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Jerome was first found in 1954. A single 6.8kg stone was recovered from a plowed field in Jerome county, Idaho. While interesting in that it’s a meteorite, Jerome lacked even the most basic dignity of a complete classification. But for now, we’ll just have to settle for Jerome, L chondrite.
When I lived in Idaho, I visited Jerome often. Just north of Twin Falls in South-central Idaho. About as eventful as any small town in Idaho, but being the home of Idaho’s first, and for 30 years only stone meteorite.
The main mass of Jerome resides in my collection. As it sits right now, the single largest piece of Jerome is a hair more than 4kg, still over half of the original stone.
While not much of a looker, Jerome does hold a special place in Idaho’s history, and in the part of Idaho in my heart from living there a dozen years, and where my kids were born. Now that I’m living under the Big Sky, the Twodot, Montana stone meteorite is important to me. But for a brief portion of my life, Jerome was my quest. Later, I added Wilder, Idaho to mix rounding out all the stone meteorites found in Montana and Idaho, a chunk of land almost 231,000 square miles, or 60 million hectares!
Until next time…
Well, you can guess that title is not referring to the lettuce that was forgotten in the refrigerator. Meteorites also do not always make it to fifty thousand years before completely falling apart and dissolving into the dirt. But, many desert falls do make it to that age or even longer. I had the process of weathering dramatically displayed for me recently.

I had done some redesigning on my saw and was testing it out on a meteorite from a box of mixed unclassified stones. I picked one at random but also because it was a space potato, nothing special no thumbprints no remaining fusion crust. I had no idea what I would find on the inside when it was cut. No clues were to be seen on the exterior. Sometimes chondrules can be seen or metal will show as a shiny spot. This stone gave me nothing to guess from and the old surface even concealed what might have once shown on the small broken area.

I attached it to a mandrel and set the saw to cut off about a third of the length. I could tell immediately that I had a stone with metal. It cut slowly and the blade slowed down badly if I feed it into the saw too fast. It took a few minutes but I had the first cut made. And the stone was very rich in metal. It had the look of a classic H chondrite. It had a uniform and dense scattering of metal grains with none of the grains being large in size. There were easy to see chondrules in the moderately darkened groundmass. This was an old stone but in pretty good shape. I would guess that better than 90% of its original metal was still there. I cut several more slices and then removed the remainder from the saw.

This is the view of the surface of the old but not too bad probable H that I found in the mixed box of unclassified meteorites.
Here is a close up of the not too old meteorite showing some nice chondrules and the metal.

I still needed to see how the saw was going to work on a few different types of material. So I went on a quest to find another meteorite to try. I was hoping I would choose an L type so I could see how the feed would run when going faster through the rock. I had been storing this great enormous really old meteorite for a few years and it had never been cut by me. It had a small corner hacked off by the individual that sold it to us. There was almost no metal showing on that cut spot. The stone was badly weathered and broken into two large halves each ready to break further with no difficulty. I took one of the halves and broke a fragment off where a crack was and mounted piece that for cutting.

I expected to progress fast through this rock since it looked to have little metal. As it turned out it too had some metal down inside. And the rock was unusually hard so progress was about what it had been with the previous metal rich stone. After the first cut on this really old stone I got to see that it had the remains of classic H chondrite metal distribution. But this time it was spotty and about 60% of the metal had rusted out of the stone. Yet in patches it was very much like a fresher H chondrite. The groundmass of this old stone was dark even black in spots. Yet chondrules were visible and actually easy to see in the stone when using a camera to view it magnified. The chondrules were nice and distinct but not pristine my guess was this was an H4 or H5. All the iron that had gone into the ground mass seemed to have made it very hard. It took a great polish and though dark in color was attractive. Some of the smaller pieces of this old stone that fall apart during cutting will find their way to becoming cabochons I think.
This shot is set to show the metal of an area but it also shows the veins of hematite or magnetite that are now running through the stone.
Here is a full slice of Tamdakht tilted to the camera so that the metal will show the groundmass is actually a very nice fresh gray. Below are two closeup images of Tamdakht.

I still had not found that low metal or metal free stone to test on the saw but I did notice during my searching two chunks of Tamdakht that I had set aside to cut after redesigning the saw when it was cutting smoother. The saw was cutting beautifully so I attached the Tamdakht to mandrels and started cutting it. Tamdakht is an H chondrite also so that made three H chondrites in a row that I had picked to cut.

