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# THE BADGER DIGGIN'S

The Badger Lapidary and Geological Society, Inc.  
Monroe, Wisconsin

Devoted to the Earth Sciences

Vol. 45, No. 5

May 2010

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## Tales from the Mud Bogs

by Teri Marché

There was nothing about the forecast for the weekend to inspire confidence, but it was to be the first fieldtrip of the season. To go or not to go? Go, of course!

Cathy would pick me up on Friday morning and we would take the Great River Road down the Mississippi through Illinois to Keokuk, IA to dig for geodes. The day was definitely overcast, and we hit showers from time to time, but that didn't keep us from making a few stops to explore on the way.

A mile or so north of Hamilton, we came to a bridge over a creek, a place Cathy recognized from an earlier trip. The hillside next to the creek was being excavated and rocks and clay were tumbled at the base. There were geodes in the clay and mudstone that we could collect, as well as many large ones in the limestone that we could not remove. With darker clouds rolling in, we packed up our finds and went on.

When we got to Keokuk, we found the hotels full of folks in town for the Civil War re-enactment. We eventually found a room at the Keokuk Inn, on the far west side of town. It is a clean, cute, and inexpensive place that served us well, and I would recommend it to anyone.

The next day we headed for Jacob's Geode Mine to meet up with the group, and found Ralph Burgener sitting on a bucket in the mud whacking away at the quarry wall. So we joined him, and began pulling geodes out of the clay. Sometime later the Hoxies arrived with the news that Dan was stuck in South Carolina and could not make the weekend. Everyone went back to work, and Colin amused himself by getting thoroughly stuck in a mud bog. The rain held off most of the day, and shortly before noon the Reeses pulled up in Dave's Jeep. Even Donna got into the act, digging, and cheerleading, and generally supervising Dave. Our buckets were pretty well filled when the first flash of lightning appeared. One good rumble of thunder, and we were all scrambling to pack up and slog through the mud to the cars. Thankfully, Dave was willing to bring our buckets out in his Jeep while we slogged

through the creek. At least that got some of the mud off our boots. Luckily we had the cars loaded before it really cut loose.

[continued on p. 3]

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## Next Meeting

Our next meeting will be held at 9:45 a.m. on Saturday, May 8, 2010, at the Monroe Public Library, 925 16<sup>th</sup> Avenue, Monroe, WI. Take the elevator to the second floor.

**Program: "Rock Terms You've Never Heard Before,"** presented by BLGS president, Dan Trocke.

Novice as well as experienced rockhounds can expect to learn some new things at this presentation that is open to all members and guests. Let's see what kind of surprises Dan has in store for us!

**Snacks:** furnished by the Westbys.

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**Tentative Calendar of Club Events – through Dec. 2010**

- May 8** Regular meeting – “Rock Terms You’ve Never Heard Before”: Dan Trocke
- May 22** Field Trip – Wendling Quarries (Iowa)  
Leader: John Tuthill
- June 12** Annual Picnic: Pleasant View Park (Green Co.)
- June 26** Field trip – Dehnel’s Aegerine Pit  
Leader: Cathy Romeis
- July 10-18** Field Trip – Minnesota to Canada  
Leaders: Teri Marché, Cathy Romeis
- July 25** Field Trip – Rufer Quarry, Monroe  
Leader: Dan Trocke
- Aug. 14** Field Trip – TBA
- Aug. 28-29** Field Trip – Wyalusing & Prairie du Chien  
Leader: Teri Marché
- Sept. 11** Regular meeting – Show & Tell
- Sept. 25** Field Trip – TBA
- Oct. 9** Lapidary Day; Host – Trockes
- Oct. 23** Field Trip – TBA
- Nov. 13** Regular meeting
- Dec. 11** Christmas party

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**Meteorite Fragments Land in Southwest Wisconsin**

A fireball which appeared in the sky on the evening of April 14 dropped a number of fragments that have been recovered in western Iowa County. At least five of the fragments have been temporarily placed on display at the UW Geology Museum in Madison.

