



THE GEOLOGICAL SOCIETY OF MINNESOTA

News

Volunteer opportunities, field trips, lectures, and public service, since 1938

**1938
GSM
2013**

Celebrating

**

75 Years

**

From the President's Desk...

With summer in full swing, I took advantage of some beautiful weather and was able to visit long-standing family friends in North Dakota with my husband. Our first stop of the road trip was Fort Abraham Lincoln State Park: <http://www.parkrec.nd.gov/parks/falsp/falsp.html>. It was originally set up as an Infantry post, but it was converted to a cavalry post because the local Native American tribes fought on horseback.

I've not seen the area in quite a few years and took note of the signs of the times. The countryside was dotted not only with cows, horses and deer, but there were also trucks hauling water, trucks hauling gas, and trucks hauling machinery on the back-roads, frontage roads and highways. I have been able to witness firsthand how the oil boom has affected the once depressed economy of this area, an area in which numerous droughts had taken their toll over the years on those that tilled the land for their daily bread. I grew to understand the difficulties of numerous families trying to do their own balancing acts.

The next couple of days were spent reminiscing with some old friends, re-telling stories, and then creating new ones! To say that Theodore Roosevelt National Park is beautiful is quite the understatement. Everything from the faulting seen more clearly at a distance, the depth in the cutbacks in the river, to the wild horses, elk, and deer, took on a peaceful significance: <http://www.nps.gov/thro/index.htm>

The South Dakota Badlands territory is every bit as gorgeous as TRNP, but the weather extremes seem more harsh and unforgiving. We carried a cooler with us and made most of our meals daily. What a relief it was to find



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from the archives: A visit to Gooseberry Falls on a GSM Field Trip Sept. 1939.



the covered picnic tables and a quiet spot to just soak in the scenery. Taking a step back to a time when men worked the fields with their bare hands, accompanied by their wives who did their share of the work sporting extra twenty-pounds in petticoats, I wonder how anyone could have survived the extremes that this land cultivates. Badlands National Park: <http://www.nps.gov/badl/index.htm>

Closer to home, my husband surprised me with a trip to Pipestone National Monument: <http://www.nps.gov/pipe/index.htm> There were quarries to check out, Circle Trail (which is a short trail with the Winnewissa Falls mid-way), and interpreters - Native artisans that give demonstrations on carving the pipestone. It was not something to miss!

Also on this trip we made a number of great side trips, maybe one of these will fit into your upcoming travels: Mount Rushmore National Monument: <http://www.nps.gov/moru/index.htm>; Dakota Dinosaur Museum: <http://www.dakotadino.com/>; Black Hills Institute: <http://www.bhigr.com/museum/>; South Dakota School of Mines and Technology: <http://www.sdsmt.edu/Museum-of-Geology/Visit-the-Museum/>



Theresa Tweet

GSM News

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Editors: Katy Paul; Harvey Thorleifson; Rich Lively

The Geological Society of Minnesota is a 501(c)3 nonprofit organization. The purpose of this newsletter is to inform members and friends of activities of interest to the Geological Society of Minnesota.

Send all GSM membership dues, change of address cards, and renewals to:

Joanie Furlong
 GSM Membership Chair
 P.O. Box 390555
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Membership dues are: \$10 Full-time students; \$20 Individuals; \$30 Families

GSM News is published four times a year: **February 15, May 15, August 15, and November 15.** Deadline for article submission is the first of the month, before the date of publication.

Send all material to:
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REMINDER!

The fair starts on **Thursday, August 22 and ends on Labor Day, September 2.**

GSM News continued:

Nominees for the Board: There will be an election of new board members at our Annual Meeting on Sept. 23. We have three vacancies to fill for 2014 and the following have accepted nominations. There will also be nominations accepted at the meeting if anyone else would like to volunteer to serve on the board. These are 2-year terms with one consecutive 2-year term allowed.

