METEORITES

South Kensington
20 April 2016

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20 APRIL
METEORITES
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SOUTH KENSINGTON

22 APRIL
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METEORITES

WEDNESDAY 20 APRIL 2016

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Eryn Brobyn

AUCTION

Wednesday 20 April 2016
at 2.30 pm Lots 1-83
85 Old Brompton Road
London SW7 3LD

AUCTION CODE AND NUMBER

In sending absentee bids or making enquiries, this sale should be referred to as **BRENHAM-12341**

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VIEWING

Saturday	16 April	11.00 am - 5.00 pm
Sunday	17 April	11.00 am - 5.00 pm
Monday	18 April	9.00 am - 7.30 pm
Tuesday	19 April	9.00 am - 5.00 pm

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Front cover: Lot 41
Back cover: Lot 40

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Christie's would like to thank Dr. Alan E. Rubin at the Institute of Geophysics and Planetary Physics, University of California, Los Angeles for his assistance in preparing the catalogues notes for lots 1-76.

***1**

WOLD COTTAGE METEORITE OF 1795

Chondrite – L6
Wold Cottage, England (54°8' N, 0°24' W)

Partial slice with a prominent vein of impact melt winding down the right margin of the creamy silicate matrix. One edge of fusion crust and metallic flakes scattered throughout. Modern cutting.

33 x 31 x 5 mm (1⅓ x 1½ x ⅛ in.)
17.8g

£3,000-5,000 $4,600-7,500 €4,300-7,000

PROVENANCE:
Natural History Museum, London
Macovich Collection of Meteorites, New York City

LITERATURE:
Pillinger, C. T. & Pillinger, J. M. (1996), "The Wold Cottage meteorite: Not just any ordinary chondrite." *Meteoritics & Planetary Science, 31*(5), 589-605.
Gray, K., Gray, D. "The Meteorite." *The Wold Cottage*. Accessed November 11, 2015.
Burke, John, "Cosmic Debris: Meteorites in History" University of California Press, 1986, 442 pp.

The Wold Cottage meteorite played a crucial role in the scientific community's acceptance that rocks could indeed fall out of the sky — a notion previously met with disbelief or considered heretical. On December 13, 1795, Wold Cottage crashed to Earth just yards from farmworker John Shipley. Edward Topham, the owner of the Wold Cottage estate, was away in London at the time, but he hurried home after reading accounts in the press. Topham was a well-known *bon vivant* with a sterling reputation. Certain that the stone was of great import, Topham arranged to have Wold Cottage placed on exhibition in London, helping to sway public opinion to embrace Shipley's extraordinary claim. The scientific community took note, especially after Wold Cottage proved similar to a rock reported to have fallen out of the sky eighteen months earlier in Siena, Italy. The fact that two stones from different localities had common characteristics convinced many scientists of their possible extraterrestrial origin. This is an uncommon offering of an extremely historic meteorite.

***2**

VALERA METEORITE — THE ONLY DOCUMENTED METEORITE TO HAVE KILLED

L5

Trujillo, Venezuela (9°19' N, 70°37' W)

One face is cut and polished. The multi-hued variegated matrix is embedded with sparkling metallic grains, and a single large metallic inclusion is at the left margin. Blurred chondrule boundaries evidence heating on its parent asteroid long before its brush with Earth and a cow. Modern cutting.

75 x 44 x 32 mm (3 x 1¾ x 1½ in.)
160g

£4,000-6,000 $6,100-9,000 €5,700-8,400

PROVENANCE:

Dr. Ignacio Ferrin, Merida, Venezuela
Accompanied by a copy of the signed affidavit attesting to the circumstances of the Valera event.

LITERATURE:

Kusuno, H., Fukuoka, T., Matsuzaki, H. (2013) "Simple relationship between Al production rate and major elemental composition of meteorite samples." Geochemical Journal, 47(1), 83-88.

An echo in miniature of the devastating asteroid believed to have killed off the dinosaurs, it was on the evening of October 15, 1972 that farmhands in Trujillo, Venezuela were startled by an inexplicable sonic boom. The next day an exotic rock was found alongside a cow's carcass whose neck and clavicle had been pulverised. It was obvious to the farm's owner, physician Dr. Argimiro Gonzalez, what had occurred, but he didn't give it a second thought since mayhem from falling meteorites seemed intuitive. An unplanned steak dinner was enjoyed that night and the celestial boulder was used as a doorstop. More than a decade later scientists confirmed what Dr. Gonzalez had long presumed. However, what Dr. Gonzalez didn't know was that this was the first and still the *only documented fatal meteorite impact*. When Dr. Ignacio Ferrin, an astronomer at the University of the Andes, learned of the act of bovicide that had occurred at Valera, he visited the Gonzalez estate and left with an affidavit affirming the aforementioned events as well as the meteorite itself.

***3**

SYLACAUGA METEORITE

H4

Talladega County, Alabama (33°14' N, 86°17' W)

This fresh partial slice has two edges of fusion crust delimiting its grey matrix with a rich profusion of iron-nickel flakes suspended throughout. Modern cutting.

39 x 32 x 2 mm (½ x ¼ x ⅛ in.)
10.3g

£6,000-9,000 $9,100-14,000 €8,500-13,000

PROVENANCE:

Smithsonian Institution, Washington, D.C.
Dr. James Schwade Meteorite Collection, Kankakee, IL

LITERATURE:

Swindel, G. W. and Jones, W. B. (1954). "The Sylacauga, Talladega County, Alabama, Aerolite: A Recent Meteoritic Fall That Injured A Human Being." *Meteoritics, 1*(2), 125–132.
Nobel, J. (2013). "The True Story of History's Only Known Meteorite Victim." *National Geographic*. Retrieved November 3, 2015.

The only documented instance of a meteorite injuring a person occurred on November 30, 1954 at 2:46 pm in Sylacauga, Alabama. The fireball from which the meteorite originated was seen in broad daylight across three states and its descent was accompanied by sonic booms. Some eyewitnesses thought a plane had crashed; others felt this extraordinary event was the nefarious doings of the Soviets — the result of rampant Cold War paranoia. Two meteorites were recovered. One crashed through the roof of Ann and Eugene Hodges' home, where it bounced off a radio and struck Ann Hodges while she napped. While Hodges and her landlord fought over the meteorite's ownership, the U.S. Air Force took custody. While the law favoured the landlord, public sentiment was solidly behind Hodges, who exclaimed, "God intended it to hit me. After all, it *hit* me!" The second meteorite was found by a local farmer, Julius McKinney, who quickly sold his specimen to the Smithsonian. The proceeds from this sale enabled McKinney to purchase a new car and home. The Hodges finally owned the meteorite that punctured their roof (and almost Ann herself) after a year of legal wrangling and a payout to their landlord. However, interest had waned during the course of the year and when the Hodges couldn't find a buyer, they donated the rock to the Alabama Museum of Natural History. Never having recovered from the emotional distress associated with these events, Ann Hodges suffered a nervous breakdown and died at the age of 52.

***4**

MURCHISON ORIENTED INDIVIDUAL

CM2

Victoria, Australia (36°37' S, 145°12' E)

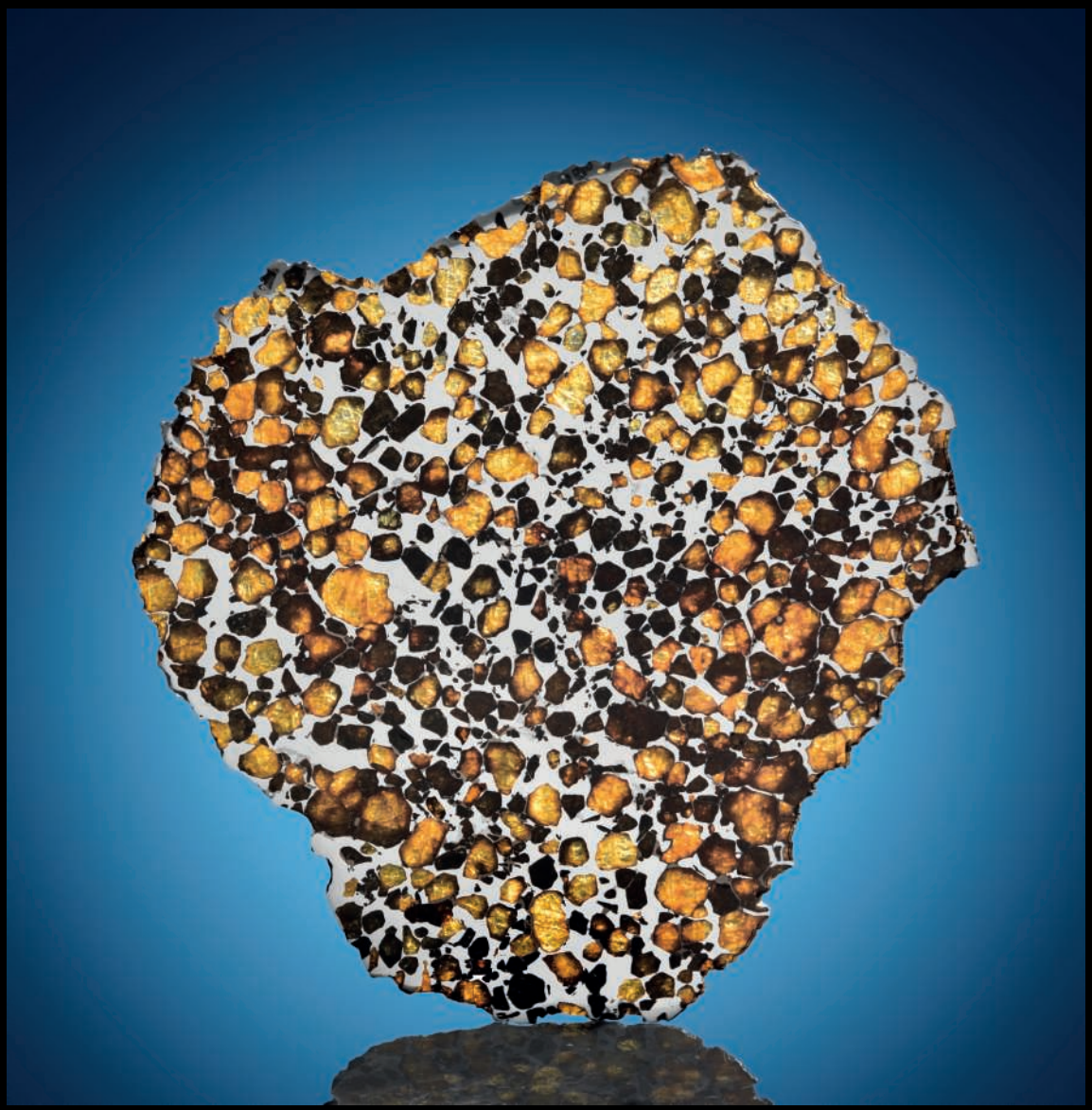
Blanketed in glossy fusion crust this specimen is highly oriented. A pronounced ablation lip is at its perimeter from which material melted and ablated off the meteorite's surface. This is a pristine, exemplary specimen of a distinguished meteorite.

58 x 40 x 25 mm (2¼ x 1½ x 1 in.)
81.7g

£8,000–12,000 $13,000–18,000 €12,000–17,000

PROVENANCE:
Philip C. Mani Collection, Houston

At 10:58 am on September 28, 1969, a meteorite shower occurred over the town of Murchison, Australia, causing a frenzy in the scientific community. In addition to containing a variety of organic compounds including alcohols and aromatic hydrocarbons, Murchison meteorites contain amino acids — the building blocks of proteins. Rich in carbon and water, Murchison is classified as a CM2 meteorite (see Cold Bokkeveld, lot 37). Chemically primitive, it experienced extensive alteration by water-rich fluids on its parent body prior to intercepting Earth. Coveted by both scientists and collectors, the last several decades have seen Murchison become among *the* most researched meteorites with citations in scores of scientific papers. Murchison provides support for the *Panspermia Theory of Life* (i.e., that life on Earth was "seeded" by extraterrestrial impact). In 2010, an article in the *Proceedings of the National Academy of Sciences* announced that 14,000 unique molecular compounds were identified in a small section of a Murchison research specimen. The study, by a team of nine German scientists further determined that many of the organic compounds *were present in the solar system prior to when life commenced on Earth* — which not only begs the question of whether meteorites may have played a key role in life's origins, but whether similar material seeded other solar systems as well. This particular specimen also boasts membership in another elite club: unlike 99% of all meteorites, this specimen experienced a minimal amount of tumbling as it careened through our atmosphere and maintained the same axis of orientation during its plunge earthward. As a result, the lead face has a different character than the dark side. The parabolic "heat shield" seen was contoured by atmospheric frictional heating. As this is the optimal angle at which heat is most efficiently deflected away from an object entering Earth's atmosphere, this same curvature was emulated in the heat shield design of the first manned space capsules.



***5**

LARGE COMPLETE SLICE OF IMILAC METEORITE WITH EXTRATERRESTRIAL PERIDOT

Stony Iron, Pallasite (PAL)
Atacama Desert, Chile (24°12' S, 68°48' W)

Comprised of a spectacular mosaic of sparkling olivine and peridot in a gleaming iron-nickel matrix, this is a quintessential example of the most beautiful extraterrestrial material known. Modern cutting.

237 x 203 x 2 mm (9 ⅓ x 8 x ⅛ in.)
507g

£8,000–12,000 $13,000–18,000 €12,000–17,000

Pallasites are not only rare, representing less than 0.2% of all known meteorites, they are also widely considered the most beautiful meteorites, and Imilac is among the most coveted. Like all pallasitic meteorites, Imilac originated from the core-mantle boundary of an asteroid that broke apart during the early history of our solar system. The crystals seen here are the result of small chunks of the stony mantle becoming suspended in the molten metal of an asteroid's iron-nickel core. Cut and polished to a mirror finish, the lustrous metallic matrix features crystals of gleaming olivine and *peridot* (gem-quality olivine) ranging in hues from emerald to amber. The *pallasite* designation for this meteorite class is in honour of the German scientist, Peter Simon Pallas, who while traveling through Siberia, examined the first pallasitic mass in the early 1770s. This is an honour Pallas is most fortunate to have received, for he fervently believed that the unusual specimen he examined could not possibly have come from outer space.

***6**

PARTIAL SLICE OF IMILAC METEORITE WITH PERIDOT

Stony Iron, Pallasite (PAL)
Atacama Desert, Chile (24°12' S, 68° 48' W)

Modern cutting. Accompanied by a pedestal with a groove that is customised for this finished partial slice from which it can be easily removed.

138 x 79 x 2 mm (5½ x 3 x ⅛ in.)
108g

£2,000-3,000 $3,100-4,500 €2,900-4,200

PROVENANCE:
Natural History Museum, London

Similar to the previous lot. Recovered from the Atacama Desert atop the Andes, the highest elevated desert on Earth. This specimen and the next originate from the single largest Imilac meteorite known to exist — the 198 kg main mass — that has been on exhibit for decades at the Natural History Museum in London (formerly the British Museum of Natural History).

•*7

PARTIAL SLICE OF IMILAC METEORITE WITH PERIDOT

Stony Iron, Pallasite (PAL)
Atacama Desert, Chile (24°12' S, 68°48' W)

Discovered in 1822 in Chile's Atacama Desert. Modern cutting. Rectangular polished partial slice with highly translucent olivine and peridot suspended in a gleaming iron-nickel matrix.

91 x 84 x 2 mm (3½ x 3⅓ x ⅛in.)
120g

£1,500-2,500 $2,300-3,800 €2,200-3,500

PROVENANCE:
Natural History Museum, London

Similar to the previous two lots. A seeming mosaic of sparkling olivine embedded in a nickel-iron matrix, this specimen also contains gem-quality olivine or *peridot*, the birthstone of August. Derived from the core-mantle boundary of an asteroid orbiting the Sun between Mars and Jupiter, pallasites are the most exquisite extraterrestrial substance known, and this is a select example.

***8**

A COMPLETE VACA MUERTA FRAGMENT WITH CHOICE PATINA

Stony-iron, Mesosiderite – MES-A1
Atacama Desert, Chile (25°45' S, 70°30' W)

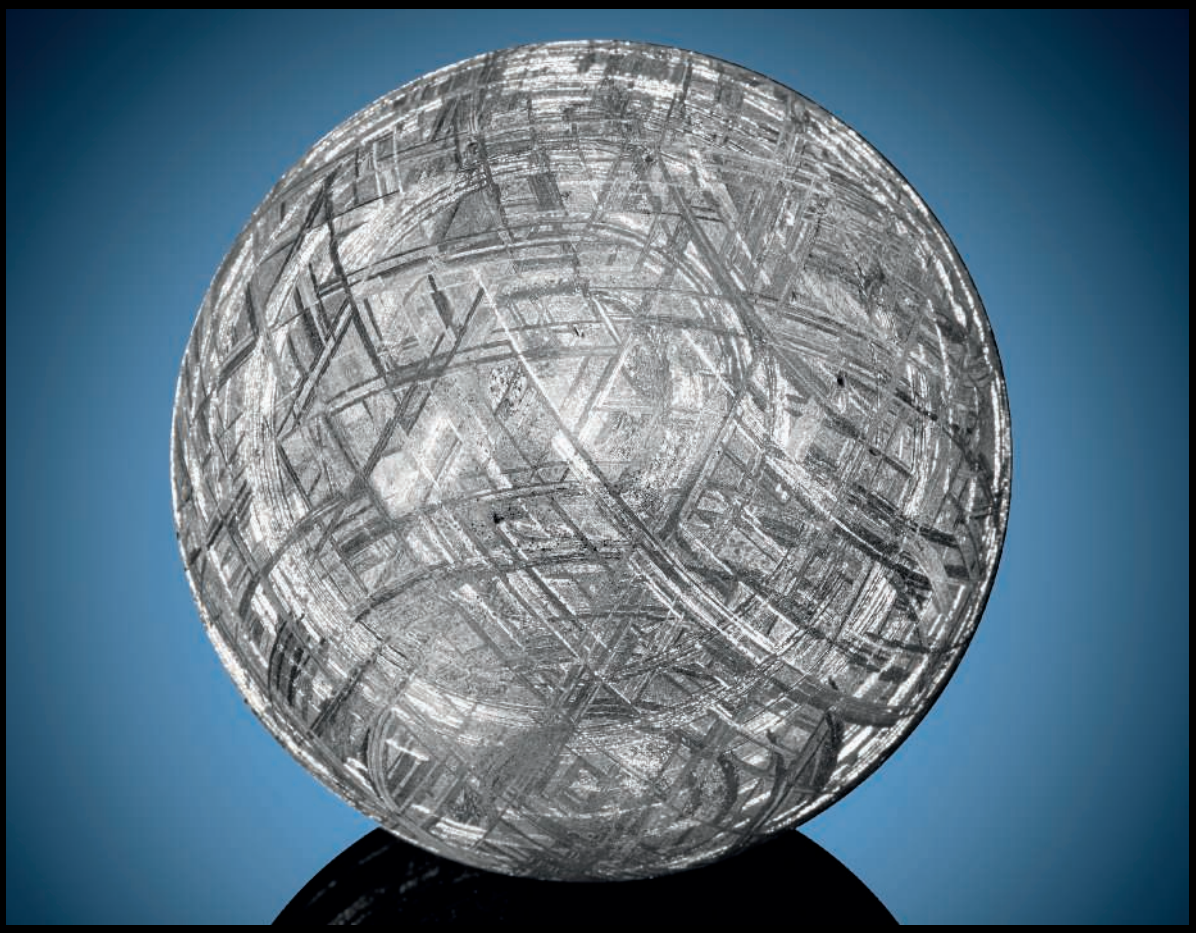
The chocolate-hued patina is dappled with yellow and chartreuse highlights — all vestiges of its tenure on Earth's surface for thousands of years.

103 x 101 x 67mm (4 x 4 x 2⅝in.)
865g (1.9lbs)

£2,000–3,500 $3,100–5,300 €2,900–4,900

PROVENANCE:
Philip C. Mani Collection, Houston

Named after a dried riverbed near the meteorite's impact site just 250 kilometres from the Imilac strewnfield (see previous lot), Vaca Muerta (Spanish for "dead cow") is a rare mesosiderite with silicate inclusions "welded" together in iron-nickel matrix. Vaca Muerta struck Earth approximately 3500 years ago and was first discovered in the late 1800s by prospectors who thought they had found silver. They were mistaken, and as a result of their exasperation, the locality of the strewnfield had not been documented. It was not until a century later that an enterprising student rediscovered the site; he found several hundred kilos of meteorites left behind by miners who had extracted the metal nodules from their silicate-rich matrix. Some of the silicate nodules in the meteorite have the highest europium-samarium ratio (two rare-earth elements) known in the Solar System. Vaca Muerta's intriguing heterogeneous composition is the result of the countless collisions that its parent body experienced in the asteroid belt. Mesosiderites are a rare class of stony-iron meteorite consisting of approximately equal parts of metallic iron-nickel and silicate. The silicate component itself consists mainly of the minerals Ca-pyroxene and Ca-rich feldspar and is very similar to some basaltic meteorites from the asteroid Vesta.



***9**

MUONIONALUSTA METEORITE CRYSTAL BALL — DRAMATISING THE CRYSTALLINE STRUCTURE IN THREE DIMENSIONS

Iron, fine octahedrite
Kiruna, Sweden (67°48' N, 23°6' E)

A choice three-dimensional display of a Muonionalusta meteorite's crystalline fingerprint is evident in what is literally an extraterrestrial crystal ball. Modern fashioning.

89mm (3½in.) in diameter
3.53kg. (7.7lbs)

£6,000-9,000 $9,100-14,000 €8,500-13,000

Muonionalusta is located in northern Sweden above the Arctic Circle near the Muonio River, for which the meteorite was named. While meteorite hunters have unearthed numerous masses in recent years, it was back in 1906 that children discovered the first Muonionalusta meteorite while engaging in a favourite childhood pastime: kicking rocks. While tending to his herd of cattle, a child unexpectedly struck a heavy object that was later verified to be an iron meteorite. Possessing what is among the highest terrestrial ages of any meteorite, Muonionalusta fell to Earth about one million years ago when the region was glaciated. Despite its age, many specimens exhibit only minor interior weathering due both to the stability of the material as well as to being kept in the freezer of the Arctic. Muonionalusta specimens are believed to be *glacial erratics* (material transported by a glacier), and their exposure to churning rocks and ice for tens of thousands of years could account for the smooth surface and prosaic shapes of most specimens. It is all about the splendor within; when sliced and etched, Muonionalusta displays the classic *Widmanstätten pattern*, the intergrowth of two iron-nickel minerals that form an unearthly metallic grid in shimmering shades of gray and silver.

***10**

NWA 859 (TAZA) METEORITE — NATURAL SCULPTURE FROM OUTER SPACE

Iron–ung (ungrouped)
Vicinity of Taza, Morocco (precise coordinates unknown)

Regmaglypts radiate in every direction from this specimen's central axis. Vibrant crests provide further animation and asymmetric balance. On the reverse a small window was cut to reveal the meteorite's internal structure. Accompanied by a custom armature.

210 x 121 x 137mm (8¼ x 4¾ x 5⅓in.)
5.65kg (12.5lbs)

£15,000-25,000

$23,000-38,000
€22,000-35,000

To enable scientists to refer to the unique attributes of a given meteorite, there must be a nomenclature system, and so a committee of scientists name meteorites after the location to which they've been "delivered," (e.g., a city, village, mountain, river, county, etc.). In a desert, where there are few distinguishing geological features, meteorites are named after a grid encompassing a restricted area and are assigned sequential numbers. NWA 859 was found in 2001; it is the 859th meteorite to be catalogued following its recovery in the Northwest African grid of the Sahara Desert. It is also more colloquially known as "Taza." As a result of atmospheric sculpting during its fiery plunge to Earth, the Taza specimen now offered creates an illusion of still being in flight. The texture of Taza meteorites is rather unusual: it consists of elongated spindles of the low-nickel iron mineral kamacite in a groundmass of fine grains of kamacite and taenite (a high-nickel iron mineral). Although 89% of iron meteorites are members of distinct chemical groups and originate from approximately a dozen different asteroids, the other 11% of recovered iron meteorites are chemically unrelated and originate from unknown parent bodies. Taza is one such "ungrouped" iron, and the sample now offered is the quintessence of a Taza meteorite.

11

*12

TIRHERT METEORITE — A METEORITE WHICH NEVER HIT EARTH

HED – unbrecciated eucrite
Guelmim-Es-Semara, Morocco (28°93' N, 8°90' W)

Blanketed in what is possibly the glossiest fusion crust of *any* meteorite — a characteristic that the accompanying image cannot truly capture — is the richly evident rippling of formerly molten material.

61 x 44 x 49mm (2½ x 1¾ x 2 in.)
148g

£15,000-25,000 $23,000-38,000 €22,000-35,000

On July 9, 2014 at 9:30pm Southern Morocco experienced an intense fireball travelling south-easterly followed by multiple sonic booms heard as far as 220 km from the impact site. Municipal and governmental authorities immediately mounted a search, and the next day meteorites were recovered close to the stretch of Highway 12 that runs between Foum El Hisn and Assa near the Algerian border. The news of meteorites being found travelled quickly and in short order hundreds of people arrived at the 3 x 6 kilometre site. Tirhert meteorites have what is perhaps the glossiest and most lustrous fusion crust of any meteorite. Gleaming even in soft light, Tirhert specimens possess an almost inconceivable glaze. Transparent patches of fusion crust reveal plagioclase grains beneath the surface; samples that broke on impact further reveal honey-brown pyroxene grains. While the Tirhert meteorite shower occurred in an area nearly bereft of vegetation, a young boy found the specimen now offered wedged between the branches of a small tree — and he enjoyed quite a bit of local celebrity as a result. There are only about 20 unbrecciated eucrites known; about a dozen were found in Antarctica and are forever unavailable to the public. Tirhert is the only witnessed fall of an unbrecciated eucrite.

*11

COMPLETE PULTUSK METEORITE

H5
Warsaw, Poland (52°46' N, 21°16 E)

This meteorite is covered with black fusion crust which was slightly abraded on its edges. The specimen number "27" is scribed and affixed on the specimen in two places, on modern tape and on a more-aged paper ID in which the meteorite is also identified as "Pultusk" in Cyrillic — Accompanied by a catalogue card.

64 x 46 x 25mm (2½ x 1¾ x 1in.)
154g

£5,000-8,000 $7,600-12,000 €7,100-11,000

PROVENANCE:
The Russian Academy of Sciences, Kazan, Tartarstan

About 35 miles northeast of Warsaw is the town of Pultusk, and it is here that Europe's largest meteorite shower occurred on January 30, 1868 at 7:00 p.m. The event, a large fireball accompanied by thunderous detonations, was witnessed by thousands. It resulted in more than 100,000 small meteorites — a true *meteorite shower*, with the vast majority being no larger than a pea. Pultusk is primarily composed of magnesium-iron silicates (olivine and pyroxene) along with iron-nickel metal and iron-sulfide (troilite). The rock was heated in its parent asteroid to such an extent that the minerals acquired homogeneous compositions and the chondrules were recrystallised. This pocketful of wonder is an engaging example of an historic meteorite.

12

***13**

SIKHOTE-ALIN METEORITE — FROM ONE OF THE LARGEST METEORITE SHOWERS IN HUMAN HISTORY

Iron, coarse octahedrite – IIAB
Maritime Territory, Siberia, Russia (46°9' N, 134°39' E)

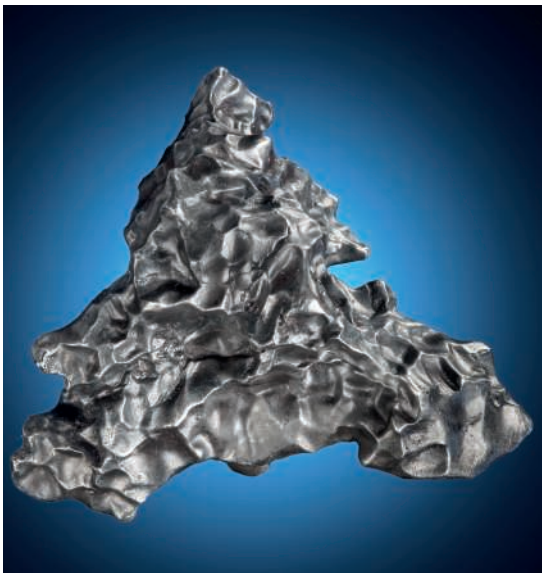
Wrapped in a pewter-hued patina with charcoal accents, the two faces of this softly triangular meteorite are markedly different. One side is blanketed in regmaglypts, the other reveals cleavage along a crystalline plane. This is a fascinating example of a cataclysmic event frozen in time from one of the largest meteorite showers in modern times.

84 x 77 x 34mm (3⅓ x 3 x 1⅓ in.)
359g

£2,000-3,000 $3,100-4,500 €2,900-4,200

After having broken off its parent asteroid 320 million years ago, a massive iron mass wandered through interplanetary space until a close encounter with Earth on February 12, 1947. A fireball brighter than the Sun (it created moving shadows in broad daylight) was seen to explode at an altitude of about 6 km over eastern Siberia. Sonic booms were heard at distances up to 300 km from the point of impact. Chimneys collapsed, windows shattered and trees were uprooted. A 33 km-long smoke trail persisted for several hours in the atmosphere after impact. Iron fragments were scattered over a broad elliptical area. Many of the meteorites penetrated the soil, producing impact craters up to 26 metres across; about 200 such depressions have been catalogued. A famous painting of the event by artist and eye-witness P. I. Medvedev was reproduced as a postage stamp issued by the Soviet government in 1957 to commemorate the impact's 10th anniversary.

