Wells Creek Impact Crater

*Stewart and Houston Counties, Central Tennessee*

*Mike Baldwin*

Sometime between 100 and 300 million years ago, a violent event occurred in what is now Wells Creek Basin in Stewart and Houston Counties of Central Tennessee. A bright light appeared and streaked southward across the sky. A meteorite, traveling 10 to 25 miles per second (36,000 to 90,000 mph), struck the earth with a shuddering impact, accompanied by a supersonic air blast, and penetrated to a depth of 2,000. *Continued, P. 3*

The 32nd Annual Memphis Mineral, Fossil, & Jewelry Show will be at the Agricenter International April 23-24, 2011. The Show will have 30 high-quality dealers, displays, demonstrations, lectures, and a popular kids area. It is an exhibition and forum for educational experiences that involve the earth sciences, lapidary arts, and archaeology. MAGS donates a portion of the proceeds each year to the Ronald McDonald House Charities of Memphis. Many volunteers are needed to make our Show successful. MAGS Members, please plan to volunteer.
EMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

MAGS Rockhound News ◇ A monthly newsletter for and by the members of MAGS

GREETINGS FROM THE PREZ

Ratz!

Every time I think that I will get to play outside it is snowing again. Maybe by the time that I start drawing Sociable Security, which will be in April, we can play outside—which means collecting rocks. Just out of curiosity, has anyone ever found a rock that the walking encyclopedia, Idajean, could not identify? Always remember our motto, “Collect more rocks.”

That is all I have to say.

The Prez

Go Online

Mike Baldwin, MAGS Webmaster

For the latest information about earthquake activity in the central United States (including the Memphis area) visit www.ceri.memphis.edu.

Established in 1977, the Center for Earthquake Research and Information (CERI) serves the University of Memphis by facilitating interdisciplinary research and education. CERI serves the public by providing authoritative scientific education and information.

This is the final newsletter issue for MAGS members who have not paid their 2011 dues. You will no longer get information about upcoming meeting programs, field trips, and other MAGS news.
feet before the tremendous downward forces together with the earth’s forces of resistance resulted in gigantic explosion. The earth shook and earthquake waves raced in all directions. A mighty fiery mushroom of masses of rock and clouds of pulverized rock dust rose high into the air, and fell back to earth. The rock fragments landed quickly, but some of the dust stayed in the air. A great crater was formed, about four miles in diameter and half a mile deep, rimmed by a surrounding pile of shattered rock debris. The crater was mostly filled in by the central uplift. The deafening noise died away and all returned to the peace and quiet that prevailed before the catastrophe.

The earth’s surface appeared to be damaged forever, but millions of years passed and erosion and vegetation softened the ugly scar. The rim of scattered rock disappeared, and the level of the region was lowered many hundreds of feet by the work of rain and running water, mass wasting, gully ing, and downward and lateral cutting by streams. Because of the shattered character of the rock in the impact area, the circular scar was eroded faster and therefore deeper than the surrounding region. Thus, circular Wells Creek Basin, as it is today, was born.

Perhaps 10,000 years ago, man first saw Wells Creek Basin, Indian tribes found haven in this pleasant basin that had so much to offer. Game was plentiful, and the streams yielded a variety of fish and mussels. Springs and clear streams were present. The low hill in the middle of the basin afforded an excellent place to camp and to live safely above the highest flood water. Outposts of watchers could guard the trail that entered the basin from the south along Wells Creek as well as paths that crossed the protective rim of hills surrounding the basin. The low central hill could be defended easily. Dense flint found in great abundance in the hills about five miles to the west could be patiently worked into arrow and spear points for war and hunting, large ceremonial flint objects, and many other useful items.

When the first white settlers came from North Carolina and Virginia, they were impressed by the relatively flat, well-drained basin. The soil was better than that of the surrounding hill country. Not only was the soil fertile and essentially free of chert blocks, but it also presented within a small area a variety of soil types formed by the weathering of many types of rock exposed there. Here in the basin, a highly agricultural society developed. The owners, their neighbors and visitors, knew that the soil was different and that the rocks were unlike others in the region. Undoubtedly many wondered why.

The center of the Wells Creek crater contains some of the finest shatter cones in the world. A shatter cone is a conical fragment of rock that is formed from the high pressure of a meteorite impact and has striations radiating from the apex of the cone.

Figure 2. Inside Wells Creek Impact Crater. MAGS member, Mike Baldwin, searching for shatter cones at ground zero. Photo by Jennifer Baldwin.
shatter cones were actually formed by the shock waves that arrived before the limestone beds were tilted by the meteorite. The cones formed pointing toward the place from which the shock waves came. The Wells Creek shatter cones were formed by shock waves coming from a position which was (at the time of impact) more than 2,000 feet underground.

