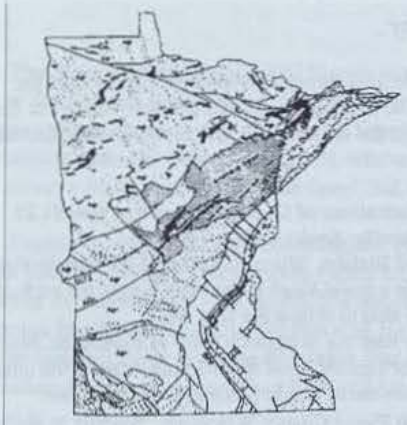

GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

WINTER 2002
VOLUME LVI NO. 4
http://www.geo.umn.edu/orgs/gsm/

Welcome New Members! Its great to see those new faces at the lectures this fall. There are always vacant positions that need to be filled, so don't be shy about volunteering. The committees are listed in the GSM directory, so if you see something that interests you, call the committee chairperson and inquire about it. And by the way, the newsletter is always looking for articles, humor, book reviews, news, and interesting anecdotes – all with a geological slant, of course.~

The 2002-2003 Lecture Series is off to a great start! So far, we have heard about the Gneiss Terrane of the Minnesota River Valley, island arcs of the Voyageurs area, the Great Lakes Tectonic Zone of central Minnesota, the Penokean Orogen, and the deposition of the Iron Formation in the Animikie Basin. Minnesota's geology, from A-gates to Z-eolites, is truly a fascinating subject, and we bring in the experts to present the information to you. Don't miss the rest of the series; 2003 promises to bring more intriguing facts about Minnesota's geologic past.~

The GSM Board of directors for 2003 is comprised of the following:

Ken Barklind
Ted Chura
Cindy Demers
Bill Farquahar
Tom Smalec
Judy Hamilton
Marlys Lowe
Paul Martin
Rosie O'Donovan

The Officers for 2003 will not be known until the December Board meeting, and these individuals will be announced at the first lecture of 2003.~

Since we all seem to like field trips, and tromping around woods and fields, I thought that the offerings of the Compleat Scholar might appeal to some of you. Check out the back cover. The Compleat Scholar is affiliated with the College of Continuing Education, U of M.~

Nebraska Quake felt in Southwest MN November 3

A 4.3-magnitude earthquake centered in eastern Nebraska was felt by residents in southwestern Minnesota and northwestern Iowa, according to a Nov. 4 report in the Worthington Daily Globe.

The USGS said the tremor lasted 10 seconds and occurred at 2:45 p.m. Sunday, Nov. 3. It was centered 30 miles northeast of O'Neill, Neb., near the Nebraska-South Dakota border, about 200 miles west of Worthington. The preliminary estimate of the epicenter depth is 5.0 KM.

The Daily Globe reported people in Southwest Minnesota and adjacent parts of Iowa felt their houses shake and noted lamps swaying.

It was the sixth minor quake in the region since 1990.

Announcements

* Have you remembered to renew your GSM membership? Look at the address label on this newsletter. If the date on the label does not say 10/01/03, you still need to send in your membership dues. Mail to Gail Marshall, Membership Chair, at the address listed in the box below.
* Starting in January, the remaining lectures in the 2002-2003 series will be held in the Electrical Engineering & Computer Science Bldg. (EE Comp Sci) Room 3-210, just a few steps N.E. of Amundson Hall. Call our GSM Hotline 612-724-210, in early Jan '03 to confirm this location, or check our website.

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; Bill Robbins; 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,

From the President...

I have had the pleasure to look through some of the papers from the archives of the GSM. The first thing I noticed was how active the first field trip schedule was. In the summer of 1938, the following field trips were organized:

June 4, 1938. Granite formations of St. Cloud. Bus trip, fare $1.25. Stops include N. Minneapolis, Anoka and St. Cloud
June 11, 1938. Afton and Hudson, Wisconsin. Start, Minneapolis Public Library at 9:00 AM "Tie a towel-sized white cloth across the back of your auto, in order to be able to follow the lead auto".
June 25, 1938. Geology near the Wisconsin town of Burkhardt. Meet at the Minneapolis Public Library, head to Stillwater, inspect the quarry near the old Prison. Cross the St. Croix proceed to Mound Dam.
July 9, 1938 Geology in Pierce County Wisconsin. Starting at Hudson, proceeding to River Falls (Similar to a field trip we had in the summer of 2001)
July 16, 1938. Hastings Minnesota. "Gasoline expense at 1 cent per mile will be 80 cents".
July 30, 1938. Cambrian Formations along the St.Croix at Marine
August 13, 1938. Keweenawan Lava flows near Pine City, Minn.
September 3, 1938. Lake Superior around Duluth
September 10, 1938. Geology around White Bear Lake

What an incredible schedule! Most, if not all, were organized by Edward Burch, the founder and "Counselor" of the organization. Lectures began on Monday September 12, 1938 in the Auditorium of the old Minneapolis Public Library. Please recall that this is not the Library that is now scheduled for demolition in downtown Minneapolis (built in 1961), but the older one which the "new" Library replaced.

This schedule shows what dedicated people can do. Also, it reminds us of a time gone by, when TV, Cable TV and the Internet had not intruded into people's lives. A field trip to the Twin Cities Brickyard in 1943 (now Lilydale Park) gave instructions on how to get there via the streetcar. We spent more time interacting with real live people, not a plastic "mouse".

I am wondering if the day of the lecture has gone. Have computers, interactive Web sites, TV and the like, replaced the old lecture? Judging by the initial turnout from this year's series, (75 plus attended the first two lectures) it does not seem like it. Still the younger generation may not care for this approach. New ways to reach people may be required in the future.

One thing is for sure: field trips will continue to be with us. Nothing replaces going out and looking at the rocks themselves. Still, the 1938 field season had access to sites now covered with parking lots, freeways and housing developments. New sites will have to be found. Field trip organizers and leaders are needed. In December and January, we will plan the summer 2003 field season. Please help out if you can. Call me to learn more.

~Steve Erickson, President

USGS: THE EARLY YEARS

By Katy Paul

The United States Geological Survey was established by Congress in 1879. Prior to that time, there was no agency of the Federal government that carried on continuously funded explorations of the country's geography or its resources. Although the Army's Corps of Topographical Engineers existed for this purpose, it depended upon annual appropriations from the War Department, whose priorities changed from year to year. Various geologic and natural history surveys functioned at the state level, but none enjoyed long term funding.

Explorers, naturalists, paleontologists, geologists, scientists of all kinds, if they were not affiliated with a college or a state funded natural history survey, were left to get funding on their own, by whatever means was available. Building a reputation in science was very difficult without private benefactors or a sponsoring agency. In the 1850's, the young Smithsonian Institution began to fill this role for struggling naturalists, by funding explorations to the territories of the west. The funding came with the provision that any discoveries of previously unknown animals, reptiles, insects, fossils, plants, minerals, etc., that were found, would be collected and shipped to the Smithsonian for study.

In 1853 a young naturalist/geologist, Ferdinand V. Hayden, made his first exploration up the Missouri River, to the White River Badlands (South Dakota). He collected numerous fossils and natural history specimens, which he was obliged to share with fellow scientists who helped fund the expedition. The next year, Hayden explored the Upper Missouri Basin into Western Montana, where he found some of the first reported dinosaur fossils. Hayden solicited private support from various benefactors, and in 1853, he began corresponding with Spencer Fullerton Baird, the Assistant Secretary of the Smithsonian Institution. Baird was responsible for organizing specimens brought back by western explorers. Eventually, after many letters, and many shipments of specimens, Hayden began to receive some funding from the Smithsonian.

Hayden's expeditions relied on Army forts as mail drops and points of re-provisioning. Through these contacts, Hayden became acquainted with Lt. George M. Wheeler of the Army's Corps of Topographical Engineers, and since money was always a scarcity, Hayden accepted a position under Wheeler as geologist/naturalist for the Corps, in 1856. They explored as far north as the mouth of the Powder River in Wyoming. Jim Bridger, hired as a guide for the party, led them to explore the Lower Yellowstone River. Bridger's stories of boiling springs and exploding mudholes of the Upper Yellowstone intrigued Hayden, and he resolved to see them for himself one day.

