Antarctic Meteorite Newsletter

Volume 24, Number 1 February 2001

Program News

New Meteorites

Dave Mittlefehldt

This newsletter contains classifications of 197 meteorites from the 1999 ANSMET collection. The meteorites classified here were collected in six different areas, from the Allan Hills and Elephant Moraine in the north, to Lewis Cliff and Queen Alexandra Range in the south. Descriptions are given for twelve meteorites of special petrologic type. These include four carbonaceous chondrites, a type 3 ordinary chondrite, a type 6 ordinary chondrite containing a shock-melt vein, five HED achondrites, and an enstatite meteorite. The latter presents some classificational problems. It is clearly very much like three other meteorites recovered in previous years from the same icefield, yet these are variously classified as an E7 chondrite, or as aubrites. Neither of these classifications seems entirely appropriate. Rather than sort this problem out here, we have elected to punt, and provisionally call this new specimen an “enstatite meteorite, unusual.” A brief scan of our database indicates that it is time to sort through problem samples and rationalize the entire database. In this regard, if you are aware of any classificational problems, let me know. My e-mail address appears at the end of this newsletter.

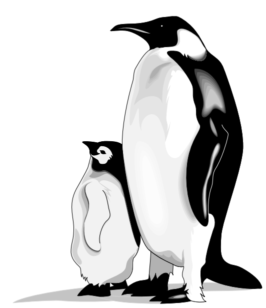
JSC Lab Renovations

Work continues on upgrading our facilities. We have begun the process of replacing the air handlers in the Meteorite Processing Lab (MPL), having the ductwork cleaned, and adding HEPA filtration. Funding for the project has been secured, and ordering of equipment and parts has begun. We are expecting to start construction probably in May, and will be shut down for about six weeks. Once work is completed, the lab will be completely cleaned before starting new work. We will do our best to get all samples allocations done before the shutdown.

A periodical issued by the Meteorite Working Group to inform scientists of the basic characteristics of specimens recovered in the Antarctic.

Edited by Cecilia Satterwhite and David Mittlefehldt, Code SN2, NASA Johnson Space Center, Houston, Texas 77058

Inside this Issue



Sample Request Deadline March 2, 2001 | **MWG Meets March 16-17, 2001**

The 2000-2001 ANSMET field season

by Ralph Harvey

ANSMET's 24th field season (which ended January 15th) was a memorable one. In early December the field team (including R. Harvey, J. Schutt, B. Bussey, S. Russell, J. Byrnes, M. Strait, L. Nittler, and B. Oefelein) was put in at Meteorite Hills, a group of nunataks nestled between the headwaters of the Darwin and Hatherton Glaciers. This site had been scouted twice previously, in 1978 and again in 1996. Based on the earlier reconnaissance visits (which yielded a total of 60 specimens), we knew the region had the potential for significant returns; what was in question was just how significant they would be. John Schutt guessed we'd recover about 200 specimens; being the perpetual optimist, I guessed about 600. When the season was done (one of our best in terms of weather), Mother Nature proved that she was smarter than either of us - 740 specimens had been recovered. A better-than-usual proportion of these (about 73 specimens, roughly 10%) appeared to be of more interesting (that is, non-OC) classifications, so we look forward to their arrival at JSC with enhanced interest.

Reconnaissance efforts yielded an additional 18 specimens from a variety of icefields. Shortly after the full field team deployed, helicopter support from the nearby Darwn Glacier Camp allowed a series of short trips to local sites of interest. On the 11th of December a team of three visited Finger Ridge, recovering 3 meteorites during an hour's walk. Between Dec. 13 and 19, a team of two explored the icefields near Bates Nunatak, recovering an additional 11 specimens while systematically searching the entire area. Another trip (Dec. 19 to 26) by the same team (augmented by two Raytheon Polar Services employees, J. Pierce and K. Young) to Tentacle Ridge yielded two additional specimens on Christmas Day (thanks, Santa!) in some difficult searching conditions. Finally, two short daytrips to Derrick Peak each yielded an iron that is probably a new member of the well-known DRP iron shower.

Based on our success during the 2000-2001 season, we will be returning to several of these sites. Many areas of the extensive icefields at Meteorite Hills remain to be systematically searched, and the Finger Ridge site demands a higher level of reconnaissance. As we make plans for the upcoming 2001-2002 season we will certainly be considering a return to the region.

Ralph Harvey

Ben Bussey enjoys the view from the pinnacles at the top of the Bates North icefield.

New Meteorites

From 1999 Collection

Pages 10 – 13 contain preliminary descriptions and classifications of meteorites that were completed since publication of issue 23(2), Sept. 2000. Specimens of special petrologic type (carbonaceous chondrite, unequilibrated ordinary chondrite, achondrite, etc.) are represented by separate descriptions unless they are paired with previously described meteorites. However, some specimens of non-special petrologic type are listed only as single line entries in Table 1. For convenience, new specimens of special petrological type are also recast in Table 2.

Macroscopic descriptions of stony meteorites were performed at NASA/ JSC. These descriptions summarize hand-specimen features observed during initial examination. Classification is based on microscopic petrography and reconnaissance-level electron microprobe analyses using polished sections prepared from a small chip of each meteorite. For each stony meteorite the sample number assigned to the preliminary examination section is included. In some cases, however, a single microscopic description was based on thin sections of several specimens believed to be members of a single fall.

Meteorite descriptions contained in this issue were contributed by the following individuals:

Kathleen McBride, Cecilia Satterwhite
Antarctic Meteorite Laboratory
NASA Johnson Space Center
Houston, Texas

Tim McCoy, Linda Welzenbach
Department of Mineral Sciences
U.S. National Museum of Natural History
Smithsonian Institution
Washington, D.C.

