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Abstract–Meteoritical Bulletin No. 84 lists information for 1341 newly classified meteorites, comprising 842 from Antarctica, 341 from Africa, 66 from Australia, 48 from Asia (including 42 from the Arabian peninsula), 38 from North America, 4 from Europe, and 2 from South America. Information is provided for 11 recent falls (Bilanga, Devri-Khera, Djoumine, Guangmingshan, Kitchener, Kobe, Leighlinbridge, Sabrum, Songyuan, Tagish Lake, and Vissannapeta); 4 martian meteorites (Dar al Gani 670/735, Dhofar 019, Los Angeles, and Sayh al Uhaymir 005/008); 3 lunar meteorites (Northwest Africa 032, Dhofar 025 and 026); an ungrouped enstatite-rich meteorite (Zaklodzie); 11 iron meteorites; and a wide variety of other interesting stony meteorites, including CK, CM, CO, CR, CV, R, enstatite, and unequilibrated ordinary chondrites, primitive achondrites, HED achondrites, ureilites, and aubrites.

INTRODUCTION

The Meteoritical Bulletin is a compilation of announcements of newly described and classified meteorites from the Meteorite Nomenclature Committee of the Meteoritical Society. Several conventions are followed in this document. Shock classifications conform to the scheme of Stöffler *et al.* (1991). The scale of Wlotzka (1993) is used to describe weathering grades, except as noted. For chondrite groups, petrologic types, shock stages, and weathering grades, slashes (*e.g.*, "H5/6") indicate transitional assignments. Hyphens in petrologic type assignments for chondrites (*e.g.*, "H5-6") indicate the range of types observed in breccias. Group names such as "L(LL)" indicate uncertain assignments, with the less probable group in parentheses. The word "ungrouped" indicates that a meteorite can not be fit into existing classification schemes. The word "anomalous" is used if a meteorite can be assigned to an established class but differs from other members of that class in a significant way. All italicized abbreviations refer to addresses tabulated at the end of this document.

NEWLY DESCRIBED METEORITES

Allan Hills 99101 76°45.659' S, 159°27.151' E
Antarctica
Found 2000 January 21
Ordinary chondrite L(LL)3

A 134.4 g stone was found in a moraine of the Allan Hills main icefield by a geological party of the Italian Antarctic research programme (PNRA). Mineralogy and classification (C. Ferraris, L. Folco, *MNA-SI*): large chondrules up to 3 mm in diameter are visible on broken surfaces; chondrule abundance, ~80 vol%; chondrule mean diameter, ~0.8 mm; metal abundance, ~4 vol%; olivine, $Fa_{3–35}$; pyroxene, $Fs_{0–2}$; shock stage, S4; weathering grade, W1; specimens, *MNA-SI.*

ANSMET meteorites
(684 meteorites)
Antarctica
Found 1996–1998

Appendix 1 brings up-to-date the list of officially announced meteorites from the U.S. Antarctic Meteorite (ANSMET) program. 8257 meteorites were previously listed in the *Meteoritical Bulletin*, nos. 76, 79, 82, and 83; these meteorites bring the total to 8941. The meteorites in Appendix 1 were published in the *Antarctic Meteorite Newsletter* (AMN), issues 22(2) (1999) and 23(1) (2000). Listed are the classifications, masses, degrees of weathering, olivine and pyroxene compositions, pairing information, ice fields upon which the meteorites were found, and bibliographic information, all sorted by sample name. Note that meteorite pairings may be tentative.

Attica 37°15' N, 98°8' W
Harper County, Kansas, USA
Found 1996 or 1997
Ordinary chondrite (H4)

A 5622 g chondrite was found in a field. Classification and mineralogy (T. McCoy, *SI*): olivine, $Fa_{18.4±0.2}$; pyroxene, $Fs_{16.7±0.6}$ $Wo_{1.5±0.2}$; shock stage, S1. Specimens: main mass with anonymous finder; type specimen, 27.1 g plus thin section, *SI.*

Beer Bottle Pass 35°39.67' N, 115°20.00' W
Clark County, Nevada, USA
Found 1999 May 2
Ordinary chondrite (L5)

An 8.9 g chondrite was found by John Gwilliam while he was hunting for meteorites on Roach Dry Lake. Classification and mineralogy (M. McGehee, *ASU*): olivine, $Fa_{22.5}$. Specimens: main mass with finder; type specimen, 1.0 g, *ASU.*

Bilanga 12°27' N, 0°5' W
Bilanga, Burkina-Faso
Fell 1999 October 27, 10:30 local time
Achondrite (diogenite)

After a widely witnessed shower, at least 25 kg of meteorites with fresh black fusion crust were collected, comprising many stones. Pieces are reported to have fallen in the villages of Bilanga-Yanga and Gomponsago (coordinates above apply to the latter). Classification and mineralogy (A. Bischoff, *Mün*): a diogenitic breccia; Ca-poor pyroxene, $Fs_{19–22}$, mean $Fs_{20.5}$; plagioclase, $An_{75–83}$; Ca-rich pyroxene is rare, one grain has $En_{46.4}Fs_{6.3}Wo_{47.4}$. Oxygen isotopes (R. Clayton, *UChi*): $\delta^{18}O$ = +3.41‰, $\delta^{17}O$ = +1.35‰. Specimens: 7.5 kg, *Casper*; 4 kg, *Heinlein*; type specimen, 8 g, *Mün*; 25 g, *NHM*; 20 g, *TCU*; 80 g, *Frei*; 600 g, *SI.*

Binya 34º13.5' S, 146º22.9' E
New South Wales, Australia
Found 1981 April 1
Iron, coarse octahedrite

An 11.3 kg iron meteorite was found by a farmer while he was plowing a wheat field. Description and composition (R. Binns, *CSIRO*; J. de Laeter, *CUWA*): kamacite extensively recrystallized; bandwidth 1.0–1.5 mm; composition by atomic absorption and x-ray fluorescence, Ni = 7.55 wt%, Co = 0.40 wt%, P = 0.19 wt%, Ga = 7.2 ± 0.8 ppm, Ge < 1 ppm, Ir = 7 ± 3 ppm; tentatively assigned to group IIIF. Specimens: main mass with finder; type specimen, 34.8 g, *QM*.

Blackwood Creek, correction
This meteorite was found in Hayes County, Nebraska, USA. The state listed in *Meteoritical Bulletin* 83 was incorrect.

Bur-Abor 3º59' N, 41º39' E
Northeastern province, Kenya
Found 1997 November 27
Iron, medium octahedrite (IIIAB)

About 50 fragments totaling 280–300 kg, the largest weighing >250 kg, were found by a family after they heard an explosion and saw a cloud of dust. Nearby banana trees were broken, and some contained embedded metal shards. However, the recovered iron meteorite is too weathered to be consistent with a recent date of fall. Description (M. Genge, *NHM*) and composition (J. Wasson, *UCLA*): band width, 0.95 mm; Widmanstätten structure exposed on outer surface; Ni content of kamacite, 6 ± 0.5 wt%; bulk metal, Co = 0.513 wt%, Ni = 7.99 wt%; Ga = 20.9 ppm; As = 6.24 ppm; Ir = 0.774 ppm, Au = 0.83 ppm. Specimens: main mass, Mr. Hassan Liban Ahmed, 162 Wentworth Road, Southall, Middlesex, UB2 5TX United Kingdom; 200 g, *NMH*.

Camel Donga 017–039, see Nullarbor Region

Cerro del Inca 22º13.0' S, 68º54.5' W
Antofagasta, Chile
Found 1997
Iron, fine to medium octahedrite (IIIF)

A 20.6 kg iron meteorite was found in the Atacama Desert by soldiers surveying a mine field with metal detectors. Description and composition (J. Wasson, *UCLA*): meteorite has one smooth, shield-shaped surface, with the obverse showing deep regmaglypt hollows; kamacite band width, 0.5 mm; bulk composition, Co = 0.379 wt%, Ni = 7.69 wt%, Ga = 6.17 ppm, As = 4.34 ppm, Ir = 3.35 ppm, Au = 0.54 ppm. Specimens: 10 kg, Mr. Rodrigo B. Martinez de los Rios, Atacama Desert Meteorites, Antofagasta, Chile; 10.6 kg is being sold privately; type specimen, 120 g, *UCLA*.

Clifford 39º6' N, 103º15.5' W
Lincoln County, Colorado, USA
Found ~1962
Ordinary chondrite (L6)

An 11.36 kg stone was found in uncultivated rangeland by a local resident who thought it looked unusual and kept it in a rock garden. The stone was recognized as a meteorite in 1997 by Gary Curtiss. Classification and mineralogy (A. Rubin, *UCLA*): olivine, $Fa_{25.2\pm0.3}$; shock stage, S3; weathering grade, W2. Specimens: main mass, Mr. Gary Curtiss, Lakewood, Colorado; type specimen, 46.6 g, *UCLA*; 596.5 g, *NHM.*

Coyote Mountains 31º55' N, 111º30' W
Pima County, Arizona, USA
Found 1998 January 7
Ordinary chondrite (H5)

A 23.04 g chondrite was found by Robert Cook while he was hiking up a desert wash. Classification and mineralogy (D. Kring and D. Hill, *UAz*): olivine, $Fa_{18.1\pm0.3}$; pyroxene, $Fs_{16.1\pm0.5}Wo_{1.2\pm0.3}$; kamacite contains 0.48 ± 0.04 wt% Co; weathering grade, W2; specimen may be part of a larger mass and may have been fluvially transported. Specimens: main mass with finder; type specimen, 3.45 g plus three thin sections, *UAz.*

Dar al Gani 364-780, see Saharan meteorites from Libya

Dar al Gani 391, correction
The mass of DaG 391 was listed incorrectly in *Meteoritical Bulletin* 83. The correct mass is 1605 g.

Dar al Gani 431 27°18.77' N, 16°13.92' E
Libya
Found 1998 March
Carbonaceous chondrite (CK3, anomalous)

A 353 g stone was found in the Libyan desert. Classification and mineralogy (J. Zipfel, *MPI*): chondrules and abundant calcium-aluminum-rich inclusions (CAIs) are set in a coarse matrix; matrix contains homogeneous olivine, $Fa_{33.8\pm0.8}$, magnetite, plagioclase, and Ca-rich pyroxene, and has high NiO contents (0.38 ± 0.1 wt%); metal is absent; olivine in chondrules is zoned ($Fa_{0.4–36}$) with a peak at $Fa_{32.2}$; CAIs are spinel, anorthite, and fassaite-rich; bulk chemistry, Fe = 20.3 wt%, Ca = 4.0 wt%, Ni = 0.3 wt%, Cr = 3150 ppm, Mn = 1190 ppm; similar to Watson 002 and Camel Donga 003; see Zipfel *et al.* (2000) for further information on classification. Specimens: type specimen, 32 g, *MPI*; main mass with anonymous finder.

Dar al Gani 647 27º10' N, 16º08' E
Libya
Found 1996/97 winter
Achondrite (eucrite)

A 1425 g oriented stone with fusion crust was collected in the Dar al Gani region. Classification and mineralogy (H. Takeda, *URyuk*; F. Wlotzka, *MPI*; M. Kurz, Neukirchen, Germany): a recrystallized monomict eucrite; subophitic texture; plagioclase laths, An_{88}; low-Ca pyroxene hosts, $Fs_{61}Wo_4$, with exsolution lamellae of augite; small individual augites, $Fs_{31}Wo_{41}$; accessory silica, ilmenite, titanian chromite; pairing with DaG 567 is possible. Specimens: type specimen, 6 g, *MPI*; 2 g, *URyuk*; main mass with finder.

Dar al Gani 670 exact location unknown
Libya
Found 1999
Martian basalt (shergottite)

A dark-brown stone, broken into three adjoining pieces, with a total mass of 1619 g was found in the Dar al Gani region. Mineralogy and classification (L. Folco, *MNA-SI*): centimeter-sized patches of fusion crust are present on the external surfaces; porphyritic texture consisting of millimeter-sized phenocrysts of brown olivine ($Fo_{58–80}$) set in a fine grained basaltic groundmass of tabular pyroxene and interstitial feldspathic glass ($An_{52–72}Or_{0–1}$); pyroxene is primarily pigeonite ($En_{56–66}Wo_{9–13}$) with subordinate enstatite ($En_{73–82}Wo_{2–3}$) and augite ($En_{48–50}Wo_{31–36}$); other minerals are chromite, titanian chromite, ilmenite, merrillite, and pyrrhotite; shock features include strong mosaicism and planar deformation in olivine, undulose extinction and twinning in pyroxene, and abundant impact-melt pockets and veinlets; pervasive veins filled in by calcite are due to terrestrial weathering. Oxygen isotopes (A. Sexton and I. A. Franchi, *OU*): $\delta^{17}O$ = +2.83‰, $\delta^{18}O$ = +4.95‰, $\Delta^{17}O$ = +0.26‰. The petrography and level of terrestrial weathering are essentially identical to those of DaG 476 and DaG 489, and the three are very likely paired. Specimens: main mass with anonymous finder; 11.9 g and one polished thin section at *MNA-SI*.

Dar al Gani 734 27°07.91' N, 16°03.00' E
Libya
Found 1996/97 winter
Enstatite chondrite (EL4)

Several stones with a total mass of 1378 g were found in the Dar al Gani region. Classification and mineralogy (F. Wlotzka, *MPI* ; M. Kurz, Neukirchen, Germany): pyroxene, $Fs_{0.3}$; pronounced chondritic texture and 50 µm size of matrix enstatite crystals indicate petrologic type 4; average chondrule size 450 ± 200 µm indicates EL group (Rubin *et al.*, 1997; Rubin and Grossman, 1987); weathering grade, W4, with all metal and sulfides oxidized. Specimens: main mass with anonymous finder; type specimen, 18 g, *MPI*.

Dar al Gani 735 27°10' N, 16°10' E
Libya
Found 1996/97 winter
Martian basalt (shergottite)

A 588 g complete stone covered with desert varnish was collected in the Dar al Gani region. Classification and mineralogy (F. Wlotzka, *MPI*; M. Kurz, Neukirchen, Germany): a porphyritic basalt with millimeter-sized olivines (normally zoned from Fa_{28} to Fa_{37}) in a finer grained matrix of pigeonite ($Fs_{25–28}$) and feldspathic glass (An_{65}); a direct comparison with a thin section of DaG 476 shows that both stones are very similar and are probably paired; however, DaG 735 does not contain terrestrial carbonate veins and appears less weathered than DaG 476. Specimens: type specimen, 6 g, *MPI*; main mass with anonymous finder.

Dar al Gani 779 26°59.543' N, 16°26.250' E
Libya
Found 1999 November 20
Achondrite (howardite)

A stone weighing ~15 kg plus many fragments within a few hundred meters (total mass, 18.8 kg) were found in the Dar al Gani region. Mineralogy and classification (J. Otto and A. Ruh, *Frei*): a polymict breccia with fragmental matrix dominated by orthopyroxene, and with clasts of basaltic and cumulate eucrite, diogenite, anorthosite, porphyritic melt rock, and glassy fragments; orthopyroxene, $Fs_{14.3–62.6}$ $Wo_{0.9–11.4}$, average, $Fs_{32.1}Wo_{3.4}$, with FeO/MnO = 31; plagioclase, $An_{74.6–96.3}$ (average, $An_{89.5}$) $Or_{0.5}$; shock stage, S2; weathering grade, W1. Specimens: main mass with anonymous finder; type specimen, *Frei*.

Devil Peak 35°39.55' N, 115°22.37' W
Clark County, Nevada, USA
Found 1999 May 2
Ordinary chondrite (L6)

A 34.7 g stone was found by John Gwilliam while he was hunting for meteorites on Roach Dry Lake. Classification and mineralogy (M. McGehee, *ASU*): olivine, $Fa_{23.0}$. Specimens: main mass with finder; type specimen, 5.1 g, *ASU*.

Devri-Khera Largest piece : 24°13.5' N, 76°31.5' E
Rajasthan, India
Fell 1994 October 30, 21:00 local time
Ordinary chondrite (L6)

A bright fireball, moving west-southwest to east-northeast and leaving a trail of smoke, was observed over a 150 km area. Several stones dropped in and around the villages of Devri-Khera, Manpura, and Jamunia, with the largest forming a 12" crater near Devri-Khera. The total recovered mass was 1140 g (individual masses, 516.8, 181.5, 149.5, 141.4, 51.0 g of tiny pieces; and 88.2 g of tiny pieces plus dust). Classification and mineralogy (S. Ghosh, *GSI*): olivine, $Fa_{24.9}$; pyroxene, $Fs_{19.3}$; plagioclase, An_{11}; shock stage, S4. Specimens: *GSI*.

Dhofar 001–024, see Oman meteorites

Dhofar 015 18°38.6' N, 54°25.8' E
Oman
Found 2000 January 21
Carbonaceous chondrite (CK3)

A black stone weighing 184 g was found in the desert. Mineralogy and classification (M. A. Ivanova, M. A. Nazarov, *Vernad*; L. A. Taylor, *UTenn*): black fusion crust; meteorite consists of fine-grained matrix, chondrules, and plagioclase-rich objects; groundmass/chondrules >>1; mineral modes (vol%) are olivine + pyroxene = 72, plagioclase = 16.6, Cr-magnetite = 9.7, ilmenite = 1.4, hercynite < 0.5, sulfides (pyrite, pentlandite, pyrrhotite, millerite) < 0.5, Cl-apatite < 0.5, Fe,Ni metal absent; olivine, $Fa_{28–34}$, contains NiO = 0.8 wt%; plagioclase, $An_{16–99}$; low-Ca pyroxene, $Fs_{25–28}$, is rare, whereas diopside, $Wo_{46}En_{46}$ is more abundant; bulk C content = 0.045 wt%; weathering grade, W1; shock stage, S3; fine-grained porous, friable matrix, distinct chondrule boundaries, and presence of glass in chondrules indicate petrologic type 3. Oxygen isotopes (R. Clayton and T. Mayeda, *UChi*) plot in the CV-CO-CK field. Specimens: type specimen, 18 g and 2 thin sections, *Vernad*; main mass with anonymous finder.

Dhofar 019 18°18.97' N, 54°08.87' E
Oman
Found 2000 January 24
Martian basalt (shergottite)

A brownish gray stone weighing 1056 g was found in the desert. Mineralogy and classification (M. Nazarov and M. Ivanova, *Vernad;* L. A. Taylor, *UTenn*): fusion crust absent; meteorite is a doleritic rock consisting of subhedral grains (0.2–0.5 mm) of pigeonite ($Wo_{9–15}$ $En_{40–70}$, Fe/Mn = 20–40 at), augite ($Wo_{30–40}$ $En_{40–55}$), olivine ($Fo_{25–60}$, Fe/Mn = 50–60 at), and feldspar ($An_{36–68}$) converted to maskelynite; olivine has higher Fe/Mg than that of coexisting pyroxenes, as it is in nakhlites; mineral modes (approximate volume percent) are pyroxene = 65, maskelynite = 25, and olivine = 10, with accessory silica, K-rich feldspar, whitlockite, chlorapatite, chromite, ilmenite, titanomagnetite, magnetite, and pyrrhotite; secondary phases are calcite, gypsum, smectite, celestite, and Fe hydroxides; shock features include fracturing and mosaicism, maskelynite, and rare impact-melt pockets; extensive terrestrial weathering present mainly as carbonate veins crosscutting the meteorite, however, there are smectite–calcite–gypsum "orangettes" replacing maskelynite, which are similar to those in Allan Hills 84001 and could be of martian origin; bulk chemistry close to Shergotty, with light rare earth elements strongly depleted. Specimens: type specimens, 113, 4, and 2 g, and two thin sections, *Vernad*; main mass with anonymous finder.

Dhofar 025 18º24.2' N, 54º09.1' E

Oman

Found 2000 March 5

Lunar meteorite (anorthositic regolith breccia)

A brownish gray stone weighing 751 g was found in the Dhofar region of Oman. Mineralogy and classification (M. Nazarov and M. Ivanova, *Vernad*): fusion crust absent; meteorite is a regolith breccia containing numerous mineral fragments and clasts of feldspathic rocks embedded in a glass-rich matrix; schlieren and vesicles are abundant; feldspar, $An_{95–96}$; pyroxene, $En_{74–84}Wo_{3–6}$ (Fe/Mn = 50–70 at); olivine, $Fo_{70–78}$ (Fe/Mn = 91–97 at); accessory minerals are silica, Ti-rich alumochromite, troilite, and Fe,Ni metal; meteorite has a prominent positive Eu anomaly (Sm/Eu = 1.95); terrestrial weathering is not significant. Specimens: type specimen, 102 g plus two thin sections, *Vernad*; main mass with anonymous finder.

Dhofar 026 18º13.6' N, 54º06.7' E

Oman

Found 2000 March 6

Lunar meteorite (anorthositic crystalline melt breccia)

A brownish gray stone weighing 148 g was found in the Dhofar region of Oman. Mineralogy and classification (M. Nazarov and M.Ivanova, *Vernad*): fusion crust absent; meteorite is a clast-poor, anorthositic, crystalline melt breccia containing rare mineral fragments and clasts of feldspathic rocks embedded in a completely devitrified fine-grained matrix; vesicles are abundant; sphere-shaped, chondrule-like inclusions, and rare impact-melt veins are present; feldspar, $An_{96–98}$; olivine (a dominant mafic phase), $Fo_{61–79}$ (Fe/Mn = 80–120 at); low-Ca pyroxene, $En_{53–63}Wo_{8–20}$ (with 0.13–0.84 wt% TiO_2, Fe/Mn = 40–60 at); high-Ca pyroxene, $En_{43–50}Wo_{27–33}$ (with 1.1–3.5 wt% TiO_2, Fe/Mn = 40–50 at); accessory minerals are silica, ilmenite (MgO = 7 wt%), troilite, and Fe,Ni metal; a prominent positive Eu anomaly (Sm/Eu = 1.04) is present; terrestrial weathering is not significant. The meteorite is completely different in texture and composition from Dhofar 025, but pairing must still be considered because of the proximity of the finds to one another. Specimens: type specimen, 41 g plus two thin sections, *Vernad*; main mass with anonymous finder.

Djoumine 36º57' N, 9º33' E

Banzart, Tunisia

Fell 1999 October 31, 18:45 to 19:00 local time

Ordinary chondrite (H5–6)

After a bright fireball was seen traveling from the southwest to the northeast, accompanied by multiple detonations, two meteorites were recovered by children near the village of Djoumine. At least five other pieces were recovered at a later time within a 4 km long strewn field, with the total mass being ~10 kg. Classification and mineralogy (A. Bischoff, *Mün*; R. Bartoschewitz, *Bart*): olivine, $Fa_{18.7±0.7}$; pyroxene, $Fs_{16.3±0.4}Wo_{1.7±0.8}$; shock stage, S3; contains shock veins and light-colored clasts in a darker-colored matrix. Specimens: main masses with anonymous finders; 2 kg, *Bart*; 23 g, *NHM*; 12 g, *Mün.*

Dos Cabezas 32°17.7' N. 109°40.2' W

Cochise County, Arizona, USA

Found 1998 August 20

Ordinary chondrite (L5)

Seven stones totaling 755 g (individual masses: 476, 139, 48, 42, 29, 19, and 2 g) were found. John Blennert discovered the first piece while he was searching for gold with a metal detector. Blennert, Jim Kriegh, and Bob Boor found the other fragments within the next two months, all within 100 feet of the first stone. Classification and mineralogy (D. Hill and D. Kring, *UAz*): olivine, $Fa_{25.1±3.1}$; pyroxene, $Fs_{21.8±2.6}$; kamacite contains 0.76 ± 0.08 wt% Co; shock stage, S3; weathering grade, W1. Specimens: type specimen, 68 g plus three thin sections, *UAz*; main masses with finders.

DuPont Collection meteorites

Several chondrites in the James M. DuPont collection (*DuPont*) have now been classified by P. Sipiera and Y. Kawachi (*Harper*). Table 1 lists the new classifications along with some previously published data on these specimens (Graham *et al*., 1985).

El Blida 001–002, see Western Sahara and Morocco meteorites

Elephant Moraine 96009, see ANSMET meteorites

El Pozo 26º56' N, 105º24' W

Chihuahua, Mexico

Found 1998 summer

Ordinary chondrite (L5)

Two pieces totaling 460 g were found by Sr. Manuel Flores Navarro while he was plowing. Classification and mineralogy (G. Sánchez–Rubio and A. M. Reyes–Salas, *CU*): olivine, $Fa_{23.6}$; pyroxene, $Fs_{22.2}$. Specimens: location of main mass unknown; type specimen, *CU*.

TABLE 1. Recently classified meteorites from the DuPont Collection.

