



# GSM NEWS

GEOLOGICAL SOCIETY OF MINNESOTA  
AUTUMN 2004 • VOLUME LVIII NO. 3 • [www.geo.umn.edu/orgs/gsm](http://www.geo.umn.edu/orgs/gsm)

## New lecture series focuses on US, Canada Parks

The geological features of the major national parks of the United States and Canada are the topics of the Geological Society of Minnesota's 2004-05 Winter Lecture Series.

A full schedule for the series is inserted in this newsletter. Thanks go to Steve Erickson for pulling the series together and recruiting the presenters.

The series kicks off on Monday, Oct. 4 with a presentation on the geology of Minnesota's North Shore state parks by Jim Miller of the Minnesota Geological Survey.

Horizons widen as the lecture series surveys the parks of the American West with presentations by such leading geologists as Dr. E. Calvin Alexander of the University of Minnesota (discussing Wind Cave and Grand Canyon National Parks).

The series swings up into Canada with presentation on the parks of the Canadian Rockies by U of M Prof. Christian Teysier and another on the proposed Manitoba Lowlands Park by Minnesota Geological Survey director and Canada native Dr. Harvey Thorlielson.

In addition to the lectures, a lab session on basic rock identification will be conducted Oct. 11 by U of M Prof. Kent Kirky and another on identifying dinosaur fossils on Dec. 6 by Dr. Ray Rogers of Macalester College.

The lectures will be held in Room 3-210 of the Electrical Engineering Building of the U of M Minneapolis campus.

As always, the GSM Winter Lecture Series is free to members and non-members alike.

## Fall Banquet, GSM Board election set for Sept. 20

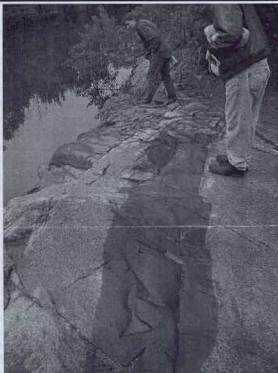
The GSM's annual Fall Banquet is set for Monday, Sept. 20 and will feature the election of new board members and a presentation by Minnesota Geological Survey Director Dr. Harvey Thorlielson.

Dinner begins at 5 p.m. and official

business at 7 p.m. The banquet will be held at Old Country Buffet, 6540 University Ave. NE, Fridley (corner of University Avenue and Mississippi Street about one mile north of I-694).

The Nominations Committee has proposed the names of Janet Hopper

and Gerald Paul for two seats coming open on the GSM Board of Directors. Rose Mary O'Donovan and Marlys Lowe are completing their service on the board. The nominating committee consisted of Diane Lentsch, Judy Hamilton and Bill Robbins.



## Granite City Field Trip

GSM members visited Quarry Park in St. Cloud and other nearby sites in May to learn about Minnesota's granite formations. The tour leader, Terry Boerboom, is showing a pink granite formation with an intruded gray/black diabase dike. The rock has been smoothed over by a glacier. See photos of the GSM field trip to a Burnsville quarry inside this newsletter.

## GSM NEWS

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The purpose of this newsletter is to inform members and friends of the activities of the Geological Society of Minnesota. GSM NEWS is published four times a year: February 15, May 15, August 15, and November 15. GSM NEWS welcomes unsolicited Geology and Earth Science related articles and photographs. Deadline for article submission is three weeks before the date of publication. Send all material for GSM NEWS to: GSM News, c/o Tom Smalec, 797 Newell Drive, Apple Valley, MN 55124, or to the e-mail listed above.

### GSM OFFICERS - 2004

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### CHANGE OF ADDRESS & NEW MEMBERSHIPS

Send all GSM membership dues, change of address cards, and renewals to the GSM Membership Chair: Gail Marshall, 12232 Allen Drive, Burnsville, MN 55337; phone 952-894-2961. See form on Page 7.

#### Membership Levels:

\$10 Full-Time Students  
\$20 Individuals \$30 Families

## From the President... Paul Martin

### Taking Geology on the Road

This will be a short letter since it is written in early July before my dear wife and I set out on a month's camping trip to the maritime provinces of Canada and New England. We've never been to there, so are really looking forward to seeing the St Lawrence River, the Gaspe Peninsula, the Bay of Fundy with its impressive tides, Acadia National Park and the jagged shoreline of Maine, and the top end of the Appalachian range, more often called the Green and White Mountains.

Isn't it interesting how often we, and I am sure many of you, choose places like these of great beauty and geological interest for our vacations! That's part of the reason the GSM board and Steve Erickson decided to have the "Parks of North America" as the theme for our next series of lectures.

