



GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

FALL 2000
VOLUME LIV NO. 3

<http://www.geo.umn.edu/orgs/gsm/>

DO
YOU
KNOW
THIS
MAN?

See
Article,
PAGE 4



Annual Fall Meeting

Monday, September 25, 5 PM
Old Country Buffet
3000 White Bear Avenue
Maplewood, Minnesota
Need directions?
Call 612-724-2101

Life: Just One Long Field Trip

Are you a keeper of lists? I don't mean "To Do" lists. I'm talking about "Have Done" lists, or "Have Seen" lists, much like bird-watchers' lifetime lists. Avid bird-watchers keep a lifetime list of bird species they have seen in the field, the object being to continually increase the length of the list by seeing more birds. Obviously the longer the list gets, the more difficult it becomes to find new species. This may lead to travel outside of one's home environment to experience unique or rare sightings, and add them to the list. Living here in Minnesota provides many opportunities for bird watching, but when the list already includes yellow-headed blackbird, pileated woodpecker, rose-breasted grosbeak, bald eagle, boreal chickadee, purple finch, etc., one might dream of venturing further afield to add to the list. Perhaps a semi-palmated sandpiper, blue-footed booby, or puffin sighting could be had through more extensive travels. The list could continue to grow for decades.

Since this is not an Audubon newsletter, but a geology newsletter, I am proposing a different sort of list that we geo-philes might enjoy. Instead of keeping a lifetime bird list, we could have our own lifetime Geology List. For example, without leaving the state of Minnesota, I already have a pretty extensive list: iron formation, karst topology, graywacke, 3.6 billion year old gneiss, greenstone belts, glacial erratics, red beds, terminal moraines, potholes, concretions, shear zones, fossils, varves, stromatolites, kink folds, columnar jointing, loess, current bedding, dropstones, glacial striations, pillow basalt... just to name a few. After scouring Minnesota for interesting geological features (and that could result in a very long list), travel to other localities could provide sightings of such wonders as a volcanic neck, salt dome, atoll, lava tube, hot spot, an active subduction zone, seastack, ophiolite suite, divergent plate boundary, or an accretionary wedge. And for more adventure, perhaps one day I might be brave enough to visit an active volcano, or the San Andreas Fault.

All of the things on my list that I mentioned above, were first sighted on field trips right here in Minnesota. So if list-keeping sounds like fun, don't miss out on the opportunities that the GSM offers. Field trips, lectures, and labs can all be sources for new additions to your list. And speaking of field trips, while you're out there, you might even see a few new bird species!

—Katy Paul

Announcements

Charlie Brennecke, having lost whatever grip he ever had on his common sense, has agreed to resume publishing the GSM Newsletter. He wants to express his appreciation to Bruce Goettman for his hard work the last 24 months, and his hope that he can continue to meet the high standards Bruce set for us.

**Oct 9 - First Lecture in the 2000-2001 Series - 7:30 PM
Amundson Hall - - Room B-75**

**Next Newsletter Deadline:
November 1, 2000**

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.

Officers: William Robbins, *President*; Bruce Goettman *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: (952) 894-2961. Membership levels are: \$10 for full-time Students, \$20 for Individuals, or \$30 for Families.



PRESIDENT'S PAGE

Our country thrives on volunteer activity. Likewise, volunteer activities abound in the Geological Society of Minnesota. Here are some typical needs for volunteers.

DNR Workshop

In mid-summer each year, the Minnesota Department of Natural Resources (DNR) provides geology workshops for teachers. Continuing Education Units are given and field trips are included as part of this program. This year, the workshop is being held at St. Cloud State University and nearby sites having geological interest. GSM members have been involved in this activity since its inception, with members contributing their time and skills. Display boxes of rocks have been assembled for this program by GSM; Doug Zbikowski has provided the leadership for this. This year, Dick Heglund has attended many of the DNR planning sessions and Steve Erickson, Dan Japuntich, and Lisa Peters are volunteering at workshops and field trips. Others are certainly welcome to volunteer for next year.

State Fair Booth

Volunteers are needed for GSM's booth at the Minnesota State Fair, Aug 24 through Sept 4. By the time you read this, that golden opportunity may have slipped by; if not, call Judy Hamilton at 651-699-9812, and don't forget about next year.