Antarctic Meteorite Locations

ALH — Allan Hills
BEC — Beckett Nunatak
BOW — Bowden Neve
BTN — Bates Nunataks
DAV — David Glacier
DEW — Mt. DeWitt
DOM — Dominion Range
DRP — Derrick Peak
EET — Elephant Moraine
GDR — Gardner Ridge
GEO — Geologists Range
GRA — Graves Nunataks
GRO — Grosvenor Mountains
HOW — Mt. Howe
ILD — Inland Forts
KLE — Klein Ice Field
LAP — LaPaz Ice Field
LEW — Lewis Cliff
LON — Lonewolf Nunataks
MAC — MacAlpine Hills
MBR — Mount Baldr
MCY — MacKay Glacier
MET — Meteorite Hills
MIL — Miller Range
OTT — Outpost Nunatak
PAT — Patuxent Range
PCA — Pecora Escarpment
PGP — Purgatory Peak
PRE — Mt. Prestrud
QUE — Queen Alexandra Range
RKP — Reckling Peak
SCO — Scott Glacier
STE — Stewart Hills
TIL — Thiel Mountains
TYR — Taylor Glacier
WIS — Wisconsin Range
WSG — Mt. Wisting

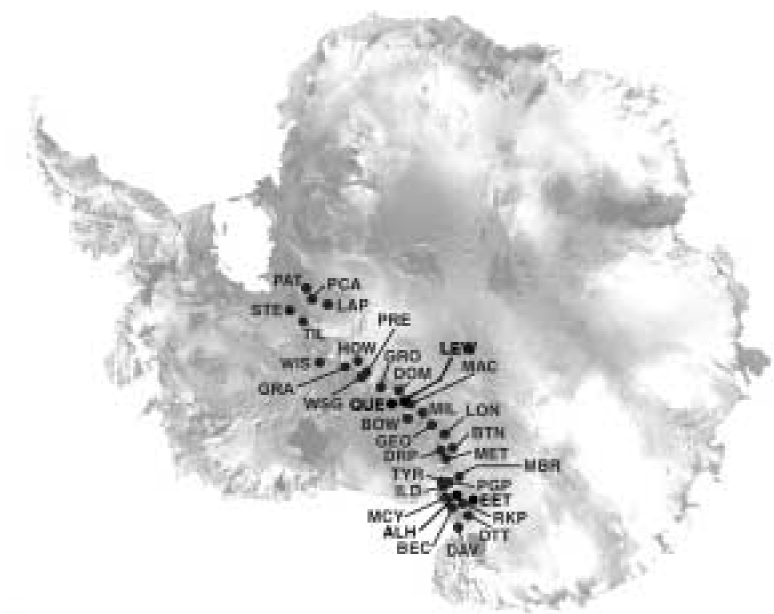


Table 1

List of Newly Classified Antarctic Meteorites **

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
ALH 99 500	13.6	CM2 CHONDRITE	B	A/B	1-47	
ALH 99 501	20.3	H6 CHONDRITE	C	B	17	15
ALH 99 502~	13.7	L5 CHONDRITE	A/B	A/B		
ALH 99 503	36.1	H4 CHONDRITE	C	C	19	8-14
ALH 99 504~	186.0	H6 CHONDRITE	C	C		
ALH 99 505~	453.6	H6 CHONDRITE	C	C		
ALH 99 506~	1009.2	L5 CHONDRITE	B	B		
EET 99 409~	400.2	L6 CHONDRITE	A	A/B		
EET 99 410~	205.1	H6 CHONDRITE	B/C	B/C		
EET 99 411~	223.8	H6 CHONDRITE	B	B		
EET 99 412~	250.0	H5 CHONDRITE	CE	B		
EET 99 413~	172.7	H5 CHONDRITE	A/B	B		
EET 99 414~	121.0	H5 CHONDRITE	C	B		
EET 99 415~	98.2	H5 CHONDRITE	A/B	A/B		
EET 99 416~	187.7	H5 CHONDRITE	C	B		
EET 99 417~	89.2	H5 CHONDRITE	B/C	B		
EET 99 418	83.2	L5 CHONDRITE	B/C	B	26	22
EET 99 419~	54.0	L5 CHONDRITE	B/C	B		
EET 99 420~	725.8	H5 CHONDRITE	C	C		
EET 99 421~	65.7	H5 CHONDRITE	B	B		
EET 99 422~	240.0	H5 CHONDRITE	B/C	A/B		
EET 99 423~	169.5	H5 CHONDRITE	A/B	A		
EET 99 424	156.6	L5 CHONDRITE	B	B	25	21
EET 99 425~	61.9	H5 CHONDRITE	B/CE	A/B		
EET 99 426~	31.6	H5 CHONDRITE	B/C	A/B		
EET 99 427~	38.8	H5 CHONDRITE	B	A/B		
EET 99 428~	63.8	H5 CHONDRITE	A/B	A		
EET 99 429~	20.9	H5 CHONDRITE	C	B		
EET 99 430	27.1	CK4 CHONDRITE	C	A/B	30-33	
EET 99 431~	26.4	H5 CHONDRITE	B/C	A/B		
EET 99 432~	18.2	H5 CHONDRITE	B/C	A/B		
EET 99 433~	12.2	H6 CHONDRITE	C	B		
EET 99 434~	20.1	L5 CHONDRITE	B/C	A/B		
EET 99 435~	2.0	H6 CHONDRITE	B/C	A		
EET 99 436~	4.2	H6 CHONDRITE	C	B		
EET 99 437	6.0	CM2 CHONDRITE	BE	B	0-51	1
EET 99 438~	1.5	H5 CHONDRITE	C	B		
EET 99 439~	9.3	L5 CHONDRITE	C	A/B		
EET 99 440~	5.0	L5 CHONDRITE	A	A/B		
EET 99 441~	2.2	H6 CHONDRITE	C	A/B		
EET 99 442~	0.3	H5 CHONDRITE	C	A		
EET 99 443	2.4	HOWARDITE	A/B	A/B		24-52
EET 99 444~	15.3	L5 CHONDRITE	A	A/B		
EET 99 445~	4.9	H5 CHONDRITE	A/B	A		
EET 99 446~	15.1	H5 CHONDRITE	C	A/B		
EET 99 447~	1.0	H6 CHONDRITE	B	A/B		
EET 99 448~	7.0	H5 CHONDRITE	B	B		

~ Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
EET 99 449~	10.9	H5 CHONDRITE	C	B		
EET 99 450	28.0	L5 CHONDRITE	B	A/B	24	20
EET 99 451~	19.3	H5 CHONDRITE	B	A/B		
EET 99 452~	14.6	H5 CHONDRITE	C	A/B		
EET 99 453~	22.0	L5 CHONDRITE	B	A/B		
EET 99 454~	25.0	H5 CHONDRITE	B/C	B		
EET 99 456~	41.8	H5 CHONDRITE	C	A/B		
EET 99 457~	9.8	L4 CHONDRITE	A/B	A		
EET 99 458~	7.4	L6 CHONDRITE	B	A/B		
EET 99 459~	41.3	L4 CHONDRITE	A/B	A		
GEO 99 100	979.5	H5 CHONDRITE	B	A	16	15
GEO 99 101	383.9	H4 CHONDRITE	A/B	A/B	18	13-17
GEO 99 102	340.6	H4 CHONDRITE	A/B	C	17	15
GEO 99 103	119.3	H4/6 CHONDRITE	B/C	B	18	16
GEO 99 104	100.7	L6 CHONDRITE	B	B/C	23	20
GEO 99 105~	51.9	L6 CHONDRITE	B	B/C		
GEO 99 106~	62.8	H5 CHONDRITE	A/B	A/B		
GEO 99 107~	50.6	L5 CHONDRITE	B	A/B		
GEO 99 108~	89.2	L5 CHONDRITE	A/B	A/B		
GEO 99 109	129.3	H4 CHONDRITE	B/C	B	18	15
GEO 99 110~	18.5	L6 CHONDRITE	A/B	A/B		
GEO 99 111~	12.4	H5 CHONDRITE	C	A		
GEO 99 112	39.6	L6 CHONDRITE	B/C	B	23	20
GEO 99 113~	34.8	L6 CHONDRITE	C	A		
GEO 99 114~	39.9	L6 CHONDRITE	B/C	B		
GEO 99 115~	8.9	H6 CHONDRITE	C	A		
GEO 99 116~	11.4	H6 CHONDRITE	C	A		
GEO 99 117~	4.4	L6 CHONDRITE	B	A/B		
GEO 99 118~	1.1	H6 CHONDRITE	C	A		
GEO 99 119~	11.4	H6 CHONDRITE	C	A		
GEO 99 120	0.5	HOWARDITE	B/CE	A		14-58
GEO 99 121~	3.6	H6 CHONDRITE	B/C	A/B		
GEO 99 122~	0.9	L6 CHONDRITE	B	A		
GEO 99 123~	2.6	H6 CHONDRITE	A/B	A/B		
GEO 99 124~	3.2	H6 CHONDRITE	B	A/B		
GEO 99 125~	2.7	L6 CHONDRITE	B	A/B		
GEO 99 126~	0.3	L6 CHONDRITE	A/B	A/B		
GEO 99 127~	0.4	H6 CHONDRITE	A/B	A/B		
GEO 99 128~	5.2	L6 CHONDRITE	B/C	A		
GEO 99 129	579.9	L6 CHONDRITE	A	A/B	23	20
LEW 99 200~	8.8	L6 CHONDRITE	B	B		
LEW 99 201~	30.2	L6 CHONDRITE	B	B		
MIL 99 300	2419.8	H5 CHONDRITE	B	B	17	15
MIL 99 301	4037.3	LL6 CHONDRITE	B	A	28	23
MIL 99 302	1460.0	H4 CHONDRITE	B	A/B	18	6-17
MIL 99 303	613.4	H5 CHONDRITE	C	C	19	16
MIL 99 304	1330.6	H5 CHONDRITE	C	CE	18	16
MIL 99 305	1710.1	L6 CHONDRITE	A/B	C	24	21
MIL 99 306~	305.2	L5 CHONDRITE	A	A/B		
MIL 99 307	291.7	L3.6 CHONDRITE	C	B	14-37	10-22

~ Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
MIL 99 308	352.7	LL6 CHONDRITE	A	B	29	24
MIL 99 309~	273.6	L5 CHONDRITE	A	B		
MIL 99 310~	315.7	L5 CHONDRITE	B/C	B		
MIL 99 311~	287.6	L5 CHONDRITE	B	B		
MIL 99 312~	142.1	L6 CHONDRITE	A/B	B		
MIL 99 313~	174.5	H5 CHONDRITE	C	A/B		
MIL 99 314~	150.7	L6 CHONDRITE	A/B	A		
MIL 99 315~	63.0	H6 CHONDRITE	C	B/C		
MIL 99 316~	66.4	L6 CHONDRITE	A/B	B		
MIL 99 317	45.6	L6 CHONDRITE	C	B/C	24	21
MIL 99 318	475.4	L6 CHONDRITE	B	B	24	21
MIL 99 319~	249.1	L5 CHONDRITE	A/B	A/B		
MIL 99 320~	400.0	L5 CHONDRITE	B	B		
MIL 99 321~	385.9	L6 CHONDRITE	B	B		
MIL 99 322~	239.1	H6 CHONDRITE	C	C		
MIL 99 323~	109.0	L5 CHONDRITE	BE	B		
MIL 99 324~	29.3	H5 CHONDRITE	C	B		
MIL 99 325~	17.8	H5 CHONDRITE	C	B		
MIL 99 326~	15.4	L5 CHONDRITE	A/B	A/B		
MIL 99 327~	12.6	H6 CHONDRITE	B/C	B		
MIL 99 328~	6.0	L6 CHONDRITE	B/C	B		
MIL 99 329~	46.1	H6 CHONDRITE	C	B		
QUE 99 008~	2228.5	H5 CHONDRITE	B	B		
QUE 99 009~	1814.3	H5 CHONDRITE	B	B		
QUE 99 010~	1293.4	L5 CHONDRITE	C	C		
QUE 99 011~	1451.9	H4 CHONDRITE	BE	B		
QUE 99 012~	2016.8	H4 CHONDRITE	B	A		
QUE 99 014~	569.5	H5 CHONDRITE	B	A/B		
QUE 99 015~	1460.4	H5 CHONDRITE	B	A/B		
QUE 99 018	1000.2	H4 CHONDRITE	A/B	A/B	18	
QUE 99 019~	350.5	L5 CHONDRITE	B	A/B		
QUE 99 020~	355.4	H5 CHONDRITE	B	A/B		
QUE 99 021~	402.9	H5 CHONDRITE	B	A		
QUE 99 022~	548.9	L6 CHONDRITE	C	B/C		
QUE 99 026~	361.4	H5 CHONDRITE	B/C	A		
QUE 99 027~	298.0	H5 CHONDRITE	A/B	A		
QUE 99 028~	302.4	L6 CHONDRITE	B/C	A		
QUE 99 029~	482.5	L5 CHONDRITE	A/B	A		
QUE 99 030	797.8	L4 CHONDRITE	A/B	B/C	23	7-19
QUE 99 033	164.2	HOWARDITE	A/B	A/B	43	20-29
QUE 99 038	52.7	CM2 CHONDRITE	A/B	A/B	1-39	
QUE 99 040~	0.3	H5 CHONDRITE	B	B		
QUE 99 041~	46.9	LL5 CHONDRITE	B	B		
QUE 99 042~	< 0.1	LL5 CHONDRITE	B	B		
QUE 99 043~	44.8	L6 CHONDRITE	B/C	B/C		
QUE 99 044~	73.2	LL5 CHONDRITE	A/B	A/B		
QUE 99 045~	0.3	LL5 CHONDRITE	B	B		
QUE 99 046~	0.5	LL5 CHONDRITE	B	B		
QUE 99 047~	0.2	LL5 CHONDRITE	B	B		
QUE 99 048~	0.5	LL5 CHONDRITE	B	B		
QUE 99 049~	2.4	LL5 CHONDRITE	B	B		
QUE 99 050	2.1	DIOGENITE	A	A		21

~ Classified by using refractive indices.

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	% Fs
QUE 99 051~	1.3	L5 CHONDRITE	B	A/B		
QUE 99 052~	0.9	L5 CHONDRITE	B/C	A/B		
QUE 99 053~	4.0	L5 CHONDRITE	B	A		
QUE 99 054~	6.3	L5 CHONDRITE	B	A		
QUE 99 055~	9.3	H5 CHONDRITE	C	A/B		
QUE 99 056~	23.0	H6 CHONDRITE	C	A/B		
QUE 99 057~	24.1	L5 CHONDRITE	A/B	A		
QUE 99 058	48.0	HOWARDITE	A/B	A		17-31
QUE 99 059	22.1	ENSTATITE MET. UNUSUAL	C	C		0-1
QUE 99 060~	2.6	LL5 CHONDRITE	B	A		
QUE 99 061~	0.7	LL5 CHONDRITE	B	A		
QUE 99 062~	0.1	LL5 CHONDRITE	B	A		
QUE 99 063~	0.1	LL5 CHONDRITE	B	A		
QUE 99 064~	1.0	L5 CHONDRITE	C	A		
QUE 99 065~	20.0	LL5 CHONDRITE	B	A/B		
QUE 99 066~	21.4	LL5 CHONDRITE	B/C	B		
QUE 99 067~	3.6	LL5 CHONDRITE	B/C	B		
QUE 99 068~	5.6	LL5 CHONDRITE	B	A/B		
QUE 99 069~	2.2	H6 CHONDRITE	C	A/B		
QUE 99 070~	0.7	LL5 CHONDRITE	B	B		
QUE 99 071~	1.4	L5 CHONDRITE	B	B		
QUE 99 072~	0.7	LL5 CHONDRITE	B	B		
QUE 99 073~	0.5	LL5 CHONDRITE	B	B		
QUE 99 074~	2.2	H6 CHONDRITE	C	B		
QUE 99 075~	0.9	LL5 CHONDRITE	B	B		
QUE 99 076~	0.5	LL5 CHONDRITE	B	B		
QUE 99 077~	1.0	L5 CHONDRITE	B	B		
QUE 99 078~	1.5	LL5 CHONDRITE	B	B		
QUE 99 079	11.3	L5 CHONDRITE	B	B	26	22
QUE 99 080~	211.9	H6 CHONDRITE	C	C		
QUE 99 081~	198.0	LL5 CHONDRITE	B/C	B		
QUE 99 082	110.3	H6 CHONDRITE	C	C	18	16
QUE 99 083~	118.2	LL5 CHONDRITE	B/C	A/B		
QUE 99 084~	113.8	LL5 CHONDRITE	B/C	B		
QUE 99 085~	173.5	H6 CHONDRITE	B/C	B/C		
QUE 99 086	200.4	H6 CHONDRITE	CE	C	18	16
QUE 99 087~	93.4	H6 CHONDRITE	C	B		
QUE 99 088~	134.1	L5 CHONDRITE	C	B/C		
QUE 99 100~	1.2	H6 CHONDRITE	C	A		
QUE 99 101~	13.8	LL5 CHONDRITE	B	B		
QUE 99 102~	4.5	LL5 CHONDRITE	C	A		
QUE 99 103~	9.3	LL5 CHONDRITE	A/B	B		
QUE 99 104~	1.7	LL5 CHONDRITE	B	B		
QUE 99 105~	1.4	LL5 CHONDRITE	B	B		
QUE 99 106~	10.2	L5 CHONDRITE	B/C	B/C		
QUE 99 107~	0.9	LL5 CHONDRITE	B	B		
QUE 99 108~	1.0	LL5 CHONDRITE	B	B		
QUE 99 109~	1.9	LL5 CHONDRITE	B	B		

~ Classified by using refractive indices.

