

# GEOLOGICAL SOCIETY OF MINNESOTA

# NEWS

WINTER 2010  
VOLUME LXIV NO. 4

<http://www.gsmn.org>

## WELCOME NEW MEMBERS

**Boesch, Dawn**  
**Carlson, Jenna**  
**Ertl, Daniel**  
**Inskeep, Mary Helen**  
**Keesey, Sherry**  
**Mayer, Stefanie**  
**Nelson, Christopher**  
**Pearson, Robert**  
**Varghese, Anthony**

## President's Message

The fall events of the GSM are off and running. Here are a few notes:

We are getting many inquires and requests for information via the GSM website. As these require time and effort to address, the Board is looking into alternatives to ensure the GSM is responsive and timely.

**The next Board meeting is planned for Saturday, 4 December, at Ed and Sandy Steffner's place.** The meeting will begin at 3 pm with a Holiday gathering afterwards. More to follow.

Thank you to the outgoing Board members: Ly Preece (4 years - 2 years as President and 1 year as Secretary) and Paul Jensen (2 years - 1 year as Treasurer). You guys rock.

Anyone interested in serving on the Board please contact a Board member or a member of the Nominating Committee (Bill Robbins, Ly Preece and Doug Zbikowski). We need a Treasurer...remember, counting money can be fun.

A special thanks to Judy Hamilton, the GSM Newsletter editor. The newsletters are informative, interesting and on time due to her efforts. Please consider volunteering to be our new editor, as this will be Judy's last edition.

Be sure to set 22 January aside and marked on your calendar for the 2<sup>nd</sup> Annual GSM Auction and Pot Luck Banquet. Rocks, minerals, books, maps, food. What else needs to be said? Last year went so well that this year we will return to the Eisenhower Community Center in Hopkins. (Please see me or Theresa Tweet if you have rocks, minerals, books or maps to donate).

Dick Bottenberg, President

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## EDITOR'S NOTES

### NEW POSITIONS AVAILABLE 2011

As pointed out in the President's message, these GSM positions are open for the upcoming year:

- ~Two Board positions, one to be Treasurer
- ~Newsletter Editor, (next issue, Feb. 2011)
- ~Chairperson for (new) Publicity Committee

If interested, please contact a Board member (names below) and let someone know. Or you can contact me (Judy Hamilton) and I will pass on the information.

Please consider being a GSM volunteer. It's important in keeping the organization running smoothly.

### GSM NEWS

Editor: Judy Hamilton

Geological Society of Minnesota is a 501(c)3 nonprofit organization. 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 the first of the month, before the date of publication. Send all material for GSM NEWS to the address below.

#### OFFICERS:

Dick Bottenberg, *President*  
Janine Atchison, *Vice President*  
Vacant, *Treasurer*  
Ly Preece, *Secretary*

Directors in addition to the officers listed above: Allan Bowles; Paul Jansen; Darrell Mytty; Alan Smith; Harvey Thorlietson; and Theresa Tweet.

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

GSM Membership Chair  
P.O. Box 390555  
Edina MN 55439-0555

Membership levels are \$10 Full-Time Students;  
\$20 Individuals; \$30 Families

## SUMMER FIELD TRIPS 2010

### Colorado:

In mid-June, Randy Strobel (with the help of Joanie Furlong and Janet Hopper) organized an ambitious, site-packed, information-filled week-long field trip to the Front Range of the Colorado Rockies. The day trips were lead by local experts--university geologists, mining/environmental geologists, paleontologists, park rangers, museum curators and gold miners.

On any day, our group numbered about 20--people would filter in some days and out the next.

The group rendezvoused at the impressive Red Rocks Amphitheater--in the pouring rain! We spent the day learning the basic stratigraphy of the area by examining the red rocks and the unconformity of Fountain Formation with the Idaho Springs granite.

We saw the dramatic stratigraphy of the I-70 road cut (with its abandoned uranium mines and a layer that oozed and smelled like petroleum) and toured Left Hand canyon. Next day we explored the famous fossiliferous Morrison formation (named for Morrison, CO) at Dinosaur Ridge visitor center where the exposures contained dinosaur bones, dinosaur "bulges" and trackways near the excavation pit where "the bone wars" began in the 1870's. That evening, the group climbed to the top of a table mesa--Castle Rock Mountain.