Our experts will teach us and show us about parks from Hawaii to northeastern Canada, and from Manitoba to Arizona! What a ride! I hope to attend them all, and I might even convince my geology widow wife to come to one or two! In the last two summers we were awed by the Arches, Bryce Canyon, Zion, and Grand Canyon National Parks, so she might want to come to the lectures of those famous parks.

Please do come visit our booth in the Education Building at the State Fair in late August-early September, if you are not one of the many who have already signed up to staff the booth. If you haven't signed up, it might not be too late. You could still phone Tom Schoeneker at (952) 474-4600 to see if he has any last-minute cancellations, or if he has a list of volunteers in case he does have any last-minute cancellations.

Helping out at the booth is a lot of fun and very educational. It is amazing how many ordinary visitors of all ages come to us and ask for advice or information about rocks and formations they have seen.

Also, please remember our fall banquet on Monday, Sept. 20. Harvey Thorleifson, Director of the Minnesota Geological Survey, will come to describe what they are doing and will be doing in the near future. It will be great!

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### Correction

The following correction applies to the "Waves" article by Bill Robbins in the Summer 2004 issue of the GSM News:

In the section on "WATER WAVES", the second paragraph, fourth sentence should read:

"Shallow water waves travel at a speed proportional to the square root of water depth, and this is the relationship used to determine ocean depth from the speed of tsunamis across oceans."

-Bill Robbins

## UW-RF Geology Program emphasizes ethics, service

When most people think of geology, the subjects of ethics, professional development or service-learning probably don't come to mind. But those subjects are very much on the minds of UW-River Falls geology faculty, who are making them an integral part of the geology program.

"These were three things we weren't doing well enough," said Robert Baker, chair of the geology department.

Professor Ian Williams says that while the topics of ethics, professional development and service-learning may emerge in other classes, those subjects have not been an integral part of any specific course. "We all thought someone else was dealing with it in their courses," Williams said.

Many students are active in community projects, campus discussion groups, or at professional conferences, but some do not take advantage of these experiences. "We want to catch the students who are hurting themselves by not becoming engaged," Professor Mike Middleton said.

To meet the professional development requirement, students must attend one professional geology conference, a day-long conference or field trip and a minimum of three visiting-scientist or faculty professional talks.

Both Williams and Baker note

frustration with student attendance at such events in the past.

The faculty believes attending these events is important because it will be a part of students' future careers and is an excellent way to network with professionals and possibly find internships.

"There are sessions going on in all aspects of geology," Baker said. "Students can connect with professionals, graduate schools, or anyone in the field."

Students must complete eight hours of volunteer activities for the service-learning requirement. Opportunities to fulfill this need range from sandbagging flooded areas and making displays at rock and mineral shows to mentoring other students or helping with Earth Week activities.

Along with the service learning portion of the curricula, students must complete and document two job explorations, such as spending a day with a geoscience professional or a

geoscience-related organization.

Ethics will be integrated into the sophomore seminar and senior research experience. Professors will cover research, field and professional ethics, such as accurate data reporting, asking permission before exploring land, or knowing when to release earthquake warnings so as not to unnecessarily alarm the public.

Faculty members hope that getting geology students out in the community will make the program more visible and give the public a better understanding of

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**"Some people believe that science is done by bespectacled people in white coats. We're not just academics in the ivory tower." - Prof. Mike Middleton**

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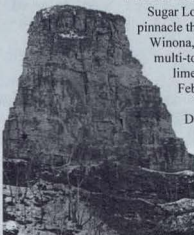
what geoscientists do.

"There has been a misconception by the public of science. No one knows what academics do," Middleton said. "Some people believe that science is done by bespectacled people in white coats. We're not just academics in the ivory tower."

Professors Bill Cordua and Kerry Keen have also been involved with the planning of the new program.

- Sarah Matara  
UW-RF News Bureau

### Winona's Sugar Loaf sheds some pounds



Sugar Loaf, a rocky pinnacle that overlooks Winona, let go of a multi-ton chunk of limestone in late February.

The Winona Daily News quoted city officials as citing the freezing and thawing action of water for loosening layers of stone.

Located above the junction of Highways 61 and 43, the Sugar Loaf is 500 feet above Mississippi River flood plain and 85 feet above the remainder of the bluff.

While many people believe the rock obelisk is a natural landform, it was in fact created by quarrying on the bluff more than a century ago.

The rockfall spread through a wooded slope and stopped about 100 yards from the nearest house. No damage was done.

