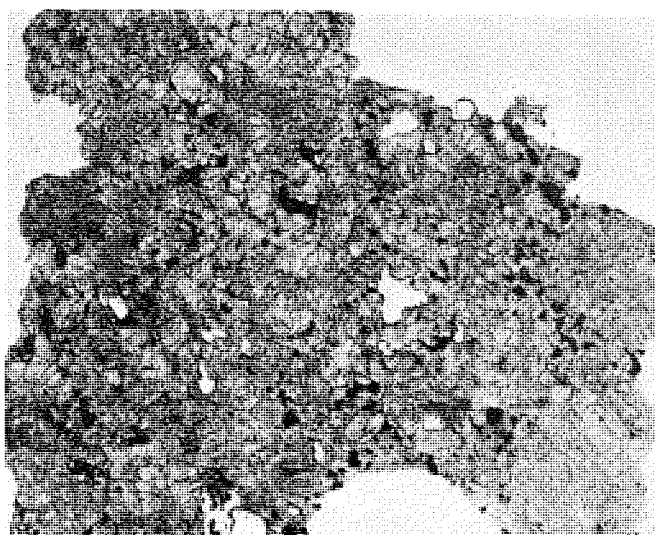
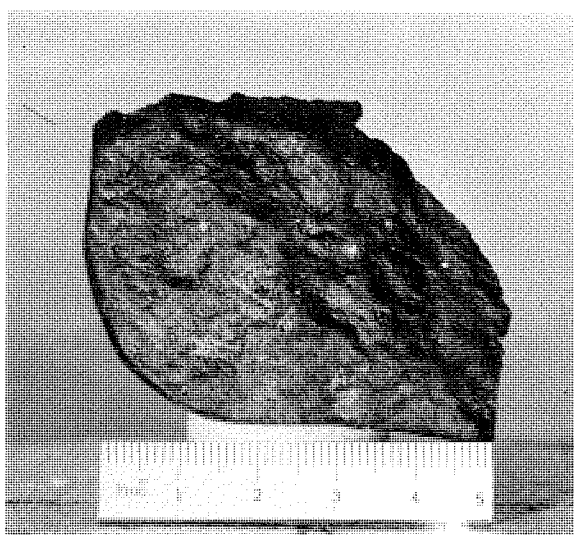
Physical Description:

A wedge-shaped fragment, partly covered with dull black fusion crust; fracture surfaces are stained brown with limonite and show occasional chondrules. The interior is pale gray with a little limonitic staining around metal grains.

Petrographic Description:

Chondritic structure is poorly defined, and many of the chondrules appear to be broken or deformed; some narrow black veinlets traverse the section, and the meteorite appears to have been shocked. The groundmass consists largely of fine-grained olivine and pyroxene, with minor amounts of coarser-grained nickel-iron and troilite. Moderate weathering is indicated by brown limonitic staining around nickel-iron grains. The meteorite is classified as an H5 chondrite.

Microprobe analyses give the following results: the mean of olivine  $Fa_{24.7}$ , low-Ca pyroxene  $Fs_{21.3}$ .



Yamato-74379 - 416

H5 Chondrite

Weight: 6.3 gms  
 Dimension: 1.7 x 1.4 cm  
 Degree of Weathering: C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'45"S 35°50'30"E  
 Original Number: 74122032  
 Found: Dec. 20, 1974, K. Yanai et al.

Physical Description:

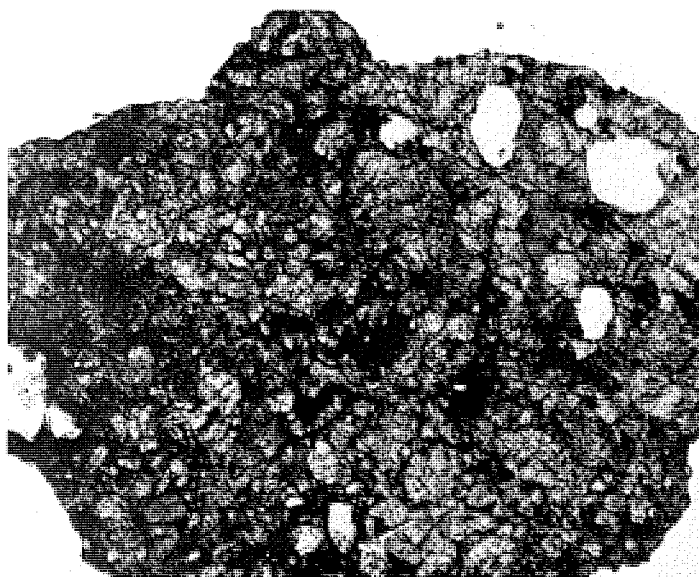
This is a group of 38 small fragments some with remnants of fusion crust, considered in the field to be pieces of a single meteorite; their physical appearance and thin sections confirm this.

Petrographic Description:

Chondritic structure is present, but the chondrules are poorly defined and tend to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite. Weathering is extensive, with brown limonitic staining throughout the section. The meteorite is classified as an H5 chondrite.

(379-416 are similar fragments probably separated from one stone; the thin sections confirm this)

Microprobe analyses give the following results: the mean of olivine  $Fa_{18.0}$ , low-Ca pyroxene  $Fs_{16.6}$ .



Yamato-74417

H3 Chondrite

Weight: 44.5 gms

Dimension: 4.2 x 2.5 x 2.2 cm

Degree of Weathering: A

Degree of Fracturing:

Location: Yamato Mountains, Antarctica

71°44'05"S 35°46'20"E

Original Number: 74122101

Found: Dec. 21, 1974, K. Yanai et al.

Physical Description:

About three-fourths of a complete stone, partly coated with dull black fusion crust; the interior shows a dark gray matrix with numerous white to pale gray chondrules. Weathering is limited to minor brown limonitic staining on exposed surfaces.

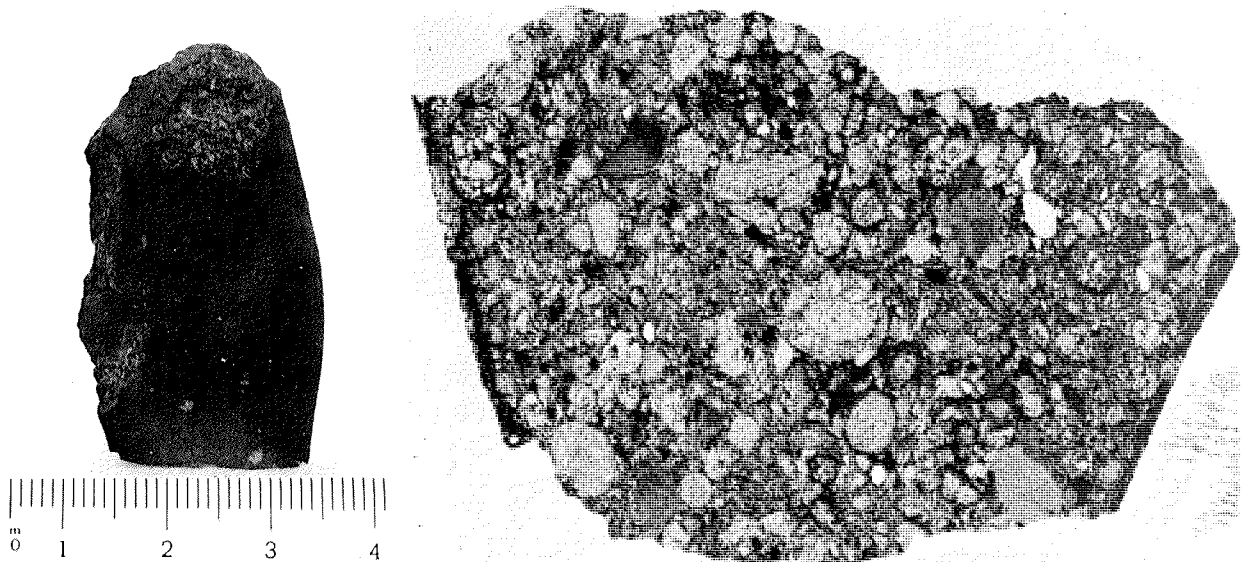
Petrographic Description:

The meteorite consists of a close-packed aggregate of chondrules and chondrule fragments, set in a minimum amount of matrix. The matrix consists of fine-grained olivine and pyroxene with some coarser-grained nickel-iron and troilite. A variety of chondrule types is present, the commonest being granular and porphyritic olivine and olivine-pyroxene, and radiating pyroxene. The pyroxene is polysynthetically twinned. Some of the chondrules have clear pale brown glass between the olivine and pyroxene grains, but usually the glass is turbid and partly devitrified. A little weathering is indicated by minor brown limonitic staining around metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>14.8</sub>	45.6	0.2-33.0
Low-Ca pyroxene	Fs <sub>11.1</sub>	59.1	1.6-43.1

The meteorite is classified as an H3 chondrite.





Bulk chemical composition of the Yamato-74417,83 meteorite is shown as follow:

SiO <sub>2</sub>	38.67
TiO <sub>2</sub>	0.09
Al <sub>2</sub> O <sub>3</sub>	2.38
Fe <sub>2</sub> O <sub>3</sub>	0
FeO	14.30
MnO	0.36
MgO	24.96
CaO	1.66
Na <sub>2</sub> O	0.87
K <sub>2</sub> O	0.07
H <sub>2</sub> O(-)	0.08
H <sub>2</sub> O(+)	0.1
P <sub>2</sub> O <sub>5</sub>	0.11
Cr <sub>2</sub> O <sub>3</sub>	0.52
FeS	6.77
Fe	7.53
Ni	1.26
Co	0.043
<hr/>	
Total	99.77

(Analyst: H. Haramura)

Yamato-74418 - 436            H6 Chondrite

Weight: 719.0 gms  
 Dimension: 11.0 x 6.5 cm  
 Degree of Weathering: C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°45'20"S 35°39'30"E  
 Original Number: 74122102  
 Found: Dec. 21, 1974, K. Yanai et al.

