Lovina

From: Darryl Pitt <darryl@dof3.com>
Subject: **Re: [meteorite-list] Rocks from Space Picture of the Day - February 24, 2010 Question**
Date: February 24, 2010 3:22:31 PM CST
To: Shawn Alan <photophlow@yahoo.com>
Cc: "meteorite-list@meteoritecentral.com" <meteorite-list@meteoritecentral.com>

Hi Shawn, List....

I'm hardly an expert and I feel especially uncomfortable being a stand-in while true experts lurk, but as your inquiry was addressed to me, I'll do my best.

I should restate at the outset, the compositional fingerprint of an iron meteorite is highly specific, and it was on this basis that John Wasson reaffirmed Lovina's certification. It should also be noted that Tim McCoy, who posed fascinating questions concerning Lovina, has acceded to Wasson's data and interpretation.

Now, I hope you don't mind if I respond by thread....

On Feb 24, 2010, at 3:01 PM, Shawn Alan wrote:

> Darryl and List,
>
> Thank you for the post you made about the weathering and oxidation features of the Lovina's meteorite. I have been reading all the posts and been looking over all the great images that have been posted about this unique features present on the surface of the Lovina meteorite and I have some questions.
>
> It seems to me and stated from others that the meteorite was discovered to be in salt water for many century's and the textural surface is caused by terrestrialized oxidization which this process is also prevalent with inside the specimen from the holes where nodules were before. Now at what point does this process make a meteorites' free iron oxidized to a point when it has became terrestrialized?

I am unqualified to answer this question.

> From the image that Michael Johnson posted from Rock from Space picture of the day, http://www.rocksfromspace.org/LOVINA_METEORITE.html it is prevalent that oxidization has taken place. Also, it is stated from the write up from Michael Johnson post that, "Lovina's stature as one of the most exotic meteorites is reconfirmed. An ataxite, Lovina contains the fourth highest nickel percentage of all meteorites and is the only meteorite known to feature ziggurat (stepped pyramidal) structures---the result of immersion in the tropical shallows of Bali for untold centuries."
>
> Now from my understanding, Ataxite iron meteorites structural bands disappear and the meteorite becomes structureless when nickel is 13 percent or higher within the a iron meteorite. However, when viewing the high nickel Lovina's slice cut image, one might observe the surface is litters with structure, almost resembling widmanstatten structure. Now is this structure the cause of oxidization within the meteorite? If so wouldnt the meteorite be terrestrailized to the point that these unique features are nothing more then destruction

> to a meteorite?

We are certainly bearing witness to the "destruction" of the meteorite, but of a very specific meteorite---one with tetrataenite and a latticework of iron sulfide inclusions---two features which are unusual in and of themselves. Phrased another way, it is my understanding that if you threw a Gibeon or most any other iron meteorite into the same waters and poked around several hundred years hence, you would not find the object now before us. A lot of serendipity was at work in the (de)formation of Lovina.

> Why I ask is because a lot of NWA meteorite fragments are tossed aside or neglected for the fact that these specimens have no significance importance because they have became terrestrailized from oxidization. Many institutions don't even touch NWA meteorites these days. But why would this oxidization feature make "Lovina's stature as one of the most exotic meteorites." ? But on the other hand, this physical feature could help scientist to identiy other meteorites underwater and could bring new discoveries to science.

Morphologically, Lovina is matchless and therefore necessarily a member of the exotic meteorite club; two museums have thus far reached out to me based on this morphological singularity. Also keep in mind that Lovina is an ungrouped iron, every one of which, by definition, are pretty darn exotic.

Hoping this was remotely helpful. ;-)

Sincerely,

Darryl

> [meteorite-list] Rocks from Space Picture of the Day - February 24, 2010
> Darryl Pitt darryl at dof3.com
> Wed Feb 24 13:12:52 EST 2010
>
> Previous message: [meteorite-list] Rocks from Space Picture of the Day - February 24, 2010
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> ---
>
> Dear List and Mike, Adam, Carl...
>
> The voids remarked upon are not vesicles but an artifact of weathering. The depressions seen are the end points where by water penetrated the meteorite and you just aren't able to see the entry point (which were the crevasses between the ziggurat structures).
>
> For vug lovers--and I count myself among you!: Lovina does indeed

contain a blanketing of tiny vugs, which are fun to have but are actuality only fully oxidized iron sulfide pockets. Remember, Lovina was in saltwater for centuries, if not longer. If you enlarge and scan the image of the cut surface, you can see where the sulfide remains in the matrix and where it oxidized out.

As expressed by J. Wasson, the compositional fingerprint (the meteorite's DNA, if you will) is the incontrovertible smoking gun.

All best / Darryl

On Feb 24, 2010, at 12:09 PM, Adam Hupe wrote:

> Very interesting, what are voids (vesicles) doing in an iron
> meteorite? I have only heard of sparse vugs found in one iron
> before and thought vesicles would most certainly disqualify an
> object from being an iron meteorite. Has cosmic ray exposure
> testing been done? It would be interesting to see how long this
> object has been in space.
>
> Best Regards,
>
> Adam

On Feb 24, 2010, at 12:21 PM, Galactic Stone & Ironworks wrote:

> HI Adam and List,
>
> This is a fascinating specimen. Surely it represents a
> previously-unknown parent body.
>
> While the presence of vugs/vesicles suggests the specimen was not
> formed in a vacuum, maybe there was some gases present during the
> formation.
>

> For example, suppose a large comet slammed into a predominately-iron
> asteroid. Comets contain large volumes of material that can
> sublimate, and maybe during the collision, some of this gaseous
> material injected into the iron body. The heat and/or shock resulting
> from the collision provided inroads for the cometary material by
> expanding existing fissures or faults. Then the intermingled material
> rapidly cooled, forming the vesicles we see now. The massive shock
> and/or heating would also wipe out the native widmanstatten pattern
> present in the iron body, leaving behind an ataxite-like mass without
> the typical crystallization patterns.....???
>
> Then this curious mass fell to Earth and experienced
> weathering/alteration to provide the strange external appearance we
> see now.
>
> Or, to play devil's advocate, perhaps this is a very atypical type of
> industrial slag unlike any seen before. Is there any industry
> present in the area where this mass was found?
>
> Best regards,
>
> MikeG
>
>

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