Table 2**

Newly Classified Specimens Listed by Type

Sample Number	Weight (g)	Classification	Weathering	Fracturing	% Fa	%Fs
		Achondrites				
QUE 99 050	2.1	DIOGENITE	A	A		21
QUE 99 059	22.1	ENSTATITE MET. UNUSUAL	C	C		0-1
EET 99 443	2.4	HOWARDITE	A/B	A/B		24-52
GEO 99 120	0.5	HOWARDITE	B/CE	A		14-58
QUE 99 033	164.2	HOWARDITE	A/B	A/B	43	20-29
QUE 99 058	48.0	HOWARDITE	A/B	A		17-31
		Carbonaceous Chondrites				
EET 99 430	27.1	CK4 CHONDRITE	C	A/B	30-33	
ALH 99 500	13.6	CM2 CHONDRITE	B	A/B	1-47	
EET 99 437	6.0	CM2 CHONDRITE	BE	B	0-51	1
QUE 99 038	52.7	CM2 CHONDRITE	A/B	A/B	1-39	
		Chondrites – Type 3				
MIL 99 307	291.7	L3.6 CHONDRITE	C	B	14-37	10-22

**Notes to Tables 1 and 2

"Weathering" Categories:

A: Minor rustiness; rust haloes on metal particle and rust stains along fractures are minor.

B: Moderate rustiness; large rust haloes occur on metal particles, and rust stains on internal fractures are extensive.

C: Severe rustiness; metal particles have been mostly stained by rust throughout.

E: Evaporite minerals visible to the naked eye.

"Fracturing" Categories:

A: Minor cracks; few or no racks are conspicuous to the naked eye, and no cracks penetrate the entire specimen.

B: Moderate cracks; several cracks extend across exterior surfaces, and the specimen can be readily broken along the cracks.

C: Severe cracks; specimen readily crumbles along cracks that are both extensive and abundant.

Table 3

Tentative Pairings for New Specimens

Table 3 summarizes possible pairings of the new specimens with each other and with previously classified specimens, based on descriptive data in this newsletter issue. Readers who desire a more comprehensive review of the meteorite pairings in the U.S. Antarctic collection should refer to the compilation provided by Dr. E.R. D. Scott, as published in issue 9(2) (June 1986). Possible pairings were updated in Meteoritical Bulletins No. 76 (Meteoritics 29, 100-143), No. 79 (Meteoritics and Planetary Science 31, A161-174), No. 82 (Meteoritics and Planetary Science 33, A221-A239), No. 83 (Meteoritics and Planetary Science 34, A169-A186) and No. 84 (Meteoritics and Planetary Science 35, A199-A225).

CM2 CHONDRITES

ALH 99500 with ALH 83100

HOWARDITES

QUE 99058 with QUE 99033

ENSTATITE METEORITES*

QUE 97289, QUE 97348, and QUE 99059 with QUE 94204

*See discussion in Program News – New Meteorites

Petrographic Descriptions

Sample No.: ALH 99500
Location: Allan Hills
Field No.: 12065
Dimensions (cm): 3.0x1.5x1.5
Weight (g): 13.596
Meteorite Type: CM2 Chondrite

Macroscopic Description:
Kathleen McBride
60% of the exterior of this carbonaceous chondrite has fractured purplish black fusion crust. The exposed interior appears to have a greenish tint. The matrix is made up of soft, chalky black material that has a sulfurous odor. Contained within the matrix are tiny white chondrules.

Thin Section (, 4) Description:
Tim McCoy and Linda Welzenbach
The section consists almost entirely of Fe-rich serpentine, which forms the matrix of the meteorite and has replaced the bulk of most chondrules. A few scattered anhydrous silicates remain. Olivine ranges from Fa_{1-47}, with many Fa_{0-1}. The meteorite is a CM2 chondrite. Pairing with ALH 83100 should be considered.

Sample No.: EET 99430
Location: Elephant Moraine
Field No.: 12395
Dimensions (cm): 4.0x3.0x1.5
Weight (g): 27.068
Meteorite Type: CK4 Chondrite

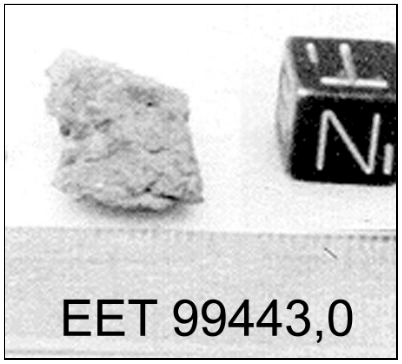
Macroscopic Description:
Kathleen McBride
The entire exterior surface of this carbonaceous chondrite is covered with thick black fusion crust with polygonal fractures. The interior is black, earthy material with a sulfurous odor. This meteorite has an oxidation rind and rust halos.

