

THE LAKE AGASSIZ ROCK HOUND

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Extra-terrestrial Hypatia stone rattles solar system status quo

[Information edited for column-space from Science Daily article that can be seen in full at:
<https://www.sciencedaily.com/releases/2018/01/180109112437.htm>]

In 2013, researchers announced that a pebble found in south-west Egypt, was definitely not from Earth. By 2015, other research teams had announced that the 'Hypatia' stone was not part of any known types of meteorite or comet, based on noble gas and nuclear probe analyses. The stone was named after *Hypatia of Alexandria*, the first Western woman mathematician and astronomer.

So, if the pebble was not terrestrial, could its makeup point to where it came from? At the University of Johannesburg, micro-mineral analyses provide unsettling answers that spiral away from usual views of how our material solar system was formed.

"The internal structure of the Hypatia pebble is somewhat like a fruitcake that fell off a shelf into flour, and cracked open," says Prof Jan Kramers, lead researcher of the study published in *Geochimica et Cosmochimica Acta* on 28 Dec 2017. "We can think of the rough mix of Hypatia as what we call two mixed 'matrices' in geology terms. The cherries and nuts in the cake represent the mineral grains found in Hypatia's unique 'inclusions'. And the flour dusting the cracks of the fallen cake represent the 'secondary materials' we found in the fractures in Hypatia, which are from Earth," he says. The original extraterrestrial rock that fell to Earth must have been at least several meters in diameter, but shattered into smaller fragments, like the Hypatia stone.

The Hypatia' mixed matrix, looks nothing like that of any known meteorites. "If it were possible to grind up the entire planet Earth to dust in a huge mortar and pestle, we would get the same chemical base as chondritic meteorites," says Kramers. "In chondritic meteorites, we see a small amount of carbon(C) and a major amount of silicon (Si). But Hypatia's matrix has a massive amount of carbon and an unusually small to non-existing amount of silicon." Even more unusual, the matrix contains high amount of specific **polyaromatic hydrocarbons**, or **PAH**; a major part of interstellar dust found in comets and meteorites created from cold (unheated) origins... not suns or from active planets.

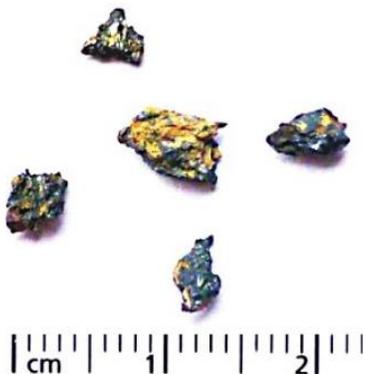
In another twist, some of the PAH in the Hypatia matrix has been transformed into micro-diamonds smaller than one micrometer, which are thought to have been formed in the shock of impact with the Earth's atmosphere or surface. These diamonds made Hypatia resistant to weathering so that it is preserved for analysis from the time it arrived on Earth.

Georgy Belyanin analyzed the mineral grains in the inclusions in Hypatia to find more weirdness. "The aluminum occurs in pure metallic form, not in a chemical compound with other elements. For instance gold occurs in nuggets, but aluminum *never does*. Pure aluminum is extremely rare on Earth and the rest of our solar system, as far as we know," says Belyanin. "There are also grains of a compound consisting of mainly Nickel, Phosphorus, with very little Iron; a mineral *combination* never observed before on Earth or meteorites."

Generally, science says that our solar system's planets ultimately formed from a huge, ancient cloud of homogenous, interstellar dust; that is, the same kind of dust everywhere. "If Hypatia itself is *not* presolar, both the PAH balances and the Ni-P-Fe features indicate that the solar nebula *wasn't* the same kind of dust everywhere ...which starts unraveling the generally accepted view of the formation of our solar system," says Kramers.

Taken together, the ancient unheated PAH carbon as well as the phosphides and the metallic aluminum suggest that Hypatia is an assembly of unchanged pre-solar material. If this is the premise, then she is older than our whole Sun, planets, or complete solar system's birth. The Ni-P-Fe grains are *inside* the matrix, unlikely to have been modified by any shock collision. This might be another pointer to pre-Solar existence.

"What we do know is that Hypatia was formed in a cold environment, probably at temperatures below that of liquid nitrogen on Earth. This speaks of regions beyond the Kuiper Belt and out towards the Oort Cloud. We know very little about the chemical compositions of space objects out there. So our next question will dig further into where Hypatia came from," says Kramers.



