Featured Monthly Articles

Accretion Desk by Martin Horejsi
Jim’s Fragments by Jim Tobin
Meteorite Market Trends by Michael Blood
Bob’s Findings by Robert Verish
IMCA Insights by The IMCA Team
Micro Visions by John Kashuba
Galactic Lore by Mike Gilmer
Meteorite Calendar by Anne Black
Meteorite of the Month by Michael Johnson
Tektite of the Month by Editor

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An January 1946 Witnessed Fall: Krymka, Ukraine

**The Chondrite That Keeps on Giving**

Stretch your imagination and pretend the surface of Krymka is the view outside your spaceship as you jump to hyperdrive while cruising the early solar system.

Let’s be honest, usually when we talk about a meteorite being gorgeous, beautiful, amazing, stunning, or magnificent, the average person might not be able to tell it from one we describe as ugly, hideous, or gruesome. But in the case of Krymka, even the casual observer is impressed with the look to the point of using their own words like gorgeous, beautiful, amazing, stunning, and magnificent.

Krymka fell to earth as an LL3.1 chondrite on January 21, 1946, but as our meteorite classification scheme matured thanks to Grossman and Brearley (2005), today we refer to Krymka as an LL3.2.
Like any good Mensa brain teaser if I asked you to make a quick guess as to how many chondrules are in this picture, likely you would likely feel somewhere between disappointed and embarrassed with the answer.

The moment you start counting, the more the chondrules you see. If you use a magnifying glass it only gets worse (or better as I look at it).

A number of years ago, a slice of Krymka blipped my shopping radar and I jumped on the chance to add a slice to my collection. Arriving in my postbox was a absolutely gorgeous crusted complete slice with more chondrule density, definition, and diversity than I have ever owned in the form of a witnessed fall. I do have to qualify the statement as “owned” and not “seen” because I once spent some time with Semarkona in the meteorite lab at the Smithsonian. Semarkona is the world’s only LL3.00 and looks it!

Oddly, the fall of Krymka is reported to have been a shower of 25kg that was recovered soon after it arrived, and another 25kg was recovered at a later date. What’s odd about that you might ask? Well, nothing except the Catalogue of Meteorites reports only about 13kg is accounted for world wide. How could you misplace 39kg of meteorite this amazing.
The meteorite collecting vernacular contains many words that positively or negatively describe specimens. In the case of my slice of Krymka some of the positive words included complete slice, crust, LL3.x, witnessed fall, over half a century old, polished faces, high surface to weight ratio, collection documentation, and parallel cut surfaces.

This is what I consider the reverse face of my slice.


TEM studies and the shock history of a “mysterite” inclusion from the Krymka LL chondrite

Krymka is characterized by the occurrence of a high modal abundance of xenolithic clasts (Semenenko and Girich 2001; Semenenko et al. 2001). These fine-grained foreign inclusions are dominated by carbonaceous clasts, which are of extraordinary scientific interest.

This very rare, fine-grained, dark material has so far been discovered only in two meteorites, Krymka (LL3.1) and Supuhee (H6). Laul et al. (1973) detected an enrichment of Ag, Tl, and Bi in these two ordinary chondrites. They concluded that this enrichment has its origin in an admixture of a phase rich in these elements in a late condensate introduced during a brecciation event. Since the petrographic carrier of the volatiles could not be specified, they named this material “mysterite.”

The mineralogical, chemical, and isotopic features, as well as the nature of the graphite and other minerals, were investigated to obtain information on their mineral associations with the aim of finding conclusive evidence concerning the origin of mysterite, a material that had already been associated with comets. The results of these combined investigations allow the following conclusions: the xenolith formation is a result of the accretion of heterogeneous components in a region depleted in chondrules. After this process, which was followed by lithification and a probable collisional fragmentation of a primary carbonaceous body, this xenolith and some others (Semenenko et al. 2005) were covered with extremely fine-grained silicate dust. Together with the main Krymka constituents, the xenoliths were accreted in the Krymka parent body.

The detailed TEM study of the Krymka carbonaceous xenolith K1 plainly indicates that a thermal and shock metamorphism must have taken place, either on a primary body of the xenolith or on the Krymka parent body itself.
Wikipedia provided the following explanation:

“Chondrules formed as molten or partially molten droplets in space before being accreted to their parent asteroids. Because chondrites represent the oldest solid material within our solar system and are believed to be the building blocks of the planetary system, it follows that an understanding of the formation of chondrules is important to understand the initial development of the planetary system.”