In 1867, Nebraska became a state, and Hayden was given the job to head the Nebraska Geological Survey. His previous explorations of the territory had facilitated many acquaintances and friendships with individuals who were now in a position to back him in this enterprise. He had served as a medical doctor in the Army during the Civil War, which brought him into contact with future political leaders. Always focused on funding, Hayden made it a priority to maintain good relationships with practically everyone he ever met. Congressmen, senators, former professors and students, colleagues, Baird at the Smithsonian, all were recipients of copious letters from Hayden, recounting his discoveries and explorations. Maintaining a high profile was necessary, he thought, in order to insure present and future funding, and even though he was thought bold and self-serving by some, his most vocal critics were his rivals. Hayden was the first to realize the popular appeal of photography and in 1868 he published "Sun Pictures", a book of scenic photographs of the Rocky Mountains. His innovative thinking brought the wonders of geology to everyone, not just fellow scientists.

By 1869, the Nebraska Geological Survey had completed its objectives, and Hayden continued independently into Wyoming. By this time, his survey was called the Geological Survey of the Territories of the United States. Hayden began publishing annual reports, with sketches and photographs of geographical features that his survey had explored. His method of blending science and scenery in his annual reports resulted in sort of a "Roadside Geology" series, which served to educate the public to the wonders of the west, and also to keep his name in the forefront. After 1870, Hayden decided that his survey would chart the entire west, and create an extensive series of maps. In 1873 it became known as the United States Geological and Geographical Survey of the Territories, or "The Hayden Survey".

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Three other independent surveys were active throughout the 1860's and 1870's. The Clarence King Survey (1867-1872) was sponsored by the War Department to explore and map a 100-mile swath across the West, along the 40th parallel from the Sierras to the front range of the Rockies. The Lt. George M. Wheeler Survey (1869-1879) explored and mapped the deserts of the Great Basin south of the 40th parallel to the Mexican border. The John Wesley Powell Survey (1869-1879) explored the Colorado Plateau and the Colorado River region, which included the first and second trips down the Colorado River though the Grand Canyon.

Hayden's survey continued to receive appropriations from the Dept. of the Interior. He was able to build a staff of geologists and topographers who gradually took over more of the fieldwork and report writing. The Hayden survey continually produced, published, and surveyed. It published books with such diverse topics as the snakes of Montana, fishes of the Rio Grande, minerals of Nevada, fossils, birds, insects, etc. Hayden looked upon his publications not just as a means of reporting on fieldwork, but as an opportunity to sponsor broad research in the natural sciences. He went out of his way to identify and encourage the endeavors of other naturalists and would even absorb the costs of publishing their reports. Hayden's scope was so broad that the sum of his publications was greater than the total of the other three surveys combined.

Ferdinand V. Hayden, in the field, 1871.

In 1871, Hayden got the chance to see the geysers and mudpots of the Upper Yellowstone that Jim Bridger had described. Hayden and his crew explored the Yellowstone region in Wyoming and Montana, and Hayden became the first public advocate for establishing Yellowstone as a national park. The crew included the photographer William Henry Jackson, and the artist Thomas Moran. Moran's paintings and Jackson's photographs were dramatic and effective testimonials in favor of establishing the region as the first national park. Hayden worked out the geography of the Yellowstone region, and he suggested the dimensions for the park in the context of his wider explorations of that region. (Abraham Lincoln had set the precedent for the idea of a national wilderness park when he granted Yosemite Valley to California as a public park in 1864.) Congress, after viewing Moran's and Jackson's depictions of hot springs, mudpots, geysers, waterfalls, and mountains, voted Yellowstone as America's first national park in March 1872.

In 1877, Hayden's survey published the "Atlas of Colorado", which was very well received, and established the standard for future publications of this kind. Hayden revealed the existence of what are now called the Ancestral Rockies, and he suggested that the many ranges within the Rocky Mountains appeared at different times. He saw a connection between the general uplift of mountains and the explosive eruption of igneous rocks. He noted that Carboniferous and Triassic beds existed on both sides of the Rockies. Hayden was the creator of "economic" maps, which designated areas according to the best use of the land: arable, pasture, timber, minerals.