As evidenced by the *regmaglypts* (thumbprints) blanketing one side of this mass, this meteorite was not part of the massive low altitude explosion. Instead, this specimen broke off at a higher altitude, providing sufficient time for frictional superheating with the atmosphere to form the regmaglypts. The groove-like reverse reveals that this meteorite ripped apart yet again at a high-enough altitude that additional shallow regmaglypts were able to form.



•*14

SIKHOTE-ALIN METEORITE

Iron, coarse octahedrite – IIAB
Maritime Territory, Siberia, Russia (46° 9' N, 134° 39' E)

Draped in a gunmetal to platinum patina, and covered on both sides with *regmaglypts* (the "thumbprints" which are an artifact of frictional heating and melting during its plunge through Earth's atmosphere). A single tendril counterbalances the sloping edge from which it emanates, resulting in a balanced natural form.

83 x 51 x 19mm (3¼ x 2 x ¾in.)
237g

£1,200-1,800 $1,900-2,700 €1,700-2,500

LITERATURE:

Krinov, E.L. (1963). "The Tunguska and Sikhote-Alin Meteorites." *The Moon Meteorites and Comets, Edited by Gerard P. Kuiper, and Barbarra Middlehurts.,* 208-208.
Kolesnikov, E.M., Lavrukhina, A.K., and Fisenko, A.V. (1971). "Radiation ages of different fragments of the Sikhote-Alin meteorite fall." *Geochimica et Cosmochimica Acta,* 36(5), 573-576.

Similar to the previous lot, this meteorite is so imbued with character that it is difficult to decide which side should be the front. This meteorite originates from a mass that slammed into Earth's atmosphere at a cosmic velocity of 13-19 kilometres per second, where it broke apart again and again before impacting Far-Eastern Siberia.

***15**

MARTIAN METEORITE NWA 7034 "BLACK BEAUTY"

Martian, Basaltic Breccia
Morocco

A basaltic breccia with crystals of plagioclase and pyroxene.

45 x 35 x16mm (1¾ x 1½ x ⅔in.)
31g

£40,000-60,000 $61,000-90,000
€57,000-84,000

LITERATURE:

Agee, C.B., et al. (2013), "Unique Meteorite from Early Amazonian Mars: Water-Rich Basaltic Breccia Northwest Africa 7034." *Science, 339*(6121), 780-785.
Humayun, M. (2013), "A Unique Piece of Mars." *Science, 339*(6121), 771-772.

"Black Beauty" is the nickname given to a unique, shiny black Martian meteorite recovered in the Sahara in 2011 along with other related specimens launched off of Mars at the same time. The formal name of the meteorite is Northwest Africa (NWA) 7034. Martian meteorites are among the rarest substances on Earth; less than 0.3% of known meteorites are from Mars and Black Beauty is rarer still: it is the second oldest Martian meteorite, having crystallised from a magma more than two billion years ago. It contains relatively large crystals of the minerals plagioclase (a calcium-aluminium silicate) and pyroxene (a calcium-magnesium-iron silicate); these grains grew slowly as the magma cooled deep beneath the surface of Mars. The large mineral grains are surrounded by fine-grained material that formed from a quickly cooled magmatic liquid, probably during a volcanic eruption. Rock and mineral fragments were incorporated into the liquid during the eruption, giving the rock a *brecciated* (i.e. fragmental) appearance. Black Beauty is also unusual in that it contains 10-30 times more chemically bound water than other Martian meteorites, probably a result of the water-rich magma from which it crystallised.

16

***16**

MARTIAN METEORITE NWA 7500

SNC – Shergottite
Taoudenni, Mali (22° 40' N, 3° 59' W)

Mostly covered in fusion crust, this specimen has one cut face to reveal interior.

113 x 115 x95mm (4½ x 4½ x3¾in.)
2.01kg (4½lbs)

£150,000-250,000 $230,000-380,000 €220,000-350,000

This meteorite was blasted off of Mars by an asteroidal impact so energetic that it transformed the plagioclase feldspar crystals into glass. Also present in the rock are patches of rapidly cooled impact melt surrounded by fractures. This is a very fresh specimen that has experienced only minor weathering during its residence on Earth. Mars is the only planet that has provided meteorites to the Earth; even so, less than 0.3% of all known meteorites are from Mars. Most of these rocks, like NWA 7500 itself, are basalts, broadly similar in texture and composition to the volcanic rocks from Iceland and Hawaii.

***17**

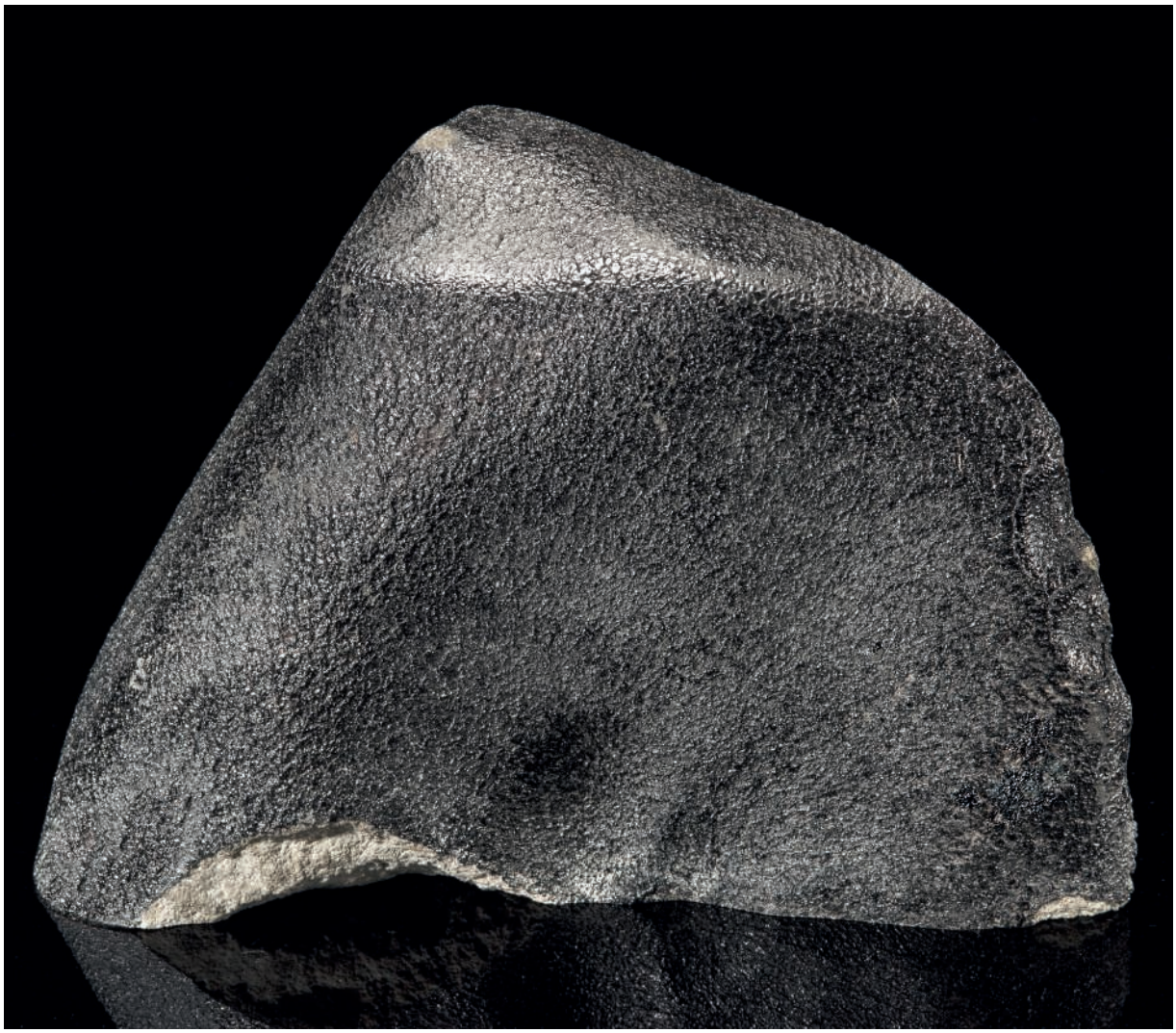
THE MAIN MASS OF THE LEGENDARY MARTIAN METEORITE ZAGAMI — A NOTEWORTHY OFFERING

SNC – Shergottite
Zagami, Nigeria (11°44' N, 7°5' E)

Lot is accompanied by:
— Bob Haag's copy of the 237 page NASA publication "Mars Meteorite Compendium – 1998" compiled by Dr. Charles Meyer of the Johnson Space Center;
Original correspondence from Meyer to Haag in which Haag is informed the farmer probably said "cows" and not "crows" as crows immediately return to a cornfield from which they've been shooed;
Original correspondence from Dr. Allan Treiman of the Johnson Space Center, dated July 29, 1991 in which Treiman expresses gratitude to Haag for having unknowingly provided support to Treiman's theory of the existence of a stream of Martian meteoroids which periodically intersect Earth's orbit. Wrote Treiman, "That Zagami fell in the mid-morning of 3 Oct, just as did Chassigny [editor's note: Chassigny fell on October 3, 1815, precisely146 years before Zagami] strengthens the possibility that there is an SNC meteorite shower." A copy of a draft of Treiman's paper "Evidence for an SNC Meteoroid Stream, and a Common Site of Origin" is attached. Following peer review, Treiman's paper was published one year later in *Meteoritics and Planetary Science* (Volume 27, Issue 1, March 1992).

151 x 73 x 106mm (6 x 2 ¾ x 4 in)
1382g (3lbs)

£250,000-450,000 $380,000-680,000 €360,000-630,000

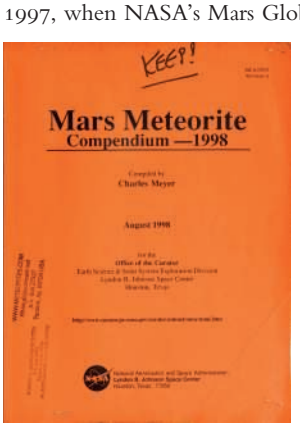


17

PROVENANCE:
British Museum of Natural History, London
Geological Survey, Kaduna, Nigeria
Robert A. Haag Meteorite Collection

On October 3, 1962, a farmer in Zagami, Nigeria was nearly struck by an 18-kg meteorite as it plummeted to Earth. As was reported in NASA's Jet Propulsion Laboratory's "2012 Martian Meteorite Compendium," Robert Haag, world-famous meteorite collector, traveled to Nigeria in 1988 and met the farmer. Haag related what the farmer told him of his experience: *"He was trying to chase the cows out of his cornfield when he heard a tremendous explosion and was buffeted by a pressure wave. Seconds later, there was a puff of smoke and a thud, as something buried itself in the soft dirt only ten feet away. Terrified that it was an artillery shell or bomb, the man waited for a few minutes before going to investigate. What he saw was a black rock at the bottom of a two-foot hole. The local commissioner was summoned and the specimen was recovered and sent to the provincial capital, where it was placed in the museum."*

It wasn't Haag's intent to travel to Nigeria just to meet the farmer, he also went to the museum in Kaduna, Nigeria to meet and acquire the meteorite. He returned home to Tucson with a significant amount of the sample following an exchange. Seven years later it was discovered that minute amounts of gas within the shock melt of Zagami and a similar Antarctic meteorite matched the chemical and isotopic composition of the Martian atmosphere that had been measured at the surface of Mars in 1976 by NASA's Viking landers. Zagami crystallised from basaltic magma 175 million years ago and was ejected off the surface of Mars 3 million years ago after the impact of a large asteroid. In 1997, when NASA's Mars Global Surveyor spacecraft entered into an orbit around Mars, it was carrying a sample of the Zagami meteorite. The Global Surveyor's mission ended in 2007; one day its orbit will decay and it will slam into Mars, returning a portion of Zagami to its birthplace. Now offered is the *main mass* (i.e., the largest existing piece — larger than the specimens in any of the world's museums) of Zagami, one of the most important meteorites in history.



***18**

MARTIAN METEORITE NWA 6148

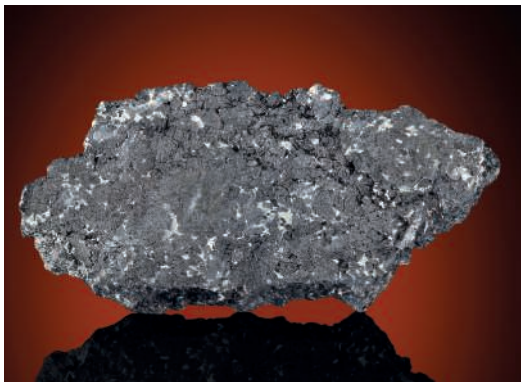
SNC – Nakhlite
Northwest Africa

The complete slice of Martian meteorite with a rarely seen green hued colour. Modern cutting.

42 x 34 x 3mm (1½ x ¾ x ⅛in.)
10.0g

£5,000-8,000 $7,600-12,000 €7,100-11,000

This Martian meteorite consists of millimetre-size, compositionally zoned grains of abundant Ca pyroxene and minor olivine surrounded by a glass containing small spiky grains of additional minerals. The large grains formed during slow cooling in a magma chamber; the small grains and glass cooled rapidly during a volcanic eruption. This specimen is among the rarest samples on Earth; only 0.02% of known meteorites are nakhlites. The sample's surface has been ablated by wind; little fusion crust remains.



***19**

MARTIAN METEORITE NWA 2737 – A COMPLETE SLICE OF A CHASSIGNITE, THE RAREST PRINCIPAL GROUP

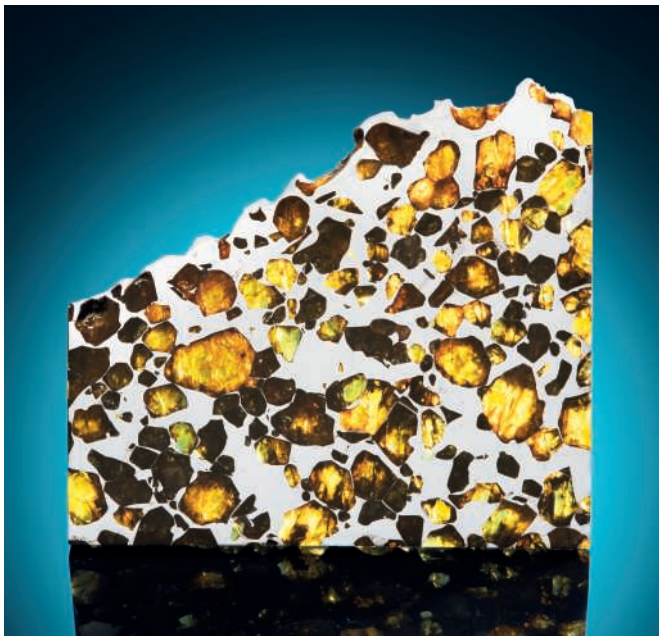
SNC – Dunite, Chassignite
Sahara Desert, Northwest Africa

Fine fissures course through a charcoal grey matrix composed mainly of the iron-magnesium silicate mineral olivine. Modern cutting.

26 x 12 x 2mm (1 x ½ x ⅛in.)
1.74g

£3,000-5,000 $4,600-7,500 €4,300-7,000

Less than 0.3% of known meteorites are from Mars. Martian meteorites are referred to in the scientific literature as *SNCs* (after the type specimens Shergotty, Nakla and Chassigny — cities in India, Egypt and France where these meteorites were seen to fall). And among the three principal groups of Martian meteorites, chassignites are the least common — only three specimens are known. NWA 2737 consists mainly of the iron-magnesium silicate mineral olivine that formed within a magma chamber deep under the Martian surface. As the crystals grew, gravity caused them to settle toward the bottom of the chamber. It took a tremendously energetic impact of a large asteroid to blast the sample into space. This sample was highly shocked as a result of this collision. Although the total mass of the meteorite is only 611 grams, more than 25 papers and abstracts involving this meteorite have thus far been published. Now offered is an especially exotic specimen of the planet Mars — one of the rarest objects on Earth.



***20**

ONE OF MOST BEAUTIFUL METEORITES IN THE WORLD, ESQUEL

Pallasite – PAL
Chubut, Argentina (42° 54'S, 71° 20'W)

A large partial slice with highly translucent crystals of olivine and peridot suspended in a nickel-iron matrix.

144 x 129 x 3mm (5⅔ x 5 x ⅛in.)
314g

£5,000-8,000 $7,600-12,000 €7,100-11,000

LITERATURE:

Ulff-Moller, F., Choi, B.-G., Rubin, A. E., Tran, J. and Wasson, J. T. (1998), "Paucity of sulfide in a large slab of Esquel: New perspectives on pallasite formation." *Meteoritics & Planetary Science, 33*(2) 221–227.

Pallasites are among the most aesthetically dazzling meteorites in the world and, much like Imilac, Esquel is among the most coveted. Esquel's crystals were not heavily shocked; as a result it showcases translucent forest-green to amber olivine crystals suspended in an iron-nickel matrix. This specimen also contains facet-grade olivine or *peridot* (the semi-precious birthstone of August). With one edge of fusion crust, this partial slice embodies Esquel's most alluring qualities. Indeed, small specimens of Esquel were the first pallasite to be utilised in modern jewellery. It is worth noting that the giant complete slice of Esquel on display at the American Museum of Natural History's Rose Center for Earth & Space has a Macovich Collection provenance — as does this estimable example.

***21**

ALLENDE — A RESEARCH SECTION OF SOME OF THE OLDEST MATTER KNOWN

Carbonaceous – CV3
Chihuahua, Mexico (26°58' N, 105°19' W)

This thick rectangular block of Allende features patches of fusion crust along a broad rim. Chondrules and CAI's — the oldest matter mankind can touch — are richly evident in the sample's dark gray matrix. Modern cutting.

60 x 27 x 42mm (2⅓ x 1 x 1⅔in.)
230g

£2,000-3,000 $3,100-4,500 €2,900-4,200

PROVENANCE:

Collection of Dr. Elbert King (An architect and first curator of NASA's Apollo Lunar Receiving Laboratory, Dr. King was responsible for curating the moon rocks returned by Apollo astronauts.)

Allende is *the* most studied meteorite in the world. Hundreds of scientific papers have been written about the meteorite and its components. The sample now offered contains (as do lots 37 and 48) tiny pre-solar grains that formed in the gaseous envelopes around dying stars *long before* the formation of our solar system 4.56 billion years ago. Also present in Allende are prominent white clasts, known as calcium-aluminium inclusions (CAIs), that are among the oldest materials in the solar system and the oldest matter mankind can touch. Allende fell to Earth on February 8, 1969 at 1:05 AM near Chihuahua, Mexico. Several new minerals have been discovered in Allende including a titanium oxide named *panguite* after the ancient Chinese god *Pan Gu*, the creator of the world who separated *yin* from *yang,* the earth from the sky.

***22**

MBALE

L5/6
Malukhu, Uganda (1°4'N, 34°10'E)

This specimen is an end piece covered in fusion crust. The polished face displays a variegated chestnut to chocolate interior split by a vein of impact melt and adorned in sparkling flakes of metallic iron-nickel.

70 x 24 x 26mm (2¾ x 1 x 1in.)
81.5g

£600-1,000 $910-1,500 €840-1,400

LITERATURE:
Jenniskens, et al. (1994), "The Mbale meteorite shower." Meteoritics, 29(2), 246–254.

Throughout the course of civilisation, hopes and fears have been roused by rocks inexplicably falling out of the sky. And so it happened again when at 3:40 PM on August 14, 1992, a deafening explosion occurred over the densely populated city of Mbale, Uganda and a shower of rocks rained earthward. In one of only two documented instances of a meteorite striking someone, a small meteorite fell through the leaves of a banana tree and struck a young boy on the head. The boy was not hurt (unlike the woman who was struck in 1954 in Sylacauga, Alabama, see lot 3). In the early 90s, Uganda was ravaged by AIDS, and many of the recovered meteorites were ground up by those who believed the stones were a cure for AIDS dispatched by God.

***23**

CANYON DIABLO END PIECE FROM THE BEST PRESERVED METEORITE CRATER ON EARTH

Iron, coarse octahedrite
Meteor Crater, Coconino County, Arizona (35°3' N, 111°2' W)

A lacquer finish exists over the robust *Widmanstätten pattern* seen on the cut face with large graphite nodules also in evidence. On the reverse, the meteorite's exterior surface is rendered in a slate-hued patina, with soft scalloping and chocolate-hued accents. Accompanied by a custom armature and pedestal. Modern cutting.

133 x 42 x 47mm (5¼ x 1⅔ x 1¾ in.)
1,345g (3lbs)

£1,500-2,500 $2,300-3,800 €2,200-3,500

LITERATURE:
Blumberg, J. (1999), "Rutgers Researchers Team With International Group To Investigate One of the Most Famous Meteorites in the World." *Near Earth Object Program*. Accessed November 5, 2015.

About 49,000 years ago, this iron meteorite was part of a metallic asteroid that plowed into the Arizona desert with the force of more than 100 atomic bombs. The enormous burst of energy vaporised most of the asteroid and created a kilometre-size impact crater in what was, just moments before, flat-lying rock. This is the renowned "Meteor Crater" near Winslow, Arizona, the most famous and best-preserved meteorite crater in the world. The chunks of iron that survived the impact are known as Canyon Diablo ("Canyon of the Devil"), the quintessential American meteorites, prized by museums and private collectors everywhere. Now offered is an end piece that reveals the meteorite's gleaming, finely textured exterior surface in addition to a cut and polished window highlighting its interior matrix.

•*24

COMPLETE CANYON DIABLO ZOOMORPHIC METEORITE

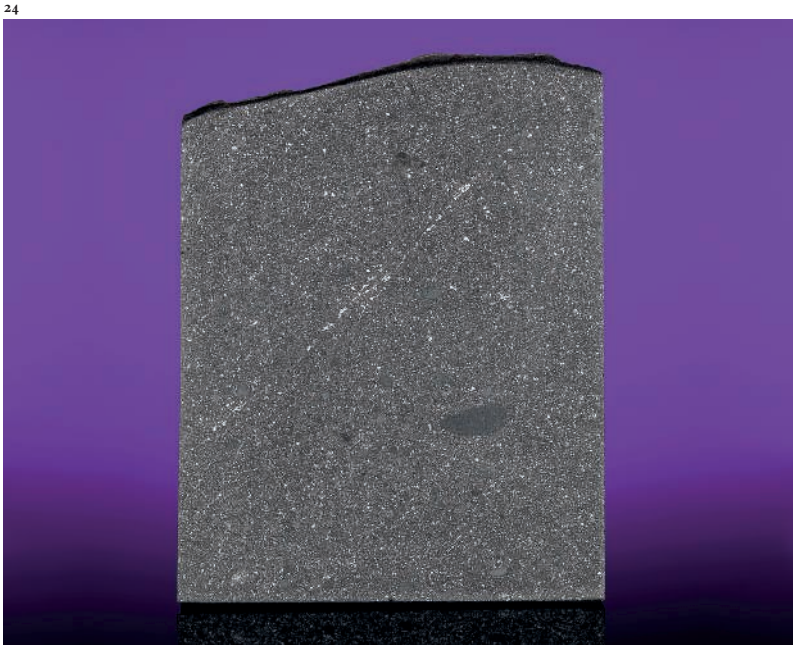
Iron coarse octahedrite – IAB-MG
Meteor Crater, Coconino County, Arizona (35°3' N, 111°2' W)

A muted metallic patina with cocoa accents veils a lightly textured surface of this animated form.

133 x 42 x 47mm (5¼ x 1⅔ x 1¾in.)
579g

£500-1,000 $760-1,500 €700-1,400

24



25

LITERATURE:

Heymann D., et al. (1966), "Canyon Diablo meteorite: Metallographic and mass spectrometric study of 56 fragments." *Journal of Geophysical Research, 71*(2), 619-641.
Blumberg, J. (1999), "Rutgers Researchers Team With International Group To Investigate One of the Most Famous Meteorites in the World." *Near Earth Object Program*. Accessed November 5, 2015.

About 49,000 years ago, a 50-metre-wide iron-nickel asteroid plowed into northern Arizona, releasing as much energy as 40 megatons of TNT. The explosion created a crater 150 metres below the surrounding plain and ejected more than 100 million tons of rock into the air. This cataclysmic impact event created the most famous and best-preserved meteorite crater in the world — the renowned "Meteor Crater" near Winslow, Arizona. The crater is 1.2 kilometres across and 200 metres deep. (The Washington Monument is shorter by more than 30 metres.) Although the main mass vaporised during the collision, some iron-nickel fragments were ripped from the asteroid beforehand, during atmospheric passage; other fragments were broken off during the impact event itself. These iron masses, collectively known as Canyon Diablo ("Devil's Canyon") meteorites, are quintessentially American, prized by museums, research institutions and private collectors everywhere. This complete individual broke off in the atmosphere prior to the impact event. It and its paired specimens lay undiscovered until 1876 when a cattleman named Mathias Armijo picked up the first iron mass about 3 kilometres west of the crater.

Similar to the previous lot. Many Canyon Diablo fragments either broke off the main iron-nickel mass in the atmosphere or fragmented after the small asteroid struck Earth and pelted the northern Arizona landscape miles from the point of impact. The present offering is a playfully-shaped sample of the object which produced what is today the freshest large impact crater on Earth.

*25

PARTIAL SLICE OF DJATI PENGILON METEORITE

H6
Ngawi District, Java (7°30' S, 111°30' E)

With a pearly luster, cool ebony matrix and countless tiny grains of iron-nickel, this is a fine partial slice with one edge of fusion crust. An ethereal thread of iron-nickel and scores of black inclusions are also seen.

91 x 70 x 3mm (3½ x 2¾ x ⅛in.)
90.7g

£1,000-1,500 $1,600-2,300 €1,500-2,100

The main mass of the Djati-Pengilon meteorite is a centerpiece of the Indonesia's National Geological Museum in Bandong, and a national treasure. Unlike finding meteorites in the world's great deserts, Indonesia's dense ground cover makes the recovery of meteorites a challenging affair. That is why about 85% of Indonesian meteorites are observed falls. Djati-Pengilon is an especially sought-after Indonesian meteorite that plunged into the Alastoeva River on March 19, 1884. It is most unusual to be able to acquire a specimen of a museum centerpiece, and this offering is a rare exception.

***26**

CAMPO DEL CIELO METEORITE

Iron, coarse octahedrite – IAB-MG
Gran Chaco, Argentina (27°28' S, 60°35' W)

The smooth, highly textured surface is enveloped in a bright chrome patina with charcoal accents. Accompanied by a custom armature and pedestal, this is a superior example.

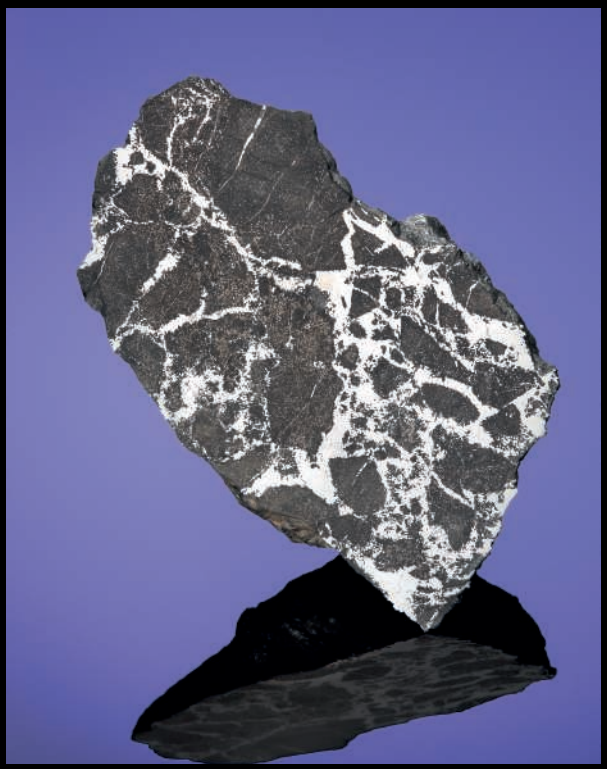
139 x 109 x 68mm (5½ x 4¼ x 2½in.)
2.54kg (5.6lbs)

£1,500-2,500 $2,300-3,800 €2,200-3,500

LITERATURE:

Cassidy, W.A., et al. (1965), "Meteorites and Craters of Campo del Cielo, Argentina." *Science, 149*(3688), 1055-1064.

Campo del Cielo meteorites were first written about by Spanish explorers in 1576, nearly 4,000 years after their collision with Earth and far before their unearthly origins were understood. A Campo was the first large meteorite ever displayed at the *British Museum of Natural History,* and several large Campo del Cielo ("Valley of the Sky") masses are today found in the finest museums in the world. Fortuitously, a previously unknown portion of the Campo *strewnfield* (the area in which a meteorite shower is "strewn" across the Earth's surface) was discovered several years ago. Located at a higher elevation than the valley where the majority of Campos fell, the meteorites from this region were less susceptible to incursions of ground water and, as a result, exhibit more dynamic sculptural forms. In this instance, the meteorite's shape evokes "Deep Thought," the supercomputer that explained the universe in Douglas Adam's *Hitchhiker's Guide to the Galaxy*.