Mary Helen Inskeep
John Jensen
Ruth Jensen

Welcome, New Members

Robert Belisle, Spring Lake Park
Drew Faherty, Andover
Chuck House, Saint Paul

Bob Klassen, Litchfield
Amy McGuire, Saint Paul
David Mauer, Duluth
Dean Peterson, Saint Paul

ANNUAL MEETING

Sept. 23, 2013

Grand City Buffet

9812 Hwy 7

St. Louis Park

5 pm – Dinner

7 pm – Meeting / Program

In Memoriam
Paul Edward Martin
Aug. 3, 2013



Paul Martin died, Saturday, August 3rd, 2013. Paul was active in GSM, serving on the board of directors, and as President in 2003 and 2004. Paul was also involved in setting up the State Fair booth each year.

Paul was a teacher, and was active in many community programs, building canoes, and volunteering at a local radio station. He is survived by loving wife, Bridget; children, Debbie and David; grandson, Naeem; siblings, Naomi, and Elaine (Karl); and other nieces and nephews.

For those of you who did not know him, he was a most remarkable person. He will be missed.

Tragedy at Lilydale Regional Park

Nearly everyone in our region who has any interest in geology has been fossil hunting at Lilydale, across the river from Saint Paul. At the park, fossiliferous Decorah Shale of Ordovician age previously was mined for the manufacture of bricks. Also exposed at the park are underlying Platteville Limestone, and St Peter sandstone into which the now-barricaded Echo Cave was once dug.

The park is a popular destination for school groups; the city of Saint Paul issues more than 400 group permits per year. Sadly, however, tragedy struck in late May, when a landslide occurred as a fourth-grade school group was visiting, resulting in injuries and two deaths.

Two investigations are now underway, to help guide appropriate follow-up to the tragedy. Saint Paul has hired a geotechnical consulting group - Northern Technologies Incorporated - to examine the site and to help understand what caused the landslide. The city also has hired a prominent attorney to examine legal aspects of the topic. Pending the outcome of these analyses, applications for permits are not being accepted by Saint Paul at this time.

**In honor of the 75th Anniversary
GSM THROUGH THE YEARS....**

**Compiled from past issues of the
GSM Newsletter**

70 Years Ago - 1943

Mr. Edward P. Burch spent the summer in and around Boston, studying the geology of that region...The first meeting of this year will be held in the Museum Auditorium, in the Public Library at 7:30 pm... Dr. Thiel's course of lectures will begin on Oct. 18. This course will be given in his usual plain, simple, non-technical manner. The course is designed to give you an intelligent understanding of the various phases of earth history represented by the usual division of time into eras and periods.

60 Years Ago - 1953

Did you know that our average attendance at the lectures so far this year is less than half of what it has been in past years in spite of the unseasonably nice weather? It is disheartening to the program committee and the board members – in fact to everyone who has worked in the Society, to have an excellent program arranged and then to find it so poorly attended...The project of installing bronze plaques at various places throughout the state depicting the geology of a particular area was the first such project ever undertaken by an amateur Geological Society anywhere in the United States.

50 Years Ago - 1963

No Newsletters were published in 1963

40 Years Ago - 1973

Dr. Matt Walton, the new Director of the Minnesota Geological Survey, had an opportunity to get acquainted with GSM members who attended the August 14-15 field trip to the Minnesota River Valley led by Dr. James Grant. Dr. Walton is an expert on Precambrian geology and

decided to avail himself of this opportunity to see first hand some of Minnesota's ancient bedrock gneisses. He came along as a regular tour member, but he added a bonus to Dr. Grant's excellent leadership with his own insightful comments.

30 Years Ago - 1983

We are looking for photos (prints or slides, preferable color) of familiar places in the Twin City area that illustrate phases of geologic processes. The purpose is to develop a slide program with script, suitable for use in the Public Schools in the Area. Teachers in some Minneapolis grade schools have expressed an interest in a teaching aid like this.