To me, when applying the above words to Krymka, my slice becomes a nursery of infant planets that, like baby dinosaurs preserved in the fossil record, never reached their potential growing to adult planets in our solar system.

Nittler, Alexander, Stadermann & Zinner observed in their article titled:

Presolar Al-, Ca-, And Ti-Rich Oxide Grains In The Krymka Meteorite.

Although a large number of presolar Al2O3 and MgAl2O4 grains have now been studied, only a handful of presolar hibonite (CaAl12O19) grains and a single presolar TiO2 grain have been previously reported. We report the identification and detailed isotopic characteristics of 46 presolar oxides from a new residue of the Krymka unequilibrated ordinary chondrite (LL3.1), including 15 Hibonites and 2 TiO2 grains.
The crust on Krymka, while as exciting and desirable as any other crust on a witnessed fall, but what I find truly amazing to see is the delicate boundary between the crust and the chondrules.

Look closely at how the chondrules brush up against the protective crust like a bag full of marbles.

As we begin a new year for the Accretion Desk, I would like to personally thank my readers. The emailed comments are fun to read. I know there is a small but growing number of collectors who specialize in historic meteorites, witnessed falls, or like me, prefer both. Thanks for reading!

Until next time…

The Accretion Desk welcomes all comments and feedback. accretiondesk@gmail.com

Please Share and Enjoy:
As I think about the Tucson Gem Show coming soon, I am trying to put together my short list of meteorites. Ones I would be interested in if I see them there. It has become increasingly apparent to me lately that I have made some real tactical errors over the years. Also I have never learned from my mistakes. This is kind of strange since I spent my childhood being dragged by my parents to antique and junk stores with the phrase “strike while the iron is hot” always in my ears. I have missed over the years of my meteorite collecting some great opportunities.

I don’t know in each case now what I was thinking back then, but it cost me some meteorites that I now look for and hardly ever see available. Some times I know I was thinking; “there is a lot of it and I can wait until Tucson to get it”. And sometimes that has been true, but on other occasions I just missed out. I know that times it was a matter of cost. I just could not bring myself to pay that much for it from a dealer that had just a few stones. I thought certainly there must be someone with more who is asking less money. Sometimes there just was no more available.

Since I have a slightly directionless collection. There are a lot of reasons for me to like a meteorite and want to get it. A person collecting only falls would have a different set of criteria. Someone collecting only visually striking irons has a very different set of decision making thoughts. I have never had a sharp focus like either of those in my collecting. But, the last few years I have been interested in acquiring the new falls as they make it to the marketplace. I have a couple new falls to decide about now. Once again the “do I buy it now or wait?” and, “is this a good price or will more be available later with greater choice and lower price?” questions ring in my mind.

I missed one a couple decades ago, and have been looking for an individual of that fall for years now. It seems like every time one comes on the market I am about two hours late inquiring about it. I remember this fall very well. There were a large number of stones and I was doing some work for a dealer who had some of them. I cut some meteorites for him and did some other projects for him. I got paid in trade. I recall several times when I was choosing meteorites from his inventory that I passed this particular fall by. Boy have I been kicking myself lately for that. I just knew in my heart that they would still be around later after I got others first. Well, they were not available later. So that fall remains ever on my short list year by year at Tucson. My eye always scanning the internet for the name.

Though I still do miss some by thinking too much. I have also gotten some lately; so maybe I am learning slowly. Perhaps the words of my parents are finally getting through to me. I struck really fast on Moss getting two nice pieces. And as it turned out there is very little. I did OK on Carancas getting a nice piece and a lot of fragments. I struck early and continuously on Juanchung and now have some wonderful pieces of that fall. I got them at a range of prices. All real bargains by today’s market.

I guess in a couple weeks I will see what happens with the opportunities this Tucson presents me. Will I over think or bite the bullet and spend the money? Will I risk it and hunt diligently for a bargain, or just seize the chance when I find one of the meteorites on my list? The worst of all things that happens is to see one right as you get to the show and say “I am going to look around a while and I’ll come back if I don’t see it somewhere else.” Then when you don’t see it, return to find the original has been sold to someone else. Were they wiser or had they just been at the show longer?