***27**

SILICATED CAMPO DEL CIELO METEORITE END PIECE

Iron, coarse octahedrite – IAB-MG
Gran Chaco, Argentina (27°28' S, 60°35' W)

Large angular inclusions compositionally and chemically chondritic in nature (in effect, fragments of a stone meteorite) are seen in the cut and polished face within the metallic matrix. The external surface is somewhat nodular as a result of the different compositions of the silicate and iron-nickel — the two primary materials of which the meteorite is composed. Modern cutting.

147 x 79 x 33mm (5¾ x 3 x 1¼in.)
912g

£1,500-2,500 $2,300-3,800 €2,200-3,500

LITERATURE:

Park, F., Bunch, T., & Massalski, T. (1966), "A study of the silicate inclusions and other phases in the Campo del Cielo meteorite." *Geochimica et Cosmochimica Acta, 30*(4), 399.

While most Campo del Cielo meteorites contain occasional silicate inclusions, the specimen now offered contains an abundance of such inclusions and was, as a result, initially believed to be a completely different meteorite that happened to fall within the Campo strewnfield. However, this *is* a Campo; its chemical signature matches those of other Campos very closely. The penetrating threads of metal are the result of a massive shock event in interplanetary space.

***28**

AN ORIENTED METEORITE — THE MAIN MASS OF NWA 10195

L4
Sahara Desert

Strong orientation and regmaglypts are quite evident. A small window reveals the meteorite's matrix on the reverse. Recovered by desert nomads and featuring a naturally sandblasted desert varnish. Accompanied by a custom pedestal.

140 x 171 x 76mm (5½ x 6¾ x 3in.)
3.48kg (7.7lbs)

£7,000–10,000 $11,000–15,000
€9,900–14,000

To enable scientists to refer to the unique attributes of a given meteorite, there must be a nomenclature system, and so a committee of scientists name meteorites after the location to which they've been "delivered," (e.g., a city, village, mountain, river, county, etc.). In a desert, where there are few distinguishing geological features, meteorites are named after a grid encompassing a restricted area and are assigned sequential numbers. NWA 10195 was found in 2013; it is the 10,195th meteorite to be catalogued following its recovery in the Northwest African grid of the Sahara Desert. The L4 classification indicates the meteorite has moderate amounts of free iron and experienced moderate metamorphism on its parent asteroid prior to launch.

What most sets this meteorite apart is the characteristic of *orientation*. Oriented meteorites are rare and occur only when the mass of a meteorite is distributed in such a way that it maintains the same axis of orientation throughout its descent in the atmosphere. Unlike 99.9% of all meteorites, oriented meteorites don't invert or tumble when frictional heating commences high in the atmosphere. As a result, oriented meteorites look different and their direction of flight is readily discerned. The parabola seen here is the angle at which heat is most efficiently deflected away from a falling body and inspired the heat shield design of Mercury, Gemini and Apollo capsules. The long grooves in the specimen are *regmaglypts* or thumbprints, a result of material streaming off the meteorite's molten surface. Most meteorites this size are barely warm to the touch when they reach the ground. There are three main reasons for this: much like fried ice cream, the freezing-cold core of the rock tends to diminish the superheating experienced at the rock's surface; the molten surface continually ablates away during atmospheric passage, allowing little time for heat to be conducted into the rock's interior; and after a falling object reaches terminal velocity, it experiences a nice breeze.

***29**

ANTHROPOMORPHIC GIBEON METEORITE EVOKES MUNCH'S "THE SCREAM"

Iron – IVA
Great Namaland, Namibia (25°30' S, 18°0' E)

The elongated mass is punctuated by three deep pockets and is accented by a surface of swirling ripples and ridges in a faint russet patina. Natural cleavage along crystalline planes is also evident. All of the foregoing combine to provide an otherworldly evocation of Edvard Munch's "The Scream." Accompanied by a custom pedestal, this is a notable offering of a celebrated iron meteorite.

548 x 239 x 211mm (21½ x 9⅓ x 8⅓in.)
81.4kg (179lbs)

£150,000-250,000 $230,000-380,000 €220,000-350,000

EXHIBITED:
Exhibited in Tel Aviv (2013) and Baku (2014) as part of the U.S. Space and Rocket Center/NASA production "Cradle to the Cosmos."

LITERATURE:
Featured in "The Approval Matrix" *New York Magazine*. October 8, 2012 (quadrant: "Highbrow/Brilliant"), pp. 100.

Recovered from the edge of the Kalahari Desert, Gibeon iron meteorites are the bounty of a huge meteorite shower that occurred thousands of years ago when an enormous iron mass slammed into Earth's upper atmosphere before exploding and raining down in an elliptical strewnfield in what is now Namibia. When indigenous tribesmen later discovered small metallic shards in the soil, they fashioned them into spear points and other tools. The specimen now offered was recently recovered by a tribesman with the aid of a metal detector. Gibeon meteorites have a relatively high nickel content and if this meteorite were cut it would reveal a gleaming octahedral crystalline pattern (e.g. see lots 9, 32 or 33.) This totem-like specimen greatly benefits from the anthropomorphic alignment of its three delimiting scoops. These hollows were most likely the result of iron sulfide (troilite) inclusions that oxidised out of the mass; the depressions grew in size over thousands of years while the meteorite was underground in the Kalahari.

Christie's would like to thank Dr. Alan E. Rubin for his assistance in preparing the catalogue note for this, and the other, meteorites in this sale.

***30**

AN ENORMOUS STONE METEORITE — NWA 8413

H6

Sahara Desert

The enormous specimen blanketed with regmaglypts, the surface with an elemental brown patina, supported on custom fitting to pedestal.

60 x 50 x 43cm (24 x 21 x17in.)
155kg (342lbs)

£70,000-100,000 $110,000-150,000 €99,000-140,000

This is the largest and one of the most beautiful stone meteorites ever offered by Christie's at auction. About 73% of the meteorites in collections are ordinary chondrites (hence the name) and these are derived from three separate asteroids. The meteorites are labeled H (high total iron), L (low total iron) and LL (low total iron, low metallic iron). (The total amount of iron includes iron metal and oxidised iron in silicates and oxides.) NWA 8413 is a member of the H-chondrite group and contains abundant metallic iron. Large stone meteorites are extremely rare. Whereas the average mass of an H chondrite find is about 24 g, NWA 8413 is the 20th largest single H chondrite known, with a mass of 155 kg. It was found in Northwest Africa in 2011. The rock has been extensively heated on its parent asteroid; during this thermal metamorphism process, the chondrules were recrystallised and the individual mineral grains became compositionally homogeneous. That heating earned the meteorite the designation of type 6, the highest metamorphic grade.

31

***31**

LARGE SEYMCHAN METEORITE SLICE

PALLASITE – PMG
Magadan District, Russia (62°54' N, 152°26' E)

This is a large format, complete slice of a Seymchan meteorite of the pure-metal variety which was cut from a meteorite that weighed hundreds of pounds. A prominent *Widmanstätten pattern* is in evidence; a latticework that is indicative of a slow cooling rate that provided sufficient time — millions of years — for the two metallic alloys (kamacite and taenite) to form their intricate intergrowth.

575 x 450 x 6mm (22½ x 17½ x ¼in.)
8kg (17.6lbs)

£7,000-10,000 $11,000-15,000 €9,900-14,000

In the 1960s, two large metallic masses were found in a streambed in a part of Siberia made infamous as the remote location of Stalin's gulags. Identified as meteorites, they were named Seymchan for a nearby town. Unlike Imilac (see lots 5,6 & 7) and Esquel (see lot 20) and the vast majority of other pallasitic meteorites, the dispersion of olivine crystals in Seymchan is extremely heterogeneous. Some specimens are olivine rich and some are olivine poor; some specimens have no olivine whatsoever.

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***32**

COMPLETE BASSIKOUNOU METEORITE

H5
Bassikounou, Hodh Ech Chargui, Mauritania (15°47' N, 5°54' W)

Fresh chocolate-coloured triangular specimen covered in fusion crust.

71 x 57 x 52mm (2¾ x 2¼ x 2in.)
242g

£800-1,200 $1,300-1,800 €1,200-1,700

In the southeast corner of Mauritania, extremely close to the Malian border, a bright fireball was observed at 1 P.M. on October 16, 2006. More than 20 stones fell from the sky and formed a strewn field that extended about 8 kilometres across the landscape. The rock from which this meteorite originated was shocked on its parent asteroid; metal and sulfide grains melted and metallic copper grains formed. Before being ejected into an Earth-intersecting orbit, the rock was buried amidst hot impact-generated debris which moderately recrystallised most of the chondrules.

***33**

END PIECE OF A LARGE SEYMCHAN METEORITE WITH INTERIOR AND EXTERIOR REVEALED

Pallasite – PMG
Magadan District, Russia (62°54' N, 152°26' E)

Punctuated by inclusions of schreibersite and black iron-rich silicates on the cut face, the external surface on the reverse is smooth and rounded, the result of exposure to Earth's elements during its long tenure on our planet. An intriguing study of the interior structure and exterior surface of an iron meteorite.

141 x 143 x 79mm (5½ x 5⅔ x 3in.)
5.80kg (12.7lbs)

£2,500-4,000 $3,800-6,000 €3,600-5,600

Similar to the previous lot, Seymchan meteorites are primarily non-aesthetic lumps, and so they are *ideal* for subdivision like the display piece now offered. Seymchan possesses what is among the most resplendent coarse *Widmanstätten patterns* known, which this specimen exhibits to great effect. These crystalline patterns result from the very slow intergrowth of two iron-nickel minerals (kamacite and taenite) deep within the core of a melted asteroid. Seymchan is among the most rust-resistant of iron-rich meteorites — perhaps due in part to its moderately high concentration of iridium, the second densest element and the most corrosion-resistant metal known.

***34**

COMPLETE SEYMCHAN METEORITE

Pallasite – PMG
Magadan District, Russia (62°54' N, 152°26' E)

With a patina ranging from ochre to cocoa and the archetypal abrasions that result from excavation, this complete meteorite is so teeming with crystals it glitters when moved under a bright light. Accompanied by a custom armature, this is a superior example

153 x 169 x 59mm (6 x 6⅔ x 2.⅓in.)
3.62kg (8lbs)

£10,000-15,000 $16,000-23,000 €15,000-21,000

Similar to the previous lot, this is a complete Seymchan pallasitic meteorite replete with olivine and peridot. It was from a meteorite similar to this, but larger, that the sphere in the previous offering had originated. Seymchan is among the most rust-resistant of iron-rich meteorites — perhaps in part the result of its moderately high concentration of iridium, the second densest element and the most corrosion-resistant metal known. This complete specimen was part of a meteorite shower that occurred in the Magadan district of Siberia and originates from the core-mantle boundary of an asteroid.

***35**

SEYMCHAN SPHERE — AN EXTRATERRESTRIAL CRYSTAL BALL

Pallasite – PMG
Magadan District, Russia (62°54' N, 152°26' E)

Originating from a large Seymchan meteorite sample that underwent a number of stages of grinding and polishing in a sphere-making apparatus. Dazzling amber-hued olivine crystals are distributed throughout a highly-polished iron-nickel matrix.

53mm (2in.) diameter
434g

£7,000–10,000 $11,000–15,000 €9,900–14,000

LITERATURE:

Van Niekerk, et al. (2007), "Seymchan: A Main Group Pallasite – Not an Iron Meteorite." *Meteoritics and Planetary Science Supplement*, Vol. 42, p.5196.

Similar to the previous lots, less than 0.2% of all meteorites are pallasites, the most beautiful extraterrestrial substances known. Pallasites are formed at the core-mantle boundary of an asteroid that underwent mixing of molten metal from the core with olivine from the mantle. The result is olivine crystals in suspension in an iron-nickel matrix. Seymchan also contains gem-quality olivine otherwise known as *peridot* (birthstone of August). Pallasites are the most dazzling of all meteorites and this is a wondrous three-dimensional presentation of a pallasite, revealing aspects of the structure impossible to see in a flat slab. This specimen can rightfully be considered an otherworldly crystal ball.

***36**

COMPLETE SPRINGWATER METEORITE

Pallasite – PMG ANOM
Saskatchewan, Canada – (52° 0'N, 108° 18'W)

The surface is blanketed with small cavities and crenellations, the result of its olivine melting away from the iron matrix during frictional heating in the atmosphere

150 x 130 x 90mm (6 x 5 x 3½in.)
3.50kg (7.7lbs)

£40,000-60,000 $61,000-90,000 €57,000-84,000

In August 1931, a 20 kilogram pallasitic mass was found in a field about 160 km west of Saskatoon, Canada. Two other masses were subsequently found, and there are unconfirmed reports that a farmer threw an even larger mass down a well. Dr. Harvey Nininger, the "Father of Meteoritics", went to Springwater in an effort to locate the large mass, but his efforts were in vain. Nearly seventy-five years later, in 2008 several meteorite dealers decided to revisit the Springwater site after looking up the coordinates listed above. After negotiating with landowners to do a property search, they hit the mother lode. While they did not find the mass allegedly thrown in the well, with the aid of metal detectors they recovered numerous additional specimens, including what is now the main mass on display at the Royal Ontario Museum in Toronto. Pallasites like Springwater formed at the core-mantle boundary of a asteroid that underwent mixing of molten metal of the core with olivine in the mantle. The result is olivine crystals in suspension in an iron-nickel matrix. Unlike pallasites like Esquel (lot 20), Springwater was subsequently annealed and its olivine crystals became rounded. This complete and uncommonly attractive specimen is part of the bounty of the recently recovered material. If cut, this mass would result in beautiful slices of small rounded olivine crystals in an iron-nickel matrix.

***37**

COLD BOKKEVELD — A NOTABLE OFFERING OF HISTORIC, SCIENTIFICALLY INVALUABLE CM2 METEORITE

CM2

Cape Province, South Africa (33°8'S, 19°23' E)

Large patches of fresh fusion crust cover a significant portion of the mass. Where breaks occur the dark pristine matrix is revealed. Catalog seal and inscription of the British Museum sample number on the specimen reads: "BM 13989"

86 x 71 x 57mm (3⅓ x 2¾ x 2¼in.)
358g

£120,000-180,000 $190,000-270,000 €170,000-250,000

PROVENANCE:

British Museum of Natural History / Natural History Museum, London

The Cold Bokkeveld meteorite fell approximately 130 kilometres northeast of Cape Town, South Africa on October 13, 1838. Like Murchison (see lot 4), Cold Bokkeveld is a chemically primitive CM2 meteorite rich in organic compounds and hydrated minerals. Unlike Murchison, of which more than 100 kilograms were recovered, there is only 5.3 kilograms of Cold Bokkeveld known to exist. The specimen now offered is larger than the amount of Cold Bokkeveld in every major museum and research institution in the world other than the Natural History Museums in London, Paris and Vienna. Cold Bokkeveld was the first witnessed fall of a CM2 meteorite. Cold Bokkeveld is also a breccia, a rock made up of different smaller rocks pushed together; the different pieces of Cold Bokkeveld have been altered to different extents by water on its parent asteroid. This meteorite also contains complex organic compounds (different than those on Earth) as well as microscopic diamonds and pre-solar gases that formed long before the solar system came into existence.

In the *American Journal of Science and Arts*; Volume 40, No 1, Oct – Dec 1840, pp 199, it states, in part:

"The event occurred on the morning of Oct 12, 1838 [subsequently corrected]. There was a cloudless sky without wind, when, say the Hottentots Kievet and Rattray, both under oath before a magistrate, about 9 o'clock 'We heard a strange noise in the air, resembling the loudest thunder we had ever heard; and on looking up we perceived a stream passing over our head, issuing a noise which petrified us with terror: a burst took place close to the wagon [with which they were getting wood], when something fell and a smoke arose from the grass. My master sent me to look what it was that had fallen when I found a stone quite warm, so much so that I could not hold it in my hands.' We are so fortunate to possess a good specimen of the African meteorite, through the kindness of a friend in Boston. It corresponds with Sir M. Faraday's description, and is very different in appearance from any meteorite which we have seen."

Here is now an opportunity to acquire a spectacular specimen of a pre-eminent meteorite.

•*38

LIBYAN DESERT GLASS

Sahara Desert

With pronounced scalloping on different contours, all surfaces are frosted, the result of generations of sandblasting by desert winds.

108 x 67 x 51mm (4¼ x 2⅝ x 2in.)
506g

£500-800 $760-1,200 €700-1,100

Tektites are chunks of silicate glass whose origin was long considered a mystery. Today scientists agree these materials (whose name comes from the Greek *tektos*, meaning "melted") formed when an asteroid impacted Earth. The extraordinary heat and pressure that resulted from such collisions liquefied terrestrial particles were blasted into the atmosphere that quenched and returned to Earth as glass. Tektites are terrestrial in origin and are named after the locality in which they are found, hence: *Australites*, *Indochinites*, *Phillipinites*, *Moldavites, Libyan Desert Glass, etc.* Among terrestrial impact glasses, the higher the silica content of the material, the lighter the colour. Desert Glass is 98% silica (molten sand) and is sunny yellow; with 80% silica, Moldavites cover a range of greens and originate from what was formerly Czechoslovakia. Now offered is a translucent example of Libyan Desert Glass found in the sands of the Sahara, where it originated from an impact which occurred 28-29 million years ago. Libyan Desert Glass was used to make tools during the Pleistocene and used as jewellery in the Pharaonic Period with examples discovered in King Tut's tomb.

***39**

COMPLETE URUACU METEORITE

Iron (IAB) Complex
Goiás, Brazil (14°32' S, 48°46' W)

With an abundance of peaks and scoops and a charcoal to platinum patina.

228 x 177 x 139mm (9 x 7 x 5½in.)
14.5kg (32lbs)

£5,000-8,000 $7,600-12,000 €7,100-11,000

Several specimens of Uruacu were reported to have been found by cattlemen and gold prospectors in central Brazil in 1992. The meteorite contains moderately high contents of the iron carbide mineral cohenite as well as the iron-nickel phosphide mineral schreibersite. However, the bulk chemical composition of Uruacu is identical to that of the Campo del Cielo iron from Argentina and it seems likely that the two meteorites are paired. Like all iron meteorites, the specimen now offered originated from the molten core of an asteroid.

***40**

DAR EL KAHAL METEORITE — EXTRATERRESTRIAL TABLETOP SCULPTURE

H5-6
Gao, Mali (22°5' N, 2°32' W)

This meteorite's form is the result of its encounters with Earth's atmosphere — and the Earth itself, as evidenced by abundant flight markings as well as an impact-cleaved partial face. Remaining on the desert floor exposed to the elements for at least hundreds of years, it acquired a milk chocolate patina and natural desert varnish.

235 x 293 x 132mm (9¼ x 11½ x 5in.)
9.37kg (20.7lbs)

£15,000-25,000 $23,000-38,000 €22,000-35,000

The only meteorite from the African nation of Mali in this offering, this specimen of Dar El Kahal is a riveting sculptural form whose allure was embellished by having split on impact at a perfect spot as if done so by design. Part of a small meteorite shower, the first specimen of Dar El Kahal was found by a nomad searching for historical artifacts near the salt mines of Taoudenni in northern Mali. Following the recovery of the first meteorite, a systematic search followed. Dar El Kahal is a *breccia* (a rock composed of smaller rock fragments fused together); the meteorite contains very metamorphosed, highly recrystallised type 6 chondritic material and somewhat less-metamorphosed, moderately recrystallised type 5 fragments. The rock was shattered, shocked and heated on its parent asteroid long before it was launched toward Earth on a circuitous journey through interplanetary space. What makes this meteorite special are its *regmaglypts*, the thumbprint-like impressions formed by ablation as it underwent frictional heating and melting during its fiery plunge through the Earth's atmosphere.

***41**

A MATCHLESS, ORIENTED CHELYABINSK METEORITE

LL5

Chelyabinskaya Oblast, Russia (54°49' N, 61°07' E)

Elongated regmaglypts extend from the nose cone to the edge of this conical mass. A pronounced ablation lip where material annealed off the meteorite is in evidence. Nearly blanketed in fusion crust, there are spots where crust is absent. Superficial contraction fissures span the specimen and solidified melt in the low pressure zone can also be seen. Among the finest meteorites of its kind from any meteorite shower, this example originates from the most historic meteorite event of modern civilisation. Accompanied by a custom armature and Lucite case.

117 x 93 x 64mm (4½ x 3⅔ x 2½ in.)
890g (2lbs)

£180,000-300,000 $280,000-450,000 €260,000-420,000

PROVENANCE:

The Russian Academy of Sciences, Moscow
Macovich Collection of Meteorites, New York City

LITERATURE:

Righter, K., et al. (2015), "Mineralogy, petrology, chronology, and exposure history of the Chelyabinsk meteorite and parent body." *Meteoritics & Planetary Science (50)*10, 1790-1819.
Badyukov, D.D., Dudorov, A.E. (2013), "Fragments of the Chelyabinsk meteorite shower: Distribution of masses and sizes and constraints on the mass of the largest fragment." *Geochemistry International, 51*(7), 583-586.

Travelling at a speed of 66,000 kilometres per hour, a giant fireball entered Earth's atmosphere at a shallow angle over Kazakhstan on February 15, 2013. At an altitude of 45 kilometres, atmospheric friction resulted in the largest portion — a 12,000-ton, 19-metre rock — to start breaking up. As fragmentation increased so did the amount of atmospheric drag, and when the object could not withstand the pressure, it exploded in a massive air burst at an altitude of 30 kilometres over the Russian city of Chelyabinsk. The total kinetic energy of the fireball was 500 kilotons of TNT (approximately 25 times more energy than released by the atomic bomb that destroyed Hiroshima). Fortunately, most of the explosive energy was absorbed by the surrounding atmosphere. Eighty-eight seconds later a shockwave reached the ground: people were knocked off their feet, 7,200 buildings in six cities were damaged and 100,000 homeowners had to replace broken windows. Worse still, more than 1,000 people were injured, most from shattered glass and some for ultraviolet burns and temporary flash blindness. This is the largest known object to have entered the Earth's atmosphere since Siberia's 1908 Tunguska event, and Chelyabinsk left a trail of shockwave-induced damage nearly 200 kilometres wide. It could have been far worse. Had the meteoroid's flight been more vertical, the shock energy would have been more focused and concentrated and the resulting damage far greater. Chelyabinsk is the only meteorite documented to have resulted in a large number of injuries. It's also the only meteorite whose final moments were extensively documented on video: hundreds of security cameras and dash-cams recorded Chelyabinsk's descent as well as the exploding windows and collapsing walls. While ⅔ of the Chelyabinsk mass disintegrated in the atmosphere, thousands of meteorites — most being extremely small — landed on Earth. The next four lots originate from this historic event.

The first offering is the largest and finest oriented meteorite that originates from this historic phenomenon. This meteorite is *not* from the lower-altitude explosion. Fully oriented meteorites like this example are rare; unlike 99% of meteorites, this sample maintained the same orientation as it descended through the atmosphere. The parabola seen here is the angle at which heat is most efficiently deflected away from a falling body and was emulated in the heat shield design of the Mercury, Gemini and Apollo space capsules. As an oriented meteorite plunges through the atmosphere, a low-pressure zone forms on its far side, resulting in the boiling of pooled molten material. One would expect the character of the far side of a perfectly oriented meteorite to be far different than the leading edge — and that is abundantly evident in the matchless Chelyabinsk specimen now offered.

Christie's would like to thank Dr. Alan E. Rubin for his assistance in preparing the catalogue note for this, and the other, meteorites in this sale.

(front)

(reverse)

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A SMALL ORIENTED CHELYABINSK METEORITE

LL5
Chelyabinskaya Oblast, Russia (54°49' N, 61°07' E)

While this is a modestly sized oriented meteorite compared to the previous lot, every feature of orientation is evident: parabolic cone, flow lines, regmaglypts, an ablation lip and evidence of bubbling on the reverse. On the obverse an evocation of a face similar to the character Kuato in the film *Total Recall.*

39 x 37 x 17mm (1½ x 1½ x ⅛in.)
45.1g

£3,000-5,000

$4,600-7,500
€4,300-7,000

LITERATURE:

Klotz, I. (2014), "Russian Meteor: Chelyabinsk Asteroid Had Violent Past." *Discovery*. Accessed November 5, 2015.
Dorminey, B. (2015), "NASA Surprised By Chelyabinsk Russian Meteor Fragments." *Forbes*. Accessed November 5, 2015

Similar to the previous lot, this is a smaller oriented meteorite from the Chelyabink meteorite shower — and as is the case with the previous lot, less than 1% of all meteorites exhibit this degree of orientation. As a result of the damage created by Chelyabinsk, scientists are racing to come up with a comprehensive global strategy to protect Earth from a larger bombardment. About 13,000 Near-Earth Objects (NEOs) like the Chelyabinsk parent body have been discovered to date; nearly 900 of them are a kilometre in diameter or larger. More than 1600 of these bodies have been officially classified as "Potentially Hazardous Asteroids." Chelyabinsk is a member of the least-common ordinary-chondrite group — the LL chondrites. It wandered through interplanetary space for a scant 1 million years, which suggests that Chelyabinsk was derived from the recent disruption of a small Earth-crossing asteroid that was itself broken off the main LL parent asteroid in the more-distant past. During one or more of these collisional events, Chelyabinsk was significantly shocked; pools of impact melt have been documented in numerous specimens.

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***43**

COMPLETE CHELYABINSK METEORITE WITH WINDOW INTO MATRIX

LL5

Chelyabinskaya Oblast, Russia (54°49' N, 61°07' E)

Covered in fusion crust, this superior specimen has a small air break that provides a view into the meteorite's creamy interior matrix with black shock veins coursing throughout. Mounted on a custom pedestal and armature on which is also mounted a piece of glass from Chelyabinsk which shattered as a result of the asteroid's pressure wave.

58 x 58 x 29mm (2¼ x 2¼ x 1in.)
165g

(2)

£1,500-2,500 $2,300-3,800 €2,200-3,500

Similar to the previous lots, this is a specimen from the massive Chelyabinsk fireball of February 15, 2013. More than 1000 people were injured, mainly as a result of shattered glass. (Many people ran to their windows to see what had happened after they heard the sonic booms, only to experience the subsequent pressure-wave explode windows into their faces.) One teacher was heralded as a hero for insisting that her pupils remain under their desks following the initial sonic booms; when the pressure wave arrived, exploding glass badly lacerated the teacher, but none of her students was injured. Now offered is an assemblage of a Chelyabinsk meteorite and a piece of broken glass recovered from the wreckage.

•*44

NUMEROUS CHELYABINSK METEORITES

LL5

Chelyabinskaya Oblast, Russia (54°49' N, 61°07' E)

85 small pieces

19 x 27 x 17mm (the largest)
300g (total weight)

£1,500-2,500 $2,300-3,800 €2,200-3,500

LITERATURE:

Povinec, P. et al. (2013), "The Chelyabinsk Meteoroid- What do We Learn from the Recovered Meteorite Fragments?" *76th Annual Meeting of the Meteoritical Society*.
Zolfagharifard, E. (2014), "Chelyabinsk meteorite smashed into an asteroid 290 million years ago: Traces of jadeite mineral reveal rock's violent history." *Daily Mail*. Accessed November 11, 2015.
Sample, I. (2013), "Scientists reveal the full power of the Chelyabinsk meteor explosion." *The Guardian*. Accessed November 11, 2015.

Similar to the previous three lots, here are scores of small Chelyabinsk meteorites and meteorite fragments that are representative of the three different Chelyabinsk lithologies that impacted Earth on February 15, 2013: LL5, shock-darkened LL5 material and impact-melt breccia.

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DRONINO METEORITE — TABLETOP SCULPTURE

Iron, ataxite (ungrouped)
Ryazan district, Russia (54° 44' N, 41° 25' E)

The wavy, textured surface seemingly embossed in a platinum-hued patina is derived from the centuries-long interaction of the specimen's particular chemical composition with that of the ground. Featuring a fascinating surface texture, this is a highly decorative and most atypical meteorite.

152 x 88 x 34mm (6 x 3½ x 1⅓in.)
1.31kg (2.9lbs)

£2,000-4,000 $3,100-6,000 €2,900-5,600

LITERATURE:

Grokhovsky, V. et all. (2005), "Structural Studies of Iron Meteorite Dronino." *36th Annual Lunar and Planetary Science Conference.*

First discovered by a mushroom hunter in 2000, specimens of the Dronino meteorite shower belong to the rare "ungrouped" population of iron meteorites. While 89% of iron meteorites are members of established chemical groups, the other 11% are chemically unrelated to other specimens. Dronino is one of these unusual, ungrouped irons. It was discovered 20 kilometres from an ancient town founded in 1152. As nothing was ever written about what would have been, without a doubt, an extremely memorable event of a fireball accompanied by smoke trails and sonic booms, it's likely that the Dronino,s arrival occurred when the area was unpopulated. Given the high degree of terrestrial weathering (which caused the unusual morphologies of Dronino specimens), a descent to Earth more than a millennium ago can be confidently inferred.

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DRONINO — EXTRATERRESTRIAL MINIMALIST SCULPTURAL FORM

Iron, ataxite (ungrouped)
Ryazan district, Russia (54° 44' N, 41° 25' E)

Accompanied by a custom armature, this is a most uncommon meteorite.

