



GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

FALL 2002
VOLUME LVI NO. 3
<http://www.geo.umn.edu/orgs/gsm/>

Annual Fall Meeting
Sept. 23, 2002

Maplewood Old Country Buffet
3000 White Bear Ave
Maplewood
5:00 pm – Dinner
7:00 pm – Meeting/Program

The GSM annual meeting, to be held on Sept. 23rd, will include the election of new board members. The nominees are:

- ▶ Ken Barklind
- ▶ Cindy Demers
- ▶ Bill Farquahar
- ▶ Marlys Lowe
- ▶ Tom Smalec

☐ ☐ ☐ ☐ ☐ ☐

Any GSM Member who has a computer probably spends lots of time searching out great geology sites. If you haven't searched for any museums yet, here are some that I think are pretty interesting. And the best part is, you don't even have to drive anywhere. For those of you who enjoy web surfing you can visit all of these on the same day.

A.E.Seaman Mineral Museum
<http://www.geo.mtu.edu/museum>

Denver Museum of Nature and Science
<http://www.dmns.org>

Chicago's Field Museum
<http://www.fnmh.org>

Carnegie Museum of Natural History – Check out the Hillman Hall of Minerals & Gems
<http://www.clpgh.org/cmnh>

Royal Ontario Museum, Toronto – Search on Dynamic Earth Gallery
<http://www.rom.on.ca>

Vermont Marble Museum – Read all about it at
<http://www.geotimes.org/current/onexhibit.html>

And for some humor:

For a rundown on the Ig Nobel Prize winners (also known as the "anti-nobels") check out their web site:
<http://www.improbable.com/ig/ig-top.html>

And a special note of thanks to all of you who noticed the typo on the last GSM Newsletter, but didn't bring it to my attention. The Volume on the last edition was incorrectly listed as LVII instead of LVI. Time flies, but not that fast. Sorry for the confusion, if anyone noticed.

–Editor

Announcements

- Aug. 22-Sept. 2** State Fair
- Sept. 7-8** Field Trip: North Shore
- Sept. 23** Annual Meeting
Old Country Buffet-Maplewood
- Sept. 30** Your GSM Membership Expires!
- Oct. 7** First Lecture in 2002-2003 Series
*Ancient Land: Southern Gneiss
Terrane of the Minn. River Valley*
~ ~ ~

GSM NEWS

Editor:

Katy Paul
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Reporter:

Tom Smalec

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 c/o Katy Paul, 6901 West 84th St., #351, Bloomington, MN 55438, phone/e-mail listed above.

Officers: Steve Erickson, *President*;
Paul Martin, *Vice President*; Ted Chura,
Treasurer; Judy Hamilton, *Secretary*.

Directors: In addition to the officers listed above: Gail Marshall; Rose Mary O'Donovan; Katy Paul; Nina Ward

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

News from the Board...

We are getting ready for the start of a great new lecture series. The Geological Society of Minnesota first offered lectures in 1938. This means we are entering our 65th year of operations. The Society was the work of an interesting man named Edward Burch.

Burch (1870-1945) started out as an electrical engineer. His first job out of the University of Minnesota was with Thomas Lowry. Lowry had started the Twin Cities Rapid Transit Company, the Minneapolis street car company (Lowry Ave. in N Minneapolis is named for him). Burch assisted in electrifying the system. He directed the installation of the turbines at the St. Anthony Falls power plant. The street cars are gone, but the plant is still there, producing electricity for Xcel Energy. He also set up some of the electrical network in Stillwater and the Wildewood substation (White Bear Lake area). In Burch's papers, there is a map of the Stillwater area, showing proposed street car routes in that city, dated March, 1899. For reasons we do not know, he left the TCRT and began a private engineering consulting work, with an office in the old Metropolitan building, and later in the new Foshey Tower. He also was a lecturer on electrification of street railways from 1902 to 1910. We have documents showing he was the consulting engineer for the Interlochen Country Club when it drilled a water well in June of 1911.