Physical Description:

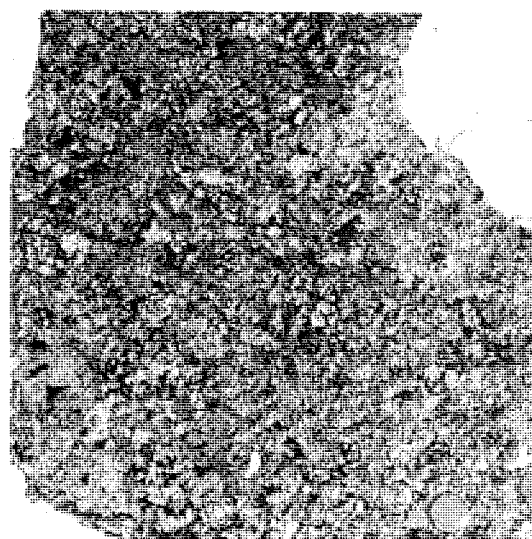
Yamato-74418, 567.2 gms. is approximately one-half of an individual stone with dull brownish-black fusion crust; flow lines on the crust suggest oriented flight. Brown limonitic staining pervades the stone and obscures the internal structure. Yamato-74419 - 436 are similar fragments and are believed to be pieces of a single meteorite.

Petrographic Description:

Chondrules and chondrule fragments are present and merge with the ground-mass, with nickel-iron, troilite and minor plagioclase. Chondritic structure poorly reserved as granular and porphyritic olivine and olivine-pyroxene, barred olivine and radiating pyroxene in most chondritic fragments. Silicate minerals are stained by the limonitic weathering product. Microprobe analysis give the following result;

	Average	%M.d.	Range
Olivine	Fa 18.7	1.6	17.8-19.8
Low-Ca pyroxene	FS <sub>16.3</sub>	3.0	15.1-17.8

This meteorite is classified as an H6 chondrite.



Yamato-74441

L3 Chondrite

Weight: 27.4 gms  
 Dimension: 3.0 x 2.9 x 2.4 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°43'25"S 35°44'30"E  
 Original Number: 74122107  
 Found: Dec. 21, 1974, K. Yanai et al.

Physical Description:

A pyramidal fragment partly coated with dull black fusion crust; fracture surfaces are stained dark brown with limonite, and show well-developed chondritic structure, with chondrules up to 3 mm in diameter.

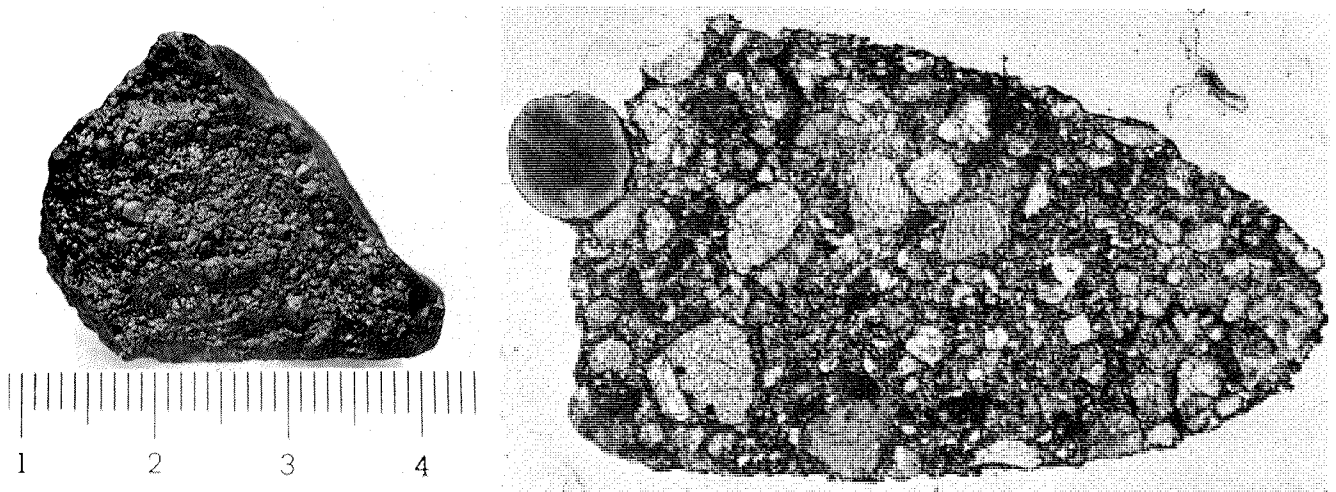
Petrographic Description:

The section shows a close-packed aggregate of chondrules and chondrule fragments, set in a dark fine-grained matrix which has minor amounts of coarser-grained nickel-iron and troilite. A variety of chondrule types is present, the commonest being granular and porphyritic olivine and olivine-pyroxene; intergranular glass in these chondrules is usually turbid and partly devitrified, but sometimes clear and pale brown in color. Pyroxene is polysynthetically twinned clinobronzite. Some weathering is indicated by the presence of minor amounts of red-brown limonite.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>15.1</sub>	44.7	1.5-31.3
Low-Ca pyroxene	Fs <sub>11.6</sub>	59.6	2.0-29.4

The meteorite is identified as an L3 chondrite.



Bulk chemical composition of the Yamato-74441,81 meteorite is shown as follow:

SiO <sub>2</sub>	38.97
TiO <sub>2</sub>	0.13
Al <sub>2</sub> O <sub>3</sub>	2.30
Fe <sub>2</sub> O <sub>3</sub>	4.38
FeO	13.75
MnO	0.38
MgO	25.11
CaO	1.61
Na <sub>2</sub> O	0.79
K <sub>2</sub> O	0.06
H <sub>2</sub> O(-)	0.41
H <sub>2</sub> O(+)	2.3
P <sub>2</sub> O <sub>5</sub>	0.14
Cr <sub>2</sub> O <sub>3</sub>	0.51
FeS	6.33
Fe	2.09
Ni	0.90
Co	0.025

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Total	100.18
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(Analyst: H. Haramura)

Yamato-74442

LL4 Chondrite

Weight: 173.3 gms  
 Dimension: 6.5 x 5.5 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°43'50"S 35°45'40"E  
 Original Number: 74122108  
 Found: Dec. 20, 1974, K. Yanai et al.

Physical Description:

A fragment with a very irregular surface, with remnants of dull black fusion crust. Fracture surfaces show dark gray clasts in a lighter gray matrix; chondrules are present in the matrix. Weathering is limited to brown limonitic halos around metal grains. This specimen resembles Yamato-74002.

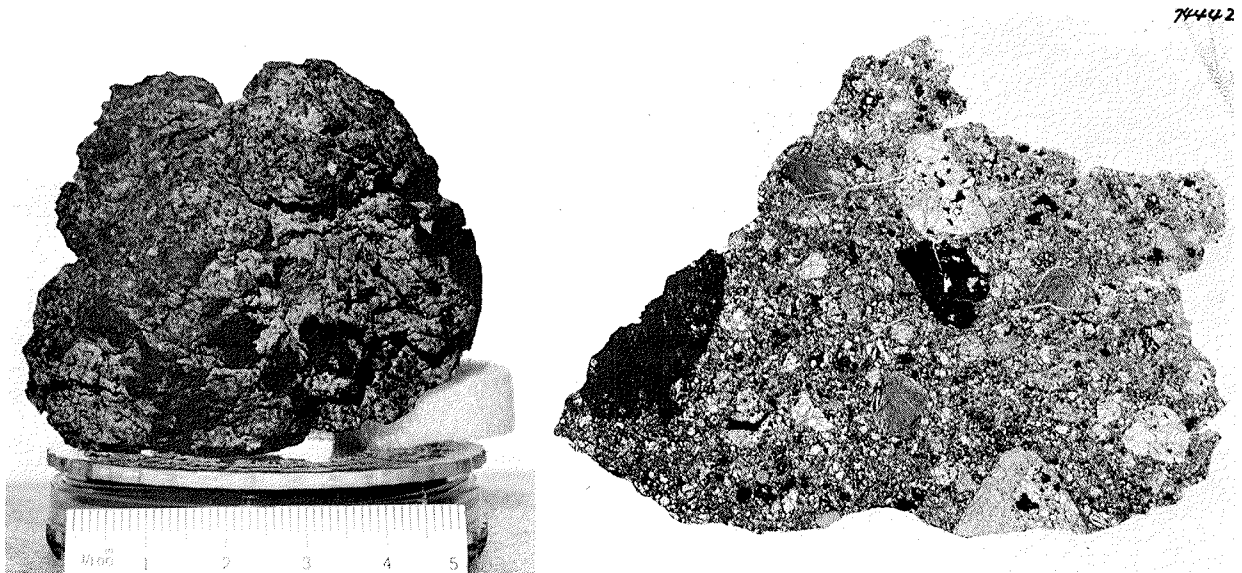
Petrographic Description:

The section shows the cataclastic structure typical of many LL chondrites. Chondrules are abundant, but many are fragmented and partly comminuted. Porphyritic olivine chondrules have intercrystal glass which is partly devitrified. Some of the pyroxene is polysynthetically twinned clinobronzite. The matrix is finely granular olivine and pyroxene with a little nickel-iron and troilite. The meteorite shows little weathering, as rusty halos around some metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>29.0</sub>	-	27-31
Low-Ca pyroxene	-	-	21-25

It is classified as an LL4 chondrite.



Bulk chemical composition of the Yamato-74442,82 meteorite is shown as follow:

SiO <sub>2</sub>	40.47
TiO <sub>2</sub>	0.23
Al <sub>2</sub> O <sub>3</sub>	3.63
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	17.89
MnO	0.35
MgO	24.95
CaO	1.98
Na <sub>2</sub> O	0.94
K <sub>2</sub> O	0.23
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0.58
P <sub>2</sub> O <sub>5</sub>	0.22
Cr <sub>2</sub> O <sub>3</sub>	0.82
FeS	4.84
Fe	2.48
Ni	0.99
Co	0.015

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Total	100.61
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(Analyst: H. Haramura)

Yamato-74445

L6 Chondrite

Weight: 2293.2 gms  
 Dimension: 5.2 x 3.2 cm  
 Degree of Weathering: C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'20"S 35°56'10"E  
 Original Number: 74122203  
 Found: Dec. 22, 1974, K. Yanai et al.

Physical Description:

An almost complete rounded stone, the surface largely covered with dull black fusion crust; several deep fractures penetrate the stone. The interior is granular and shows little trace of chondritic structure. Brown limonitic staining pervades the specimen.