People interested in seeing what can happen when something does get in the way of a major rockfall should visit the Rock In The House attraction in nearby Fountain City, Wis., where a 55-ton boulder clobbered a two-bedroom house in April, 1995.

# GSM takes to the field

Edward Kraemer & Sons, Inc.'s Burnsville Quarry is located on the north side of Burnsville, in the Minnesota River Valley. The quarry, opened by the company in 1959, produces high quality dolomitic limestone used in concrete, asphalt, and road base applications. The quarry produces approximately 2.75 million tons of aggregate annually, and employs 47 people.

Three members of the Ordovician-aged Prairie du Chien Formation are quarried in three different benches at Burnsville. They include the Shakopee Formation; made up of the Willow River and New Richmond



**Above and Right:** GSM members young and old look for interesting samples at the Edward Kraemer & Sons Quarry in Burnsville.

**Left:** Geologist Jim Small explains the quarry's formations.



A GSM member traces the path of a post-glacial stream etched in the top of the Oneota Dolomite. This stream, and others like it, once fed the mighty River Warren before filling with sediments.

Members, and the Oneota Dolomite Member.

The tour of the Geological Society of Minnesota occurred on July 17, 2004 and was attended by about 50 members and guests. We made several stops overlooking the quarry where the basics of quarrying operations were discussed; topics such as drilling, blasting, rock crushing, environmental permitting and reclamation planning.

The final stops at the quarry focused on the geology of the site. We visited the area where the overburden had been recently removed, exposing the eroded surface of the dolomite.

We then traveled to the floor of the quarry and looked at exposures of each of the three formations and viewed specimens of a formerly undescribed species of stromatolite. Our final stop provided an opportunity for visitors to collect



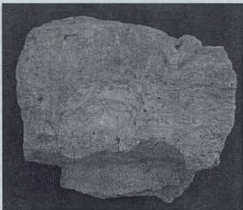
imens of stromatolite colonies for their personal sections.

-Submitted by James R. Small, Geological Services  
nager, Edward Kraemer & Sons, Inc.

## Primitive life in Burnsville!

*The following item, written by Doug Zbikowski with assistance from Dr. Anthony Runkel of the Minnesota Geological Survey, is a description of the stromatolites collected on the GSM trip to the Edward Kraemer & Sons quarry on July 17. It*

*will accompany the sample stromatolite pictured at right, at the State Fair, libraries and other exhibits.*



\*\*\*\*\*

This rock is a stromatolite - a laminated, usually mounded sedimentary fossil formed from layers of blue-green algae, calcium carbonate, and trapped sediment. This rock is evidence that blue-green algae once lived in a shallow and warm saltwater sea about 480 million years ago, over what is now Burnsville. This specimen was found in the Edward Kraemer & Sons Quarry at the top of a thick layer of rock called the Oneota Dolomite that extends across the Metro and a large part of southeastern Minnesota. Blue-green algae, actually a type of bacteria, left some of the oldest fossils known in the world today. Modern stromatolites are forming today from living algae colonies in the very salty Shark Bay on the western coast of Australia.

**Stromatolites form by the interaction of living organisms and sediments.** Blue-green algae, or cyanophytes, are primitive, water-dwelling, plant-like organisms that are photosynthetic (able to use sunlight to turn water and CO<sub>2</sub> into simple sugars). This activity gives off oxygen and was a source of this gas to our early seas and atmosphere.

Stromatolitic algae reproduce by simple fission, grow in clusters or filaments, and secrete a gelatinous sheath to protect the living cells from dehydration. After sunset, algal growth stops, and the gelatinous sheath forms a sediment trap where a layer of fine particles accumulates overnight. During daylight hours, the photosynthetic algae grow through and over this sediment layer. As these day and night laminations accumulate, a stromatolite forms.

Cyclic changes in the sedimentation rate caused by varying tides (two cycles per month) or seasons, and cyclic changes in the amount of sunlight seasonally and yearly, are known to be recorded in some stromatolites by varying trends of thick and thin layers that can easily be seen in cross section. Their record makes stromatolites a valuable tool for geologists to interpret the Earth's ancient solar, lunar, and tidal periods.