At the Colorado School of Mines we toured the US Geological Survey Earthquake center where data streams in constantly. Also on campus we visited the Colorado Museum of Mines. Triceratops Hill is nearby and they built the golf course around these fossil beds.

We drove to the top of Lookout Mountain (dodging cyclists and runners) for an overview of the countryside. This is where Buffalo Bill Cody is buried. Another day, we needed to wait for the snow plows to clear the road so we could drive to the summit of Mt. Evans (14,130)--several climbed on foot (through the snow) to the absolute summit.

We visited an old-school gold mine lead by the story-telling owner of the Phoenix mine. He pointed out the quartz/gold seam and explained how the old equipment worked. This example of traditional mining contrasted sharply with what we experienced later in the Cripple Creek-Victor region. We had a bus tour of the gargantuan open-pit gold mine--The Cripple Creek and Victor AngloGold Ashanti (Colorado Corp) mine. We were turned loose in the high-grade pit and were allowed to collect samples.

What gold there is is microscopic and associated with pyrite and takes years to separate. But they are very proud of their safety and environmental record and their mine reclamation efforts.

In the walls of the terraced pit, one could see the old "stopes" or tunnels from the old traditional mines. There are many old headframes in the area and we explored a few of them.

(Continued on Page 3)

(Colorado Field Trip – Continued from Page 2)

Also in this area are the Florissant Fossil beds. Here there are giant petrified sequoia stumps and some of the most unique and diverse fossils. And I thought they were kidding when they told us we would be using razor blades to split rocks to hunt for fossils. Then we were turned loose on a shale quarry to split the layers to expose the delicate 35 million year old pressed fossils of insects and plants. Some of us had good luck!

Later, we drove through the Garden of Gods--formed by the weathering of the red rocks into shapes and forms.

And there was one more stop in Colorado. In a secret, remote site Randy arranged for us to see a recently unearthed exposure containing evidence of the K-T boundary. What a thrill! And a fitting "official" ending to a dinosaur-filled trip!

Some of the group continued along "the fossil trail" up through Nebraska and the rest of us headed east to MN.

Submitted by: Diane Lentsch, Photos by David Wilhelm

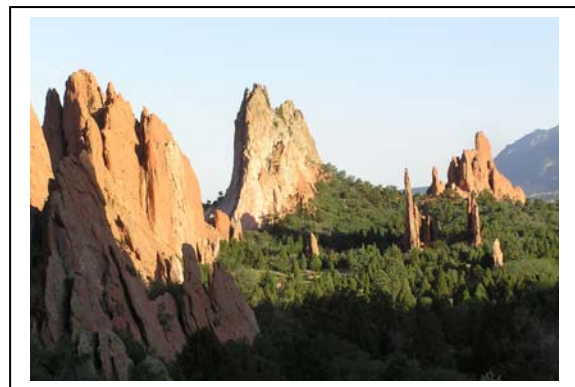
**For more photos and in beautiful color,  
go to David's photo album at <http://picasaweb.google.com/dewilhelm53>**



GSM members at summit of Castle Rock near Golden, CO



Joanie gets a new slant on geology life  
With fossil clamshells (North of Denver)



Garden of the Gods  
Colorado Springs



GSM hikers at summit of  
Mt. Evans (14,360 feet)

## THE MINNESOTA MINING COMMUNITY

Minnesota is a mining state. Mining brings economic benefits to the state, and the industry seeks to maximize these benefits while minimizing environmental impacts, and optimizing the role of mining in society. There is a mining community in Minnesota, consisting of people who seek to optimize the contribution of mining to our state, for the benefit of themselves, and for us all. These people organize themselves, to encourage awareness of the role that mining plays in our society, to network among themselves, to optimize the reputation of the mining industry and profession, to support career development, and to attract bright new professionals to the industry.

The community largely consists of the owners and employees of businesses, whether producing iron ore mines and industrial minerals operations producing construction material such as sand and gravel or crushed stone throughout the state, or those who provide services, supplies, and equipment to the industry.