189 x 158 x 57mm (7½ x 6¼ x 2¼in.)
5.75kg (12.6lbs)

£5,000-8,000 $7,600-12,000 €7,100-11,000

LITERATURE:

Oshtrakh, M., Milder, O., Grokhovsky, V. & Semionkin, V. (2004), "Hyperfine Interactions in Iron Meteorites: Comparative Study by Mossbauer Spectroscopy." *Hyperfine Interactions, 158*(1-4), 365-370

Similar to the previous lot, Dronino is an ungrouped iron meteorite. There is no meteorite that is chemically similar to Dronino, which implies it originated from a previously unknown parent asteroid. This is an unusual specimen as it regards its geometric simplicity. Earth's elements interacted with the meteorite for more than 1000 years, resulting in this minimalist form of two distinct richly textured slopes.

***47**

MASSIVE DRONINO METEORITE — AMONG THE LARGEST KNOWN TO EXIST

Iron, ataxite (ungrouped)
Ryazan district, Russia (54° 44' N, 41° 25' E)

With a surface texture throughout that is unique to Dronino, hints of this meteorite's original shape — feint ridges and shallow scoops — are evident. Curiously, the reverse showcases the unusual texture of parallel arcs more commonly associated with smaller Dronino specimens.

495 x 279 x 134mm (19½ x 11 x 5¼in.)
64kg (141lbs)

£25,000-35,000 $38,000-53,000 €36,000-50,000

LITERATURE:
Grokhovsky, V.I., et al. (2005), "Dronino: An Ancient Iron Meteorite Shower in Russia." *Lunar and Planetary Science, 306*, 1692.

Similar to the previous two lots, Dronino meteorites are from an otherwise unsampled asteroid orbiting the sun between Mars and Jupiter, a determination made from an analysis of its chemical composition. Dronino's exceedingly low gallium and gold percentages leave Dronino in a class by itself — quite literally: it has been classified as not belonging to a known meteorite group, and is therefore referred to as being *UNGR* (ungrouped) — a sought-after designation for both the scientific and the collecting communities. Given its unique chemical make-up, one would expect that as a result of Dronino meteorites having interacted with Earth's geochemistry for more than 1000 years before being excavated, there would be interesting results. Dronino does not disappoint. There is no other meteorite that looks like Dronino, and no North American museum has a Dronino meteorite as large as this imposing modern form from outer space.

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KAINSAZ — THICK SLAB OF EXOTIC RUSSIAN METEORITE WITH EXTRATERRESTRIAL ORGANIC MATTER AND STARDUST

C03 – Carbonaceous Chondrite
Muslyumov, Tatarskaya, Russia (55°26' N, 53°15' E)

With three cut and polished faces, one broken edge of the meteorite's external surface and a second external surface largely covered in fusion crust. With characteristic dark grey matrix loaded with some of the smallest chondrules on record and CAIs (calcium-aluminium-rich inclusions), the oldest matter mankind can touch. Modern cutting.

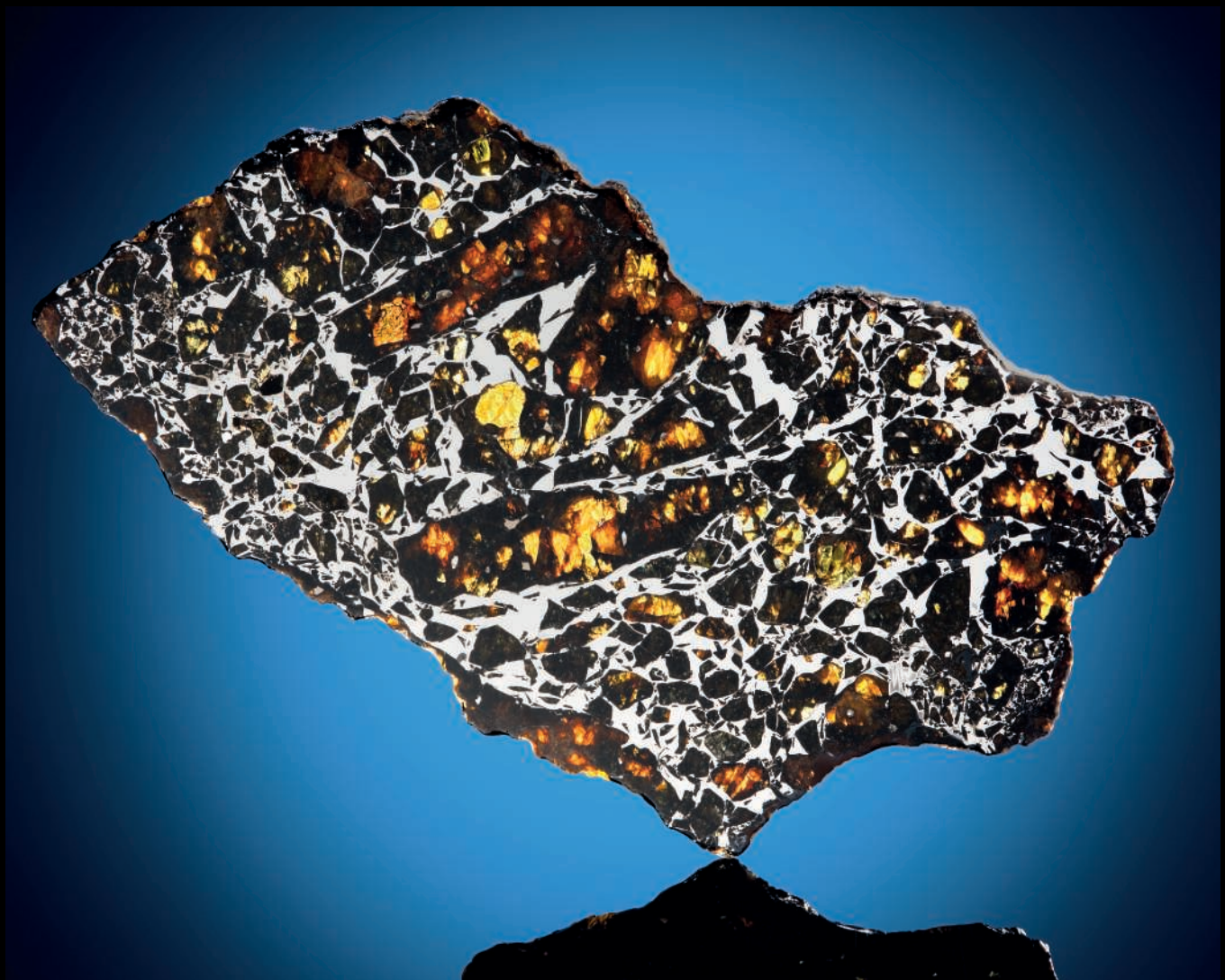
85 x 33 x 79mm (3⅓ x 1¼ x 3in.)
478g

£10,000-15,000 $16,000-23,000 €15,000-21,000

PROVENANCE:
The Russion Academy of Sciences, Kazan, Tartarstan
Macovich Collection of Meteorites, New York City

LITERATURE:
Remusat, L., et al. (2008), "Molecular study of insoluble organic matter in Kainsaz CO_3 carbonaceous chondrite: Comparison with CI and CM IOM." *Meteoritics & Planetary Science, 43*(7), 1099–1111.
Holmberg, B. B. & Hashimoto, A. (1992), "A unique, (almost) unaltered spinel-rich fine-grained inclusion in Kainsaz." *Meteoritics, 27*(2), 149–153.

It was at 2:15 pm on September 13, 1937 that Kainsaz streaked across the sky with a series of detonations heard 130 kilometres away. Uncertain as to its origins, KGB agents were placed on high alert and recovered the four largest meteorites. Now offered is a large specimen of this same famed meteorite, and it's larger than the examples in nearly all of the world's great museums outside of Russia. Kainsaz is a member of the rare carbonaceous CO_3 subgroup. It is Russia's only CO_3 meteorite and there are just five other CO_3 witnessed falls — and it's quite the exclusive club: Ornans, Lance, Moss, Warrenton and Felix. Of these six, Kainsaz is the most unequilibrated — the most primitive; it also is the richest of all CO_3 chondrites in metallic iron-nickel. Kainsaz contains a relatively high abundance of pre-solar grains — particles that formed in the atmospheres of dying stars long before the creation of our solar system. Also present in Kainsaz are light-coloured *CAIs* (calcium-aluminium inclusions) which are the oldest materials to form in the solar system; they are products of the gaseous nebula from which the Sun and planets formed and represent some of the oldest matter mankind can touch. Like other CO chondrites, Kainsaz contains some of the smallest chondrules known among major chondrite groups. It also contains insoluble organic matter that is extraterrestrial, but in lower concentrations than those found in the CM chondrites Murchison and Cold Bokkeveld (see lots 4 and 37).



***49**

COMPLETE SLICE OF THE ADMIRE PALLASITE

PAL – Pallasite
Admire, Lyon County, Kansas (38° 42' N, 96° 6' W)

Olivine and peridot are suspended in its iron-nickel matrix which is delimited by the meteorite's external surface. The attenuated, angular crystals in this specimen are a superior example of Admire's olivine crystalline signature. Modern cutting.

279 x 149 x 3mm (11 x 5¾ x ⅛in.)
492g

£7,000-10,000 $11,000-15,000 €9,900-14,000

PROVENANCE:
Macovich Collection of Meteorites, New York City

Admire is a pallasite, the most beautiful of all meteorite varieties, and the most resplendent extraterrestrial substance known. Admire pallasites are readily identified by large polycrystalline areas that cleaved into highly angular shards, and it is rare that the distribution of these angular crystals is as aesthetic as in the example now offered. Less than 0.2% of all meteorites are pallasites, rocks that formed at the core-mantle boundary of an asteroid when olivine (a magnesium-rich silicate mineral) crystallised in magma chambers within the mantle atop the molten metallic core. Gem-quality olivine, the semi-precious gemstone *peridot* (the August birthstone) is found in some pallasites — and such is the case with the current offering. The first two masses of the Admire pallasite were discovered while plowing a field in Lyon County, Illinois in 1881. More than a century later, enterprising meteorite hunters returned to the site, and after a lot more plowing (following the use of a metal detector) they discovered several additional masses. Admire meteorites are also the source of PalladotTM, the trademarked name of faceted peridot specifically extracted from Admire pallasites for jewellery applications.

***50**

NORTH WEST AFRICA (NWA) 869 — A STONE METEORITE HEWN INTO PERFECT SPHERE

L3-6

The Sahara Desert, near the Moroccan/Algerian Border

The milk chocolate matrix is accented with slate-grey and ochre accents and a multitude of metallic flecks throughout. Modern fashioning.

97mm (3¾in.) diameter
1.59kg

£3,000-5,000 $4,600-7,500 €4,300-7,000

This sphere was created from a prosaically shaped stone meteorite recovered in Algeria and purchased in a Moroccan market. Given the amount of material lost in the sphere-making process, such rendering would never occur if this material were more exotic. Moreover, only when the needs of research institutions and collectors are satisfied, does the luxury exist to create a sphere at all — exotic or not — and such is the case with the current example. The meteorite from which this sphere was hewn was part of the massive NWA 869 meteorite shower that pelted the Sahara centuries ago. Based on the amount of material recovered, the NWA 869 meteorite shower is among the largest documented meteorite showers of all time. The meteorite is a breccia, a rock composed of many small inclusions that have experienced different degrees of metamorphic heating within its parent asteroid. Some material (type-3 chondrite fragments) largely escaped heating and still retain their primitive textures and compositions; other materials (e.g., type-6 chondrite fragments) have been extensively heated and recrystallised.

***51**

BMNH SPECIMEN OF AN 18TH CENTURY JAPANESE OGI METEORITE

Chondrite – H6

Kyushu, Japan – (33°17' N, 130°12' E)

This elongated specimen has one edge of crust and two broken faces.

41 x 14 x 14mm (1⅔x ½ x ½in.)
19.8g

£5,000-8,000 $7,600-12,000 €7,100-11,000

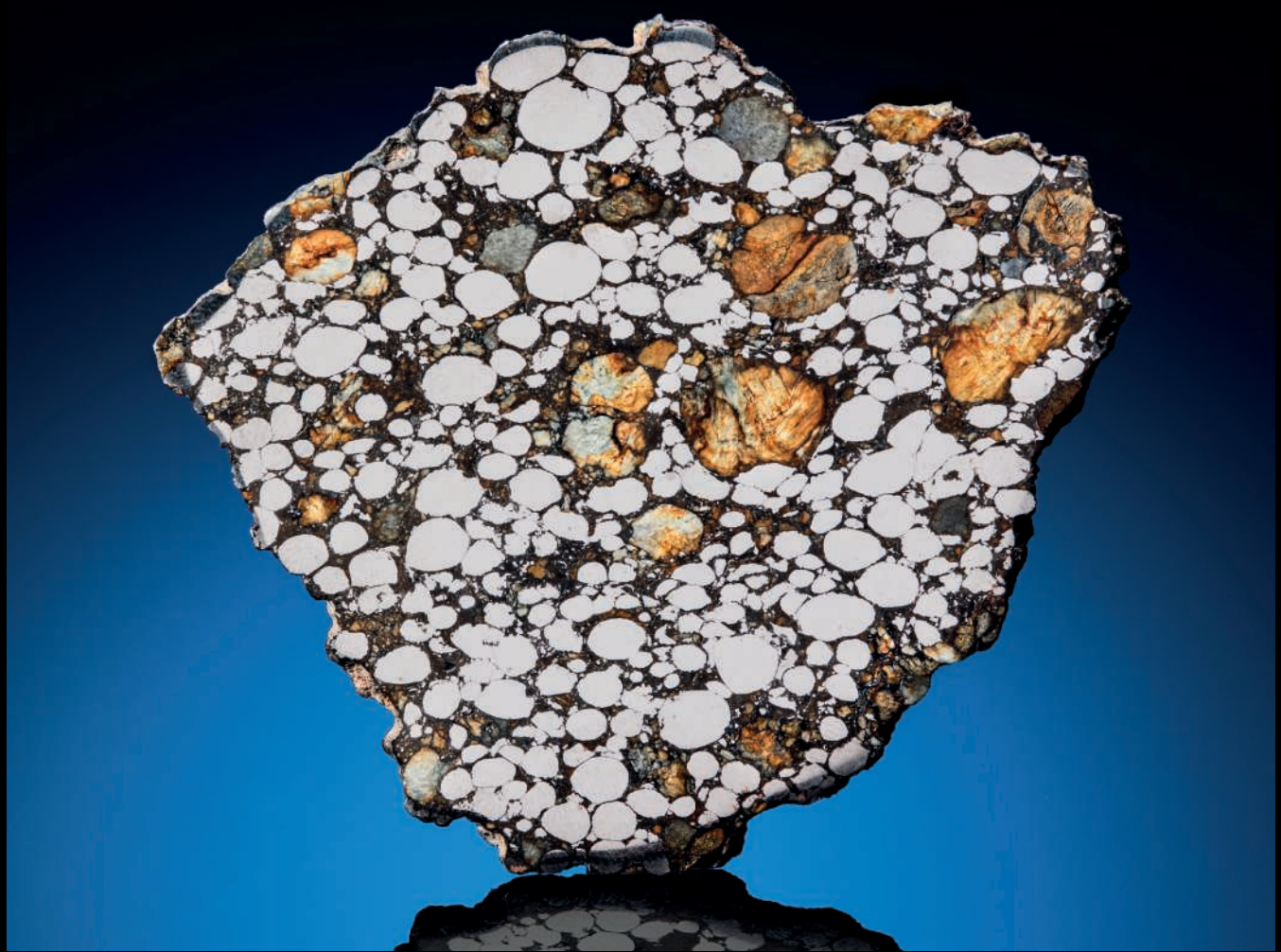
PROVENANCE:

Natural History Museum, London

LITERATURE:

Padia, J.T., Nautiyal, C.M., Rao, M.N., Venkatesan, T.R. "Noble gas composition in Ogi and Siena meteorites." *Earth and Planetary Sciences, 93*(1), 79-82.

Japanese meteorites are difficult to obtain. Japan is a relatively small target, and it's a country where much of the culture reveres meteorites as sacred objects. As a result of being venerated, several Japanese meteorites are tucked away the Buddhist shrines to which they were offered shortly after their arrival. Due to their rarity, Japanese meteorites are worth more, and the current offering is an historic example. On June 8, 1741, at a time when the origin of meteorites was not yet understood, thunder-like sounds were heard as a meteoroid plunged through the skies of the Japanese island of Kyushu. At the time of fall, it was believed that the four small recovered stones fell from the loom of the goddess Shokujo; the rocks were collected and preserved for worship in a temple where they became part of an annual re-offering to Shokujo. The British Museum of Natural History was able to obtain the largest of the four meteorite samples, and this specimen originates from that mass.



***52**

COMPLETE SLICE OF THE SINGULAR GUJBA METEORITE

Achondrite – bencubbenite
Yobe, Nigeria

This is a complete slice with characteristic nodules of metal and silicate in ample evidence. The sample shows a NE-SW alignment of nodules, a result of impact compression. Modern cutting.

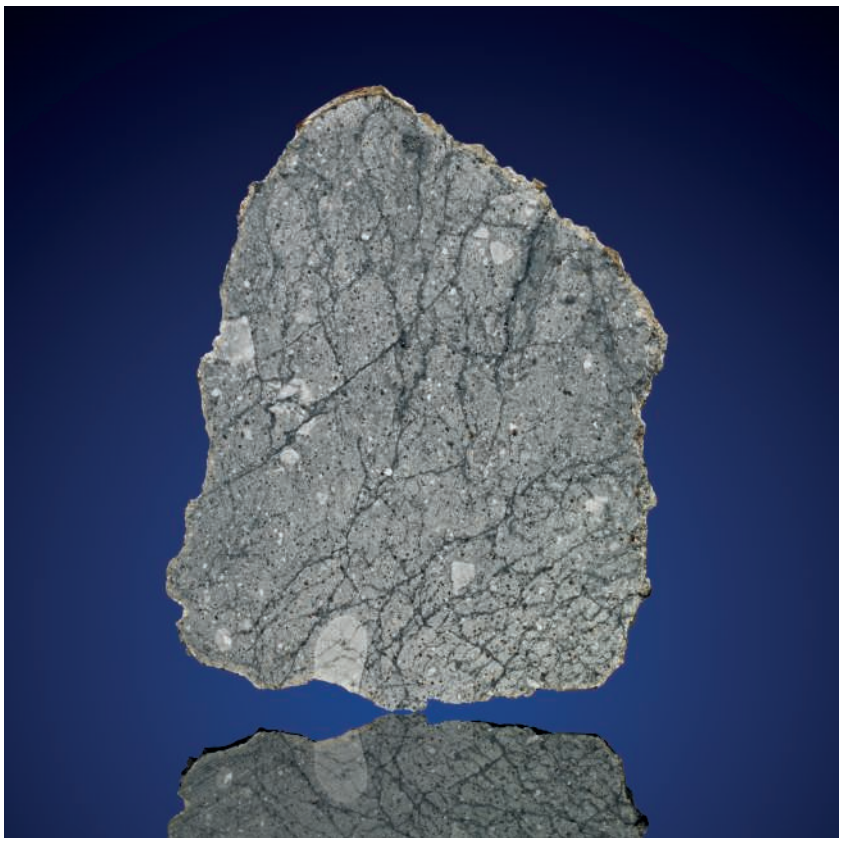
76 x 69 x 2mm (3 x 2¾ x ⅛in.)
44.6g

£2,500-3,500 $3,800-5,300 €3,600-4,900

LITERATURE:

Rubin, A. et al. (2001), "Gujba: a new Bencubbin-like meteorite fall." *Lunar and Planetary Science XXXII.*
Rubin, A. et al. (2003), "Formation of metal and silicate globules in Gujba: a new Bencubbin-like meteorite fall." *Geochima et Cosmochima Acta, 67*(17), 3283-3298.

On April 3, 1984 at 6:30 P.M., a large mass burst into Earth's atmosphere and became a blazing fireball over northeastern Nigeria. The meteorite landed in a cornfield, and the local citizenry broke the meteorite into numerous pieces and carried them away as talismans. Gujba is an exceedingly exotic coarse-grained bencubbinite — of which only a handful are known — and it's the *only* observed bencubbinite fall. It is also pristine — the bencubbinite least affected by subsequent impact-induced brecciation and crushing. Gujba is made up of large ellipsoidal metal nodules and even-larger silicate nodules consisting of fine-grained fan-like arrays of pyroxene. It also contains some mineral grains formed at high shock pressure. Gujba is believed to have formed within an impact plume caused by a cataclysmic collision on a chondritic asteroid billions of years ago. Among the most beautiful and unusual-looking meteorites known, Gujba is an artifact from the early history of our solar system.



***53**

NWA 8022 — A PIECE OF THE MOON

Lunar
Sahara Desert, North West Africa

The specimen contains numerous dark impact-melt veins cutting through the silicate matrix.

111 x 102 x 2mm (4½ x 4 x ⅛in.)
43g

£5,000-8,000 $7,600-12,000 €7,100-11,000

There are currently less than 250 lunar meteorites known, but because many specimens break up in the atmosphere or on the ground, there are probably only about 120 separate lunar meteorites. None is an observed fall. Lunar meteorites are readily recognizable because they can be compared to the samples returned by the Apollo astronauts and three Soviet Luna missions. Many of the lunar meteorites were shocked when launched from the Moon's surface. NWA 8022 is classified as a feldspathic breccia – a rock made out of numerous fragments enriched in calcium-aluminium silicate. Most of the minerals are very fine grained. The specimen was found in the Sahara as a single 1226-g stone with some residual brown fusion crust.

***54**

NWA 6950

Lunar
Sahara Desert, North West Africa

Numerous dark impact-melt veins cutting through the silicate matrix of the specimen.

134 x 90 x 5mm (5¼ x 3½ x ⅛in.)
109g

£15,000-25,000 $23,000-38,000 €22,000-35,000

NWA 6950 contains thin black shock veins made from impact-melted silicate. The specimen is classified as a "gabbro" – this is essentially a coarse-grained basalt, a rock that crystallised at depth instead of being erupted at the lunar surface as a lava flow. The sample was found in the Sahara as a single 1649-g stone (broken into eight pieces) with some residual fusion crust.

*55

END PIECE OF A LUNAR METEORITE NWA 10178

Lunar troctolitic granulite
Sahara Desert, North West Africa

The cut face of this Moon rock reveals a filigree of dark-coloured shock melt coursing through a fine-grained matrix with glittering maskelynite — an impact glass. On the reverse, the meteorite's external surface has the same features, but they are less distinct. A desert varnish, the result of being naturally sandblasted by desert winds for generations, provides a lustrous, waxy finish that shrouds the details more readily observed on the cut face.

117 x 99 x 26mm (4½ x 3¾ x 1in.)
543g (1.2lbs)

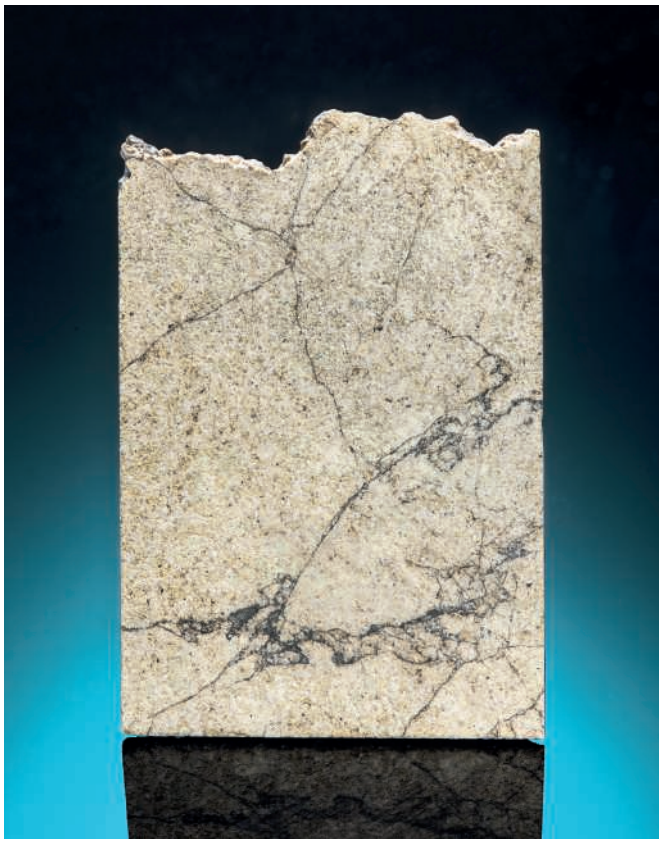
£80,000-140,000 $130,000-210,000 €120,000-200,000

Rocks from the Moon are among the rarest substances on Earth, and now offered is a piece of the Moon ejected from the lunar surface as a result of an asteroid impact. There are less than 135 kg of lunar meteorites known to exist and a significant fraction is controlled by governmental institutions. While Apollo astronauts returned with 400 kg of Moon rocks, not one milligram is available for private ownership. The amount of the Moon that is not governmentally controlled and available to the private sector might fill a single oversized suitcase. Moon rocks are identified by specific textural, mineralogical, chemical and radiation signatures. Many of the common minerals found on Earth's surface are rare on the Moon and some lunar minerals are unknown on Earth. In addition, Moon rocks contain gases captured from the solar wind with isotope ratios very different from the same gases found on Earth. As one would expect, many of the Apollo missions samples returned to Earth are nearly identical to lunar meteorites.
As for the specimen now offered, unlike most lunar meteorites (which are regolithic or feldspathic breccias), NWA 10178 is a troctolitic granulite; it is much finer-grained than many lunar breccias. NWA 10178 also contains maskelynite;
a shock-produced glass formed from plagioclase (a calcium-aluminium silicate mineral) during launch off the lunar surface. The meteorite was classified by Dr. Anthony Irving, among the world's foremost classifiers of planetary material. This meteorite was recovered by Berber nomads in 2015 from an undisclosed location in the Sahara Desert. The other end portion of this meteorite is in an important private North American collection.

Christie's would like to thank Dr. Alan E. Rubin for his assistance in preparing the catalogue note for this, and the other, meteorites in this sale.

(cut face)

(reverse)



***56**

NWA 10178 — A PARTIAL SLICE OF THE MOON

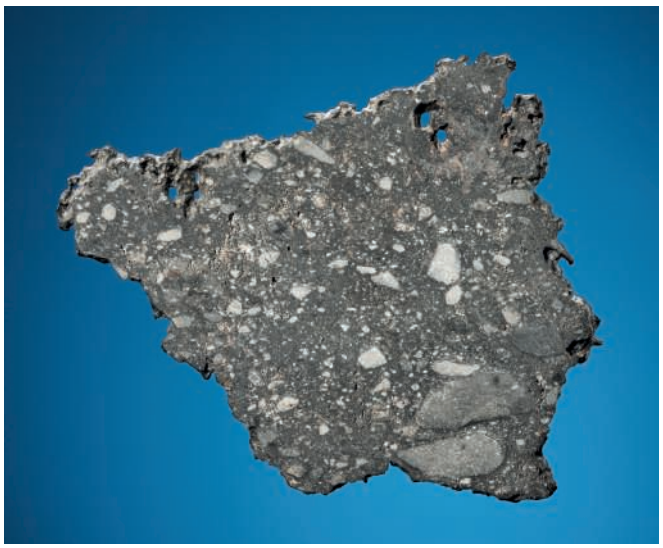
Lunar troctolitic granulite
Sahara Desert, North West Africa

Three cut edges and one natural external delimit this partial slice. The tan matrix is embellished with a filigree of dark impact melt — the result of meteorite impacts on the lunar surface injecting molten rock through the silicate matrix.

71 x 50 x 2mm (2¾ x 2 x ¾in.)
30.1g

£4,500-7,250 $6,800-11,000 €6,400-10,000

This partial slice originated from the same NWA 10178 mass as the previous lot.