The Tamdakht cut just like the first space potato had. The metal made cutting slow. But all the cuts were perfect. I chose to make them all about 2 mm thick to get as many slices as I could from the two nice fragments we had. There was a patch of fusion crust on one of the fragments. I aligned that piece to make the best use of the fusion crust and get some on several slices. Since Tamdakht is a witnessed fall and our fragments were very fresh truly W0 state the slices had that wonderful uniform gray color. The gray disturbed only by the occasional white chondrules that stood out in stark contrast. As I cut the slices I dried them and plunged them in anhydrous alcohol for a nice soak to draw out the distilled water. Then I dried them off with a clean cloth to remove any residue of cutting before placing them in silica gel. I would go through that drying and cleaning process again when the slices were lapped smooth. The lapping was not much of a chore since the saw was working so smoothly. Just a touch with the 260 grit lap to get any burs sticking up at the final point of cutting when the slice falls free of the blade. Then a touch on the 1200 grit disk to make them pretty. Then I put them back in alcohol and silica gel. They were ready to go.
I had ended up in one day cutting H chondrites from as fresh as straight out of space to one that was ancient and falling apart with more that half the metal gone. I had cut one in between these two with nearly all its metal but a chocolate colored matrix. It may have been on Earth less than a few thousand years. I had seen a time lapse of meteorite weathering right there at my saw. Zero deterioration to quite terrestrialized in a couple hours of cutting.

I was still playing around with the saw the next day and picked another stone to cut. This stone was very unmeteorite looking. If I had put this stone up on one of the Facebook meteorite pages the audience would have surely said it was not a meteorite from the image. It was reddish in color and had nothing about its shape to give a clue that it was a space rock. As I put it in the saw I was thinking myself that even though it would attract a magnet strongly it looked like red hematite and was a meteor wrong mixed into a box of real meteorites. When the blade hit the stone and the mud that was made was really red I was even more sure it was going to not be a meteorite when I looked at the cut surface.

The end piece fell free of the blade and I looked at it and saw nothing immediately on the wet stone that looked meteorite like. I dried it off and took it outside into the sun. I could see some chondrules all stained brown and difficult to make out but they were there. Looking even more carefully I could see some extremely tiny remaining specks of metal that sparkled microscopically on the surface. But what was most interesting were the patches of black in the reddish brown matrix. The black patches were the shape of large metal grains that one would see in an L chondrite. Scattered around the cut surface were these black patches that I am guessing is likely magnetite the remains of metal grains. Some black spots had a hole eaten out of them like you would see in a stone that was weathered but still had metal.
For a moment I was doubtful if this was a meteorite but it has many nice chondrules even though they are a little hard to see in the dark red groundmass.

This was the most weathered chondrite I have ever cut. It was at that point that we read about in books. A meteorite where all the metal is gone and converted into byproducts and the ground mass is stained and converted to an iron mineral like stone. A meteorite with small pits or holes where the original metal rusted out partially but the rest became magnetite or hematite. I was starting to get a real education on weathered meteorites in just a couple days. This last stone I think most of us would have thrown away while hunting. Wrong color, wrong shape, red color upon grinding a spot would have said to me hematite. It would have been in the air again flying away from me as a poor excuse for a meteor wrong. But someone saved it. Likely because it was found in a place where other better looking meteorites not as burned out were being found.

How long have some of these stones we collect been around? There were some researchers years ago trying to answer that. I have not seen many results however. It is a difficult question tied closely to the climate of the place the meteorite falls and the way that climate has changed or stayed the same. I have no doubt the two most weathered I have described have been here for tens of thousands of years. I will have some new thoughts as I hunt for meteorites in the future. I may not toss away everyone of those stones that looks sort of right but has the wrong color and no visible iron. I almost threw away one years ago because of a poor field test. It turned out to be a meteorite after I got home. I have plenty of room in my yard for a rock pile of old reddish brown stones.

Til next time, enjoy
In all of my previous Bob’s Bulletins, I explained the meaning of the phrase “orphaned-meteorites from the USA”. I defined these “orphans” as being unwitnessed-fall Ordinary Chondrite (OC) meteorite “finds” that are recovered in the U.S., but that the finders of these meteorites have found great difficulty in getting their finds recorded, let alone accepted for classification.

Unfortunately, the vast majority of new U.S. finds are of this type. I went on to write that these “Unclassified U.S. finds” (UU) were being orphaned from the family of “approved” meteorites for the following reasons:

1) The lack of funding for U.S. researchers to authenticate, classify, and document/record these U.S. OC finds has resulted in several new [negative]; trends.