## Book review: Nordic Stone

Edited by Olavi Selonen and Veli Suominen; published 2003 by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the International Association of Engineering Geology (IAEG); ISBN 92-3-103899-0; 64 pages, soft cover, color photographs, maps, tables.  
Ordering information:  
<http://upo.unesco.org/bookdetails.asp?id=4107>

Reviewed by Harvey Thorleifson  
Minnesota Geological Survey

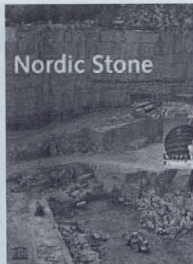
This book is an attractive and informative guide to the excellent and diverse stone resources of the Nordic countries – Norway, Sweden, and Finland. The editors are Olavi Selonen, Research Professor affiliated with Abo Academi University in Turku and the Geological Survey of Finland, and Doctor Veli Suominen of the Geological Survey of Finland. The book is one of a series of reports on global stone resources published by Unesco and the IAEG – it is an initiative of the IAEG Commission C-10 on Building Stones and Ornamental Rocks.

The book includes much information not previously available in English. Included are accounts of well-known Nordic granites, schist, sandstone, quartzite, flagstone, marble, limestone, and soapstone. The opening chapters address definitions, terminology, as well as geological, technical, economic,

and infrastructural requisites for natural stone. A section on history and heritage ranges from the Middle Ages to post-Reformation to the Industrial Revolution.

Stone resources in Finland, Norway, and Sweden are then described in a well-structured and well-illustrated manner. The ensuing section describes technology for exploration, extraction, and processing of natural stone. A section on exploration addresses regional-scale and prospect-scale investigations, the latter including methods such as ground-penetrating radar. The description of extraction describes granite extraction, diamond wire sawing, soapstone extraction, as well as schist and flagstone extraction. The section on processing describes methods used for granite and marble, schist and flagstone, soapstone, and a description of urban and rural applications. Methods used to manufacture well-known rotating stone globes also are described. The environmental impact of the natural stone industry is also the subject of a section.

Color photographs in the text illustrate historic use of stone in the region, views of active quarries, examples of recent use of Nordic stone in international buildings and sculpture,



as well as a page of photographs showing polished stone surfaces.

An annex provides a table of selected types of Nordic natural stone, commercial name and color, density, water absorption, compressive strength, and flexural strength. A second annex provides quartz and biotite content in percent for selected granites. An index of localities and an index of commercial stone names also are provided.

This book is highly recommended to any person with an interest in stone, Nordic geology, or Nordic architecture.

### 4.5 quake rocks Illinois, felt in MN

A brief earthquake epicentered in Northern Illinois struck early on June 28, rattling windows and awakening sleeping residents from Wisconsin to Missouri and from Indiana west to Iowa. The USGS received shake reports from Rochester, Minn., and LaCrosse, Wis. The USGS said the quake was Richter magnitude 4.5, and its epicenter was about eight miles northwest of Ottawa, Ill.

### Quaternary Fault Database is up

What are the faults in my state and where are they? Now you can find out the answer to these questions online through a user-friendly interface from the USGS at <http://qfaults.cr.usgs.gov/>. It summarizes geologic, geomorphic, and geographic information on about 2,000 Quaternary faults and fold-related faults in the U.S.

Ten years in the making, this massive collection of data is estimated to contain about 10,000 pages of content.

- USGS News Release

### Quake center opens in Memphis

The University of Memphis, USGS and the Mid-America Earthquake Center recently opened the doors to Memphis' first-ever earthquake learning center.

Located near the epicenters of a trio of devastating earthquakes in 1811 and 1812, the Public Earthquake Resource Center on the campus of the University of Memphis helps visitors understand more about earthquakes and the New Madrid seismic zone. Earthquake simulators and computerized displays of worldwide earthquakes happening in near real-time are featured at the center. A main highlight is the re-creation of a field trench, allowing visitors to experience what seismologists and geologists might see when they search for evidence of powerful prehistoric earthquakes.

PERC houses extensive information for folks seeking information on earthquake preparedness. It's free and open to the public. Visit PERC at <http://www.ceri.memphis.edu/perc>.

-PERC News Release

# Revisiting New Madrid

## New epicenter proposed for 1 of 4 main shocks of 1811-12

A sequence of four large earthquakes hit the New Madrid Fault Zone from December 1811 to February 1812, and research reported in the journal *Nature* on May 20 indicates one of those earthquakes may not have taken place on the New Madrid Fault Zone.

The new research has raised concerns that far-off large earthquakes could potentially trigger other earthquakes across the eastern United States.

Seismologists Karl Mueller of the University of Colorado at Boulder and Sue Hough of the USGS collected recent microseismicity to map stress changes. They then used historic data and those modern events to create models of the four-earthquake series.

The team established that three of the events - not including the third earthquake - triggered each other like dominoes falling.