News of the meteorite fall has also drawn collectors, both amateur and professional, to the area from as far away as Arizona. One hunter, Karl Aston of Pacific, Missouri, recovered a 160-gram fragment. See Wisconsin State Journal, April 19, 2010 (p. 1).

## MWF (& related) Club Events

**May 15-16: Wauwatosha, WI.** Wisconsin Geological Society's 53<sup>rd</sup> Annual Gem, Mineral, and Fossil Show. Mueller Building at Hart Park. Sat., Sun. 10-5. Admission \$3; or \$5 for two adults. Accompanied children free. Contact: Paul Schmidt, (414) 771-8668 or [pvs@wi.rr.com](mailto:pvs@wi.rr.com).

**June 5-6: Viroqua, WI:** Coulee Rock Club's Annual Show. Viroqua Junior High School Gym, 100 Blackhawk Drive. Sat. 10-5, Sun. 10-4. Contact: Gary J. Krause, (608) 637-2574 or [garyjkrause@yahoo.com](mailto:garyjkrause@yahoo.com).

**June 12: Skokie, IL.** Chicago Rocks & Minerals Society's 3<sup>rd</sup> Annual "Geode Fest." St. Peter's United Church of Christ Gymnasium, 8013 Laramie Avenue. Contact Craig Henize, (847) 584-8637 or [chenize@flash.net](mailto:chenize@flash.net).

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## Tales from the Mud Bogs – cont.

The downpour lasted most of the night and the Hoxies wisely decided to head home instead of trying to set up camp. After hot baths and showers, the rest of us spent a great evening at the most fantastic Chinese buffet. However, we had to "swim" across the parking lot just to reach the door. There were some folks in uniforms and long dresses at the buffet. I think the Civil War camp was washed out as well.

On Sunday, the rain had let up but it was overcast and rather chilly and windy. We decided to try to find the Hilltop Mud Bog in St. Francisville, Missouri. However, given the amount of water standing in the fields, the prospect of a place normally designated "mud bog" seemed pretty doubtful. After circling the area, we found the location. The geodes here are reputed to be exceptionally large, and what we saw around the owner's house and garage seemed to bear that out. There were some real monsters there!

The owner was friendly, and assured us that if we got stuck getting to the bog, he had the equipment to get us out. That sounded *so*

reassuring. Prudence won out and we decided to head home, satisfied with the buckets of geodes in hand, and the fun we had in the process.

On the way home, we saw the sky turn this strange, non-gray color of blue, and this bright shining orb appeared for a few minutes. It was actually blinding! Luckily the clouds rolled in again, and the shock quickly wore off. The rest of the trip was uneventful.

Now, who has that geode cracker?

P.S. A few miles south of Nauvoo on the way down, we stopped to explore the riverbank. I just cannot pass that much water without getting closer. There, caught up in the roots of a tree along shore was a drift of shells, actually as it turned out, over 140 *Quadrula quadrula*, and a number of other species as well. There were fossils in the rocks nearby, but I was too busy scooping up shells to go for a hammer.



Ralph Burgener and Dave and Donna Reese collect geodes at Jacob's Geode Mine.

## What's Rockin'

The What's Rockin' Table was rockin' with fossils this month, with two cephalopods from Connor Trocke and one from Dan Trocke, who also brought some erthrite.

Erich Hessner brought some pyrites from Peru and Spain.

Cathy Romeis brought a wire-wrapped stone and some books on wire-wrapping.

## *The Greens*

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## The Mystery of Hourglass Selenite

by Jordan Marché

When I attended Sandy Fuller's presentation, "World of Fluorescence," at the BLGS show last month, I became intrigued by one particular image that she showed. It depicted a piece of gypsum/selenite that, under the action of long- or short-wave UV radiation, demonstrates the so-called "hourglass effect," in which about one-third of the crystal has its fluorescence suppressed, in the curious shape of a symmetrical hourglass pattern. Because I have some background in optics, I found this to be an especially interesting occurrence. According to Sandy, the phenomenon itself may not be fully understood to this day. To explore it further on my own, I purchased a small selenite crystal, about one inch long, from her, which originates from Willow Creek, Nanton, Alberta, Canada, and that demonstrates this effect very nicely (see photo below).