Name	Latitude	Longitude	Wt. (g)	Found	Class	Fa (mol%)	Fs (mol%)	WG	Finder, Main Mass
Delphos (c)	34°3' N	103°38' W	885	1977	L5	25.5	20.8	W4	J. Warnica
Delphos (d)	34°3' N	103°33' W	276	1969	H5	19.7	17.0	W3	J. Warnica
Elida (a)	33°55' N	103°31.1' W	936.8	1968	L6	22.4	19.4	W2	*IWilson*
Kenna (b)	33º42.5' N	103º46' W	453	1972	L5	25.8	21.1	W2	J. Warnica
Milnesand (stone)	33º38' N	103º20' W	>34	1971	L6	21.5	18.8	W2	H. Elam
Taiban (b)	34º27' N	104º1' W	>21	1984	LL6	27.6	21.9	W3	21 g *Dupont*

El-Quss Abu Said 27º18.85' N, 27°57.88' E

Al Wadi al Jadid, Egypt

Found 1999 August 24

Carbonaceous chondrite (CM2)

Two stones that fit together, total mass 53.1 g, were found in the desert by a person hunting for meteorites. Classification and analysis (J. Otto and A. Ruh, *Frei*): olivine, $Fa_{9.4}$, range $Fa_{0.3–56}$; pyroxene, $Fs_{1.5}Wo_{1.6}$ range $Fs_{0.5–10.4}$; shock stage, S1; weathering grade, W0. Specimens: main mass with anonymous finder; type specimen, *Frei*.

Fish Canyon 31º44.1' N, 110º45.2' W

Pima County, Arizona, USA

Found 1992 August

Iron, coarse octahedrite (IAB)

A 27.3 g iron meteorite was found in a wash by John Harris. Classification and analysis (D. Hill and D. Kring, *UAz*): bandwidth, 1.85 mm; bulk metal composition, Ni = 6.50 wt%, Co = 3950 ppm, Ga = 72.8 ppm, Ir = 2.059 ppm. Specimens: 1.4 g, *UAz*; main mass with finder.

Frontier Mountain

Antarctica

Found 1990s

(153 meteorites)

One-hundred-fifty-three meteorites were recovered from the Frontier Mountain blue-ice field (Table 2) by the Italian Antarctic research programme (PNRA) in 1997–1998 and 1999–2000, and by EUROMET/PNRA in 1990–1991 and 1993–1994. **Frontier Mountain 97002** and **97003** (CV3): probably paired; contain abundant millimeter-sized chondrules (primarily type IA and IB, $Fa_{2–12}$ and $Fs_{1–5}$, respectively) and minor refractory inclusions; black matrix, mainly consisting of FeO-rich olivine grains ($Fa_{39–71}$) up to several micrometers in size; opaque minerals include submicrometer grains of Ni-rich sulfide (up to 18 wt% Ni), and no metal has been detected; O isotopes for FRO 97002 are $\delta^{17}O$ = –2.16‰, $\delta^{18}O$ = +2.45‰, $\Delta^{17}O$= –3.44‰. **Frontier Mountain 97013** (ureilite): typical texture; olivine (73 vol%) and pigeonite (16 vol%) have homogeneous cores (Fa_{21} and $Fs_{18}Wo_6$, respectively) and reduced rims; minor minerals include metal, sulfide and schreibersite; interstitial carbonaceous material bears tiny diamond crystals, as identified by cathodoluminescence. **Frontier Mountain 97045** (polymict eucrite): fragments and lithic clasts (up to 800 µm) of plagioclase (An_{90}), exsolved pigeonite (host, En_{38} Wo_{11}; lamellae $En_{33}Wo_{35}$), zoned pigeonite ($En_{57–42}Wo_6$), and secondarily silica are embedded in a fine-grained, fragmental and glassy matrix; glass spherules up to some tens of micrometers in diameter are rare; contains minor ilmenite and chromite; a single, large clast (one centimeter across) of cumulate eucrite has been observed; O isotopes are $\delta^{17}O$ = +1.57‰, $\delta^{18}O$ = +3.41‰, $\Delta^{17}O$ = +0.20‰. **Frontier Mountain 99030** (lodranite): a flat (2 × 1.5 × 0.5 mm) metal fragment with abundant silicates; metal is predominantly kamacite and minor taenite (Ni = 7.1 and 28.9 at%, respectively); silicate areas are coarse grained (average grain size >0.5 mm) and consist of orthopyroxene ($Fs_{12}Wo_3$), olivine (Fa_{10}), chromian diopside (Fs_4Wo_{45}, average Cr_2O_3 = 1.36 wt%), interstitial sodic plagioclase ($An_{12–20}$), and minor troilite and schreibersite; the fragment is likely a sample of the large metal veins occuring in lodranites. **Frontier Mountain 99040** (CO3): abundant chondrules (~45 vol%) and refractory inclusions (~10 vol%) set in a fine-grained matrix; chondrule mean diameter 0.2 mm; metal abundance ~5 vol%; olivine, $Fa_{1–49}$, pyroxene, $Fs_{1–7}$. Mineralogy and classification by: B. Anselmi, C. Ferraris, and L. Folco (*MNA-SI*); R. Carampin, A. M. Fioretti, and G. Molin (*UPad*); M. Macrì, A. Maras, and M. Serracino (*URoma*). Oxygen-isotopic analyses by A. Sexton and I. A. Franchi (*OU*). For 1990 and 1993 samples, main masses at *MNA-SI*, type specimens at *OU*. For 1997 and 1999 samples, main masses, type specimens, and thin sections at *MNA-SI*.

TABLE 2. Meteorites from Frontier Mountain, Antarctica.

Name FRO	Lat. (+72° S)	Long. (+160° E)	Mass (g)	Pieces	Class	Shock	WG†	Fa (mol%)	Fs (mol%)	Comments‡	Analysts§
90081	59'23"	24'41"	1.31	1	H6	S4	A/B	21.4	20.8	–	b
90082	59'40"	24'40"	60.48	1	H5	S2	A	19.9	18.4	–	b
90186	57'11"	26'21"	3.09	1	H6	S3	A/B	19.2	16.8	–	a
90205	59'30"	24'32"	7.13	1	H3.9–6	S4	B	–	–	br	b
90211	57'21"	32'25"	10.92	1	H5	S3	A/B	19.3	–	–	b
90215	57'21"	26'18"	5.55	1	L6	–	–	25	21.6	–	a
90218	57'21"	26'18"	3.18	1	H5	–	–	18.4	16.6	–	b
90220	57'17"	26'30"	0.96	1	L6	–	–	25.3	21.4	–	a
90226	57'21"	26'18"	24.79	1	H5–6	–	–	17.9	16	–	a
90229	57'19"	26'26"	4.38	1	H4–5	–	–	18.8	17.4	–	a
90230	57'19"	26'24"	3.98	1	L6	–	–	25.1	21.7	–	a
90231	57'18"	26'27"	18.21	1	L5	–	–	26.3	21.9	–	a
90237	57'17"	26'40"	2.69	1	H5	–	–	18.6	16.4	–	a
93002	58'05"	25'23"	665.2	1	H6	S3	B	19.2	17.2	–	e
93003	57'21"	28'01"	65.25	1	L6	S3	A	25.2	21.6	–	e
93004	57'10"	31'37"	2.38	1	H5	S2	B	18.9	16.7	–	e
93005	58'11"	26'16"	1665.4	1	L5	S3/4	A	25	21.8	–	e
93006	58'17"	27'39"	60.33	1	H5/6	S3	A	18.3	16	–	e
93007	57'14"	30'01"	0.85	1	H6	S3	A/B	18.9	16.5	–	e
93008	57'16"	26'16"	12.01	1	Ureilite	–	A/B	14.4	13.7	–	e
93009	59'36"	24'55"	106.5	1	L4	–	–	23.7	18.2	–	e
93010	58'54"	26'16"	3.06	1	H5	S3	B	19.8	17.5	–	e

TABLE 2. *Continued*.

Name FRO	Lat. (+72° S)	Long. (+160° E)	Mass (g)	Pieces	Class	Shock	WG[†]	Fa (mol%)	Fs (mol%)	Comments[‡]	Analysts[§]
93011	59'23"	24'28"	2.66	1	H5	S2	B	19.2	13.2	–	e
93012	57'11"	31'47"	19.95	1	L5	S4	A	25.5	20.7	–	e
93013	57'09"	30'19"	8.45	1	H6	S5	A	19.5	17.7	–	e
93014	57'30"	30'45"	9.62	1	H5	S3	W1	18.7	18.2	–	a
93015	57'03"	27'10"	1.84	1	L6	S4	W2	25.4	23.2	–	a
93016	57'09"	26'52"	1.05	1	L6	S2	W1	25.1	21.2	–	a
93017	57'09"	30'19"	10.81	1	H5	S2	W2	18.3	16.7	–	a
93018	58'54"	26'16"	1.05	1	L5	–	–	24.2	17.9	–	a
93019	58'54"	26'16"	2.61	1	H6	S2	W1	18.4	–	–	a
93020	57'18"	28'30"	78.2	1	L5	–	B	24.5	20	–	c
93021	57'09"	25'48"	80.43	1	H5	S2	W1	19	16.7	–	a
93022	59'30"	24'32"	0.92	1	H5	S2	W1	20.2	17	–	a
93023	59'23"	24'28"	0.68	1	H5	–	C	18.1	16	–	c
93024	59'23"	24'28"	15.23	1	H5	S2	W2	18.2	–	–	a
93025	59'23"	24'26"	4.03	1	H5	S2	W2	19.2	18.3	–	a
93026	59'20"	24'28"	19.19	1	H5	–	C	17	16	–	c
93027	59'23"	24'28"	4.31	1	H6	–	B	17.3	18	–	c
93028	57'05"	27'24"	10.19	1	H4	–	B	17.4	11	–	c
93034	59'23"	24'28"	7.28	1	L3	–	B	–	–	–	c
93037	59'26"	24'39"	0.52	1	H4	–	C	18.9	13	–	c
93039	59'23"	24'28"	1.02	1	H5	–	C	19.7	18	–	c
93042	57'20"	26'03"	2.26	1	H5	S2	W1	18.5	15.8	–	d
93043	57'20"	26'03"	9.09	1	L6	S2	W2	26	21.6	–	d
93044	57'05"	27'09"	1.8	1	L6	S6	A/B	24.6	25	–	c
93045	58'54"	26'16"	0.64	1	H3.8	S2	W1	–	–	–	d
93047	57'17"	26'13"	0.18	1	H6	S2	W1	18.4	15.9	–	d
93048	59'35"	24'47"	11.72	1	H4	S2	W2	19.2	15.4	–	d
93049	59'23"	24'28"	10.6	1	H3.6	S2	W1	–	–	–	d
93050	58'54"	26'16"	1.77	1	H3.2	S2	W1	–	–	–	d
93051	59'20"	24'19"	15.28	1	H6	S2	W1	18.1	17.4	–	d
93053	59'23"	24'26"	3.09	1	H5	–	B/C	18.9	18	–	c
97001	57'12"	28'51"	4.8	1	L5	S3	W1	24	20	–	f
97002	57'12"	29'02"	0.3	4	CV3	S1	–	chc 7	chc 3	see text	f,g
								mx 52			
97003	57'12"	29'02"	0.2	1	CV3	S1	–	chc 9	chc 1	see text	e
								mx 51			
97004	57'18"	26'29"	5.1	1	L6	S1/2	W3	25	21	–	f
97005	57'10"	26'21"	1	1	L5	S4	W1	23	20	–	f
97006	57'13"	26'27"	1.6	1	H6	S3	W1	20	18	–	f
97007	57'10"	26'25"	2.3	1	L6	S5	W1	25	21	m	e
97008	57'10"	26'27"	14.9	1	H4/5	S2	W1	19	17	br	f
97009	57'12"	26'25"	0.8	2	H5	S2	W1	19	17	–	f
97010	57'11"	28'57"	23.1	1	L4	S1	W1	22	16	–	e
97011	57'08"	30'12"	0.8	1	L6	S3	W1	25	21	–	f
97012	57'10"	26'29"	0.2	1	H5	S1	W1	19	17	–	f
97013	57'13"	26'46"	21.4	1	Ureilite	S3/4	W1	21	18	see text	e
								rr 4			
97015	57'11"	26'51"	0.7	1	H6	S4	W1	19	16	–	e
97016	57'09"	26'42"	5.1	1	H6	S4	W1	19	17	sv	e
97019	57'06"	27'18"	1.4	1	L6	S4	W0	26	21	–	f
97020	57'06"	27'33"	6	1	H6	S2	W2	20	18	–	f
97022	56'58"	27'54"	2.9	1	H5	S2	W1	20	16	–	e
97023	57'14"	26'54"	2.5	1	H4	S1	W2	18	17	–	f
97024	57'12"	31'21"	16.1	1	H4/5	S3	W1	20	17	–	f
97025	57'12"	31'21"	28.2	1	H5	S3	W0	18	16	–	f
97026	57'12"	31'21"	1.4	1	H4	S1	W2	20	15	–	f
97027	57'08'	31'04"	20.5	1	H6	S2	W2	20	17	–	f
97028	57'08"	31'04"	15.6	1	H5	S2	W0	19	17	–	f
97029	57'18"	31'41"	26.1	1	H5	S3	W1	19	17	–	e
97030	57'18"	31'41"	60.4	1	L6	S3	W2	25	22	–	f
97031	57'12"	31'20"	1.9	1	H6	S4	W0	19	17	–	e
97032	57'09"	31'13"	13.1	–	H6	S2	W1	20	17	–	f

TABLE 2. *Continued*.

Name FRO	Lat. (+72° S)	Long. (+160° E)	Mass (g)	Pieces	Class	Shock	WG†	Fa (mol%)	Fs (mol%)	Comments‡	Analysts§
97033	57'13"	30'19"	29.1	1	H4/5	S2	W0	16	14	–	f
97034	56'58"	30'44"	3.8	1	L6	S4	W1	21	18	sv	e
97035	58'04"	28'39"	5.1	1	H5	S3	W1	20	17	–	f
97036	59'22"	24'45"	1	1	H5	S2	W2	19	17	–	f
97037	59'20"	24'26"	0.6	2	H4	S2	W1	18	14	–	f
97038	59'18"	24'26"	0.5	1	H4	S3	W1	20	19	–	f
97039	59'18"	24'25"	1.3	4	H5	S2	W1	19	18	–	f
97040	59'18"	24'26"	0.5	1	H4/5	S2	W2	19	17	–	f
97041	59'18"	24'24"	7.8	1	H4	S2	W1	20	16	–	f
97042	59'23"	24'24"	2.6	1	H5	S3	W1	18	14	sv	e
97043	59'23"	24'24"	1.1	1	H4	S2	W0	20	17	–	f
97044	59'22"	24'27"	8.9	1	H4	S2	–	20	14	–	f
97045	59'19"	24'25"	14.9	1	Eu "pm"	S3/4	–	–	–	see text	f,g
97046	59'23"	24'21"	3.4	1	H6	S2	W3	20	18	–	f
97047	59'12"	24'31"	0.8	1	H4	S2	W1	19	17	–	f
97048	59'23"	24'34"	1	1	H4	S1	W1	19	17	–	f
97049	59'20"	24'22"	2.9	1	H4	S2	W1	20	13	–	f
97050	59'19"	24'32"	1.8	1	H4	S2	W1	19	15	–	f
97051	59'19"	24'25"	6.6	1	H4	S3	W1	16	16	im	e
97052	57'18"	26'02"	12.4	1	L5	S2/3	–	25	22	–	f
97053	57'12"	28'40"	11.3	1	H5	S2	W0	20	17	–	f
97054	59'23"	24'32"	1.8	1	H6	S3	W2	20	17	im	h
97055	59'21"	24'20"	9.1	1	H5	S2	W2	19	17	–	h
97056	59'26"	24'20"	1.6	1	L(LL)3	S4	W1	chc 1–32 mx 13–83	chc 2–33 mx 7–32	sv	h
97058	59'23"	24'24"	8.9	1	H4	S2	W1	19	12	–	h
97059	59'23"	24'24"	4	1	H4	S3	W1	19	17	–	h
97060	59'34"	24'16"	6.1	1	H4	S2	W1	19	14	–	h
97061	59'30"	24'17"	4.2	1	H4	S2	W1	19	12	–	h
97062	59'39"	23'51"	5.6	1	H5	S3	W1	19	17	–	h
97063	59'29"	24'19"	3.6	1	H4/5	S2	W1	19	18	–	h
97064	59'29"	24'16"	3.5	1	H5	S2	W1	19	17	–	h
97065	59'28"	24'21"	5.1	1	H6	S2	W1	19	17	–	h
97066	59'25"	24'18"	1.8	1	H4	S2	W1	18	18	–	h
99001	57'39"	19'08"	221.5	1	L6	S4	W2	25	22	br	f
99002	59'40"	24'42"	1	1	H3	S2	W2	15 (0–21)	12 (4–18)	–	f
99003	59'41"	24'39"	2.2	1	H3	S2	W2	16 (14–17)	12 (7–15)	–	f
99004	59'46"	25'32"	0.7	1	H4	S4	W2	18	17	–	f
99005	59'35"	24'37"	3.5	1	H5	S2	W1	20	19	–	f
99007	59'35"	24'37"	16.3	1	H3	S2	W1	15 (1–20)	13 (2–19)	–	f
99008	58'36"	27'04"	123.3	1	H5/6	S4	W1	19	18	–	f
99009	56'47"	22'42"	6.3	1	L6	S5	W1	24	22	m	f
99010	57'39"	32'45"	3.5	1	H5/6	S3	W1	20	18	–	f
99011	59'26"	23'55"	8.4	1	H6	S1	W2	20	18	–	f
99012	59'40"	24'06"	1.9	1	H3/4	S2	W1	16	15	–	f
99013	59'42"	24'00"	10.7	1	H4	S1	W2	20	16	–	h
99014	59'35"	24'02"	14.1	1	H4	S1/2	W2	20	18	–	h
99015	59'42"	24'07"	4.4	1	H4	S1/2	W2	20	17	–	h
99016	59'42"	24'06"	23.3	1	L5	S2/3	W1	26	23	–	h
99017	59'41"	24'06"	0.9	1	H4	S2	W1	19	17	–	h
99018	59'39"	23'58"	10.1	1	H4	S1/2	W2	20	18	–	h
99019	59'23"	23'54"	8.3	1	H3/4	S1/2	W1	17 (6–21)	14 (6–23)	–	h
99020	59'33"	24'34"	0.3	1	H4	S1	W1	19	15	–	h
99021	58'27"	27'13"	127.9	1	H4	S1	W1	20	17	–	h
99022	59'36"	24'52"	0.4	1	L5	S1/2	W2	25	21	–	h
99023	59'31"	24'40"	0.3	1	H4	S1	W1	19	16	–	h
99024	59'36"	24'28"	0.7	1	H5/6	S1	W1	19	17	–	h
99025	59'16"	25'18"	297.8	1	H5	S2	W1	19	16	–	h
99026	59'24"	24'31"	3.4	1	H3	S2	W2	18 (1–25)	15 (7–20)	br	e
99027	57'21"	26'06"	8.2	1	L4	S1	W1	26	21	–	e
99028	58'47"	29'11"	771.8	1	L6	S4	W1	25	21	–	e
99029	59'06"	30'12"	8.1	1	H5	S3	W2	18	16	–	e

TABLE 2. *Continued*.

Name FRO	Lat. (+72° S)	Long. (+160° E)	Mass (g)	Pieces	Class	Shock	WG†	Fa (mol%)	Fs (mol%)	Comments‡	Analysts§
99030	57'49"	29'52"	4.6	1	Lodranite	S1	W0	10	12	see text	e
99031	57'45"	34'03"	201.6	3	L3	S4	W1	21 (1–28)	17 (4–49)	–	e
99032	57'45"	33'51"	28.1	2	H6	S4	W1	19	16	–	e
99033	59'03"	29'13"	3.5	1	H5/6	S3/4	W1	19	16	–	e
99034	59'20"	24'11"	1.9	1	H4	S3	W2	19	15	br	e
99035	59'24"	24'08"	3.3	1	H3/4	S2	W2	17 (12–19)	17 (14–27)	–	e
99036	59'17"	24'14"	6.1	1	H3/4	S2	W2	18 (5–24)	16 (7–21)	–	e
99037	57'45"	34'12"	19.6	2	H4	S1	W1	18	13	–	e
99038	58'35"	33'04"	12.1	1	H5	S4	W0	20	16	–	e
99039	57'08"	33'58"	4	1	H6	S2	W1	19	17	–	e
99040	57'50"	33'29"	71.4	1	CO3	S2	W0	12 (1–49)	4 (1–7)	see text	e

†Weathering grades A, B, and C are categories from *Antarctic Meteorite Newsletter*, as in Appendix 1; others follow Wlotzka (1993).
‡*Abbreviations*: br = breccia; im = impact-melt breccia; chc = chondrule cores; m = maskelynite; mx = matrix; rr = reduced rims; sv = shock veins.
§Analysts: a = A. Maras (*URoma*); b = P. Bland (*OU*) and L. Folco (*MNA-SI*); c = S. Russell (*NHM*); d = C. Smith and S. Russell (*NHM*); e = R. Carampin, A. M. Fioretti, and G. Molin (*UPad*); f = B. Anselmi, C. Ferraris and L. Folco (*MNA-SI*); g = A. Sexton and I. A. Franchi (*OU*); h = M. Macrì, A. Maras, and M. Serracino (*URoma*).

Glasston 48º43' N, 97º18' W
Pembina County, North Dakota, USA
Found 1969 or before
Ordinary chondrite (L5)

A 1990 g stone was recovered by Dean A. Young. Classification and mineralogy (T. McCoy, *SI*): olivine, $Fa_{24.1\pm0.3}$; pyroxene, $Fs_{20.5\pm0.1}Wo_{1.5}$; shock stage, S2; weathering grade, W3; contains metal-sulfide shock veins. Specimens: main mass, 1680 g, *SI*.

Glenrothes 56º15' N 3º10' W
Fife, Scotland, United Kingdom
Found 1998 July
Ordinary chondrite (H5)

A 1.1 g chondrite plus ~35 weathered fragments totaling ~13 g, were found with a magnet around Holl Reservoir by Rob Elliott. Classification and mineralogy (M. Grady, *NMH*; A. Sexton, *OU*): olivine, $Fa_{21.4}$; shock stage, S3; weathering grade, W4; O isotopes, $\delta^{17}O$ = +2.69‰, $\delta^{18}O$ = +4.21‰. Specimens: main mass, *Fernlea*; 0.3 g, *NHM*.

Golden Rule 35º52.4' N, 114º12' W
Mohave County, Arizona, USA
Found 1999 February 16
Ordinary chondrite (L5)

A 797.6 g stone was found by Ingrid Monrad while she was searching for pieces of the Gold Basin meteorite using a metal detector. Classification and mineralogy (D. Kring, *UAz*): olivine, $Fa_{24.1\pm0.5}$; pyroxene, $Fs_{20.6\pm0.8}Wo_{2.0\pm0.4}$; shock stage, S3; weathering grade, W1. Specimens: type specimen, 22 g plus two thin sections, *UAz*; main mass with finder.

Graves Nunataks 98001–98186, see ANSMET meteorites

Grosvenor Mountains 95659, see ANSMET meteorites

Grove Mountains
Antarctica
Found 1999 January
(Four meteorites)

Four meteorites (Table 3) were found on blue ice near the Grove Mountains in East Antarctica by Jinyan Li and Dongmin Huo, who were searching for meteorites as part of the 15th Chinese Antarctic Research Expedition. The abbreviation for these meteorites shall be GRV. Classification and mineralogy was done by X. Liu (*Beijing*) and J. Chen (*PekU*). Specimens: *Beijing*.

Guangmingshan 39º48'15" N, 122º45'50" E
Liaoning Province, China
Fell 1996 December 30, ~08:00 Beijing time
Ordinary chondrite (H5)

A 2.91 kg stone was recovered by Bingde Wang after a loud whistling sound was heard. The meteorite left a small crater in the frozen ground. Classification and mineralogy (Y. Lin, *GIG*): olivine, $Fa_{19.5\pm0.5}$; pyroxene, $Fs_{17.3\pm0.5}Wo_{1.2\pm0.3}$; kamacite contains 0.49 ± 0.05 wt% Co; shock stage, S1. Specimens: main mass, *Dalian*; type specimen, 19.6 g, *GIG*.

Gunnadorah 003–010, see Nullarbor Region

Hammadah al Hamra 242 and 243, correction

The longitudes of HaH 242 and 243 were listed incorrectly in

TABLE 3. Meteorites from the Grove Mountains, Antarctica.