His work with water well drilling seems to have led him back to the University. In the 1930s, (his 60's) he began taking Geology Courses at the U. This helped him eventually set up the GSM in 1938. Burch collected well information for his consulting work around the Twin Cities. I have taken some of this data to the Minnesota Geologic survey offices. They will scan through the data and see if they need any of it. We have a lot more data of his that we will sort through in the next few weeks and pass any of interest on to the Survey. I think it is great that we can provide the Survey information that will be a benefit to all Minnesotans. After all these years, the work of Edward Burch is still important to us all.

He died of a heart attack on May 5, 1945, interestingly enough, while riding a street car in Boston MA. One of our GSM roadside markers was dedicated to Burch in 1949.

~Steve Erickson, *President*

◎ ◎ ◎ STATE FAIR TIME ◎ ◎ ◎

The *Show and Exhibits* committee is again working on putting together the schedule of workers to man the State Fair Geological Society Booth. The booth will be open from 9:00 AM Thursday, August 22nd to 9:00 PM Monday, September 2nd. The 36 four-hour shifts of the 12-day fair require a total of 72 people.

Tom Schoenecker, the "Fair Chairman", will be calling many of you to solicit your help in working one or more of these shifts. If you want to sign up for a particular time, call Tom at (952) 474-4600. For those of you who don't call, please be kind to Tom and volunteer a shift when he calls you.

For those of you who have not worked the State Fair Booth before, we would love to have you try. You don't have to be a Geological Genius. You just have to show your unbridled interest in rocks, and invite the fair goers to our lectures and field trips. Many who have worked the Fair in previous years agree, it is a lot of fun talking rocks.~

CORE ISSUE

Geo labs running out of places to keep samples - but Minnesota has space to spare

By Tom Smalec

Rocks have been accumulating in North America for more than 3 billion years, but in the past decade we've run out of places to put them.

Across the nation, drill cores, rock samples and other collections of geological data are at risk of being lost simply because of a lack of storage space at universities, state geological surveys and private companies. Much of the data would be expensive or impossible to replace. In some cases, collections have been lost over issues like warehouse costs - or simply dumped. Work on organizing and cataloging the data and samples, essential to its future use, is falling farther behind every year as more and more material comes in.

The National Research Council has now recommended creating three new government-funded centers, at a cost of \$50 million, to house and organize threatened collections. The centers would serve the Gulf Coast, Rocky Mountain, and Pacific Coast regions. The proposal calls for creating scientific advisory committees to figure out what should be kept - or given up.

In Minnesota, however, the situation is brighter. Most of Minnesota's geological record is stored in the Minnesota Drill Core Library, operated by the Department of Natural Resources in Hibbing and kept under the management of geologist Rick Ruhanen.

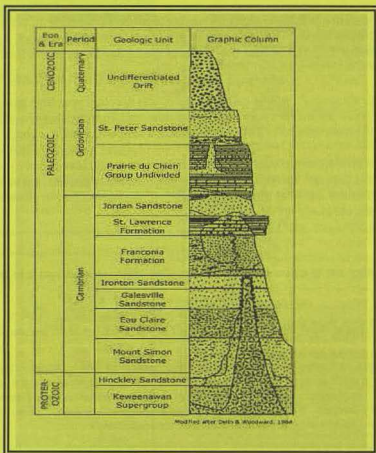
"The situation here is good," Ruhanen said. "We have three buildings built over the last 30 years. The last was built in 1990, and added to in 1995. So we've got a lot of capacity."

Ruhanen's facility stores some 2 million feet of drill core. That's more than 378 miles laid end to end, enough to stretch from Lake of the Woods to the Iowa border. Much of it has been accumulated by the Minnesota Geological Survey and companies doing mineral exploration in the Duluth Complex and the Paleozoic sedimentary beds of southeastern Minnesota.

Ruhanen estimates that the DNR Hibbing facility will have sufficient storage space for 20 years at the current rate that samples are coming in. That's good news for the Minnesota Geological Survey, which normally holds its cores and samples for just a year or two before shipping them to Hibbing.