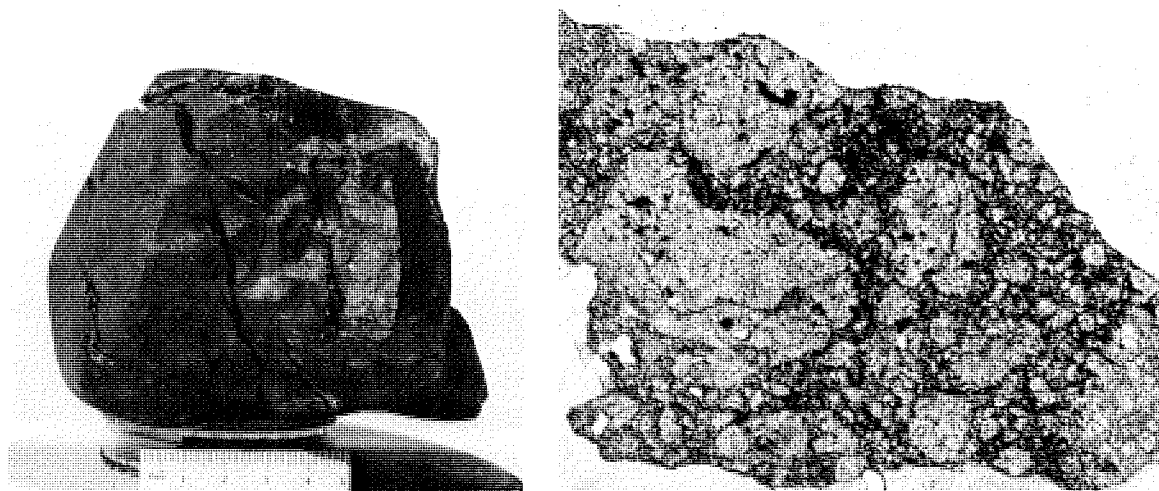
Petrographic Description:

Chondritic structure is almost obliterated, being seen only as a few chondrule remnants almost completely integrated with the granular ground-mass, which consists largely of olivine and pyroxene with minor amounts of plagioclase, nickel-iron, and troilite. The meteorite is brecciated, and parts of the section show a network of black veinlets. Weathering is extensive, with limonitic staining and areas of red-brown limonite throughout the section.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>24.8</sub>	1.5	23.7-25.8
Low-Ca pyroxene	Fs <sub>20.8</sub>	2.0	20.2-22.0

The meteorite is classified as an L6 chondrite.



Yamato-74450

Eucrite (polymict)

Weight: 235.6 gms  
 Dimension: 5.5 x 5.5 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°46'05"S 36°00'30"E  
 Original Number: 74122305  
 Found: Dec. 23, 1974, K. Yanai et al.

Physical Description:

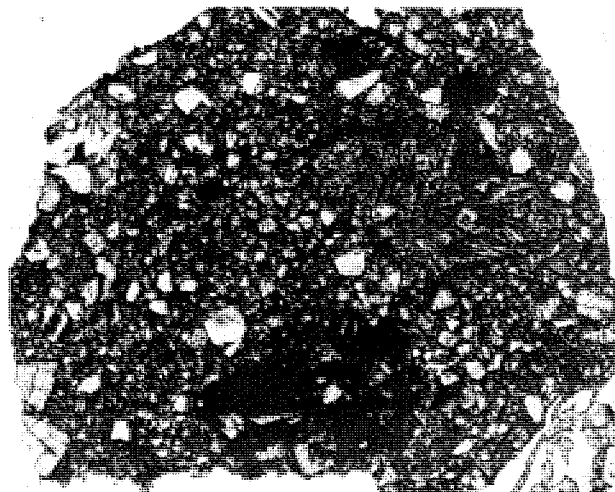
An almost complete cone-shaped stone, largely covered with lustrous black fusion crust; the interior is light gray and finely granular, with small grains of white plagioclase and gray clasts.

Petrographic Description:

Yamato-74450 contains several fragments which show as more coarser grained clasts in fine grained matrix. Takeda et al. (1978) have described Y-74450 as follows: Yamato-74450 is a 235 g meteorite covered with a thin black-shiny fusion crust. The large portion of a fragment we examined shows a variolitic texture of white and grayish minerals, which in polished thin section proves to be radiated lath-shaped or needle-like calcic plagioclase and pyroxenes (Fig. 4). The chemical trends and zoning of the pyroxenes detected by the microprobe analyses resemble those of the Pasamonte eucrite. These trends represent both the chemical variation of different grains and the zoning within one crystal. Large pyroxenes with ophitic texture are frequently found in the variolitic matrix. The core of such pyroxenes has uniform chemical composition but the rims of such grains show chemical zoning. The most magnesium-rich pyroxene observed has the composition  $\text{Ca}_{4.0}\text{Mg}_{68.3}\text{Fe}_{27.1}$ .

The pyroxene composition distributes towards more iron- and calcium-rich direction up to  $\text{Ca}_{31}\text{Mg}_{17}\text{Fe}_{52}$ . The tie lines drawn in Fig. 5 indicate

chemical zoning. The host-lamellae relation has not been detected except in one grain in a small brecciated portion of the meteorite. The exsolution pattern of this pyroxene resembles that of Juvinas. No coarse-grained diogenitic orthopyroxene has been found within the thin section examined.





Bulk chemical composition of the Yamato-74450,82 meteorite is shown as follow:

SiO <sub>2</sub>	49.36
TiO <sub>2</sub>	1.04
Al <sub>2</sub> O <sub>3</sub>	10.82
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	18.26
MnO	0.51
MgO	8.06
CaO	9.52
Na <sub>2</sub> O	0.51
K <sub>2</sub> O	0.06
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0.35
P <sub>2</sub> O <sub>5</sub>	0.10
Cr <sub>2</sub> O <sub>3</sub>	0.33
NiO	0.003
FeS	0.64
Fe	-
Ni	-
Co	0.003
<hr/>	
Total	99.56

(Analyst: H. Haramura)

Yamato-74452

L6 Chondrite

Weight: 33.9 gms

Dimension: 3.0 x 2.6 x 2.4 cm

Degree of Weathering:

Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°44'35"S 36°04'50"E

Original Number: 74122307

Found: Dec. 23, 1974, K. Yanai et al.

Physical Description:

An almost complete angular stone with block fusion crust. Removed surface shows a bright grey and fresh interior without chondritic structure. Weathering is slightly indicated by brown halos around some metal grains.

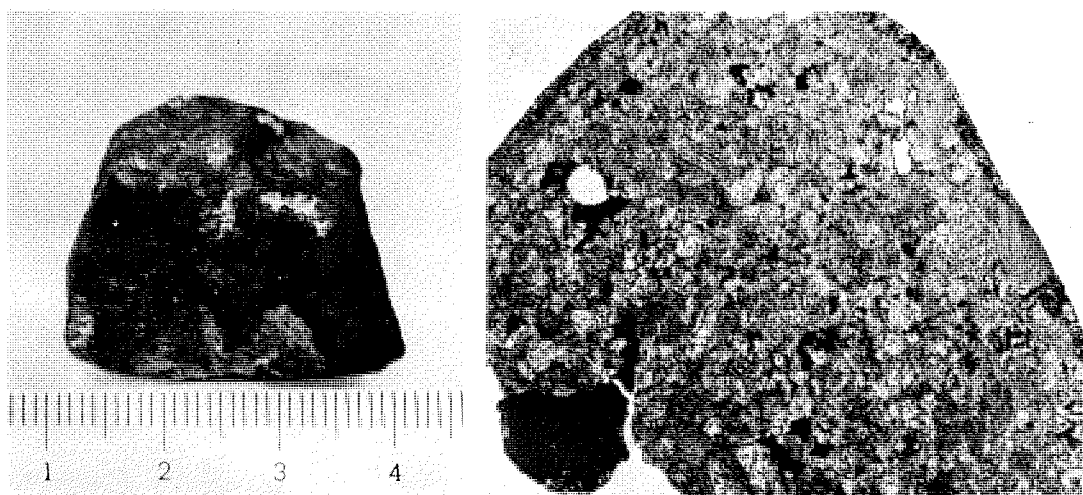
Petrographic Description:

Chondrules are sparse and poorly defined. Merging with the granular ground-mass. Most of the section is granular aggregate of olivine and pyroxene, with minor amounts of nickel-iron and troilite. The meteorite is completely fresh and unweathered, limonitic staining around metal grains is very rare and very slightly as if there are.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>24.0</sub>	1.6	23.1-25.4
Low-Ca pyroxene	Fs <sub>20.7</sub>	1.8	19.5-20.7

This meteorite is classified as an L6 Chondrite.



Bulk chemical composition of the Yamato-74452,71 meteorite is shown as follow:

SiO <sub>2</sub>	39.91
TiO <sub>2</sub>	0.06
Al <sub>2</sub> O <sub>3</sub>	2.12
Fe <sub>2</sub> O <sub>3</sub>	0
FeO	14.51
MnO	0.33
MgO	25.58
CaO	1.88
Na <sub>2</sub> O	0.86
K <sub>2</sub> O	0.10
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0.0
P <sub>2</sub> O <sub>5</sub>	0.22
Cr <sub>2</sub> O <sub>3</sub>	0.45
FeS	6.46
Fe	6.81
Ni	1.25
Co	0.054

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Total 100.59

(Analyst: H. Haramura)

Yamato-74454

L6 Chondrite

Weight: 578.8 gms  
 Dimension: 8.6 x 6.2 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'30"S 36°00'40"E  
 Original Number: 74122309  
 Found: Dec. 23, 1974, K. Yanai et al.

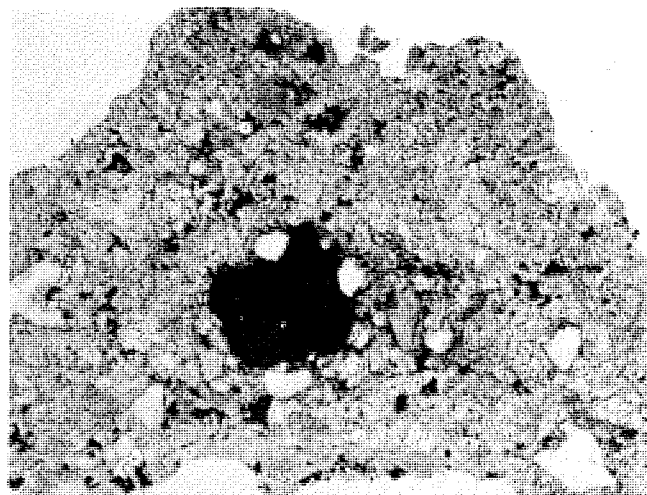
Physical Description:

An almost complete trapezoidal stone, coated with dull black fusion crust; the interior is pale gray and shows occasional darker gray chondrules. Weathering is limited to brown limonitic staining below the fusion crust and around the metal grains.