20 Years Ago - 1993

An exciting new idea was proposed at the October 27 Board meeting – a video lending library of geological tapes available to the membership. A temporary committee, to be chaired by Doug Zbikowski, will investigate the question. The availability of geological video tapes (VHS format) has already been researched somewhat, with currently over 16 separate sources identified and contacted. Tapes range in price from \$19 to \$250 each, with over a hundred tapes available for under \$100.

10 Years Ago - 2003

The Legislature established a new Mineral Coordinating Committee in the Department of Natural Resources to establish a plan to encourage mineral exploration and development in Minnesota. The committee brings together various resource and economic development agencies, including the Geological Survey, Natural Resources Research Institute and representatives of mining and mineral industries. They are to work out a plan over the next three years.

Salt peter Caves in Minnesota

In 1700 Pierre-Charles Le Sueur claimed to have found salt peter in caves along the shores of Lake Pepin. Greg Brick from the Department of Earth Sciences at the University of Minnesota has investigated this claim and he has permitted us to condense his study for use in our newsletter.

In 1700, French fur trader Pierre-Charles Le Sueur reported finding caves containing salt peter along the Minnesota shore of Lake Pepin. This was the earliest report of cave salt peter in North America. Salt peter (potassium nitrate) was an important ingredient in gunpowder, as well as being used as a meat preservative, a medicine, and a fertilizer. Native Americans used it for work with dyestuffs.

Although Le Sueur described the Lake Pepin cave finds as “salt peter”, he was more likely referring to calcium nitrate. What is called a “salt peter cave” in the literature does not always mean a cave that actually contains salt peter (potassium nitrate) but rather a precursor substance, historically known as “petre dirt,” containing calcium nitrate which must be converted into salt peter by human activities such as leaching with lye made from potash, and boiling.

The prevailing humidity in Minnesota caves is too high for Le Sueur to have encountered anything other than deliquescent salts, dissolved in the sediment, rather than crystallized salt peter. Apart from whitish snow-like efflorescences, not even experienced salt peter prospectors could identify nitrate-rich sediments by sight and the usual confirmation was a bitter taste, until modern chemical tests for nitrates were developed. Minnesota lies well outside the classic “salt peter belt” that runs from the Appalachians west to the Ozarks, so what was it that Le Sueur actually found?

The location of Le Sueur’s salt peter caves is not identified on historic maps. The French cartographer Guillaume Delisle used Le Sueur’s notes for his 1702 map of the Mississippi and this map does label some mineral resources such as copper and lead mines, but it does not depict the salt peter caves. Le Sueur’s notes mention a “chain of mountains” where the caves were found, and this tallies reasonable well with former islands in the ancestral Mississippi River in Goodhue County, of which Barn Bluff in Red Wing is the best known example. This series of ridges were once mesa-like islands in the river — slices of the hinterland

separated by post-glacial stream erosion, composed of bedrock, and not to be confused with the low, sandy, alluvial islands with which we are familiar today, such as nearby Prairie Island. In other early narratives describing Lake Pepin, such as that by Jonathan Carver, the bluffs walling in the lake are described as “a range



of mountains” but the way in which Le Sueur delimits the lengths of the mountains suggest discrete massifs, i.e. the bluff islands, rather than the river bluffs generally.

Of the several possible Goodhue County “islands” the one that best matches Le Sueur’s stated dimensions is the Sevastopol Bluff which towers over the logging ghost town of Sevastopol, north of U.S. Highway 61 and east of the modern Sevastopol Road. While there is no way of knowing if Le Sueur actually visited this bluff, it is consistent with the descriptions in his narrative. Testing of the floor sediments found in crevices in the Sevastopol Bluff showed elevated levels of nitrate.