Researchers Jan Kramers and Georgy Belyanin found mineral compounds unlike anything on Earth, or in known meteorites or comets, in these fragments from the Hypatia stone, which was picked up in south-west Egypt in the Libyan Desert Glass Field.

Credit: Dr Mario di Martino, INAF Osservatorio Astrofisico di Torino

Please Come to the LARC

March 2018 Meeting

**Wednesday, March 7th, 7:30 pm
Stevens Hall Room 136, NDSU**

Program:

**September Hamilton will demo us an
introduction to "Steven Universe"**

Guests are always welcome!

Lake Agassiz Rock Club

President: Frank Svezia
Vice President: James Zinke
Secretary: Chris Patenaude
Treasurer: Terry Mallick
Silent Auctions: Jerry Loegering
and/or other members as happens
Program planning ideas/volunteers welcome

What is our Purpose?

To create an interest and promote a knowledge of all phases of geology in an informal setting.

Where and When Do We Meet?

The Geology Lab, Room 136, on the lower level of Stevens Hall, NDSU, Fargo. Time: 7:30 p.m.

[From N. University Dr. turn West on 12th Ave N. Turn North on Bolley Dr. Drive just past Centennial Blv. See **Stevens Hall** on west side of Bolley, 2nd hall from the corner. To park, go into next driveway ahead, on the left. Drive west, then left again behind a laboratory building to Stevens Hall back-lot.]

How Much Are the Dues?

Single person—\$20.00; Family—\$30.00; College (any school) students and youth (if not a family member)—\$10.00 per year. Send dues to Terry Mallick, Treasurer; 416 3rd Avenue S., Moorhead, MN 56560.

What Happens at Meetings?

We cover business; then the main program; a silent auction of rocks, minerals, and fossils; and “lunch”.

What are some of our Club Activities?

Members and their families enjoy many exciting activities. Youth are always welcome. Field trips are taken to collecting areas in ND, SD, and MN. We do exhibits at the R.R.V. Fair and other events. LARC sponsors an award to an outstanding Geology student at NDSU each year. Often we offer info-lessons given just before the scheduled meetings.

What are Our Club Affiliations?

We are affiliated with the Midwest Federation of the Mineralogical and Geological Societies and the American Federation of Mineralogical Societies.

How Do We Keep in Touch?

The *Lake Agassiz Rock Hound* is our monthly bulletin mailed one week before each meeting. Non-members may subscribe to it for \$10.00 per year. Members are urged to send news tips and articles to the editor: Chris Patenaude P.O.Box 434, Perley, MN 56574 or email LakeAgzRC70@yahoo.com.

Rock Hound articles may be reprinted if full credit is given, unless otherwise noted.

Minutes from February 7th, 2018 Meeting

Submitted by Chris Patenaude, Secretary

NDSU Geo-Club arrived with more sales items! An extra 15 minutes were taken to complete happy interactions. Meeting called to order by VP **James Z.** Our president Frank is enjoying the annual Arizona rockapaloosa and hounding down there. Happy Hunting!

Secretary's minutes for January's meeting were read by **Chris P.**, motion to accept by **Jerry L.**, **Dan E.** 2nd s

Treasurer's Report, Terry M: RRVF Insurance has been paid towards any liabilities. Fees for grounds-footprint reservation are paid. ND Secretary of State's office has asked for official clarification of who our contacting “Clerk” for Club legal matters is. **James Z.**, being a trained adviser, has stepped up as the most logical member. Thanks James! Word has come back that **Frank S.** has indeed struck it well in AZ for chips and gem bits for the Prospecting Activity, thanks to tips & leads from **Jerry L.** A quip went around that we couldn't get a better deal on shipping. Frank will be personally driving back with a full SUV!
Amy H. moves to accept the Tr.'s Report; **Jerry L.** 2nd s.

We are still working on licensing the Club's storage trailer. The trailer will be getting a “lifetime” licensing and ID plate. Merle H. and Frank S. will be handling that. Crispy has offered to store it on her yard when it is not on the road or going out on demonstrations. With this piece of equipment, we hope to be on a more frequent ‘fieldtrip’ schedule to schools, care-homes and perhaps shorter fundraiser events for ourselves; art fests, street fairs, Island Park celebrations...

Joe S. is in charge of Club Name Tags as any new members sign up. Keep track of your own tag and wear it proudly to meetings so we can get to know each other easier! Joe called in ill, this week, and couldn't make the meeting. Get well soon, Joe!! Best wishes from all of us!