2) The increasing trend of commercializing the classifying of meteorites by U.S. researchers has priced U.S. OC finds out of the market, and

3) The increasing trend of U.S. researchers to turn away OC finds, even when finders of U.S. OC meteorites are willing to pay for their classification.

This month’s edition of the “Newsletter” focuses on just the most recent US finds that I have had the privilege to record. All of the images in this article are by me, but not all of the meteorites depicted were found by me. So, even though I took the in-situ image, it doesn’t mean that I found that meteorite. Although I am aware of, or have been informed about, many other recent U.S. finds, I am not privy to their recovery data, so they won’t appear here. And so, consider the meteorites depicted here to be just the tip of the
iceberg. And there lies the problem. There continues to be a large number of U.S. meteorites being found, and the list of those going unreported is growing longer.

This months finds, being relatively recent, haven’t gone under the blade of my rock-saw, let alone had a type-specimen or a thin-section prepared. So, for this month I will forego the “Petrographic Description” until some time later. And since nearly all of the specimens are moderately-weathered externally, I will also forego the “Macroscopic Description” until later, as well. I hope the reader will enjoy the image gallery.

The following “Bulletin” is just one example of an alternative way in which to record U.S. OC meteorite finds that are going unreported (because of a lack of funding to classify U.S. meteorites [but there is funding for Antarctic meteorites], which leads to a lack of interest in OC finds by U.S. researchers). It is my hope that this compilation will bring attention to the problem of the increasing number of meteorites found here in the USA, not only going unclassified, but also going unrecorded. Hopefully, some volunteers will offer to help establish an on-line database that will document these “orphans”.

Newsletter for Unclassified (a.k.a., Orphaned) Meteorites found in the USA – Volume 2 No. 2 — May 2016

Meteorite-Recovery Information Petrographic Descriptions

Due to the pace of recovery of recent meteorite finds, this edition of the Newsletter is going to forego (until a later time) the publishing of “Recovery Information” and Petrographic Descriptions” that usually appears here. For now, what will appear here will be a gallery of images of the finds (before they are cut) to include their in-situ photos.

Image Gallery of Recently Found Meteorites:
NV160404B NV160404A CA160326B and A, a.k.a. “Pam’s Meteorite” CA160324H CA160323G CA160323F CA160323E CA160323D CA160323C CA160323B CA160323A AZ160307C AZ160307B AZ160307A NV150407 NV141229B NV141229A SNV031203

Gallery of Unclassified USA (UU) “Orphaned” Meteorite Images —

NV160404B:
CA160326B and A — part of “Pam’s Meteorite”:
CA160323E:
SNV031203 – “Shadow Mountain”: 
The above “Bulletin” is just one example of a way in which to record U.S. OC meteorite finds. Hopefully, this compilation will bring attention to the problem of the increasing number of meteorites found here in the USA, not only going unclassified, but even going unreported. Hopefully, some volunteers will offer to help establish a database that will document these “orphans”.

In the meanwhile, I will do my part and continue to gather data, and along with others, make a list of what we know to be “orphaned meteorites”.

References:
Bob’s Bulletin – Vol. 1 No. 1 — In my first Bulletin, I introduced the phrase “orphaned-meteorites from the USA”. I defined these “orphans” as being unwitnessed-fall Ordinary Chondrite (OC) meteorite “finds” that are recovered in the U.S.

Unfortunately, the vast majority of U.S. finds are of this type. I went on to write that these U.S. finds were being orphaned from the family of “approved” meteorites for the following reasons:

1) The lack of funding for U.S. researchers to authenticate, classify, and document/record these U.S. OC finds has resulted in several new [negative] trends.

2) The increasing trend of commercializing the classifying of meteorites by U.S. researchers has priced U.S. OC finds out of the market, and

3) The increasing trend of U.S. researchers to turn away OC finds, even when finders of U.S. OC meteorites are willing to pay for their classification.

Bob’s Bulletin – Vol. 1 No. 2 — In my 2nd Bulletin, I went into more detail about why I use the phrase “orphaned-meteorites from the USA”. I focused on the lack of U.S.-tax-dollar-funding and why no funding was going towards the classification of these particular meteorites. In hindsight, I now realize that I should have pointed-out that there is also a lack of funding for just authenticating and recording that a U.S. meteorite has been found. This function should never be confused with “classifying” a meteorite, which is obviously way more labor intensive and costly.