Petrographic Description:

Chondrules are present, but their margins are ill-defined and merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of plagioclase, nickel-iron, and troilite. One unusually large (about 3mm) nickel-iron grain is present in the section. Weathering is limited to brown limonitic staining in association with metal grains. The meteorite is classified as an L6 chondrite.

Microprobe analyses give the following results: the mean of olivine  $Fa_{23.6}$ , low-Ca pyroxene  $Fs_{20.8}$ .



Yamato-74455

L6 Chondrite

Weight: 114.1 gms  
 Dimension: 6.3 x 3.5 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'20"S 35°59'40"E  
 Original Number: 74122310  
 Found: Dec. 23, 1974, K. Yanai et al.

Physical Description:

A nearly complete rounded stone; dull black fusion crust covers most of the specimen, but is less well developed on one face than the others, suggesting a late break up in the atmosphere. The interior is pale gray, granular, with little trace of chondritic structure. Weathering is limited to brown limonitic staining associated with metal grains.

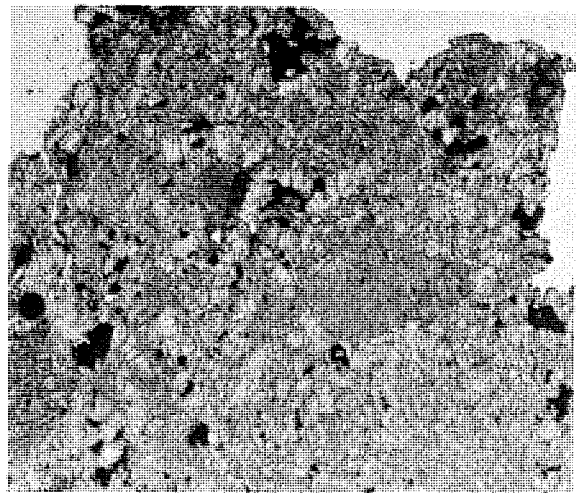
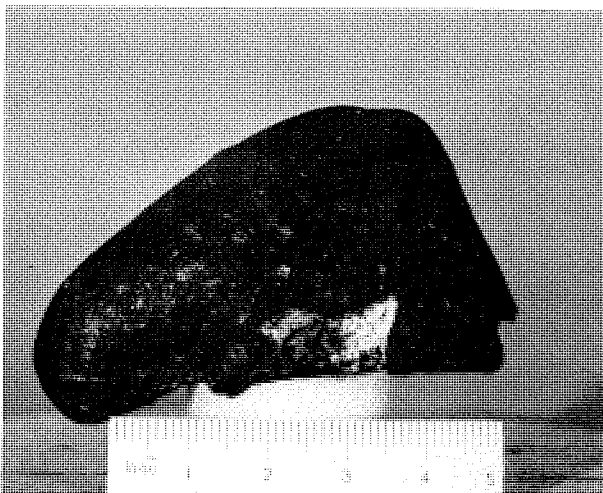
Petrographic Description:

Chondritic structure is barely visible, the few chondrules merging with the granular groundmass, which consists of olivine and pyroxene with minor amounts of plagioclase, nickel-iron, and troilite. Well-preserved fusion crust rims one edge. Weathering is minimal, with a little limonitic staining around some metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>24.7</sub>	1.4	24.0-25.4
Low-Ca pyroxene	Fs <sub>20.8</sub>	1.6	20.0-24.1

The meteorite is classified as an L6 chondrite.



Bulk chemical composition of the Yamato-74455,73 meteorite is shown as follow:

SiO <sub>2</sub>	40.20
TiO <sub>2</sub>	0.08
Al <sub>2</sub> O <sub>3</sub>	2.48
Fe <sub>2</sub> O <sub>3</sub>	0
FeO	15.25
MnO	0.31
MgO	25.91
CaO	1.67
Na <sub>2</sub> O	0.87
K <sub>2</sub> O	0.07
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0
P <sub>2</sub> O <sub>5</sub>	0.23
Cr <sub>2</sub> O <sub>3</sub>	0.39
FeS	4.16
Fe	7.11
Ni	1.13
Co	0.041

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Total 99.90

(Analyst: H. Haramura)

Yamato-74457

L5 Chondrite

Weight: 120.8 gms  
 Dimension: 5.7 x 5.1 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'05"S 35°58'00"E  
 Original Number: 74122312  
 Found: Dec. 23, 1974, K. Yanai et al.

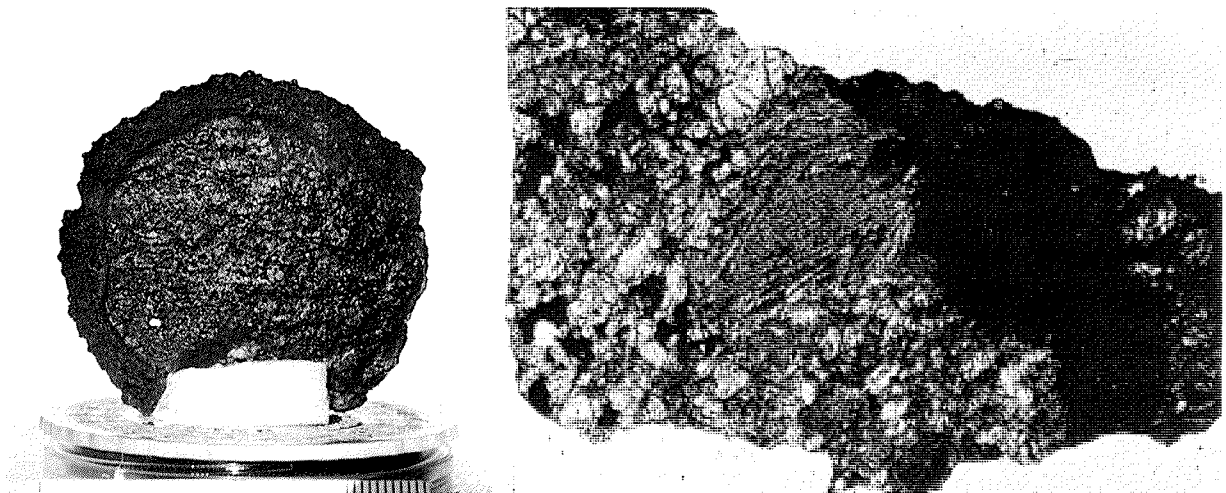
Physical Description:

About one-half of a hemispherical stone, with black fusion crust thickened around the flat rear surface. The interior is pale gray, granular, showing traces of chondritic structure. Weathering is extensive, with brown limonitic staining on a thick shell under the fusion crust.

Petrographic Description:

Chondrules are present, but are poorly defined, tending to merge with the granular groundmass, which consists largely of olivine and pyroxene with minor amounts of nickel-iron and troilite. The section is partly rimmed with well preserved and unusually thick fusion crust. Weathering is moderate, with some brown limonitic staining throughout the section. The meteorite is classified as an L5 chondrite.

Microprobe analyses give the following results: the mean of olivine  $Fa_{25.3}$ , low-Ca pyroxene  $Fs_{22}$ .



Yamato-74459 - 602 and 74613 - 638

H6 Chondrite (except 74546)

Weight: 5283.2 gms

Dimension: 13.0 x 11.0 cm

Degree of Weathering: C

Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°43'35"S 35°58'30"E

Original Number: 74122314

Found: Dec. 23, 1974, K. Yanai et al.

Physical Description:

This group of specimens comprises a few large stones and many small fragments, some with fusion crust, and are believed to be pieces of one stone or the same shower. In most of them brown limonitic staining obscures the internal structure; where it can be seen the interior is pale gray, granular, with a few poorly defined chondrules.

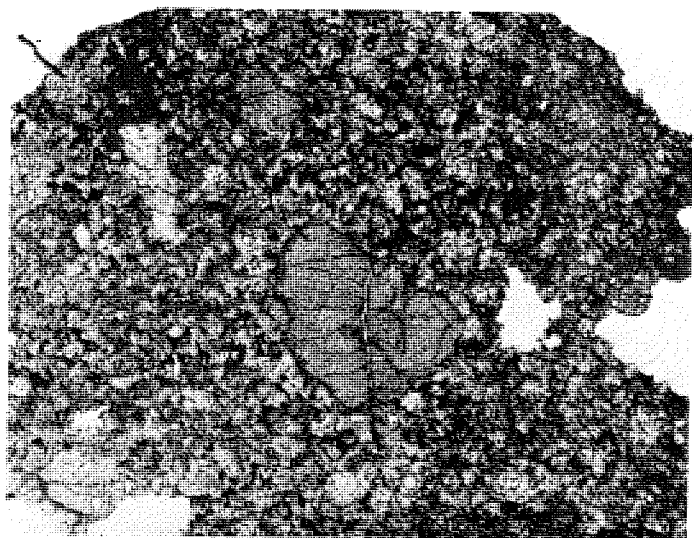
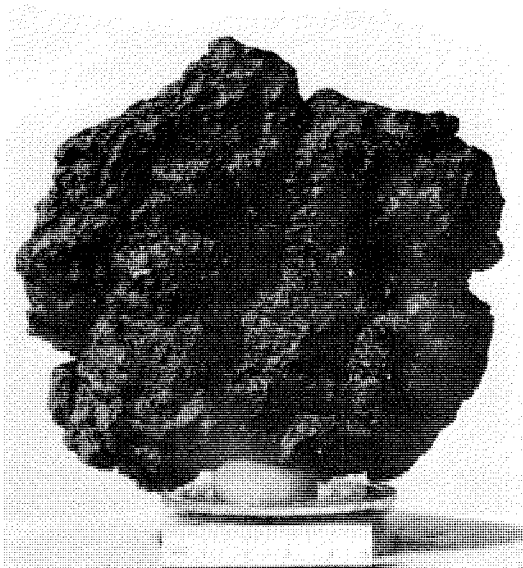
Petrographic Description:

This collection of 168 specimens, many of them small fragments, was noted in the field as probably all from one stone or the same shower. Sections made from a number of them support this. Chondritic structure is barely perceptible, the sparse chondrules being almost completely integrated with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron, plagioclase, and troilite. Remnants of fusion crust are present on some sections. Weathering is extensive, with limonitic staining throughout and veinlets of red-brown limonite.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>18.9</sub> and 18.0	2.7 and 2.1	17.8-22.8 and 17.0-18.7
Low-Ca pyroxene	Fs <sub>16.4</sub> and 15.9	2.4 and 1.4	15.7-17.6 and 15.6-16.1

The specimens are classified as an H6 chondrites.