Sisters **Jessica and Jenny W.** report on the progress with opening an LARC FACEBOOK page. They are coordinating with **Mike K.**, our previous club prez, to figure out directorship responsibilities. Contact has been sketchy, lately, so **James Z.** who tends office near Mike's workplace, will get in touch to help facilitate communications.

Each meeting there's a “Silent Auction” of donated prizes. **Sharon P.** moves that we have a separate specimen table for kids, so that they can afford to bid and not compete with adult wallets. Ayes have it, hands in the air, for youngsters 15 yrs. and under allowed to participate. **Jerry L.** 2nd s.

The growing need and urgency to establish a working Youth Group within the LARC has been addressed. Parents of younger members are finding the business end of the meetings to be drawn out and boring for the kids. Years ago, Crispy tried to drum up interest in getting a Youth Group started, but could not get anyone interested in taking the leadership role. Now we have active parents who can help!

Our uber-connecting organizations, **AFMS** and **MWF** have excellent, pre-set, simple programs, syllabus and active projects for the younger Rock Hounds! It is very much like familiar “scouting” formats with plans, goals, free resources and even “merit badges” for the kids. Crispy will bring info pages and material to the next meeting.

NDSU 2018 LARC Scholarship Awarded

We have heard from the NDSU Geo Sciences Chair, Dr. Peter Oduor, that the recipient has been chosen. Congratulations to Samuel Marolt! He sends a card to us:

THANK YOU

Dear Lake Agassiz Rock Club,
Thankyou for the scholarship!
The extra cash will help me greatly.
It was a blast talking with ya'll at
the Christmas party.

Go Rock Hounds!

Thank you again,

Samuel Marolt

Brad Smith's Bench Tips

Many readers of these **Bench Tips** sell their jewelry at shows, in galleries or online. They are sole proprietors and constantly under pressure to design new pieces and make enough product to keep up with demand. So their options are few when a large order comes in. They can burn the midnight oil themselves, or they can be smart and get some temporary help. But you need good help, and you often need it fast.

Jewelry assemblers are skilled, trustworthy and reliable craftsmen who make it their business to help others handle overloads and meet deadlines. Flexible arrangements are possible, working by the job, by the hour or by the piece. Each has a different mix of skills, from fabrication to enameling, casting, stone setting, lapidary and others.

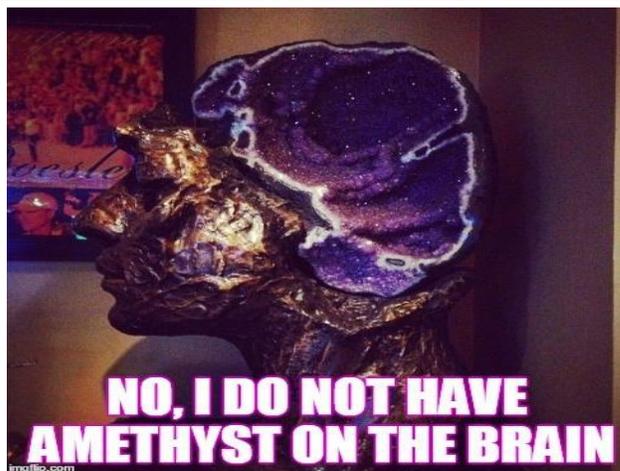
Assemblers are known to the trade, so you may have to ask around to find some references. But some assemblers advertise on the Net. For instance, a good friend of mine, Janice Metz <JenFT4@aol.com>, has been working with designers and fabricators in the West Los Angeles area since 1997. She specializes in silversmithing, wire-wrapping, beading and stringing.

For more tips or to learn new jewelry skills see
[Amazon.com/author/bradfordsmith](https://www.amazon.com/author/bradfordsmith)

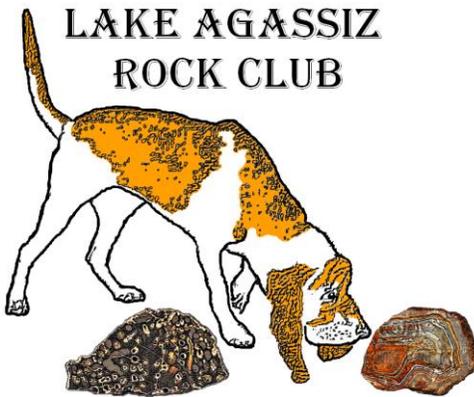
MWF MAY 2018 Calendar

(Edited for time and proximity to Fargo. See complete calendar at:
<http://www.amfed.org/mwf/Calendar/March.html>)