Bob’s Bulletin – Vol. 1 No. 3 — In my 3rd Bulletin, I proposed the idea of an on-line database for these “orphaned” and other unclassified U.S. meteorites. This would have to be an all-volunteer effort, much in the same manner that the American Meteor Society has established the Fireball Reporting System. This database would give finders a central point to report their finds and have a field ID number issued to them. This “Field ID” would reflect which US state and date of find. The function of this database should not be confused with already established processes of getting a meteorite “classified”, which is obviously way more labor intensive and costly.

Bob’s Bulletin – Vol. 1 No. 4 — In my 4th Bulletin, I reported that several U.S. researchers were volunteering their time and effort to record and publish meteorite falls and finds, such as, Creston and Misfits Flat. I suggested that this method of cataloging newly found US meteorite specimens could be expanded, but the main hindrance is that there is no funding for this kind of effort.

Bob’s Bulletin – Vol. 2 No. 1 — In my 5th Bulletin, I published a table of all the unclassified finds from Coyote Dry Lake DCA that were reported prior to 2007.

Meteoritical Bulletin: the search results for all provisional meteorites found in “USA” – Published by Meteoritical Society – Meteoritical Bulletin, Database.

Meteorites of California the list of formally-recognized California meteorite falls and finds.

My previous Bob’s Bulletins can be found *HERE*

If you would like to sponsor any of these orphans, and help in the funding for getting them classified, in order to get them entered into the Meteoritical Bulletin Database, then please contact me by email: bolidechaser at yahoo-dot-com
Micro Visions Ribbons

John Kashuba

We’ve seen curtains of microscopic bubbles before in meteorite thin sections. Readers might remember some in Greg Hupé’s NWA 6704 ungrouped achondrite, third photo. Here are others in another ungrouped achondrite that are intriguing for a couple of reasons. They often occur in multiple parallel sheets and they are sometimes quite wavy like heavy drapery.

When viewing sections we should keep in mind that we are inspecting samples of a distinct thickness taken through material at unknown orientations to features therein. For example, a glancing slice through a barred olivine chondrule with a thick igneous rim (or through a hardboiled egg) might miss the bars (or yoke). Likewise, a section through the bars might show many thin or a few apparently wide bars depending on the angle of the cut.

A section cut from drapery will produce a ribbon. Here we see multiple ribbons side by side. In NWA 7835 the angle of cut through the bubble drapery combined with the transparency of the resultant ribbon sometimes gives the appearance of helixes, augers or screws. But this is just an illusion.

Still, there are questions. What’s in the “bubbles?” When and how do they form? Elsewhere in the mineral kingdom there are superficially similar features that are probably not related but they are fun to consider.

Actual helical inclusions occur in several minerals and from a number of locations. Some of these are beryl including aquamarine from Pakistan, heliodor from Tajikistan and emerald. Also, there is spodumene from Afghanistan, natrolite from Namibia and Canada, tourmaline from Madagascar and topaz. Their mode of formation is debated but a new, perhaps definitive study of the phenomenon is underway.

Sheets of fluid filled inclusions make up the milky thread that runs through faden quartz. These are usually said to be break-and-heal formation features under conditions unlike those an achondrite would encounter.

Are our curtains of bubbles partially healed defects? Why are they wavy? What forces were at work? Is there a clue in beryl? Most materials expand as they are heated and contract as they cool. Some do the reverse. Some do both – water contracts as it cools UNTIL it reaches about 4°C and its maximum density. Further cooling expands water. Some materials have a different coefficient of expansion in each crystal axis direction (anisotropic thermal expansion). Some materials are highly anisotropic in thermal expansion. When beryl is heated from 0°C to 300°C it expands in the a-axes directions but the c-axis direction contracts. Above 300°C it expands in all directions.