Name	Lat. (+72° S)	Long. (+75° E)	Mass (g)	Pieces	Class	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)
GRV 98001	58'16"	17'41'	13.5	1	Ord. Chon.	W2	–	–	–
GRV 98002	49'16"	25'35"	76.4	1	L5	W1	25.1	21.1	1.8
GRV 98003	49'16"	25'18"	282.2	1	Iron†	W0	–	–	–
GRV 98004	50'5"	25'16"	154.8	1	H5	W2	18.6	16.6	1.3

†Finest octahedrite, kamacite bandwidth = 0.037 mm.

Meteoritical Bulletin 83. They should be 12°53.14' E and 12°58.51' E, respectively.

Hammadah al Hamra 260–281, see Saharan meteorites from Libya

Hope Creek ~65º23' N, 146º16' W
Fairbanks North Star Borough, Alaska, USA
Found 1998 summer
Ordinary chondrite (LL6)

A 9.83 kg stone was found with a metal detector by Chris Shaw while he was prospecting for gold in a creek. Classification and mineralogy (M. McGehee, G. Huss, *ASU*): breccia; olivine, Fa_{29}; pyroxene, $Fs_{20.7}$; shock stage, S3 (light-colored clasts), S4 (dark-colored host); weathering grade, W2. Specimens: main mass, 5.74 kg, with finder; ~2 kg *AShaw*; ~2 kg, *OShaw*; 46.2 g, *AMNH*; 41.8 g, *UCLA*; 32.6 g, *ASU*.

Hughes 034–058, see Nullarbor Region

Indianópolis 19º10' S, 47º50' W
Minas Gerais, Brazil
Found 1989 July
Iron, coarsest octahedrite (IIAB)

A 14.85 kg mass was found among the gravels of the Araguari River. Classification and analysis (B. Spettel, *MPI*; R. Bartoschewitz, *Bart*): kamacite band width, 10–13 mm; rich in schreibersite; composition, Ni = 6.00 wt%, Cu = 125 ppm, Ga = 49.8 ppm, Ge = 104 ppm, Ir = 12 ppb. This meteorite is similar in composition to Santa Luzia, which was also found in a river, but several 100 km from Indianópolis. It is possible that the two meteorites are paired and that transport by indigenous people has occurred. Specimens: main mass unknown; 1.26 kg, *Bart*; 0.23 kg, *USP*.

Inningen 48º19' N, 10º53' E
Bavaria, Germany
Found 1998 September
Iron (IIAB)

A 1214.5 g iron was found by B. Ruf on the road connecting Inningen and Haunstetten. Classification and analysis (B. Spettel, *MPI*): bulk composition, Ni = 5.77 wt%, Ga = 55.7 ppm, Ge = 150 ppm, Ir = 26 ppb, Au = 965 ppb; structure unknown. Specimens: main mass, *MPI*.

Jdiriya 27º14' N, 10º27' W
Western Sahara
Found 1999 spring
Ordinary chondrite (L5)

Two stones totaling 343 g (the larger weighing 331 g) were found 5 km northwest of Jdiriya by two anonymous individuals while they were conducting a systematic search for meteorites. Classification and mineralogy (P. Sipiera, *Harper*): olivine, $Fa_{25.4}$; pyroxene, $Fs_{21.0}$; weathering grade, W2. Specimens: main mass with finders; type specimen, 21 g, *Dupont*.

Jiddat al Harasis 002–010, see Oman meteorites

King Tut 35º55.4' N, 114º6.1' W
Mohave County, Arizona, USA
Found 1997 March 6
Ordinary chondrite (L5)

A 19.51 g stone was found by John Blennert while he was searching for gold with a metal detector. Classification and mineralogy (D. Kring, *UAz*): olivine, $Fa_{24.7\pm0.5}$; pyroxene, $Fs_{20.4\pm0.1}$ $Wo_{1.6\pm0.1}$; kamacite contains 0.7 ± 0.2 wt% Co; shock stage, S3; weathering grade, W2; probably not paired with Gold Basin based on a terrestrial age measurement of 11.4 ± 1.8 ka (T. Jull, *UAz*). Specimens: type specimen, 0.6 g plus six thin sections, *UAz*; main mass with finder.

Kitchener 43º23' N, 80º23' W
Ontario, Canada
Fell 1998 July 12, 08:30 (EDT)
Ordinary chondrite (L6)

An approximately spherical meteorite weighing 202.6 g was heard to fall by a golfer at the sixth tee of the Doon Valley golf course in the city of Kitchener. The single, completely crusted stone was immediately recovered. Classification and mineralogy (G. Wilson, *UTor*): olivine, $Fa_{25.8}$; pyroxene, $Fs_{21.4}$; shock stage, S2; kamacite contains 0.95 wt% Co; fusion crust averages 0.4 mm thick. Main mass, *GSC*.

Kobe 34º44' N, 135º10' E
Tsukushigaoka, Kita-ku, Kobe, Japan
Fell 1999 September 26, 20:21 h (local time)
Carbonaceous chondrite (CK4)

A fireball was widely observed in the western prefectures of Kobe City. Shortly after a detonation was heard, one stone was recovered in Tsukushigaoka, Kita-ku, in the northern part of the city. It broke into 20 pieces after penetrating the roof of the house of Ryoichi Hirata; much of the material ended up on a bed. The total mass is 136 g, with the largest pieces weighing 64.9, 32.9, and 13.6 g. Classification and mineralogy (N. Nakamura and K. Tomeoka, *UKobe*; H. Kojima, *NIPR*): olivine, $Fa_{31.4}$ (range $Fa_{30.0–32.0}$, N = 54); pyroxene, $Fs_{25.8}$ (range $Fs_{24.7–26.6}$, N = 14); plagioclase, $An_{57.2}$ (range $An_{50.2–67.3}$); contains magnetite with 0.5–2.1 wt% Al, 3.2–5.2 wt% Cr; chondrules are distinct, 0.2 to 2 mm in diameter; a few white inclusion-like objects appear on the broken surface of the largest stone. Specimens: type specimen, 0.9 g (from which two thin sections were produced), *NIPR*; two pieces, 17 g, on loan from finder to N. Nakamura, *UKobe*, for consortium studies; remainder with finder.

La Esmeralda 27º4' N, 103º26' W
Coahuila, Mexico
Found 1999 June or July
Ordinary chondrite (L6)

A 483 g stone was found by a rancher and recognized as a meteorite by Padre Jaime Lienert. Classification and mineralogy (A. Rubin, *UCLA*): olivine, $Fa_{25.1\pm0.4}$; shock stage, S2; weathering grade, W4. Specimens: main mass, John and Marcella Hopkins, 1765 Soledad Way, San Diego, California 92109, USA; type specimen, 16 g, *UCLA*.

Lahmada 002–018, see Western Sahara and Morocco meteorites

Landreth Draw 37º15' N, 98º8' W
Ector County, Texas, USA
Found 1955
Ordinary chondrite (H5)

A large meteorite was found by Paul G. Rhoades while he was hunting doves on the K-(Kar Bar) Ranch. A piece ~50 cm in diameter and ~8 cm thick was kept in the ranch house yard, and a larger piece may also have existed. In 1965, a piece was sent to Dr. R. H. Horton of Washington State University, who then sent a piece to the *SI*. Classification and mineralogy (T. McCoy, *SI*): olivine, $Fa_{18.5\pm0.3}$; pyroxene, $Fs_{16.3\pm0.1}Wo_{1.4\pm0.4}$; shock stage, S2; weathering grade, W2. Specimens: 630.5 g, *SI*; location of main mass(es) unknown.

Lea County 003 32º2.6' N, 103º9.2' W
Lea County, New Mexico, USA
Found 1999 October 26
Ordinary chondrite (H4)

A 4.59 g chondrite partly covered by black fusion crust was found by T. Mikouchi while he, P. Buchanan, K. Welton, M. Hutchison, and R. Hutchison were searching for meteorites near Jal, New Mexico. Classification and mineralogy (T. Mikouchi, *JSC):* olivine, most grains $Fa_{17–32}$, one chondrule has Fa_1, PMD = 1.4%, CaO content 0.01–0.03 wt%; low-Ca pyroxene, $Fs_{10–41}Wo_{0.5–4}$, PMD = 2.4%; high-Ca pyroxene, $Fs_{4–17}Wo_{37–48}$; weathering grade, W3. Specimens: main mass and thin section, *UTok*; thin section, *NHM*.

Leighlinbridge 52º40' N, 6º58' W
County Carlow, Ireland
Fell 1999 November 28, 22:10 GMT
Ordinary chondrite (L6)

A bright fireball accompanied by detonations was observed over Carlow on 1999 November 28 A reward was posted by R. Elliott for the first recovered pieces. Four stones totaling 271.4 g (individual masses: 84.7, 73.3, 65.6, and 47.9 g) were recovered from the area between 1999 December 12 and 2000 January. Coordinates above refer to the first recovered specimen found at the side of the Leighlinbridge to Bagenalstown road. Classification and mineralogy (J. Bridges and M. Grady, *NMH*): olivine, Fa_{24}; shock stage, S3. Oxygen isotopes (A. Sexton, *OU*): $\delta^{17}O$ = +3.46‰, $\delta^{18}O$ = +4.44‰. Specimens: main masses, *Fernlea*; type specimens, 4.6 g plus thin section, *NHM.*

Los Angeles original find location unknown
Los Angeles County, California, USA
Recognized 1999 October 30
Martian basalt (shergottite)

Two stones, weighing 452.6 and 245.4 g, respectively, were found by Bob Verish in his backyard while he was cleaning out a box of rocks that was part of his rock collection. The specimens may have been collected ~20 years ago in the Mojave Desert. Classification and mineralogy (A. Rubin, P. Warren, and J. Greenwood, *UCLA*): a basalt with a texture closely resembling that of the QUE 94201; plagioclase laths, 43.6 vol%, $An_{41}Or_4$ to $An_{58}Or_1$, have been shocked to maskelynite; Ca-pyroxene, 37.7 vol%, ranges from $Fs_{45}Wo_{13}$ to $Fs_{45}Wo_{37}$ to $Fs_{72}Wo_{24}$; other mineral modes (in vol%), silica = 4.9, fayalite = 4.2, K-rich felsic glass = 2.4, titanomagnetite = 3.5, Ca phosphate = 2.7 (including whitlockite and chlorapatite), pyrrhotite = 0.7, and ilmenite = 0.2; contains a higher proportion of plagioclase than Shergotty or Zagami, and has pyroxene that is moderately more ferroan than that in QUE 94201. Specimens: main masses with finder; 30 g, *UCLA*; 20 g, *SI*. Note, one may encounter references to the two masses as Los Angeles 001 and 002, or stone no. 1 and stone no. 2, respectively; these are unofficial designations.

Lucerne Valley Meteorites, new classifications
(Two meteorites)
San Bernardino County, California, USA
Found 1963 to 1999

Two meteorites listed in *Meteoritical Bulletin* 83 have now been classified by A. Rubin (*UCLA*). Lucerne Valley 002: class, LL4; shock stage, S2, weathering grade, W3; olivine, $Fa_{27.5\pm0.6}$. Lucerne Valley 017: class, L6; shock stage, S3; weathering grade, W4; $Fa_{25.5\pm0.6}$. Neither meteorite can be paired with certainty to any other find from this region.

Muckera 019, see Nullarbor Region

Northwest Africa 001–031, see Saharan meteorites from Morocco

Northwest Africa 032 near 30º22' N, 5º3' W
Morocco, near Algerian border
Found 1999 October
Lunar meteorite (olivine-pyroxene basalt)

A stone of ~300 g was found in the desert (see Table 9). Classification and mineralogy (T. Fagan, *UHaw*; T. Bunch and J. Wittke, *NAU*): olivine, pyroxene, and chromite phenocrysts occur in a groundmass of elongate, zoned pyroxene ($En_{1–25}Wo_{15–25}$) and feldspar (~An_{85}) crystals radiating from common nucleation sites; opaque phases include elongate, skeletal ilmenite, troilite, and trace metal; olivine phenocrysts (~12 vol%) up to 300 µm are zoned from Fo_{65} (cores) to Fo_{60} (rims) and commonly have chromite inclusions; pyroxene phenocrysts (~5 vol%) are complexly zoned, with $En_{40–50}Wo_{20–40}$ and $En_{15–25}Wo_{10–20}$ domains; both olivine and pyroxene phenocrysts surrounded by Fe-rich quenched margins (olivines, ~Fo_{30}; pyroxenes, $En_{5–25}Wo_{15–30}$); glass with ~45.7 wt% SiO_2 occurs in semicontinuous shock veins up to 50 µm wide; some terrestrial weathering products are present in fractures, but primary assemblage is essentially unaltered. Oxygen-isotopic compositions (R. Clayton, *UChi*): $\delta^{18}O$ = +5.63‰, $\delta^{17}O$ = +2.92‰. Bulk composition (in wt%, E. Jarosewich, *SI*): SiO_2 = 44.7; TiO_2 = 3.08; Al_2O_3 = 8.74; FeO = 23.0; MnO = 0.33; MgO = 8.45; CaO = 10.9; Na_2O = 0.37; K_2O = 0.11; H_2O = 0.06. Specimens: type specimen, about 5–6 g, contact T. Bunch, *NAU*; 1.1 g plus thin section, *UHaw*; main mass, 260 g, *Radomsky*.

Nullarbor Region
South Australia and Western Australia
Found 1993–1995
(62 ordinary chondrites)

Thirty-four meteorites were collected by a WAMET/EUROMET collaborative expedition led by Alex Bevan in 1994 (Camel Donga, Gunnadorah, and three Sleeper Camp specimens), and 28 were collected by anonymous finders (one Sleeper Camp plus Hughes, Reid, and Muckera specimens). Data are listed in Table 4.

O'Donnell 32º54.733' N, 101º55.120' W
Dawson County, Texas, USA
Found 1992 spring
Ordinary chondrite (H5)

A 12.7 kg stone was found by a farmer who was plowing a cotton field. Classification and mineralogy (A. Rubin, *UCLA*): olivine, $Fa_{18.6}$; shock stage, S2; weathering grade, W2. Specimens: main mass, *Cott*; type specimen, 235.5 g, *UCLA*.

TABLE 4. Meteorites from the Nullarbor region, Australia.*

Name	Found (1900+)	Latitude (S)	Longitude (E)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)	Info[†]
Camel Donga 017	94	30°01.32'	126°33.15'	6.44	1	H5	S3	W3	19.1	17.5	–	a
Camel Donga 018	94	30°01.35'	126°33.12'	12.94	1	L6	S4	W2	25.5	21	–	a
Camel Donga 019	94	30°04.78'	126°53.35'	0.60	1	L6	S4	W3	25	–	–	a
Camel Donga 020	94	30°04.78'	126°53.35'	0.81	1	L6	S4	W2	25.4	21.3	–	a
Camel Donga 021	94	30°03.83'	126°53.05'	4.15	1	L6	S3	W3	25.5	21.6	–	a
Camel Donga 022	94	30°05.13'	126°54.07'	0.40	1	L6	S4	W3	25.6	21.1	–	a
Camel Donga 023	94	30°05.24'	126°54.10'	0.60	1	H6	S2	W2	18.4	13.8	–	a
Camel Donga 024	94	30°05.92'	126°53.13'	0.65	1	L6	S3	W2	25.9	21.8	–	a
Camel Donga 025	94	30°05.92'	126°53.12'	2.58	1	L/LL6	S4	W2	26.4	–	–	a
Camel Donga 026	94	30°05.50'	126°53.33'	1.00	1	L6	S3	W3	25.7	21.6	–	a
Camel Donga 027	94	30°05.50'	126°53.33'	5.20	1	L/LL6	S2	W2	26.4	22.5	–	a
Camel Donga 028	94	30°05.50'	126°53.33'	1.48	1	L6	S4	W2	25.8	21.8	–	a
Camel Donga 029	94	30°05.50'	126°53.33'	1.00	1	L6	S4	W1/2	25.7	21.1	–	a
Camel Donga 030	94	30°05.50'	126°53.33'	3.01	1	L6	S2	W3	25.8	21.8	–	a
Camel Donga 031	94	30°05.50'	126°53.33'	0.32	1	L6	S2	W3	25.4	24.9	–	a
Camel Donga 032	94	30°05.50'	126°53.33'	2.33	1	LL6	S4	W3	27	22.2	–	a
Camel Donga 033	94	30°05.50'	126°53.33'	0.95	1	LL6	S3	W3	26.4	22.4	–	a
Camel Donga 034	94	30°05.50'	126°53.33'	0.70	1	L6	S3	W3	25.8	21	–	a
Camel Donga 035	94	30°05.50'	126°53.33'	0.45	1	L6	S4	W2	25.3	22.7	–	a
Camel Donga 036	94	30°05.50'	126°53.33'	0.41	1	L6	S2	W2	25.5	21.4	–	a
Camel Donga 037	94	30°11.07'	126°41.02'	8.70	1	L6	S3	W3	25.4	21.3	–	a
Camel Donga 038	94	30°11.05'	126°42.00'	0.99	1	H6	S4	W2	19.5	16.9	–	a
Camel Donga 039	94	30°19.00'	126°36.00'	3.57	1	H6	S3	W1	19.3	17.2	–	a
Gunnadorah 003	94	30°29.98'	126°13.31'	2.81	1	L6	S3	W3	25.6	21.5	–	a
Gunnadorah 004	94	30°28.03'	126°20.62'	47.35	1	H5	S2	W2	19	17	–	a
Gunnadorah 005	94	30°28.49'	126°21.53'	40.37	1	L6	S2	W2	25.2	21	–	a
Gunnadorah 006	94	30°28.49'	126°21.53'	16.01	1	L6	S2	W1	25	21.4	–	a
Gunnadorah 007	94	30°28.82'	126°20.82'	3.26	1	L6	S3	W3	25.9	21.1	–	a
Gunnadorah 008	94	30°28.85'	126°20.78'	6.13	1	H6	S5	W2	18.1	15.7	–	a
Gunnadorah 009	94	30°28.85'	126°20.78'	0.40	1	H6	S4	W2	19.5	19	–	a
Gunnadorah 010	94	30°28.00'	126°20.00'	1.30	1	H5	S2	W3	19	16.7	–	a
Hughes 034	93	30°17'	129°32'	150.6	3	H5	S3	W3	18.9	17	1.6	b
Hughes 035	93	30°20'	129°30'	23	1	L6	S3	W1/2	24.3	20.6	1.6	b
Hughes 036	93	30°21'	129°40'	35.9	1	H4	S1/2	W3	17.9	15.9	1.3	b
Hughes 037	94	30°25'	129°39'	28.5	1	H5	S2	W3	18.3	16.3	1.2	b
Hughes 038	93	30°23'	129°41'	10	1	LL6	S3	W1	30.4	25.9	2.3	b
Hughes 039	93	30°23'	129°42'	8.5	1	LL5	S1	W3	27.9	23.1	1.5	b
Hughes 040	93	30°23'	129°31'	159.1	3	L5	S3	W3	23.8	20.1	1.2	b
Hughes 041	93	30°26'	129°36'	14	1	LL6	S3/4	W1/2	31	26	2.3	b
Hughes 042	93	30°26'	129°33'	39	1	H4	S1	W3	17	15.1	1	b
Hughes 043	93	30°21'	129°39'	47.4	1	L6	S3	W2	24.2	20.8	1.5	b
Hughes 044	93	30°19'	129°41'	98.5	1	L5/6	S4	W2/3	23.8	20.3	1.3	b
Hughes 045	93	30°20'	129°41'	25.6	2	L4	S2	W1/2	24.7	20.7	1.4	b
Hughes 046	93	30°33'	129°39'	96.9	1	H5	S2	W2	18.9	16.5	1.3	b
Hughes 047	93	30°19'	129°44'	1100	1	H5/6	S4	W4	18.2	16.1	1.5	b
Hughes 048	93	30°20'	129°46'	46	1	H5	S2	W3/4	18.2	16.2	1.1	b
Hughes 049	93	30°23'	129°49'	33.6	1	L6	S3	W2	24.1	20.4	1.6	b
Hughes 050	93	30°20'	129°48'	47.4	1	H5	S1/2	W1/2	18.1	16	1.2	b
Hughes 051	93	30°26'	129°46'	12.8	1	H3	S1/2	W2	18.0 ± 3.8	11.4 ± 5.4	1	b
Hughes 052	93	30°28'	129°43'	458.3	10	L5	S3	W2	23.5	20.2	1.1	b
Hughes 053	93	30°28'	129°47'	68.9	1	L5	S2	W2	24.5	20.8	1.6	b
Hughes 054	93	30°28'	129°48'	311.2	4	L5	S3	W3/4	23.7	20.6	1.1	b
Hughes 055	93	30°28'	129°48'	664.4	38	L5	S3	W3	23.9	20.4	1.4	b
Hughes 056	93	30°29'	129°38'	186.8	5	L5	S3	W1	24.8	20.8	1.6	b
Hughes 057	93	30°28'	129°41'	74.3	3	L5	S3	W2	23.7	20.3	1.4	b
Hughes 058	93	30°26'	129°30'	37.2	1	H6	S2	W0/1	18.5	16.3	1.2	b
Muckera 019	93	30°25'	129°51'	37.7	1	L4	S1	W2/3	24.4	20.7	1.5	b
Reid 028	94	30°07.42'	128°50.97'	30.6	1	H6	S3	W3	18.7	16.5	1.4	b
Sleeper Camp 014	95	30°11'	126°22'	66	1	LL5	–	–	29.9	24.1	1.3	c
Sleeper Camp 015	94	30°01.65'	126°16.21'	3.50	1	H5	S2	W1	19.1	16.6	–	a
Sleeper Camp 016	94	30°01.91'	126°16.37'	173.8	1	L6	S4	W1	25.1	21.1	–	a
Sleeper Camp 017	94	30°00.77'	126°15.47'	0.47	1	H5	S1	W3	19.7	17.4	–	a

*Camel Donga, Gunnadorah, Reid, and Sleeper Camp meteorites are from Western Australia; Hughes and Muckera meteorites are from South Australia.
[†]Abbreviations: a = Classified by A. Sexton (*OU*), type specimens at *OU*, main masses at *WAM*; b = classified by J. Otto and A. Ruh (*Frei)*, type specimens *Frei*, main masses held by anonymous finder; c = classified by F. Brandstätter, *NHMV*, main mass H. Stehlik, Vienna, type specimen (28 g) *NMHV*.

Oman meteorites

(39 meteorites)
Oman
Found 1999–2000

Thirty-nine meteorites (Table 5) were found during field work in the desert of Oman by people searching for meteorites. Notable finds were two lunar meteorites (Dhofar 025 and 026), three martian basalts (Dhofar 019, Sayh al Uhaymir 005 and 008), a CK3 (Dhofar 015), a howardite (Dhofar 018), a cumulate eucrite (Dhofar 007), and a highly unequilibrated H3 chondrite (Dhofar 008). Four large meteorite showers were recognized. The existing H4 chondrite known as Jiddat al Harasis will now take on the synonym Jiddat al Harasis (JaH) 001. Meteorites JaH 002 and 003 may be paired with each other; they were found within 25–50 km of the Ghubara (L5) fall site, but both are less shocked that Ghubara and are probably not paired with it. See separate entries for Dhofar 015, 019, 025, 026, Sayh al Uhaymir 005/008.

Otto 35°10' N, 105°59' W

Santa Fe County, New Mexico, USA
Found 1970 January 15
Ordinary chondrite (H5)

TABLE 5. Meteorites from Oman.