***57**

NWA 8306 COMPLETE LUNAR SLICE

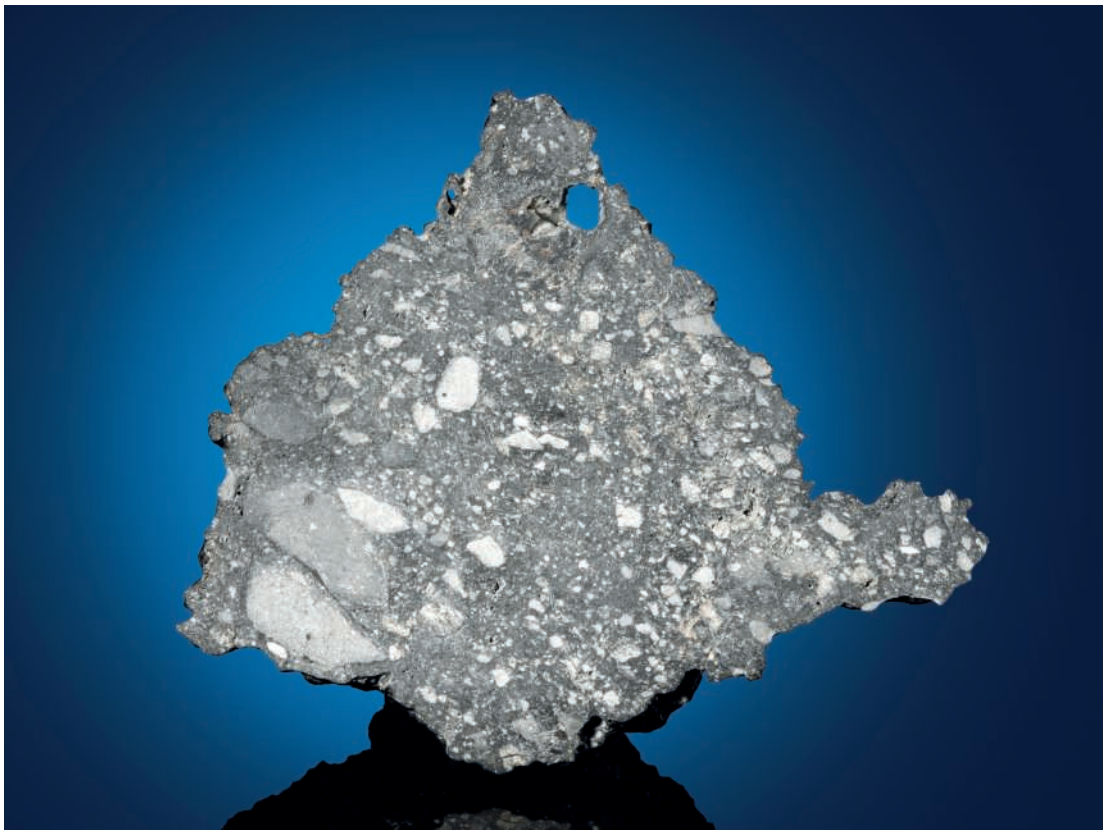
Lunar meteorite (feldspathic, regolithic breccia)
Sahara Desert, North West Africa

Large clasts abound in this dark feldspar-rich breccia whose groundmass is *regolith* (lunar soil).

122 x 102 x 2mm (4¾ x 4 x ⅛in.)
36.5g

£10,000-15,000 $16,000-23,000 €15,000-21,000

This complete slice was removed from precisely the same lunar meteorite whose end piece is offered in the following lot. The total known weight of NWA 8306 is only 1389 grams and this will forever be one of the few complete slices of this meteorite. The meteorite formed at the lunar surface and was blasted off the Moon and sent on its way to Earth by the impact of an errant asteroid — which was not an unusual event: the vast majority of craters on the Moon are the result of asteroid impacts.



***58**

NWA 8306 — INTERIOR AND EXTERIOR OF A MOON ROCK WITH NATURAL HOLE

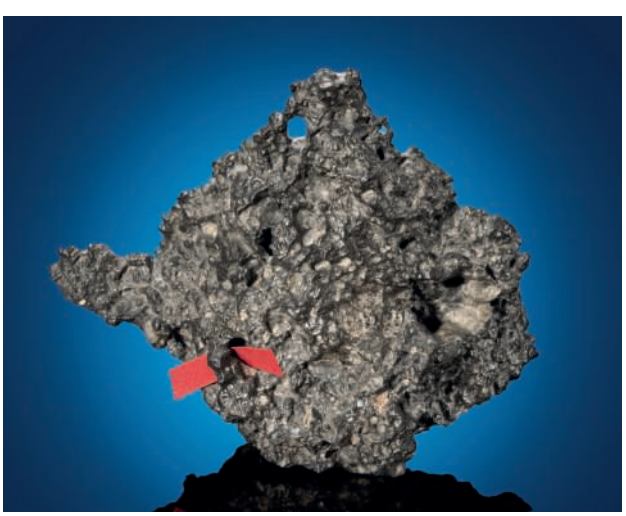
Lunar meteorite (feldspathic, regolithic breccia)
Sahara Desert, North West Africa

The cut face evidences a galaxy of inclusions, the result of the ongoing pulverising of the Moon's surface by meteorite impacts prior to the collision responsible for launching this rock to Earth. The highly textured reverse is a result of natural sandblasting by desert winds over a period of centuries. Numerous variables such as the angle at which this rock sat on the desert floor, the direction of the wind and idiosyncrasies of the material itself (allowing softer components to erode out), produced the holes in what is a singular and noteworthy specimen of the Moon.

121 x 101 x 39mm (4¾ x 4 x 1½in.)
305g

£80,000-160,000 $130,000-240,000 €120,000-220,000

This is a unique end piece of a lunar meteorite, a rock that was ejected from the lunar surface following an asteroid impact. The Moon is among the rarest substances on Earth; there are less than 135 kilograms known to exist and just 0.4% of all meteorites are of lunar origin. As was mentioned in previous descriptions, Moon rocks are identified by specific textural, mineralogical, chemical and radiation signatures. Many of the common minerals found on Earth's surface are rare on the Moon and some lunar minerals are unknown on Earth. NWA 8306, the 8306th meteorite to be catalogued following its recovery in the Northwest African grid of the Sahara Desert, is a fine example of a feldspathic regolithic lunar breccia — a rock formed at the lunar surface and composed of different fragments of rocks and minerals cemented together by lunar soil and other crushed rock. What sets this specimen apart, however, is that it contains naturally formed holes; these are a sought-after rarity in meteorites, and 99.9% of the time they occur only in iron meteorites. It is virtually unheard of that a naturally formed hole is seen in a stony meteorite—and such is the case in this exceptional sample of the Moon. NWA 8306 was classified by Dr. Anthony Irving, among the world's foremost classifiers of planetary material.



(reverse side with red marker through natural hole)

A PIECE OF THE MOON TOUCHED BY THE STARS AND SERENADED BY KEVIN SPACEY

***59**

NWA 8306

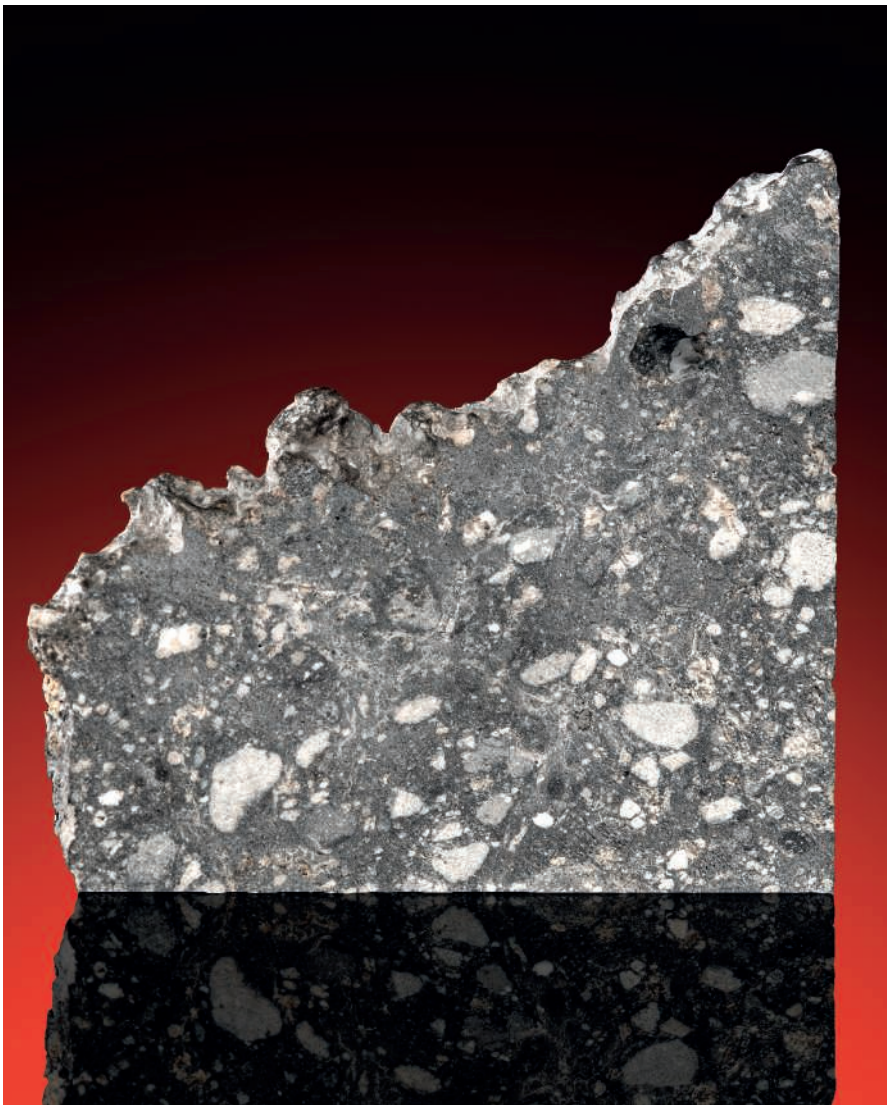
Lunar meteorite (feldspathic, regolithic breccia)
Sahara Desert, North West Africa

This cut partial slice has one edge of its desert-varnished exterior surface. Large light-coloured clasts are dispersed throughout this feldspar-rich breccia whose ground mass is *regolith* (lunar soil). Modern cutting.

This lot is accompanied by a two-page document which states, "I touched the Moon at the Thelonious Monk Institute of Jazz All Star Jazz Salute to Bill Clinton." Twenty-two signatories, all entertainers, attested to having done so by having first printing and then signing their names.

41 x 38 x 2mm (1½ x 1½ x ⅛in.)
6.4g

£15,000–25,000 $23,000–38,000 €22,000–35,000



Similar to the previous two lots, closing out the section of lunar meteorites is a third specimen of NWA 8306. Rocks from the Moon are among the rarest objects on Earth. There are less than 135 kg of lunar meteorites known to exist and a significant fraction is controlled by governmental institutions. While Apollo astronauts returned with 400 kg of the Moon, not one milligram is available for private ownership. Moon rocks are identified by specific textural, mineralogical, chemical and radiation signatures. Many of the common minerals found on Earth's surface are rare on the Moon and some lunar minerals are unknown on Earth. In addition, Moon rocks contain gases captured from the solar wind with isotope ratios very different than the same gases found on Earth. The meteorite from which this sample originated was classified by one of the world's foremost classifiers of planetary material and then his work was vetted by a panel of scientists prior to being assigned a name (NWA 8306) and published in the Meteoritical Bulletin.

While pieces of the Moon are exceedingly rare on Earth, what makes this specimen rarer still is that it was nestled among the stars in a manner unlike any other piece of the Moon will be again. Academy Award winning actor Kevin Spacey (*L.A. Confidential, Seven, Usual Suspects, American Beauty* and *House of Cards*) had this very piece of the Moon in his pocket as he sang, "Fly Me to the Moon" at the Thelonious Monk Institute's "All-Star Gala Concert: A Tribute to President Bill Clinton" at the Dolby Theater in Los Angeles on November 9, 2014. The successful bidder will receive — in addition to this lunar sample — two pages of original signatures attesting to the signatories having touched this piece of the Moon at the aforementioned event. Included among the luminaries are Herbie Hancock, Pharell Williams, Goldie Hawn, Don Cheadle, Dianne Reeves, Quincy Jones and Kevin Spacey. (President Clinton was prevented from doing so by a secret service agent.)

Devoted to nurturing musical excellence, the proceeds generated by the sale of this specimen will be going to the Thelonious Monk Institute.

•*60

CORNER CUT OF THE TOULON METEORITE

H5

Stark County, Illinois (41°7' N, 89°48' W)

The grey matrix is loaded with chondrule fragments delimited by a weathered exterior rim. Cataloging inscription on specimen: H17.18. Modern cutting.

19 x 24 x 4mm (¾ x 1 x ⅛in.)
7.3g

£150-250 $230-380 €210-350

PROVENANCE:
Glen Huss, American Meteorite Laboratory

Just north of Peoria in what is Illinois farm country, a single meteorite weighing just 1214 grams was found on a farm in 1962. Samples of the Toulon meteorite are seldom seen. It is an H5 ordinary chondrite, indicating that the sample is metal rich and has been appreciably metamorphosed on its parent asteroid.

•*61

COMPLETE DHOFAR 1658 METEORITE

LL6

Dhofar, Zufar, Oman (18°21' N, 54° 24' E)

Dark fusion crust and regmaglypts are in evidence. Terrestrial tinting is also seen along with desert soil in the breaches fusion crust. This palm-sized specimen has a deceptively smooth, textured surface with a gently-curved slope. All surfaces are blanketed in a natural desert varnish — the result of being sandblasted for hundreds of years, if not longer, while residing at the surface of an ancient seabed that geologists refer to as "desert pavement." Accompanying this lot is an *in-situ* image of the meteorite and its surrounding desert pavement environs.

113 x 79 x 53mm (4½ x 3 x 2in.)
465g

£1,500-2,500 $2,300-3,800 €2,200-3,500

To enable scientists to refer to the unique attributes of a given meteorite, there must be a nomenclature system, and so a committee of scientists name meteorites after the location to which they've been "delivered," (e.g., a city, village, mountain, river, county, etc.). In a desert, where there are few distinguishing geological features, meteorites are named after a grid encompassing a restricted area and are assigned a sequential number. Dhofar 1658 is the 1658th meteorite to be catalogued following its recovery in the Dhofar grid of Oman bordering Yemen. Dhofar 1658 experienced extreme thermal metamorphism on its parent asteroid: its once-spherical chondrules were extensively recrystallised and the mineral grains within the rock (which initially had diverse compositions) became chemically uniform. It was derived from the LL parent asteroid responsible for other LL (low-iron, low metallic iron) chemical group of meteorites. The meteorite is a breccia; it is made up of small metamorphosed rock fragments fused together by minor impact-melting along grain boundaries.

(Lot 61 as it was found in situ)

***62**

WILLAMETTE METEORITE — THE LARGEST COMPLETE SLICE OF THE MOST FAMOUS METEORITE IN THE WORLD

Iron – IIIAB
Clackamas County, Oregon (45°22' N, 122°35' W)

This slice is accompanied by the December 2015 issue of "Meteoritics and Planetary Science." The cover story on the Willamette meteorite is by UCLA researchers who determined the meteorite was misclassified and the layperson who first noticed the anomaly. All four authors autographed the cover which features an image of the Willamette main mass on display at the American Museum of Natural History in New York.
With a postcard, circa 1950, depicting a girl peering into the meteorite.

271 x 254 x 3mm (10⅔ x 10 x ⅛ inches)
526g (1.15lbs)

£70,000-100,000 $110,000-150,000 €99,000-140,000

PROVENANCE:
American Museum of Natural History, New York City
Macovich Collection of Meteorites, New York City

The Willamette meteorite was discovered in 1902 by a miner named Ellis Hughes on the property of Oregon Iron & Steel, which happened to be adjacent to his own. Hughes claimed the 15.5-ton meteorite and ingeniously (and illegally) moved it onto his property over a period of months where it was placed on exhibition for a fee. One of Hughes' first customers — an attorney from Oregon Iron & Steel — noticed the groove through the forest from where the meteorite had been hauled, and successfully sued to have the meteorite returned. The meteorite was exhibited at the 1905 World's Fair and then sold to Mrs. William E. Dodge, who gifted the meteorite to the American Museum of Natural History — where the meteorite has been on display for more than a century where it has been seen or touched by an estimated 50 million people.

Its tenure at the Museum has not been without disruption. In what was billed as a civics lesson, in 1990 tens of thousands of Oregonian schoolchildren signed petitions to have the meteorite returned to Oregon. However, it is believed that the meteorite, the largest recovered in continental North America (a Cape York meteorite in Greenland is larger) fell in Canada or Montana untold epochs ago and was a *glacial erratic* (i.e., it was deposited in Oregon by a glacier during the last Ice Age). In any event, as a result of the signed petitions, a U.S. Senate bill was proposed to have the meteorite returned and an Oregon congressman even suggested withholding federal funds earmarked for the Museum pending its return. There was a collective sigh of relief when the teachers who advocated for Willamette's repatriation to Oregon were persuaded to discontinue their efforts. In 1999, however, controversy arose yet again when a

coalition of Oregonian Native Americans, The Confederated Tribes of Grand Ronde, filed a claim to have the meteorite returned to Oregon by invoking the Native American Graves Protection and Repatriation Act (NAGPRA). According to Clackamas tradition, the meteorite, called "Tomanowos", was delivered from the Moon to the Clackamas from the beginning of time, and carried messages from the spirit world. The Museum went to federal court seeking a declaratory judgment against the Grand Ronde, and as part of a settlement, it was decided the meteorite would remain a Museum centrepiece and never again be cut. The complete slice offered here — which evokes a coyote baying at the…asteroid belt (from where the Willamette meteorite originated) — is the largest complete slice that will ever exist.

One of the most remarkable features of the meteorite is the set of numerous deep cavities, up to 70 cm wide, that occur at the top of the sample. The cavities were caused by terrestrialisation and the weathering-out of iron sulfide. The rock itself formed within the metal core of a melted asteroid. At some point in its long history, it suffered a major shock event that caused the metal grains to recrystallise into a sugary, granular texture. Some of the iron sulfide melted and penetrated fractures in the metal as thin sulfide tendrils. Although 89% of iron meteorites are members of distinct chemical groups and hail from about a dozen different asteroids, the other 11% of recovered iron meteorites are chemically unrelated to other specimens and come from separate, otherwise unsampled, asteroids. They are known as "ungrouped" irons. Willamette had been classified as a member of one of the established iron-meteorite groups, but recent work by UCLA researchers has shown it is actually ungrouped, perhaps the sole known representative of its parent asteroid.

Willamette's signature recrystallised *Widmanstätten pattern* is showcased to marvellous effect in this zoomorphic slice delimited by the meteorite's external surface. A large cavity is evident at the bottom of the specimen. This offering presents the rarest of collecting opportunities: it is virtually unheard of to be able to obtain the largest complete slice of a centrepiece exhibit at a world-renowned museum.

***63**

COMPLETE SLICE OF WILLAMETTE METEORITE

Iron – IIIAB

Clackamas County, Oregon (45°22' N, 122°35' W)

Willamette's signature recrystallised matrix is contrasted by the smooth, curved rim of the meteorite's exterior. A nodule of troilite with never before seen metallic embayments is in evidence near the top left.

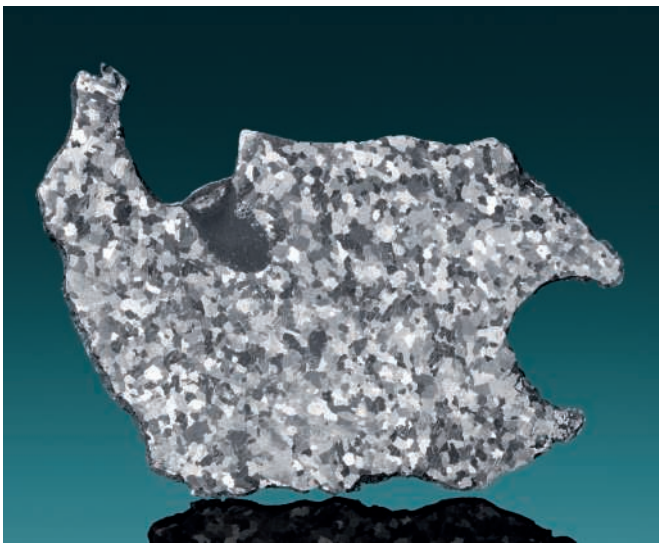
119 x 76 x 1mm (4⅔ x 3 x ⅛ inches)
80g

£6,000–10,000 $9,100–15,000 €8,500–14,000

PROVENANCE:

American Museum of Natural History, New York City

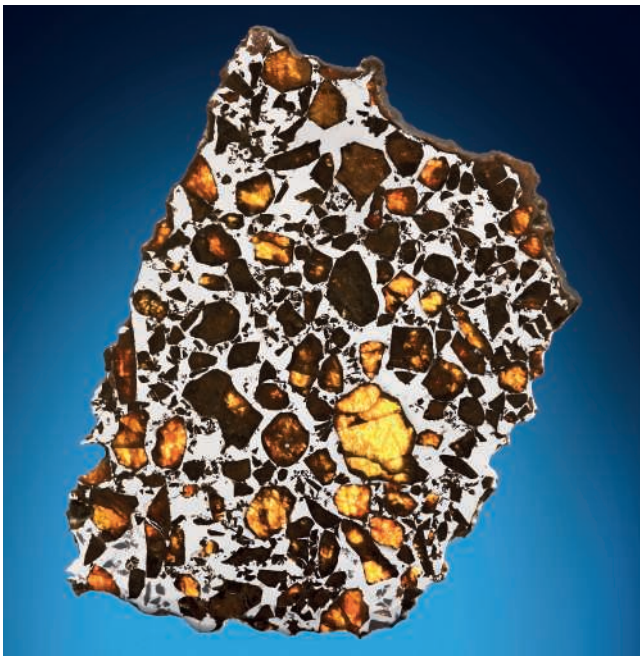
Similar to the previous offering. The 15.5-ton Willamette meteorite is the largest meteorite found in North America and the 6th largest in the world. It is also the most famous: when an image of a meteorite is needed, by far the most frequently used image is that of Willamette. A centrepiece exhibit at the American Museum of Natural History in New York City, the Willamette meteorite



63

has been seen or touched by an estimated 50 million people. This complete slice is from the crown section of the meteorite — and just a couple of inches away from the previous offering. It was the late Dr. Martin Prinz of the AMNH who decided to remove the meteorite's 13 kg crown section in 1997. This not only provided the public with a window to the meteorite's unique internal matrix, it also allowed scientists to study the specimen and piece together its unique formation history. When only one meteorite is recovered and no additional specimens exist from the same event, meteorites should always be subdivided — and Prinz's decision to cut the meteorite proved spot-on despite the criticism encountered. After Prinz passed away, an unusual feature seen on the meteorite's cut surface by a layperson was brought to Dr. John Wasson's attention. Wasson, an internationally renowned expert on iron meteorites at UCLA found the new presentation fascinating. "We cannot remember having seen angular FeS fragments entrained into a eutectic melt before." In a paper published in December 2015 in *Meteoritics and Planetary Science,* the most important journal devoted to the science of meteorites, a team of researchers led by Wasson's colleague, Dr. Alan Rubin, makes a compelling case for the reclassification of what may be the most famous meteorite in the world. While there is an agreement between the American Museum and Oregonian Native Americans that the Willamette meteorite will never again be cut, science was served. Now offered is one of the few complete slices of Willamette which will ever exist — and one of only a handful that feature the exotic new anomaly reported.

The Willamette meteorite, from a postcard *circa* 1950



***64**

COMPLETE SLICE OF NWA 10023 — THE ONLY PLESSITIC PALLASITE

Pallasite – Anomalous (PAL-ANOM)
Sahara Desert, near the Moroccan/Algerian border

Complete slice with exterior rim. Translucent crystals of olivine are suspended in a highly polished iron-nickel plessitic matrix. Modern cutting.

126 x 83 x 1mm (5 x 3¼ x ⅛in.)
107g

£5,000-8,000 $7,600-12,000
€7,100-11,000

Pallasites are the most exquisite extraterrestrial materials known, and NWA 10023, a new Sahara Desert find, ranks among the very best. As previously indicated, less than 0.2 percent of all meteorites are pallasites, and of those, not many possess beautifully translucent crystals of the silicate mineral olivine — the hallmark of the best pallasites like Esquel, Imilac, Fukang, Admire and Glorieta Mountain. NWA 10023, the 10,023rd meteorite to be catalogued following its recovery from the Northwest African grid of the Sahara, does have such crystals and it's more special still: it has been classified PAL-ANOM (anomalous), the result of its metallic matrix being comprised of an unusually high amount of *plessite*— and more than in any pallasite. Plessite is a fine-grained mixture of the two dominant iron-nickel alloys found in meteorites, kamacite and taenite, and it usually occurs in the gaps between large bands of these alloys. In this instance, the large bands are absent and the metallic matrix is almost entirely comprised of this plessitic "cement." This visually arresting complete slice is the first offering of NWA 10023, a most unusual meteorite with a limited total known weight (6.95 kilograms).

***65**

COMPLETE SLICE OF IBITIRA — A RARE VESICULAR EUCRITE

Eucrite – AEUC
Martinho Campos, Minas Gerais, Brazil (19°42' S, 43°93' W)

Complete slice filled with vesicles; there are patches of fusion crust on the meteorite's rim.

102 x 101 x 2mm (4 x 4 x ⅛in.)
72.3g

£4,500-6,500 $6,800-9,800
€6,400-9,100

PROVENANCE:
Robert A. Haag Meteorite Collection

With untold bubbles dispersed throughout its ivory matrix, Ibitira is one of the very few vesicular meteorites in existence. There is no other meteorite that looks like Ibitira and its petrology indicates it is not like any other basaltic eucrite. The bulk oxygen isotopic composition of Ibitira is different than that of all other eucrites. It seems clear it did not originate from the same parent asteroid as the vast majority of eucrites (which most researchers think is Vesta, the second largest asteroid). Ibitira is almost certainly from an otherwise unknown parent body. Ibitira's arrival on Earth on June 30, 1957 was accompanied by the characteristic fireball and a noise "like the reverberation of thunder." While it was seen to break-up in the atmosphere, only one stone weighing approximately 2.5 kilograms wrapped in a glossy black fusion crust was recovered near the town of Ibitira, approximately 400 km northwest of Rio de Janiero (which the meteorite came close to flying over prior to landing). Ibitira also made some noise on Christmas Day 1996 when the international meteorite community received the following news: "Dear Sir: We of the Centro de Estudos Astonomicos de Minas Gerais, an amateur astronomers association in Minas Gerais, Brazil, own a meteorite called Ibitira...we decided to sell it for the best offer."

***66**

PARTIAL SLICE OF NWA 8257 — THE RAW INGREDIENTS OF THE PLANETS

LL3 (provisional)
Sahara Desert, North West Africa

This partial slice contains an abundance of densely packed chondrules with variable textures held together by fine-grained silicate matrix material (compacted nebular dust dating from the earliest stages of solar-system history). The matrix is extremely fresh and is delimited by three cut edges and a natural rim.

99 x 79 x 2mm (3¾ x 3 x ⅛in.)
78.2g

£2,000-3,000 $3,100-4,500 €2,900-4,200

Now offered is a partial slice of the 8257th catalogued meteorite from the Northwest African grid of the Sahara Desert. Nomads who have learned to become experts in hunting of meteorites found it as a single 17.45 kg stone. NWA 8257 is scientifically significant: unlike 99% of other stone meteorites, the material seen here has remained largely unchanged since its origins in the cloud of gas and dust known as the "solar nebula." This is a rare glimpse of the raw ingredients that formed the planets, moons, comets and asteroids of the solar system. The onset of planetary processes (e.g., heat, pressure, water alteration, etc.) blended and baked the primitive ingredients seen in this specimen into the aforementioned celestial bodies. Research is currently being done on other specimens of NWA 8257 as a result of its scientific allure: it is petrologically primitive, extremely fresh and it shares affinities with other scientifically significant meteorites. Less than 32 kg of planetary material has been recovered that is more primitive than NWA 8257. This is an exemplary specimen of an important meteorite.

***67**

NWA 108 — THE MAIN MASS OF A SAHARAN METEORITE THE INTERIOR AND EXTERIOR REVEALED

L6
Sahara Desert, North West Africa

This trapezoidal-shaped specimen exhibits a variegated tan to milk chocolate matrix featuring three unusually large light-coloured inclusions. About 80% of the reverse is covered in fusion crust with terrestrialised fractured surfaces. Accompanied by a custom armature.