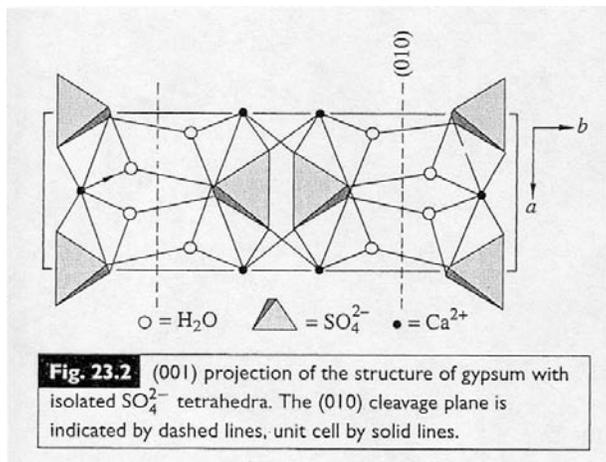


Although there are several references to the hourglass effect in the standard literature (e.g., Robbins, 1983, p. 125) and on websites such as that of the Fluorescent Mineral Society ([www.galleries.com/minerals/fluoresc.HTM](http://www.galleries.com/minerals/fluoresc.HTM)), there does not seem to be an explanation forthcoming about the cause of this effect. Given what others have written, and what I have observed directly, I think I may have reached a partial understanding and will make a tentative proposal about what might be going on, relative to the crystal structure. I welcome further discussion/input on this question from those who are more knowledgeable in mineralogy.

Gypsum/selenite is  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . The crystal structure is monoclinic (prismatic),  $2/m$  (Pough, 1976, pp. 172-173). From the mindat website ([www.mindat.org/min-1784.html](http://www.mindat.org/min-1784.html)), the lengths of the three crystal axes (a, b, and c) are given, along with the important obtuse angle ( $\beta$ ) =  $118.43^\circ$ , between axes a and c. This data is confirmed by newer texts such as Anthony, et al. (2003). The mindat website also features a rotating 3-D model of the gypsum crystal, showing the calcium ions, the  $\text{SO}_4$  tetrahedra, and the attendant water molecules. But while the zoned hourglass fluorescence is likewise noted, no explanation for the effect is reported there.

When the crystal is activated with UV radiation, there is a regular pattern of fluorescence produced, in which two obtuse angles, directly opposite one another, appear bright, whereas the corresponding supplementary angles are dark, producing the hourglass effect. Given that the obtuse angle is very nearly equal to that of angle  $\beta$  above, I conclude that the bright, fluorescent part of the crystal is that found between the a and c axes, with the b axis being perpendicular to both a and c (and to the largest, tabular face of the selenite crystal). If that is correct, then this seems to imply that fluorescence can and does occur within the unit cells of the crystal, between the a and c axes only. Then, for whatever reason, likely having to do with the crystal structure itself (either from the  $\text{SO}_4$  tetrahedra or else the water molecules), fluorescence is either suppressed or absorbed in the remaining acute supplementary angle ( $61.57^\circ$ ).

But here is where other important information comes into play. The so-called “unit cell” of a gypsum crystal consists of not one, but six SO<sub>4</sub> tetrahedra, along with six Ca ions and eight H<sub>2</sub>O molecules (see figure below, reproduced from Wenk and Bulakh, 2004, p. 380). Along the b-axis of the crystal, there are actually mirror-image pairs of ‘half-cells’, consisting of three SO<sub>4</sub> tetrahedra, three Ca ions, and four H<sub>2</sub>O molecules each. Thus, the fully-symmetrical nature of the hourglass effect perhaps arises from the two oppositely-directed ‘half-cells’ within the unit cell of the crystal, whereby the calcium ions, SO<sub>4</sub> tetrahedra, and water molecules are arranged in mirror-image fashion, so that there can be a suppression of fluorescence in opposite directions.