Yamato-74603

L4 Chondrite

Weight: 188.7 gms  
 Dimension: 6.5 x 6.5 cm  
 Degree of Weathering: C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°43'40"S 35°59'10"E  
 Original Number: 74122315  
 Found: Dec. 23, 1974, K. Yanai et al.

Physical Description:

A well-rounded lens-shaped stone almost completely covered with dull brownish-black fusion crust; where the fusion crust is missing the surface is weathered, and brown limonitic staining obscures the internal structure, but chondrules can be seen.

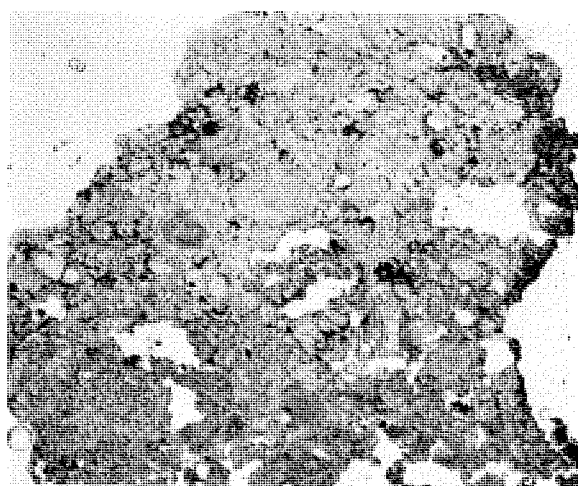
Petrographic Description:

Chondritic structure is well developed, but chondrule margins are somewhat diffuse, tending to merge with the groundmass, which consists of fine-grained olivine and pyroxene with minor amounts of coarser-grained nickel-iron and troilite. Some of the pyroxene is polysynthetically twinned clinobronzite. Weathering is extensive, with veins of red-brown limonite throughout the section.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>21.8</sub>	-	20.2-25.0
Low-Ca pyroxene	Fs <sub>20.4</sub>	-	18.8-22.7

The meteorite is classified as an L4 chondrite.



Yamato-74605

L6 Chondrite

Weight: 580.8 gms  
 Dimension: 8.7 x 7.0 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°43'50"S 35°57'40"E  
 Original Number: 74122317  
 Found: Dec. 23, 1974, K. Yanai et al.

Physical Description:

A rounded fragment, covered with dull black fusion crust except on two fracture surfaces, these surfaces are stained brown with limonite, and occasional chondrules can be seen. The interior is pale gray, granular, with traces of chondritic structure.

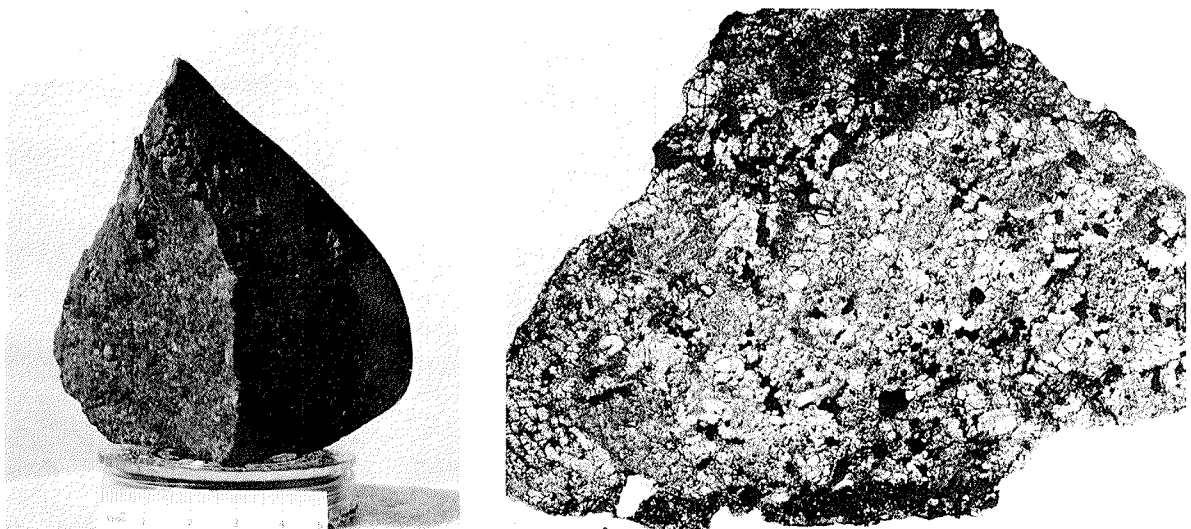
Petrographic Description:

Chondritic structure is barely perceptible, the section showing a granular aggregate of olivine and pyroxene, with minor amounts of plagioclase, nickel-iron, and troilite. Well-preserved fusion crust rims part of the section. Weathering is moderate, shown by brown limonitic staining concentrated around metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>23.8</sub>	1.5	22.8-24.9
Low-Ca pyroxene	Fs <sub>20.2</sub>	1.7	19.4-21.1

The meteorite is classified as an L6 chondrite.



Yamato-74609

H5 Chondrite

Weight: 257.2 gms  
 Dimension: 7.0 x 4.2 cm  
 Degree of Weathering: C  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°43'55"S 35°58'40"E  
 Original Number: 74122601  
 Found: Dec. 26, 1974, K. Yanai et al.

Physical Description:

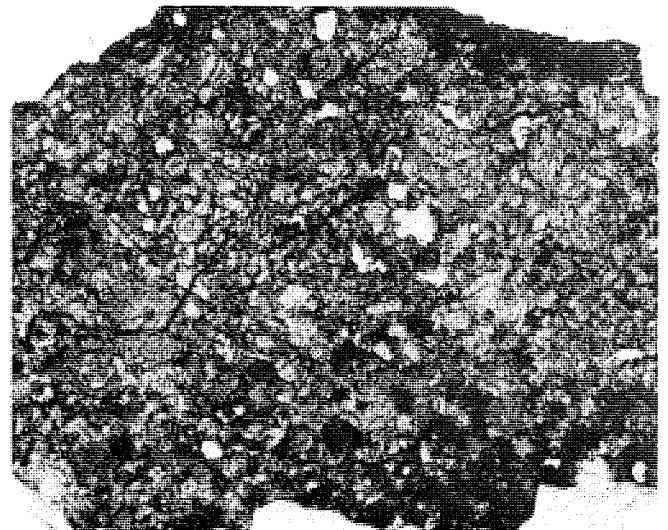
An almost-complete rounded stone, covered with dull brownish-black fusion crust; a sawn surface shows numerous metal grains and white to gray chondrules in a dark gray matrix. Brown limonitic staining pervades the specimen.

Petrographic Description:

Chondritic structure is present, but is not prominent, the chondrules merging with the granular groundmass, which consists of olivine and pyroxene, with minor amounts of nickel-iron and troilite. Weathering is extensive, with brown staining and veins of red-brown limonite throughout the section. Well-preserved fusion crust is present along one edge. Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>18.4</sub>	1.7	17.2-19.2
Low-Ca pyroxene	Fs <sub>16.0</sub>	2.8	14.4-17.4

The meteorite is classified as an H5 chondrite.



Yamato-74610

H4 Chondrite

Weight: 46.8 gms

Dimension: 3.5 x 3.4 x 2.5 cm

Degree of Weathering: B

Degree of Fracturing:

Location: Yamato Mountains, Antarctica

71°43'50"S 35°59'00"E

Original Number: 74122602

Found: Dec. 26, 1974, K. Yanai et al.

Physical Description:

An almost complete conical stone, largely covered with dull brownish-black fusion crust; a fracture surface shows numerous chondrules, up to 3 mm in diameter. Brown limonitic staining pervades the specimen.

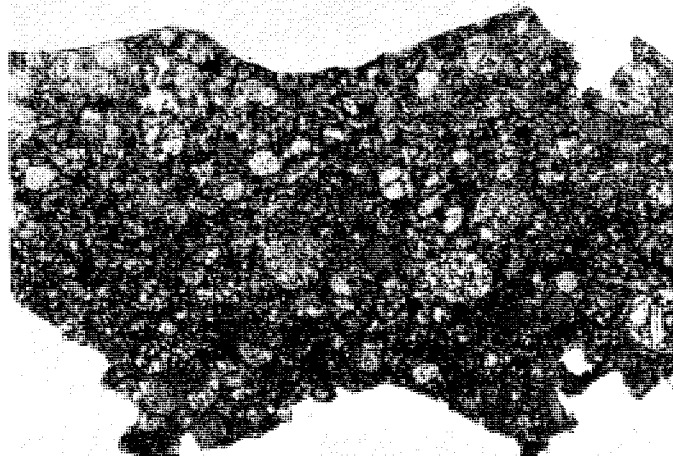
Petrographic Description:

Chondrules are abundant and well developed, and a variety of types is present. The commonest are granular olivine and porphyritic olivine and olivine-pyroxene; some barred olivine chondrules are present. The chondrules are set in a matrix of fine-grained olivine and pyroxene, with some coarser grains of nickel-iron and troilite. Much of the pyroxene is polysynthetically twinned clinobronzite. Brown limonitic staining pervades the section.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>17.9</sub>	1.6	17.1-19.1
Low-Ca pyroxene	Fs <sub>15.8</sub>	2.4	15.1-16.9

The meteorite is classified as an H4 chondrite.



Yamato-74640

H6 Chondrite

Weight: 1065.9 gms

Dimension: 12.0 x 10.0 x 5.5 cm

Degree of Weathering: C

Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°42'50"S 35°59'50"E

Original Number: 74122802

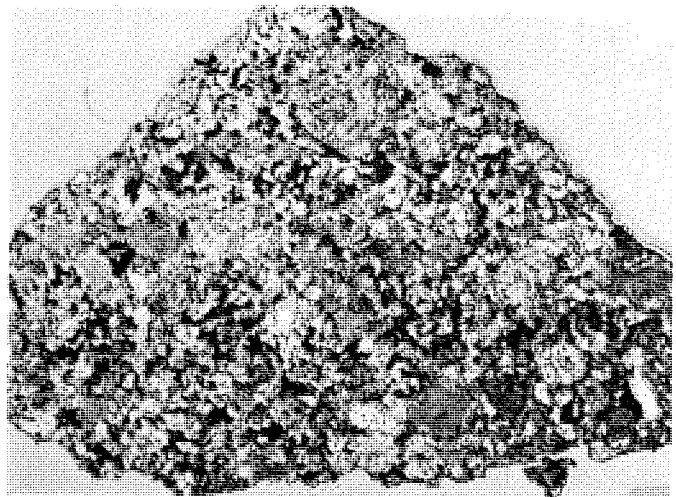
Found: Dec. 28, 1974, K. Yanai et al.

