



GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

SPRING 2000
VOLUME LIV NO. 1
<http://www.geo.umn.edu/orgs/gsm/>

Kimball Memorial Banquet

May 1, 2000

"PLEISTOCENE GLACIATION AND THE DEVELOPMENT
OF EARTH'S LIVING COMMUNITIES"

Edward J. Cushing, Ph.D., Univ. of MN

Old Country Buffet
3000 White Bear Ave.
Maplewood, MN

Dinner at 5:30 pm
Meeting at 7:30 pm

ON THE ROCKS

Ever wonder why it is so difficult to identify a rock or mineral? Just when you think you really know what to look for to make that identification, you see another field guide with a picture and description of "your" rock, and it isn't even close to what you thought it was! For anyone who has that inadequate feeling concerning I.D.-ing rocks, *On the Rocks... Earth Science for Everyone* by John S. Dickey, Jr. will build your confidence level plus provide a wealth of information. In chapter two, "Atoms, Crystals, and Rocks", the author states that many rocks are ambiguous. "Unlike rabbits and cows, many of them can interbreed: Both magmas and sediments can mix, and metamorphic materials are notorious mixtures...Some rocks are rich in certain chemicals and some rich in others, and the same combinations of chemical elements may be organized into different minerals." Well, that made *Me* feel better.

The author states in the preface "This little book is intended to encourage and promote that sharing (...of pleasure) especially among those who, for one reason or another, have not had an opportunity to study natural science." Both science and philosophy play an integral role in the book. And yes, it is about geology — but it also touches on cosmology, chemistry, physics, anthropology, crystallography, hydrology, with a sprinkling of history, literature, poetry, and even — at last — a definition of traprock!

In chapter seven, "On Trembling Ground in an Ambivalent Field", a fascinating discussion of magnetism includes Marco Polo bringing the technology of compasses to Europe, as well as Michael Faraday's discovery of electromagnetism. And it turns out that there is a name for the kind of magnetism we see in our own Minnesota iron formation: remanent magnetism. But which do you suppose it is: thermal remanent magnetism, chemical remanent magnetism, or depositional remanent magnetism? (Sorry...you will have to read the book to find out.)

If you have ever wondered where the word ooid originated (from the Greek word for egg) or why ice is a mineral but water is not (neither is mercury), you will love this book! From diamond pipes to diagenesis, from porcelain to precipitates, *On the Rocks* presents a great deal of material in such an enjoyable manner, I hated to see the book end. In fact, I think I'll read it again!

Katy Paul

The entire ocean circulates through submarine hot springs every 8 to 10 million years.

Announcements

Longtime and active GSM member, Philip Curtis, is in the hospital recovering from surgery for cancer of the esophagus. His recovery has been extended with some complications. It would really lift his spirits if members would write him get-well cards. His mailing address is: Philip Curtis; 6 West - Room #656-2; Regions Hospital; 640 Jackson St.; St. Paul, MN 55101

Next newsletter will be mailed on May 15, 2000. Deadline for submissions: May 1st.

GSM NEWS

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The purpose of this newsletter is to inform the 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. It 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: Geological Society of Minnesota c/o Katy Paul, 6901 West 84th Street, Bloomington, MN 55438. Phone: as listed above, or e-mail: again, as listed above.

Outgoing Officers: William Robbins, *President*; Bruce Goetteman, *Vice President*; Steve Erickson, *Treasurer*; Judy Hamilton, *Secretary*.

Directors: In addition to the officers listed above, David Christianson; Paul Lemke; Sylvia Huppler; Gail Marshall; Jean Hosterman.

Send all GSM membership dues, change of address cards, and renewals to the GSM Membership Chair: c/o Gail Marshall, 12232 Allen Drive, Burnsville, MN 55337. Phone: (612) 894-2961. Membership levels are: \$10 for full-time Students, \$20 for Individuals, or \$30 for Families.