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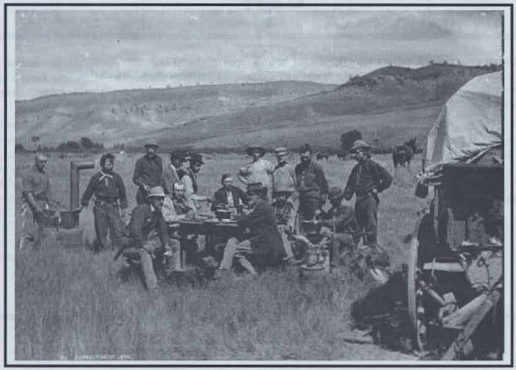
Since 1873, Hayden had been promoting the idea of one permanent Survey. And by the time of Hayden's publication of the "Atlas of Colorado" in 1877, the U.S. Congress had become convinced of the need for the complete and uniform mapping of the West. The Atlas pointed at Hayden as the one who should be entrusted with that duty. He was the obvious choice to head a Survey that would consolidate all scientific exploration and eliminate rivalry and duplicate work.

The other surveys all lobbied Congress for their choice of first leader of the USGS. Virtually no one viewed the USGS as a new idea. In fact, letters to Congress from the sponsors of King and Hayden emphasized the fitness of their candidate to *continue* the work of a geological survey. And everyone appreciated, some grudgingly, that it was Hayden who had originated and developed that geological survey.

Since Hayden had never possessed a secure income, and was annually forced to lobby Congress for funding, many "distinguished" professors and "influential scientists" of that time, though impressed by Hayden's accomplishments, worried about his propensity for self-promotion. Such behavior was thought to be unnecessary for a scientist and unbecoming to a gentleman. Additionally, Hayden displayed the broad interests of a generalist rather than the concentrated focus of a specialist. With the creation of the United States Geological Survey in 1879, the specialized approach became the norm, and the unified approach was rejected, along with the man who personified it. Clarence King was appointed the first director of the USGS.

Ferdinand V. Hayden achieved the reputation as the greatest explorer of the American West, thanks to Yellowstone. But the Geological Survey that he had built was handed to Clarence King. John Wesley Powell became the second director of the USGS in 1881. Hayden died nine years after the creation of the USGS.~



The Hayden Expedition Camp. Hayden is seated at the table, center, back.

Groundwater and Bedrock Valleys of Carver County

Part III, Last in a Series

by Bruce Goetteman

Prior to glaciation, the landscape and topography in Carver County were mostly determined by the contour of the bedrock. Figure 1 shows the approximate pre-glacial landscape, the bedrock topography, and contours. The topography consisted of highland areas cut by deep river and stream valleys. The buried valley system in the County is deeper and exposes more formations than was suspected 15 years ago. The valley system cuts through the confining St. Lawrence/Franconia formation, the Ironton-Galesville aquifer, the Eau Claire aquifer and the Mt. Simon aquifer in a major valley to the south. The Keweenawan Supergroup is also exposed in the southern valley.

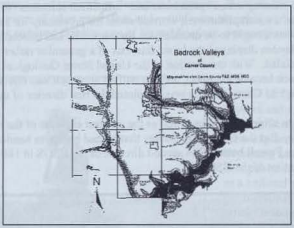


Fig. 1

When glaciation occurred, the valleys were filled with various types of glacial material. As the glaciers melted, main river valleys followed the approximate course of some of the pre-glacial river valleys. The Minnesota River Valley in Carver County follows the approximate course of a large pre-glacial valley. Figure 2 illustrates an existing river in a bedrock valley and also illustrates a typical bedrock valley infilling with drift material.