Name	Latitude (N)	Longitude (E)	Wt. (g)	Found (mm/dd/yy)	Pieces	Class	Shock stage	WG	Fa (mol%)	Fs (mol%)	Comments	Info[§]
Dhofar 001	18°09.9'	54°05.0'	46	12/2/99	1	L6	S4	W3	24.6	21.8	–	a
Dhofar 002	18°10.0'	54°05.1'	36	12/2/99	1	L5	S4	W3	25.1	21.7	–	a
Dhofar 003	18°12.1'	54°08.2'	65	12/2/99	1	H4	S3	W4	17.7	17	–	a
Dhofar 004	18°25.7'	54°03.2'	163	12/3/99	1	H5	S4	W2	18.7	17.7	–	a
Dhofar 005	18°10.0'	54°10.0'	125.5 kg	3/6/00	687	L6	S4	W4	24.8	22.3	–	a
Dhofar 006	18°07.9'	54°06.5'	364.5	12/3/99	1	L5	S3	W4	24.4	22.5	–	a
Dhofar 007	18°20.1'	54°10.9'	21270	12/4/99	37	Eucrite	–	–	–	43.3	Cumulate; br; An_{92}	a
Dhofar 008	18°20.5'	54°11.3'	2200	12/4/99	3	H3	S3	W2	18.7 1.3–50	13.4 2.1–27.6	PMD > 42[†]	a
Dhofar 009	18°16.9'	54°06.6'	2102	12/5/99	1	L6	S3	W2	24.9	22.5	–	a
Dhofar 010	18°20.3'	54°11.9'	3527.6	12/5/99	16	H6	S3	W3	18.7	17.7	Br; im	a
Dhofar 011	18°20.7'	54°11.9'	150	12/5/99	1	LL7[‡]	S3	W3	30.5	25.5	CaO in low-Ca px, 1.14 wt%	a
Dhofar 012	18°21.5'	54°14.0'	4472	1/17/00	7	L4	S3	W3	21.7	19.5	–	a
Dhofar 013	18°22.0'	54°14.2'	1070	1/17/00	2	H4	S1	W4	18.5	17.8	–	a
Dhofar 014	18°14.6'	54°08.5'	414	1/21/00	1	LL7[‡]	S4	W1	29.7	24.3	CaO in low-Ca px, 1.24 wt%	a
Dhofar 015	18°38.6'	54°25.8'	184	1/21/00	1	CK3	S3	W1	–	–	See separate entry	a
Dhofar 016	18°59.6'	54°24.9'	22	1/25/00	1	H4	S4	W4	17.9	16.8	–	a
Dhofar 017	18°09.6'	54°08.3'	1736	1/26/00	10	H4	S3	W3	16.2	15.7	–	a
Dhofar 018	18°18.1'	54°09.2'	833	1/17/00	12	How	–	–	29.1	49.4 23.9–63.6	$An_{80–94}$	a
Dhofar 019	18°18.9'	54°08.9'	1056	1/21/00	1	Martian	–	–	–	–	See separate entry	a
Dhofar 020	19°02.0'	54°31.0'	~256 kg	3/10/00	>2000	H4-5	S4	W3	18.1	15.9	–	a
Dhofar 021	18°09.2'	54°10.7'	2534	3/10/00	10	H5-6	S2	W4	18.3	17.2	–	a
Dhofar 022	19°01.7'	54°29.5'	110	3/13/00	8	H3.9	S3	W3	18.0 16.0–22.1	17.6	PMD = 6.4; prob. paired 024	a
Dhofar 023	19°04.5'	54°30.0'	118	3/11/00	1	H5	S2	W2	17.6	17.3	–	a
Dhofar 024	19°03.7'	54°33.2'	164	3/10/00	2	H3.9	S3	W3	18.0 16.1–23.7	17.7	PMD = 6.5; prob. paired 022	a
Dhofar 025	18°24.2'	54°09.1'	751	3/5/00	1	Lunar	–	–	–	–	See separate entry	a
Dhofar 026	18°13.6'	54°06.7'	148	3/6/00	1	Lunar	–	–	–	–	See separate entry	a
Jiddat al Harasis (JaH)												
JaH 002	19°18.8'	56°3.8'	265	8/1/99	1	L5	S4	W4	23.9	22.3	–	a
JaH 003	19°31.8'	55°45.5'	10830	8/2/99	1	L5	S3	W4	24.6	22.2	–	a
JaH 004	19°34.9'	55°42.6'	40	8/4/99	1	H4	S3	W4	20.0	19.5	–	a
JaH 005	19°18.03'	56°3.24'	216.5	10/4/99	1	H5	S2	W2	18.7	18.7	–	a
JaH 006	19°21.6'	56°17.5'	1318	11/26/99	18	H5	S3	W4	18.4	16.4	–	a
JaH 007	19°14.9'	56°08.5'	815	11/26/99	4	L5	S2	W4	24.3	20.2	–	a
JaH 008	19°15.2'	56°08.7'	851	11/26/99	1	L5	S2	W3	23.3	21	–	a
JaH 009	19°16.1'	56°08.7'	162	11/28/99	1	H4	S3	W4	18.2	17.2	Prob. paired 010	a
JaH 010	19°16.5'	56°05.2'	80	11/28/99	1	H4	S2	W4	17.6	16.9	Prob. paired 009	a
Sayh al Uhaymir (SaU)												
SaU 001	20°31.0'	56°40.0'	408 kg	3/16/00	1000's	L4/5	S2	W1	24.7	21.4	–	a
SaU 002	20°58.31'	56°52.68'	2569	10/8/99	102	L5-6	S4	W4	24.1	22.7	–	a
SaU 005	20°59.76'	57°19.55'	1344	11/26/99	3	Martian	–	–	–	–	See separate entry	b
SaU 008	20°58.83'	57°19.14'	8579	11/26/99	2	Martian	–	–	–	–	See separate entry	b

Abbreviations: br = breccia; im = impact melt; how = howardite; PMD = percent mean deviation of FeO content of olivine.

[§]Analysts and locations of type specimens (main masses with anonymous finders): a = M. Ivanova, M. Nazarov, and S. Afanasiev (*Vernad*); b = J. Zipfel (*MPI*).

[†]Highly unequilibrated: subtype < 3.3.

[‡]Chondrules almost completely absent. Matrix thoroughly recrystallized and relatively coarse grained. Pairing is possible between Dhofar 011 and 014.

A 28 g chondrite was found by Howard Elam who was searching for meteorites in the desert east of Albuquerque. Classification and mineralogy (P. Sipiera and Y. Kawachi, *Harper*): olivine, $Fa_{19.8}$; $Fs_{17.3}Wo_{1.5}$; weathering grade, W2. Specimens: main mass, 24 g, *DuPont*.

Ouzina 30º48' N, 4º11' W
Morocco, near Algerian border
Found 1999 April
Rumuruti-type chondrite (R4)
A 642 g stone was found by a Bedouin. Classification and mineralogy (M. Killgore, *SWML*; A. Rubin, *UCLA*): chondrules (0.4 to 1 mm) well-defined, but matrix and chondrule mesostasis recrystallized; barred olivine and porphyritic chondrules abundant; average olivine, $Fa_{40.1}$, with 0.18 wt% NiO; shock stage, S2; weathering grade, W4. Specimens: main mass, with a dealer who wishes to remain anonymous; *Fectay*; 120 g, *SWML*; type specimen, 27 g, *FMNH*.

Park City location unknown
Summit County, Utah, USA
Found ~1934
Iron meteorite, hexahedrite (IIAB)
An iron meteorite was acquired by William Cole prior to 1935. Over 50 years later, his wife remembered that he got it while working at the Silver King Mine near Park City, although it is not known whether he actually found it himself. Classification and analysis (T. McCoy, *SI*; J. Wasson, *UCLA*): contains coarse kamacite crystals (up to 14 cm), millimeter-sized schreibersite, and remelted troilite nodules; bulk metal composition, Co = 0.456 wt%, Ni = 5.89 wt%, Ga = 57.0 ppm, As = 5.14 ppm, Ir = 2.31 ppm, Au = 0.661 ppm. Specimens: 630.5 g, *SI*; 12.8 g, *UCLA*; main mass, 9.049 kg, plus slices of 669, 1052, and 835 g with a friend of the Cole family.

Pigick 35º54.4' S, 141º51.3' E
Victoria, Australia
Found ~1994
Ordinary chondrite (H5)
Eight fragments totaling 690 g were found by Daryl Wedding while he was plowing wheat paddocks. Individual masses were 169, 156, 110, 103, 63, 58, 26.4, and 7.6 g. The Rainbow meteorite (see below) was found in the same paddocks. Classification and mineralogy (W. Birch, *Vict):* olivine, $Fa_{18.8}$; pyroxene, $Fs_{16.6}Wo_{1.5}$; shock stage, S3; weathering grade, W2; contains minor oligoclase. Specimens: stones of 169, 156, 63, and 26.4 g, *Vict*; other masses with finder.

Poeppel Corner 25º47' S, 137º56' E
Northern Territory, Australia
Found 1980 October
Ordinary chondrite (L6)
A 277 g stone was found among sand dunes by Peter May. Classification and mineralogy (T. McCoy, *SI*): olivine, $Fa_{24.4\pm0.4}$; pyroxene, $Fs_{20.7\pm0.3}Wo_{1.6\pm0.3}$; shock stage, S3; weathering grade, W2; contains metal-sulfide shock veins. Specimens: main mass, *SAM*; type specimen, 12 g, *SI*.

Queen Alexandra Range 97077–97679, see ANSMET meteorites

Ragged Top 32º26.8' N, 111º20.8' W
Pima County, Arizona, USA
Found 1997 April
Ordinary chondrite (H4)
A 122.7 g chondrite was found ~8 cm below ground by Sam Lindsey, who was trying to locate a buried pipe with a metal detector. Classification and mineralogy (D. Kring and D. Hill, *UAz*): olivine, $Fa_{18.6\pm0.4}$; pyroxene, $Fs_{16.4\pm0.4}Wo_{1.1\pm0.2}$; kamacite contains 0.47 ± 0.02 wt% Co; weathering grade, W2. Specimens: main mass with finder; type specimen, 42 g plus three thin sections, *UAz*.

Rainbow 35º54.4' S, 141º51.3' E
Victoria, Australia
Found ~1994
Carbonaceous chondrite (CO3)
Two stones, 1132 and 421 g, were found by Daryl Wedding while he was plowing wheat paddocks. The Pigick meteorite (see above) was found in the same paddocks. Classification and mineralogy (W. Birch, *Vict*; J. Grossman, *USGS):* olivine, $Fa_{0.2–51.6}$, median $Fa_{4.5}$ (n = 50), pyroxene, $Fs_{0.4–27.8}Wo_{0.4–4.5}$, most around $Fs_{0.9}Wo_{0.9}$ (n = 15); weathering grade, W2; contains very little kamacite; chondrules mostly <0.5 mm in diameter; metamorphic subtype probably similar to Kainsaz (3.2); see also Grossman *et al.* (2000). Specimens: 1132 g main mass, *Vict*; 421 g mass with finder.

Rammya ~31º10' N, 3º55' W
Morocco
Found 1996, summer
Ordinary chondrite (H5)
More than 150 fragments that probably came from a single weathered mass, with a total weight of 2481 g, were found together ~40 km southeast of Erfoud. Classification and mineralogy (G. Kurat, *NHMV*): olivine, $Fa_{18.0}$; pyroxene, $Fs_{15.9}Wo_{1.1}$; kamacite contains 0.5 wt% Co; a complex, veined breccia. Specimens: type specimen, 18.05 g, *NHMV*; main mass, Mr. Vincent Jacques, Chaumont-Gistoux, Belgium.

Reid 028, see Nullarbor Region

Roosevelt County meteorites
Roosevelt County, New Mexico, USA
Found 1969–1988
(Five meteorites)
These meteorites (Table 6) were classified by P. Sipiera, *Harper*, and type specimens are in *Dupont*, except RC 102, which was classified by D. Kring and has a type specimen at *UAz*.

Rub' al-Khali Meteorites
Rub' al-Khali, Saudi Arabia
Found 1950s
(Three meteorites)
Three meteorites (Table 7) were found by Charles Sidney Morse while he was conducting a geological survey for the Arabian American Oil Company. Approximate locations of finds are all 20º N, 50º E. None of these meteorites is among those reported by Holm (1962). Classifications and descriptions by N. Chabot and D. Kring (*UAz*). Rub' al-Khali 003: an almost completely oxidized iron meteorite showing relic Widmanstätten pattern; kamacite, 7 wt% Ni; taenite, 31 wt% Ni; schreibersite present. Specimens: main masses with Marshall Mott–Smith; type specimens (Table 7), *UAz*.

TABLE 6. Meteorites from Roosevelt County, New Mexico.

Name	Latitude	Longitude	Wt. (g)	Found	Class	Fa (mol%)	Fs (mol%)	Wo (mol%)	Shock stage	WG	Finder, Main mass
Roosevelt County (RC)											
RC 098	34°13' N	103°33' W	15	1969	L6	20.6	17.9	–	–	W3	J. Warnica
RC 099	33°36' N	103°18' W	9.4	1969	H(5?)	18.5	16.6	–	–	W3	J. Warnica
RC 100	34°18' N	103°27' W	6.8	1970	L5	20.5	17.6	–	–	W2	J. Warnica
RC 101	34°3' N	103°35' W	12.6	1979	H5	19.0	16.2	–	–	W3	*Iwilson*
RC 102	33°59.7' N	103°15' W	8345	1988	L5	25.3	22.6	1.3	S3	W2	R. Thetford[†]

[†]Main mass with *Farmer*.

TABLE 7. Meteorites from the Rub' al-Khali, Saudi Arabia.

Name	Found	Class	Wt. (g)	Fa	Fs (mol%)	Kamacite (Co wt%)	WG	*UAz* Type Specimen
Rub' al-Khali 001	mid 1950s[†]	H5	>490	18.9 ± 0.5	16.7 ± 0.6	0.44 ± 0.04	3	90 g
Rub' al-Khali 002	mid 1950s[†]	L5	>55	24.9 ± 0.6	21.3 ± 0.2	0.85 ± 0.15	2	30 g
Rub' al-Khali 003	1957	Iron	>18	–	–	–	–	10 g

[†]One of these meteorites was found in 1955 May, the other on an unknown date.

Sabrum 23º5' N, 91º40' E

Tripura, India

Fell 1999 April 30

Ordinary chondrite (LL6)

Local inhabitants bathing in a pond heard a whistling sound and witnessed the fall of a 478 g stone. Classification and mineralogy (S. Ghosh, *GSI*): olivine, $Fa_{30.5}$; pyroxene, $Fs_{22.2}$; plagioclase, $An_{10.7}$; shock stage, S4. Specimens: *GSI*.

Sahara 98058–99555, see Saharan meteorites from unknown locations

Saharan meteorites from Libya

Libya

Found 1997–2000

(256 meteorites)

A number of different anonymous finders recovered 256 meteorites from several regions of the Libyan Sahara (Table 8). See separate entries for a CK chondrite (DaG 431), a eucrite (DaG 647), two martian basalts (DaG 670 and 735), and enstatite chondrite (DaG 734), and a howardite (DaG 779).

Saharan meteorites from Morocco

Northwest Africa

Purchased or found 1999

(32 meteorites)

Many meteorites lacking first-hand documentation of the find location are being sold by Moroccan rock and mineral dealers, and by people from other countries who have collected material in Morocco. These meteorites are all sold as Moroccan finds, but there are plausible reports that some were actually collected in Algeria or Western Sahara. The reliability of locality information associated with these meteorites is difficult to assess because of the anonymity of all of the finders and most of the original sellers. All such meteorites will henceforth be numbered in a "Northwest Africa" (NWA) series. The Nomenclature Committee considers it possible that differently numbered specimens are paired with each other or with other named meteorites, and some may even be derived from the same individual object. Table 9 lists 32 specimens of this type. See separate entry for the lunar meteorite, Northwest Africa 032. Note: some of the specimens listed elsewhere in this and previous issues of the *Meteoritical Bulletin* may belong in this category but had their names approved prior to the decision by the Nomenclature Committee to create the NWA series.

TABLE 8. Meteorites from the Libyan Sahara.

Name	Found	Latitude (N)	Longitude (E)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)	Comments[§]	Info[‡]
Dar al Gani (DaG)													
DaG 364	1997	27°50.36'	15°53.51'	982	1	L6	S6	W1	24.4	19.9	1.2	sv, rw	a
DaG 366	1997	27°51.09'	15°52.29'	233	1	L6	S6	W1	23.6	19.8	1.0	sv, rw	a
DaG 386	1997	27°26.59'	16°11.13'	772	5	H5/6	S2	W5	18.4	16.0	0.7	–	a
DaG 387	1997	27°20.24'	16°12.08'	189	1	L5	S2	W3	24.3	20.4	1.1	–	a
DaG 388	1997	27°08.55'	16°03.57'	291	1	H5/6	S2	W5	18.0	15.8	1.0	–	a
DaG 389	1997	27°27.68'	16°11.73'	61	1	H5	S2	W3	18.0	15.9	0.9	–	a
DaG 390	1997	27°27.89'	16°11.24'	99	1	H6	S2	W3	17.9	15.8	0.9	–	a
DaG 392	1997	27°25.43'	16°20.40'	718	1	H5	S2	W3	16.6	15.0	0.8	–	a
DaG 393	1997	27°26.13'	16°15.98'	195	1	L6	S6	W3	24.2	20.3	1.2	sv, rw	a
DaG 394	1997	27°24.54'	16°12.25'	167	1	H6	S2	W3	17.9	15.8	1.0	–	a
DaG 395	1997	27°45.89'	16°05.18'	270	1	H6	S2	W2	18.7	16.5	0.9	–	a
DaG 396	1998	27°49.11'	15°55.64'	388	3	L6	S6	W1	23.6	19.9	0.9	sv, rw	a
DaG 397	1998	27°49.10'	15°54.92'	1008	3	L6	S6	W1	23.7	19.9	1.1	sv, rw	a
DaG 398	1998	27°50.19'	15°49.47'	502	2	H6	S2	W2	18.9	16.7	0.9	–	a

TABLE 8. *Continued.*

Name	Found	Latitude (N)	Longitude (E)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)	Comments[§]	Info[‡]
DaG 401	1998	27°50.53'	15°53.80'	405	1	L6	S6	W1	23.6	20.2	1.1	sv, rw	a
DaG 402	1998	27°48.84'	15°54.69'	1861	1	L6	S4	W1	23.6	20.2	1.1	sv	a
DaG 403	1998	27°45.83'	15°54.65'	665	1	L6	S4	W1	23.7	20.2	1.2	sv	a
DaG 404	1998	27°50.26'	15°54.80'	585	2	L6	S4	W1	23.8	20.0	1.1	sv	a
DaG 405	1998	27°55.88'	15°52.05'	193	1	H3	S2	W1	14.2±5.9	8.5±5.4	0.5±0.6	a	
									2.2–23.2	1.9–18.6	0.2–2.4		
DaG 409	1998	27°49.43'	15°52.71'	584	3	L6	S4	W1	24.0	20.0	0.9	sv	a
DaG 410	1998	27°22.35'	16°14.41'	605	many	H5	S2	W1	17.8	16.0	1.1	–	a
DaG 412	1998	27°20.82'	16°05.30'	946	1	CK5	S2	W3	30.7	–	–	(1)	a
DaG 413	1998	27°29.24'	16°19.51'	156	1	IIAB	–	–	–	–	–	(2)	a
DaG 414	1998	27°30.97'	16°17.00'	956	1	L6	S4	W1	24.2	20.2	1.3	sv	a
DaG 415	1998	27°22.71'	16°11.13'	103	1	H5/6	S2	W3	18.3	16.1	1.0	–	a
DaG 420	1998	27°51.86'	15°52.40'	150	1	L6	S4	W1	23.9	20.0	1.2	sv	a
DaG 421	1998	27°52.47'	15°52.33'	105	1	L6	S6	W1	23.6	20.2	1.0	sv, rw	a
DaG 422	1998	27°51.83'	15°52.21'	702	1	L6	S4	W1	23.7	19.9	1.1	sv	a
DaG 431	1998	27°18.77'	16°13.92'	353	1	CK3-an	–	–	–	–	–	see separate entry	a
DaG 437	1998	26°41.77'	16°19.65'	239	2	L6	S4	W2	24.0	20.4	1.1	sv	a
DaG 439	1998	27°49.74'	15°55.68'	867	1	L6	S4	W2	23.7	20.1	1.2	sv	a
DaG 440	1998	27°29.00'	16°15.78'	1561	2	L6	S6	W2	24.2	20.5	1.1	sv	a
DaG 448	1998	27°26.01'	16°05.07'	392	1	L4/5	S2	W2	23.8	19.9	0.9	–	a
DaG 449	1998	27°25.61'	16°03.22'	184	1	LL6	S3	W3	26.5	22.1	1.2	–	a
DaG 453	1998	27°48.24'	15°56.10'	1896	1	L6	S4	W1	23.4	20.0	1.0	–	a
DaG 455	1998	27°48.31'	15°55.60'	2670	many	L6	S4	W2	23.7	20.2	0.9	sv	a
DaG 456	1998	27°47.87'	15°56.50'	838	2	L6	S4	W1	23.6	19.9	1.1	–	a
DaG 457	1998	27°48.44'	15°56.26'	855	2	L6	S6	W1	23.8	19.9	1.3	sv	a
DaG 458	1998	27°48.60'	15°55.98'	364	2	L6	S4	W1	23.7	20.2	1.0	sv	a
DaG 459	1998	27°48.86'	15°54.87'	1082	4	L6	S4	W1	23.8	19.8	1.1	sv	a
DaG 460	1998	27°48.23'	15°55.26'	2310	1	L6	S4	W1	23.6	19.9	1.2	sv	a
DaG 461	1998	28°01.14'	15°51.80'	1228	1	L6	S4	W3	24.1	20.3	1.3	–	a
DaG 462	1998	28°00.91'	15°51.82'	740	1	L6	S4	W2	24.1	20.4	1.2	–	a
DaG 463	1998	28°00.70'	15°51.89'	1916	3	L6	S4	W2	24.1	20.4	1.3	–	a
DaG 464	1998	28°01.18'	15°53.41'	254	1	L6	S4	W2	24.2	20.6	1.2	–	a
DaG 466	1998	28°00.60'	15°50.70'	1296	1	L6	S4	W2	24.2	20.4	1.0	–	a
DaG 467	1998	28°00.53'	15°50.57'	1731	1	L6	S4	W2	24.1	20.5	1.2	sv	a
DaG 470	1998	27°47.12'	15°57.14'	4152	1	L6	S4	W2	23.9	19.8	1.1	sv	a
DaG 472	1998	27°47.48'	15°57.91'	482	1	LL6	S3	W3	29.8	24.1	1.6	sv	a
DaG 474	1998	27°47.19'	16°05.83'	68	1	L6	S3	W3	24.1	20.5	1.3	sv	a
DaG 477	1998	27°44.86'	16°00.18'	16128	8	L6	S4	W1	23.7	19.8	1.2	–	a
DaG 478	1998	27°45.28'	15°58.91'	7367	4	L6	S4	W1	23.8	19.9	1.1	sv	a
DaG 481	1998	27°22.13'	16°17.13'	258	1	L6	S3	W1	24.1	20.5	1.1	sv	a
DaG 611	1998	27°17.03'	16°10.28'	434	5	L6	S4	W2	23	21	–	br	b
DaG 612	1998	27°16.15'	16°21.84'	1492	many	H5	S3	W2	17	16	–	–	b
DaG 613	1998	27°02.34'	16°15.67'	566	4	LL4	S2	W3	28	24	–	–	b
DaG 614	1998	27°07.64'	16°01.34'	53	4	H6	S2	W4	19	18	–	–	b
DaG 615	1998	27°23.76'	16°06.89'	295	1	H6	S4	W1	20	17	–	fragmental br	b
DaG 616	1998	27°09.76'	16°17.76'	150	1	L6	S3	W5	25	22	–	–	b
DaG 617	1998	27°09.76'	16°17.76'	126	1	H6	S1	W2	18	16	–	–	b
DaG 618	1998	27°01.75'	16°13.76'	44	1	L6	S3	W2	25	21	–	–	b
DaG 619	1998	27°28.73'	16°18.22'	1050	1	L6	S4	W2	24	20	–	–	b
DaG 620	1998	27°29.05'	16°18.32'	335	1	L6	S4	W2	23	20	–	–	b
DaG 621	1998	27°30.28'	16°19.30'	76	2	L4	S4	W2	24	21	–	–	b
DaG 622	1998	27°21.12'	16°14.85'	46	1	H5	S2	W3	18	16	–	–	b
DaG 623	1998	27°14.18'	16°21.23'	135	1	L6	S4	W2	27	22	–	–	b
DaG 624	1998	27°22.33'	16°11.30'	1750	1	L6	S4	W2	23	21	–	–	b
DaG 625	1998	27°21.31'	16°12.21'	502	1	L6	S3/4	W2	24	21	–	–	b
DaG 626	1998	27°21.10'	16°14.14'	233	1	H4	S1	W2	19	17	–	–	b
DaG 627	1998	27°19.25'	16°19.33'	72	1	H5	S1	W3	18	16	–	–	b
DaG 628	1998	27°16.41'	16°20.30'	60	1	CO3	S1	W2	9 (1–62)	0.5 (0.5–1)	–	–	b
DaG 629	1998	27°14.12'	16°20.28'	65	1	H5	S3	W3	17	16	–	–	b
DaG 630	1998	27°03.33'	16°03.04'	159	2	H4	S2	W2	18	17	–	–	b
DaG 631	1998	27°09.14'	16°20.24'	41	1	H4	S2	W3	18	17	–	–	b
DaG 632	1998	26°54.46'	16°42.10'	340	1	LL3	S4	W2	4.7–35.9	17.7	–	subtype 3.2–3.4	c
DaG 633	1998	26°55.14'	16°40.65'	210	1	LL5	S2	W2	27.1	23.4	–	–	c