This is what makes collecting of anything fun. The hunter is still in there, inside us. We no longer get up in the morning with bow or spear and head out to find food or to fight. But, in us is that spirit to conquer something. It may have been reduced to the conquest of the mall for clothes or the gem show for meteorites. But, I think it is partly what keeps online auctions sites alive. The “I GOT IT” feeling. So next month I will give my yearly report of Tucson. Feel free to read in between the
lines a few caveman expressions of a successful hunt. For I guarantee if this year is like most I will be just as happy about what I come home with, as our distant ancestor was about getting his elk or deer for dinner.

I hope to see and greet many of you at the show, and I wish you all a successful and prosperous year of collecting. Until next month. Jim

Please Share and Enjoy:
Meteorite Times Magazine

Meteorite Market Trends
by Michael Blood

This Month's Meteorite Market Trends

by Michael Blood

Please Share and Enjoy:
Could this meteorite that was found on December 31st (18:50 GMT) be the very last find for the year 2009?

The weather forecast for the Sonoran Desert looked perfect and my schedule was free for the last few remaining days of 2009. So I arranged a trip out to the desert and invited some of my friends. My long-time rockhounding partner, James LaBarbera, accepted my invitation. After he drove down from Los Angeles, we transferred his gear into my truck and we headed east towards the Colorado River. And after getting supplies in Yuma AZ, it wasn't long until we were in the middle of “nowhere”.

Because of the condition of the dirt roads it would still take 3 more hours of slow driving through a maze of BLM-approved ATV trails until we arrived at the desired spot that I “pre-selected” from study of satellite imagery of the area. Through some strange quirk in cell phone coverage, I am able to track our location on my Blackberry, otherwise this portion of the trip could have easily taken twice as long.
Other than cholla and ocotillo, there is very little vegetation at this locality.

No meteorites were recovered on the first day, but because most of the day was spent just getting to this “pre-chosen” locality, we decide to return directly to this spot to resume searching the next day.

Just discernable in the middle of the above image (and off into the distance) stands a meteorite hunter, giving some sense of scale to the daunting task of searching for meteorites at his locality.

We got a late start, but we eventually found our way back to the same spot from the previous day where I had a “very good feeling” about the surface we were searching. I was a little disappointed to see so many ATV tracks on such a nice surface, but something told me to stop and park the truck immediately. I actually parked just next to a well-used ATV trail. Although having cell phone reception was a god-send for helping us locate this spot, it also made us vulnerable to
distracting phone calls. Which was exactly what happened while I was parking the truck: James got a phone call on his cell phone.

Not sure why, but without grabbing any of his gear, James decided to get out of the truck in order to take his phone call. Figuring that James wanted some privacy as he walked around the truck talking on his cell phone, I stayed inside the truck and took my time gearing-up for the morning hike.

It wasn’t very long until I heard a tapping sound on the front passenger side window. It was James, still talking on his cell phone, but he was smiling and pointing straight down, which I immediately knew was the “international sign” for “you just parked next to a meteorite – AGAIN!”

The reason I say “again” is because this has happened more than just a couple times in the past. In fact, this happens often enough that we now measure the distance from the truck to the find, and in this case, it was only the 3rd shortest distance! I insist that there is no way, statistically speaking, to explain this phenomenon.

There’s another version of the phenomenon that is well-known to meteorite-hunters, in which you hike all day but find nothing, only to return to your vehicle and then find a meteorite lying next to it. So, I’m not complaining. I’d rather have the meteorite found immediately, as opposed to finding it only after hiking all day.

Of course, we hiked all day and didn’t find another meteorite.

Somewhere in the above image there lies (at least) one meteorite. Hint: follow the fresh ATV track along the left side of this image.

Instead of repeating what I wrote in one of my earlier articles about my method of taking “in-situ” images, I’ll just redirect you to my May 2004 article. You can do so by “clicking” on this link below:
Taking Pictures of Meteorites In-Situ – Images of “in-place” meteorites – as they were found on the ground.

The image above is a close-up of the previous image.

Above is another in-situ image of the meteorite and the find location. Hint: see the next image.
The above image is a close-up of the previous image.

The above image is an in-situ view rotated 180 degrees from the previous image, now looking back into the direction of the sun, producing a strong reflection of sunlight.
The above image is a close-up of the previous image. Notice that James is still talking on his cell phone while searching for more meteorites.