Our rippled ribbons probably don’t deserve a dedicated study but they are interesting to contemplate.
Ribbon-like inclusions in NWA 7835 ungrouped achondrite. Thin section in cross-polarized light.
Ribbon-like inclusions in NWA 7835 ungrouped achondrite. Thin section in oblique incident light.
Curtains of microscopic bubbles in Greg Hupé's NWA 6704 ungrouped achondrite. Thin section in oblique incident light. Field of view is 0.3mm wide.
Ribbons, sections of curtains, side by side. Only the top of each ribbon is in focus to better illustrate the depth, i.e. thickness in the thin section. NWA 7835 Ung achondrite. Thin sections in cross-polarized light. Field of view is 0.3mm wide.
Same as above with the full thickness of the thin section in focus.
Ribbon-like inclusions in NWA 7835 ungrouped achondrite. Thin section in cross-polarized light. Field of view is 0.3 mm wide.
Ribbon-like inclusions in NWA 7835 ungrouped achondrite. Thin section in cross-polarized light. Field of view is 0.2 mm wide.
Ribbon in which the size of the individual bubbles vary, increasing toward the upper right. NWA 7835 ungrouped achondrite. Thin section in cross-polarized light. Field of view is 0.3 mm wide.
Part slice of NWA 7835 harzburgitic ungrouped achondrite from which thin sections were made. 1.037 grams.
Thin section made from part of above part slice.

Ribbon-like inclusions can be seen in the large grain on the left. NWA 7835 ungrouped achondrite. Thin section in cross-polarized light. Field of view is 3 mm wide.
Beryl var. aquamarine – Marambaia, Minas Gerais, Brazil. The crystal is traversed by a helical dislocation sheet, typical but rare. Height: 25 cm. Photo Munich 2015, Roger Warin.
Faden quartz section taken at right angle to the length of the faden viewing several curtains of defects face-on through the depth of the section. Thick section (T~100um) in oblique incident light. Field of view is 0.53mm wide
Faden quartz section with faden length running left-right, curtains of defects viewed edge-on. Thick section (T~100um) in oblique incident light. Field of view is 0.44mm wide.
Faden quartz, Afghanistan. 51 mm long.
A Glass of Three Tales
Norm Lehrman

Trinitite. Edeowie glass. Daugistau glass (if you've ever heard of this last one, you are part of a very exclusive brotherhood indeed. This article may well be the first time this material has been discussed in any public venue). These three (there are others, but this is a tale of three glasses!) are all of quite remarkably similar character. They consist of relatively thin plates or spatters of glass rarely in excess of a few cm thick. On the basal surface they fused to the substrate sands or soils. On the top they are commonly glossy, sometimes with bulging, ropy, or plastic flow features, like miniature tongues of pahoehoe lava. In broken profile, all are similarly vesiculated.

But don't suppose that these similarities indicate similar genetic explanations. They all surely involved intense heat of some sort, but no single story works for all three.
Trinitite

We begin with the only one of the three glasses whose story we know with good clarity.

5:29 AM, July 16, 1945. “Fat Man” exploded atop a hundred-foot tower at the Trinity Site, Alamogordo, New Mexico, USA:

Exploding with the force of 38 million pounds of dynamite, a billowing fireball rocketed upwards atop a slender cauliflower-textured mushroom cloud, ringed with outward speeding shock-waves, and flashing with massive plasma bolts. For the most part, it vacuumed an 800 meter-wide crater deep into the bedrock of ground zero. The materials sucked into the sun-like temperatures of the fireball were quickly reduced to blobs of green glass, that tumbled about in the white-hot turbulent cloud until spattered out on the ground below as a glistening crust. The blobs fused onto the sand on which they splatted and bubbled slowly, so viscous that bubbles could form but not escape. On steeper surfaces, fingers ran a little, like a thick hot wax.

This is the one glass of the three that we understand with solid knowledge. It took an atomic bomb to make it. Pretty exotic, but nothing compared to the next story!

Edeowie Glass
Down under our planet, there is a region about 55 km long and 10 km wide running along the west side of the Flinders Range in South Australia, where discontinuous sheets of glass significantly thicker than Trinitite spot the face of the earth. Some have argued for lightning strike origins, others for some sort of aerial burst like a giant Tunguska. But I’m writing this story, so we’ll talk about my favorite theory: an antimatter bolide! With all the dark matter that astrophysicists see drifting around in space, it has been argued that there is a theoretical possibility of earth being struck by a mass of mirror matter. What would happen? As soon as the antimatter starts encountering atoms of matter on entry to our solar system, it would begin blazing a track of pure energy bursts released by annihilation. In the denser matter-packed lower atmosphere, annihilation would have spawned a searing flash of thermal energy.

Theoretically, one kilogram of matter reacting with one kilogram of antimatter could approach the energy released by the Tsar 27,000 kg bomb, the largest thermonuclear device ever detonated.