Of course, I have been unable to explain what actually suppresses the fluorescence in the acute supplementary angles of the ‘half-cells’ (if that is indeed what is happening). I have also had to assume that it is the calcite ion that produces the weak fluorescence in the obtuse angles of the half-cells, but have not seen anything in writing to confirm that notion. This supposition itself may be incorrect; according to a Belgian rockhound named Axel Emmerman, there could be a strontium activator in the gypsum (presumably replacing the calcium ions?) that produces the fluorescence. Unfortunately, the links to his websites are obsolete, and nothing more can be said with certainty about this claim. Because the hourglass effect occurs under both long- and short-wave UV radiation, the suppression of fluorescence cannot be a simple interference effect, because the light sources are not monochromatic.

While there appears to be no similar occurrence in the mineral kingdom to the hourglass effect of selenite, the much more complex mineral stilbite (Ca,Na)<sub>3</sub>Al<sub>5</sub>(Al,Si)Si<sub>14</sub>O<sub>40</sub> · 15H<sub>2</sub>O is sometimes reported as having inclusions of a related shape within it. Not surprisingly, stilbite has the same monoclinic structure as selenite and water molecules present in its crystal structure.

Though very different from the phenomenon of double refraction in calcite, the hourglass effect in gypsum/selenite seems comparatively less well known and studied. I continue to be intrigued by this effect, and would welcome additional facts or insights from anyone who can share them.

I wish to thank BLGS member Marv Hanner for bringing the relationship with stilbite to my attention and for the links to Emmerman’s ideas concerning strontium.

References:

Anthony, John W., et al. 2003. *Handbook of Mineralogy, Vol. V: Borates, Carbonates, Sulfates*. Tucson, AZ: Mineral Data Publishing.

Pough, Frederick H. 1976. *A Field Guide to Rocks and Minerals*, 4<sup>th</sup> ed. Boston: Houghton Mifflin.

Robbins, Manuel. 1983. *The Collector’s Book of Fluorescent Minerals*. New York: Van Nostrand Reinhold Co.

Wenk, Hans-Rudolf, and Bulakh, Andrei. 2004. *Minerals: Their Constitution and Origin*. Cambridge: Cambridge University Press.

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**Nickel Minerals in Wisconsin**  
(a note from Dave Zimmerman)

I came across this interesting article about nickel minerals in the lead mining region of Wisconsin. This topic is fairly new to me, despite collecting in the area for many years. I think this would be of interest to the other members via the newsletter.

[http://www.minsocam.org/MSA/collectors\\_corner/a rc/winickel.htm](http://www.minsocam.org/MSA/collectors_corner/a rc/winickel.htm)

## May Field Trip – Wendling Quarries, Iowa

We have been invited on one of two yearly fieldtrips to a selection of Wendling Quarries in eastern Iowa.

**Date:** Saturday, May 22, 2010

**Time:** 8:30 – 9:00 a.m.

**Meet at:** Behr Quarry, DeWitt, IA (see map)

**Bring:** Permission forms filled out (see below), hardhats, safety glasses, steel-toed boots, agate bags, hard rock collecting gear. Lunch, water, sunscreen, & other items as needed for the weather.

**Itinerary:** Start at Behr Quarry, DeWitt, IA for agates & fossils; proceed to another quarry for fossils (possibly Makoketa, for brachiopods); end at Gateway Sandpit, Commanche, IA for agates.

**NOTE:** This trip is for adults only. No children.

### Driving Directions:

From Dewitt, Take Hwy. 30 West 1 mile to 260th Avenue.

Turn north and drive 1 mile.

The quarry entrance is on the east side of the road.



### General Rules:

**NEW RULE** – This permission is only valid if there is **NO** crushing crew or equipment at the quarry you plan to visit. New MSHA rules require mine training for anyone getting out of a vehicle at a site where a plant is located. Thus no access is allowed for recreational purposes while dredging/crushing crews and equipment is at a site. This applies to weekend and after business hours too. No exceptions.