Thin Section (, 4) Description:
Tim McCoy and Linda Welzenbach
The section consists of large (up to 2 mm), well-defined chondrules in a matrix of finer-grained silicates, sulfides and abundant magnetite. The meteorite is extensively shocked and brecciated. Olivine is relatively homogeneous Fa_{30-33}. In this section, we observed a 1.5 by 2 mm CAI consisting of anorthite, fassaite and pleonaste spinel. A very unusual feature of this meteorite is the presence of FeO-rich phyllosilicates, which occur as veins and patches. The phyllosilicates also appear to cross cut the brecciated texture and are sometimes associated with magnetite. The origin of these phyllosilicates (terrestrial vs. extraterrestrial; timing relative to metamorphism and brecciation) is uncertain. The meteorite is a CK4 chondrite. However, phyllosilicates have not been previously reported in CK chondrites and large CAIs are very rare. This specimen is clearly very unusual.

Sample No.: EET 99437
Location: Elephant Moraine
Field No.: 12329
Dimensions (cm): 1.5x1.5x1.5
Weight (g): 5.997
Meteorite Type: CM2 Chondrite

Macroscopic Description:
Kathleen McBride
The exterior has thick black fusion crust with polygonal fractures on its entire surface. The matrix is black, charcoal-like with an oxidation rind. The meteorite contains white and rust colored chondrules/inclusions, less then 1 mm in size.

Thin Section (, 3) Description:
Tim McCoy and Linda Welzenbach
The section consists of small chondrules (rarely up to 1 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are $Fa_{0-51,}$ with many grains Fa_{0-1}. A single orthopyroxene is Fs_1. The matrix consists dominantly of an Fe-rich serpentine. The meteorite is a CM2 chondrite.



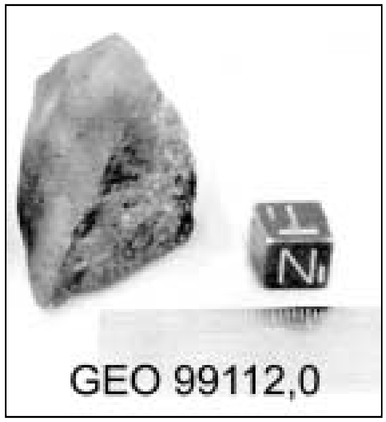
Sample No.:	EET 99443
Location:	Elephant Moraine
Field No.:	12348
Dimensions (cm):	2.0x1.0x0.5
Weight (g):	2.448
Meteorite Type:	Howardite

Macroscopic Description: Kathleen McBride

The interior is a medium gray matrix that contains some rusty halos and minor metal. Light gray inclusions are present.

Thin Section (, 2) Description: Tim McCoy and Linda Welzenbach

The section exhibits isolated pyroxene and plagioclase grains up to 0.5 mm. The section contains one part in which the groundmass is finely comminuted pyroxene and plagioclase grains, while the groundmass in the other is a fine-grained, lath-like structure suggestive of an impact melt. Pyroxene ($Fs_{24-52}Wo_{2-40}$) includes low-FeO orthopyroxene, moderate FeO pigeonite and low-FeO augite. Plagioclase exhibits a range of compositions ($An_{86-95}Or_{0-1}$). The meteorite is a howardite.



Sample No.:	GEO 99112
Location:	Geologists Range
Field No.:	10744
Dimensions (cm):	3.0x3.0x2.5
Weight (g):	39.581
Meteorite Type:	L6 Chondrite

Macroscopic Description: Kathleen McBride

50% of this ordinary chondrite's exterior is covered with smooth brown/black fusion crust with oxidation halos. Thin fractures penetrate the surface. The interior matrix is light gray in color but most areas are rusty due to a high concentration of metal.

Thin Section (, 2) Description: Tim McCoy and Linda Welzenbach

The meteorite is an equilibrated L6 chondrite (Fa_{23}, Fs_{20}). An exceptional feature is the presence of a 4 by 2 mm shock melt vein characterized by a fine-grained quenched textured matrix, which includes mosaicized mafic silicate enclaves and rounded metal-sulfide blebs. No ringwoodite was noted.

Sample No.:	GEO 99120
Location:	Geologists Range
Field No.:	10733
Dimensions (cm):	0.8x0.7x0.2
Weight (g):	0.506
Meteorite Type:	Howardite

Macroscopic Description: Cecilia Satterwhite

The exterior is mostly brown with about 10% of black fusion crust. The interior is dark brown to black with some light colored crystalline faces in one area and some areas that are highly oxidized.

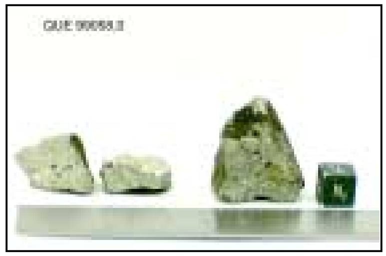
Thin Section (, 2) Description: Tim McCoy and Linda Welzenbach

The section consists of one portion which is an interlocking fabric of isolated pyroxene grains and basaltic clasts (up 1 mm) and a second portion dominated by a fine-grained comminuted matrix with isolated silicate grains up to 0.5 mm. Pyroxene ($Fs_{14-58}Wo_{1-41}$) includes low- to high-FeO ($Fs_{14-58}Wo_{1-4}$) orthopyroxene and low-FeO augite ($Fs_{22-37}Wo_{32-41}$). A single plagioclase grain is $An_{91}Or_1$. The meteorite is a howardite.

Sample No.: MIL 99307
Location: Miller Range
Field No.: 11295
Dimensions (cm): 10x6.5x2.0
Weight (g): 291.7
Meteorite Type: L3 Chondrite (estimated 3.6)

Macroscopic Description: Kathleen McBride
The exterior of this flat, ordinary chondrite's surface is smooth and has a brown/black fusion crust with little dings and pits. This meteorite is very hard and dense. The interior is rusty and has a high concentration of metal.