Do we have anything on earth that has the earmarks of an antimatter bolide impact? Some would say Edeowie Glass is the best fit. It wasn’t a nuclear blast, so despite its similarities to Trinitite, we need another explanation. Lightning strikes are perhaps the most widely accepted suggestion, but I don’t accept it. We have all sorts of fulgurites from all over the world, and I’m not aware of anything resembling Edeowie. As for a Tunguska-like thermal burst, the linear 55 X 10 km field of distribution doesn’t seem right.

The idea of an antimatter bolide streaking at a low angle across the sky as a bolt of scorching thermal energy is a mind-stretching violation of Occam’s Razor, but at least it’s a fun idea, and I don’t know of anything more plausible at this point, so Ockham may have to hold his breath a while longer.

It even gathers a bit of indirect support from the story of Daugistau glass, the final tale of our three glasses. Here, for the first time anywhere, we present a most peculiar story.

**Daugistau Glass**
We've seen what an atom bomb can do to the face of the earth. We've learned ways to harness that power, but it still has a devastating rebellious streak. We speculated on the character of possible products of an antimatter bolide colliding with earth or its atmosphere. Now, we will imagine the practical applications of matter/antimatter-fueled energy release.

This is a personal story. It began for me in 1992 in a Soviet-era uranium producing region so secret that it is not shown on maps of earlier vintage. When the doors of free enterprise first cracked open, I was sent to the Kyzyl Kum Desert of Uzbekistan, looking for gold. At a place called Daugistau, not far from one of the biggest gold deposits on earth, there was a Russian geological expedition village so old that very large trees were buckling the sidewalks by their root mass. I entered the office of the Chief Geologist of the expedition. By force of trained habit, my eyes scanned the shelves of his office for mementos of the most interesting things in the region. There was still a KGB presence that the locals euphemistically called “Department number one”, and a lot of nervousness on the part of our hosts as to what they could or could not reveal about strategic resources, so we learned to scrutinize museum collections and office shelves for clues regarding ore deposits that had not been described to us. In this case, one window sill held a sequence of glassy (trinitite-like!) objects. After formalities and business matters were concluded and the setting had become social, I asked about the glass, and was told the following story:

"During the cold war, this was a very secret place with a strong military presence. In the 1960’s, there was a period when there were many reported UFO sightings in the region. At the height of the excitement, some kids came running into the Daugistau expedition chief geologist’s office, breathlessly describing that they had seen some sort of aircraft land. Humanoid beings got out and collected rocks then got back in and took off. The kids took the geologist to the place, where they had seen the aircraft blast off, and he found there a glistening elliptical patch of glass about 20 meters long. At one end, the glass was up to 6 inches thick. It tapered off to a feather edge at the far end. Beyond that, there were scattered blobs of clinker glass strewn over the desert surface."

"We considered everything. The military said they had no role in its formation. Lightning was excluded. There was no elemental signature characteristic of some exotic source and no radioactivity. The children’s story is the only story we’ve got."

My piece is from the downstream apron of the ellipse, a gift from the Chief Geologist’s window sill collection. Although the locality was not far away, he was reluctant to take us there as he was upset by the way the odd feature had been vandalized by UFO buffs.

Discussion

I am imagining that if one were to ask a nuclear physicist: “What is the most extreme source of power we can imagine that has some degree of scientific plausibility?” I would suppose the answer would involve the thermal burst ballooning from the annihilation of matter and antimatter.

So, indulge me the short leap from a consideration of energy derived from the reaction of matter with
antimatter to “best hypothetical interstellar travel propellant”, and we have the story of Daugistau Glass. At Edeowie we boldly speculated on the possibility of an antimatter bolide annihilating in the lower atmosphere. At Daugistau, we find something that looks quite similar where kids said they saw some sort of a spacecraft take off. There, the glassy remnants are limited to a dimensionally small area, but the intense heating event was apparently highly focused. Although an order of magnitude smaller than the Trinitite atom bomb crater, the glass was up to an order of magnitude thicker at the proximal end of the ellipse! Was it the product of technologically controlled mutual annihilation of matter and antimatter? Was this the propellant for interstellar (or intergalactic?) travel? How would one fuel a warp-drive propulsion system?

“They’re coming to take me away ho ho ha ha he he, back to the funny farm where life is beautiful all the time and I’ll be happy to see those nice young men in their clean white coats and they’re coming to take me away, ha ha!”

A glass of three tales, indeed!

**Epilogue**

Lest this article should signal the end my reputation as a serious scientist, I will toss a conciliatory bone to dear old William of Ockham. There probably is a simpler explanation.