GSM Board News

This last year the GSM provided its members and attendees varied learning opportunities through lectures, laboratory experiences and field trips. This was possible because of the dedication of many people. Thanks are due Sylvia Huppler for serving two years as GSM chair. Such guidance and commitment would be relished by any organization. Sylvia's wisdom will still be available, as she continues on the board for another term. Thanks are also due all those who have volunteered so much time and effort during the last year. The lecture series and accompanying laboratory programs were well attended this fall, some of the latter to the point of overflowing! I believe that GSM members treasure the time they spend in lectures, labs and field trips.

GSM provides knowledge and understanding, well organized, factual and well grounded, albeit specific to geology. Experienced GSM members emphasize that we must match lectures to people's interests and backgrounds, actually a key element of being a non-profit educational organization. I believe that GSM does a good job of this. To be sure, GSM competes with other activities and interests, and we may be drawing as many participants as could be expected. The state fair booth is our primary source of new members, and is achieving an excellent record. There may be additional ways of getting out the news that GSM is a good source of knowledge. I would like to focus my efforts toward ensuring that all those having an interest in geology know of GSM's existence.

The GSM board met on the afternoon of Dec 11, 1999 at the home of Goldie Johnson. Thanks to Goldie for being such a wonderful hostess. Bruce Goetteman, GSM Treasurer reported equity of \$10,947.29, with 139 paid and 6 presenter memberships to date. Doug Zbikowski, chair of Public Service and Outreach Programs reported that there would be two geological plaques at Gooseberry Falls and one at the Silver Creek Tunnel rest area. He mentioned that Macalester and Carlton students are volunteering for school presentations. Judy Hamilton, Show and Exhibits chair reported that Paul Lemke donated a vacuum cleaner for the State Fair Booth. Alex Lowe, Video Library chair, closed the books on the video library at \$988.55. Rick Uthe, Program-Lectures and Labs chair, reported excellent attendance at lectures and labs. The board decided on a theme for 2000/2001 lecture series, Earth Dynamics: Basic and Catastrophic.

A meeting was held on Jan 29, 2000 of the Program Lectures and Labs Committee, Rick Uthe, chair, and the Field Trip Committee, Gail Marshall, Co-chair. Eighteen people attended.

Bill Robbins, GSM President (651)-739-1146

Where did the glaciers go? They went back to Canada to pick up another load of rocks. C. Matsch

HOW THEY KNOW WHAT THEY KNOW

Structural geology is the study of the ways in which rocks or sediments are primarily arranged or deposited, and secondarily deformed. Sedimentary rock displays obvious layering or stratification, which is referred to as bedding. A bed has a definable top or bottom and can be distinguished from adjacent beds by differences in color, sorting, composition, erosion rate, grain size, or by a physical parting surface.

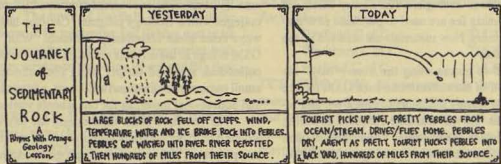
Bedding, or stratification, provides a reference frame for describing the deformation of rocks. In regions where the rocks have been strongly deformed through folding or faulting, the original attitudes of strata may be greatly altered, and sequences of strata that were once horizontal may be steeply inclined, folded, or overturned. When sediments are initially deposited, they form horizontal, or nearly horizontal layers. In analyzing complexly deformed or folded metasedimentary rocks, geologists search for preserved characteristics of original bedding. If the original bedding is recognizable, the earliest formed folds can be identified. This helps in sequencing the deformation events. By being able to recognize the "facing", geologists know which way was "up" before the deformation event occurred. Stratigraphic facing is also called "younging direction" - the direction in which beds



get progressively younger. If strata are folded, or overturned, knowing the younging direction can help to determine which events came first, since there may have been several deformation events, separated by millions of years.