Thin Section (, 2) Description: Tim McCoy and Linda Welzenbach
The section exhibits numerous well-defined chondrules (up to 2 mm) in a matrix of fine-grained silicates, metal and troilite. Moderate shock effects are present and weathering is extensive. Silicates are unequilibrated; olivines range from Fa_{14-37}, with a weak peak at Fa_{21-25}. Orthopyroxene range from Fs_{10-22}. The meteorite is an L3 chondrite (estimated subtype 3.6).



Sample No.: QUE 99033; QUE 99058
Location: Queen Alexandra Range
Field No.: 11643; 11658
Dimensions (cm): 6.5x5.0x3.5; 5.0x2.5x2.5
Weight (g): 164.177; 48.000
Meteorite Type: Howardite

Macroscopic Description: Kathleen McBride
The exterior of these two meteorites have a thin, patchy, brown/black fusion crust. The exposed interiors are gray in color with a few visible clasts. The interior matrix is gray in color with numerous angular to sub-angular multicolored clasts.

Thin Section (, 2;, 4) Description: Tim McCoy and Linda Welzenbach
These meteorites are so similar that a single description suffices. The sections show a groundmass of comminuted pyroxene and plagioclase (up to 2.5 mm) with fine- to coarse-grained basaltic and pyroxenitic clasts ranging up to 2 mm. Both contain clasts similar in texture to the unusual eucrite ALHA 81001. Pyroxenes include orthopyroxene ($Fs_{17-31}Wo_{0-4}$) and finely-exsolved pyroxenes that include augite ($Fs_{28}Wo_{37}$) and orthopyroxene. The Fe/Mn ratio of pyroxene is ~30. Plagioclase is $An_{70-95}Or_{0-2}$. The meteorites are howardites.

Sample No.: QUE 99038
Location: Queen Alexandra Range
Field No.: 11672
Dimensions (cm): 5.5x3.5x1.5
Weight (g): 52.677
Meteorite Type: CM2 Chondrite

Macroscopic Description: Kathleen McBride
This carbonaceous chondrite has a dark gray to blackish crust, but appears to be a melted glob of chondrules spread over the entire exterior of the rock. The surface has a vesicular-like texture. The interior is charcoal gray with numerous mm-sized chondrules and light and dark gray crystalline materials. This meteorite is moderately hard and has a sulfurous odor.

Thin Section (, 2) Description: Tim McCoy and Linda Welzenbach
The section consist of a few small chondrules (up to 1.5 mm), mineral grains and CAIs set in a black matrix; rare metal and sulfide grains are present. Olivine compositions are Fa_{1-39}, with many Fa_{0-3}. The matrix consists dominantly of an Fe-rich serpentine. The meteorite is a CM2 chondrite.

Sample No.	QUE 99050
Location:	Queen Alexandra Range
Field No.:	11637
Dimensions (cm):	1.3x1.0x1.0
Weight (g):	2.115
Meteorite Type:	Diogenite

Macroscopic Description: Kathleen McBride
20% of this achondrite's exterior is covered with a thin, black fusion crust. The interior is tan with tiny black inclusions <1 mm in size. Also visible are large (1 mm sized) euhedral olivine crystals.

Thin Section (, 3) Description: Tim McCoy and Linda Welzenbach
The section shows a groundmass of essentially monomineralic, coarse (up to 1.5 mm) comminuted orthopyroxene of uniform composition ($Fs_{21}Wo_2$). The Fe/Mn ratio of the pyroxene is ~30. The meteorite is a diogenite.

Sample No.:	QUE 99059
Location:	Queen Alexandra Range
Field No.:	11685
Dimensions (cm):	3.0x2.0x2.0
Weight (g):	22.064
Meteorite Type:	Enstatite Meteorite Unusual

Macroscopic Description: Kathleen McBride
10% of the exterior surface of this achondrite is covered with thin brown/black patches of fusion crust. The meteorite is rusty, friable, and very fractured. The interior matrix has a rusty, sugary texture exhibiting elongated crystals, melted blebs and numerous inclusions.

Thin Section (, 4) Description: Tim McCoy and Linda Welzenbach
The section consists of mm-sized enstatite grains (Fs_{0-1}), abundant SiO_2, metal, troilite, daubreelite, alabandite and schreibersite. The latter phases often occur as rounded enclaves in the enstatite. QUE 99059 is almost certainly paired with the trio QUE 94204/97348/97289, although it differs from them in having abundant SiO_2 instead of abundant feldspar. These meteorites are unusual aubrites or enstatite chondrite impact melt rocks.

Table 4

Natural Thermoluminescence (NTL) Data for Antarctic Meteorites

Paul H. Benoit and Derek W.G. Sears
Cosmochemistry Group
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Fayetteville, AR 72701 USA

The measurement and data reduction methods were described by Hasan *et al.* (1987, *Proc. 17th LPSC*, E703-E709; 1989, *LPSC XX*, 383-384). For meteorites whose TL lies between 5 and 100 krad, the natural TL is related primarily to terrestrial history. Samples with NTL <5 krad have TL levels below that which can reasonably be ascribed to long terrestrial ages. Such meteorites have had their TL lowered by heating within the last million years or so by close solar passage, shock heating, or atmospheric entry, exacerbated in the case of some achondrites by anomalous fading.

Sample	Class	Natural TL [krad at 250 °C]
ALH 97101	H5	0.7 ± 0.1
ALH 97102	H5	39.4 ± 0.3
GRA 98186	H6	39.8 ± 0.5
SCO 98200	L4	3.5 ± 0.1
ALH 97100	L6	22.5 ± 0.1
LEW 97204	L6	12.4 ± 0.1
LEW 97205	L6	11.6 ± 0.1
LEW 97207	L6	9.7 ± 0.1
LEW 97210	L6	12.3 ± 0.1
LEW 97212	L6	9 ± 1
SCO 98201	L6	6.9 ± 0.2
LEW 97213	LL5	5.5 ± 0.1
QUE 97805	LL5	0.4 ± 0.1
QUE 97807	LL5	4.0 ± 0.1
QUE 97811	LL5	17.0 ± 0.1
QUE 97840	LL5	3.2 ± 0.1
LEW 97203	LL6	7.6 ± 0.1
LEW 97206	LL6	4.9 ± 0.1

COMMENTS: The following comments are based on natural TL data, TL sensitivity, the shape of the induced TL glow curve, classifications, and JSC and Arkansas sample descriptions.