TABLE 8. *Continued.*

Name	Found	Latitude (N)	Longitude (E)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)	Comments[§]	Info[‡]
DaG 634	1998	27°22.25'	15°59.48'	160	many	L6	S4	W2	25.6	21.6	–	–	c
DaG 635	1998	26°54.29'	16°40.74'	1390	1	H5	S3	W1–2	19.8	17.7	–	–	c
DaG 636	1998	26°52.86'	16°32.95'	2975	3	L5	S3	W2	25.3	21.2	–	–	c
DaG 637	1998	26°52.93'	16°39.10'	1149	2	L6	S4	W2	25.3	21.1	–	–	c
DaG 638	1998	26°57'	16°9'	8170	1	H4	–	W2	18.6	16.6	2.4	28 g *Dupont*	d
DaG 639	1998	26°56.41'	16°25.14'	237	1	LL5	S3	W2	26.8	22.1	–	–	c
DaG 640	1998	26°59.59'	16°08.36'	34	1	H5	S2	W2	18.9	17.5	–	–	c
DaG 641	1998	26°57.85'	16°28.15'	1030	1	H5	S2	W0/1	18.5	16.8	–	paired with DaG 646?	c
DaG 642	1998	26°53.12'	16°34.74'	265	1	L6	S3	W1	24.9	20.5	–	–	c
DaG 643	1998	26°58.80'	16°24.30'	152	2	L6	S3	W1	24.8	20.8	–	paired with DaG 644?	c
DaG 644	1998	27°09.44'	16°25.19'	223	1	L6	S3	W1/2	25.3	n.d.	–	paired with DaG 643?	c
DaG 645	1998	26°58.90'	16°27.50'	160	2	H5	S2	W2	19.7	17.2	–	–	c
DaG 646	1998	26°54.50'	16°40.16'	171	1	H5	S2	W1	18.6	17.3	–	paired with DaG 641?	c
DaG 647	1996-97	27°10'	16°8'	1425	1	Euc	–	–	–	–	–	see separate entry	e
DaG 648	3/1999	27°9'47"	16°0'16"	288	1	H5	S2	W3	18.2	17.1	–	–	f
DaG 649	3/1999	27°15'38"	16°0'27"	310	16	L6	S5	W2–4	25.0	21.5	–	–	f
DaG 650	3/1999	27°15'31"	16°0'41"	3700	~500	L6	S6	W3	24.7	21.0	–	rw, sv	g
DaG 651	1997	27°07.01'	16°06.02'	84	1	H6	S2/3	W2	19	18	–	br	b
DaG 670	1999	–	–	1619	3	Martian	S5	–	–	–	–	see separate entry	b
DaG 734	1996-97	27°7.91'	16°3.00'	1378	several	EL4	–	–	–	–	–	see separate entry	h
DaG 735	1996-97	27°10'	16°10'	588	1	Martian	–	–	–	–	–	see separate entry	h
DaG 736	1999	27°08.29'	16°02.23'	243	1	L3	–	W3	7–25	4–20	–	Equil. ol. grains $Fa_{24.2}$	h
DaG 737	1998	27°11.37'	16°03.87'	1053	1	L3	–	W4	14–25	6–20	–	Equil. ol. grains Fa_{24}	h
DaG 738	1998	27°06.53'	16°03.59'	257	1	H6	–	W3	18.1	16.3	–	–	h
DaG 739	1998	27°11.8'	16°05.31'	390	several	H5	–	W2	18.2	16.3	–	–	h
DaG 740	1998	27°09.26'	16°01.99'	320	many	H5	–	W3	17.7	16.4	–	–	h
DaG 741	1998	27°04.9'	16°17'	20500	several	H4	–	W2	17.5	15.9	–	–	h
DaG 742	1998	27°08'	16°03'	2222	many	H5	–	W3	18.3	17.0	–	–	h
DaG 743	1998	27°07.24'	16°05.04'	980	1	H6	–	W3	18.7	17.1	–	–	h
DaG 744	1998	27°07.7'	16°03.05'	390	1	LL6	–	W3	30.4	25.0	–	–	h
DaG 745	1998	27°18.3'	16°12.10'	866	1	LL6	–	W3	29.6	24.0	–	–	h
DaG 746	1998	27°09.13'	16°06.19'	2300	1	H5	–	W0	18.3	16.2	–	–	h
DaG 747	1999	27°08.06'	16°06.61'	179	1	H6	–	W4	19.3	–	–	–	h
DaG 748	1998	27°16.72'	16°12.99'	265	1	H5	–	W2	19.5	16.7	–	–	h
DaG 750	10/1999	28°14.928'	15°31.104'	44.3	3	L3	S3	W0	20.6±6.7	15.8±5.6	1.1	Kam: 0.8 wt% Co	I
								Peaks:	24	20			
DaG 751	11/1999	27°52.224'	15°52.301'	315	1	L6	S3/4	W1	24	20.8	1.5	sv	i
DaG 752	11/1999	27°51.816'	15°51.997'	124	1	L6	S3/4	W1	24.1	20.6	1.6	sv	i
DaG 753	11/1999	27°51.065'	15°52.543'	484	2	L6	S3/4	W1	24	20.6	1.5	sv	i
DaG 754	11/1999	27°50.990'	15°53.039'	454	1	L6	S3/4	W2	24	20.6	1.6	sv	i
DaG 755	11/1999	27°50.998'	15°53.039'	200	1	L6	S3/4	W1	24	20.6	1.5	sv	i
DaG 756	11/1999	27°50.550'	15°53.060'	454	1	L6	S3/4	W1	24.2	20.9	1.5	sv	i
DaG 757	11/1999	27°49.945'	15°53.119'	505	7	L6	S3/4	W1	24	20.9	1.5	sv	i
DaG 758	11/1999	27°46.060'	15°56.439'	2223	1	L6	S3/4	W2	24.4	21.3	1.6	sv	i
DaG 759	11/1999	27°42.858'	15°52.123'	90.5	1	H5	S3	W1/2	18.5	16.5	1.3	–	i
DaG 760	11/1999	26°57.484'	16°20.101'	316	1	L6	S4	W1	24.5	21.4	1.6	sv	i
DaG 761	11/1999	26°58.250'	16°23.138'	158	1	L6	S5	W2	24.8	21.3	1.6	sv	i
DaG 762	11/1999	26°58.432'	16°22.514'	346	1	L6	S6	W1/2	24.8	21.5	1.6	sv, rw	i
DaG 763	11/1999	27°00.928'	16°32.042'	3906	1	L5	S1	W1	25	21.6	1.6	–	i
DaG 764	11/1999	26°54.370'	16°40.306'	122	1	L6	S3	W3	24.9	21.4	1.7	br	i
DaG 765	11/1999	26°56.498'	16°33.959'	194	1	LL6	S4	W2	30.5	24.9	1.8	br	i
DaG 766	11/1999	26°58.228'	16°32.226'	1806	1	H4	S2	W1	17.4	15.6	0.9	–	i
DaG 767	11/1999	27°07.264'	16.30.983'	35.8	1	L6	S6	W4	24.4	21	1.5	sv, rw	i
DaG 768	11/1999	26°59.005'	16°28.097'	77.9	1	Eucrite	S2	W0	–	63.7	2.4	br, plag: $An_{88–93}$	i
DaG 769	11/1999	26°54.921'	16°32.254'	22.3	1	L5	S2	W2	23.6	20.6	1.5	–	i
DaG 770	11/1999	26°53.748'	16°34.341'	84.6	1	L6	S4	W1	24.8	21.2	1.7	–	i
DaG 771	11/1999	26°55.149'	16°31.334'	60.8	1	H5	S2	W3	18.4	16.6	1.2	–	i
DaG 772	11/1999	26°55.931'	16°29.659'	8.7	1	LL3	S2	W2	0.5–30.6	1.8–25.3	0.8–7.7	i	
DaG 773	11/1999	26°57.709'	16°27.007'	88.5	1	LL3	S2	W2	0.4–36.1	1.8–36.2	0.2–5.8	i	
DaG 774	11/1999	26°56.899'	16°28.676'	24.9	1	H5	S3	W3	18.4	16.6	1	–	i
DaG 775	11/1999	26°58.047'	16°26.983'	596	25	H5	S1	W3	18.2	16.6	1.5	–	i
DaG 776	11/1999	26°59.021'	16°26.717'	49.4	5	H5	S2	W3	18.6	16.8	1	–	i
DaG 777	11/1999	26°59.077'	16°26.689'	124	1	L6	S3	W3	24.7	21.3	1.6	–	i

TABLE 8. *Continued.*

Name	Found	Latitude (N)	Longitude (E)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)	Comments[§]	Info[‡]
DaG 778	11/1999	26°59.456'	16°26.657'	28.9	1	L3/4	S2	W0	24.3±0.3	20.5±1.8	0.9	kam: 1.1 wt% Co	i
DaG 779	11/1999	26°59.543'	16°26.250'	18800	many	Howardite	S2	W1	–	–	–	br; see separate entry	i
DaG 780	1/2000	26°59.229'	16°26.227'	56.7	1	H5	S2	W3	18.5	16.7	1.1	–	i
DaG 781	1/2000	27°00.973'	16°28.078'	13.7	1	L6	S4	W2	24.5	21.2	1.5	sv	i
DaG 782	1/2000	26°58.228'	16°28.136'	89.9	1	H5	S2	W3	18.7	16.7	1.2	–	i
DaG 783	1/2000	26°28.595'	16°27.654'	84	3	H5	S2	W2	18.7	16.8	1	–	i
DaG 784	1/2000	26°59.003'	16°26.396'	50.7	1	H5	S2	W3	19.3	17.2	1.6	–	i
DaG 785	1/2000	26°59.928'	16°26.570'	278	11	LL3	S2	W4	0.6–32.9	1.9–28.4	0.2–4.3	i	
DaG 786	1/2000	27°01.132'	16°26.039'	243	5	L6	S3	W3	24.3	21.7	1.6	–	i
DaG 787	1/2000	27°02.493'	16°24.046'	32.1	1	Ureilite	med.	W2	23.2	18.4	10	br	i
DaG 788	1/2000	26°58.206'	16°28.183'	36.8	1	H5	S3	W3	18.2	16.7	0.9	–	i
DaG 789	1/2000	26°59.410'	16°26.852'	52.7	1	L6	S4	W2	24.3	20.9	1.8	sv	i
DaG 790	1/2000	26°59.959'	16°25.859'	241	1	L6	S4	W1	24.2	21.6	1.4	sv	i
DaG 791	1/2000	27°16.663'	16°14.231'	148	1	H4	S1	W3	17.7	16.1	1.2	–	i
DaG 792	1/2000	26°54.827'	16°27.900'	202	1	LL3	S2	W2	0.5–27.9	2.3–26.8	0.2–2.0	kam: 0.29 wt% Co	i
DaG 793	1/2000	27°27.819'	16°08.792'	109	1	LL6	S3	W2	29.5	24.3	1.8	br, sv	i
DaG 794	1/2000	26°59.603'	16°27.034'	166	3	H5	S3	W3	18.2	16.6	1.1	–	i
DaG 795	1/2000	26°59.227'	16°26.241'	27.8	1	H5	S3	W4	18.1	17	1	–	i
DaG 796	1/2000	27°22.171'	16°14.406'	41.4	1	L6	S4	W3	24.3	21.8	1.6	–	i
DaG 797	1/2000	27°00.020'	16°26.774'	56.7	1	H5	S1	W3	19.4	17.1	1.6	–	i
DaG 798	1/2000	26°59.672'	16°27.122'	76.4	1	H5	S2	W3	18.2	17.1	1.3	–	i
DaG 799	1/2000	27°01.971'	16°29.381'	107	1	H6	S2	W2	18.6	16.7	1.6	–	i
DaG 800	1/2000	27°00.533'	16°27.601'	96.4	4	H6	S1	W4	19.2	17	1.5	–	i
DaG 801	1/2000	27°02.814'	16°24.526'	25.2	1	Ureilite	low	W2	22.9	20.8	8	–	i
DaG 802	1/2000	27°00.330'	16°28.373'	230	1	H6	S1	W2	19	17.1	1.5	–	i
DaG 803	1/2000	27°00.866'	16°23.324'	37	1	L6	S4	W1	24.4	21.7	1.6	–	i
DaG 804	1/2000	26°59.225'	16°26.224'	10.5	1	H5	S2	W4	18.3	16.5	1.2	–	i
DaG 805	1/2000	27°32.453'	16°09.470'	51.9	1	L6	S4	W2	24.2	21.5	1.5	–	i
DaG 806	1/2000	26°57.955'	16°30.166'	48.4	1	H5	S3	W3	18.4	16.7	1.2	–	i
DaG 807	1/2000	27°03.421'	16°26.703'	187	1	H5	S3	W3	18.2	16.8	1	–	i
DaG 808	1/2000	26°59.209'	16°26.408'	69	1	L6	S4	W2	23.9	21.4	1.9	br, sv	i
DaG 809	1/2000	26°59.893'	16°26.377'	97.8	1	L6	S4	W2	23.8	21.3	1.5	br, sv	i
DaG 810	1/2000	26°58.485'	16°23.409'	64	1	L6	S4	W2	24.3	21.4	1.5	br, sv	i
DaG 811	1/2000	26°59.654'	16°27.114'	60	1	H5	S2	W4	18.2	16.8	1.1	–	i
DaG 812	1/2000	26°57.520'	16°27.332'	2022	55	H5	S2	W3	18.5	16.6	1.4	–	i
DaG 813	1/2000	26°59.642'	16°27.134'	37.8	3	H5	S3	W3	18.1	16.6	1.1	–	i
DaG 814	1/2000	26°59.399'	16°23.865'	102	1	L4	S2	W2	22.3	20.3	1.5	–	i
DaG 815	1/2000	26°59.003'	16°27.702'	214	1	H5	S2	W4	18.1	16.6	1.5	–	i
DaG 816	1/2000	26°59.672'	16°27.218'	71.2	1	H5	S3	W3	18.1	16.7	1.1	–	i
DaG 817	1/2000	27°24.788'	16°16.769'	196	1	H6	S2	W3	18.3	17	1.4	sv	i
DaG 818	1/2000	26°58.546'	16°28.018'	110	1	H4/5	S2	W3	18	16.6	1.1	–	i
DaG 819	1/2000	26°59.720'	16°26.810'	688	1	L4/5	S2	W3	23.2	19.9	1.9	crumbled	i
DaG 820	1/2000	27°46.267'	15°55.942'	560	30	L6	S2	W3	24.3	21.5	1.8	br, sv	i
DaG 821	1/2000	26°59.720'	16°26.810'	1103	50	H4/5	S2	W3	18.2	16.7	1.1	–	i
DaG 822	1/2000	26°58.578'	16°28.050'	44.2	1	H5	S3	W4	18.1	16.6	1.1	–	i
DaG 823	1/2000	26°58.906'	16°25.870'	47.3	1	L6	S4	W3	23.8	21.1	1.6	sv	i
DaG 824	1/2000	26°59.712'	16°27.132'	112	3	H5	S3	W3	18.5	16.5	1	–	i
DaG 825	1/2000	26°59.213'	16°26.228'	6	1	H5	S3	W4	18	16	1.1	–	i
DaG 826	1/2000	27°03.409'	16°23.851'	23	1	L5/6	S3	W3	22.9	19.6	1.7	–	i
DaG 827	1/2000	26°59.221'	16°26.223'	107	1	H5	S3	W3	18	16	1.1	–	i
DaG 828	1/2000	26°58.318'	16°28.081'	7.4	1	L6	S4	W4	24.1	21	1.5	–	i
DaG 829	1/2000	27°28.735'	16°08.358'	23.7	1	H5/6	S2	W1	18.4	17	1.6	–	i
DaG 830	1/2000	27°02.900'	16°23.063'	53.1	1	Ureilite	low	W2	21	19.7	6.7	–	i
DaG 831	1/2000	26°57.924'	16°28.119'	54.5	1	H5	S3	W3	18.3	16.6	0.9	–	i
DaG 832	1/2000	27°26.818'	16°08.888'	166	3	L4/5	S4	W1	23.7	20.9	1.2	–	i
DaG 833	1/2000	26°59.194'	16°26.252'	9	1	H5	S3	W4	18	16.8	1.1	–	i
DaG 834	1/2000	26°57.955'	16°30.166'	12.9	1	H6	S3	W3	17.5	16.4	1.1	–	i
DaG 835	1/2000	26°58.224'	16°27.430'	68.8	1	H5	S3	W3	17.9	16.7	1.1	–	i
DaG 836	1/2000	26°59.318'	16°26.232'	35.1	1	L6	S4	W2	24.1	20.8	1.7	sv	i
DaG 837	1/2000	27°16.410'	16°14.410'	113	1	L6	S2	W2	24.2	21.5	1.8	–	i
DaG 838	1/2000	26°58.318'	16°28.081'	27.1	1	H5	S3	W3	18.1	16.7	1.3	–	i
DaG 839	1/2000	26°59.485'	16°27.373'	12.6	1	H5	S3	W3	18	16.7	1.1	–	i
DaG 840	11/1999	26°59.088'	16°26.450'	63.7	1	L6	S4	W1/2	24.1	20.9	1.6	–	i
Hammadah al Hamra (HaH)													
HaH 260	–	28°36.78'	12°56.83'	530	1	L6	S3	W1	25.9	21.7	–	–	c
HaH 261	1/2000	28°27.300'	12°51.050'	1078	1	Eucrite	S2	W0	–	64.8	5.8	Plag: $An_{80–87}$; paired HaH 262	i

TABLE 8. *Continued.*

Name	Found	Latitude (N)	Longitude (E)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Wo (mol%)	Comments§	Info‡
HaH 262	1/2000	28°27.313'	12°52.091'	377	1	Eucrite	S2	W0	–	64.5	5.5	Plag: $An_{81–87}$; paired HaH 261	i
HaH 263	1/2000	28°27.106'	12°52.411'	233	1	LL6	S4	W3	32	26.7	2.1	br, sv	i
HaH 264	1/2000	28°34.916'	12°53.111'	182	1	LL6	S4	W3	31	26.1	2.2	br, sv	i
HaH 265	1/2000	28°26.349'	12°53.118'	203	1	LL6	S4	W3	31	25.9	1.8	br, sv	i
HaH 266	1/2000	28°28.729'	12°51.817'	3263	1	L5	S2	W4	25.1	21.3	1.6	–	i
HaH 267	1/2000	28°26.282'	12°49.760'	983	1	L6	S3	W2	24.4	21.4	1.6	br, sv	i
HaH 268	1/2000	28°27.434'	12°52.228'	174	1	LL6	S4	W3	31	26	2.3	br, sv	i
HaH 269	1/2000	28°27.233'	12°52.064'	162	1	LL6	S4	W4	31	25.9	2.1	br, sv	i
HaH 270	1/2000	28°41.156'	12°54.164'	100	1	L3-5	S3/4	W2	22.2	17.9	1.2	–	i
								Peaks:	25	21			
HaH 271	1/2000	28°26.272'	12°53.198'	277	1	LL6	S4	W3	31.3	26	2.1	br, sv	i
HaH 272	1/2000	28°27.267'	12°52.017'	268	1	LL6	S4	W4	30.8	25.6	1.6	br, sv	i
HaH 273	1/2000	28°27.548'	12°52.156'	133	1	LL6	S4	W3	31.8	26	2.2	br, sv	i
HaH 274	1/2000	28°27.567'	12°52.244'	69.8	1	LL6	S4	W3	31	26	1.9	br, sv	i
HaH 275	1/2000	28°27.782'	12°51.410'	342	1	LL6	S5	W3	30.9	26.6	2.3	br, sv	i
HaH 276	1/2000	28°26.490'	12°53.075'	246	1	LL6	S5	W3	30.4	25.9	2.3	br, sv	i
HaH 277	1/2000	28°27.467'	12°51.860'	436	1	LL6	S3	W4	30.6	26	2	br, sv	i
HaH 278	1/2000	28°27.396'	12°52.102'	191	1	LL6	S3	W3	30.7	26.2	2.3	br, sv	i
HaH 279	1/2000	28°28.183'	12°51.587'	129	1	LL6	S4	W3	31	26.4	2.3	br, sv	i
HaH 280	3/2000	28°28.214'	12°58.317'	26500	~20	CK4	S4	W3	32.3	9.6	48	Plag: $An_{29–78}$; paired HaH 281	i
HaH 281	3/2000	28°29.547'	13°12.782'	3598	1	CK4	S4	W3	32.5	12.7	48.4	Plag: $An_{31–64}$; paired HaH 280	I
HaH 282	1/2000	28°26.346'	12°53.172'	424	1	LL6	S3	W2	31.7	26	2	br, sv	i
HaH 283	1/2000	28°27.297'	12°52.177'	121	1	LL6	S4	W2	30.2	25.3	2.2	br, sv	i
HaH 284	1/2000	28°26.442'	12°52.903'	140	1	LL6	S4	W3	30.9	25.9	2.1	br, sv	i
Sarir Qattusah (SQ)													
SQ 004	3/1999	27°08.325'	15°32.854'	462	1	L6	S3	W2	24.6	20.3	1.3	–	i
SQ 005	5/1999	26°50.550'	15°41.505'	1527	3	L6	S6	W1	25	20.4	1.5	sv, rw	i

Abbreviations: br = breccia; im = impact melt; kam = kamacite; ol = olivine; plag = plagioclase; rw = ringwoodite; sv = shock veins.
‡Analysts and locations of type specimens (main masses with finders unless noted): a = J. Zipfel (*MPI*); b = L. Folco *(MNA-SI)*; c = A. Sexton (*OU*); d = P. Sipiera (*Harper*), specimens in *DuPont* collection; e = F. Wlotzka (*MPI*) and H. Takeda (*Chiba*); f = F. Wlotzka (*MPI*) and R. Bartoschewitz (*Bart*), type specimens at *MPI*, main masses *Bart* and *Gehler*; g = M. Grady (*NHM*) and R. Bartoschewitz (*Bart*), type specimen in *NMH*, main mass *Bart* and *Gehler*; h = F. Wlotzka (*MPI*) and M. Kurz (Neukirchen, Germany); i = J. Otto and A. Ruh (*Frei*).
§(1) $\delta^{18}O$ = –0.79‰, $\delta^{17}O$ = –4.89‰ (R. N. Clayton and T. K. Mayeda, *UChi*). (2) Bulk composition, Ni = 5.47 wt%, Ga = 61.7 ppm, Ir = 4.74 ppm (B. Spettel, *MPI*); recrystallized hexahedrite (A. El Goresy).

Saharan meteorites from unknown locations
Sahara, country unknown
Found 1998–1999
(25 meteorites)

These meteorites (Table 10) have been collected by Marc, Luc and Jim Labenne in the Sahara. The Labennes will not disclose the exact locations of these meteorites at the present time. The secret origin (w, z) in Table 10 is identical to the origin reported last year in *Meteoritical Bulletin* 83, and is several hundred kilometers distant from the origin (x, y) given in *Meteoritical Bulletin* 82. Classified by A. Bischoff and L. Niemann, *Mün*. The three R chondrites (Sahara 99527, 99531, and 99537) may be paired. Specimens: main masses, *Labenne*; type specimens (~20 g for meteorites >200 g, and 10% of meteorites <200 g), *Mün*.

Sarir Qattusah 004–005, see Saharan meteorites from Libya

Sayh al Uhaymir 001–002, see Oman meteorites

Sayh al Uhaymir 005 20°59.76' N, 57°19.55' E
Sayh al Uhaymir 008 20°58.83' N, 57°19.14' E
Oman
Found 1999 November 26
Martian basalt (shergottite)

At two locations, 1864 m apart, five grey-greenish stones were found that are macroscopically identical. Sayh al Uhaymir (SaU) 005 comprises one fragment of 547 g and two individuals of 561 and 236 g, which are partially covered by fusion crust and show regmaglyptes. Sayh al Uhaymir 008 comprises one large individual of 7805 g and a smaller fragmented individual of 774 g. On the latter, the fresh black fusion crust is almost completely preserved. The total mass of SaU 005/008 is 9923 g. Mineralogy and classification (J. Zipfel, *MPI*): porphyritic texture with large olivine phenocrysts ($Fo_{64–71}$) in a fine-grained groundmass of pigeonite ($En_{61–70}Wo_{6–13}$) and maskelynite ($An_{51–65}Or_{0.3–0.9}$); minor phases are augite, phosphates, and opaques; strongly shocked: mosaicism and planar deformation of olivines, twinning and fracturing of clinopyroxene, and up to millimeter-sized shock melted areas with quench textures are common; brown-orange ringlike structures formed by extremely fine-grained intergrowths of unidentified phases are abundant in impact-melt areas and pyroxenes; the meteorite is extremely fresh, with only a few of the larger cracks partially filled with calcite. Bulk chemical analyses (B. Spettel, G. Dreibus, *MPI*; H. Palme, *Köln*), noble gas analyses (M. Paetsch, L. Schultz, *MPI*), and Sm-Nd systematics (E. Jagoutz, *MPI*): texture, bulk chemistry, noble gases, and Sm-Nd systematics indicate a very close relationship to Dar al Gani 476/489/670/735; however, on the basis of the distinct mineral chemistry and the place of find, simple pairing with those meteorites can be excluded. Specimens: type specimen, 60 g, *MPI*; main mass with anonymous finder.