In 2006 about 20 members of the Memphis Archaeological and Geological Society were given a grand tour of the Wells Creek Crater by Tennessee state geologist, Marvin Berwind. Mr. Berwind gave us an overview of the formations and fault patterns that make up the Wells Creek structure. We were given an opportunity to view the structure from several locations along the rim before venturing into the crater for an afternoon of exploration and shatter cone collecting at ground zero. Shatter cones were very abundant, although most required a little bit of work to extract from the limestone formations. The Wells Creek shatter cones averaged from about a quarter of an inch to two or two and a half inches in diameter, although shatter cones outside that range were also available.

REFERENCES:

March 19 Field Trip To Wells Creek

On Saturday, March 19, MAGS will sponsor a field trip to the Wells Creek Impact Structure, near Erin, Tennessee. We will meet at 10:00 A.M. at Ryes N-Shine Inc., 1349 Highway 149 E, between Erin, TN, and Cumberland City, KY (WNW of Nashville, approximately 3 hours from Memphis).

The trip leader will be Marvin Berwind, (931) 801-8393, retired from the Tennessee Department of Environment and Conservation, Division of Geology. The MAGS trip leader is Marc Mueller, (615) 491-5110.

Before his retirement Berwind was in charge of the subsurface geology section in the division’s Nashville office. In 2006 he led another MAGS field trip to this site. For more information please see Mike Baldwin’s article, “Wells Creek Impact Crater,” which starts on P. 1 and ends just above.

**Fossils and/or Minerals:** Primarily shatter cones, with some fossils possible.

**Tools:** We will be surface collecting and materials are abundant. Bring leather gloves and buckets. If desired, rock hammer and chisel with safety glasses, also small pry bar. Small wagon or two-wheel cart for transporting heavy buckets.

Signup sheets for those interested in this trip will be available at the March meeting.

Figure 1. Digital elevation model view from south to north. Geology of central uplift is: Orange peak, yellow and dark pink areas at center are Lower to Middle Ordovician Limestone. This material was thrust upwards a distance as much as 800m+/-.

Light pink through to orange are Silurian, Devonian and Mississippian strata. Middle Ordovician Strata and above are flanking a ring structure.
The Memphis Mineral, Fossil, & Jewelry Show
Table Sponsorship
Friends of the Show Sponsorship

For club members
Sell Table and/or Friends of the Show sponsorships and you may win.
1. For every $25 sales you generate you will receive one ticket that may win you gift certificates to spend at the show.
   - Sell one $100 sponsorship you will receive four tickets.
   - Sell one $25 sponsorship you will receive one ticket.
   - Sell five (5) $25 sponsorships you will receive 5 tickets.
   - You may purchase sponsorships for yourself.

Your ticket(s) may be a winner
Friday show dinner tickets will be drawn and winner(s) will receive:
1. First place–show gift certificates equal to 10% of total Table/Friend of the Show sponsorships
2. Second place–show gift certificates equal to 5% of total Table/Friend of the Show sponsorships sales
3. Third place–show gift certificates equal to 5% of total Table/Friend of the Show sponsorships sales when total sponsorship reaches $2,500

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For complete details contact WC McDaniel, w.c.mcd@att.net or 901-274-7706
Other Area Club Events

CAGMAGS Rock Swap

The Central Arkansas Gem, Mineral and Geology Society will hold its annual rock, mineral, and fossil swap meet on April 9, 2011, from 9 am until 5 PM. It will be at Burns Park in North Little Rock, Arkansas, at the Elder Johnson Pavilion next to the visitor center. Take exit 150 off of I-40 on to Military Drive, and go north on Military Drive to the first road to the west. Go west to the park visitor center; the Elder Johnson Pavilion is next to it on the west side. The swap is open to all area rock clubs and the public, no set up charge. Contact Mike Austen, (501) 868-4553 or steelpony@aol.com for more information.

The Central Arkansas club, along with other clubs from the area, will have rocks, minerals, fossils and other related items for sale or trade. Bring along your own items for free identification or trading. Admission is free, so just come and see what kinds of wonderful items can be found in our state. You can talk to some great people with a lot of knowledge of geology and the hobby of rock collecting. You can get information about or join the Central Arkansas Gem, Mineral and Geology Society.

Asheville Gem Fest 2011

Asheville Gem Fest 2011 is affiliated with the Southern Appalachian Mineral Society (SAMS) and the Colburn Earth Science Museum. SAMS is an SFMS member club. This show supports the hobby of mineral collecting and also helps the Colburn Earth Science Museum continue to offer great earth science education to the kids of Western North Carolina. The museum also sponsors the "Junior Rockhounds Club," which gets new young people interested in minerals and mineral collecting.