Years ago, we obtained a fragment of what appeared to be typical Trinitite, but is was much thicker than any specimen known to me, something in excess of 3 or 4 inches. It generated a lot of interest and discussion amongst Trinitite enthusiasts, and it was ultimately concluded by most of us that it was not Trinitite at all.

At the Alamogordo White Sands research facility there was work underway on things other than nuclear weaponry. For one, rocket engines were being developed and tested, sometimes anchored to stationary bases in order to better measure and observe performance parameters. Such relatively intense and sustained mega-torches reduced the desert sands—the same desert sands that Fat Man melted—to thick puddles of Trinitite-like glass.

Returning to the Daugistau case, I am sure that neither William of Ockham nor most of the rest of us would find it hard to believe that the cold war era soviet military might be less than forthcoming about secret test work undertaken out of sight of prying eyes deep in the highly classified region of the Kysyl Kum Desert. The asymmetrical puddle of glass sounds just right as the product of a test burn of a rocket or missile engine directed horizontally from a fixed position.

If I had to place my bets, this is where I would put my money, but it is not nearly so much fun as an antimatter-fueled UFO!

Deep enough.
In a rare event in the field of meteoritics, researchers at UCLA quietly announced the discovery of a new kind of ordinary chondrite in an abstract submitted to the 47th Lunar and Planetary Science Conference. This two page abstract is a precursor to a much more in depth paper soon to be published with a working title of, ‘A new kind of chondrite: Matrix-rich clast in the NWA 10214 LL3-chondrite breccia’, authored by Alan Rubin et al, which explains that in addition to sporting characteristics of several classes of meteorite, this matrix-rich clast also shows chemistries unlike anything studied to date.

Though generally referred to as Clast 6 in the paper, it’s been dubbed the “Chimeric Clast” by lead author Alan Rubin. It would be difficult to calculate the total known weight or (TKW) of this new meteorite, as it isn’t even a whole stone. Rather, it’s a small clast embedded within another meteorite. The clast was found in the LL3 chondrite known simply as Northwest Africa 10214. The host meteorite is officially classified as an LL3 with the Meteoritical Society’s Nomenclature Committee, however the authors drill down on this high-level description to a much finer detailed classification. The paper clarifies NWA 10214 as being a type-3 LL 3.7 fragmental genomict breccia. It reports the meteorite contains ~8% clasts. These fragments represent a variety of LL5, LL6 and other shock altered LL material as well as the Chimeric Clast.
The Chimeric Clast is a dark xenolithic unequilibrated matrix-rich chondritic inclusion that the authors suspect was embedded into the host stone’s parent asteroid as a projectile traveling at a low relative-velocity. The paper also explain that the ‘chimeric’ moniker was chosen because the clast displays chemical and textural characteristics of three different types of chondrites, just as the mythical chimera beast of antiquity was made of the similarly incongruent lion, goat, and snake.

One of the paper’s co-authors, Sean Tutorow was the first to notice the clast-rich region of the host meteorite while he was cutting and examining the stone prior to classification. The new chondrite is only a small part of a much larger 1.8 kilogram meteorite riddled with a variety of dark clasts. After conferring with Dr. Rubin by phone about the extraordinary lithology, Sean selected a particularly clastfull slice and used a black sharpie to indicate the points of greatest interest. The marked-up slice was carefully packaged and sent to Dr. Rubin at UCLA for analysis. After extensive scrutiny and painstaking synthesis of the data, it was clear this was no ordinary Ordinary Chondrite. They had found something new.

How exactly is the Chimeric Clast related to the other types of chondrites? In broad terms, the paper describes the clast as displaying the distorted heads of ‘Carbonaceous’, ‘Ordinary’, and ‘Enstatite’ chondrites. Breaking it down much the way the authors of the paper do, we can tackle the specific ways Clast 6 both shows affinities for, and divergences from, these three classes of chondritic meteorites.
The search of existing slices and the main mass for more of the Chimeric material continues. Initial suspect clasts like this one on the exposed edge of the main mass look promising. | Photo – Dustin Dickens

**The Carbonaceous Chondrite Connection:** The paper describes a textural similarity of the percentage of matrix to chondrules in Clast 6, [~60% matrix to ~20% chondrules], that is indicative of a CM carbonaceous chondrite. A lone cosmologically ancient refractory inclusion known as a CAI further reinforces what seems to be an obvious carbonaceous lithology. However, on closer inspection the chondrules themselves show no similarity to CM or any other type of carbonaceous chondrite.