TABLE 9. Meteorites from Morocco.*

Name	Possible origin	Place of purchase	Lat.† (N)	Long.† (W)	Mass (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Notes‡	Info§
Northwest Africa (NWA)													
NWA 001	Kem Kem	Unknown	–	–	1200	1	L6	S3	W2	25.2	–	–	a
NWA 002	Anbdour	Tagounite	29°55'	5°35'	10	many	EL6	S6	W4	–	0.52	1	b
NWA 003	Azhakan	Tagounite	29°55'	5°35'	120	1	H4	S3	W2	18.9	16.9	–	b
NWA 004	Azhakan	Tagounite	29°55'	5°35'	115	1	L4	S4	W1	22.2	18.6 (12.6–20.5)	–	b
NWA 005	Bonkzhy	Tagounite	29°55'	5°35'	50	2	H4	S3	W3	17.4	16.7	–	b
NWA 006	Bonkzhy	Tagounite	29°55'	5°35'	15	1	H5	S4	W4	18.3	17.4	–	b
NWA 007	Bonkzhy	Tagounite	29°55'	5°35'	15	2	LL5	S5	W0	27.5	24.3	–	b
NWA 008	Bonkzhy	Tagounite	29°55'	5°35'	5	1	H4–5	S4	W3	18.8 (17.4–22.0)	16.4	–	b
NWA 009	–	Erfoud	31°30'	4°15'	4	1	L5	S4	W1	24.1 (22.9–30.2)	20.8	–	b
NWA 010	Hamada	Tagounite	29°55'	5°35'	2000	1	H4	S2	W3	17.2	14.9	–	b
NWA 011	–	Rissani	31°20'	4°20'	40	1	Eucrite	–	–	–	35-64	2	b
NWA 012	–	Rissani	31°20'	4°20'	15	1	L4	S3	W1	22.5	17.2 (9.2–22.1)	–	b
NWA 013	–	Rissani	31°20'	4°20'	80	1	L5	S4	W3	24.4	21.7	–	b
NWA 014	–	Rissani	31°20'	4°20'	39	1	H3–6	S4	W3	20.5 (18.2–24.6)	17.1	–	b
NWA 015	–	Rissani	31°20'	4°20'	39	1	H4	S3	W2	17.7	15.6	–	b
NWA 016	–	Rissani	31°20'	4°20'	39	1	H3–4	S4	W3	20.7 (15.1–30.3)	15.4 (10.5–17.4)	–	b
NWA 017	–	Rissani	31°20'	4°20'	39	1	H4	S2	W1	17.9	17	–	b
NWA 018	–	Rissani	31°20'	4°20'	39	1	H5	S4	W3	18.6	17	–	b
NWA 019	Tagmart	Tagounite	29°55'	5°35'	116	1	L4	S3	W1	22.2	21	3	b
NWA 020	Tagmart	Tagounite	29°55'	5°35'	64	1	L4	S3	W1	21.7	21.3	3	b
NWA 021	Tagmart	Tagounite	29°55'	5°35'	166	1	L4	S3	W1	22.1	21.2	3	b
NWA 022	Tagmart	Tagounite	29°55'	5°35'	30	1	L4	S3	W1	22.2	18.9	–	b
NWA 023	Tagmart	Tagounite	29°55'	5°35'	76	1	L4	S3	W1	22.1	21.2 (15.0–26.6)	3	b
NWA 024	Wol-Hammit	Tagounite	29°55'	5°35'	800	1	H4	S5	W3	19.6	16.7	–	b
NWA 025	–	Zagora	30°20'	5°50'	510	1	L6	S3	W2	23.7	20.8	4	b
NWA 026	–	Zagora	30°20'	5°50'	1265	1	L6	S3	W2	24.3	20.6	4	b
NWA 027	–	Zagora	30°20'	5°50'	705	1	H5	S2	W3	16.9	15.9	5	b
NWA 028	–	Zagora	30°20'	5°50'	305	1	H3.7	S3	W1	16.8 (3.61–23.8)	9.7 (0.96–28.7)	6	b
NWA 029	–	Zagora	30°20'	5°50'	275	1	L6	S3	W2	24.1	20.9	–	b
NWA 030	–	Zagora	30°20'	5°50'	65	1	H4	S3	W1	18	16.3	–	b
NWA 031	–	Zagora	30°20'	5°50'	730	1	H5	S2	W4	16.8	15.8	5	b
NWA 032	#	–	–	–	~300	1	Lunar	–		See separate entry			

*Most of these were purchased from Moroccan dealers. If information was supplied by a dealer about where the specimen may have been collected, this is noted under "Possible origin." None of the exact collection locations are known.
†Coordinates of place of purchase, not where the meteorite was found.
‡(1) = Partly melted; 0.93 wt% Si in metal; plag, $An_{10.5}$. (2) = Unbrecciated; feldspar, An_{83}. (3) = NWA 019, 020, 021, and 023 are probably paired. (4) = NWA 025 and 026 are probably paired. (5) = NWA 027 and 031 are probably paired. (6) = Percent mean deviation of olivine composition = 23%.
§a = Purchased by D. Bessey; classified by A. Rubin (*UCLA*); type specimen, 31 g, *UCLA*. b = Purchased by S. Afanasiev, V. Kalachev, and D. Kachalin during a 1999 meteorite expedition in the Moroccan Sahara; classifications by S. Afanasiev and M. Ivanova (*Vernad*); specimens, *Vernad*.
#Found by a consortium of anonymous European collectors; location possibly near 30º22' N 5º3' W, which is west of the Kem Kem plateau.

Sheephole Valley 34º7.5' N, 115º33.8' W

San Bernardino County, California, USA
Found 1999 September 25
Ordinary chondrite (H4)

Two stones weighing 43.0 and 19.1 g were found by Arthur Jones while he was searching a dry lake bed for meteorites. Classification and mineralogy (A. Rubin, *UCLA*): $Fa_{18.2±0.3}$; shock stage, S2; weathering grade, W2. Specimens: type specimen, 9.2 g, *UCLA*; main mass with finder.

Sleeper Camp 014–017, see Nullarbor Region

Songyuan 45º15' N, 125º0' E

Jilin Province, China
Fell 1993 August 15, 14:30–15:00 local time
Ordinary chondrite (L6)

Four meteorites were recovered within a 10 km^2 area shortly after falling in the countryside of Fuyu in Songyuan city. Individual masses were 28 kg, unknown, 6.4 kg, and 2.5 kg. The largest object created a pit 60 cm deep. Classification and mineralogy (A. Rubin, *UCLA*): olivine, $Fa_{24.4±0.3}$; shock stage, S2. Specimens: type specimen, 95.6 g, *UCLA*; 6.4 kg stone split evenly between *Morgan* and *Reed*; main mass, *Fuyu*.

Tagish Lake 59º42'15.7" N, 134º12'4.9" W

British Columbia, Canada
Fell 2000 January 18, 08:43:42 PST (16:43:42 UT)
Carbonaceous chondrite (C2, ungrouped)

A brilliant fireball followed by loud detonations was widely observed over the Yukon Territory and northern British Columbia. The fireball was also detected by satellites in Earth orbit. Dust clouds from terminal fragmentation events were widely observed. Jim Brook recovered several dozen meteorites totaling ~1 kg on the ice of Taku Arm, Tagish Lake, on January 25 and 26 (coordinates of first find given above). Between April 20 and May 8, ~500 additional specimens were located on the ice of Taku Arm and a small, unnamed lake 1.5 km to the east, but only ~200 were retrieved as many had melted down into the ice making their

TABLE 10. Meteorites from the Sahara, locations unknown.

Name	Latitude†	Longitude†	Mass (g)	Pieces	Class	Shock	WG	Fa	Fs	Comments
Sahara										
98058	*z*+0°10'55"	*w*+0°31'23"	681	1	H5	S3	2	19.6	16.5	sv
98276	*z*+0°08'52"	*w*+0°28'50"	93	1	L6	S6	2	25.6	22.2	sv, rw
98429	*z*+0°08'48"	*w*+0°28'48"	137	1	L6	S4	2/3	26.1	22.3	sv
98473	*z*+0°08'50"	*w*+0°28'31"	68	1	L6	S3	2	25.7	21.9	br, sv
98639	*z*+0°08'54"	*w*+0°28'31"	300	1	H4	S3	3	20.9	18.9	close to L4
98660	*z*+0°09'23"	*w*+0°28'17"	141	1	L3-6	S3	1/2	22.9	19.6	br, sv
							ranges:	2–32	5–26	–
98645	*z*+0°09'32"	*w*+0°28'21"	51	1	H3	S3	1/2	19.1	15.7	–
							ranges:	10–24	5–24	–
98683	*z*+0°09'26"	*w*+0°28'10"	361	1	L3	S3	2	21.1	12.1	–
							ranges:	5–29	1–23	–
98691	*z*+0°09'35"	*w*+0°28'05"	16	1	L3	S3	2/3	23.2	15.2	–
							ranges:	6–33	2–23	–
98748	*z*+0°09'37"	*w*+0°28'05"	439	2	H3-6	S3	1	17.9	16.8	–
							ranges:	0–27	7–19	–
98782	*z*+0°09'33"	*w*+0°28'33"	47	1	L3	S4	1/2	25.4	16.1	–
							ranges:	6–36	5–29	–
99037	*z*+0°09'56"	*w*+0°29'18"	365	1	H6	S2	1	20.1	17.7	br, mv
99076	*z*+0°09'48"	*w*+0°29'19"	62	1	How§	–		~40	24–34	(diog. frags)
								–	50–57	(euc. frags)
99314	*z*+0°09'33"	*w*+0°29'27"	56.5	1	How$	–		–	25–31	(diog. frags)
								–	50–60	(euc. frags)
99082	*z*+0°03'35"	*w*+0°31'03"	135	1	H4/5	S4	1/2	17.7	16.6	–
99099	*z*+0°03'36"	*w*+0°30'50"	267	1	LL6	–	–	31.5	25.9	br
99159	*z*+0°03'37"	*w*+0°30'54"	1023	1	LL3	–	–	27.8	17.7	–
								±9.4	±10.4	
99339	*z*+0°09'32"	*w*+0°28'26"	32.4	1	LL(L)3	S2	3	14.4	13.7	subtype <3.5
								±8.9	±10.4	
99456	*z*+0°10'26"	*w*+0°30'44"	62	1	E6@	S2	2	–	<0.5	
99502	*z*+0°13'45"	*w*+0°32'10"	481	2	LL6	S3	4	32	26.5	br, sv
99527	*z*+0°09'16"	*w*+0°28'54"	19	1	R5	S3	4	39.9	–	sv
99531	*z*+0°09'18“	*w*+0°28'57	31	1	R3–5	S3	3/4	40.4	–	br, sv
								2–42	(uneq. clasts)	
99537	*z*+0°09'19"	*w*+0°28'59"	27	1	R3-6	S3	3/4	40.0	–	br, sv
								3–42	(uneq. clasts)	
99544	*z*+0°08'45"	*w*+0°29'28"	1360	1	CO3*	S2	2	0–60	–	–
99555	*z*+0°13'53"	*w*+0°32'01"	2710	1	Angrite#	–	–	–	–	–

Abbreviations: br = breccia; diog = diogenite; euc = eucrite; mv = metal veins; rw = ringwoodite; sv = shock veins; uneq = unequilibrated.
†The geographic coordinates of these meteorites have not been disclosed by the finder. Listed are the offsets relative to a secret origin at (*w*°W longitude, *z*°N latitude, where *w* and *z* are integers that are **not** the same as *x* and *y* in Table 7 of *Meteoritical Bulletin* 82).
§Plagioclase $An_{63–93}$ and SiO_2 occur in the diogenitic fraction.
$Plagioclase $An_{86–93}$ occurs in the diogenitic fraction.
@Contains no relict chondrules.
*Fa and Fs are mainly < 5 mol% in chondrule minerals.
#Contains anorthite, fassaite, olivine, and kirschsteinite; see Bischoff *et al.* (2000).

collection time consuming; recovery was prioritized based on meteorites' mass and degree of disaggregation. The total mass collected was between 5 and 10 kg. The strewnfield is at least 16 × 3 km, oriented approximately S30° E. Classification and mineralogy (M. Zolensky, *JSC*; M. Grady, *NMH*): possibly CI2 group; a matrix-dominated chondrite, with a few small chondrules, CAIs, and isolated grains; matrix mainly phyllosilicates, Fe-Ni sulfides and magnetite, with abundant Ca-Mg-Fe carbonates; olivine, $Fa_{0–29}$, PMD = 2%, with a peak at Fa_1; pyroxene, $Fs_{1–7}$, PMD = 2%, with a peak at Fs_2; bulk C content 5.4 wt%, with $\delta^{13}C$ = +24.3‰; shock stage, S1. Oxygen isotopes (R. Clayton, *UChi*): $\delta^{18}O$ = +18.0–19.0‰, $\delta^{17}O$ = 8.3–9.2‰. Specimens: majority held by *UCalg* (contact A. Hildebrand) and *UWO* (contact P. Brown).

Taouz 002, see Western Sahara and Morocco meteorites

Vissannapeta 16º50' N, 80º45' E
Andhra Pradesh, India
Fell 1997 December 13, 15:30 local time
Achondrite (cumulate eucrite)

A 1303.8 g stone fell with a loud thud on Shri Ramulu's roof. Classification and mineralogy (S. Ghosh, *GSI*): a medium- to coarse-grained equigranular aggregate of ~49% plagioclase ($An_{92.4–94.3}$), ~35% orthopyroxene ($Fs_{44.2–49.7}$), ~9% clinopyroxene ($Fs_{16}Wo_{42}$), ~6% SiO_2, and <1% chrome spinel; the meteorite is a breccia with relict primary gabbroic texture. Specimens: main mass, *GSI*.

Wagon Mound 35º50.45' N, 104º35.15' W
Mora County, New Mexico, USA
Found 1932, spring
Ordinary chondrite (L6)

An 87.5 kg stone was found by Donald Wiggins while he was planting a field. His family kept the meteorite for 67 years, before

TABLE 11. Meteorites from Western Sahara (Lahmada) and Morocco (El Blida).

Name	Found 1900+	Latitude (N)	Longitude (W)	Wt. (g)	Pieces	Class	Shock	WG	Fa (mol%)	Fs (mol%)	Comments	Info†
El Blida 001	98	~29°55'	~5°25'	301.2	1	H5	S2	W3	19.8	17.9	–	a
El Blida 002	98	~29°55'	~5°25'	>286	many	H6	S3	W1	19.4	17.5	shock veins	a
Lahmada 002	99	~27°10'	~9°30'	360.1	1	L6	S4	W3	26.0	21.8	–	a
Lahmada 003	99	~27°10'	~9°30'	374.5	1	L6	S2	W3	25.8	22.3	–	a
Lahmada 004	99	~27°10'	~9°30'	139.6	1	H6	S2	W2	19.0	16.8	breccia	a
Lahmada 005	99	~27°10'	~9°30'	103.1	1	L4/5	S4	W2	23.7	21.3	breccia	a
Lahmada 006	99	~27°10'	~9°30'	904.6	1	L6	S4	W1	25.7	22.1	–	a
Lahmada 007	99	~27°10'	~9°30'	620.6	1	H5	S3	W1/2	19.2	16.6	paired with 016?	a
Lahmada 008	99	~27°10'	~9°30'	43.3	1	L6	S3	W3	26.2	22.8	–	a
Lahmada 009	99	~27°10'	~9°30'	70 000	many	H3-6	S2	W2	18.1 ± 3.1	16.6 ± 3.5	breccia	a
Lahmada 010	99	~27°10'	~9°30'	117.4	1	H6	S3	W1	19.1	17.0	breccia, shock veins	a
Lahmada 011	98–99	27°13.82'	9°45.03'	1520	1	H5	S2	W1	19.3	16.9	–	b
Lahmada 012	98–99	27°14.00'	9°45.51'	2510	1	H5	S2	W2	19.2	16.8	paired 013 and 015?	b
Lahmada 013	98–99	27°14.01'	9°45.49'	1373	many	H6	S3	W1	19.2	16.6	paired 012 and 015?	b
Lahmada 014	98–99	27°14.18'	9°44.48'	312	1	H5	S3	W2	19.1	16.6	–	b
Lahmada 015	98–99	27°14.01'	9°45.46'	1455	1	H6	S3	W2/3	19.2	14.1–19.3	paired 012 and 013?	b
Lahmada 016	98–99	27°13.80'	9°45.40'	998	1	H5	S2	W2	19.2	16.5	paired with 007?	b
Lahmada 017	98–99	27°13.59'	9°44.47'	85	1	H5	S2	W1	19.2	16.7	–	b
Lahmada 018	98–99	27°17.10'	9°35.41'	226	many	H5	S2	W2	17.9	16.4	–	b
Taouz 002	99	~30°54'	3°58'	8350	1	LL6	S3	W0/1	31.0	25.7	–	a

†a = Classified by A. Bischoff (*Mün*), main masses *JNMC* (except Lahmada 009, 7120 g at *JNMC*), type specimens *Mün*; b = Classified by A. Sexton (*OU*), type specimens, *OU*, main masses with anonymous finder.

selling it in 1999. Classification and mineralogy (A. Rubin, *UCLA*): olivine, $Fa_{25.3\pm0.3}$; shock stage, S2; weathering grade, W2. Specimens: type specimen, 80 g, *UCLA*; main mass, *Cott*.

Western Sahara and Morocco meteorites
(20 meteorites)
Northwestern Africa
Found 1999

These meteorites (Table 11) were collected by anonymous persons and are being sold by mineral dealers in Morocco. Lahmada 002-018 come from the same region of Western Sahara as the previously described meteorite Lahmada; the latter now takes on the synonym Lahmada 001. El Blida 001 and 002 and Taouz 002 were found in Morocco. Taouz 001 now becomes a synonym for Taouz, an L6 chondrite found in 1991. Lahmada 010 could be paired with Zag (see *Meteoritical Bulletin* 83), although no unequilibrated lithology such as is found in Zag was identified in the classified thin section.

Wildcat Peak 32°33.92' N, 111°43.53' W
Pinal County, Arizona, USA
Found 1998 Jan 31
Ordinary chondrite (H5)

A 202 g stone was found partially buried in sandy soil by Henry Johnson and Gordon Nelson while they were hiking and looking for minerals in the desert. Classification and mineralogy (D. Hill and D. Kring, *UAz*): $Fa_{19.6\pm1.1}$; pyroxene, $Fs_{17.1\pm1.5}Wo_{1.2\pm0.1}$; kamacite contains 0.46 ± 0.06 wt% Co; weathering grade, W1 (interior) to W3 (near crust); contains microfaults with psuedotachylitic melting along them. Specimens: type specimen, 22.4 g, plus thin section, *UAz*; main mass split between finders.

Zag (b)
Morocco
Found 1992
Primitive achondrite

A well oriented stone weighing 300 g and covered with fusion crust was found by a Moroccan in search of additional pieces from the Zag fall. Classification and mineralogy (B. Zanda, *MNHNP*, and J. Delaney, *RU*): olivine $Fa_{19.4}$; orthopyroxene, $Fs_{25.7}Wo_{2.3}$, clinopyroxene, $Fs_{10.5}Wo_{4.9}$; feldspar, $Ab_{74.6}$; olivines contain small (~10 µm) reaction "channels" in which metal (often transformed into sulfide or oxide) is associated with $Fs_{17}Wo_1$ orthopyroxene. Oxygen isotopes (R. Clayton, *UChi*): $\delta^{18}O$ = +4.84‰, $\delta^{17}O$ = 2.06‰, which places it within the winonaites field and very close to Divnoe. Specimens: 12.7 g plus thin sections, *MNHNP*; main mass, 255 g, *Radomsky*. **Zag (a)** will now become a recognized synonym for the **Zag** fall, although use of this name is discouraged.

Zaklodzie 50°45'46" N, 22°51'58" E
Zamosc, Poland
Found 1998 September
Ungrouped enstatite-rich meteorite

An 8.68 kg stone partially covered with fusion crust was found beside a dirt road by Mr. Stanislaw Jachymek while he was searching for rocks and fossils. Classification and mineralogy (F. Wlotzka, *MPI*; M. Stepniewski, *PGI*; R. Bartoschewitz, *Bart*): granoblastic texture, containing ~60 vol% orthoenstatite, ~20 vol% metal, ~10 vol% troilite, and ~10 vol% feldspar, with accessory schreibersite, silica, oldhamite, alabandite, and amphibole; may be similar to QUE 97289; pyroxene grains 0.1–1 mm, subhedral to rounded, $Fs_{<0.1-1.6}Wo_{0.7}$; feldspar bimodal in composition, $Ab_{59-64}An_{36-41}Or_{0-0.5}$ and $Ab_{86-89}An_{0-5}Or_{9-12}$; metal contains 6–16 wt% Ni, 1.6 wt% Si; troilite contains 4.7 wt% Cr, 1.4 wt% Mn, 0.9 wt% Ti. Specimens: main mass, 8.5 kg, *NEM*; 35 g, *PGI*; 17 g, *Bart*; 1 g, *MPI*.