In addition, several organizations have roles in promoting, facilitating, and regulating mining. The mining industry itself is represented by the Iron Mining Association of Minnesota (IMA), the Aggregate and Ready Mix Association of Minnesota (ARM), as well as the Minnesota Asphalt Pavement Association (MAPA). There also is great potential for non-ferrous production, in particular copper, nickel, and platinum-group elements in the Duluth region, and this community is represented by Mining Minnesota.

The government role in mining is largely tended to by the Minnesota Department of Natural Resources (DNR), as well as by Minnesota Pollution Control Agency (MPCA) and others. The DNR Division of Lands and Minerals, according to its web site, manages the state's mineral resources for the benefit of all Minnesotans; provides real estate services to support the resource goals of the state; manages mineral exploration and mine development on state-owned and tax-forfeited lands to generate equitable rental and royalty income for the state's School and University trust funds, local communities, and the state's General Fund; ensures that mineral development is environmentally sound and mined areas are reclaimed to be safe, free of pollution, and suitable for future use; and maintains the surface and mineral land records for state-owned, DNR-administered lands.

Professional development and networking in the mining industry is promoted by the Minnesota Section of the Society for Mining, Metallurgy, and Exploration, Inc. (SME). SME operates both at the level of the State Section, and as the northern and southern Subsections. The Section, according to its web site, strives to advance the mining and minerals community in the state by providing members with an informative and educational annual conference held in April in Duluth for the purpose of information exchange and professional development; through the efforts of the Subsections, by promoting meaningful educational opportunities for professional development with informative meetings and short courses throughout the year; and by promoting and developing future careers in the industry through scholarships, internships, and involvement with educational institutions.

The Natural Resources Research Institute (NRRI) at University of Minnesota, Duluth (UMD) plays a big role in mining. In their Minerals Division, geologists at the NRRI Economic Geology Group in Duluth focus on mapping of ferrous, non-ferrous and industrial minerals. Metallurgical engineers at the NRRI Coleraine Minerals Research Laboratory have innovative research experience in all aspects of mineral processing from crushing, grinding, concentration to hydrometallurgy and pyrometallurgy, with a special emphasis on iron ore processing.

Engineering programs at the University of Minnesota Duluth and Twin Cities campuses educate future mining professional, as do community colleges. Information needed by the mining industry is produced by agencies such as Minnesota Geological Survey (MGS), and the US Geological Survey (USGS). Concurrently, the diverse geological community in the state includes many who play a direct role in mining.

(Continued on Page 5)

The Minnesota Center for Mineral Resource Education (MCMRE) promotes awareness of the positive contribution that mineral resources make to the Minnesota way of life, principally by providing teacher education in mineral resources. MCMRE does so by organizing the annual Minnesota Minerals Education Workshop (MMEW). Meanwhile, Minnesota Mineral Resource Education Foundation (MMRE) also plays a role, and facilities such as Minnesota Museum of Mining, the Minnesota Discovery Center, and Soudan Underground Mine State Park tell the story of mining in our State.

The Minnesota mining community thus is a cross section of our society that is working hard to optimize their standing, and their contribution to our quality of life.

Contributed by: Harvey Thorleifson Ph.D., P.Geo., D.Sc., Director, Minnesota Geological Survey; State Geologist of Minnesota; Professor, Department of Geology and Geophysics; University of Minnesota; 2642 University Ave W, St Paul, MN 55114-1057 USA; Telephone 612-627-4780 ext 224; Fax 612-627-4778; [thorleif@umn.edu](mailto:thorleif@umn.edu)

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### **Abstracts for two of the Spring Lectures**

