OVER 5,600 JAPANESE COLLECTION OF ANTARCTIC METEORITES: RECOVERIES, CURATION AND DISTRIBUTION; K. Yanai, and H. Kojima, National Institute of Polar Research (NIPR), 9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173, Japan 9160

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Recoveries of Yamato Meteorites

Until 1969, only six meteorite fragments had been recovered from the Antarctic continent. In December 1969, the Japanese Antarctic Research Expedition (JARE) collected nine meteorite pieces from a bare ice field south of the Yamato Mountains in east Antarctica(1). The nine specimens have been classified into four types of meteorites indicating they did not derive from a common fall. The types include an enstatite chondrite (EH3), a diogenite (granoblastic), a carbonaceous chondrite (C4) and six ordinary chondrites.

In December 1973, another 12 specimens, including a howardite, were found on the bare ice near the Yamato Mountains(2). Eight specimens were collected from the same ice field as those of the 1969 collection while the others were found on a bare ice field located 30-40 km to the north and north-west. This find indicated that meteorites could be found on other bare ice fields.

The 1974 field season was very successful when a JARE search party collected 663 meteorite pieces from the Yamato Mountains bare ice fields during November and December. About 200 of these specimens were found in the same vicinity of the 1969 and 1973 finds. Over 400 specimens were found in previously unsearched areas of the ice field between Massif A and Motoi Nunatak, near Massif A, near JARE-IV Nunataks, and south of Massif B. The 1974 collection included many meteorite types including a lodranite, a pallasite, numbers of achondrites, and six ungrouped meteorites, but no irons(3,4).

In 1975 the systematic search techniques initiated in 1974 resulted in a find of 308 new fragments. Included within these finds were two irons and a unique diogenite. Most of these meteorites were collected from the area of bare ice located east of Massif D and Massif G(5).

The first theory on a concentration mechanism of Antarctic meteorites was proposed as a result of the dense concentation of Yamato specimens found on the bare ice surface(4). It was suggested that meteorites which fell into the snow accumulation zone were trapped by the gradually thickening ice sheet and were transported to an ablation zone by the moving ice. Ablation zones are found near mountains or nunataks where the ice sheet has stagnated. Meteorites that had been trapped within the ice for a long time appeared on the bare ice surface after the ablation of snow and ice.

The search for meteorites during the 1979 field season was the most systematic up to that time and it was based on the dense concentration mechanism theory. The JARE party mainly searched the area of stagnant ice adjacent to the Yamato Mountains and several nunataks located near these mountains. Over 3,600 meteorite fragments were recovered from the bare ice in this field season. Included within these finds was a most peculiar specimen, a lunar meteorite (anorthositic regolith breccia). The 1979 collection also contains many irons, lodranites, achondrites and carbonaceous chondrites(6).

In the 1980, 1981, 1982, 1983, and 1984 field seasons, 13, 133, 211, 42, and 58 specimens were collected, respectively. In particular, the 1982 collection included two lunar meteorites and a C1 chondrite which was classified as preliminary.

The total area of exposed bare ice around the Yamato Mountains is on the order of 4,000 square km. Ten JARE parties have searched for meteorites there in the face of a great deal of danger, however, much of it still remains to be searched. The Yamato Mountains are the one place in Antarctica with the greatest possibility for many more meteorites.

Recoveries of Victoria Land Meteorites:

A Japan-U.S. program titled "Antarctic Search for Meteorites" (ANSMET) was initiated as a result of the discoveries of meteorites in the Yamato Mountains. This joint program continued for three years (1976-1979) in the area of the bare ice fields of Victoria Land.

The first two meteorites found in Victoria Land were collected from the bare ice surface of the polar plateau adjacent to the Wright Valley in December 1976. They were chondrites and were named Mt. Baldr Meteorites after the name of the nearest mountain. Nine other specimens were collected that same season from the bare ice on the plateau side of Allan Nunatak (renamed Allan Hills), 230 km north of McMurdo Station, in January 1977. These were named Allan Hills Meteorites and they consisted of one iron, one eucrite and seven ordinary chondrites, one of which weighed over 400 kg.(7).