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APPENDIX 1. Recently described meteorites from ANSMET.*

Name†	Class‡	Mass	Weath.	%Fa	%Fs	Pairing	Ice§	Ref
EET 96009	IAB	40.0	–	5	7-10	87504	j	23(1)
GRA 98001	H5	7296.7	C	19	17	–	17	22(2)
GRA 98002	H5	735.4	B/C	19	16	–	16	23(1)
GRA 98003	L5	426.7	C	23	20	–	3	23(1)
GRA 98004	H5	721.9	C	19	17	–	3	23(1)
GRA 98005	C2	202.9	CE	0-4	1-2	(2)	3	22(2)
GRA 98006	Eu "Br"	163.7	A/B	–	60	(8)	3	22(2)
GRA 98007	H5	82.1	B/C	19	17	–	3	23(1)
GRA 98008	H5	120.1	C	17	16	–	3	23(1)
GRA 98009	H5	116.9	C	19	17	–	3	23(1)
GRA 98010	H5	140.3	C	19	17	–	3	23(1)
GRA 98011	L5	104.5	A	23	20	–	16	23(1)
GRA 98012	H5	530.0	B/C	19	16	–	15	23(1)
GRA 98013	H4	697.5	C	19	1-19	–	3	23(1)
GRA 98014	H5	1130.7	B/C	18	17	–	15	23(1)
GRA 98015	H5	1201.9	C	19	17	–	3	23(1)
GRA 98016	H5	512.8	B/C	19	16	–	3	23(1)
GRA 98017	H5	341.8	B/C	18	16	–	15	23(1)
GRA 98018	H5	315.4	C	19	16	–	3	23(1)
GRA 98019	Eu "Br"	95.5	B	–	64	(13)	3	23(1)
GRA 98020	L5	200.9	B	25	21	–	3	23(1)
GRA 98021	H5	81.3	B/C	19	16	–	15	23(1)
GRA 98022	H5	62.7	C	18	16	–	3	23(1)
GRA 98023	H3.8	136.7	B	3-33	4-9	(4)	3	23(1)
GRA 98024	H3.8	59.1	C	4-22	16	98023	3	23(1)
GRA 98025	CR2	14.4	C	1-37	1-3	–	3	23(1)
GRA 98026	Eu "Br"	68.4	B	–	63	98006	3	23(1)
GRA 98027	H6	14.8	C	20	17	–	3	23(1)
GRA 98028	Acap	22.4	C	8-9	8-10	–	3	23(1)
GRA 98029	L5	8.9	C	23	20	–	3	23(1)
GRA 98030	How	32.6	A/B	12	21-52	–	3	23(1)
GRA 98031	H4	2309.8	C	19	16	–	3	23(1)
GRA 98032	How	1699.5	C	14-26	–	–	3	23(1)
GRA 98033	Eu "Br"	123.2	A/B	–	64	–	3	22(2)
GRA 98034	H6	416.3	C	–	–	–	3	23(1)
GRA 98035	L5	248.4	B	–	–	–	3	23(1)
GRA 98036	L6	182.2	B/C	–	–	–	3	23(1)
GRA 98037	Eu "Br"	107.9	A	–	62	98019	3	23(1)
GRA 98038	H6	118.6	B/C	–	–	–	3	23(1)
GRA 98039	Eu "Br"	72.8	C	–	64	98019	3	23(1)
GRA 98040	H5	542.6	B	20	18	–	3	23(1)
GRA 98041	L6	1081.5	B	–	–	–	3	23(1)
GRA 98042	Eu "Br"	92.6	C	–	64	98019	3	23(1)
GRA 98043	Eu "Br"	102.9	C	–	64	98019	3	23(1)
GRA 98044	Eu "Br"	27.5	B	–	65	98006	3	23(1)
GRA 98045	H4	260.4	C	18	16	–	14	23(1)
GRA 98046	L6	657.6	C	24	20	–	14	23(1)
GRA 98047	H5	594.1	B	19	16	–	14	23(1)
GRA 98048	H6	702.1	C	–	–	–	3	23(1)
GRA 98049	L6	2341.9	C	24	20	–	18	23(1)
GRA 98050	H3.8	337.4	C	4-20	16	98023	17	23(1)
GRA 98051	H5	171.9	CE	–	–	–	3	23(1)
GRA 98052	Eu "Br"	63.6	C	–	64	98019	3	23(1)
GRA 98053	H6	145.5	C	–	–	–	3	23(1)
GRA 98054	Eu "Br"	103.4	A/B	–	62	98006	3	23(1)
GRA 98055	Eu "Br"	140.8	B	–	62	98019	3	23(1)
GRA 98056	H6	177.9	B/C	–	–	–	15	23(1)
GRA 98057	L6	65.1	B/C	–	–	–	3	23(1)
GRA 98058	L5	105.7	C	–	–	–	18	23(1)
GRA 98059	H5	67.9	C	–	–	–	3	23(1)
GRA 98060	H6	54.0	CE	–	–	–	3	23(1)
GRA 98061	L6	121.5	B	–	–	–	3	23(1)
GRA 98062	H5	51.9	C	–	–	–	3	23(1)
GRA 98063	H6	41.1	B/C	–	–	–	3	23(1)
GRA 98064	H6	42.7	C	–	–	–	18	23(1)
GRA 98065	H6	53.6	CE	–	–	–	3	23(1)
GRA 98066	L6	18.2	B	–	–	–	3	23(1)
GRA 98067	Eu "Br"	53.2	A/B	–	61	98006	3	23(1)
GRA 98068	L6	51.6	C	–	–	–	3	23(1)
GRA 98069	H6	42.5	C	–	–	–	3	23(1)
GRA 98070	H6	16.3	C	–	–	–	18	23(1)
GRA 98071	H6	64.3	C	–	–	–	3	23(1)
GRA 98072	H6	29.9	C	–	–	–	3	23(1)
GRA 98073	H6	6.5	C	–	–	–	3	23(1)
GRA 98074	CM2	51.9	CE	1-34	–	98005	18	23(1)
GRA 98075	H5	20.6	C	5-27	–	–	3	23(1)
GRA 98076	H6	29.2	C	–	–	–	3	23(1)
GRA 98077	L6	24.9	C	–	–	–	3	23(1)
GRA 98078	L6	7.5	B/C	–	–	–	3	23(1)
GRA 98079	H6	3.7	C	–	–	–	3	23(1)
GRA 98080	H5	91.8	C	19	16	–	3	23(1)
GRA 98081	H6	87.5	C	–	–	–	3	23(1)
GRA 98082	H6	13.5	C	–	–	–	3	23(1)
GRA 98083	H6	23.0	C	–	–	–	3	23(1)
GRA 98084	L6	42.3	C	–	–	–	3	23(1)
GRA 98085	L6	43.7	C	–	–	–	3	23(1)
GRA 98086	L6	32.3	C	–	–	–	3	23(1)
GRA 98087	H3.8	22.3	C	1-19	8-14	98023	3	23(1)
GRA 98088	Eu "Br"	64.6	A/B	–	62	98006	3	23(1)
GRA 98089	H4	60.8	B/C	19	16	–	3	23(1)
GRA 98090	H5	42.4	C	–	–	–	3	23(1)
GRA 98091	H5	20.8	C	–	–	–	3	23(1)
GRA 98092	H5	20.7	C	–	–	–	3	23(1)
GRA 98093	H5	40.4	C	–	–	–	3	23(1)
GRA 98094	L6	7.2	B	–	–	–	3	23(1)
GRA 98095	L6	31.9	B	–	–	–	3	23(1)
GRA 98096	H6	45.9	C	–	–	–	3	23(1)
GRA 98097	Eu "Br"	12.9	B	–	61	98019	3	23(1)
GRA 98098	Eu "Ub"	779.2	B	–	59	–	3	22(2)
GRA 98099	H5	26.7	C	–	–	–	18	23(1)
GRA 98100	H6	17.9	C	–	–	–	3	23(1)
GRA 98101	L6	38.6	C	–	–	–	3	23(1)
GRA 98102	CK4	7.0	B	24	23	–	3	23(1)
GRA 98103	Eu "Br"	41.1	C	–	65	98006	3	23(1)
GRA 98104	L6	15.2	CE	–	–	–	3	23(1)
GRA 98105	H6	13.9	CE	19	17	–	3	23(1)
GRA 98106	L6	47.6	C	–	–	–	3	23(1)
GRA 98107	L6	35.0	C	–	–	–	3	23(1)
GRA 98108	Ol Diog	12.7	B	27	22	–	3	23(1)
GRA 98109	L5	7.3	C	25	21	–	14	23(1)
GRA 98110	H6	70.3	C	–	–	–	3	23(1)
GRA 98111	H6	80.0	C	–	–	–	3	23(1)
GRA 98112	H6	86.0	C	–	–	–	3	23(1)
GRA 98113	Eu "Br"	63.7	B/C	–	62	98019	3	23(1)
GRA 98114	Eu "Br"	58.7	B	–	65	98019	3	23(1)
GRA 98115	L6	44.9	B	–	–	–	3	23(1)
GRA 98116	L6	66.5	B/C	–	–	–	3	23(1)
GRA 98117	H5	89.5	C	–	–	–	3	23(1)
GRA 98118	L6	78.4	A	–	–	–	15	23(1)
GRA 98119	L6	45.4	C	–	–	–	3	23(1)
GRA 98120	L6	42.5	C	–	–	–	3	23(1)
GRA 98121	H5	48.0	C	–	–	–	3	23(1)
GRA 98122	H6	12.9	C	19	16	–	3	23(1)
GRA 98123	L6	14.8	C	–	–	–	3	23(1)
GRA 98124	H5	5.8	C	–	–	–	3	23(1)
GRA 98125	H5	17.4	C	–	–	–	3	23(1)
GRA 98126	H5	26.2	C	–	–	–	3	23(1)
GRA 98127	H5	17.5	C	–	–	–	3	23(1)
GRA 98128	H5	19.6	C	19	17	–	3	23(1)
GRA 98130	L4	45.1	B	25	6-22	–	3	23(1)
GRA 98131	Eu "Br"	26.1	B/C	–	62	98006	3	23(1)
GRA 98132	H6	14.6	C	–	–	–	3	23(1)
GRA 98133	H6	18.7	C	–	–	–	3	23(1)
GRA 98134	H5	22.4	C	–	–	–	3	23(1)
GRA 98135	H6	25.7	C	–	–	–	3	23(1)
GRA 98136	H5	2.7	C	–	–	–	3	23(1)
GRA 98137	H6	16.4	C	–	–	–	3	23(1)
GRA 98138	H5	9.8	C	–	–	–	3	23(1)
GRA 98139	H6	63.8	C	–	–	–	3	23(1)
GRA 98141	H6	41.5	C	–	–	–	3	23(1)
GRA 98142	L6	9.1	A/B	–	–	–	18	23(1)
GRA 98143	L6	11.0	B	–	–	–	3	23(1)
GRA 98144	H6	13.9	C	19	16	–	3	23(1)
GRA 98145	H6	16.1	C	18	16	–	3	23(1)
GRA 98146	H5	3.6	C	–	–	–	3	23(1)
GRA 98147	L6	9.2	C	–	–	–	3	23(1)
GRA 98148	H5	6.7	C	–	–	–	3	23(1)
GRA 98149	H6	79.7	C	–	–	–	3	23(1)
GRA 98150	H6	36.9	C	19	16	–	3	23(1)
GRA 98151	H6	52.8	C	–	–	–	3	23(1)
GRA 98152	H4	69.3	C	18	9-17	–	3	23(1)
GRA 98153	H4	35.1	B/C	17	5-16	–	3	23(1)
GRA 98154	H5	21.2	C	–	–	–	3	23(1)
GRA 98155	H5	33.9	C	–	–	–	3	23(1)

Name[†]	Class[‡]	Mass	Weath.	%Fa	%Fs	Pairing	Ice[§]	Ref
GRA 98156	H5	29.3	C	–	–	–	3	23(1)
GRA 98157	Eu "Br"	39.2	C	–	63	98019	3	23(1)
GRA 98158	Eu "Br"	66.9	B	–	62	98019	3	23(1)
GRA 98159	Eu "Br"	33.9	B	–	62	98019	3	23(1)
GRA 98160	H6	7.8	B/C	18	17	–	3	23(1)
GRA 98161	H6	7.7	C	19	17	–	3	23(1)
GRA 98162	L6	0.8	B	–	–	–	16	23(1)
GRA 98163	H6	15.5	C	–	–	–	3	23(1)
GRA 98164	L6	15.1	C	23	20	–	3	23(1)
GRA 98165	H6	11.3	C	–	–	–	3	23(1)
GRA 98166	H5	10.8	C	–	–	–	3	23(1)
GRA 98167	H5	4.9	C	–	–	–	3	23(1)
GRA 98168	How	7.0	A	–	26	–	3	23(1)
GRA 98169	LL5	22.1	B	28	23	–	3	23(1)
GRA 98170	H5	21.0	C	–	–	–	3	23(1)
GRA 98171	L3.8	8.0	CE	7-25	4-20	–	3	23(1)
GRA 98172	H6	13.8	C	–	–	–	3	23(1)
GRA 98173	L5	30.0	B/C	25	21	–	3	23(1)
GRA 98174	L6	8.5	A	–	–	–	15	23(1)
GRA 98175	L6	27.5	B	–	–	–	16	23(1)
GRA 98176	H6	15.1	C	20	17	–	3	23(1)
GRA 98177	H6	10.0	C	–	–	–	3	23(1)
GRA 98178	L6	7.2	B/C	–	–	–	3	23(1)
GRA 98179	H6	18.7	B/C	–	–	–	3	23(1)
GRA 98180	H5	13.1	CE	–	–	–	3	23(1)
GRA 98181	L4	2.9	B/C	23	19	–	18	23(1)
GRA 98182	H6	63.5	C	–	–	–	3	23(1)
GRA 98183	L6	145.4	B/C	–	–	–	3	23(1)
GRA 98184	L6	119.1	B/C	–	–	–	3	23(1)
GRA 98185	H6	70.0	C	–	–	–	3	23(1)
GRA 98186	H6	29000.0	B	19	16	–	16	23(1)
GRO 95659	H6	6.9	B	19	17	–	1	22(2)
QUE 97077	CM2	20.0	A/B	1-35	0-1	(2)	F	23(1)
QUE 97150	LL5	0.6	B	–	–	–	S	22(2)
QUE 97151	LL5	1.6	B	–	–	–	S	22(2)
QUE 97152	LL5	0.3	B	–	–	–	S	22(2)
QUE 97153	LL5	7.5	B	–	–	–	S	22(2)
QUE 97154	LL5	9.1	B	–	–	–	S	22(2)
QUE 97155	LL5	27.2	A	–	–	–	S	22(2)
QUE 97156	LL5	6.2	B	–	–	–	S	22(2)
QUE 97157	LL5	4.8	B	–	–	–	S	22(2)
QUE 97158	LL5	45.2	B/C	–	–	–	S	22(2)
QUE 97159	LL5	0.7	B	–	–	–	S	22(2)
QUE 97160	LL5	32.3	B	–	–	–	S	22(2)
QUE 97161	LL5	1.4	B	–	–	–	S	22(2)
QUE 97162	LL5	4.8	A/B	–	–	–	S	22(2)
QUE 97163	LL5	8.7	A/B	–	–	–	S	22(2)
QUE 97164	LL5	11.9	B	–	–	–	S	22(2)
QUE 97165	LL5	7.3	B	–	–	–	S	22(2)
QUE 97166	LL5	5.6	A/B	–	–	–	S	22(2)
QUE 97167	LL5	2.4	B	–	–	–	S	22(2)
QUE 97168	H3.6	24.8	C	9-23	1-25	–	S	22(2)
QUE 97169	H5	15.2	C	18	17	–	S	22(2)
QUE 97170	LL5	11.8	A	–	–	–	S	22(2)
QUE 97171	LL5	43.5	A	–	–	–	S	22(2)
QUE 97172	LL5	44.6	A/B	–	–	–	S	22(2)
QUE 97173	LL5	70.2	B	–	–	–	S	22(2)
QUE 97174	LL5	58.8	B	–	–	–	S	22(2)
QUE 97175	LL5	29.8	A	–	–	–	S	22(2)
QUE 97176	LL5	2.8	A	–	–	–	S	22(2)
QUE 97177	LL5	41.4	A	–	–	–	S	22(2)
QUE 97178	LL5	53.8	A	–	–	–	S	22(2)
QUE 97179	LL5	13.7	B	–	–	–	S	22(2)
QUE 97180	LL5	232.5	B	–	–	–	S	22(2)
QUE 97181	LL5	89.8	A/B	–	–	–	S	22(2)
QUE 97182	LL5	109.7	A	–	–	–	S	22(2)
QUE 97183	LL5	83.9	A	–	–	–	S	22(2)
QUE 97184	LL5	134.9	B	–	–	–	S	22(2)
QUE 97185	LL5	37.8	B	–	–	–	S	22(2)
QUE 97186	CV3	72.7	B	0-31	1-2	–	S	22(2)
QUE 97187	LL5	2.4	A/B	–	–	–	F	22(2)
QUE 97188	LL5	5.5	A	–	–	–	F	22(2)
QUE 97189	LL5	3.3	A/B	–	–	–	S	22(2)
QUE 97190	LL5	59.2	A/B	–	–	–	S	22(2)
QUE 97191	LL5	7.1	A/B	–	–	–	S	22(2)
QUE 97192	LL5	3.9	A/B	–	–	–	F	22(2)
QUE 97193	LL5	36.8	C	–	–	–	S	22(2)
QUE 97194	H5	4.6	C	19	16	–	S	22(2)
QUE 97195	LL5	0.8	B	–	–	–	F	22(2)
QUE 97196	LL5	4.0	A/B	–	–	–	F	22(2)
QUE 97197	H5	20.7	C	19	17	–	S	22(2)
QUE 97198	LL5	1.2	B	–	–	–	F	22(2)
QUE 97199	LL5	3.3	A/B	–	–	–	F	22(2)
QUE 97200	LL5	20.6	A/B	–	–	–	S	22(2)
QUE 97201	LL5	0.9	B	–	–	–	F	22(2)
QUE 97202	LL5	30.4	A/B	–	–	–	S	22(2)
QUE 97203	LL5	17.2	B/C	–	–	–	S	22(2)
QUE 97204	LL5	14.1	A/B	–	–	–	S	22(2)
QUE 97205	LL5	14.6	B	–	–	–	S	22(2)
QUE 97206	LL5	17.0	B	–	–	–	S	22(2)
QUE 97207	LL5	38.0	B	–	–	–	S	22(2)
QUE 97208	H5	38.2	C	19	17	–	S	22(2)
QUE 97209	LL5	17.6	A/B	–	–	–	S	22(2)
QUE 97210	LL5	85.0	A/B	–	–	–	S	22(2)
QUE 97211	H5	53.6	B	18	17	–	S	22(2)
QUE 97212	LL5	4.8	A/B	–	–	–	S	22(2)
QUE 97213	LL5	57.9	A/B	–	–	–	F	22(2)
QUE 97214	LL5	8.1	A/B	–	–	–	S	22(2)
QUE 97215	H5	10.9	C	19	17	–	S	22(2)
QUE 97216	LL5	9.6	A/B	–	–	–	F	22(2)
QUE 97217	LL5	9.9	A/B	–	–	–	S	22(2)
QUE 97218	L5	18.6	A/B	25	21	–	S	22(2)
QUE 97219	LL5	8.1	B	–	–	–	S	22(2)
QUE 97220	LL5	4.8	B	–	–	–	S	22(2)
QUE 97221	LL5	10.0	B	–	–	–	S	22(2)
QUE 97222	LL5	8.9	B	–	–	–	S	22(2)
QUE 97223	LL5	4.6	B	–	–	–	S	22(2)
QUE 97224	H6	11.0	CE	19	17	–	S	22(2)
QUE 97225	LL5	14.3	B	–	–	–	S	22(2)
QUE 97226	H5	34.9	B/C	18	16	–	S	22(2)
QUE 97227	LL5	9.8	B	–	–	–	S	22(2)
QUE 97228	LL5	1.5	B	–	–	–	F	22(2)
QUE 97229	LL5	5.0	A/B	–	–	–	S	22(2)
QUE 97230	LL5	11.2	B	–	–	–	S	22(2)
QUE 97231	LL5	47.6	B	–	–	–	S	22(2)
QUE 97232	H5	86.3	C	18	16	–	S	22(2)
QUE 97233	LL5	39.3	A/B	–	–	–	S	22(2)
QUE 97234	LL5	3.0	A/B	–	–	–	F	22(2)
QUE 97235	LL5	17.2	A/B	–	–	–	S	22(2)
QUE 97236	LL5	9.5	A/B	–	–	–	S	22(2)
QUE 97237	LL5	1.1	A/B	–	–	–	F	22(2)
QUE 97238	LL5	32.3	A/B	–	–	–	F	22(2)
QUE 97239	LL5	1.2	C	–	–	–	S	22(2)
QUE 97240	LL5	12.0	A/B	–	–	–	S	22(2)
QUE 97241	LL5	2.3	A/B	–	–	–	F	22(2)
QUE 97242	H5	26.9	C	18	16	–	S	22(2)
QUE 97243	LL5	46.9	B/C	–	–	–	S	22(2)
QUE 97244	LL5	9.6	B	–	–	–	S	22(2)
QUE 97245	LL5	7.0	B	–	–	–	S	22(2)
QUE 97246	LL5	0.4	B	–	–	–	S	22(2)
QUE 97247	LL5	50.7	A/B	–	–	–	F	22(2)
QUE 97248	LL5	26.0	B	–	–	–	S	22(2)
QUE 97249	LL5	43.6	A	–	–	–	S	22(2)
QUE 97250	LL5	8.4	B	–	–	–	S	22(2)
QUE 97251	LL5	0.9	B	–	–	–	S	22(2)
QUE 97252	LL5	8.9	A/B	–	–	–	S	22(2)
QUE 97253	LL5	31.9	B/C	–	–	–	S	22(2)
QUE 97254	LL5	3.6	B	–	–	–	S	22(2)
QUE 97255	LL5	0.4	B	–	–	–	F	22(2)
QUE 97256	LL5	0.4	A/B	–	–	–	F	22(2)
QUE 97257	LL5	6.6	A/B	–	–	–	S	22(2)
QUE 97258	LL5	2.8	B	–	–	–	F	22(2)
QUE 97259	LL5	0.6	A/B	–	–	–	F	22(2)
QUE 97260	LL5	23.2	B	–	–	–	S	22(2)
QUE 97261	LL5	47.2	B	–	–	–	S	22(2)
QUE 97262	LL5	31.2	A/B	–	–	–	S	22(2)
QUE 97263	LL5	23.4	B	–	–	–	S	22(2)
QUE 97264	LL5	37.4	A/B	–	–	–	F	22(2)
QUE 97265	LL5	15.5	B/C	–	–	–	S	22(2)
QUE 97266	LL5	28.4	B	–	–	–	S	22(2)
QUE 97267	LL5	19.4	B	–	–	–	S	22(2)
QUE 97268	LL5	36.9	B	–	–	–	S	22(2)
QUE 97269	LL5	21.5	B	–	–	–	S	22(2)
QUE 97270	H5	4.9	B/C	18	16	–	S	22(2)
QUE 97271	LL5	1.8	A/B	–	–	–	F	22(2)
QUE 97272	LL5	13.9	A/B	–	–	–	F	22(2)