Physical Description:

About one-half of a complete stone, with partly abraded fusion crust on three faces; the other faces are fracture surfaces showing a greenish-gray granular interior with rare chondrules. Brown limonitic staining pervades the stone.

Petrographic Description:

Chondrules are sparse, and tend to merge with the granular groundmass, which consists largely of olivine and pyroxene with minor amounts of nickel-iron, troilite, and plagioclase. Weathering is extensive, with veins and small areas of red-brown limonite throughout. The meteorite is classified as an H6 chondrite. It shows a close resemblance to Yamato-74094. Microprobe analyses give the following results: the mean of olivine  $Fa_{19.0}$ , low-Ca pyroxene  $Fs_{17}$ .



Bulk chemical composition of the Yamato-74640,87 meteorite is shown as follow:

SiO <sub>2</sub>	33.69
TiO <sub>2</sub>	0.06
Al <sub>2</sub> O <sub>3</sub>	2.50
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	17.26
MnO	0.30
MgO	22.54
CaO	1.43
Na <sub>2</sub> O	0.81
K <sub>2</sub> O	0.06
H <sub>2</sub> O(-)	0.31
H <sub>2</sub> O(+)	2.3
P <sub>2</sub> O <sub>5</sub>	0.27
Cr <sub>2</sub> O <sub>3</sub>	0.49
NiO	0.86
FeS	5.11
Fe	10.74
Ni	0.70
Co	0.078
<hr/>	
Total	99.50

(Analyst: H. Haramura)

Yamato-74641, 74642

CM2 Chondrite

Weight: 4.5 gms; 10.6 gms  
 Dimension: 2.8 x 1.4 x 1.1 cm  
               2.6 x 1.9 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°42'10"S 35°54'20"E  
 71°42'10"S 35°54'30"E  
 Original Number: 74122803; 74122804  
 Found: Dec. 28, 1974, K. Yanai et al.

Physical Description:

Two fragments (74641 is partly covered with thick dull black fusion crust, 74642 has no crust); the interior is black and fine-grained, with some small white chondrules (about 0.5 mm across) and white to gray mineral grains.

Petrographic Description:

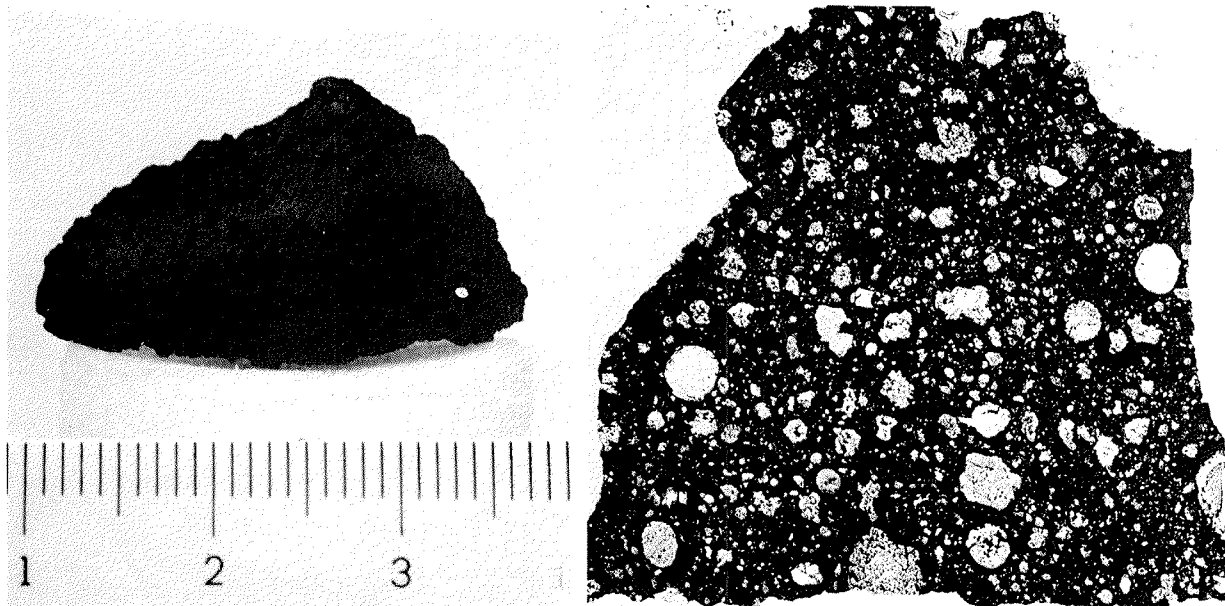
The section consists of chondrules, amoeboid olivine inclusions, Calcium-Aluminium inclusions, silicate and opaque mineral fragments, calcite fragments, opaque clots and matrix. Chondrules are smaller than 1.2 mm in diameter. Olivine-pyroxene-porphyrific chondrules are the main type. Minor olivine-porphyrific, barred-olivine and radial-pyroxene chondrules also occur. Most of pyroxene is polysynthetically-twinned. Globular Fe-Ni metals, up to several tens microns, are contained in most chondrules. The groundmasses of chondrules have suffered the alteration, and change to dark brown altered materials. But no olivine and pyroxene crystals have suffered the alteration.

The matrix occupies about 50 % of the section, being opaque to translucent brown in colour.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>10.1</sub>	20.9	0.3-55.0
Low-Ca pyroxene	Fs <sub>3.1</sub>	111.3	0.5-20.3

The meteorite is classified as an CM2 Chondrite.



Bulk chemical composition of the Yamato-74642,82 meteorite is shown as follow:

SiO <sub>2</sub>	28.53
TiO <sub>2</sub>	0.24
Al <sub>2</sub> O <sub>3</sub>	3.58
Fe <sub>2</sub> O <sub>3</sub>	4.26
FeO	18.28
MnO	0.25
MgO	19.24
CaO	2.03
Na <sub>2</sub> O	0.29
K <sub>2</sub> O	0.06
H <sub>2</sub> O(-)	1.54
H <sub>2</sub> O(+)	11.82
P <sub>2</sub> O <sub>5</sub>	0.25
Cr <sub>2</sub> O <sub>3</sub>	0.51
FeS	7.60
Fe	-
Ni	1.08
Co	0.036

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Total	99.59
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(Analyst: H. Haramura)



Yamato-74646

LL6 Chondrite

Weight: 554.7 gms

Dimension: 13.0 x 7.0 x 4.0 cm

Degree of Weathering: A

Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°40'45"S 35°58'40"E

Original Number: 74122808

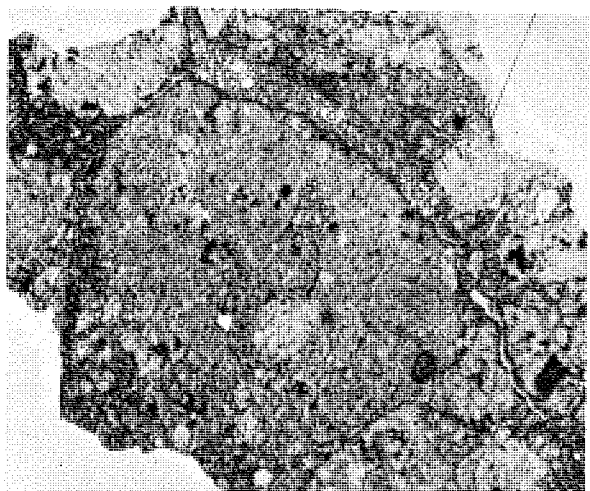
Found: Dec. 28, 1974, K. Yanai et al.

Physical Description:

A nearly complete stone with an irregular surface with remnants of dull black fusion crust. The interior shows mostly pale gray finely granular clasts bounded by dark gray veinlets, giving a highly brecciated structure. Weathering is limited to near-surface limonitic staining.

Petrographic Description:

The section shows the brecciated structure characteristic of many LL chondrites. Most of the clasts have only traces of chondritic structure and can be classified as LL6, but one has more pronounced chondritic structure and may be LL5. The meteorite consists largely of olivine and pyroxene, with small amounts of plagioclase, nickel-iron, and troilite. Black veinlets are present in parts of the section, probably shock-produced. Weathering is limited to a little brown limonitic staining around metal grains. The meteorite is classified as LL6, possibly with some LL5 clasts. Microprobe analyses give the following results: the mean of olivine  $Fa_{29.1}$ , range 27.6-29.8, low-Ca pyroxene  $Fs_{24.8}$ .



Bulk chemical composition of the Yamato-74646,88,95 meteorite is shown as follow:

	,88	,95
SiO <sub>2</sub>	40.26	40.00
TiO <sub>2</sub>	0.15	0.15
Al <sub>2</sub> O <sub>3</sub>	3.37	2.26
Fe <sub>2</sub> O <sub>3</sub>	-	-
FeO	19.02	20.05
MnO	0.37	0.33
MgO	25.11	25.71
CaO	1.72	1.82
Na <sub>2</sub> O	0.97	0.93
K <sub>2</sub> O	0.13	0.11
H <sub>2</sub> O(-)	0.00	0.05
H <sub>2</sub> O(+)	0.64	0.2
P <sub>2</sub> O <sub>5</sub>	0.25	0.24
Cr <sub>2</sub> O <sub>3</sub>	0.78	0.56
FeS	4.59	5.51
Fe	1.96	0.90
Ni	1.01	0.96
Co	0.031	0.03
<hr/>		
Total	100.36	99.81

(Analyst: H. Haramura)

Yamato-74647

H5 Chondrite

Weight: 2323.8 gms

Dimension: 12.0 x 11.5 x 7.5 cm

Degree of Weathering: A

Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
71°41'45"S 36°01'00"E

Original Number: 74122809

Found: Dec. 28, 1974, K. Yanai et al.

Physical Description:

An almost complete cuboidal stone, covered with dull black fusion crust; a small fracture surface shows black slickensides. A sawn surface shows numerous metal particles and occasional metal veinlets in a pale gray finely granular matrix, with few chondrules. Weathering is slight, being limited to a small amount of limonitic staining around some metal grains.