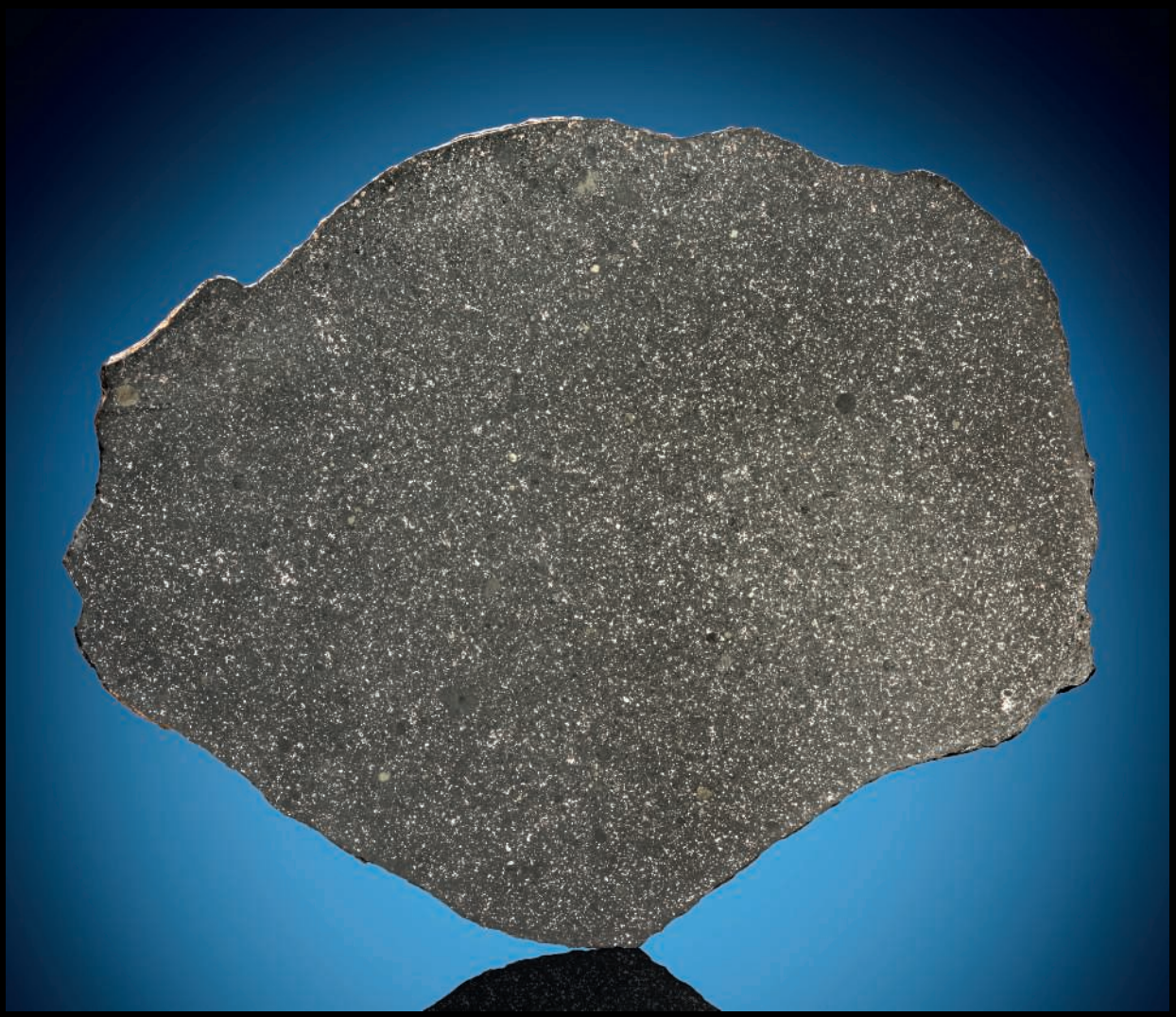
193 x 203 x 85mm (7½ x 8 x 3⅓in.)
5.68kg (12.5lbs)

£4,000-6,000 $6,100-9,000 €5,700-8,400

PROVENANCE:
Philip C. Mani Collection

To enable scientists to refer to the unique attributes of a given meteorite, there must be a nomenclature system, and so a committee of scientists name meteorites after the location to which they've been "delivered," (e.g., a city, village, mountain, river, county, etc.). In a desert, where there are few distinguishing geological features, meteorites are named after a grid encompassing a restricted area and are assigned a sequential number.

As can be inferred from its very low number, the meteorite now offered is among the earliest meteorite recoveries since the advent of the grid system in 1999. NWA 108 is an L6 chondrite, indicating that it has a relatively low amount of iron and has been extensively metamorphosed on its parent asteroid. Its chondrules were recrystallised and the constituent minerals became compositionally uniform. This is the main mass of NWA 108, i.e., it is the largest portion of this meteorite in existence. The warm, earthy hues seen in the matrix are the result of *terrestrialisation* (exposure to the elements as for an extended period of time).



***68**

TRAVIS COUNTY (A) A MASSIVE COMPLETE SLICE OF A TEXAN METEORITE

Chondrite – H5
Travis County, Texas (30°18' N, 97°42' W)

Cut from the largest of the Travis County (a) masses, now offered is one of the two largest complete slices of this storied Texan meteorite. This large-format slice is festooned with endless metallic flakes as well as numerous dark inclusions scattered throughout the matrix. The outer rim has extensive patches of fusion crust.

463 x 377 x 5mm (18¼ x 14¾ x ⅛in.)
3.50kg (7.7lbs)

£7,000–10,000 $11,000–15,000 €9,900–14,000

PROVENANCE:
The Oscar Monnig Collection, Texas Christian University, Fort Worth, Texas
Philip C. Mani Collection

Travis County meteorites found their way into scientific literature when Dr. R. T. Hill of the University of Texas received a 2.5 kg fragmentary mass that he donated to the Smithsonian in 1889. The fragment originated from a ranch in Travis County, home to the state capitol of Austin as well as the university where he worked. Nearly forty years later, celebrated meteorite hunter Oscar Monnig met Dr. Hill and was able to trace the specimen donated to the Smithsonian to the Sunset Ranch in Leander, Texas. Unfortunately, just where the meteorite was found had been long forgotten, so Monnig organised a search of the area and soon located numerous additional masses totaling more than 100 kg. All were believed to have originated from the same event, but in 1995 it was determined — ironically by another Smithsonian researcher — that about 20% of the specimens were of a different meteorite that just happened to fall in the same area and were thus given the name "Travis County (b)."

•*69

NWA 5407 — COMPLETE SLICE OF AN ENGAGING METEORITE

L5-IMB (impact melt breccia)
Sahara Desert, North West Africa

70 x 59 x 3mm (2¾ x 2⅓ x ⅛in.)
43.4g

£400-600 $600-900 €560-840

In June 2008 a prosaic-looking 564-gram meteorite was purchased in Guelmim, Morocco. Like the best piñatas, worldly or otherwise, only when these objects are opened do they become a treasure to behold. Such is the case with NWA 5407, which provides a fascinating peek as to what can occur when two extraterrestrial bodies traveling at high cosmic velocity collide in interplanetary space. One might anticipate the results would not be pretty, but that's not the case as it pertains to the spectacular specimen now offered. There are three different lithologies within NWA 5407. There is a layer of completely melted material, as well as layers of extensively melted and partially melted material. Fine-grained crystallised impact melt is what has cemented these different zones together. If this rock had been cut perpendicularly, the three different lithologies seen in one slice might not have been seen and the features that make this so special may have never been noticed.

***70**

STRATHMORE METEORITE — THICK SLAB FROM A 1917 SCOTTISH FIREBALL

L6
Perthshire, Scotland (56°35' N, 3°15' W)

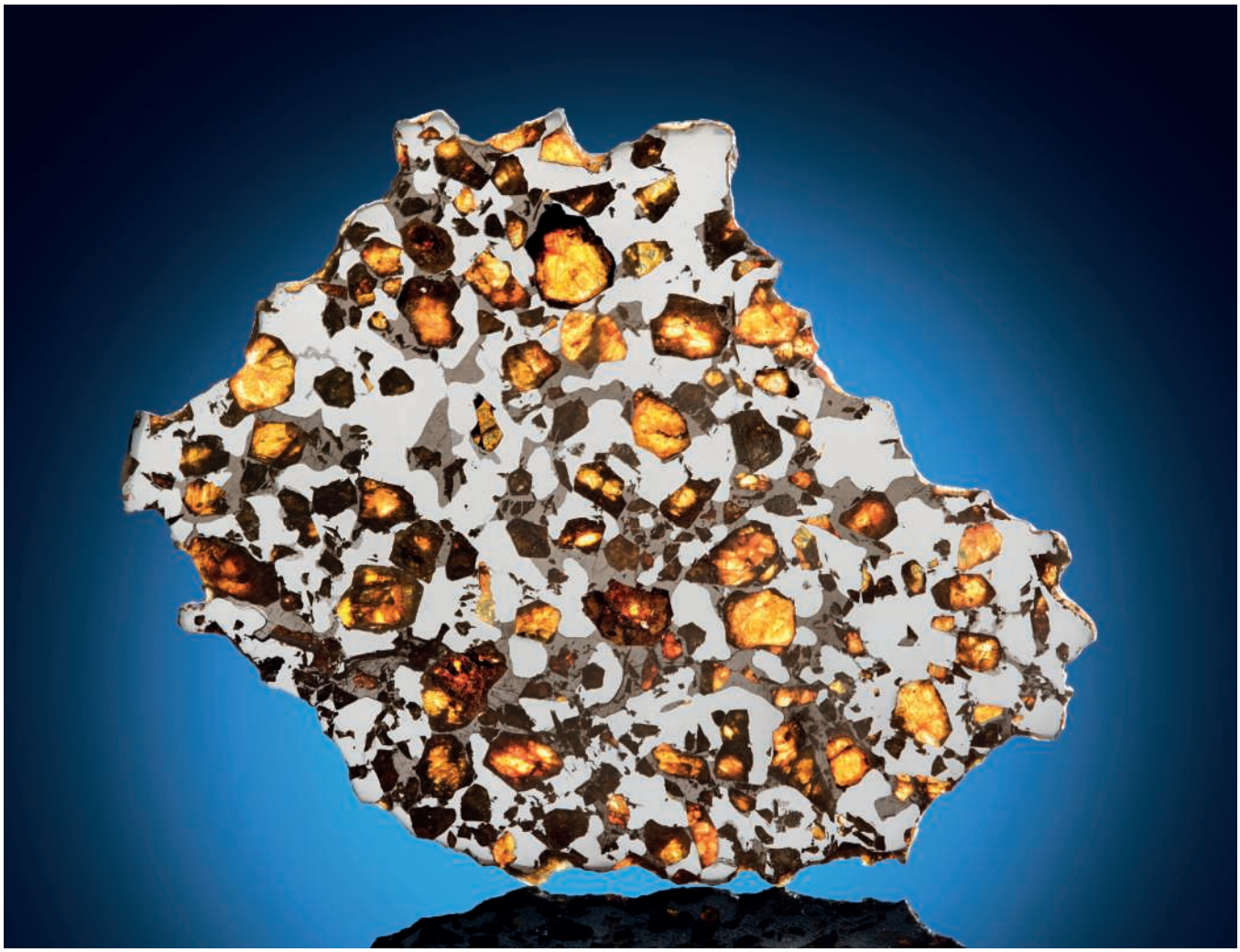
With two edges of fusion crust along with one cut and one crenulated edge, a creamy matrix is accented by terrestrial tinting along with fresh metal scattered throughout. Modern cutting.

57 x 57 x 9mm (2¼ x 2¼ x ⅓ inches)
95.9 grams

£10,000-15,000 $16,000-23,000 €15,000-21,000

PROVENANCE:
Natural History Museum, London

Following the appearance of a brilliant fireball on December 3, 1917 that entered the atmosphere east of Dunbar, Scotland and passed over Fife and the Sidlaws Hills where it broke apart in the sky, four stones weighing a total of approximately 13 kg were recovered. Three of the stones were found in Perthshire at Easter Essendy, Carsie and Keithick, and one stone in Forfarshire at South Corston. As indicated by the L6 designation, Strathmore has a moderately low amount of iron for a chondritic meteorite and its chondrules have been extensively recrystallised when the rock was metamorphosed on its parent asteroid. During this heating process, the mineral grains became compositionally uniform. Nearly 10 kg of Strathmore is at the National Museum of Scotland, where it is most likely to remain.



***71**

GLORIETA MOUNTAIN PALLASITE — A SUPERB COMPLETE SLICE FROM THE SCHONER MASS

Stony-Iron – PAL-ANOM
Glorieta Mountain, New Mexico

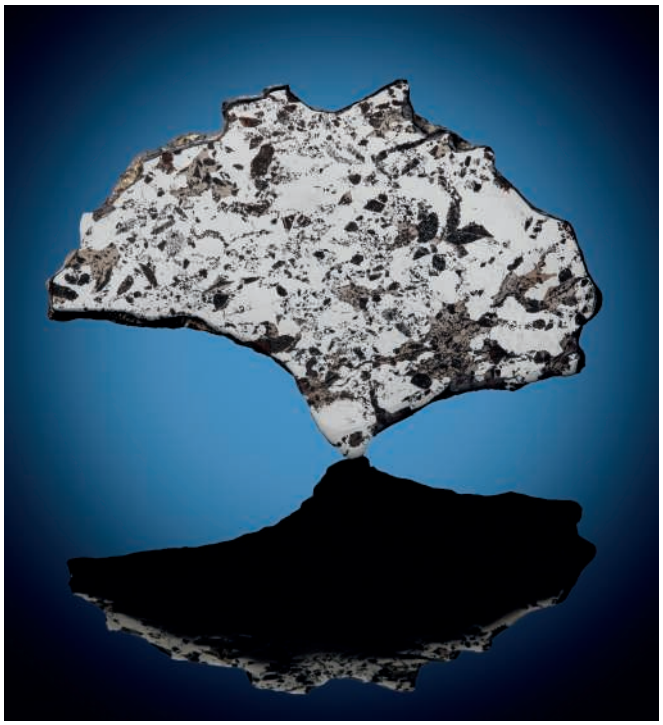
This specimen features the signature sulfide inclusions of this meteorite along with crystals of olivine and *peridot* (the semi-precious birthstone of August) suspended in a highly polished metallic matrix. This is among the finest complete slices of the Glorieta Mountain pallasite known to exist.

203 x 169 x 3mm (8 x 6⅔ x ⅛in.)
357g

£8,000-12,000 $13,000-18,000 €12,000-17,000

PROVENANCE:
Steve Schoner Meteorite Collection, Clyde Tombaugh House, Flagstaff, Arizona

The complete slice of Glorieta Mountain now offered was adjacent to the slice whose image served as the frontispiece of the *Cambridge Encyclopedia of Meteorites*. Less than 0.2% of all meteorites are pallasites — the most resplendent of all meteorites — and Glorieta Mountain is the most famous American pallasite. In 1965 the "Father of Meteoritics", Harvey Nininger, befriended a teenaged Steve Schoner and informed him of the small meteorites found on Glorieta Mountain in northern New Mexico. Years later, Schoner's recovery of tiny pallasitic fragments fuelled his belief in the existence of a far larger mass — a Holy Grail to meteorite enthusiasts. After seventy searches of two to three weeks each over a period of 15 years, Schoner's efforts finally paid off. The stunning specimen now offered is from the 20 kg meteorite recovered by Schoner. As a result of the material lost from cutting, grinding and polishing, only 11 kg of fine specimens from this historic mass exist. While pallasites are extremely rare, Glorieta Mountain is rarer still because it is chemically and morphologically anomalous. It also has a relatively high abundance of iron sulfide (the mineral troilite), leading researchers to classify Glorieta as an anomalous member of the main pallasite group.



***72**

COMPLETE SLICE OF THE ZAGORA METEORITE

Iron, IAB with silicate inclusions
Zagora, Ouarzazate, Morocco (30°22' N, 5° 51' W)

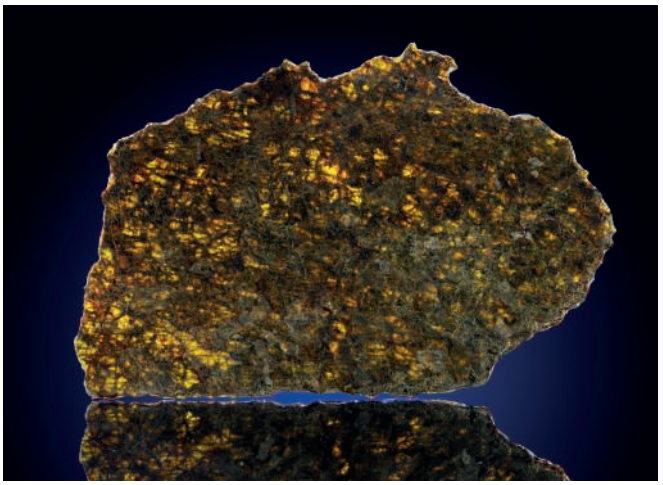
The iron-nickel matrix of this complete slice is filled with an abstract distribution of silicates and sulfides. This meteorite slice is constrained by a rim of the meteorite's smokier external surface comprised of one large arc with animated contouring on one side and two smoother and smaller arcs that meet at a crest. Modern cutting.

141 x 101 x 3mm (5½ x 4 x ⅛in.)
216g

£1,500-2,500 $2,300-3,800 €2,200-3,500

PROVENANCE:
Robert A. Haag Meteorite Collection

First found in 1987, several masses of Zagora have since been recovered; the total known mass is about 50 kg. Silicates are absent in the vast majority of iron meteorites, but many members of the IAB group contain rounded silicate inclusions, sharp-angled fragments and small grains. Whereas most iron meteorites are derived from the molten metal cores of asteroids, the IAB group appears to have formed near the surface of a chondritic asteroid following a large impact. Molten metal and silicate were incompletely separated after the impact event.



***73**

NWA 7831 — INTERIOR SLICE FROM THE DEEP CRUST OF VESTA

Diogenite
Sahara Desert, North West Africa

This slice of a diogenite shows fine-grained yellow-green orthopyroxene grains surrounded by fine-grained material interspersed with pale-orange weathering products.

201 x 135 x 2mm (8 x 5¼ x ⅛in.)
194g

£4,000-6,000 $6,100-9,000 €5,700-8,400

Vesta is the second largest asteroid and the only large one covered with basalt — the same fine-grained volcanic rock that spews from Hawaiian volcanoes, makes up the dark areas of the Moon and the huge shield volcanoes on Mars. Three groups of achondrites (igneous meteorites) are widely thought to have come from Vesta; these are the HED meteorites – *H*owardites, *E*ucrites and *D*iogenites. Eucrites are basalts derived from the surface and upper crust of Vesta; diogenites are from the deep crust; and howardites are impact mixtures of both groups. Diogenites are rare objects, making up just 0.7% of known meteorites. NWA 8306 is the 8,306th sample to be catalogued following its recovery in the Northwest African grid of the Sahara Desert. It was found buried in the soil as a single 20-kg mass that broke into small fragments during excavation.

The meteorite was part of a huge asteroid fragment excavated from the lower crust of Vesta by an energetic collision early in Solar-System history. Over the ensuing eons, pieces broke off this fragment. This meteorite probably broke off a few million years ago and was sent on a collision course with Earth.

*74

THE WORLD'S LARGEST ORIENTED METEORITE WITH EXTRATERRESTRIAL GEMSTONES — BRENHAM METEORITE MAIN MASS

Stony iron—PAL
Kiowa County, Kansas

Encompassing an enormous aggregate of extraterrestrial olivine and peridot is a steel-blue patina dappled with mango accents . Supported on custom-built stand with the parabolically-curved heat shield facing skyward.

650kg (1433lbs)

£500,000-800,000 $760,000-1,200,000 €710,000-1,100,000

EXHIBITED:
Fort Worth Museum of Science and History, 2006
Wichita, Kansas, The Exploration Place, 2006 & 2007
Hutchinson, Kansas, The Cosmosphere, 2006
Kansas City, Missouri, Union Station, 2007
Houston Museum of Natural Science, *Geopalooza*, 2008
Tyler, Texas, Center for Earth & Space Science Center, 2011 & 2012
Tel Aviv, Israel, U.S. Space and Rocket Center, *Space Mania*, 2013
Baku, Azerbaijan, Heydar Aliyev Center, 2013
Space Center Houston (NASA), 2015

Now offered is a matchless example of an oriented meteorite. Discovered in 2005 in Kansas, scientists have referred to this specimen as the most significant American meteorite discovery in decades.

The pedigree of this meteorite is unrivalled. This is the largest oriented meteorite with naturally-occurring, extraterrestrial gems — olivine and peridot — known to exist. Such meteorites are referred to as pallasites — a group of meteorites that represent less than 0.2% of all meteorites. This is the largest pallasite found in North America and is also the largest intact pallasite in the world, yet it is its *orientation* that is the source of this specimen's great renown.

As evidenced by its shape, this meteorite—unlike the vast majority of other meteorites — did not tumble or change its vertical axis as it plunged through Earth's atmosphere. The parabolic "heat shield" curvature seen here was sculpted at exceedingly high temperatures, and is the most efficient angle at which heat deflects from a falling object. This is the reason NASA engineers studied this parabola in other oriented meteorites when designing the heat shields for the first manned space capsules.

The smoothness of the surface is the result of the melting process in Earth's upper atmosphere in which olivine crystals melted and exposed tendrils of the nickel-iron matrix in a process that repeated until the meteorite slowed to terminal velocity. A significant fraction of the meteorite vaporised or ablated off its edges during its descent. The ablative heat shield-like action pushed the hottest gasses (referred to as the *shock layer* — which is hotter than the surface of the sun — away from the meteorite).

While there is uncertainty regarding whether any Native Americans witnessed the Brenham meteorite shower, petroglyphs have been found nearby depicting what could have been the Brenham event. The presence of Brenham meteorites in numerous burial mounds as far away as Ohio — including jewellery fashioned out of Brenham meteorites — indicates that Native Americans, like modern collectors, were transfixed by the beautiful extraterrestrial stones.

It was in the late 19th Century that wide attention first came to these curious-looking stones. Eliza Kimberly, a homesteader, believed the rocks scattered across her property were meteorites and she collected them. Her suspicions were confirmed in 1890 when scientists affirmed the meteoritic origin of several masses, and the area was dubbed "The Kansas Meteorite Farm."

Forensic sleuthing was required to locate this matchless specimen. In 1929, after having recovered multiple specimens, the "Father of Meteoritics," Dr. H. H. Nininger plotted what he believed to be the Brenham meteorite *strew field* (the elliptical area in which the pieces of the Brenham meteorite are strewn across Earth's surface). Seventy-five years later, a geologist who became an oil & gas attorney and avid meteorite collector, Phillip C. Mani, financed a return to Kansas to investigate the Brenham site. Mani's partner, meteorite hunter Steve Arnold, reviewed Nininger's archives and, utilising data provided by local prospector H. O. Stockwell (who in the 1940s recovered several large pallasites using a primitive wheelbarrow metal-detector), replotted the strewn field. It was with the aid of a sophisticated metal detector in a previously unsearched area, that Arnold found the mother lode.

Following the announcement of Arnold's discovery, the NASA-funded Lunar and Planetary Institute and the Houston Museum of Natural History visited the replotted strewn field to conduct experiments with a newly-designed ground penetrating radar intended for use on Mars. This effort resulted in the recovery of an additional 150-lb specimen.

At 1,430 lbs, this oriented Brenham is the pinnacle of a meteoritic bounty rooted in the history of the Heartland. Until this 2005 recovery, the largest known Brenham pallasite was a 1000 pound example found by Stockwell and was, until a devastating tornado on May 4, 2007, on display in Greensburg, Kansas.

This meteorite has been on exhibition since its recovery. An incomparably magnificent showpiece, the discovery of this mass was reported by hundreds of publications and is the finest meteorite of its kind in the world. Dr. Denton S. Ebel, Curator of Meteorites at the American Museum of Natural History, is among those who have referred to this specimen as among the most important American meteorite recoveries in decades and has stated that the value of this meteorite is in excess of one million dollars.

Please note that this lot can be viewed at Christie's, 8 King Street, St. James's, London SW1Y 6QT on 15–19 April 2016.

Christie's would like to thank Dr. Alan E. Rubin for his assistance in preparing the catalogue note for this, and the other, meteorites in this sale.

75

SIKHOTE-ALIN METEORITE — ONE OF THE LARGEST KNOWN

Iron, coarse octahedrite – IIAB
Maritime Territory, Siberia, Russia (46°9' N, 134°39' E)

Blanketed in a dark gun-metal patina and engagingly sculptural, this impressive meteorite is supported on a fitted stand.

33 x 23 x 22cm. (13 x 9 x 9in.)
45kg (99lbs)

£20,000-30,000

$31,000-45,000
€29,000-42,000

The Sikhote-Alin event was the largest meteorite shower in recorded history. After breaking off from its parent asteroid 320 million years ago, a 70-metric-ton iron mass wandered through interplanetary space until encountering Earth on 12 February 1947. A fireball brighter than the Sun (it created moving shadows in broad daylight) was seen to explode at an altitude of about 6 km over eastern Siberia. Sonic booms were heard at distances up to 300 km from the point of impact. Chimneys collapsed, windows shattered and trees were uprooted. A 33-km-long smoke trail persisted for several hours in the atmosphere after impact. Iron fragments were scattered over a broad elliptical area. Many of the fragments penetrated the soil, producing impact craters as large as 26 metres; about 200 such depressions have been catalogued. A famous painting of the event by artist and eye-witness P. I. Medvedev was reproduced as a postage stamp issued by the Soviet government in 1957 to commemorate the tenth anniversary of the meteorite fall.

***76**

NWA 4664 — INTERIOR SLICE FROM THE DEEP WITHIN VESTA'S CRUST

Diogenite

Sahara Desert, North West Africa

This slice is a fine example of a diogenite, an igneous rock rich in the magnesium- and iron-rich silicate orthopyroxene. Also present are small amounts of the minerals olivine, plagioclase, Ca pyroxene, chromite and iron sulfide. NWA 4664 is a breccia – a rock made of numerous diogenite fragments fused together. The specimen has been little affected by alteration on Earth and thus possesses the textures and mineralogy it developed on Vesta.

115 x 89 x 2mm (4½ x 3½ x ⅛in.)

57g

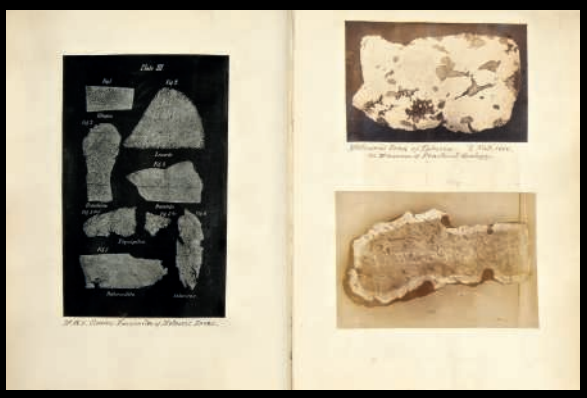
£500-700

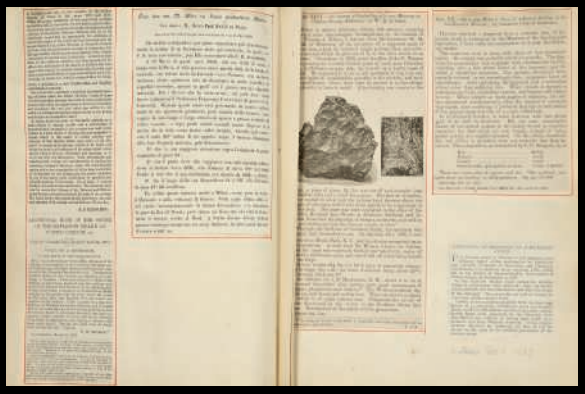
$760-1,100
€700-980

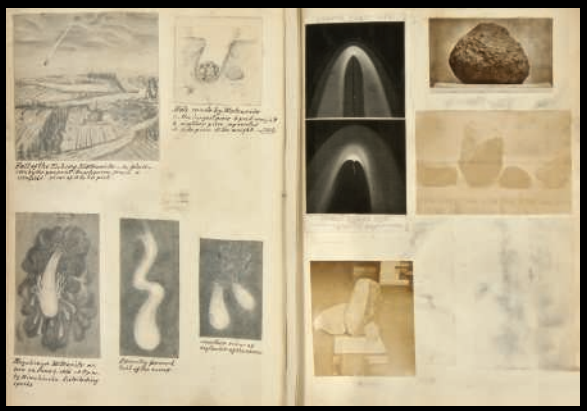
Vesta is the second largest asteroid and the only large one covered with basalt — the same fine-grained volcanic rock that spews from Hawaiian volcanoes, makes up the dark areas of the Moon and the huge shield volcanoes on Mars. Three groups of achondrites (igneous meteorites) are widely thought to have come from Vesta; these are the HED meteorites – *H*owardites, *E*ucrites and *D*iogenites. Eucrites are basalts derived from the surface and upper crust of Vesta; diogenites are from the deep crust; and howardites are impact mixtures of both groups. Diogenites are rare objects, making up just 0.7% of known meteorites. NWA 4664 is the 4664th sample to be catalogued following its recovery in the Northwest African grid of the Sahara Desert.

The meteorite was part of a huge asteroid fragment excavated from the lower crust of Vesta by an enormously energetic collision early in Solar-System history. Over the ensuing eons, pieces broke off this fragment. This meteorite probably broke off a few million years ago and was sent on a collision course with Earth.

The cut face of the meteorite has a fine-grained texture, the result of impact pulverisation. Sprinkled in are coarser grains that cooled slowly at depth within Vesta and managed to avoid substantial crushing.







77

JAMES GREGORY'S METEORITE SCRAPBOOK

Late 19th Century

73 pages containing seven pencil drawings of meteorite falls, sixteen albumen photos of meteorites, folding lithographic plates and other illustrations excised from publications, numerous British and international newspaper cuttings (dating from1868-1893) describing meteorite falls, some with copious annotations in Gregory's hand, some articles and three cartes-de-visites loosely inserted; rebound in later blue half-morocco.

305 x 248mm. (12 x 9¾in.)

£7,000-10,000

$11,000-15,000
€9,900-14,000

LITERATURE:

Cooper, M. P. *Robbing the Sparry Furniture: A 200-year History of British Mineral Dealers* (Tuscon, 2006) pp.144-153

James Reynolds Gregory (1831-1898) was one of the most important mineral dealers of the 19th century, and assembled a "museum-like establishment" of superb gems and meteorites. A member of the Geological Society of London, and numerous other international societies, he authored many papers on the subject of meteorites. A large part of collection was acquired by the British Museum (Natural History) on his death. His sons joined the firm, and under its last name, Gregory, Bottley & Lloyd it carried on into the 21st century. The present scrapbook is of immense importance to the history of meteoritic studies and is almost certainly the last remaining meteorite dealer's notebook from the 19th century. The following lots have all come from the same private collection.

78

METEORITE CATALOGUE

PARIS, 1913

Catalogue de la collectionde météorits du Docteur Latteux. Paris: 1913.
Gelatin silver print to title-page
— with a group of late nineteenth century printed catalogues

272 x 211mm. (10¾ x 8¼in.)