Continued on page 7

Groundwater and Bedrock Strata of Carver County, Minnesota
 Part II in a Series
 by Bruce Goetteman



The hydrogeologic structure in Carver County consists of several layers, most of which are, or could be utilized for water supply, at least for domestic purposes. The bedrock layers are not uniform, due to upthrust along faultlines and to erosion prior to glaciation. Older layers are exposed in upthrust areas and valleys where the younger layers have eroded. The accompanying diagram illustrates the bedrock strata. The following descriptions summarize the type of rock at each layer.

The Prairie du Chien group is a bedrock unit deposited during the Ordovician Period. This formation is present in the eastern and southwestern portion of the County. Where this group exists, it is the first bedrock of contact in that area. It is comprised of dolostone, sandy dolostone, sandstone and shale. The layer ranges in thickness from zero to 150 feet thick. High transmissivity is due to joint, cavities and fractures within.

The Jordan sandstone is made up of fine to coarse-grained sandstone that occurs in much of the County. It is exposed as surface bedrock in a number of areas. The coarse-grained sandstone allows for high transmissivity. It is grouped with the Prairie du Chien in the hydrogeologic structure of the County.

GEOLOGICAL SOCIETY OF MINNESOTA

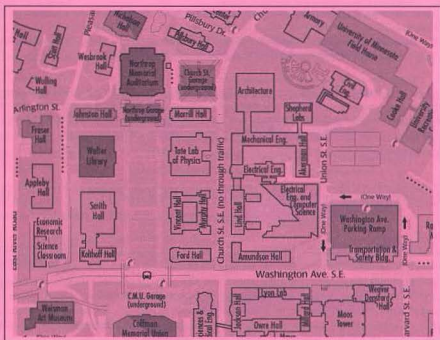
~Supporting and Promoting Public Interest in the Geological Sciences since 1938~

To assist new members and friends in finding the locations of our lectures and labs, a quick map of the University of Minnesota East Bank Campus is provided below. Lectures scheduled through December 2002 will be held in:

Amundson Hall Room B-75

If you're unfamiliar with the campus, or unsure of parking potential, call the official **GSM Hotline at (612) 724-2101** for assistance and reassurance. But please, don't wait until the last minute.

The location of Lectures after December 2002 will be posted in the *GSM Newsletter* and on our website at <http://www.geo.umn.edu/orgs/gsm/>



Additional copies of this schedule are available upon request.

Call the GSM Hotline at (612) 724-2101

GEOLOGICAL SOCIETY OF MINNESOTA



2002-2003 Lecture Program

Free Lectures & Labs held at 7:30 P.M.
Mondays on the Minneapolis Campus of the
Univ. of Minnesota. See map on reverse side.
Questions? Call: (612) 724-2101

23 Sep 02		Fall Annual Meeting – Program: Summer Field Trips Dinner at 5 P.M. / Meeting at 7 P.M. – Old Country Buffet, Maplewood		
<u>Lecture#</u>		THEME: FASCINATING GEOLOGY OF MINNESOTA: FROM A-GATES TO Z-EOLITES		
7 Oct 02	1	Ancient Land: Southern Gneiss Terrane of the Minn. River Valley G.B. Morey, PhD (Minnesota Geological Survey, Retired)		Room B-75 Amundson Hall
21 Oct 02	2	Island Arcs and Granite: The Voyageurs Area Chris Hemstad, MSc (Voyageurs National Park)		Room B-75 Amundson Hall
28 Oct 02	3	Terranes Collide: Great Lakes Tectonic Zone Mark Jirsa, MSc (Minnesota Geological Survey)		Room B-75 Amundson Hall
4 Nov 02	4	Penokean Orogeny and the Animikie Basin Mark Jirsa, MSc (Minnesota Geological Survey)		Room B-75 Amundson Hall
11 Nov 02	5	Banded Iron Formation: Minnesota's Major Metallic Resource Richard Ojakangas, PhD (Univ. of Minn – Duluth, Retired)		Room B-75 Amundson Hall
25 Nov 02		Laboratory: Minnesota's Minerals and Rocks Alan Knaeble, BSc (Minnesota Geological Survey)		Minn. Geological Survey 2642 University Ave. W.
13 Jan 03	6	Detritus of the Penokean Mountains: The Sioux Quartzite of SW Minn. Richard Ojakangas, PhD (Univ. of Minn – Duluth, Retired)		Location to be Announced
10 Feb 03	7	A Continent Asunder: The Keweenaw Rift Terry Boerboom, MSc (Minnesota Geological Survey)		TBA
24 Feb 03	8	An Excursion Along the North Shore and Boundary Waters Area: Agates, Zeolites, and Ancient Life John Green, PhD (Univ. of Minn – Duluth, Retired)		TBA
3 Mar 03		Laboratory: Fossils of Minnesota Alan Knaeble, BSc (Minnesota Geological Survey)		Minn. Geological Survey 2642 University Ave. W.
10 Mar 03	9	The Paleozoic Sea Invades Minnesota Anthony Runkel, PhD (Minnesota Geological Survey)		TBA
24 Mar 03	10	Karst Terrains of Southeastern Minnesota: Caves and Environmental Problems E. Calvin Alexander, Jr., PhD (Univ. of Minnesota)		TBA
7 Apr 03	11	Ice Time: Glaciers Descend from the Northeast and Northwest Carrie Patterson, PhD (Minnesota Geological Survey)		TBA
14 Apr 03		Laboratory: Minnesota's Landforms and Landscapes Howard Hobbs, PhD (Minnesota Geological Survey)		TBA
21 Apr 03	12	Glacial Lake Agassiz and the Formation of Lake Superior Howard Hobbs, PhD (Minnesota Geological Survey)		TBA
5 May 03		Kimball Memorial Banquet – Role of Minerals in the Cultural History of Minnesota Mark Jirsa, MSc (Minnesota Geological Survey)		TBA