The typical close-up view of most "in-situ meteorite" images.
The above image is a different version of the "typical close-up view of most in-situ images". I like to take this shot after having extracted the just found meteorite, flipping it over and laying it up-side-down next to its former resting place. This kind of shot gives us unique "once only" information that we can never "go back in time" to obtain. Notice that the scale cube has the "B" on top.
After taking the obligatory suite of in-situ images I like to take a couple images of the immediate area around the find location, and at the same time use this as an opportunity to take another image of the "just-plucked" meteorite.

The above two images are different in that they are taken with different lens settings. The former was taken in macro mode and the
latter was set to infinity. Most photographers strive to keep their shadow outside of the field-of-view of their shot, but in these two images, my shadow is intentionally included.

Although this stony was mildly attracted to a magnet, it did not produce any response on my White’s VSat Goldmaster metal-detector (unfortunately).

The above image depicts the 2009-12-31 meteorite find after it has been cleaned in warm distilled water, removing any sand or clay from its exterior. Now that this specimen has been "cleaned" it can be weighed. Its mass is 21.3 grams.
The above image depicts the "bottom-side" of this post-cleaned (but pre-cut) 2009-12-31 meteorite find.

Since the above images were taken this specimen has been cut. A 6.7 gram sample has been extracted, from which a thin-section will be made and the remaining mass will be submitted as a type specimen.

Preliminary examination suggests that this stony is an equilibrated L-chondrite.

Moni Waiblinger and James LaBarbera later that same day (New Years Eve) at the Barona Casino.

We made our solitary find on New Years Eve 2009. At this time of year sunset comes early. And even before sunset, the shadows get long early and get in the way of trying to spot small dark stones on a gravel surface. So, we departed early, giving us plenty of time to travel back to San Diego and meet for dinner with Moni Waiblinger. We decided on a popular buffet at a gaming casino on a small indian reservation called “Barona”. The chefs there put together a special New Years Eve Dinner. Unlike other buffets, here you can reserve your spot and not have to wait in a long line. Of course, this allows the patrons to go off and gamble some more, but James continued with his good luck by winning $400! Using the same slot machine, Moni and I won enough to pay for our meal. The King Crab legs were one of many highlights of the dinner.

Over dinner we discussed our recent trip and wondered whether our find was the last one made for year 2009, and whether it was the last meteorite found for this past decade (if you count year 2000 as the beginning of the past decade). We reflected on the past 10 years, and speculated on what the next 10 years would bring. The buffet closed and we moved the party out into the casino.
The author with James inside the Barona Casino toasting the New Year with free glasses of champagne. (Image by Moni.)

The Barona Casino made a special effort for this New Years Party by having a variety of venues for entertainment. Well before midnight they started dispensing the free champagne. Then finally a multitude of colorful balloons fell from the rafters. Happy New Year everyone!

As evidenced by the poor quality of the above image, all of the free champagne has degraded my ability to take a decent picture. But we had a lot to celebrate that night.

What a way to end the year. We can only hope that the new year (and the coming decade) will be as forthcoming with new meteorite finds and falls!
References:

Bob's Findings – article titled, Taking Pictures of Meteorites – In-Situ Images of “in-place” meteorites – as they were found on the ground”, in Meteorite-Times.com – May 2004.

Link to the website with the latest issue of:
MAPS Vol. 44 Supplement 2009 July

My previous articles can be found *HERE*

For for more information, please contact me by email:

*Bolide* chaser

Please Share and Enjoy:
Irons from Space Pictures of the Day
by Dave Gheesling

After a recent business trip to neighboring South Carolina, I was fortunate enough to catch Michael Johnson during a free moment and get a personal tour of his spectacular meteorite collection. Michael is probably best known by all of us in the meteorite community for his terrific Rocks from Space Picture of the Day (aka RFSPOD) postings through his website, www.spacerocksinc.org. But it is Michael's aesthetic iron meteorite collection that is the real show stopper!