Submitted by Steve Erickson

#### **Origin and Evolution of the Moon - April 18, 2011, William Phinney**

We have come a long way from the days when the Moon was hypothesized to consist of oceans and mountains with people living there (200 BC) or to be an ejected chunk of Earth from the Pacific Ocean (1882). It has been nearly 40 years since the Apollo Program provided us with actual data from both surface and orbital instruments as well as returned samples from the Moon. From geophysical, geochemical, petrologic, geochronologic, and photogeologic studies of the instrument data and the samples there has been a continually developing picture of the Moon's origin and evolution. Its thermal history, internal structure, dates of major events, surface history, and petrologic development from an early molten sphere have provided us with information not only about lunar history but also significant inputs to the early evolution of the solar system as well as the Earth. The study of samples and structures produced by lunar impact events has greatly improved our recognition and knowledge of terrestrial impact products. The impetus for distinguishing the products of impact melts from truly igneous melts was a result of lunar sample studies. Dating of impact melts indicates a significant spike in meteorite flux in the solar system around 4.0 to 3.9 by ago. Extension of supercomputer codes for nuclear explosions to meteorite impacts has provided a basis for models of the Moon's origin and its relation to Earth. The training of astronauts to conduct geostudies of the lunar surface required monthly field training for nearly 2 years for each Apollo crew from Apollo 13 through Apollo 17. The details of that training may be surprising to most Earth Scientists.

#### **Muddy Waters and the Minnesota River Blues – February 21, 2011, Carrie Jennings, Geological Survey**

The Minnesota River is the major sediment source to a large, riverine lake on the Mississippi, Lake Pepin, which is infilling at ten times its pre-settlement rate. Both the Minnesota River and Lake Pepin are impaired and the focus of Clean-Water-Act mandated restoration efforts. An interdisciplinary team funded in part by the Minnesota Pollution Control Agency is using traditional mapping, geochemical sampling and modeling efforts to: locate and quantify sediment sources; develop an understanding of Holocene sediment dynamics; and document the response of the system to land-use and hydrologic change over the last 170 years of human modification.

The prime agricultural soils in the watershed are developed in loamy glacial sediment which is ideal for farming, if drained. Evidence from fallout-radionuclide tracing of surface sediment suggests that the fine-textured soils in fields, although a modern (and not pre-settlement) contributor to the sediment load, are not the dominant source of sediment to the streams and do not account for the increase in sediment load to Lake Pepin. The geologic history of the watershed exposes the entire glacial section in certain river reaches. The channel now occupied by the Minnesota River was created suddenly 11,500 radiocarbon years ago when Lake

Agassiz discharged through glacial River Warren. The spillway incision ranged from 45 m at the outlet to 70 meters 300 km downstream. Major knickpoints that were initially created at tributary mouths have migrated tens of kilometers upstream, varying somewhat owing to local stratigraphy, watershed area, and runoff amounts. The knick zones separate the basin into an upper watershed, receiving sediment primarily from uplands and streambanks and a lower, incised zone, which receives additional sediment from high bluffs and ravines. Stream gages installed above and below knick zones in the Le Sueur show dramatic increases in sediment loading above that expected from increases in drainage area, indicating substantial inputs of fine-grained sediment from the bluffs and ravines that expose the glacial section. We focus on the Le Sueur basin because of its unusually high sediment loads and well-gaged tributaries and use a combination of remote sensing, field, and stream observations to constrain the contributions of different sediment sources.

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### **PUBLIC SERVICE & PUBLICITY COMMITTEE SPLITS**

In an effort to keep the volunteer work load reasonable and balanced, the GSM Board has recognized the need to split the Public Service & Publicity Committee into two committees. The new committees will be the **Public Service Committee** and the **Publicity Committee**.

The Public Service Committee will continue to provide school outreach and manage the geological markers program. Doug Zbikowski, who served as chair of the combined committee has graciously, agreed to chair the Public Service Committee. Members interested in participating on this committee should contact Doug at 763-784-0201.

The Publicity Committee will create and/or update the informational flyers printed for distribution at libraries and the State Fair. The GSM Board is seeking a Chairperson for this new committee. So, we challenge the budding writers and/or geologic enthusiasts in our group to consider this new opportunity to serve as chair or member of this important committee. For additional information call Janine Atchison at 763-533-6877 or Alan Bowles at 651-982-6525.

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### **ANNUAL APPRECIATION POTLUCK DINNER AND SILENT AUCTION**

**January 22 from 4:00 to 7:00**  
**Eisenhower Community Center**  
**1001 Hwy 7, Hopkins, MN 55305**

<http://old.hopkins.k12.mn.us/pages/district/CommED/facility/f-drive.html>

Set-up will be from 3:00 to 4:00, with the dinner to follow shortly thereafter. The Silent Auction will run from 5:00 until 6:45. If you are interested in staffing an item table, please let Theresa Tweet know at: [phoenix8185@gmail.com](mailto:phoenix8185@gmail.com). It would be great if we could get two people per table - then we could all enjoy bidding on the items.