This finding prompted more testing of sediments found in nearly one hundred caves and crevices in the Upper Mississippi Valley, from a variety of rock types (dolomites, limestones, sandstones, and basalts) that ranged in age from the Precambrian to Pennsylvanian. Laboratory analysis of these sediments showed that high concentrations (up to 35,000 ppm) were widespread among rock voids on both shores of Lake Pepin. The highest nitrate value obtained during this study was from the dry, reddish sediment of an Oneota rockshelter in Rattlesnake Bluff, which forms the western end of Frontenac State Park. This compares with the 3 percent to 5 percent nitrate historically reported for commercial concentrations.

Le Sueur’s claim of finding salt peter (or more likely, calcium nitrate) in Minnesota caves is credible. Many of the Minnesota cave sediments are sufficiently enriched in nitrate to be worth extraction. But individual Lake

Pepin crevices are small, narrow, widely separated, and often difficult to get to, being located at the top of steep talus slopes at a considerable elevation above the lake. Even if a sufficient number of them were available for mining, the amount of human labor involved would be enormous.



Greg Brick

Collection on Display at MIA

GSM member Mark Ryan's "Paleoart; Past and Present", a collection of fossils, figures, and dinosaur artwork, both current and vintage, is showing now at the **Minneapolis Institute of Arts**.



The display is part of the "Show and Tell: Everyone's a Collector" exhibit in conjunction with the MIA's current "What's New / What's Now"



show.

The display will be on view until September 1st and is located in the entrance to the museum's Target Wing gallery on the 2nd Floor.

The museum is located on East 24th Street at 3rd Avenue in Minneapolis.

PLEASE NOTE: Entrance to the museum's main galleries (including the Paleoart display) is free. However, there is a fee for the "What's New / What's Now" special exhibit.



USGS CONFIRMS METEORITE CRASH 470 MILLION YEARS AGO

Recent airborne geophysical surveys near Decorah, Iowa are providing an unprecedented look at a 470 - million-year-old meteorite crater concealed beneath bedrock and sediments.

The aerial surveys, a collaboration of the U.S. Geological Survey with the Iowa and Minnesota Geological Surveys, were conducted to map geologic structures and assess the mineral and water resources of the region.

"Capturing images of an ancient meteorite impact was a huge bonus," said Dr. Paul Bedrosian, a USGS geophysicist in Denver who is leading the effort to model the recently acquired geophysical data. "These findings highlight the range of applications that these geophysical methods can address."

In 2008-09, geologists from the Iowa Department of

Natural Resources' (Iowa DNR) Iowa Geological and Water Survey hypothesized what has become known as the Decorah Impact Structure. The scientists examined water well drill-cuttings and recognized a unique shale unit preserved only beneath and near the city of Decorah. The extent of the shale, which was deposited after the impact by an ancient seaway, defines a "nice circular basin" of 5.5 km width, according to Robert McKay, a geologist at the Iowa Geological Survey.

Bevan French, a scientist the Smithsonian's National Museum of Natural History, subsequently identified shocked quartz - considered strong evidence of an extra-terrestrial impact - in samples of sub-shale breccia from within the crater. "The recognition of this buried geological structure was possible because of the collaboration of a local geologist, water well drillers, the USGS STATEMAP program, and the support of the Iowa DNR concerning research on fundamental aspects of Iowa geology," said McKay.

The recent geophysical surveys include an airborne electromagnetic system, which is sensitive to how well rocks conduct electricity, and airborne gravity gradiometry, which measures subtle changes in rock density. The surveys both confirm the earlier work and provide a new view of the Decorah Impact Structure. Models of the electromagnetic data show a crater filled with electrically conductive shale and the underlying breccia, which is rock composed of broken fragments of rock cemented together by a fine-grained matrix.

"The shale is an ideal target and provides the electrical contrast that allows us to clearly image the geometry and internal structure of the crater," Bedrosian said.