June 17-19, 2011
Asheville, NC
Asheville Gem Fest 2011
Fri. & Sat.: 10 AM - 6 PM
Sun.: 12 noon - 5 PM
Pack Place, 2 South Pack Square (Downtown Asheville)
Free admission, minerals, gems, jewelry, fossils, kids' activities, silent auction, door prizes
(828) 254-7162
www.colburnmuseum.org

March 26 Field Trip to Vulcan Rock Quarry

Since the rock quarry closes at noon, we will meet early, at 7:00 at the Parsons Hardee's, 148 Tennessee Avenue N, Parsons, TN 38363-2027. Then we will convoy over to the rock quarry, which is close by.

Directions: From Memphis take I-40 East towards Nashville. Take exit 93, TN 152, Law Road, toward Lexington. Follow TN 152 for 30 miles, passing through Lexington until you reach Parsons. In Parsons, turn left onto Tennessee Avenue and Hardee's will be about .1 mile. Please be on time because we have to sign a release and then all go in at the same time.

Specimens: Marine invertebrate fossils such as corals, crinoids, brachiopods, sponges and trilobites. These specimens may be found in gray limestone and shale.

Tools: Bring rock pick, hammer, chisel, pry bar, screwdriver, etc. Leather gloves are a good idea, also safety glasses. Newspapers for wrapping specimens, collecting containers such as bucket or clothes bags.

Hotels:
Announcement – Please Post

Feather River Lapidary and Mineral Society, Oroville, CA is pleased to announce the

**Third Annual World Rock Tumbling Championship**

![2010 Winning stones](image)

www.orovillerocks.com

It’s time to challenge the champions! The Third Annual Rock Tumbling contest is open to everyone, any age, worldwide, who enjoys tumbling rocks and wants a shot at being the best in the world. Here’s how:

- Send in a completed application (below) with a $40.00 entry fee postmarked no later than May 6, 2011.
- Nevada Royal Jasper mine owner, Randy Messer, has agreed to provide the contest material this year. Each contestant will receive almost 4 pounds of rough sent USPS Priority Mail by the end of May.
- Contestants will have over three months to tumble the rock in a rotary or vibratory tumbler and mail a half-pound (1/2 lb) of the best pieces for judging. The entries must be received no later than September 23, 2011.
- Steve Hart, author of Modern Rock Tumbling, will evaluate each entry on the basis of smoothness, shape, shine and overall appeal. He will select the top five entries to be displayed at the FRLMS Rock and Gem Show held in Oroville, California the first week-end of October.
- Everyone attending the Rock and Gem show will examine the top five entries and cast a ballot for their favorite. The top three popular vote winners will be announced following the show.

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**Note to Rock and Gem clubs:** Get your club noticed! Consider sponsoring a contestant from your club. This year we will include club affiliation when announcing the name of the winners! Also, this is a wonderful opportunity for your junior members to learn more about tumbling and competition.

*(FRLMS is actively seeking a source of tumbling rough for the 2012 contest. Please contact the club at the address below or through the website www.orovillerocks.com with suggestions.)*

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**2011 Application Form**

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<td>E-Mail Address</td>
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Please mail applications with a check or money order by May 6th to:
FRLMS Contest Headquarters, PO Box 2645, Oroville CA 95965
MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

MAGS Rockhound News ◊ A monthly newsletter for and by the members of MAGS

**January 2011 Board Minutes, Marc Mueller**  
The MAGS Board of Directors met January 6, at the St. Clare Room in St. Francis Hospital, 5959 Park Avenue. Present were: Lou White, Mike Baldwin, Carol and Matthew Lybanon, Marc Mueller, Alan Schaeffer, Ron Brister, Neville Mayfield, W.C. McDaniel, Nannett McDougal-Dykes, Doris Jones, Alan Parks  
Secretary: December 2010 Board Minutes were approved as submitted.  
Treasurer: Report –November Treasurer’s report was presented by Doris Jones. Bank charges $15 per month when our balance falls below $5,000. Recommended that we transfer $1,000 right now and as needed $500. Approved.  
Field Trips: Columbus Mississippi, Feb 12 at 10:00 am. George Phillips, our speaker on Feb 11, will lead.  
Junior Program: Rubber stamps, Feb – Herb Nicholson will do program on different types of rocks.  
Show: W.C. hoping to sell out show spaces. Web site is up. Please review web site and feed back your ideas. Need donations of material for the Gem Dig. Have received some donations already of tumbled stone, drusy quartz. Need volunteers.  
Library: Nothing new. Will buy 2 new rolling cabinets and free up two cabinets for educational. Will rearrange by category so that TN stuff is together, etc. Fossil Reference collections.  
Historian/Rock Swap: Newsletters are being scanned for soft reference and possibly being added online.  
Newsletter: Matthew Lybanon will take over on February. Mike Baldwin will do the January Newsletter. Please submit material, particularly pictures. Any officer is free to use the newsletter to inform the club about events.  
Webmaster: Mike Baldwin is redesigning the Web site – first time in five years. Send links and design ideas. Would like to start a Flikr account for picture access.  
Membership: Membership roles being finalized. Renewals arriving every day. Need announcement in the newsletter.  
Old Business: None  
New Business: W.C.: Memphis Botanical Garden has requested that we repeat our presentation. We are planning for Friday Oct 14. Last year we made about $600. Room at the storage shed may be used to store the paper mache man-sized dinosaur made by Philip Loveland.  
Memphis Stone and Gravel is requesting our help in the approval of a new development in North Shelby County. The board will send a letter in support. Ron will send a letter to the Secretary, who will sign and send it.  
Charles Hill – anyone contact.  