The only people allowed on the waters of Wendling Quarries, Inc. properties are WQI mined trained employees. With specific permission non-employees may accompany WQI employees on the water if they are permitted, have executed a valid waiver and are with and under the control of the WQI employee at all times. This includes boating and ice fishing. **NO EXCEPTIONS.**

Anyone who brings any non-permitted individual onto WQI sites for recreational purposes is subject trespassing charges.

Non-mine train people **CANNOT** be at sites that have permanent MSHA ID numbers if they are not accompanied by a mine train employee. These sites include but are not limited to CR South, Moscow, Robins, Behr, and Blairs Ferry Sand.

1. All visitors must sign the liability waiver and Wendling Quarries Inc. Safety Policy, parents must sign for minors.
2. Unattended minors are prohibited.
3. All visitors must sign in at the site Mine Office during business hours.
4. Alcohol and drugs are strictly prohibited on mine property.
5. While operating a motor vehicle the headlights must be on when in quarry.
6. All traffic signs must be observed and followed.
7. Speed limit is 15 mph.
8. Seat belts must be worn.
9. Always yield right-of-way to quarry traffic.
10. Park out of the way in the open areas away from water, stockpiled materials, electrical lines or high walls.
11. Check behind your vehicle before backing.
12. No smoking or use of open flame.
13. No acts of violence or horseplay will be tolerated.
14. Be alert and remain clear of all equipment.
15. Do not climb on equipment.
16. Stay away from blast areas or recently worked areas.
17. Stay at least 50 feet back from all high walls.
18. Do not climb any stockpiled material or loose stone on quarry floor.
19. No Swimming.
20. Stay back 50 feet from and electrical wiring.
21. All injuries or accidents must be reported to John Kulper or Lindsey Yankovic at 563-659-9181.
22. Access is restricted to day light hours.
23. Use of motorize recreational equipment (four-wheeler, snowmobiles, motorcycles) is strictly prohibited.
24. Boating on quarry waters is limited to Wendling Quarries, Inc. personnel. All applicable IDNR and MSHA laws, codes and rules must be adhered to while boating on quarry waters.
25. Do not dispose of any refuse or litter in the quarry.

**PERMISSION TO ENTER PROPERTY FOR RECREATIONAL PURPOSES**  
**Waiver of Liability**

This permit allows the undersigned to enter Wendling Quarries, Inc. property for the purpose:

**Person(s):** Central Iowa and Badger Lap Clubs

**Site(s):** Collect Rocks on Wendling Property per John Tuthill

**Type of activity:** May 22, 2010

**Authorized by:** \_\_\_\_\_

**I, do hereby acknowledge receipt of permission to enter Wendling Quarries, Inc. premises:**

**Permit Holder Signature:** \_\_\_\_\_

**I UNDERSTAND AND AGREE:**

1. not to hold Wendling Quarries, Inc. or any representative, employee, or associates thereof liable for any loss, damage, injury or death sustained by me while my family and/or I am on the premises;
2. to abide by all instructions and restrictions communicated to me and to take all appropriate safety precautions while on the premises;
3. not to interfere with the operations or the conduct of business, not to disturb any structures, machinery or livestock on the premises;
4. to abide by all Wendling Quarries, Inc. work rules and restrictions including but not limited to those rules attached; and
5. to report all accidents regardless of the degree of severity to John Kulper, WQI Safety Department at 563-659-9181.
6. permit holder acknowledges the privileges granted herein expire December 31, 2009 or earlier as stated on permit card. If the permit is renewed in subsequent year(s) the promises, covenants, terms and conditions as stated herein shall survive from year to year.

I (the permit holder), acknowledge that I have not compensated Wendling Quarries, Inc. or any of its employees for the recreation purposes herein granted. In addition, I recognize the fact this permission is a privilege and it may be revoked without cause and without notice. I agree to be cooperative with any law enforcement personnel or company representative who wishes to inspect this permit. I recognize and am familiar with the inherent dangers on the premises and will take the necessary precautions to protect myself and others from such. I agree to help Wendling Quarries, Inc. police their property against illegal trespassing, but at no times putting myself in harms way or peril in doing such.

**This waiver must be signed and returned to John Tuthill, Bring it with you to the Behr Quarry on May 22.**

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