**The Enstatite Chondrite Connection:** Chondrule types, and how often they occur within a given area of a sample can offer useful diagnostic information about a chondrite. According to the paper, the ratio of pyroxene-rich chondrules to olivine-rich chondrules in the Chimeric Clast is most like the metal-rich type-3 enstatite chondrite (EH3). However, the lack of non-porphyritic chondrule types; RP, C and GP within the clast clearly distinguish it from an EH3.

**The Ordinary Chondrite Connection:** When it comes to meteorite classification, oxygen isotopic analysis can often be the final word. The authors of the paper report that oxygen isotopic compositions of the chondrules within the clast be similar to unequilibrated type-3 H ordinary chondrites. This establishes a strong connection to the ordinary chondrite class, despite a distinct lack of overall tectural affinity. So, even while the abundance of chondrules to matrix and the ratios of chondrule types points to two other type of chondrite, researchers have high confidence the actual chondrules within the chimeric clast are essentially akin to those in type-3 H ordinary chondrites.
Looking closely, well formed chondrules and clast boundaries can be discerned through the exterior patina of the host meteorite. | Photo – Dustin Dickens

The complexity, and to some degree high art, of discerning where within the cracks of the existing meteoritic taxonomy a completely new type of meteorite belongs, is utterly staggering. In the end, the paper concludes the chimeric clast is best classified as an entirely new kind of unequilibrated ordinary chondrite. This, despite a CAI and gross textures that simultaneously scream carbonaceous, and softly whisper enstatite. Once again, oxygen work takes the day.

In an eloquent narrative in the Discussion section of the paper, the authors propose a model for how Clast 6’s parent body may have formed and how a piece of that parent body may have ended up as a clast inside of NWA 10214. It begins by suggesting that due to the low shock in both the clast and the host LL3 meteorite, it was likely introduced into the host meteorite’s parent LL asteroid as a projectile at low-relative velocity.

The authors characterize the formation of the chimeric clast parent body as a type-3 ordinary chondrite that acquired an unusually high volume of matrix during formation. While being very type-3 H like, it formed in a somewhat less oxygen rich (or reduced) environment than other known type-3 H chondrites. They explain the clast parent body likely formed in a nebular region where aerodynamic radial-drift processes had concentrated a large amount of CAI and matrix material. The paper also indicates there may have been a small degree of aqueous alteration on the clast parent body after formation.

With an idea of how the clast formed, how did it get here? The chain of events that led NWA 10214 and the Chimeric Clast to this planet may go something like this. The Chimeric Clast parent asteroid is struck by another large asteroid, which sends fragments pummeling into and embedding within the parent asteroid of host meteorite NWA 10214. A bit later, yet another asteroid hits the Chimeric Clast impregnated parent asteroid of host meteorite NWA 10214. This creates the host LL3.7 meteorite with its breccia of dark clasts. The same impact that creates NWA 10214, also ejects it into what ultimately becomes an Earth crossing trajectory. It then misses the Moon and somehow makes it into the ablative hell of passing through our atmosphere. Rapidly shedding cosmic velocity without completely vaporizing, it slows and drops from the sky missing the many oceans and lakes covering 75% of the planet. It falls in a place that a human paying attention to such things can retrieve it. Nothing short of impossible.

How prolific the chimeric material is within the host meteorite remains to be determined, but there is hope
more clasts will be identified as further study of the main mass and several large slices continues. While many collectors and researchers alike seem to focus more and more on the new bounty of planetary meteorites flooding the market, I for one am quite happy the ordinary chondrite is back in the news.
After much thought I have decided to publish a new quarterly magazine about hunting, collecting, and the science of rocks from outer space. I will not be accepting yearly subscription payments, only payments as each individual issue is published and ready to mail out to the subscribers.

If you have any questions please send me a private message or contact me using the email listed below. Your support is what will make this magazine a success for us all in the meteorite community.

Regards,

Michael Johnson
Editor-in-Chief, Space Rocks Magazine

Please submit your article with photos to: spacerocksmagazine@gmail.com
Osceola Meteorite

Paul Harris

Our Meteorite of the Month is kindly provided by Tucson Meteorites who hosts The Meteorite Picture of the Day.

Contributed by Mexico Doug. Osceola Meteorite L6 TKW 991 grams. Observed fall 24 Jan 2016, Florida, USA. Copyright Mexico Doug. All rights reserved.

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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.

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