- 9-11: KANSAS CITY, MO** Association of Earth Science Clubs of Greater Kansas City Annual Show. Fri 10 am - 8 pm; Sat 10 am - 7 pm; Sun 10 am - 5 pm. KCI Expo Center, 11730 NW Ambassador Dr., Kansas City. Contact Bruce Stinemetz, (816) 795-5159; brucestinemetz@att.net
- 10: SKOLIE, IL** Chicago Rocks & Mineral Society Annual Silent Auction. 6 - 9 pm. St. Peter's United Church of Christ Gym, 8013 Laramie, Skokie. Contact: Jeanine Mielecki; (312) 623-1554; jaynine9@aol.com
- 10-11: MACOMB, IL** Geodeland Earth Science Clubs, Inc. Annual Show. Sat 10 am - 6 pm; Sun 10 am - 5 pm. Western Illinois University Student Union Ballroom, Murray Street, Macomb. Contact Ed Wagner, (309) 376-7781; loesseditor@gmail.com
- 10-11: WEST BEND, WI** Kettle Moraine Geological Society Annual Show. Sat 10 am - 5 pm; Sun 10 am - 4 pm. Washington County Fair Park & Convention Center, 3000 Hwy PV, West Bend. Contact: John Rettler, W 477 Hwy 100, Rubicon 53078; (262) 345-5020; johnrettler@gmail.com
- 11: LINCOLN, NE** Lincoln Gem & Mineral Club Geology Day. 1 pm - 4 pm. Pioneer Park, Codrington & West Van Dorn, Lincoln. Contact Sharon Marburger, (402) 792-2348; jmc.editor@outlook.com
- 24-25: CEDAR RAPIDS, IA** Cedar Valley Rocks & Mineral Society Annual Show. Sat 8:30 am - 6 pm; Sun 9:30 am - 5 pm. Hawkeye Downs Expo Center, 4400 - 6th St., SW, Cedar Rapids. Contact: Marvin Houg, 1820 - 30th St. SE, Cedar Rapids; (319) 364-2868; m-houg@yahoo.com
- 24-25: WHEATON, IL** Earth Science Club of Northern Illinois Annual Show. Sat 10 am - 5 pm; Sun 10 am - 4 pm. DuPage County Fairgrounds, 2015 Manchester Rd., Wheaton. Contact: Dave Carlson, 840 Oak St., Elgin (847) 931-0856; fossil54@att.net
- 24-25: JANESVILLE, WI** Badger Lapidary & Geological Society Annual Show. Sat 9 am - 5 pm; Sun 9 am - 4 pm. Craig Center Building, Rock County Fairgrounds, 1301 Craig Ave, Janesville. Contact: Debbie Wehinger, 708 W 2nd Ave, Brodhead 53520; (608) 897-2608; jdrules3@gmail.com
- 31: WOODBURY, MN** St. Croix Rockhounds Annual Show. 9 am - 2 pm. Valley Creek Mall, Weir Dr. & Valley Creek Rd., Woodbury. Contact: David Rusterholz; (715) 760-0479; d.b.rusterholz@uwrf.edu



Lake Agassiz Rock Hound
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Hidden Treasures Found by Sharp Eyes

"Iris Agate" is a name used for a finely-banded agate that produces a spectacular display of color when it is cut properly and illuminated from a direction that sends light through its very thin bands. The name "iris agate" is used because one meaning of the word "iris" is "a rainbow-like display of colors."

A specimen of iris agate is shown in the pair of photographs in this photo. This specimen is a thin slice of agate that measures about 25 mm high, 14 mm wide and 3 mm in thickness. The agate is very finely banded. The parts of the agate that produce the iris effect are translucent to transparent and have at least 15 to 30 bands per millimeter that are countable under a gemological microscope. Some parts of the agate have a higher density of bands, but they cannot be counted because they are very thin and the agate is milky.

Two views of a specimen of iris agate. The photo on the left was taken in normal light and displays the color of light reflected from the agate. The photo on the right shows the agate with backlighting. The backlighting reveals the diffraction grating or "iris" effect produced when light passes through the very fine banding of the agate. This specimen is a thin slice of Brazilian agate that measures about 25 mm high, 14 mm wide and 3 mm in thickness. As with chatoyance and opalization effects, these spectral colors can shift and change with the angle of moving light and observation.

Iris agate is not often seen in museums and mineral shows. Yet, they are probably more common than that. Most slabs are too thick... thinner slab = stronger hues. Many thinly-sliced agates never get backlit. So, if you have some thinly-banded agate that's translucent to transparent, you could cut it thin to see if it's a rainbow!

To the Right... Cabachon style!