Delivery of Fliers

Volunteers are needed to deliver GSM lecture series fliers to libraries, schools, The Science Museum, The Bell Museum of Natural History, Minnesota History Museum and the Minnesota Geological Survey.

Contributions

Members may voluntarily give contributions to GSM. Typically, contributions would be tax deductible if deductions were itemized because GSM is a 501(c)(3) non-profit educational organization.

Writing for Newsletter

Volunteer to write articles for this GSM newsletter. The newsletter is great already but you might make it even better.

Ride Pooling

Some ride pooling to GSM lectures and field trips already occurs. I would like to suggest a ride-sharing plan to help get people to lectures and field trips. The plan would connect those who wish to share or don't drive with those who drive and would like help with parking and driving costs. Park and ride and meeting at nodes would help with parking costs, and might also help people from greater Minnesota attend. Additionally, the environment would be happier. Please call me at 651-739-1146 if you wish to find a ride. I will then ask for volunteers from your region to drive.

Volunteer activities are educational and enriching, try some!

Forms for recording Continuing Education Units (CEUs) will be available for this season's lecture series and for upcoming field trips.

—Bill Robbins, President

BOARD MEMBER NOMINATIONS

GSM Directors will be elected at the September 25th Annual Meeting. Those retiring from the Board at the end of this year are Sylvia Huppler and Jean Hosterman.

Nominees to replace the two people retiring, for a first two-year term, are:

Katy Paul
Rose Mary O'Donovan

Those who have served their first two-year term and desire to be elected for a second two-year term are:

Steve Erickson
Gail Marshall
Bill Robbins

Continuing in their present terms (as of January 1, 2001) will be:

Dave Christianson, second half - second term
Bruce Goettman, second half - second term
Judy Hamilton, second half - first term
Paul Lemke, second half - second term

Directors are elected by the GSM general membership. The term of office is two years, commencing January 1 and terminating December 31 of the second year. No Director may serve more than two consecutive terms (four years). However, after a one year absence from the Board, an individual who has served may again be nominated if he/she so desires.

Nominations will also be accepted from the floor at the meeting and included in the election. Officers (President, Vice-President, Treasurer and Secretary) are elected by the Board at the last Board meeting of the year and begin serving on January 1.

Respectfully submitted

— *The Nominating Committee*

GRANITE, BASALT FINES TESTED AS FARM FERTILIZER

University of Minnesota is conducting field trials to see if rock fines—the waste-dust created by Minnesota's quarrying industry—can be used as a farm fertilizer.

Tests are under way at farms in Gutches Grove, Long Prairie and Bertha, with granite from sources at Cold Spring, Granite Falls and St. Cloud, and basalt from Dresser, Wis. Between 10 tons and 55 tons were spread per acre, a coating of about one-eighth of an inch. Preliminary findings indicate the material added manganese, copper and zinc to the soils. Added nutrients from the fines may increase the nutritional value of animal-feed crops, such as hay and alfalfa, grown on the land.

There is currently no commercial use for the material, so it is being stockpiled at aggregate processing facilities around the state. The Minnesota Department of Natural Resources asked the U of M to see if the fines could be used as a source of slow-release nutrients. The Minnesota Department of Agriculture funded the initiative.

—Tom Smalec

IMPACT CRATERS

In 1980 physicist Luis Alvarez and his geologist son Walter theorized that a meteor impact was responsible for the extinction of the dinosaurs 65 million years ago. They based this hypothesis on their discovery of a thin film of iridium, a chemical produced in the heat and pressure of meteorite impacts, which had inexplicably been deposited simultaneously throughout the world. The next step was to find evidence of an impact big enough to have created such massive destruction. In the early 1990's, geologists discovered a 105-mile-wide buried impact crater in Chicxulub, Mexico. This crater is believed to be the smoking gun.

Geologists have long held that gas and oil collect in parts of the crust where the rock is less dense. In the past, they looked for oil and gas near faults—gaps in the crust where tectonic plates rubbed together. But after the huge Chicxulub crater was identified in the Yucatan, geologists realized that the geologic effects of the meteorite impact were probably the prime cause of the oil reservoir in the Gulf of Mexico.