Michael Johnson with eight stunning iron meteorite specimens (six Sikhote-Alins and two Gibeons) (Photo courtesy of Dave Gheesling)
A closer look at these specimens, sitting atop custom-made pillars like Easter Island statues in their heyday! (Picture courtesy of Dave Gheesling)

A ground zero view of this 10+ kilogram specimen, featuring fresh fusion veneer, against a backdrop of P. J. Medvedev's historic portrait of February 12, 1947 (Picture
The smiling curator juxtaposed against yet another row of meteorite-topped pillars (Photo courtesy of Dave Gheesling)

It's hard to pick just one, but this ~5 kilogram natural sculpture has to be one of my personal favorites (Photo courtesy of Dave Gheesling)
It's not all about irons for Michael, as these beautiful, fresh stones from the Bassikounou, Allende and Chergach witnessed falls attest (and the huge etched Sikhote-Alin slice shows the coarsest octahedrite structure like none other I've seen). (Photo courtesy of Dave Gheesling)

My shirt was red when I arrived at Michael's house, but had turned green with envy by departure ;-) (Photo courtesy of Dave Gheesling)

Thanks again Michael for your southern hospitality and the front row view of your wonderful meteorite collection!

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Chuck,

Let me point out another place to see good thin section pictures. Jeff Hodges has a great collection of slides and a very good microscope. He loans thin sections to Tom Phillips (we talked about Tom last time), particularly polished sections (no glass cover slip) that Tom really likes working with. Jeff’s evolving site is:

http://meteoritethinsectiongallery.com/index.html

I just got a thin section with a large variety of features. It is from a slice of NWA 4560 LL3.2. Take a look.

- John
This is the slice the slide was made from, front and back. I don’t think any of either of the two obvious inclusions became part of this particular slide.

Just for laughs, here is a different slice of this same find. Pretty wild. Its grade of 3.2 tells us it didn’t get a lot of heating back on its home asteroid. But obviously it’s seen some mechanical pushing and shoving.
This radial pyroxene chondrule has been cratered and there is alteration around the edge. Roger Warin and I have an article on cratered chondrules in the November 2009 issue of Meteorite magazine. I hope you are a subscriber. We have pictures and we touch on a few theories of how they came to be.

This fragment of a RP chondrule was separated after alteration took place.
Similar story, lots of aqueous alteration bleached the outside part of a RP chondrule before it broke and a fragment ended up here.

Let’s have a vocabulary review: Euhedral crystals are well-formed with sharp, easily-recognized faces. Anhedral crystals lack sharp, recognizable crystal faces. Subhedral – neither fish nor fowl.
Here is a contrast in textures, fine granular olivine on the left and coarse pyroxene on the right.

Okay. Nice Barred olivine chondrule with a thin rim, but what’s happening there on the bottom?
Ah. Here it is in incident light. Like we suspected, that black is a big bleb of metal. And that other business around it looks to be material accreted after the BO chondrule formed.

Hmmm. Cryptocrystalline interior and some well crystallized portions on the outside?
A dusky interior. Maybe a relict grain – a crystal fragment that did not (re)melt when this chondrule formed?

This dark amorphous inclusion is 6 mm long. The metal has been melted but the mineral fragments are angular.
Finally, another set of contrasting textures including a pair of wispy, poorly crystallized fans and a couple variations on the barred olivine theme.

Please Share and Enjoy:
# Meteorite Calendar – January 2010

by Anne Black

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<thead>
<tr>
<th>METEORITE FALLS CALENDAR</th>
<th>JANUARY</th>
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<tr>
<td>These meteorites fell in January but the exact dates are unknown.</td>
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<td>1844 Coima</td>
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<td>1869 Hessle</td>
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<td>1985 La Cidella</td>
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<td>1949 Gudder</td>
<td>1960 Soleria</td>
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<td>1996 Tshibua</td>
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<td>1938 Lavrentievka</td>
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<td>1919 Ayala Blanca</td>
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<td>1995 Gabié</td>
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<td>1949 Bepton</td>
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<td>1966 Senni</td>
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<td>1836 Marsombes</td>
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<td>1879 La Baccato</td>
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<td>1933 Dyurt Island</td>
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<td>1977 Louisville</td>
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<td>1991 Campos Sales</td>
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NWA 2481 Eucrite Meteorite

by Editor

7.0 gram slice with 13.8 gram magnificent Tungsten Carbide Scale Cube by Jeff Kuyken of Meteorites Australia
Get your own scale cube from Jeff at www.scalecubes.com

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Meteorite-Times Magazine

Interesting Odd Shaped Rizalites Tektites

by Editor

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Once a few decades ago this opening was a framed window in the wall of H. H. Nininger's Home and Museum building. From this window he must have many times pondered the mysteries of Meteor Crater seen in the distance.

Photo by © 2010 James Tobin