Groundwater and Bedrock Strata of Carver County, Minnesota
continued from page 4

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The aquifer comprised of the Prairie du Chien group and Jordan sandstone is an important source of water in Carver County. About twenty-six percent of the bedrock wells interpreted by the Minnesota Geologic Survey are finished in this formation. Well yields range from 500 to 1000 gal/min and can exceed 2000 gal/min. This aquifer is confined by the St. Peter sandstone in northern Chanhassen and by drift elsewhere in the County.

About thirty-two percent of the bedrock wells are finished in an aquifer unit referred to as the St. Lawrence/Franconia confining bed. This unit acts as a confining layer due to its silty and shaly composition. The formation is present throughout the County and is missing only in areas where erosion has created bedrock valleys. While it does perform a confining function, it does not completely stop the movement of water. The rate of flow through this formation is slower than through formations typically considered aquifers.

The Ironton-Galesville sandstones function as an aquifer. The number of wells finished in this formation is significant, but not as large as the number finished in the formations above. The aquifer is present throughout the County and is absent only where dissected by bedrock valleys.

The Mt. Simon unit is a major aquifer of the future because of its great depth. It consists primarily of fine to conglomerate sandstone, yet also contains scattered to thick beds of shale and siltstone. The Mt. Simon is quite thick throughout the County, with thickness ranging up to 300 feet. It underlies the entire County and is confined by the Eau Claire sandstone. The Mt. Simon aquifer is exposed in the major valley and fault areas in San Francisco Township (immediately beneath me, as I write) and Hancock Township. Although previously believed to be part of the Hinckley group, recent information indicates that no Hinckley sandstone occurs in Carver County.

The final rock layer to be considered is termed the Keweenaw Supergroup. This unit is exposed in two small areas of the bedrock valley in southern Carver County. (Buried bedrock valleys in Carver County are deeper and expose more formations than was suspected 15 years ago.) It is made up of intercalated units of shale and sandstone, and ultimately igneous rock. The data available at this time indicates that this unit does not directly affect the groundwater system in the County.~

Next time: Part III will explore the groundwater and bedrock valleys in Carver County.

Text of the Geological Marker at Gooseberry Falls State Park- Middle Falls

Located in Lake County, on U.S. Highway 61, at the Gooseberry River

THE GEOLOGY BEHIND THE WATERFALLS

About 1.1 billion years ago, this continent began splitting apart along a rupture called the Midcontinent Rift, which extended from the Lake Superior region southwest to Kansas. During a period of about 20 million years, thousands of lava eruptions flowed out over a flat landscape. Layer upon layer of flows accumulated until the growing stack reached a thickness of up to 20 kilometers in the Lake Superior area. Most of these flows solidified into the dark volcanic rock called basalt.