£500-800 $760-1,200
€700-1,100

78

79

79

GROUP OF METEORITE CATALOGUES AND OFFPRINTS

Henry Ward and Others, circa 1900

Ward, H. *The Ward-Coonley collection of meteorites*. Chicago: 1900, with a cyanotype of four Canyon Diablo meteorite loosely inserted
— with nineteen other titles, some multiple copies, including Story-Maskelyne, N. *Catalogue of the collection of meteorite exhibited in the mineral department of the British Museum*. London: [1875], Haidinger, W.v. *Der Meteorsteinfall am. 9 Juni 1866 bei Knyahinya*. 1866 with three folding lithographic plates.

260 x 190mm. (10¼ x 7½in.)

£800-1,200 $1,300-1,800
€1,200-1,700

80

SIX NOTEBOOKS ON METEORITES

James R. Gregory and Others

Five manuscript notebooks: *Catalogue of the literature of meteoric stones and irons*, *Index of meteorites with synonyms*, *Literature of meteorites*, *Astrolithology: List of meteorites, date of fall, locality, remarks &c*, untitled notebook of sales by A.G.F Gregory; printed catalogue *Collection of Meteorites* (London: James R. Gregory, 1889) annotated throughout and on cover 'Sources from whence specimens were obtained, J.R.G.'.

196 x 160mm. (7¾ x 6¼in.)

£3,000-5,000 $4,600-7,500
€4,300-7,000

80

81

COLLECTION OF METEORITE EPHEMERA

James R. Gregory, W. Botley and Others, circa 1900

Twenty cards with albumen photographs of meteorites, eighteen envelopes with additional photographs, offprints and catalogues.

176 x 159mm. (7 x 6in.)

£500-800 $760-1,200 €700-1,100

82

COLLECTION OF METEORITE SHAVINGS

James R. Gregory & Co., circa 1910 and later

The pine box with twenty card containers, some labelled, of trimmings and off cuts from the slicing of meteorites, the largest piece 38.7g with label 'Meteoric Stone America', three cartons of blank labels, manuscript and typed lists of weights, one microscope slide with two thin sections of meteorites.

385 x 245 x 60mm. (15 x 9½ x 2½in.)

£800-1,200 $1,300-1,800 €1,200-1,700

83
METEOROLITES
James Sowerby (1757-1822)
handcoloured etching, proof before title, inscribed in pencil to reverse 'by J. Sowerby', [published by James Sowerby FLSGS, 2 Mead Place, Lambeth]

14 ¾ x 22 ½in. (37.5 x 57.2cm.)

£3,000-5,000 $4,600-7,500 €4,300-7,000

LITERATURE:
Cleevely, R.J., 'A Provisional Bibliography of Natural History Works by the Sowerby Family, *J. Soc.Biblphy nat.Hist.6 (1974) p.492*

A rare example (we can locate only three other copies) of Sowerby's large-sheet print of meteorites "the only three to have fallen in Great Britain".

END OF SALE

CONDITIONS OF SALE • BUYING AT CHRISTIE'S

CONDITIONS OF SALE

These Conditions of Sale and the Important Notices and Explanation of Cataloguing Practice set out the terms on which we offer the **lots** listed in this catalogue for sale. By registering to bid and/or by bidding at auction you agree to these terms, so you should read them carefully before doing so. You will find a glossary at the end explaining the meaning of the words and expressions coloured in **bold**.

Unless we own a **lot** (Δ symbol, Christie's acts as agent for the seller.

A BEFORE THE SALE

1 DESCRIPTION OF LOTS

(a) Certain words used in the catalogue description have special meanings. You can find details of these on the page headed 'Important Notices and Explanation of Cataloguing Practice' which forms part of these terms. You can find a key to the Symbols found next to certain catalogue entries under the section of the catalogue called 'Symbols Used in this Catalogue'.

(b) Our description of any **lot** in the catalogue, any **condition** report and any other statement made by us (whether orally or in writing) about any **lot**, including about its nature or **condition**, artist, period, materials, approximate dimensions or **provenance** are our opinion and not to be relied upon as a statement of fact. We do not carry out in-depth research of the sort carried out by professional historians and scholars. All dimensions and weights are approximate only.

2 OUR RESPONSIBILITY FOR OUR DESCRIPTION OF LOTS

We do not provide any guarantee in relation to the nature of a **lot** apart from our **authenticity warranty** contained in paragraph E2 and to the extent provided in paragraph I below.

3 CONDITION

(a) The **condition** of **lots** sold in our auctions can vary widely due to factors such as age, previous damage, restoration, repair and wear and tear. Their nature means that they will rarely be in perfect **condition**. **Lots** are sold 'as is', in the **condition** they are in at the time of the sale, without any representation or warranty or assumption of liability of any kind as to **condition** by Christie's or by the seller.

(b) Any reference to **condition** in a catalogue entry or in a **condition** report will not amount to a full description of **condition**, and images may not show a **lot** clearly. Colours and shades may look different in print or on screen to how they look on physical inspection. **Condition** reports may be available to help you evaluate the **condition** of a **lot**. **Condition** reports are provided free of charge as a convenience to our buyers and are for guidance only. They offer our opinion but they may not refer to all faults, inherent defects, restoration, alteration or adaptation because our staff are not professional restorers or conservators. For that reason they are not an alternative to examining a **lot** in person or taking your own professional advice. It is your responsibility to ensure that you have requested, received and considered any **condition** report.

4 VIEWING LOTS PRE-AUCTION

(a) If you are planning to bid on a **lot**, you should inspect it personally or through a knowledgeable representative before you make a bid to make sure that you accept the description and its **condition**. We recommend you get your own advice from a restorer or other professional adviser.

(b) Pre-auction viewings are open to the public free of charge. Our specialists may be available to answer questions at pre-auction viewings or by appointment.

5 ESTIMATES

Estimates are based on the **condition**, rarity, quality and **provenance** of the **lots** and on prices recently paid at auction for similar property. **Estimates** can change. Neither you, nor anyone else, may rely on any **estimates** as a prediction or guarantee of the actual selling price of a **lot** or its value for any other purpose. **Estimates** do not include the **buyer's premium** or any applicable taxes.

6 WITHDRAWAL

Christie's may, at its option, withdraw any **lot** at any time prior to or during the sale of the **lot**. Christie's has no liability to you for any decision to withdraw.

7 JEWELLERY

(a) Coloured gemstones (such as rubies, sapphires and emeralds) may have been treated to improve their look, through methods such as heating and oiling. These methods are accepted by the international jewellery trade but may make the gemstone less strong and/or require special care over time.

(b) All types of gemstones may have been improved by some method. You may request a gemmological report for any item which does not have a report if the request is made to us at least three weeks before the date of the auction and you pay the fee for the report.

(c) We do not obtain a gemmological report for every gemstone sold in our auctions. Where we do get gemmological reports from internationally accepted gemmological laboratories, such reports will be described in the catalogue. Reports from American gemmological laboratories will describe any improvement or treatment to the gemstone. Reports from European gemmological laboratories will describe any improvement or treatment only if we request that they do so, but will confirm when no improvement or treatment has been made. Because of differences in approach and technology, laboratories may not agree whether a particular gemstone has been treated, the amount of treatment or whether treatment is permanent. The gemmological laboratories will only report on the improvements or treatments known to the laboratories at the date of the report.

(d) For jewellery sales, **estimates** are based on the information in any gemmological report or, if no report is available, assume that the gemstones may have been treated or enhanced.

8 WATCHES & CLOCKS

(a) Almost all clocks and watches are repaired in their lifetime and may include parts which are not original. We do not give a **warranty** that any individual component part of any watch is **authentic**. Watchbands described as 'associated' are not part of the original watch and may not be **authentic**. Clocks may be sold without pendulums, weights or keys.

(b) As collectors' watches often have very fine and complex mechanisms, a general service, change of battery or further repair work may be necessary, for which you are responsible. We do not give a **warranty** that any watch is in good working order. Certificates are not available unless described in the catalogue.

(c) Most wristwatches have been opened to find out the type and quality of movement. For that reason, wristwatches with water resistant cases may not be waterproof and we recommend you have them checked by a competent watchmaker before use.

Important information about the sale, transport and shipping of watches and watchbands can be found in paragraph H2(h).

B REGISTERING TO BID

1 NEW BIDDERS

(a) If this is your first time bidding at Christie's or you are a returning bidder who has not bought anything from any of our salerooms within the last two years you must register at least 48 hours before an auction to give us enough time to process and approve your registration. We may, at our option, decline to permit you to register as a bidder. You will be asked for the following:

(i) for individuals: Photo identification (driving licence, national identity card or passport) and, if not shown on the ID document, proof of your current address (for example, a current utility bill or bank statement).

(ii) for corporate clients: Your Certificate of Incorporation or equivalent document(s) showing your name and registered address together with documentary proof of directors and beneficial owners; and

(iii) for trusts, partnerships, offshore companies and other business structures, please contact us in advance to discuss our requirements.

(b) We may also ask you to give us a financial reference and/or a deposit as a condition of allowing you to bid. For help, please contact our Credit Department on +44 (0)20 7839 9060.

2 RETURNING BIDDERS

We may at our option ask you for current identification as described in paragraph B1(a) above, a financial reference or a deposit as a condition of allowing you to bid. If you have not bought anything from any of our salerooms in the last two years or if you want to spend more than on previous occasions, please contact our Credit Department on +44 (0)20 7839 9060.

3 IF YOU FAIL TO PROVIDE THE RIGHT DOCUMENTS

If in our opinion you do not satisfy our bidder identification and registration procedures including, but not limited to completing any anti-money laundering and/or anti-terrorism financing checks we may require to our satisfaction, we may refuse to register you to bid, and if you make a successful bid, we may cancel the contract for sale between you and the seller.

4 BIDDING ON BEHALF OF ANOTHER PERSON

If you are bidding on behalf of another person, that person will need to complete the registration requirements above before you can bid, and supply a signed letter authorising you to bid for him/her. A bidder accepts personal liability to pay the **purchase price** and all other sums due unless it has been agreed in writing with Christie's before commencement of the auction that the bidder is acting as an agent on behalf of a named third party acceptable to Christie's and that Christie's will only seek payment from the named third party.

5 BIDDING IN PERSON

If you wish to bid in the saleroom you must register for a numbered bidding paddle at least 30 minutes before the auction. You may register online at **www.christies.com** or in person. For help, please contact the Credit Department on +44 (0)20 7839 9060.

6 BIDDING SERVICES

The bidding services described below are a free service offered as a convenience to our clients and Christie's is not responsible for any error (human or otherwise), omission or breakdown in providing these services.

(a) Phone Bids

Your request for this service must be made no later than 24 hours prior to the auction. We will accept bids by telephone for **lots** only if our staff are available to take the bids. If you need to bid in a language other than in English, you must arrange this well before the auction. We may record telephone bids. By bidding on the telephone, you are agreeing to us recording your conversations. You also agree that your telephone bids are governed by these Conditions of Sale.

(b) Internet Bids on Christie's Live™

For certain auctions we will accept bids over the Internet. Please visit **www.christies.com/livebidding** and click on the 'Bid Live' icon to see details of how to watch, hear and bid at the auction from your computer. As well as these Conditions of Sale, internet bids are governed by the Christie's LIVE™ terms of use which are available on **www.christies.com**.

(c) Written Bids

You can find a Written Bid Form at the back of our catalogues, at any Christie's office or by choosing the sale and viewing the **lots** online at **www.christies.com**. We must receive your completed Written Bid Form at least 24 hours before the auction. Bids must be placed in the currency of the saleroom. The auctioneer will take reasonable steps to carry out written bids at the lowest possible price, taking into account the **reserve**. If you make a written bid on a **lot** which does not have a **reserve** and there is no higher bid than yours, we will bid on your behalf at around 50% of the **low estimate** or, if lower, the amount of your bid. If we receive written bids on a **lot** for identical amounts, and at the auction these are the highest bids on the **lot**, we will sell the **lot** to the bidder whose written bid we received first.

C AT THE SALE

1 WHO CAN ENTER THE AUCTION

We may, at our option, refuse admission to our premises or decline to permit participation in any auction or to reject any bid.

2 RESERVES

Unless otherwise indicated, all lots are subject to a **reserve**. We identify **lots** that are offered without **reserve** with the symbol • next to the **lot** number. The **reserve** cannot be more than the **lot's low estimate**.

3 AUCTIONEER'S DISCRETION

The auctioneer can at his sole option:

(a) refuse any bid;

(b) move the bidding backwards or forwards in any way he or she may decide, or change the order of the **lots**;

(c) withdraw any **lot**;

(d) divide any **lot** or combine any two or more **lots**;

(e) reopen or continue the bidding even after the hammer has fallen; and

(f) in the case of error or dispute and whether during or after the auction, to continue the bidding, determine the successful bidder, cancel the sale of the **lot**, or reoffer and resell any **lot**. If any dispute relating to bidding arises during or after the auction, the auctioneer's decision in exercise of this option is final.

4 BIDDING

The auctioneer accepts bids from:

(a) bidders in the saleroom;

(b) telephone bidders, and internet bidders through 'Christie's LIVE™ (as shown above in Section B6); and

(c) written bids (also known as absentee bids or commission bids) left with us by a bidder before the auction.

5 BIDDING ON BEHALF OF THE SELLER

The auctioneer may, at his or her sole option, bid on behalf of the seller up to but not including the amount of the **reserve** either by making consecutive bids or by making bids in response to other bidders. The auctioneer will not identify these as bids made on behalf of the seller and will not make any bid on behalf of the seller at or above the **reserve**. If **lots** are offered without **reserve**, the auctioneer will generally decide to open the bidding at 50% of the **low estimate** for the **lot**. If no bid is made at that level, the auctioneer may decide to go backwards at his or her sole option until a bid is made, and then continue up from that amount. In the event that there are no bids on a **lot**, the auctioneer may deem such **lot** unsold.

6 BID INCREMENTS

Bidding generally starts below the **low estimate** and increases in steps (bid increments). The auctioneer will decide at his or her sole option where the bidding should start and the bid increments. The usual bid increments are shown for guidance only on the Written Bid Form at the back of this catalogue.

7 CURRENCY CONVERTER

The saleroom video screens (and Christies LIVE™) may show bids in some other major currencies as well as sterling. Any conversion is for guidance only and we cannot be bound by any rate of exchange used. Christie's is not responsible for any error (human or otherwise), omission or breakdown in providing these services.

8 SUCCESSFUL BIDS

Unless the auctioneer decides to use his or her discretion as set out in paragraph C3 above, when the auctioneer's hammer strikes, we have accepted the last bid. This means a contract for sale has been formed between the seller and the successful bidder. We will issue an invoice only to the registered bidder who made the successful bid. While we send out invoices by post and/or email after the auction, we do not accept responsibility for telling you whether or not your bid was successful. If you have bid by written bid, you should contact us by telephone or in person as soon as possible after the auction to get details of the outcome of your bid to avoid having to pay unnecessary storage charges.

9 LOCAL BIDDING LAWS

You agree that when bidding in any of our sales that you will strictly comply with all local laws and regulations in force at the time of the sale for the relevant sale site.

D THE BUYER'S PREMIUM, TAXES AND ARTIST'S RESALE ROYALTY

1 THE BUYER'S PREMIUM

In addition to the **hammer price**, the successful bidder agrees to pay us a **buyer's premium** on the **hammer price** of each **lot** sold. On all **lots** we charge 25% of the **hammer price** up to and including £50,000, 20% on that part of the **hammer price** over £50,000 and up to and including £1,000,000, and 12% of that part of the **hammer price** above £1,000,000.

2 TAXES

The successful bidder is responsible for any applicable tax including any VAT, sales or compensating use tax or equivalent tax wherever they arise on the **hammer price** and the **buyer's premium**. It is the buyer's responsibility to ascertain and pay all taxes due. You can find details of how VAT and VAT reclaims are dealt with in the section of the catalogue headed 'VAT Symbols and Explanation'. VAT charges and refunds depend on the particular circumstances of the buyer so this section, which is not exhaustive, should be used only as a general guide. In all circumstances EU and UK law takes precedence. If you have any questions about VAT, please contact Christie's VAT Department on +44 (0)20 7839 9060 (email: VAT_london@christies.com, fax: +44 (0)20 3219 6076).

3 ARTIST'S RESALE ROYALTY

In certain countries, local laws entitle the artist or the artist's estate to a royalty known as 'artist's resale right' when any **lot** created by the artist is sold. We identify these **lots** with the symbol λ next to the **lot** number. If these laws apply to a **lot**, you must pay us an extra amount equal to the royalty. We will pay the royalty to the appropriate authority on the seller's behalf.

The artist's resale royalty applies if the **hammer price** of the **lot** is 1,000 euro or more. The total royalty for any **lot** cannot be more than 12,500 euro. We work out the amount owed as follows:

Royalty for the portion of the **hammer price** (in euros)

4% up to 50,000

3% between 50,000.01 and 200,000

1% between 200,000.01 and 350,000

0.50% between 350,000.01 and 500,000

over 500,000, the lower of 0.25% and 12,500 euro.

We will work out the artist's resale royalty using the euro to sterling rate of exchange of the European Central Bank on the day of the auction.

E WARRANTIES

1 SELLER'S WARRANTIES

For each **lot**, the seller gives a **warranty** that the seller:

(a) is the owner of the **lot** or a joint owner of the **lot** acting with the permission of the other co-owners or, if the seller is not the owner or a joint owner of the **lot**, has the permission of the owner to sell the **lot**, or the right to do so in law; and

(b) has the right to transfer ownership of the **lot** to the buyer without any restrictions or claims by anyone else.

If either of the above **warranties** are incorrect, the seller shall not have to pay more than the **purchase price** (as defined in paragraph F1(a) below) paid by you to us. The seller will not be responsible to you for any reason for loss of profits or business, expected savings, loss of opportunity or interest, costs, damages, **other damages** or expenses. The seller gives no **warranty** in relation to any **lot** other than as set out above and, as far as the seller is allowed by law, all **warranties** from the seller to you, and all other obligations upon the seller which may be added to this agreement by law, are excluded.

2 OUR AUTHENTICITY WARRANTY

We warrant, subject to the terms below, that the **lots** in our sales are authentic (our '**authenticity warranty**'). If, within five years of the date of the auction, you satisfy us that your **lot** is not **authentic**, subject to the terms below, we will refund the **purchase price** paid by you. The meaning of **authentic** can be found in the glossary at the end of these Conditions of Sale. The terms of the **authenticity warranty** are as follows:

(a) It will be honoured for a period of five years from the date of the auction. After such time, we will not be obligated to honour the **authenticity warranty**.

(b) It is given only for information shown in **UPPERCASE type** in the first line of the **catalogue description** (the '**Heading**'). It does not apply to any information other than in the **Heading** even if shown in **UPPERCASE type**.

(c) The **authenticity warranty** does not apply to any **Heading** or part of a **Heading** which is **qualified**. **Qualified** means limited by a clarification in a **lot's catalogue description** or by the use in a **Heading** of one of the terms listed in the section titled **Qualified Headings** on the page of the catalogue headed 'Important Notices and Explanation of Cataloguing Practice'. For example, use of the term 'ATTRIBUTED TO…' in a **Heading** means that the **lot** is in Christie's opinion probably a work by the named artist but no **warranty** is provided that the **lot** is the work of the named artist. Please read the full list of **Qualified Headings** and a **lot's** full **catalogue description** before bidding.

(d) The **authenticity warranty** applies to the **Heading** as amended by any **Saleroom Notice**.

(e) The **authenticity warranty** does not apply where scholarship has developed since the auction leading to a change in generally accepted opinion. Further, it does not apply if the **Heading** either matched the generally accepted opinion of experts at the date of the sale or drew attention to any conflict of opinion.

(f) The **authenticity warranty** does not apply if the **lot** can only be shown not to be **authentic** by a scientific process which, on the date we published the catalogue, was not available or generally accepted for use, or which was unreasonably expensive or impractical, or which was likely to have damaged the **lot**.

(g) The benefit of the **authenticity warranty** is only available to the original buyer shown on the invoice for the **lot** issued at the time of the sale and only if the original buyer has owned the **lot** continuously between the date of the auction and the date of claim. It may not be transferred to anyone else.

(h) In order to claim under the **authenticity warranty** you must:

(i) give us written details, including full supporting evidence, of any claim within five years of the date of the auction;

(ii) at Christie's option, we may require you to provide the written opinions of two recognised experts in the field of the **lot** mutually agreed by you and us in advance confirming that the **lot** is not **authentic**. If we have any doubts, we reserve the right to obtain additional opinions at our expense; and

(iii) return the **lot** at your expense to the saleroom from which you bought it in the **condition** it was in at the time of sale.

(i) Your only right under this **authenticity warranty** is to cancel the sale and receive a refund of the **purchase price** paid by you to us. We will not, in any circumstances, be required to pay you more than the **purchase price** nor will we be liable for any loss of profits or business, loss of opportunity or value, expected savings or interest, costs, damages, **other damages** or expenses.

(j) **Books**. Where the **lot** is a book, we give an additional **warranty** for 14 days from the date of the sale that if on collation any **lot** is defective in text or illustration, we will refund your **purchase price**, subject to the following terms:

(a) This additional **warranty** does not apply to:

(i) the absence of blanks, half titles, tissue guards or advertisements, damage in respect of bindings, stains, spotting, marginal tears or other defects not affecting completeness of the text or illustration;

(ii) drawings, autographs, letters or manuscripts, signed photographs, music, atlases, maps or periodicals;

(iii) books not identified by title;

(iv) **lots** sold without a printed **estimate**;

(v) books which are described in the catalogue as sold not subject to return; or

(vi) defects stated in any **condition** report or announced at the time of sale.

(b) To make a claim under this paragraph you must give written details of the defect and return the **lot** to the sale room at which you bought it in the same **condition** as at the time of sale, within 14 days of the date of the sale.

(k) **South East Asian Modern and Contemporary Art and Chinese Calligraphy and Painting.**

In these categories, the **authenticity warranty** does not apply because current scholarship does not permit the making of definitive statements. Christie's does, however, agree to cancel a sale in either of these two categories of art where it has been proven the **lot** is a forgery. Christie's will refund to the original buyer the **purchase price** in accordance with the terms of Christie's **authenticity warranty**, provided that the original buyer notifies us with full supporting evidence documenting the forgery claim within twelve (12) months of the date of the auction. Such evidence must be satisfactory to us that the **lot** is a forgery in accordance with paragraph E2(h)(ii) above and the **lot** must be returned to us in accordance with E2h(iii) above. Paragraphs E2(b), (c), (d), (e), (f) and (g) and (i) also apply to a claim under these categories.

F PAYMENT

1 HOW TO PAY

(a) Immediately following the auction, you must pay the **purchase price** being:

(i) the **hammer price**; and

(ii) the **buyer's premium**; and

(iii) any amounts due under section D3 above; and

(iv) any duties, goods, sales, use, compensating or service tax or VAT.

Payment is due no later than by the end of the seventh calendar day following the date of the auction (the '**due date**').

(b) We will only accept payment from the registered bidder. Once issued, we cannot change the buyer's name on an invoice or re-issue the invoice in a different name. You must pay immediately even if you want to export the **lot** and you need an export licence.

(c) You must pay for **lots** bought at Christie's in the United Kingdom in the currency stated on the invoice in one of the following ways:

(i) Wire transfer

You must make payments to:

Lloyds Bank Plc, City Office, PO Box 217, 72 Lombard Street, London EC3P 3BT. Account number: 00172710, sort code: 30-00-02 Swift code: LOYDGB2LCTY. IBAN (international bank account number): GB81 LOYD 3000 0200 1727 10.

(ii) Credit Card.

We accept most major credit cards subject to certain conditions. To make a 'cardholder not present' (CNP) payment, you must complete a CNP authorisation form which you can get from our Cashiers Department. You must send a completed CNP authorisation form by fax to +44 (0)20 7389 2869 or by post to the address set out in paragraph (d) below. If you want to make a CNP payment over the telephone, you must call +44 (0)20 7839 9060. CNP payments cannot be accepted by all salerooms and are subject to certain restrictions. Details of the conditions and restrictions applicable to credit card payments are available from our Cashiers Department, whose details are set out in paragraph (d) below.

(iii) Cash

We accept cash subject to a maximum of £5,000 per buyer per year at our Cashier's Department only (subject to conditions).

(iv) Banker's draft

You must make these payable to Christie's and there may be conditions.

(v) Cheque

You must make cheques payable to Christie's. Cheques must be from accounts in pounds sterling from a United Kingdom bank.

(d) You must quote the sale number, your invoice number and client number when making a payment. All payments sent by post must be sent to: Christie's, Cashiers Department, 8 King Street, St James's, London SW1Y 6QT.

(e) For more information please contact our Cashiers Department by phone on +44 (0)20 7839 9060 or fax on +44 (0)20 7389 2869.

2. TRANSFERRING OWNERSHIP TO YOU

You will not own the **lot** and ownership of the **lot** will not pass to you until we have received full and clear payment of the **purchase price**, even in circumstances where we have released the **lot** to the buyer.

3 TRANSFERRING RISK TO YOU

The risk in and responsibility for the **lot** will transfer to you from whichever is the earlier of the following:

(a) When you collect the **lot**; or

(b) At the end of the 90th day following the date of the auction or, if earlier, the date the **lot** is taken into care by a third party warehouse as set out on the page headed 'Storage and Collection', unless we have agreed otherwise with you in writing.

4 WHAT HAPPENS IF YOU DO NOT PAY

(a) If you fail to pay us the **purchase price** in full by the **due date**, we will be entitled to do one or more of the following (as well as enforce our rights under paragraph F5 and any other rights or remedies we have by law):

(i) to charge interest from the **due date** at a rate of 5% a year above the UK Lloyds Bank base rate from time to time on the unpaid amount due;

(ii) we can cancel the sale of the **lot**. If we do this, we may sell the **lot** again, publicly or privately on such terms we shall think necessary or appropriate, in which case you must pay us any shortfall between the **purchase price** and the proceeds from the resale. You must also pay all costs, expenses, losses, damages and legal fees we have to pay or may suffer and any shortfall in the seller's commission on the resale;

(iii) we can pay the seller an amount up to the net proceeds payable in respect of the amount bid by your default in which case you acknowledge and understand that Christie's will have all of the rights of the seller to pursue you for such amounts;

(iv) we can hold you legally responsible for the **purchase price** and may begin legal proceedings to recover it together with other losses, interest, legal fees and costs as far as we are allowed by law;

(v) we can take what you owe us from any amounts which we or any company in the **Christie's Group** may owe you (including any deposit or other part-payment which you have paid to us);

(vi) we can, at our option, reveal your identity and contact details to the seller;

(vii) we can reject at any future auction any bids made by or on behalf of the buyer or to obtain a deposit from the buyer before accepting any bids;

(viii) to exercise all the rights and remedies of a person holding security over any property in our possession owned by you, whether by way of pledge, security interest or in any other way as permitted by the law of the place where such property is located. You will be deemed to have granted such security to us and we may retain such property as collateral security for your obligations to us; and

(ix) we can take any other action we see necessary or appropriate.

(b) If you owe money to us or to another **Christie's Group** company, we can use any amount you do pay, including any deposit or other part-payment you have made to us, or which we owe you, to pay off any amount you owe to us or another **Christie's Group** company for any transaction.

5 KEEPING YOUR PROPERTY

If you owe money to us or to another **Christie's Group** company, as well as the rights set out in F4 above, we can use or deal with any of your property we hold or which is held by another **Christie's Group** company in any way we are allowed to by law. We will only release your property to you after you pay us or the relevant **Christie's Group** company in full for what you owe. However, if we choose, we can also sell your property in any way we think appropriate. We will use the proceeds of the sale against any amounts you owe us and we will pay any amount left from that sale to you. If there is a shortfall, you must pay us any difference between the amount we have received from the sale and the amount you owe us.

G COLLECTION AND STORAGE

1 COLLECTION

(a) Once you have made full and clear payment, you must collect the **lot** promptly following the auction. You may not collect the **lot** until you have made full and clear payment of all amounts due to us.

(b) If you have paid for the **lot** in full, but you do not collect the **lot** within 90 calendar days after the sale, we may sell it, unless otherwise agreed in writing. If we do this we will pay you the proceeds of the sale after taking our storage charges and any other amounts you owe us and any **Christie's Group** company.

(c) Information on collecting **lots** is set out on an information sheet which you can get from the bidder registration staff or Christie's cashiers +44 (0)20 7839 9060.

2 STORAGE

(a) If you have not collected the **lot** promptly following the auction, we or our appointed agents can remove the **lot** at our option to a warehouse.

(b) If you have not collected the lot within 90 calendar days of the auction, we will charge you storage costs and can, at our option, charge you transport costs and handling fees for moving the **lot** to and within the warehouse.

(c) Details of the removal of the **lot** to a warehouse, fees and costs are set out at the back of the catalogue on the page headed 'Storage and Collection'. You may be liable to us or our agent directly for these costs.