In the second year the joint party collected about 300 specimens from the bare ice around Allan Hills during December 1977 and January 1978. This collection consists of many ordinary chondrites, several irons, a few carbonaceous chondrites and achondrites including a shergottite(8).

In the last year (1978-79) of the cooperative effort the joint party searched several areas and collected nine irons from the detritus of Derrick Peak, and over 300 specimens from the bare ice abound Bates Nunatak, Meteorite Hills, Reckling Peak and the Allan Hills(9,10).

Curation of Yamato and Victoria Land Meteorites:

The present Japanese collection of Antarctic meteorites with the exception of Victoria Land specimens is estimated to total 5,618 fragments. The Department of Antarctic Meteorites, NIPR, Tokyo has been processing the Japanese collection since 1975. All collected specimens have been numbered, weighed, photographed, identified, and classified as preliminary. The specimens are stored in an air conditioned clean room.

The Yamato collection includes 7 stony-irons (six lodranites), 60 carbonaceous chondrites including the largest mass over 25 kg, many achondrites including aubrites, ureilites, diogenites, howardites, eucrites and anorthositic breccias (lunar meteorites), 4 enstatite chondrites and many ordinary chondrites. The collection may also contain more new and as of yet unidentified specimens.

Japanese Antarctic Meteorite Sample Distribution:

Since 1975, the meteorite curator of the NIPR has received 410 research proposals from scientists representing fifteen countries. Those proposals also include several consortium studies such as the lunar meteorite(s) and the Y-691 enstatite chondrite. All research proposals are judged for scientific merit by the Committee on Antarctic Meteorite Reseach of Japan. To date, over 2,100 samples have been allocated to scientists throughout the world.

REFERENCES: (1) Yoshida M., Ando H., Naruse R. and Ageta Y. (1971) Antarctic Record, Japan 39. p. 62-65. (2) Shiraishi K., Naruse R. and Kusunoki K. (1976) Antarctic Record, Japan 55. p. 49-60. (3) Yanai K. (1976) Antarctic Record, Japan 56. p. 70-81. (4) Yanai K. (1978) Memoirs of NIPR, Special Issue 8. p. 1-37. (5) Matsumoto Y. (1978) Memoirs of NIPR, Special Issue 8. p. 38-50. (6) Yanai K. (1981) Memoirs of NIPR, Special Issue 20. p. 1-8. (7) Cassidy W.A. (1977) Antarctic Journal of the United States 12. p. 96-98. (8) Yanai K., Cassidy W.A., Funaki M. and Glass B.P. (1978) Proc. Lunar Sci. Conf. 9th, p. 977-987. (9) Cassidy W.A. (1979) Antarctic Journal of the United States 15. p. 41-42. (10) Shiraishi K. (1979) Memoirs of NIPR 15. p. 1-12.

Table Types of Meteorite of the Yamato Collection

	Y-69	Y-73	Y-74	Y-75	Y-79	Y-80	Y-81	Y-82	Y-83	Y-84
E chondrite	1		2		205					
H3			9	5	15			1		
L3			5	0	1			1		
LL3			2	1	1					
L-LL3				2						
H4	1	3	52	11	213					
L4			9	11	4					
LL4			3	1						
H5	3	2	236	11	68			1		
L5			7	5	6					
LL5			1	3						
H6	2	2	218	14	33					
L6		3	71	216	71			2		
LL6		1	5	5	2					
C.chondrite	1		4	3	31		7	15		
Shocked ch.			2		179					
Ungrouped ch.			6	5						
Iron				2	9					
Pallasite			1							
Mesosiderite										
Lodranite			1	1	3	1				
Aubrite					1					
Ureilite			4		3			1		
Diogenite	1		22	7	30	1	2	5		
Howardite		1			15			3		
Eucrite			3	5	39			10		
Anorth.Br.					1			2		
Unclassified	0	0	0	0	2746	11	124	170	42	58
Total	9	12	663	308	3676	13	133	211	42	58