The waterfalls of the Gooseberry River show the layering of these lava flows. When basaltic lava erupts at the earth's surface, the gases it contains form bubbles, which slowly rise in the viscous liquid. Rapid heat loss at the top surface of a flow causes the lava just below the surface to solidify quickly. This quick-hardening lava captures the bubbles within it, creating a zone of porous rock along the flow top. Because the interior of a lava flow stays liquid longer, its gases have time to escape, leaving a solid section. After the flows here accumulated, warm groundwater percolated through the layers for a long time, altering minerals and softening the porous flow tops more readily than the solid interiors. This process left each flow supported by the weakened porous top of the flow underneath it.

If you walk on the flows nearby, you will see some polygonal patterns of cracks in the basalt. The geometric shapes are actually the tops of rock columns that extend down into each flow. The columns formed parallel to the direction heat was lost when each lava flow cooled. Slow, uniform contraction of the rock during its cooling created the pattern of cracks, called columnar joints.

The columnar joints of a flow and the erosion of the weakened flow top underneath it work together to partition a flow into poorly secured columns. These columns are broken apart by weathering and frost, and the rushing water of the river removes the chunks from the downstream edge of the flow. Thus, the way in which these ancient lava flows erode produces waterfalls in the shape of giant stairsteps.

Erected by the Geological Society of Minnesota
in partnership with the Minnesota Department of Transportation,
the Minnesota Geological Survey,
and the Minnesota Department of Natural Resources
2002

Dale Setterholm, MGS assistant director, said most of the space crunch is occurring in states where there has been an upsurge in oil and gas exploration. The NRC study found state geological surveys - even those that have constructed core libraries or significantly added onto existing facilities within the past 15 years - report 16 percent or less remaining space.

Minnesota law requires people exploring for minerals to submit data and core samples to the DNR. The agency began accumulating mineral samples in the 1940s, but most of its material started coming in when exploration for non-ferrous metals began in the Duluth Complex in the 1960s. Cataloging all that data is another critical issue identified by the National Research Council. Many collections suffer from insufficient "metadata" - data about the data, which tells researchers where to look among the millions of specimens.

But Minnesota is again better off than other states. While some of the Minnesota DNR data is protected during active exploration, much of it is open to other researchers and the public. Much of the data has been scanned and indexed and can be viewed on the internet at <http://minarchive.dnr.state.mn.us> (note there is no "www" in the web address.)

Geologists who access the Minnesota DNR collection are required to share any data they derive from it, such as chemical analysis. And one U of M researcher went hunting for fossils among core samples from southeastern Minnesota.

But most states aren't as well-positioned as Minnesota. Continued erosion of the nation's geological database seems inevitable without some intervention by federal government, private industry and the geological academic community.-

MEMBERSHIP RENEWAL

Reminder... your GSM membership expires September 30th. 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. Fill in the form below, and mail it with your check, to Gail Marshall, Membership Chair.

Geological Society of Minnesota

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

Membership Renewal - October 1, 2002 to September 30, 2003

\$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 (____) _____

E-Mail _____

In the news...Fossil Discovery

Last May, the fossilized remains of a giant marsupial lion were discovered in a cave in Western Australia. Alongside the lion were six partial skeletons of fellow giant lions, identifiable by their retractable claws and large front teeth.

Operation Leo, as the expedition was called, was exploring three caves on the Nullabor Plain in Western Australia when the fossils were discovered. Also found were the fossils of the world's largest kangaroo and a wombat, the size of a small car. Palaeontologist John Long from the Western Australian Museum in Perth described the fossils as "the find of the century."

Long believes that the caves must have been somehow sealed off, and trapped the animals inside causing their death. That would explain the perfectly undisturbed and complete state of most of the fossils. This find is providing a glimpse of what the Pleistocene period was like in Australia from 1.8 million to 10,000 years ago. While future expeditions are planned, these discoveries are being referred to as just "the tip of the iceberg".

~BBC News



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