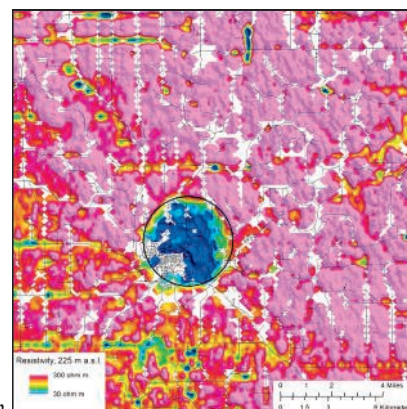
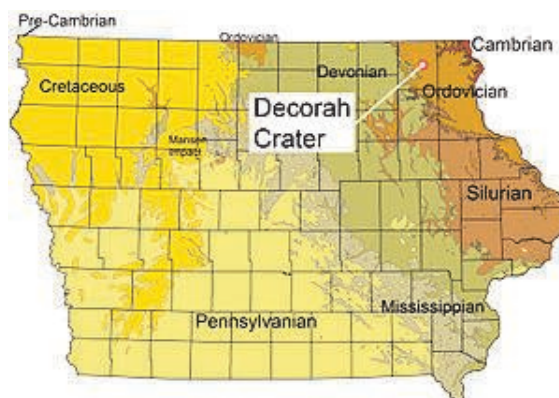
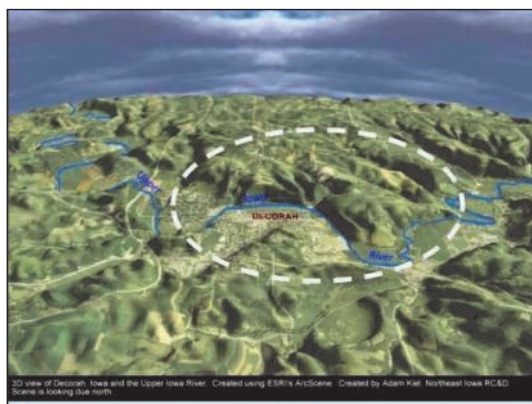
More analysis of the data will provide additional detail. These data show the impact as a nearly circular region distinct from the surrounding area to a depth of several hundred meters.

"These data, when coupled with physical property measurements on drill core samples, will form the basis for modeling efforts to constrain the impact geometry and energy of the meteorite," said Dr. Andy Kass, a USGS geophysicist working on the effort.

The Iowa and Minnesota airborne geophysical surveys are targeting an igneous intrusion, known as the Northeast Iowa Igneous Intrusive complex,

that may be similar to the Duluth layered igneous complex exposed in the Lake Superior region of northern Minnesota. Known copper, nickel, and platinum group metal resources were deposited during the formation of the Duluth complex. Both of these complexes are associated with a large structural feature known as the Midcontinent Rift, which is exposed in the Lake Superior Region but is covered by younger rocks as it extends to the south through Iowa, Nebraska, Kansas, and Missouri.

This geophysical survey is part of a larger USGS effort to evaluate the concealed mineral resource potential of the greater Midcontinent Rift region that formed about 1.1 billion years ago.



from USGS.gov

MEMBERSHIP RENEWAL REMINDER

Our fall membership renewal is on the horizon. Renew by mail or wait until the lecture series starts September 23, and renew in person.

Everybody will be up for renewal this fall when the new lecture series starts. (Some people have just recently paid so your renewal date is October 1, 2014) If you wish to mail in your dues please include the information below.

Membership renewal October 1, 2013 to October 1, 2014.

Name(s) ---- _____

Address ---- _____

Phone ----- _____ E-mail(s) _____

Would you like to help save money (and trees) and receive our quarterly newsletter only by email

Yes _____ No _____

Please make check payable to : GSM

Please mail to:

Membership Levels

() Student -----\$10

() Individual---\$20

() Family -----\$30

() Sustaining---\$50

() Supporting---\$100

_____ Membership fee

_____ Tax-deductible contribution (GSM is a 501(c) 3 nonprofit educational organization)

_____ Total included

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