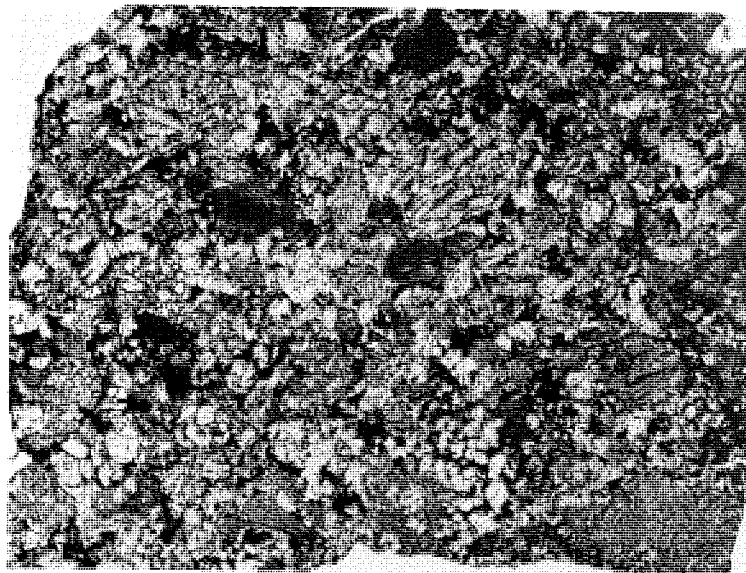
Petrographic Description:

Chondritic structure is not prominent, the chondrules tending to merge with the granular groundmass, which consists of olivine and pyroxene with minor amounts of nickel-iron and troilite. The meteorite is practically unweathered.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>18.3</sub>	2.5	17.3-19.3
Low-Ca pyroxene	Fs <sub>15.9</sub>	1.8	15.4-16.7

The meteorite is classified as an H5 chondrite.



Bulk chemical composition of the Yamato-74647,96 meteorite is shown as follow:

SiO <sub>2</sub>	36.62
TiO <sub>2</sub>	0.17
Al <sub>2</sub> O <sub>3</sub>	2.19
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	11.13
MnO	0.33
MgO	24.38
CaO	1.66
Na <sub>2</sub> O	0.86
K <sub>2</sub> O	0.09
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0.0
P <sub>2</sub> O <sub>5</sub>	0.26
Cr <sub>2</sub> O <sub>3</sub>	0.55
NiO	0.43
FeS	4.87
Fe	15.45
Ni	1.41
Co	0.039
<hr style="border-top: 1px dashed black;"/>	
Total	100.43

(Analyst: H. Haramura)

Yamato-74650

L6 Chondrite

Weight: 163.2 gms  
 Dimension: 6.0 x 4.9 x 3.5 cm  
 Degree of Weathering: A/B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°44'55"S 35°59'50"E  
 Original Number: 74122812  
 Found: Dec. 28, 1974, K. Yanai et al.

Physical Description:

A complete pyramidal stone, covered with dull black fusion crust; a chipped surface shows a light gray granular interior, with little evidence of chondritic structure. Weathering is limited to a little brown limonitic staining near the fusion crust.

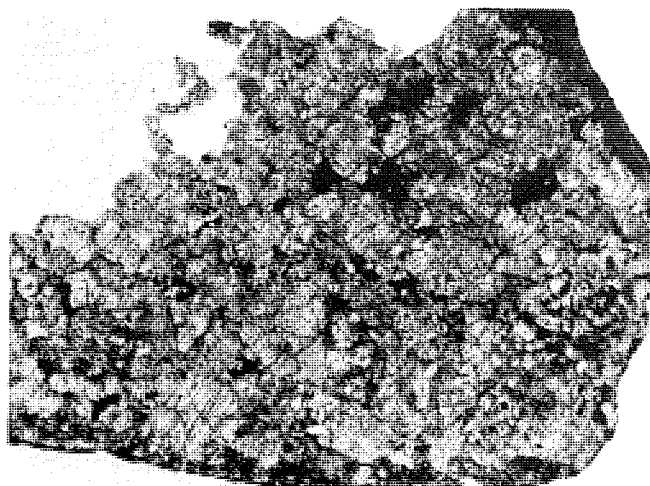
Petrographic Description:

Chondritic structure is poorly developed, the chondrules merging with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron, troilite, and plagioclase. Well-preserved fusion crust rims much of the section. Weathering is minor, being limited to brown limonitic staining around metal grains.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>24.6</sub>	1.3	23.7-25.3
Low-Ca pyroxene	Fs <sub>20.6</sub>	1.6	19.8-21.2
Plagioclase	An <sub>9.5-10.2</sub>		

The meteorite is classified as an L6 chondrite.



Yamato-74659

Ureilite

Weight: 18.9 gms  
 Dimension: 4.2 x 2.7 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°47'48"S 36°09'05"E  
 Original Number: 74122906  
 Found: Dec. 29, 1974, K. Yanai et al.

Physical Description:

Approximately one-half of the original stone, partly coated with thick dull black fusion crust, fracture surfaces show a dark gray aggregate of mm-sized crystals of olivine and pyroxene. Some weathering is indicated by minor brown lemonitic staining.

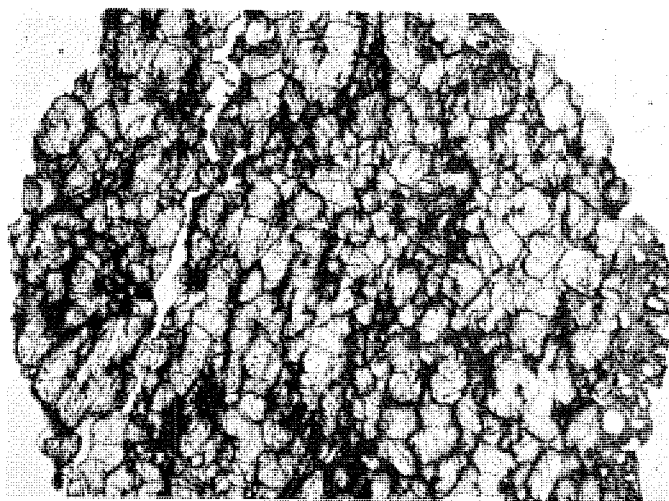
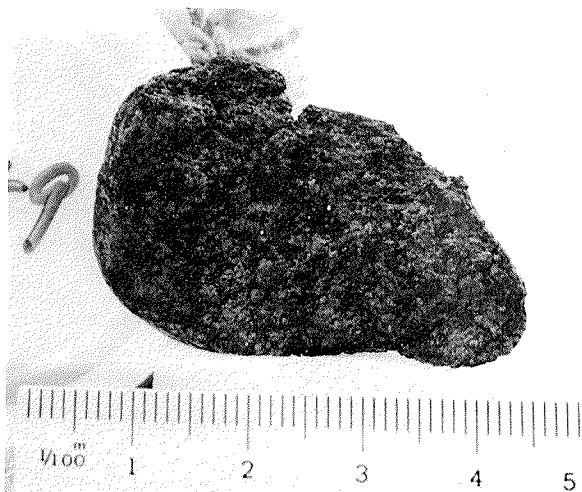
Petrographic Description:

Takeda et al. (1978) have described Y-74659 as follows: This meteorite is the ninth known ureilite. The elemental composition of Y-74659 is different from the other ureilites in that the FeO content (8.83 wt%) is the lowest among the known ureilites and it is richer in SiO<sub>2</sub> (42.91 wt%). The comp-

sition is consistent with the fact that it is composed of one of the most Mg-rich pigeonites Ca<sub>7</sub>Mg<sub>85</sub>Fe<sub>8</sub> and Mg-rich olivine Fa<sub>7.9</sub>, and that the amount

of pigeonite is larger than olivine. Olivine grains forming triple point junctures display minor difference in their Fe content. A round pigeonite grain enclosed entirely in olivine gives the lowest Ca concentration.

The thermal history of Y-74659 must be constrained such that the growth of pyroxenes and olivines with nearly uniform composition was followed by shock events and rapid cooling.



Bulk chemical composition of the Yamato-74659,92 meteorite is shown as follow:

SiO <sub>2</sub>	42.91
TiO <sub>2</sub>	0.14
Al <sub>2</sub> O <sub>3</sub>	1.07
Fe <sub>2</sub> O <sub>3</sub>	1.47
FeO	8.83
MnO	0.42
MgO	38.78
CaO	1.71
Na <sub>2</sub> O	0.07
K <sub>2</sub> O	0.02
H <sub>2</sub> O(-)	0.17
H <sub>2</sub> O(+)*	3.65
P <sub>2</sub> O <sub>5</sub>	0.14
Cr <sub>2</sub> O <sub>3</sub>	0.64
FeS	0.49
Fe	-
Ni	0.14
Co	0.003

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Total	100.653
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(Analyst: H. Haramura)

\* Volatiles released at 1,100°C, including C.

Yamato-74660

LL3 Chondrite

Weight: 27.2 gms

Dimension: 3.1 x 2.3 x 1.8 cm

Degree of Weathering:

Degree of Fracturing:

Location: Yamato Mountains, Antarctica

71°47'50"S 36°09'10"E

Original Number: 74122907

Found: Dec. 29, 1974, K. Yanai et al.

Physical Description:

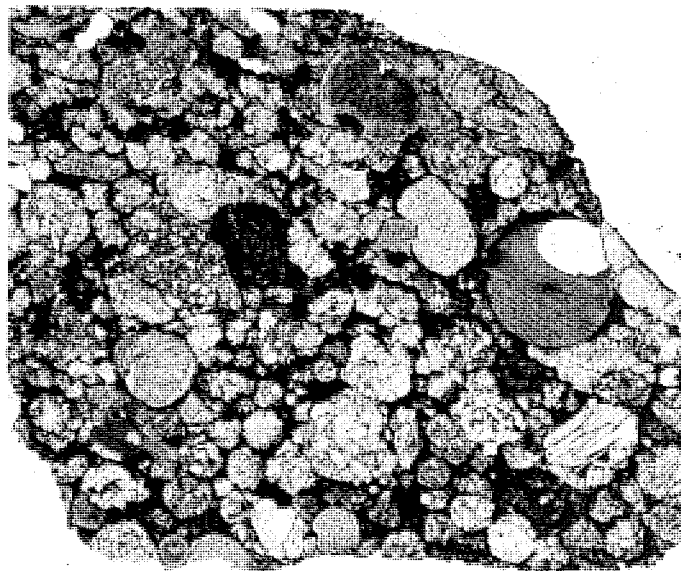
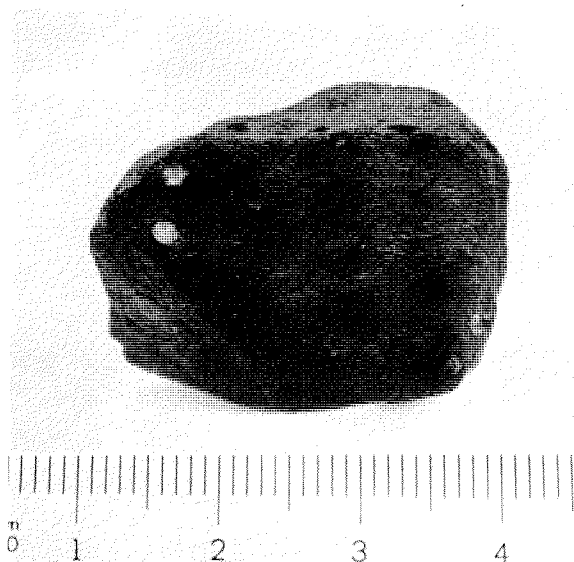
An almost complete angular stone with dark brownish-black fusion crust: some chondrules can be seen on the fusion crust as white spots or shiny-black one. An exposed surface show numerous chondrules in a medium grey-brown matrix.