The heat and pressure of a meteorite impact causes chemical changes that can turn suitable rock into potentially lucrative mines. The impact of a meteorite can heat rock so hot it melts. The resulting geological effects can create deposits rich in nickel, copper and platinum. Or an impact can simply expose or preserve existing deposits. So naturally, geologists who work for oil companies are taking a keen interest in craters, both for their oil and mineral deposits as well. The oldest known earthly crater—the 180-mile-wide crater in Vredefort, South Africa, is one of the world's biggest gold mines; revenues from gold and uranium amount to \$7 Billion a year.

Excerpted from the August 2000 issue of
Discover Magazine

LOUIS AGASSIZ:

Jean Louis Rodolphe Agassiz was born on May 28, 1807 in Motier, Switzerland. As a boy, Louis, as he was always known, was fascinated with fish. This interest later developed into serious study and in 1827 at the University of Munich, he began working on a book describing Brazilian fish. He employed an artist to illustrate his folio, and after it was published, he began to study fossil fish.

Although Agassiz obtained a medical degree in 1830 to please his parents, he eventually went to Paris to continue his research and study of fossil fish. While he was in Paris, Agassiz became acquainted with Georges Cuvier, a noted fossil authority and professor of Natural History. Cuvier was planning to do his own study of fossil fish, but he decided to turn over all of his notes and collections to Agassiz. It was a vast project. By 1833 Agassiz published his first volume describing fossil fishes. This book was enthusiastically received by the scientific community. For the first time, scientists were provided a key to understanding the relative chronology of geologic events.

Fossils in the strata show the order in which species appeared and became extinct. Agassiz' book cataloged many of these fossil fish, listing which had come before and which after others. He also noted which fish were freshwater and which were marine species, enabling geologists to determine whether they were looking at the remains of a lake or a sea. Agassiz' work was important to geologists because so many strata contained fish and mollusk fossils.

The success of Agassiz' book in scientific circles afforded him the opportunity to meet many of the great scientists of his day. He visited England where the Geological Society provided him with a room in its headquarters to use for study. He attended lectures, and collected more fossils. One of the men Agassiz met, Jean de Charpentier, had been studying Alpine glaciers. His theory was that all of the erratic boulders that lay all over the plains and mountains of Switzerland had been carried there by glaciers, and not by water as everyone had thought. Having lived in Switzerland all his life, Agassiz thought this theory extremely improbable, as did everyone else.

But he was curious, and so he spent the summers of 1836 and 1837 climbing and exploring the glaciers and moraines of his homeland. In 1837 at the annual meeting of the Swiss Society of Natural Sciences, leading scientists gathered to hear discussions and theories presented by their colleagues. Agassiz presumably

would be presenting his latest paper on fossil fish. Three years earlier, Jean de Charpentier had presented his glacial theories, which stated that the glaciers of Switzerland had once been much larger. Most dismissed this theory contemptuously, since the popular belief was that a great flood was responsible for the huge erratic boulders that littered the land.

Most people at the conference had no idea that Agassiz had been studying glaciers. So when he began his presentation and it became clear that he had joined the glacialist camp, they were extremely distressed. Indeed, Agassiz did not present a paper on fossil fish, but presented evidence based upon his observations, that glaciers had once covered the land from the North Pole to the Mediterranean. This idea shocked everyone and was greeted with derision and contempt. Agassiz presented evidence that he had seen in the Swiss alps.

Old moraines and scratched and polished rocks could be found well beyond the current range of glaciers. Erratic boulders with sharp edges and almost no signs of erosion rested on top of small stones and grit that had been worn into round balls. Agassiz said that if water had carried those stones, the smaller rocks would have settled on the top of the erratics, not on the bottom. His explanation was that the small stones and grit had been dragged beneath the glacier and sand-papered into balls. The sharp-edged boulders had ridden on top of the glaciers, where they had escaped erosion. As the ice melted away, the uneroded boulders descended, finally settling on the sharply eroded debris at the bottom of the glacier. But his audience was not persuaded.