However, geologic field work near Reelfoot Lake in western Tennessee

shows that the region did not rupture during the third of the four shocks, and authors say the third event doesn't fit stress distribution models.

The team hypothesized that the third earthquake happened far away from New Madrid, triggering the current aftershocks in that unruptured area, though where the epicenter was remains unclear. Southern Illinois and western Kentucky are potential sites.

The authors argue that if their modeled epicenter for the second event is correct, then the hazard for large earthquakes triggering others from hundreds of kilometers away is greater than previously thought across the eastern half of the United States.

Mueller notes that glacial rebound for the area is still occurring, and those gradual changes in stresses may have an effect.

There may be "other faults lurking," he says, that are too small to detect or



Year	Month	Day	Time	Lat	Long	Depth	Intensity	Damage	Notes
1811	12	16	18:00	36.2°N	89.4°W	10 km	8.0	Severe	First New Madrid earthquake
1812	01	20	08:00	36.2°N	89.4°W	10 km	7.5	Severe	Second New Madrid earthquake
1812	02	06	08:00	36.2°N	89.4°W	10 km	7.0	Severe	Third New Madrid earthquake
1812	02	06	18:00	36.2°N	89.4°W	10 km	7.0	Severe	Fourth New Madrid earthquake

This shake map illustrates what the first New Madrid earthquake on Dec. 16, 1811, felt like. Researchers relocated one of the four main shocks far away from the New Madrid fault zone. Image courtesy of USGS

have not ruptured in historic time and therefore are not outlined by aftershock sequences.

### Geological Society of Minnesota

c/o Gail Marshall, Membership  
12232 Allen Drive  
Burnsville, MN 55337

#### Membership Renewal – October 1, 2004 to September 30, 2005

- \$10 Student       \$20 Individual       \$30 Family  
 \$50 Sustaining       \$100 Supporting       \$250+ Guarantor

NAME \_\_\_\_\_  
(As you would like it to appear in the GSM Directory)

ADDRESS \_\_\_\_\_ PHONE (\_\_\_\_) \_\_\_\_\_

ZIP \_\_\_\_\_ E-MAIL \_\_\_\_\_

## Field Trip Alert!

**Date:** Saturday-Sunday,  
Aug. 14-15 to the  
Mesabi & Vermilion  
Iron Ranges.

**Leader:** Dr. Richard  
Ojakangas, Professor  
Emeritus, UM-Duluth

*See GSM website for  
map and details.*

**Advance reservations  
required!**

**Contact Doug  
Zbikowski at  
(763) 784-0201**

## Crater identified in Western Wisconsin

A 650- to 700-foot-wide meteorite crashed into Western Wisconsin about 450 million years ago, creating a crater up to four miles wide and 600 feet deep, according to an article published in the Geological Society of America Bulletin.

The site is near Rock Elm, Wis., about 70 miles southeast of the Twin Cities. The area's convulsed geology has been known for decades, but it was only now that Dr. William S. Cordua of the University of Wisconsin-River Falls and two other scientists positively identified it as a

meteorite impact structure.

Cordua has been working on the area since the early 1980s. Working with Bevan French of the Smithsonian Institution, the discovery of "shocked quartz" in the structure helped confirm its astronomical origin.

The area was filled with a shallow sea at the time, and filled with sediment in the millennia following the impact.

Most of the crater is on farmland in eastern Pierce County, but part is in Nugget Lake County Park.

## Pierce County puts it geology on CD-ROM

The Pierce County, Wis., tourism bureau has produced a CD-ROM guiding vacationers and day-trippers to Wisconsin's longest cave, biggest crater and best gold-panning. The tour was written by Prof. William Cordua of the University of Wisconsin-River Falls.

The CD costs \$14.95 (plus \$2.50 shipping and handling) and can be purchased either on the web at [www.travel Pierce County.com](http://www.travel Pierce County.com), by e-mailing to [info@travel Pierce County.com](mailto:info@travel Pierce County.com), or by calling 1-800-4-PIERCE or 715-273-5864.

Proceeds go to the tourism bureau.



**GSM NEWS**  
c/o Tom Smalec  
797 Newell Drive  
Apple Valley, MN 55124



FIRST CLASS MAIL

### MEMBERSHIP RENEWAL CHECK THE DATE ON THE LABEL

With your membership support, GSM can continue to offer a fine lecture program, provide area schools with an invaluable resource through the Outreach Program, and introduce you to the pool of talented professionals in the field of geology. Flip this page for the renewal form.

10/1/2004  
Harvey THORLEIFSON  
1011 5th Street SE  
Minneapolis, MN 55414