Petrographic Description:

Chondritic structure is well developed. The section show a close-packed aggregate of chondrules and a lot of chondrule fragments, with little interstitial black matrix. The chondrules are granular and porphyritic olivine and olivine-pyroxene, barred olivine and radiating pyroxene, and some devitrified glass spherules. Interstitial glass is clear in some chondrules. Most of pyroxene is polysynthetically twinned. Less amount of nickel-iron and froilite are present. Some limonitic staining is present. Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>10.5</sub>	63.4	0.4-49.5
Low-Ca pyroxenes	Fs <sub>8.9</sub>	78.4	0.4-34.5

The meteorite is classified as an LL3 Chondrite.





Bulk chemical composition of the Yamato-74660,71 meteorite is shown as follow:

SiO <sub>2</sub>	38.52
TiO <sub>2</sub>	0.07
Al <sub>2</sub> O <sub>3</sub>	2.61
Fe <sub>2</sub> O <sub>3</sub>	2.09
FeO	14.65
MnO	0.33
MgO	25.28
CaO	1.84
Na <sub>2</sub> O	0.81
K <sub>2</sub> O	0.09
H <sub>2</sub> O(-)	0.90
H <sub>2</sub> O(+)	2.2
P <sub>2</sub> O <sub>5</sub>	0.26
Cr <sub>2</sub> O <sub>3</sub>	0.48
FeS	7.53
Fe	1.39
Ni	0.65
Co	0.029

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Total	99.72
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(Analyst: H. Haramura)

Yamato-74662

CM2 Chondrite

Weight: 150.9 gms  
 Dimension: 5.0 x 4.5 cm  
 Degree of Weathering: A  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica  
 71°48'21"S 36°11'10"E  
 Original Number: 74122909  
 Found: Dec. 29, 1974, K. Yanai et al.

Physical Description:

A nearly complete stone covered with partly abraded thick black fusion crust; the interior is fine-grained, black, with some white to gray small chondrules and mineral grains.

Petrographic Description:

Ikeda (1983) described Y-74662 as follows: This chondrite consists of chondrules, Sp-01 aggregates, amoeboid olivine inclusions, devitrified glass fragments, silicate and opaque mineral fragments, calcite fragments, opaque clots, and matrix.

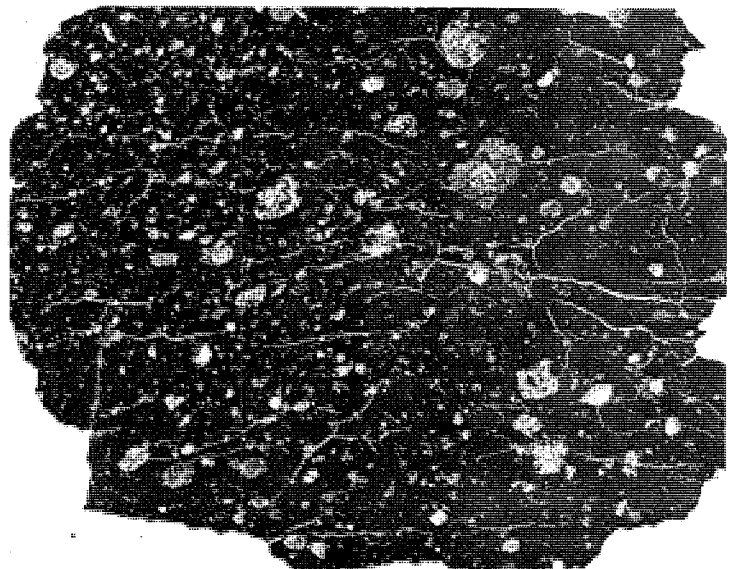
The chondrules are smaller than 1.5 mm across, the main type being Ol-Px porphyritic chondrules. Most chondrules have suffered intense alteration. The groundmasses of all chondrules are altered to greenish yellow, dark or greenish brown materials. Low-Ca pyroxenes showing polysynthetic twinning in chondrules also have suffered alteration in various degrees, although the olivines in chondrules remain fresh. Fe-Ni metal grains in chondrules have altered completely to Fe-hydrates and/or oxides. A hibonite-bearing inclusion, about 200 microns in size, occurs set in the matrix. This consists of a nodule, about 80 microns in diameter, and dark greenish brown materials, the former being an aggregate of Mg-Al spinel and hibonite (MgO=3.62 wt%, Al<sub>2</sub>O<sub>3</sub>=79.72, CaO=7.99, TiO<sub>2</sub>=8.47, FeO=0.14).

Devitrified glass fragments have altered to pale brown to dark brown materials. Calcite fragments are less than 200 microns across.

Microprobe analysis give the following result:

	Average	%M.D.	Range
Olivine	Fa10.9	112	0.2-52.8
Low-Ca pyroxene	Fs5.0	118	0.5-45.3

This meteorite is classified as CM2 chondrite.



Bulk chemical composition of the Yamato-74662,64 meteorite is shown as follow:

SiO <sub>2</sub>	29.18
TiO <sub>2</sub>	0.22
Al <sub>2</sub> O <sub>3</sub>	2.38
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	22.53
MnO	0.22
MgO	19.29
CaO	1.70
Na <sub>2</sub> O	0.28
K <sub>2</sub> O	0.04
H <sub>2</sub> O(-)	1.56
H <sub>2</sub> O(+)	13.26
P <sub>2</sub> O <sub>5</sub>	0.23
Cr <sub>2</sub> O <sub>3</sub>	0.52
NiO	0.85
FeS	7.38
Fe	-
Ni	-
Co	0.059
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Total	99.69

(Analyst: H. Haramura)

Yamato-74663

LL6 Chondrite

Weight: 213.9 gms  
 Dimension: 5.3 x 4.2 cm  
 Degree of Weathering: B  
 Degree of Fracturing:

Location: Yamato Mountains, Antarctica

Original Number: 74122910

Found: Dec. 29, 1974, K. Yanai et al.

Physical Description:

An almost complete rounded stone, largely covered with dull black fusion crust; the interior is pale gray, granular, with traces of chondritic structure. Weathering is minor, being limited to brown limonitic staining below the fusion crust and around metal grains.

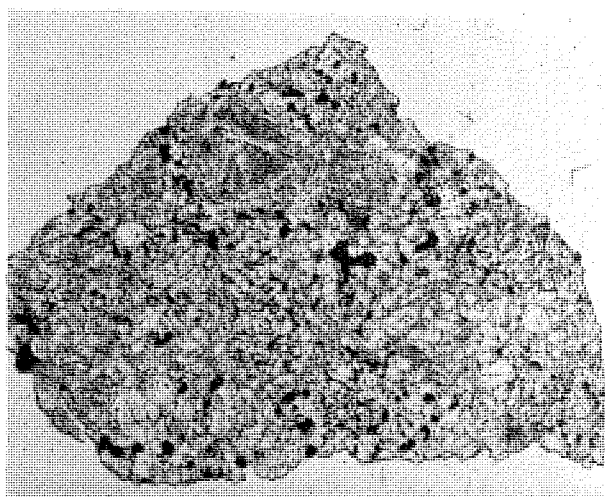
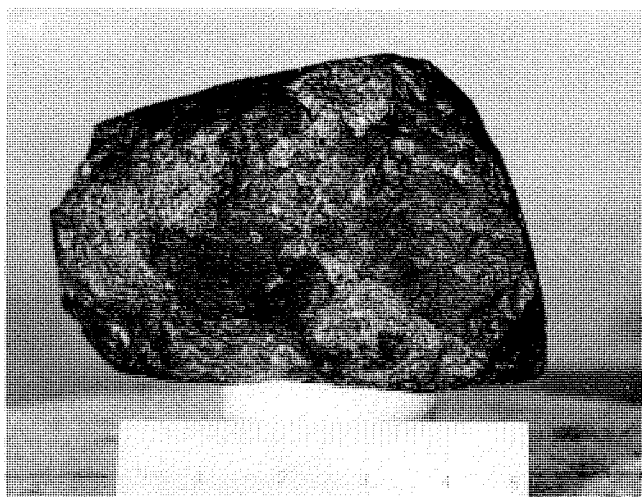
Petrographic Description:

Chondrules are sparse and poorly defined, being extensively integrated with the granular groundmass, which consists largely of olivine and pyroxene, with minor amounts of nickel-iron, troilite, and plagioclase. A little fusion crust is present on one edge. Brown limonitic staining pervades the section.

Microprobe analyses give the following results:

	Average	%M.D.	Range
Olivine	Fa <sub>21.8</sub>	1.2	26.8-28.8
Low-Ca pyroxene	Fs <sub>23.0</sub>	1.8	21.8-23.8

The meteorite is classified as an LL6 chondrite.



Bulk chemical composition of the Yamato-74663,81 meteorite is shown as follow:

SiO <sub>2</sub>	40.40
TiO <sub>2</sub>	0.06
Al <sub>2</sub> O <sub>3</sub>	2.09
Fe <sub>2</sub> O <sub>3</sub>	-
FeO	19.63
MnO	0.34
MgO	26.41
CaO	1.59
Na <sub>2</sub> O	0.94
K <sub>2</sub> O	0.07
H <sub>2</sub> O(-)	0.00
H <sub>2</sub> O(+)	0.0
P <sub>2</sub> O <sub>5</sub>	0.26
Cr <sub>2</sub> O <sub>3</sub>	0.52
NiO	0.52
FeS	4.77
Fe	2.03
Ni	0.58
Co	0.067
<hr/>	
Total	100.27

(Analyst: H. Haramura)