H TRANSPORT AND SHIPPING

1 TRANSPORT AND SHIPPING

We will enclose a transport and shipping form with each invoice sent to you. You must make all transport and shipping arrangements. However, we can arrange to pack, transport and ship your property if you ask us to and pay the costs of doing so. We recommend that you ask us for an **estimate**, especially for any large items or items of high value that need professional packing before you bid. We may also suggest other handlers, packers, transporters or experts if you ask us to do so. For more information, please contact Christie's Art Transport on +44 (0)20 7839 9060. See the information set out at **www.christies.com/shipping** or contact us at arttransport_london@christies.com. We will take reasonable care when we are handling, packing, transporting and shipping a **lot**. However, if we recommend another company for any of these purposes, we are not responsible for their acts, failure to act or neglect.

2 EXPORT AND IMPORT

Any **lot** sold at auction may be affected by laws on exports from the country in which it is sold and the import restrictions of other countries. Many countries require a declaration of export for property leaving the country and/or an import declaration on entry of property into the country. Local laws may prevent you from importing a **lot** or may prevent you selling a **lot** in the country you import it into.

(a) You alone are responsible for getting advice about and meeting the requirements of any laws or regulations which apply to exporting or importing any **lot** prior to bidding. If you are refused a licence or there is a delay in getting one, you must still pay us in full for the **lot**. We may be able to help you apply for the appropriate licences if you ask us to and pay our fee for doing so. However, we cannot guarantee that you will get one. For more information, please contact Christie's Art Transport Department on +44 (0)20 7839 9060. See the information set out at **www.christies.com/shipping** or contact us at arttransport_london@christies.com.

(b) **Lots made of protected species**

Lots made of or including (regardless of the percentage) endangered and other protected species of wildlife are marked with the symbol ~ in the catalogue. This material includes, among other things, ivory, tortoiseshell, crocodile skin, rhinoceros horn, whalebone, certain species of coral, and Brazilian rosewood. You should check the relevant customs laws and regulations before bidding on any **lot** containing wildlife material if you plan to import the **lot** into another country. Several countries refuse to allow you to import property containing these materials, and some other countries require a licence from the relevant regulatory agencies in the countries of exportation as well as importation. In some cases, the **lot** can only be shipped with an independent scientific confirmation of species and/or age and you will need to obtain these at your own cost. If a **lot** contains elephant ivory, or any other wildlife material that could be confused with elephant ivory (for example, mammoth ivory, walrus ivory, helmeted hornbill ivory), please see further important information in paragraph (c) if you are proposing to import the **lot** into the USA. We will not be obliged to cancel your purchase and refund the **purchase price** if your **lot** may not be exported, imported or it is seized for any reason by a government authority. It is your responsibility to determine and satisfy the requirements of any applicable laws or regulations relating to the export or import of property containing such protected or regulated material.

(c) **US import ban on African elephant ivory**

The USA prohibits the import of ivory from the African elephant. Any **lot** containing elephant ivory or other wildlife material that could be easily confused with elephant ivory (for example, mammoth ivory, walrus ivory, helmeted hornbill ivory) can only be imported into the US with results of a rigorous scientific test acceptable to Fish & Wildlife, which confirms that the material is not African elephant ivory. Where we have conducted such rigorous scientific testing on a **lot** prior to sale, we will make this clear in the lot description. In all other cases, we cannot confirm whether a **lot** contains African elephant ivory, and you will buy that **lot** at your own risk and be responsible for any scientific test or other reports required for import into the USA at your own cost. If such scientific test is inconclusive or confirms the material is from the African elephant, we will not be obliged to cancel your purchase and refund the **purchase price**.

(d) **Lots containing material that originates from Burma (Myanmar)**

Lots which contain rubies or jadeite originating in Burma (Myanmar) may not generally be imported into the United States. As a convenience to US buyers, **lots** which contain rubies or jadeite of Burmese or indeterminate origin have been marked with the symbol ψ in the catalogue. In relation to items that contain any other types of gemstones originating in Burma (e.g. sapphires) such items may be imported into the United States provided that the gemstones have been mounted or incorporated into jewellery outside of Burma and provided that the setting is not of a temporary nature (e.g. a string).

(e) **Lots of Iranian origin**

Some countries prohibit or restrict the purchase and/or import of Iranian-origin 'works of conventional craftsmanship' (works that are not by a recognised artist and/or that have a function, for example: carpets, bowls, ewers, tiles, ornamental boxes). For example, the USA prohibits the import of this type of property and its purchase by US persons (wherever located). Other countries, such as Canada, only permit the import of this property in certain circumstances. As a convenience to buyers, Christie's indicates under the title of a **lot** if the **lot** originates from Iran (Persia). It is your responsibility to ensure you do not bid on or import a **lot** in contravention of the sanctions or trade embargoes that apply to you.

(f) **Gold**

Gold of less than 18ct does not qualify in all countries as 'gold' and may be refused import into those countries as 'gold'.

(g) **Jewellery over 50 years old**

Under current laws, jewellery over 50 years old which is worth £34,300 or more will require an export licence which we can apply for on your behalf. It may take up to eight weeks to obtain the export jewellery licence.

(h) **Watches**

(i) Many of the watches offered for sale in this catalogue are pictured with straps made of endangered or protected animal materials such as alligator or crocodile. These lots are marked with the symbol ~ in the catalogue. These endangered species straps are shown for display purposes only and are not for sale. Christie's will remove and retain the strap prior to shipment from the sale site. At some sale sites, Christie's may, at its discretion, make the displayed endangered species strap available to the buyer of the lot free of charge if collected in person from the sale site within one year of the date of the sale. Please check with the department for details on a particular lot.

For all symbols and other markings referred to in paragraph H2, please note that **lots** are marked as a convenience to you, but we do not accept liability for errors or for failing to mark **lots**.

I OUR LIABILITY TO YOU

(a) We give no **warranty** in relation to any statement made, or information given, by us or our representatives or employees, about any **lot** other than as set out in the **authenticity warranty** and, as far as we are allowed by law, all **warranties** and other terms which may be added to this agreement by law are excluded. The seller's **warranties** contained in paragraph E1 are their own and we do not have any liability to you in relation to those **warranties**.

(b) (i) We are not responsible to you for any reason (whether for breaking this agreement or any other matter relating to your purchase of, or bid for, any **lot**) other than in the event of fraud or fraudulent misrepresentation by us or other than as expressly set out in these Conditions of Sale; or

(ii) give any representation, **warranty** or guarantee or assume any liability of any kind in respect of any **lot** with regard to merchantability, fitness for a particular purpose, description, size, quality, condition, attribution, authenticity, rarity, importance, medium, provenance, exhibition history, literature, or historical relevance. Except as required by local law, any **warranty** of any kind is excluded by this paragraph.

(c) In particular, please be aware that our written and telephone bidding services, Christie's LIVE™, **condition** reports, currency converter and saleroom video screens are free services and we are not responsible to you for any error (human or otherwise), omission or breakdown in these services.

(d) We have no responsibility to any person other than a buyer in connection with the purchase of any **lot**.

(e) If, in spite of the terms in paragraphs (a) to (d) or E2(i) above, we are found to be liable to you for any reason, we shall not have to pay more than the **purchase price** paid by you to us. We will not be responsible to you for any reason for loss of profits or business, loss of opportunity or value, expected savings or interest, costs, damages, or expenses.

J OTHER TERMS

1 OUR ABILITY TO CANCEL

In addition to the other rights of cancellation contained in this agreement, we can cancel a sale of a **lot** if we reasonably believe that completing the transaction is, or may be, unlawful or that the sale places us or the seller under any liability to anyone else or may damage our reputation.

2 RECORDINGS

We may videotape and record proceedings at any auction. We will keep any personal information confidential, except to the extent disclosure is required by law. However, we may, through this process, use or share these recordings with another **Christie's Group** company and marketing partners to analyse our customers and to help us to tailor our services for buyers. If you do not want to be videotaped, you may make arrangements to make a telephone or written bid or bid on Christie's LIVE™ instead. Unless we agree otherwise in writing, you may not videotape or record proceedings at any auction.

3 COPYRIGHT

We own the copyright in all images, illustrations and written material produced by or for us relating to a **lot** (including the contents of our catalogues unless otherwise noted in the catalogue). You cannot use them without our prior written permission. We do not offer any guarantee that you will gain any copyright or other reproduction rights to the **lot**.

4 ENFORCING THIS AGREEMENT

If a court finds that any part of this agreement is not valid or is illegal or impossible to enforce, that part of the agreement will be treated as being deleted and the rest of this agreement will not be affected.

5 TRANSFERRING YOUR RIGHTS AND RESPONSIBILITIES

You may not grant a security over or transfer your rights or responsibilities under these terms on the contract of sale with the buyer unless we have given our written permission. This agreement will be binding on your successors or estate and anyone who takes over your rights and responsibilities.

6 TRANSLATIONS

If we have provided a translation of this agreement, we will use this original version in deciding any issues or disputes which arise under this agreement.

7 PERSONAL INFORMATION

We will hold and process your personal information and may pass it to another **Christie's Group** company for use as described in, and in line with, our privacy policy at **www.christies.com**.

8 WAIVER

No failure or delay to exercise any right or remedy provided under these Conditions of Sale shall constitute a waiver of that or any other right or remedy, nor shall it prevent or restrict the further exercise of that or any other right or remedy. No single or partial exercise of such right or remedy shall prevent or restrict the further exercise of that or any other right or remedy.

9 LAW AND DISPUTES

This agreement, and any non-contractual obligations arising out of or in connection with this agreement, or any other rights you may have relating to the purchase of a **lot** will be governed by the laws of England and Wales. Before we or you start any court proceedings (except in the limited circumstances where the dispute, controversy or claim is related to proceedings brought by someone else and this dispute could be joined to those proceedings), we agree we will each try to settle the dispute by mediation following the Centre for Effective Dispute Resolution (CEDR) Model Mediation Procedure. We will use a mediator affiliated with CEDR who we and you agree to. If the dispute is not settled by mediation, you agree for our benefit that the dispute will be referred to and dealt with exclusively in the courts of England and Wales. However, we will have the right to bring proceedings against you in any other court.

10 REPORTING ON WWW.CHRISTIES.COM

Details of all **lots** sold by us, including **catalogue descriptions** and prices, may be reported on **www.christies.com**. Sales totals are **hammer price** plus **buyer's premium** and do not reflect costs, financing fees, or application of buyer's or seller's credits. We regret that we cannot agree to requests to remove these details from **www.christies.com**.

K GLOSSARY

authentic: a genuine example, rather than a copy or forgery of:

(i) the work of a particular artist, author or manufacturer, if the **lot** is described in the **Heading** as the work of that artist, author or manufacturer;

(ii) a work created within a particular period or culture, if the **lot** is described in the **Heading** as a work created during that period or culture;

(iii) a work for a particular origin source if the **lot** is described in the **Heading** as being of that origin or source; or

(iv) in the case of gems, a work which is made of a particular material, if the **lot** is described in the **Heading** as being made of that material.

authenticity warranty: the guarantee we give in this agreement that a **lot** is **authentic** as set out in section E2 of this agreement.

buyer's premium: the charge the buyer pays us along with the **hammer price**.

catalogue description: the description of a **lot** in the catalogue for the auction, as amended by any saleroom notice.

Christie's Group: Christie's International Plc, its subsidiaries and other companies within its corporate group.

condition: the physical **condition** of a **lot**.

due date: has the meaning given to it in paragraph F1(a).

estimate: the price range included in the catalogue or any saleroom notice within which we believe a **lot** may sell. **Low estimate** means the lower figure in the range and **high estimate** means the higher figure. The **mid estimate** is the midpoint between the two.

hammer price: the amount of the highest bid the auctioneer accepts for the sale of a **lot**.

Heading: has the meaning given to it in paragraph E2.

lot: an item to be offered at auction (or two or more items to be offered at auction as a group).

other damages: any special, consequential, incidental or indirect damages of any kind or any damages which fall within the meaning of 'special', 'incidental' or 'consequential' under local law.

purchase price: has the meaning given to it in paragraph F1(a).

provenance: the ownership history of a **lot**.

qualified: has the meaning given to it in paragraph E2 and **Qualified Headings** means the section headed **Qualified Headings** on the page of the catalogue headed 'Important Notices and Explanation of Cataloguing Practice'.

reserve: the confidential amount below which we will not sell a **lot**.

saleroom notice: a written notice posted next to the **lot** in the saleroom and on **www.christies.com**, which is also read to prospective telephone bidders and notified to clients who have left commission bids, or an announcement made by the auctioneer either at the beginning of the sale, or before a particular **lot** is auctioned.

UPPER CASE type: means having all capital letters.

warranty: a statement or representation in which the person making it guarantees that the facts set out in it are correct.

VAT SYMBOLS AND EXPLANATION

You can find a glossary explaining the meanings of words coloured in bold on this page at the end of the section of the catalogue headed 'Conditions of Sale'

VAT payable

Symbol	
No Symbol	We will use the VAT Margin Scheme. No VAT will be charged on the **hammer price**. VAT at 20% will be added to the **buyer's premium** but will not be shown separately on our invoice.
†	We will invoice under standard VAT rules and VAT will be charged at 20% on both the **hammer price** and **buyer's premium** and shown separately on our invoice.
θ	For qualifying books only, no VAT is payable on the **hammer price** or the **buyer's premium**.
*	These **lots** have been imported from outside the EU for sale and placed under the Temporary Admission regime. Import VAT is payable at 5% on the **hammer price**. VAT at 20% will be added to the **buyer's premium** but will not be shown separately on our invoice.
Ω	These **lots** have been imported from outside the EU for sale and placed under the Temporary Admission regime. Customs Duty as applicable will be added to the **hammer price** and Import VAT at 20% will be charged on the Duty Inclusive **hammer price**. VAT at 20% will be added to the **buyer's premium** but will not be shown separately on our invoice.
α	The VAT treatment will depend on whether you have registered to bid with an EU or non-EU address: • If you register to bid with an address **within** the EU you will be invoiced under the VAT Margin Scheme (see No Symbol above). • If you register to bid with an address **outside** of the EU you will be invoiced under standard VAT rules (see † symbol above)
‡	For wine offered 'in bond' only. If you choose to buy the wine in bond no Excise Duty or Clearance VAT will be charged on the **hammer**. If you choose to buy the wine out of bond Excise Duty as applicable will be added to the **hammer price** and Clearance VAT at 20% will be charged on the Duty inclusive **hammer price**. Whether you buy the wine in bond or out of bond, 20% VAT will be added to the buyer's premium and shown on the invoice.

VAT refunds: what can I reclaim?

If you are:

A non VAT registered UK or EU buyer		**No VAT refund is possible**
UK VAT registered buyer	**No symbol and α**	**The VAT amount in the buyer's premium cannot be refunded.** However, on request we can re-invoice you outside of the VAT Margin Scheme under normal UK VAT rules (as if the **lot** had been sold with a † symbol). Subject to HMRC's rules, you can then reclaim the VAT charged through your own VAT return.
	*** and Ω**	Subject to HMRC's rules, you can reclaim the Import VAT charged on the **hammer price** through your own VAT return when you are in receipt of a C79 form issued by HMRC. The VAT amount in the **buyer's premium** is invoiced under Margin Scheme rules so cannot normally be claimed back. However, if you request to be re-invoiced outside of the Margin Scheme under standard VAT rules (as if the **lot** had been sold with a † symbol) then, subject to HMRC's rules, you can reclaim the VAT charged through your own VAT return.
EU VAT registered buyer	**No Symbol and α**	**The VAT amount in the buyer's premium cannot be refunded**. However, on request we can **re-invoice** you outside of the VAT Margin Scheme under normal UK VAT rules (as if the **lot** had been sold with a † symbol). See below for the rules that would then apply.
	†	If you provide us with your EU VAT number we will not charge VAT on the **buyer's premium**. We will also refund the VAT on the **hammer price** if you ship the **lot** from the UK and provide us with proof of shipping, within three months of collection.
	*** and Ω**	**The VAT amount on the hammer and in the buyer's premium cannot be refunded**. However, on request we can **re-invoice** you outside of the VAT Margin Scheme under normal UK VAT rules (as if the **lot** had been sold with a † symbol). See above for the rules that would then apply.
Non EU buyer		If you meet **ALL** of the conditions in notes 1 to 3 below we will refund the following tax charges:
	No Symbol	We will refund the VAT amount in the **buyer's premium**.
	† and α	We will refund the VAT charged on the **hammer price**. VAT on the **buyer's premium** can only be refunded if you are an overseas business. **The VAT amount in the buyer's premium cannot be refunded to non-trade clients.**
	‡ (wine only)	No Excise Duty or Clearance VAT will be charged on the **hammer price** providing you export the wine while 'in bond' directly outside the EU using an Excise authorised shipper. VAT on the **buyer's premium** can only be refunded if you are an overseas business. **The VAT amount in the buyer's premium cannot be refunded to non-trade clients.**
	*** and Ω**	We will refund the Import VAT charged on the **hammer price** and the VAT amount in the **buyer's premium**.

1. We **CANNOT** offer refunds of VAT amounts or Import VAT to buyers who do not meet all applicable conditions in full. If you are unsure whether you will be entitled to a refund, please contact Client Services at the address below **before you bid**.
2. No VAT amounts or Import VAT will be refunded where the total refund is under £100.
3. In order to receive a refund of VAT amounts/Import VAT (as applicable) non-EU buyers must:
(a) have registered to bid with an address outside of the EU; **and**
(b) provide immediate proof of correct export out of the EU within the required time frames of: 30 days via a 'controlled export' for * and **Ω lots**. All other **lots** must be exported within three months of collection.
4. Details of the documents which you must provide to us to show satisfactory proof of export/shipping are available from our VAT team at the address below.
We charge a processing fee of £35.00 per invoice to check shipping/export documents. We will waive this processing fee if you appoint Christie's Shipping Department to arrange your export/shipping.
5. If you appoint Christie's Art Transport or one of our authorised shippers to arrange your export/shipping we will issue you with an export invoice with the applicable VAT or duties cancelled as outlined above. If you later cancel or change the shipment in a manner that infringes the rules outlined above we will issue a revised invoice charging you all applicable taxes/charges.
6. If you ask us to re-invoice you under normal UK VAT rules (as if the **lot** had been sold with a † symbol) instead of under the Margin Scheme the **lot** may become ineligible to be resold using the Margin Schemes. You should take professional advice if you are unsure how this may affect you.
7. All reinvoicing requests must be received within four years from the date of sale.

If you have any questions about VAT refunds please contact Christie's Client Services on info@christies.com
Tel: +44 (0)20 7389 2886.
Fax: +44 (0)20 7839 1611.

SYMBOLS USED IN THIS CATALOGUE

The meaning of words coloured in **bold** in this section can be found at the end of the section of the catalogue headed 'Conditions of Sale'.

°
Christie's has a direct financial interest in the **lot**. See Important Notices and Explanation of Cataloguing Practice.

Δ
Owned by Christie's or another **Christie's Group** company in whole or part. See Important Notices and Explanation of Cataloguing Practice.

♦
Christie's has a direct financial interest in the **lot** and has funded all or part of our interest with the help of someone else. See Important Notices and Explanation of Cataloguing Practice.

λ
Artist's Resale Right. See Section D3 of the Conditions of Sale.

•
Lot offered without **reserve** which will be sold to the highest bidder regardless of the pre-sale estimate in the catalogue.

~
Lot incorporates material from endangered species which could result in export restrictions. See Section H2(b) of the Conditions of Sale.

ψ
Lot containing jadeite and rubies from Burma or of indeterminate origin. See Section H2(d) of the Conditions of Sale.

?, ⋆, Ω, α, #, ‡
See VAT Symbols and Explanation.

■
See Storage and Collection Pages on South Kensington sales only.

Please note that **lots** are marked as a convenience to you and we shall not be liable for any errors in, or failure to, mark a **lot**.

IMPORTANT NOTICES AND EXPLANATION OF CATALOGUING PRACTICE

CHRISTIE'S INTEREST IN PROPERTY CONSIGNED FOR AUCTION

Δ **Property Owned in part or in full by Christie's**
From time to time, Christie's may offer a **lot** which it owns in whole or in part. Such property is identified in the catalogue with the symbol Δ next to its **lot** number.

° **Minimum Price Guarantees**
On occasion, Christie's has a direct financial interest in the outcome of the sale of certain lots consigned for sale. This will usually be where it has guaranteed to the Seller that whatever the outcome of the auction, the Seller will receive a minimum sale price for the work. This is known as a minimum price guarantee. Where Christie's holds such financial interest we identify such **lots** with the symbol ° next to the **lot** number.

♦ **Third Party Guarantees/Irrevocable bids**
Where Christie's has provided a Minimum Price Guarantee it is at risk of making a loss, which can be significant, if the **lot** fails to sell. Christie's therefore sometimes chooses to share that risk with a third party. In such cases the third party agrees prior to the auction to place an irrevocable written bid on the **lot**. The third party is therefore committed to bidding on the **lot** and, even if there are no other bids, buying the **lot** at the level of the written bid unless there are any higher bids. In doing so, the third party takes on all or part of the risk of the **lot** not being sold. If the **lot** is not sold, the third party may incur a loss. **Lots** which are subject to a third party guarantee arrangement are identified in the catalogue with the symbol ♦.

The third party will be remunerated in exchange for accepting this risk based on a fixed fee if the third party is the successful bidder or on the final hammer price in the event that the third party is not the successful bidder. The third party may also bid for the **lot** above the written bid. Where it does so, and is the successful bidder, the fixed fee for taking on the guarantee risk may be netted against the final **purchase price**.

Third party guarantors are required by us to disclose to anyone they are advising their financial interest in any **lots** they are guaranteeing. However, for the avoidance of any doubt, if you are advised by or bidding through an agent on a **lot** identified as being subject to a third party guarantee you should always ask your agent to confirm whether or not he or she has a financial interest in relation to the **lot**.

Other Arrangements
Christie's may enter into other arrangements not involving bids. These include arrangements where Christie's has given the Seller an Advance on the proceeds of sale of the **lot** or where Christie's has shared the risk of a guarantee with a partner without the partner being required to place an irrevocable written bid or otherwise participating in the bidding on the **lot**. Because such arrangements are unrelated to the bidding process they are not marked with a symbol in the catalogue.

Bidding by parties with an interest
In any case where a party has a financial interest in a **lot** and intends to bid on it we will make a saleroom announcement to ensure that all bidders are aware of this. Such financial interests can include where beneficiaries of an Estate have reserved the right to bid on a **lot** consigned by the Estate or where a partner in a risk-sharing arrangement has reserved the right to bid on a **lot** and/or notified us of their intention to bid.

Please see http://www.christies.com/ financial-interest/ for a more detailed explanation of minimum price guarantees and third party financing arrangements.

Where Christie's has an ownership or financial interest in every lot in the catalogue, Christie's will not designate each lot with a symbol, but will state its interest in the front of the catalogue.

POST 1950 FURNITURE

All items of post-1950 furniture included in this sale are items either not originally supplied for use in a private home or now offered solely as works of art. These items may not comply with the provisions of the Furniture and Furnishings (Fire) (Safety) Regulations 1988 (as amended in 1989 and 1993, the 'Regulations'). Accordingly, these items should not be used as furniture in your home in their current condition. If you do intend to use such items for this purpose, you must first ensure that they are reupholstered, restuffed and/or recovered (as appropriate) in order that they comply with the provisions of the Regulations.

STORAGE AND COLLECTION

STORAGE & COLLECTION CHARGES

Specified lots, marked with a filled square (■) not cleared from Christie's by 5.00 pm on the day of the sale and all sold and unsold lots not cleared from Christie's by 5.00 pm on the fifth Friday following the sale will be removed to the warehouse of:
Cadogan Tate Ltd
241 Acton Lane, Park Royal
London NW10 7NP
Telephone: +44 (0)800 988 6100
Email: collections@cadogantate.com
Lots will be available for collection on the first full business week after transfer to Cadogan Tate Ltd and every business weekday from 9.00 am to 5.00 pm.

Property, once paid, can be released to **Christie's Fine Art Storage Services (CFASS)** in London, New York or Singapore FreePort at any time for environmentally controlled long term storage, per client request. CFASS is a separate subsidiary of Christie's and clients enjoy complete confidentiality. Visit www.cfass.com, or contact london@cfass.com. Telephone: +44 (0)20 7622 0609 for details.

TRANSFER, STORAGE & RELATED CHARGES (PER LOT)

CHARGES	Furniture/ Large Objects	Pictures/ Small Objects
Transfer/Admin	£42.00	£21.00
Storage per day	£5.25	£2.65
Extended Liability Charge:	The lower amount of 0.6% of Hammer Price or 100% of the above charges	

All charges are subject to VAT. Very large or heavy items may be subject to a surcharge.

Please note that there will be no charge to purchasers who collect their lots within two weeks of this sale.

COLLECTION & PAYMENT OF ANY CHARGES DUE

Lots will be available for collection from
Cadogan Tate Ltd
241 Acton Lane, Park Royal
London NW10 7NP
Telephone: +44 (0)800 988 6100
Email: collections@cadogantate.com
on every business day after the day of transfer, from 9.00 am until 5.00 pm.
Lots may only be released by Cadogan Tate upon
a) production of the 'Collection Order' obtained from the cashier's office at Christie's, 85 Old Brompton Road, London SW7 or Christie's, 8 King Street, London SW1
b) payment of any charges that may be due to Cadogan Tate Ltd
To assist Cadogan Tate to provide a swift release please telephone on the business day prior to collection to ensure that Lots are available and to ascertain any charges due. If sending a carrier please ensure that they are provided with all necessary information, your written authority to collect, the Collection Order and the means to settle any charges.

COLLECTION FROM CADOGAN TATE

Please note that Cadogan Tate Ltd's opening hours are Monday to Friday 9.00 am to 5.00 pm, and purchases transferred to their warehouse are not available for collection at weekends.

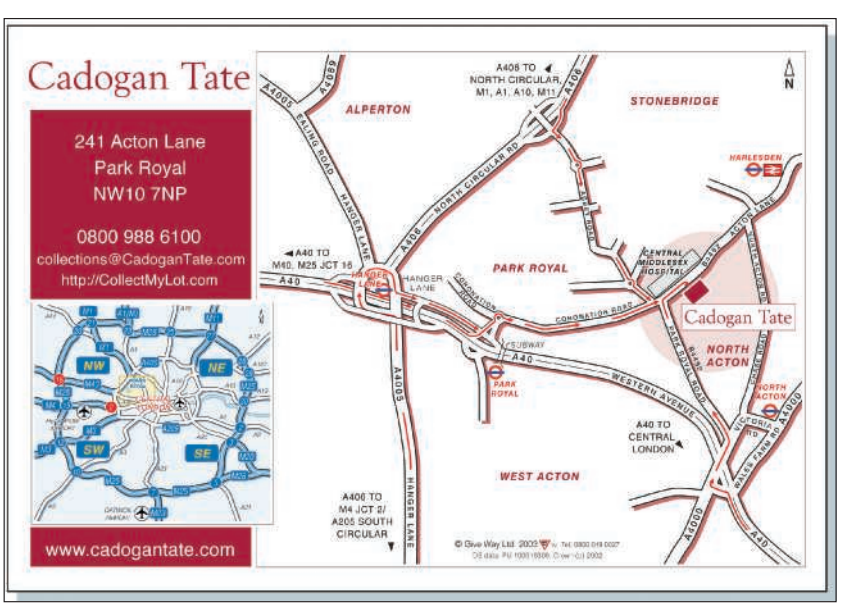
SHIPPING AND DELIVERY

Christie's Art Transport can organise local deliveries or international freight. Please contact them on +44 (0) 20 7389 2712 or arttransport_london@christies.com.
To ensure that arrangements for the transport of your lot can be finalised before the expiry of any free storage period, please contact Christie's Art Transport for a quote as soon as possible after the sale. As storage is provided by a third party, storage fees incurred while transport arrangements are being finalised cannot be waived.

EXTENDED LIABILITY CHARGES

All services provided by Cadogan Tate Ltd ("Cadogan Tate") will be subject to their standard Conditions of Business, copies of which are available at Christie's South Kensington.
Please note in particular that Cadogan Tate
• does not accept any liability for damage or loss, due to its negligence or otherwise, exceeding the Hammer Price of a Lot plus associated Buyer's Premium, or, at its sole option, the cost of repairing or replacing the damaged or missing Lot and
• it reserves a lien over all goods in its possession for payment of storage and all other charges due to it and
• it automatically arranges on behalf of the Lot's owner and at the owner's cost, insurance of the Lot for the sum of the Hammer price plus Buyer's Premium. The Extended Liability Charge covers the Lot from the time of collection from the saleroom until release of the Lot to the owner or the owner's agent. The Extended Liability Charge payable by the owner of the Lot is 0.6% of the sum of the Hammer Price and Buyer's Premium or 100% of the transfer and storage charges, whichever is the smaller. This Extended Liability will not be arranged and no charge will be payable only on receipt by Cadogan Tate of advance written notice from the owner of the lot together with formal waiver of subrogation from the owners insurers.

Christie's Fine Art Storage Services (CFASS) also offers storage solutions for fine art, antiques and collectibles in New York and Singapore FreePort. CFASS is a separate subsidiary of Christie's and clients enjoy complete confidentiality.
Visit www.cfass.com for charges and other details.



CADOGAN TATE LTD'S WAREHOUSE
241 Acton Lane,
Park Royal,
London NW10 7NP
Telephone: +44 (0)800 988 6100
Email: collections@cadogantate.com

24/07/15

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UK£5,000 to UK£10,000	by UK£500s
UK£10,000 to UK£20,000	by UK£1,000s
UK£20,000 to UK£30,000	by UK£2,000s
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