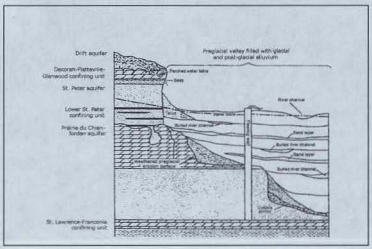


Fig. 2

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Bedrock valleys are a significant factor in groundwater planning. Confining or retarding layers such as clayey till or the confining bedrock layers (St. Lawrence/Franconia, Eau Claire, lower St. Peter), under normal circumstances, segregate the water of various aquifers. While some interchange occurs, it is somewhat limited and occurs over a relatively long period of time. Problems in one aquifer are generally limited to that specific aquifer by confining beds. The bedrock valleys, however, can provide an opportunity for potential intermixing of the water from all of the aquifers through which the valley cuts. This situation can introduce pollutants from the surface of an upper drift aquifer into lower drift and bedrock aquifers. The Reilly Tar & Chemical site in St. Louis Park and the Twin Cities Arsenal in Arden Hills are examples of these types of contamination where pollutants were channeled from one aquifer to another.

Although it is believed that the bedrock valleys greatly affect the flow of groundwater in the County, there is no localized information to demonstrate the extent of the effect. Nevertheless, Carver County considers all bedrock valley areas as sensitive areas. It is believed they offer the potential for connection between aquifers, rapid transport of contaminants from the surface to aquifers, and the possibility for rapid linear transport of contaminants. Bedrock valleys can short circuit the natural protection provided by confining layers in the drift, and the bedrock valleys are "holes" in the layers of rock that normally retard substantial vertical movement of contaminants.

It is understood that further data collection and analysis is needed in this area. Consequently, as new information becomes available, the County will take it under advisement and amend current land use/development policy accordingly.~

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* * * STATE FAIR RECAP * * *

With a few exceptions, last minute cancellations and substitutions, the 2002 Fair exhibit was a great success! This year we had a total of 55 GSM members and 2 non-members working in the booth. These 57 people worked a combined total of 288 hours, greeted well over 15,000 fair goers (my estimate), and gave out about 2,500 copies of our lecture series schedules and membership applications. Many of our members worked two or more shifts. Most notable: Dick Hegland working four shifts, Don Swensrud working three shifts, and Judy Hamilton, Val O'Malley, Steve Erickson, Roger Willette, Doug Zbikowski and Tom Schoenecker each working two shifts.

I would also like to acknowledge and thank Dave Wilson, Doug Zbikowski and Mark Lukkarilla who helped set up, and my friends, Don O'Reilly and Ron Wurm who helped to take the booth down.

~Tom Schoenecker, State Fair Chairman

COMPLEAT SCHOLAR WEEKEND OPPORTUNITIES 2003

WINTER JOURNEY: WILDLIFE EXPLORATION AT CEDAR CREEK
February 15-16, 2003 $230 fee includes one night lodging (double occupancy), all meals and refreshments. Weekend begins Saturday at 9 a.m. and concludes on Sunday at 1 p.m.
ARC Retreat Center, 1680 373 Ave. N.E., Stanchfield, MN.
This weekend course combines a comfortable retreat setting, slide illustrated lectures, and field study, in an exploration of wildlife habitat, biology, and ecology.

NORTHERN OWLS: WINTER FIELD STUDY IN MINNESOTA'S BOREAL FORESTS
March 7-9, 2003 $325 fee includes two nights lodging, all meals and refreshments. Weekend begins Friday at 7 p.m. and concludes on Sunday at 2 p.m., Cascade Lodge, 3719 W. Highway 61, Lutsen, MN.
Class will explore the biology, natural history, and conservation of the Boreal Owl, Hawk Owl, Great Gray Owl, Saw-whet Owl, and Snowy Owl through lectures, discussions, and field trips.

OTHER PATHS—SIMPLICITY IN A COMPLEX WORLD
March 28-30, 2003 $375 fee includes two nights lodging, all meals and refreshments. Weekend begins Friday at 7 p.m. and concludes on Sunday at 1 p.m.
Cloquet Forestry Center, 175 University Road, Cloquet, MN.
This weekend retreat will explore choices and possibilities created by examining the work of philosophers and thinkers who wrote and spoke about simplicity. As background for our discussions, we will read brief selections from Henry David Thoreau, Mahatma Gandhi, Dorothy Day, Jane Addams, Septima Clark, and Mary Oliver.

For in-depth descriptions and to register online: www.cce.umn.edu/scholars
Call **612-625-7777** to register by phone and to receive a newsletter.

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