**Juniors Program**  
Carol Lybanon, Youth Director  
In March Herb Nicholson will talk to us about “Rocks.” Juniors, if you bring in a written definition for Plutonic Rocks you may win a prize! Who will be the winner?  
Our April program will be part of our Mineral, Fossil, & Jewelry Show. Look forward to programs on magnetism, arrowheads, dinosaurs, and fern fossils.
An Official Field Trip of Gaston County Gem, Mineral & Faceting Club (Gaston, NC) (HOST)
An Official Field Trip of the (enter your associated club's name here!)

8:30AM until 12:00PM EDT
Saturday – March 12, 2011

Martin Marietta Quarry, Kings Mountain, NC

WHERE: The Martin Marietta Quarry in Kings Mountain NC. The entrance is on Holiday Inn Drive, which is an access road at the I-85/Rt 161 interchange (exit 8) on I-85. The quarry entrance is at the plant office which is the assembly area.

WHEN: Saturday – March 12, 2011  Rain or Shine.

DIRECTIONS:
From I-85 South, take exit 8, turn right onto 161. Take the first left (not the return to I-85), you will see the Waffle House; this road takes you right in front of the Waffle House. Pass the Waffle House and the motel (both on your right) and continue app. 1/4 miles. You will see the gate on your right.

From I-85 North, take exit 8, take a left. Go over bridge, pass the return road to I-85 then turn left onto the next road, you will see the Waffle House; this road takes you right in front of the Waffle House. Pass the waffle house and the motel (both on your right) and continue app. ¼ miles. You will see the gate on the right.

ASSEMBLY TIME: 8:00 TO 8:30AM EDT at the plant office parking lot. We will have a safety briefing starting at 8:30. We will then load up and convoy a short distance to the collecting area at the southern end of the property. This area is composed of overburden and mine dumps from the Foote Mine, which is located next door (west of the collecting area).

COLLECTING: The minerals found in this area include most of the species found in the Foote mine including the usual assemblage for a lithium pegmatite: spodumene, quartz, and feldspar. The area is known for the large number of unusual lithium, tin and beryllium minerals, especially phosphate minerals, which are found in fractures in the pegmatite. The Foote Mine has been shut down since 1992 and the mine dumps have been closed to collectors for approximately 20 years. These dump areas on the Martin Marietta property are the only material from the Foote Mine that have been “turned over” since the mines closure.

AGE LIMIT: No children (must be age 14 or older)

EQUIPMENT: Hard Hat, safety glasses, steel toe or good strong leather boots. No sneakers or sandals will be allowed. You should wear long pants and have gloves. A rock pick or mason’s hammer, a 3 to 4 pound crack hammer, chisels and a really large sledge if you are serious about busting rocks. Buckets or bags, newspaper with which to wrap your finds and, of course, plenty of water, Dress according to the weather this day and prepare for a rain shower.

SAFETY: Martin Marietta is very safety conscious and has an excellent record. If you are in an unsafe area you will be asked to move. We will not in an active mining area but there are still many potential hazards. Please respect the safety berms and marked unsafe areas. Be aware of your location at all times.

CONTACT:
Tom Taylor
Gaston CGM&FC - Vice Pres.
704-735-9271  tom.taylor@chemetall.com
Lost & Found

Hello, MAGSters! The glasses in the photo above were left at a meeting two or three months ago. If they’re yours, please contact our Membership Director, Neville Mayfield, to arrange to get them back: (901)-386-3006.

Now Available

The new MAGS business cards are here! They are a perfect complement to the postcard-size club and Show cards announced in the February MAGS Rockhound News. When you need to get MAGS information to prospective members or just anyone you’re telling about MAGS or the Show, they are a convenient, compact source of the information you need. Get them at the meetings or from Board Members.

Calendar

March 3
Board Meeting, St. Clare Room, St. Francis Hospital, 6:30 P.M.

March 11
Membership Meeting, Shady Grove Presbyterian Church, 7:30 P.M.

March 19
Field trip to Wells Creek Formation

March 26
Field trip to Vulcan Quarry

April 23-24
2011 Memphis Mineral, Fossil, & Jewelry Show, Agricenter International