In addition to serving as indicators of stratigraphic facing, graded beds and cross beds are used by geologists to ascertain water current directions or tectonic activity. Graded beds result from sediments moving down a slope under water. The heaviest/largest grains settle first and the finest grains last. The presence of graded beds could indicate previous tectonic activity, such as earthquakes or volcanoes that typically trigger turbidity flows (underwater sediment clouds, or slides). Cross beds form when sediments are moved by wind or water action. Cross bedding is characteristic of sand dunes, river deltas and stream channel deposits.

By interpreting the bedding characteristics of a rock outcrop, geologists can infer things like what the climate was like (dry, rainy, windy, stormy), what sort of tectonic activity was happening (earthquakes, volcanoes, plate collisions), and how many times the rock underwent some sort of deformation.



Fissility: Any sedimentary rock which has a tendency to have closely spaced partings is said to display fissility. Shale is a very good example of a fissile rock. Having been compressed by many overlying layers, the platy flakes of clay in the pre-shale mud oriented themselves parallel to the bedding plane. This "preferred orientation" of the clay particles is what makes shale so easy to split.

GSM VIDEO LIBRARY

by Patricia Hanauer

As a member of the Geological Society of Minnesota, you have the opportunity to access an up-to-date video library. This resource is available to extend and enrich the learning that takes place at the lectures, and to provide an avenue to explore additional areas of study that members find interesting.

The video library was initiated in 1994 by Doug Zbikowski. Doug donated and loaned many video tapes to launch the idea of a video lending library. Alex Lowe is presently in charge of the 140 video tapes and the 7 CD's in the library. Alex indicates that the library is a well-used resource. In fact, there have been 693 transactions in the video library since 1994!

In order to access the video library, a one-time \$15.00 membership fee is charged. Once that fee is paid, the member receives a catalog of all the titles in the library and can check out any of the library's materials for a check-out fee of \$1.00 per item. Currently, the Video Library serves as a valued resource to over sixty library members.

The library now has a video on just about any conceivable geological topic. The technical levels of the presentations vary from that appropriate for complete beginners in Geology to experienced professionals. We have several lengthy video series from the Annenberg/CPB Project, as well as contributions from the Discovery and the Learning Channels, and various educational organizations. For more advanced learners, we have many topics covered by the American Association of Petroleum Geologists. The library check-out fee and membership fee are used to purchase new materials for the library. New materials are selected by the library committee.

Alex Lowe makes using the library easy. He brings about half of the collection to each GSM lecture in order to allow library members to check out and return the materials. He will also take a request, and bring a particular video to the meeting. The library is open for business before lectures and during the break between the lecture and the question-and-answer period.

To find out more about the library or to make special arrangements to check out videos and CD's call Alex Lowe at 651-451-6853.

School Outreach is Rockin'

by Doug Zbikowski

Since life is but a stage, the GSM School Outreach troupe has really been performing in the Metro area lately! As many of you know by now, Geology students at both the University of Minnesota and Macalester College participate in our program, and give Rocks & Fossils presentations to elementary schools and some eighth grade Earth Science classes. Last semester, the GSM program conducted thirty-six presentations and one science fair, and Fall is typically not our busiest season!

Some are born to rock, some aspire to rock, and some have rocks thrust upon them. Our players in these educational performances were given student memberships in the GSM and include: Joy Branlund, Dyanna Czeck, Cathy Hier, and Michael Lamb, all from the U of M; plus Avery Cook and Christa Kelsey from Macalester. Besides giving sterling performances, they presented each school with the now famous GSM rock box and the companion slide set of the same rocks in thin-section.

To rock or not to rock? Carleton College in Northfield recently decided to rock with the GSM and forwarded some seed money to help build the large, portable collection we use for the hands-on part of the presentation. The construction of the eight trays is now complete and the process of filling them with specimens has begun. When it is ready, we plan to mail our flyers to all schools within a ten-mile radius of Northfield and coordinate the requests via email, just as we do our current program. Like most colleges with a Geology program, Carleton has always done some community outreach. What the GSM brings to the effort is an outstanding portable collection, standard scripts using the collection, email request coordination/fulfillment, advertising, and educational materials for the schools visited.