LEW 97207 (L6) has very low TL sensitivity and may be highly shocked.

Pairings suggested by TL data:
L6: LEW 97205, LEW 97210, and LEW 97212 with LEW 97204.
LL5: QUE97805 with QUE97070 (AMN 22:2)
LL5: QUE 97807 and QUE 97840 with the QUE 97016 group (AMN 22:2).
LL6: LEW 97206 with LEW 97203.

Sample Request Guidelines

All sample requests should be made **preferably via e-mail** to:

Secretary, Meteorite Working Group
E-mail: kimberly.e.cyr1@jsc.nasa.gov

Please put "MWG request" in the subject line.

If necessary, hard copies can be sent to:
Secretary, Meteorite Working Group
NASA/Johnson Space Center
SN2
Houston, TX 77058 USA
FAX: (281) 483-5347

Requests that are received by the MWG Secretary before **March 2, 2001** will be reviewed at the MWG meeting on **March 16-17, 2001**, to be held in Houston, Texas. Requests that are received after the **March 2** deadline may possibly be delayed for review until MWG meets again in the Fall of 2001. PLEASE SUBMIT YOUR REQUESTS ON TIME. Questions pertaining to sample requests can be directed in writing to the above address or can be directed to the curator by phone, FAX, or e-mail.

The Meteorite Working Group (MWG) meets twice a year, around March in Houston, Texas and around October in Washington, D.C. The deadline for submitting a request is generally three weeks before the scheduled meeting. Requests received after the deadline may possibly be delayed until the following MWG meeting. Questions pertaining to sample requests can be directed to the MWG Secretary by e-mail, mail, or FAX.

Requests for samples are welcomed from research scientists of all countries, regardless of their current state of funding for meteorite studies. Graduate student requests should be accompanied by confirming e-mail (or an initialed or countersigned hard copy) by a supervising scientist to confirm access to facilities for analysis. All sample requests will be reviewed in a timely manner. Those requests that do not meet the guidelines for JSC curatorial allocation will be reviewed by the Meteorite Working Group (MWG), a peer-review committee which meets twice a year to guide the collection, curation, allocation, and distribution of the U.S. collection of Antarctic meteorites. Issuance of samples does not imply a commitment by any agency to fund the proposed research. As a matter of policy, U.S. Antarctic meteorites are the property of the National Science Foundation and all allocations are subject to recall.

Each request should accurately refer to meteorite samples by their respective identification numbers and should provide detailed scientific justification for proposed research. Specific requirements for samples, such as sizes or weights, particular locations (if applicable) within individual specimens, or special handling or shipping procedures should be explained in each request. Some meteorites are small, of rare type, or are considered special because of unusual properties. Therefore, it is very important that all requests specify both the optimum amount of material needed for the study, **and** the minimum amount of material that can be used. Requests for thin sections, which will be used in destructive procedures such as ion probe, etch or even repolishing, must be stated explicitly. Consortium requests should be accompanied by confirming e-mail from the lead member of each group in the consortium, or hard copies should be initialed or countersigned by them. In most cases, all necessary information should be condensable into a 500-1000 word message, although informative attachments (publications that explain rationale, flow diagrams for analyses, etc.) are welcome. **It is very helpful to include a table summarizing the request listing each meteorite requested, the type of samples (e.g. interior chip, thin section, etc.) and the optimum and minimum masses needed.**

Samples can be requested from any meteorite that has been made available through announcement in any issue of the Antarctic Meteorite Newsletter. Many of the meteorites have also been described in five *Smithsonian Contributions to the Earth Sciences*: Nos. 23, 24, 26, 28, and 30. Tables containing all classified meteorites (as of February 2000) have been published in several issues of the Meteoritical Bulletin in *Meteoritics* 29, 100-143, and *Meteoritics and Planetary Science* 31, A161-A174; 33, A221-A239; 34, A169-A186; and 35, A199-A225. The most current listing is found on-line at:
http://www-curator.jsc.nasa.gov /curator/antmet/us_clctn.htm

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Meteorites On-Line

Several meteorite web sites are available to provide information on meteorites from Antarctica and elsewhere in the world. Some specialize in information on martian meteorites and on possible life on Mars. Here is a general listing of ones we have found. We have not included sites focused on selling meteorites even though some of them have general information. Please contribute information on other sites so we can update the list.

JSC Curator, Antarctic meteorites	http://www-curator.jsc.nasa.gov/curator/antmet/antmet.htm
JSC Curator, Martian meteorites	http://www-curator.jsc.nasa.gov/curator/antmet/marsmets/contents.htm
JSC Curator, Mars Meteorite Compendium	http://www-curator.jsc.nasa.gov/curator/antmet/mmc/mmc.htm
Antarctic collection	http://www.cwru.edu/affil/ansmet
LPI Martian meteorites	http://cass.jsc.nasa.gov/lpi/meteorites/mars_meteorite.html
NIPR Antarctic meteorites	http://www.nipr.ac.jp/
BMNH general meteorites	http://www.nhm.ac.uk/mineralogy/collections/meteor.htm
UHI planetary science discoveries	http://www.soest.hawaii.edu/PSRdiscoveries
Meteoritical Society	http://www.uark.edu/studorg/metsoc
Meteorite! Magazine	http://www.meteor.co.nz
Geochemical Society	http://www.geochemsoc.org