At this time, items have been donated by the Mountain Press, the Minnesota Geological Survey and many members of the Geological Society of Minnesota. If you think that you have more than your share of rocks and minerals gracing your home and/or garage, if you feel that it is time to share them with others, consider donating them to the Silent Auction.

Additionally, we need people and food. Please respond to the Evite that Janet Hopper will be sending out or contact Janet about menu ideas and needs at [jrhopper@comcast.net](mailto:jrhopper@comcast.net) . Plates, cups, napkins, cake, and coffee will be provided. The event was very successful this year. Hope we see you in 2011.

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### **GSM Member Wins Third Place in National Fossil Day Artwork Contest**

Our very own GSM member, Mark Ryan, won third place in the National Fossil Day Art Contest., October 13, 2010. See ([http://www.nature.nps.gov/geology/nationalfossilday/art\\_contest\\_2010\\_results.cfm](http://www.nature.nps.gov/geology/nationalfossilday/art_contest_2010_results.cfm)) This site shows all winners in the contest by age category, as well as information about National Fossil Day. Mark's entry is a very nice poster. The contest is about portraying the importance of fossils and what we should do to preserve them. National Fossil Day is organized by the National Park Service.

To put a copy of his piece in this newsletter would not do it justice (since we print the newsletter in black and white) and it can be much more appreciated if seen in color, Mark has posted his piece on <http://www.flickr.com/photos/rynoceras/5147192442/> .

Submitted by the Editor and Mark Ryan

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### **State Fair 2010 THANKS**

The State Fair Committee again wishes to thank everyone who participated in staffing the booth this fall. Being a major source of new memberships, your time at the booth contributed to keeping GSM "up and running." Remember if you have any interesting photos that could be used on the backdrop, especially of the field trips, please let Tom Schoenecker know at [etschoen@juno.com](mailto:etschoen@juno.com) Listed below are the GSM volunteers who staffed the booth this year (2010). The number behind the name, indicates the number of times worked. Not in alphabetical order.

Theresa Tweet  
Mark Ryan (2)  
Dave Wilson  
Paul Martin  
Dick Bottenberg (2)  
Jerry Shirmers  
Marty Collier  
Pat Hanauer  
Roger Benepe (2)  
Late Hintz  
Joel and Nancy Anderson  
Judy Luger  
Patsy Huberty (2)  
Dick Heglund (3)  
John Maronde (2)  
Fran Corcoran  
Roger Willette  
Nancy Weins  
Joan Furlong & Randy Strobel  
Diane Lentsch

Dave Wilhelm  
John Ernst  
Dan Japuntich  
Bill Robbins  
Cindy Schneider (2)  
Bently & Deb Preece  
Sandy & Ed Steffner  
Tom Noerenberg  
Janet Hopper  
Paul Jensen  
Jim Nye  
Gerry Paul  
Tom Cody  
Mark Nupin (2)  
Lee Kaphingst  
Darrell Mytty  
Vern Shaff  
Judy Hamilton  
Allen & Georgia Cox

Keith Zilinski  
Ken Hallberg  
Jean Doyle  
Pat Ryan  
Steve Erickson  
Harlan Finney  
Elaine Handelman  
John & Ruth Jensen  
Harvey Thorliefson  
Nancy Helvorson  
Mary O'Connor  
Don Swensrud  
Ken Holmbeck  
Janine Atchison  
Allan Bowles  
Larry Kalina  
Marilyn Nelson  
Mary Kay Arthur  
Alan & Kay Smith

**FINAL REMINDER**

If the label on this newsletter has the date 10/01/10, your GSM membership has EXPIRED. This will be your last newsletter...unless you renew your membership now. With your 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. **Please renew your membership!!**

**Mail your check to: GSM, PO Box 390555, Edina MN 55439-0555**

**Thanks**



P.O.Box 390555  
Edina MN 55439-0555

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