If you have some time during the day and would like to occasionally volunteer as an assistant to a presenter, please contact the program administrator, Doug Zbikowski - email zbiko001@tc.umn.edu or phone (612) 784-0201. It can be great fun to go back to an elementary classroom and support for science education in our schools is really needed!

A DO-IT-YOURSELF GEOLOGICAL, HISTORICAL FIELD TRIP

To The Bayfield Peninsula

by S. Joan Kain

GETTING THERE: Basically, there are two choices. Go north on US 35, a pleasant trip that takes you from Twin City urbanescapes to northern landscapes with time for stops at Thompson Hill Rest Area and Canal Park in Duluth or the Wisconsin Travel Information Center on Hwy 53 near the SS Meteor Whaleback Museum in Superior. Go east from the Twin Port on Hwy 13. At Port Wing, Cornucopia and Red Cliff, an Ojibwe Indian Reservation, you catch glimpses of Lake Superior. Another option: go east on US 2, a more direct route to the junction of US 2 and Hwy 13 near Ashland.

An alternative route could be any number of north/east diagonal roads across wooded Wisconsin which is especially beautiful in the fall.

WHAT TO SEE:

BAYFIELD: The headquarters of the Apostle Islands National Lakeshore is located at Washington Ave between 4th and 5th. (Open year-round, Nov. thru May daily but check weekends, 715-779-3397 or www.nps.gov/apis, free) Housed in the 1866 courthouse, one of Wisconsin's first brownstone buildings, and operated by the National Park Service, the APNL headquarters offers programs and publications on the history of the area. APNL also runs a variety of boat tours to brownstone quarries on Presque Isle and Basswood, to the Sand Island Light House and other island sites. The town of Bayfield itself is historic with evidence of its lumbering and fishing past in its wooden Victorian homes and in the large marina with regular ferry service to Madeline Island and Big Bay State Park.

WASHBURN: The Washburn Historical Museum and Cultural Center (Mem. Day to Labor Day at 1 E Bayfield St., 715-373-5591, free or donation) is lo-

cated in a brownstone bank building designed by the firm of Conover and Porter, the former a teacher and mentor to Frank Lloyd Wright. The museum grew from the efforts of local citizens to preserve a record of their heritage, which includes quarrying, lumbering and munitions production. The museum also features art exhibits, concerts, lectures and demonstrations.

ASHLAND: Located just west of the junction of Hwy 13 and US 2, the Northern Great Lakes Museum and Visitor Center (year-round, 715-685-9983, free or donation) is a recent addition to the area, the result of collaboration of public and private interest (US Forest Service, National Park Service, Wisc State Historical Society, Univ. of WISC Extension and local environmental and historical groups). The building itself is made of modern materials that reflect its Lake Superior location. This includes cast brownstone trim and a lighthouse lookout. Changing museum exhibits showcase the effect of human activities on the natural resources in the northern third of Minnesota, Wisconsin and Michigan. Programming includes audiovisual productions and an excellent museum store as well as nature walks in the area. The museum is also responsible for operating the historical museum on Madeline Island.

REMINDER: It is always prudent to check ahead for weekend lodging!

Bayfield C of C	715-779-3335
Washburn C of C	715-373-5017
Ashland C of C	715-682-2500

IT'S UP TO YOU: As you can guess, there is much more to see and some wonderful places to just stop and absorb the beauty and freshness of this scenic place so close to the Twin City Area. Why not fit the Bayfield Peninsula into your travel plans?

"The meek shall inherit the earth, but not the mineral rights."

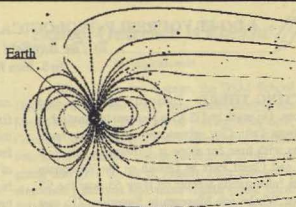
- John Paul Getty, oil billionaire

GEOMAGNETIC STORMS

Geomagnetic storms give rise to the beautiful Northern lights, but they can also pose a serious threat for commercial and military satellite operators, power companies, and astronauts. They can even shorten the life of oil pipelines in Alaska by increasing pipeline corrosion.