Name†	Class‡	Mass	Weath.	%Fa	%Fs	Pairing	Ice§	Ref
QUE 97273	LL5	2.8	A/B	–	–	–	F	22(2)
QUE 97274	LL5	15.6	A/B	–	–	–	S	22(2)
QUE 97275	LL5	61.0	A/B	–	–	–	S	22(2)
QUE 97276	LL5	9.3	A	–	–	–	S	22(2)
QUE 97277	LL5	22.0	A	–	–	–	S	22(2)
QUE 97278	LL5	32.7	A	–	–	–	S	22(2)
QUE 97279	LL5	27.3	A	–	–	–	S	22(2)
QUE 97280	LL5	10.2	B	–	–	–	F	22(2)
QUE 97281	LL5	23.1	B	–	–	–	F	22(2)
QUE 97282	LL5	1.8	B	–	–	–	S	22(2)
QUE 97283	LL5	37.2	B	–	–	–	S	22(2)
QUE 97284	LL5	23.9	A/B	–	–	–	S	22(2)
QUE 97285	H6	20.9	B/C	20	17	–	V	22(2)
QUE 97286	LL5	58.2	B	–	–	–	Y	22(2)
QUE 97287	LL5	23.0	B	–	–	–	S	22(2)
QUE 97288	L6	100.4	B/CE	–	–	–	V	22(2)
QUE 97289	Aub	51.9	C	–	0.1	(2)	19	22(2)
QUE 97290	L6	129.8	B	–	–	–	19	22(2)
QUE 97291	LL5	14.1	A/B	–	–	–	R	22(2)
QUE 97292	H5	104.0	C	18	16	–	?	22(2)
QUE 97293	LL6	3.6	B/C	30	26	–	R	22(2)
QUE 97294	H5	14.9	B	20	17	–	W	22(2)
QUE 97295	H6	2.2	C	19	17	–	R	22(2)
QUE 97296	LL5	2.4	B	–	–	–	R	22(2)
QUE 97297	LL5	2.5	B	–	–	–	R	22(2)
QUE 97298	LL5	4.3	B	–	–	–	R	22(2)
QUE 97299	H5	1.8	C	19	17	–	Q	22(2)
QUE 97300	LL5	24.7	A/B	–	–	–	S	22(2)
QUE 97301	LL5	4.7	A/B	–	–	–	S	22(2)
QUE 97302	LL5	4.7	A/B	–	–	–	S	22(2)
QUE 97303	LL5	18.8	A/B	–	–	–	S	22(2)
QUE 97304	LL5	0.8	A/B	–	–	–	S	22(2)
QUE 97305	LL5	29.5	A/B	–	–	–	S	22(2)
QUE 97306	LL5	3.8	A/B	–	–	–	S	22(2)
QUE 97307	LL5	13.4	A/B	–	–	–	S	22(2)
QUE 97308	LL5	5.8	A/B	–	–	–	S	22(2)
QUE 97309	LL5	0.7	A/B	–	–	–	S	22(2)
QUE 97310	LL5	7.4	B	–	–	–	S	22(2)
QUE 97311	LL5	25.3	B	–	–	–	S	22(2)
QUE 97312	LL5	4.2	B/C	–	–	–	S	22(2)
QUE 97313	LL5	20.1	B/C	–	–	–	S	22(2)
QUE 97314	LL5	2.0	B	–	–	–	S	22(2)
QUE 97315	LL5	7.5	B	–	–	–	S	22(2)
QUE 97316	LL6	23.4	A/B	30	24	–	S	22(2)
QUE 97317	H5	7.6	C	19	17	–	F	22(2)
QUE 97318	LL5	7.8	B	–	–	–	S	22(2)
QUE 97319	L6	2.0	C	–	–	–	Q	22(2)
QUE 97320	H5	12.1	C	18	16	–	Q	22(2)
QUE 97321	LL5	96.4	A/B	–	–	–	S	22(2)
QUE 97322	LL5	0.7	B	–	–	–	S	22(2)
QUE 97323	LL5	20.1	B	–	–	–	S	22(2)
QUE 97324	LL5	46.9	A/B	–	–	–	S	22(2)
QUE 97325	LL5	43.3	B	–	–	–	S	22(2)
QUE 97326	LL5	12.2	B	–	–	–	S	22(2)
QUE 97327	LL5	5.8	B	–	–	–	S	22(2)
QUE 97328	L6	6.3	B	–	–	–	S	22(2)
QUE 97329	LL5	70.4	A/B	–	–	–	S	22(2)
QUE 97330	LL5	27.8	A/B	–	–	–	S	22(2)
QUE 97331	L5	36.7	B/C	26	22	–	Q	22(2)
QUE 97332	LL5	36.5	A/B	–	–	–	S	22(2)
QUE 97333	LL5	11.5	A/B	–	–	–	S	22(2)
QUE 97334	LL5	43.5	B	–	–	–	S	22(2)
QUE 97335	LL5	9.7	B	–	–	–	S	22(2)
QUE 97336	LL5	1.9	B	–	–	–	S	22(2)
QUE 97337	L6	16.7	C	25	21	–	Q	22(2)
QUE 97338	L6	23.0	C	–	–	–	F	22(2)
QUE 97339	LL5	7.5	A/B	–	–	–	S	22(2)
QUE 97340	LL5	9.7	B	–	–	–	F	22(2)
QUE 97341	LL5	21.7	B	–	–	–	F	22(2)
QUE 97342	H5	177.0	C	17	15	–	F	22(2)
QUE 97343	H5	76.2	B/C	18	16	–	W	22(2)
QUE 97344	LL5	31.9	B	–	–	–	R	22(2)
QUE 97345	LL5	40.8	B	–	–	–	R	22(2)
QUE 97346	L6	130.2	B/C	–	–	–	Y	22(2)
QUE 97347	L6	98.0	B/C	–	–	–	S	22(2)
QUE 97348	Aub	50.7	C	–	0.2	97289	19	22(2)
QUE 97349	LL5	24.8	B	–	–	–	F	22(2)
QUE 97350	L6	71.2	B	24	21	–	?	22(2)
QUE 97351	LL5	47.5	A/B	–	–	–	F	22(2)
QUE 97352	LL5	9.1	A/B	–	–	–	R	22(2)
QUE 97353	LL5	25.0	B	–	–	–	R	22(2)
QUE 97354	LL5	20.1	B	–	–	–	R	22(2)
QUE 97355	LL5	15.0	B	–	–	–	R	22(2)
QUE 97356	H6	11.6	C	18	16	–	U	22(2)
QUE 97357	H5	4.7	C	19	16	–	R	22(2)
QUE 97358	L6	8.9	C	–	–	–	V	22(2)
QUE 97359	LL5	0.5	A/B	–	–	–	F	22(2)
QUE 97360	L6	139.9	B/C	24	20	–	F	22(2)
QUE 97361	LL5	14.1	A/B	–	–	–	S	22(2)
QUE 97362	L6	16.5	B/C	–	–	–	S	22(2)
QUE 97363	LL5	73.3	B	–	–	–	S	22(2)
QUE 97364	LL5	28.4	A/B	–	–	–	S	22(2)
QUE 97365	LL5	12.8	A/B	–	–	–	S	22(2)
QUE 97366	LL5	85.6	A/B	–	–	–	S	22(2)
QUE 97367	LL5	8.1	A/B	–	–	–	F	22(2)
QUE 97368	LL5	13.8	A/B	–	–	–	S	22(2)
QUE 97369	LL5	3.2	B	–	–	–	F	22(2)
QUE 97370	LL5	1.3	B	–	–	–	F	22(2)
QUE 97371	L6	1.0	C	–	–	–	R	22(2)
QUE 97372	LL5	0.7	B	–	–	–	F	22(2)
QUE 97373	LL5	5.4	B	–	–	–	F	22(2)
QUE 97375	LL5	4.2	A/B	–	–	–	S	22(2)
QUE 97376	LL5	4.2	B	–	–	–	F	22(2)
QUE 97377	LL5	1.7	A/B	–	–	–	F	22(2)
QUE 97378	L6	1.3	A/B	–	–	–	F	22(2)
QUE 97379	LL5	2.7	A/B	–	–	–	S	22(2)
QUE 97380	LL5	31.9	A/B	–	–	–	S	22(2)
QUE 97381	L6	2.8	B	–	–	–	F	22(2)
QUE 97382	LL5	0.1	B	–	–	–	F	22(2)
QUE 97383	H5	3.1	B	18	16	–	S	22(2)
QUE 97384	LL5	28.6	B	–	–	–	S	22(2)
QUE 97385	LL5	12.5	B	–	–	–	S	22(2)
QUE 97386	LL5	21.5	A/B	–	–	–	S	22(2)
QUE 97387	LL5	54.3	A/B	–	–	–	S	22(2)
QUE 97388	LL5	3.5	A/B	–	–	–	S	22(2)
QUE 97389	LL5	6.6	A/B	–	–	–	S	22(2)
QUE 97390	LL5	64.9	A	–	–	–	S	22(2)
QUE 97391	LL5	21.5	A	–	–	–	S	22(2)
QUE 97392	LL5	25.3	A	–	–	–	S	22(2)
QUE 97393	LL5	7.3	A/B	–	–	–	S	22(2)
QUE 97394	LL5	38.8	A/B	–	–	–	S	22(2)
QUE 97395	LL5	54.5	A	–	–	–	S	22(2)
QUE 97396	LL5	16.8	A	–	–	–	S	22(2)
QUE 97397	LL5	75.8	A	–	–	–	S	22(2)
QUE 97398	LL5	44.1	B	–	–	–	S	22(2)
QUE 97399	LL5	31.2	A	–	–	–	S	22(2)
QUE 97400	LL5	34.4	A/B	–	–	–	S	22(2)
QUE 97401	LL5	42.3	A/B	–	–	–	S	22(2)
QUE 97402	LL5	43.0	A/B	–	–	–	S	22(2)
QUE 97403	LL5	116.3	A/B	–	–	–	S	22(2)
QUE 97404	LL5	20.0	A/B	–	–	–	S	22(2)
QUE 97405	LL5	20.5	A/B	–	–	–	S	22(2)
QUE 97406	LL5	16.0	A/B	–	–	–	S	22(2)
QUE 97407	LL5	18.0	B	–	–	–	S	22(2)
QUE 97408	LL5	29.6	A/B	–	–	–	S	22(2)
QUE 97409	LL5	2.4	A/B	–	–	–	S	22(2)
QUE 97411	LL5	5.5	A	–	–	–	S	22(2)
QUE 97412	LL5	0.8	B	–	–	–	F	22(2)
QUE 97413	LL5	3.0	A/B	–	–	–	S	22(2)
QUE 97415	LL5	12.2	A/B	–	–	–	S	22(2)
QUE 97416	CO3	12.3	B/C	1-50	1-15	–	V	23(1)
QUE 97417	LL5	8.7	A/B	–	–	–	S	22(2)
QUE 97418	LL5	4.7	B	–	–	–	S	22(2)
QUE 97419	LL5	1.3	B	–	–	–	S	22(2)
QUE 97420	LL5	23.2	B	28	23	–	S	23(1)
QUE 97421	LL5	29.0	B	–	–	–	S	23(1)
QUE 97422	LL5	10.6	A/B	–	–	–	F	23(1)
QUE 97423	LL5	15.2	A/B	–	–	–	S	23(1)
QUE 97424	LL5	7.9	B	–	–	–	S	23(1)
QUE 97425	LL5	37.1	B	–	–	–	S	23(1)
QUE 97426	LL5	36.3	A/B	–	–	–	F	23(1)
QUE 97427	LL5	28.9	B	–	–	–	S	23(1)
QUE 97428	LL5	42.1	B	–	–	–	S	23(1)
QUE 97429	LL5	39.9	B/C	28	23	–	S	23(1)
QUE 97430	Eu "Br"	69.7	B	–	60	–	S	23(1)
QUE 97431	LL5	101.6	A/B	–	–	–	S	23(1)

Name[†]	Class[‡]	Mass	Weath.	%Fa	%Fs	Pairing	Ice[§]	Ref
QUE 97432	H5	128.7	B/C	19	16	–	V	23(1)
QUE 97433	LL5	106.2	A/B	–	–	–	S	23(1)
QUE 97434	LL5	37.3	A/B	–	–	–	F	23(1)
QUE 97435	LL5	14.7	A/B	–	–	–	S	23(1)
QUE 97436	LL5	1.9	A/B	–	–	–	F	23(1)
QUE 97437	LL5	3.0	A/B	–	–	–	S	23(1)
QUE 97438	LL5	2.6	A/B	–	–	–	F	23(1)
QUE 97439	LL5	5.1	A/B	–	–	–	S	23(1)
QUE 97440	L6	87.3	B/C	–	–	–	S	23(1)
QUE 97441	LL5	60.2	A/B	–	–	–	S	23(1)
QUE 97442	LL5	42.2	A/B	–	–	–	S	23(1)
QUE 97443	LL5	32.6	A/B	–	–	–	S	23(1)
QUE 97444	LL5	76.0	A/B	–	–	–	S	23(1)
QUE 97445	LL5	35.8	A/B	–	–	–	S	23(1)
QUE 97446	LL5	20.5	A/B	–	–	–	S	23(1)
QUE 97447	LL5	22.6	A/B	–	–	–	S	23(1)
QUE 97448	LL5	17.4	A/B	–	–	–	S	23(1)
QUE 97449	LL5	10.9	A/B	–	–	–	S	23(1)
QUE 97450	LL5	11.8	A/B	–	–	–	F	23(1)
QUE 97451	LL5	24.7	A/B	–	–	–	S	23(1)
QUE 97452	LL5	7.3	A/B	–	–	–	S	23(1)
QUE 97453	LL5	8.2	A/B	–	–	–	S	23(1)
QUE 97454	LL5	9.8	B	–	–	–	S	23(1)
QUE 97455	LL5	13.5	A/B	–	–	–	F	23(1)
QUE 97456	H6	3.8	B/C	–	–	–	F	23(1)
QUE 97457	LL5	1.6	B	–	–	–	S	23(1)
QUE 97458	LL5	1.5	B	–	–	–	S	23(1)
QUE 97459	LL5	2.4	A/B	–	–	–	S	23(1)
QUE 97460	LL5	6.4	B/C	–	–	–	S	23(1)
QUE 97461	LL5	16.3	A/B	–	–	–	S	23(1)
QUE 97462	EL6	12.3	BE	–	0-1	–	S	23(1)
QUE 97463	LL5	3.0	B/C	–	–	–	S	23(1)
QUE 97464	LL5	2.3	C	–	–	–	S	23(1)
QUE 97465	LL5	13.9	A/B	–	–	–	S	23(1)
QUE 97466	LL5	30.9	A	–	–	–	S	23(1)
QUE 97467	LL5	7.2	B/C	–	–	–	S	23(1)
QUE 97468	LL5	8.4	B/C	–	–	–	S	23(1)
QUE 97469	LL5	23.7	A/B	–	–	–	S	23(1)
QUE 97470	LL5	52.7	A/B	–	–	–	S	23(1)
QUE 97471	LL5	27.3	A/B	–	–	–	S	23(1)
QUE 97472	LL5	17.1	A/B	–	–	–	S	23(1)
QUE 97473	L6	4.9	B/C	–	–	–	F	23(1)
QUE 97474	LL5	7.4	A/B	–	–	–	F	23(1)
QUE 97475	LL5	7.2	A/B	–	–	–	S	23(1)
QUE 97476	LL5	33.7	A/B	–	–	–	S	23(1)
QUE 97477	H6	74.4	B/C	–	–	–	V	23(1)
QUE 97478	H6	83.5	B/C	–	–	–	V	23(1)
QUE 97479	LL5	0.5	A/B	–	–	–	S	23(1)
QUE 97480	LL5	10.1	A/B	–	–	–	S	23(1)
QUE 97481	LL5	9.4	A/B	–	–	–	S	23(1)
QUE 97482	LL5	27.7	B	–	–	–	S	23(1)
QUE 97483	LL5	0.5	A/B	–	–	–	S	23(1)
QUE 97484	LL5	0.4	A/B	–	–	–	S	23(1)
QUE 97485	LL5	1.2	A/B	–	–	–	S	23(1)
QUE 97486	LL5	4.2	B	–	–	–	S	23(1)
QUE 97487	LL5	22.2	A/B	–	–	–	S	23(1)
QUE 97488	LL5	2.8	A/B	–	–	–	F	23(1)
QUE 97489	LL5	1.3	B	–	–	–	S	23(1)
QUE 97490	LL5	101.8	B	–	–	–	V	23(1)
QUE 97491	LL5	0.3	B	–	–	–	F	23(1)
QUE 97492	LL5	8.9	B	–	–	–	S	23(1)
QUE 97493	LL5	8.4	B	–	–	–	S	23(1)
QUE 97494	LL5	3.6	B	–	–	–	S	23(1)
QUE 97495	LL5	34.5	B	–	–	–	S	23(1)
QUE 97496	LL5	2.4	B	–	–	–	S	23(1)
QUE 97497	LL5	1.2	A	–	–	–	S	23(1)
QUE 97498	LL5	1.1	B	–	–	–	S	23(1)
QUE 97499	LL5	0.1	B	–	–	–	S	23(1)
QUE 97500	LL5	2.9	A/B	–	–	–	S	23(1)
QUE 97501	LL5	48.3	A/B	–	–	–	S	23(1)
QUE 97502	LL5	1.2	B	–	–	–	S	23(1)
QUE 97503	LL5	4.8	A/B	–	–	–	F	23(1)
QUE 97504	LL5	15.5	A/B	–	–	–	F	23(1)
QUE 97505	LL5	1.6	A/B	–	–	–	F	23(1)
QUE 97506	LL5	2.6	A/B	–	–	–	S	23(1)
QUE 97507	LL5	5.1	A/B	–	–	–	F	23(1)
QUE 97508	LL5	1.7	A/B	–	–	–	F	23(1)
QUE 97509	LL5	1.7	A/B	–	–	–	F	23(1)
QUE 97510	LL5	2.4	A	–	–	–	F	23(1)
QUE 97511	LL5	0.8	A	–	–	–	F	23(1)
QUE 97512	LL5	0.5	A/B	–	–	–	F	23(1)
QUE 97513	LL5	4.1	A/B	–	–	–	F	23(1)
QUE 97514	LL5	42.5	B	–	–	–	F	23(1)
QUE 97515	LL5	29.0	A/B	–	–	–	F	23(1)
QUE 97516	LL5	1.2	A/B	–	–	–	F	23(1)
QUE 97517	LL5	0.6	A/B	–	–	–	S	23(1)
QUE 97518	LL5	3.3	A/B	–	–	–	F	23(1)
QUE 97519	LL5	6.7	A/B	–	–	–	F	23(1)
QUE 97520	LL5	2.2	A/B	–	–	–	F	23(1)
QUE 97521	LL5	41.4	A/B	–	–	–	S	23(1)
QUE 97522	LL5	38.5	A/B	–	–	–	S	23(1)
QUE 97523	LL5	26.5	A/B	–	–	–	F	23(1)
QUE 97524	LL5	80.5	A/B	–	–	–	F	23(1)
QUE 97525	LL5	130.0	A/B	–	–	–	S	23(1)
QUE 97526	LL5	33.3	A/B	–	–	–	S	23(1)
QUE 97527	LL5	25.2	A/B	–	–	–	S	23(1)
QUE 97528	LL5	15.3	A/B	–	–	–	S	23(1)
QUE 97529	LL5	22.5	A/B	–	–	–	S	23(1)
QUE 97530	LL5	2.9	B	–	–	–	F	23(1)
QUE 97531	LL5	2.2	A/B	–	–	–	F	23(1)
QUE 97532	LL5	5.2	A/B	–	–	–	S	23(1)
QUE 97533	H6	9.3	C	–	–	–	S	23(1)
QUE 97534	LL5	2.2	A/B	–	–	–	F	23(1)
QUE 97535	LL5	2.1	A/B	–	–	–	S	23(1)
QUE 97536	LL5	1.5	B	–	–	–	S	23(1)
QUE 97537	LL5	16.3	A/B	–	–	–	S	23(1)
QUE 97538	L6	4.6	C	–	–	–	S	23(1)
QUE 97539	LL5	1.1	B	–	–	–	S	23(1)
QUE 97540	LL5	2.1	A/B	–	–	–	F	23(1)
QUE 97541	LL5	3.6	A/B	–	–	–	F	23(1)
QUE 97542	LL5	12.3	A/B	–	–	–	S	23(1)
QUE 97543	LL5	1.2	A/B	–	–	–	S	23(1)
QUE 97544	LL5	9.1	A/B	–	–	–	S	23(1)
QUE 97545	H6	3.1	B	–	–	–	S	23(1)
QUE 97546	LL5	3.5	A/B	–	–	–	S	23(1)
QUE 97547	LL5	0.4	B	–	–	–	F	23(1)
QUE 97548	LL5	2.0	A/B	–	–	–	F	23(1)
QUE 97549	LL5	8.6	B	–	–	–	F	23(1)
QUE 97550	H6	50.4	B	–	–	–	S	23(1)
QUE 97551	LL5	29.2	B	–	–	–	S	23(1)
QUE 97552	LL5	28.6	C	–	–	–	F	23(1)
QUE 97553	LL5	78.8	B	–	–	–	S	23(1)
QUE 97554	LL5	37.6	B	–	–	–	S	23(1)
QUE 97555	L6	96.9	A/B	–	–	–	S	23(1)
QUE 97556	LL5	78.5	A	–	–	–	S	23(1)
QUE 97557	LL5	26.1	A	–	–	–	S	23(1)
QUE 97558	L6	39.0	A/B	–	–	–	S	23(1)
QUE 97559	LL5	92.8	B	–	–	–	S	23(1)
QUE 97560	LL5	7.7	A/B	–	–	–	S	23(1)
QUE 97561	H5	21.6	B	–	–	–	T	23(1)
QUE 97562	LL5	10.1	A/B	–	–	–	S	23(1)
QUE 97563	LL5	3.5	A/B	–	–	–	S	23(1)
QUE 97564	LL5	4.4	A/B	–	–	–	S	23(1)
QUE 97565	LL5	22.8	A/B	–	–	–	S	23(1)
QUE 97566	LL5	5.7	A/B	–	–	–	S	23(1)
QUE 97567	LL5	3.4	A/B	–	–	–	S	23(1)
QUE 97568	LL5	3.3	A/B	–	–	–	F	23(1)
QUE 97569	H6	16.0	B	–	–	–	S	23(1)
QUE 97570	H6	33.9	C	–	–	–	S	23(1)
QUE 97571	LL5	0.6	B	–	–	–	S	23(1)
QUE 97572	LL5	3.3	B	–	–	–	S	23(1)
QUE 97573	LL5	1.0	A/B	–	–	–	F	23(1)
QUE 97574	LL5	56.5	A/B	–	–	–	F	23(1)
QUE 97575	LL5	173.1	B	–	–	–	F	23(1)
QUE 97576	H6	18.3	C	–	–	–	S	23(1)
QUE 97577	LL5	19.0	B	–	–	–	S	23(1)
QUE 97578	LL5	31.9	B	–	–	–	S	23(1)
QUE 97579	LL5	8.6	B	–	–	–	S	23(1)
QUE 97580	LL5	7.2	A/B	–	–	–	S	23(1)
QUE 97581	LL5	16.8	A/B	–	–	–	S	23(1)
QUE 97582	LL5	9.8	A/B	–	–	–	S	23(1)
QUE 97583	LL5	6.5	A/B	–	–	–	S	23(1)
QUE 97584	LL6	1.9	A/B	–	–	–	S	23(1)
QUE 97585	H6	14.5	B	–	–	–	Q	23(1)
QUE 97586	LL5	0.9	B	–	–	–	S	23(1)
QUE 97587	LL5	0.2	B	–	–	–	S	23(1)

Name†	Class‡	Mass	Weath.	%Fa	%Fs	Pairing	Ice§	Ref
QUE 97588	LL5	4.8	A/B	–	–	–	S	23(1)
QUE 97589	LL5	4.6	A/B	–	–	–	S	23(1)
QUE 97590	LL5	49.4	A/B	–	–	–	S	23(1)
QUE 97591	LL5	127.3	A/BE	–	–	–	S	23(1)
QUE 97592	LL5	26.6	A/B	–	–	–	S	23(1)
QUE 97593	LL5	48.8	A/B	–	–	–	S	23(1)
QUE 97594	LL5	29.5	A/BE	–	–	–	S	23(1)
QUE 97595	H5	20.1	A/B	–	–	–	S	23(1)
QUE 97596	LL5	17.8	B/C	–	–	–	Q	23(1)
QUE 97597	LL5	18.5	A/B	–	–	–	S	23(1)
QUE 97598	LL5	24.0	A/BE	–	–	–	S	23(1)
QUE 97599	H6	41.6	B/C	–	–	–	Q	23(1)
QUE 97600	LL5	7.2	A/B	–	–	–	S	23(1)
QUE 97601	LL5	2.9	A/B	–	–	–	S	23(1)
QUE 97602	LL5	8.9	A/B	–	–	–	S	23(1)
QUE 97603	LL5	1.7	A/B	–	–	–	S	23(1)
QUE 97604	LL5	9.4	A/B	–	–	–	S	23(1)
QUE 97605	LL6	5.2	A/B	30	24	–	S	23(1)
QUE 97606	LL5	37.7	A/B	–	–	–	S	23(1)
QUE 97607	LL5	30.4	A/B	–	–	–	S	23(1)
QUE 97608	LL5	27.7	A/B	–	–	–	S	23(1)
QUE 97609	LL5	9.8	A/B	–	–	–	S	23(1)
QUE 97610	LL5	31.1	B	–	–	–	S	23(1)
QUE 97611	LL5	71.1	B	–	–	–	S	23(1)
QUE 97612	LL5	116.8	B	–	–	–	S	23(1)
QUE 97613	L5	15.4	B	26	22	–	S	23(1)
QUE 97614	L6	22.2	C	–	–	–	F	23(1)
QUE 97615	LL5	38.0	B	–	–	–	S	23(1)
QUE 97616	LL5	23.8	B	–	–	–	S	23(1)
QUE 97617	LL5	2.3	B	–	–	–	S	23(1)
QUE 97618	LL5	4.1	B	–	–	–	S	23(1)
QUE 97619	LL5	9.2	B	–	–	–	F	23(1)
QUE 97620	LL5	21.2	A/B	–	–	–	S	23(1)
QUE 97621	CM2	2.8	B	1-38	–	97077	F	23(1)
QUE 97622	LL5	2.9	A/B	–	–	–	S	23(1)
QUE 97623	LL5	14.7	A/B	–	–	–	S	23(1)
QUE 97624	LL5	11.7	A/B	–	–	–	S	23(1)
QUE 97625	H6	5.4	B/C	19	17	–	Q	23(1)
QUE 97626	L6	1.9	A/B	–	–	–	S	23(1)
QUE 97627	L4	2.0	B	26	22	–	Q	23(1)
QUE 97628	LL5	1.0	A/B	–	–	–	S	23(1)
QUE 97629	LL5	6.1	B/C	–	–	–	S	23(1)
QUE 97630	H5	6.9	C	19	17	–	S	23(1)
QUE 97631	LL5	2.7	B/C	–	–	–	S	23(1)
QUE 97632	Eu "Br"	0.8	A/B	–	61	–	F	23(1)
QUE 97633	L6	6.1	C	–	–	–	F	23(1)
QUE 97634	LL5	1.4	CE	–	–	–	S	23(1)
QUE 97635	LL5	3.7	B/C	–	–	–	S	23(1)
QUE 97636	LL5	7.8	B	–	–	–	S	23(1)
QUE 97637	L6	10.7	B	–	–	–	S	23(1)
QUE 97638	H6	14.7	C	19	17	–	S	23(1)
QUE 97639	LL5	1.3	B/C	–	–	–	S	23(1)
QUE 97670	H4	56.5	C	18	17	–	S	23(1)
QUE 97671	LL5	34.1	A/B	27	24	–	S	23(1)
QUE 97672	LL5	3.2	B	–	–	–	S	23(1)
QUE 97673	H6	36.1	C	19	17	–	S	23(1)
QUE 97674	L6	0.8	B	–	–	–	S	23(1)
QUE 97675	LL5	1.6	B	–	–	–	F	23(1)
QUE 97676	CM2	2.4	C	1-32	0-2	–	S	23(1)
QUE 97677	LL5	3.8	C	–	–	–	S	23(1)
QUE 97678	LL5	20.6	B	–	–	–	S	23(1)
QUE 97679	LL5	23.6	A/B	–	–	–	F	23(1)

*See "Notes to Table 2" in *Meteorite Bulletin* 79 (Grossman and Score, 1996) for explanation of columns.

†Abbreviations for meteorite names: EET = Elephant Moraine; GRA = Graves Nunataks; GRO = Grosvenor Mountains; QUE = Queen Alexandra Range.

‡Abbreviations for meteorite classes: Acap = acapulcoite; Aub = aubrite; Br = brecciated; Diog = diogenite; Eu = eucrite; How = howardite; Ol = olivine; Ub = unbrecciated.

§Ice field names: F = Goodwin Nunataks Icefields; Q = Foggy Bottom Moraine; R = Footrot Flats; S = Mare Meteoriticas; T = Pwellam Icefield; U = Round Bottom Moraine; V = Scoraine Moraine; W = Scoraine Moraine Icefield; Y = Tail's End Icefield; j = Meteorite City; 1 = Outer Cecily; 3 = Lower Central; 14 = Goodwin Nunataks Icefield; 15 = Inuksuq NE; 16 = Inuksuq SW; 17 = Lower NE; 18 = Lower SW; 19 = W. Tail's End Icefield; ? = unassigned.