Geomagnetism is the study of the Earth's magnetic field. The field can undergo large and rapid fluctuations due to the interaction of charged particles ejected by the Sun that collide with the geomagnetic field. These disturbances are known as "geomagnetic storms," and can cause power blackouts, disruptions in communications, satellite failures, and other hazardous effects. These solar ejections, traveling at more than a million miles an hour, are associated with sunspots, whose number increase and decrease over an 11-year cycle. The number of geomagnetic storms therefore increases and decreases in concert with that cycle. The next peak in sunspot activity is expected to occur in early 2000.

The last great magnetic storm occurred exactly 11 years ago this coming March 13 at 3 a.m. EST. That storm caused the collapse of the Hydro-Quebec power system in Canada, leaving about 6 million people without power. If the storm had struck a few hours later than it did, the blackout would likely have been much worse because of the heavier power consumption during daytime hours. Magnetic storms are not rare, but great storms like this are.



The USGS operates a network of 13 magnetic observatories that continuously monitor the Earth's magnetic field. The USGS provides this valuable geomagnetic data to a wide variety of users and organizations that can be affected by a geomagnetic storm. The data are collected in near-real time via satellite to a downlink center located in Golden, Colorado. They are then sent to the U.S. Air Force (USAF) Space Command Center for use in their operational models that characterize the near-space environment surrounding the Earth, and to NOAA's Space Environment Center for distribution to their extensive customer list.

The geomagnetic data are also shared with agencies comparable to the USGS in other countries including Canada, Japan, France, Brazil, the United Kingdom, and others as part of an international organization called INTERMAGNET. The data are made available to the worldwide community via the World Wide Web and by e-mail request.

Legislative Panel Recommends \$8 million for Accelerated Geological Mapping

With Minnesota facing an impending shortage of sand and gravel, a state legislative panel has recommended expedited geological mapping of the state with an eye toward identifying new sources of aggregate minerals for construction projects.

The report of the Aggregate Resources Task Force, issued on Feb. 1, calls for a complete mapping of the state by 2006 by the Department of Natural Resources Division of Lands & Minerals and the Minnesota Geological Survey. The panel recommended \$8 million in state funding for the mapping program.

The task force, which has been at work for about 18 months, also recommended a variety of new legislation to protect untapped sand and gravel beds and mitigate the environmental impact of aggregate production. Many potential sources in the Twin Cities area have been covered by suburban development, which makes accessing those deposits impossible, according to the report.

Data collected by the group estimates that the Twin Cities area will exhaust its currently identified sand and gravel sources within 13 years. Consumption in the metro area has doubled since the early 1980s, and state-wide consumption is up 50 percent in that period.

Tom Smalec

Conglomerate



The USGS estimates that there is over a 90 percent chance of an **earthquake** of magnitude 6 to 7 happening in the New Madrid, Missouri area [see GSM News-Spring 1999] in the next 50 years. When that happens, residents throughout the central and eastern United States will likely feel its effects.....Scientists from Cambridge University and China reported findings of two **fishlike fossils** from the Lower Cambrian, about 530 million years old. Previously the fossil record showed the first fish arriving in the Lower Ordovician, about 480 million years ago, with only questionable evidence of earlier arrival. The 2.5-inch-long fossils were discovered in China. One resembles a lamprey and the other a primitive hagfish..... With only three landings remaining in NASA's **Mars Surveyor program** (the 2001, 2003 and 2005 missions), choosing the right landing sites is vital. New findings in the fields of remote sensing and exobiology, (the study of life as it may exist on other planets) may offer new methods for detecting and recognizing biomarkers that might exist in martian rocks and soil. Since almost all life requires water, searching for existing or once-present water is one of the primary goals for remote sensing. Researchers can infer the presence of water from the presence of compounds that generally require water to form-carbonates, sulfates, clays or any other minerals associated with water chemistry. The next three Surveyor lander missions will have new equipment for observing fine-scale chemistry and textures. Cameras on future rovers will be able to differentiate details on the scale of microbial mat layering, with a resolution of 0.28 milliradians per pixel. In the final 2005 stage of the program, the landers will package specimens and send them to an orbiting craft that will carry them to Earth..... Sediments in Elk Lake, in the Mississippi headwaters region, in northwestern Minnesota, are providing **archives of climate and environmental change** over time periods that range from years to millennia. Elk Lake holds sediments which contain varves that have marked off the seasons year after year for the last 10,400 years. Studies of these lake sediments can detect periods of drought, types of vegetation, windiness, and other climatic changes.....Lakes, reservoirs, and peatlands collectively cover less than 2 percent of the Earth's surface but **bury organic carbon** at an annual rate that is four times the carbon burial rate in all oceans, which cover 71 percent of the Earth's surface..... An area northwest of Assean Lake, in Manitoba, previously interpreted to be dominantly Early Proterozoic, holds a newly discovered piece of ancient crust which contains paragneisses with a dominant population of 3.0 to 3.4 Ga detrital zircons. This newly discovered pre-3.5 Ga crust provides the first evidence for the possible preservation of some very old rocks (pre-3.8 Ga) in this region, older than any known Superior Province crust..... The Department of Energy's Sandia National Laboratories, has developed an unconventional approach to **locating a snow-buried skier after an avalanche**, using the same method that is used to locate the point source of a chemical or biological attack. This recently developed computer program, which provides group intelligence for a swarm of mini-robots to rapidly pin-point a source of contagion, can also be used by a group of humans carrying minicomputers, global positioning receivers, and simple radio equipment to find a skier buried in snow. In computer simulations, searchers using the "swarm" algorithm called "Distributed Optimization" found avalanche victims four times faster than simulations of any published search scheme currently in use. The search algorithm enables cockroach-sized robots to "talk" to each other through radio transmitters and home in on a target far more quickly than solitary searchers using more conventional means. The steady streams of information from multiple sources allow each member of the swarm to continually refine the direction of its search.....



ILSG Annual Meeting

Planning of next spring's annual Institute on Lake Superior Geology meeting in Thunder Bay is underway.

The technical sessions have been scheduled for Wednesday, May 10 and Thursday, May 11, 2000. Field Trips will be offered on May 8 - 9, and May 12-13. The field trips that are tentatively confirmed include:

- 1) Geology of the Lac des Iles Cu-Ni-PGE Mine— Leaders: Moe Lavigne (Matawin Mineral Exploration) and Staff, Lac des Iles Mines Ltd.
- 2) Geology of the Mesoproterozoic Sibley Group— Leaders: Phil Fralick (Lakehead University) and Mark Smyk (Ontario Geological Survey)
- 3) Geology of the Paleoproterozoic Gunflint Iron Formation— Leader: Phil Fralick (Lakehead Univ.)
- 4) Geoaerchaeology and Deglaciation History of the Thunder Bay area— Leaders: Brian Phillips and Joe Stewart (Lakehead University)

5) Glacial History and Regional Till Sampling in the Shebandowan Greenstone Belt—Leader: Andy Bajc (Ontario Geological Survey)

6) Geology of the Archean Steep Rock Lake — Finlayson Lake Greenstone Belt—Leaders: Denver Stone (Ontario Geological Survey), Kirsty Tomlinson (Geological Survey of Canada) and Ray Bernatchez (Atikokan Resources Inc.)

For registration information, contact: Dr. Stephen Kissin 807-343-8461 or e-mail at sakissin@gale.lakeheadu.ca

[Editor's Note: This event is open to any interested parties, NOT just geologists. It can be a great learning experience and lots of fun too!!!]



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c/o Katy Paul
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First Class

10/1/00
Steve Erickson
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