4 *I have devoted my whole life to the study of Nature, and yet a single sentence may express all that I have done. I have seen the stages of their growth in the egg, — that is all. It chanced to be a result that was found to apply to other groups and*

BORN MAY 28, 1807 - DIED DEC 13, 1873

Over the next several years, Agassiz became an expert on glaciers and their effects. He tramped all through the alps gathering more and more evidence for his theory, and slowly converted more fellow scientists to his beliefs. He saw evidence that glaciers move, and as they move, push moraines in front of them, carry boulders on top of them, and scratch and polish rocks beneath them. He visited Scotland and saw evidence where glaciers had once been. In 1846 he published his first of 3 planned volumes describing glaciers: their appearance, how they move, and the climatic and geographic conditions that create them.



But still, the majority of Agassiz' contemporaries remained skeptical. In the autumn of 1846, Agassiz sailed for America. He was eager to search for evidence of glacial action on the American continent. When his ship docked at Halifax, Nova Scotia, he hiked up the hill above the landing and saw furrows and scratches and polished surfaces on the rocks. He immediately recognized these as glacial evidence.

Agassiz was enthusiastically welcomed in Boston and during his first month in the United States, he met many notable American scientists, including James Dwight Dana, the country's rising geologic star. He toured and lectured throughout the northern United States

and fell in love with America. During the next 27 years he became one of the leading figures and scientists of the U.S. He became professor of zoology and organizer of the Museum of Comparative Zoology at Harvard University. Zoology, teaching, and lecturing came first, but wherever Agassiz went, he always continued his studies of glaciation.

In 1848, Agassiz led a party of 16 on an exploring expedition. The destination was the north shore of Lake Superior. His purpose was to gather as many zoological specimens as were interesting and important. They traveled in birch bark canoes as far as Fort William (Thunder Bay) and were accompanied by French Canadians and Ojibwa Indians who served as guides. At each landfall Agassiz gave impromptu lectures describing the particular geological and zoological features of the environment.

He collected a great variety of fresh-water fishes and packed them for shipment back to Harvard. He found clear evidence of past glacial action in land areas of New York State and on the shores of Lake Erie and Lake Superior. The results of Agassiz' "scientific pleasure" trip were published in 1850 in the volume *Lake Superior*. This book became popular as a book of travel and nature description, as well as a scientific account of the findings.

In 1857, 20 years after Agassiz presented his glacial theory at the Swiss Society of Natural Sciences, Charles Lyell, the nineteenth century's most influential geologist, published *The Geological Evidences of the Antiquity of Man*. One third of the book was devoted to the glacial period. Long opposed to Agassiz' theory of a great ice age with glaciers the size of continents, Lyell had stubbornly refused to affirm Agassiz' observations. But when Elisha Kent Kane returned from a 2-year expedition to Greenland in 1855, with eye witness accounts of enormous glaciers that stretched as far as the eye could see, suddenly the skeptics could accept Agassiz' theory.

Lyell retracted his old arguments in his new book and he credited Agassiz as the source of the Ice Age theory. But although Agassiz had proved that ice is a major geological force, Lyell fleshed out the weak points in his theory, and seized the Ice Age constituency. Louis Agassiz died on December 13, 1873. An erratic boulder weighing more than a ton was brought over from Switzerland and placed on his grave. Many memorials, statues and plaques all over the world bear his name. There is a Mount Agassiz in California and another in Chile. In 1879, a lake that existed at the end of the ice age was named in his honor, by Warren Upham. Glacial Lake Agassiz covered about 200,000 square miles in Manitoba, eastern Saskatchewan, western Ontario, eastern North Dakota, and northwestern Minnesota.

have shown that there is a correspondence between the succession of Fishes in geological times and the different and has led to other conclusions of a life nature. — Louis Agassiz, 1869

MINNESOTA STATE FAIR 2000

August 24 - Labor Day September 4

It's almost upon us again! *That Great Minnesota Get Together*. We have been calling you folks for the past few weeks for sign-up to work the GSM booth. If you haven't received a call, you will get one. You are asked to work only one 4-hour shift. We have a comfortable piece of carpeting for the floor so standing is easier. Or, you can sit in one of the chairs if you desire.

The Fair runs for 12 days. Our booth is open for 3 shifts each day from 9 a.m. to 9 p.m. and we need 2 people per shift (thus, we need all the help we can get). It is mandatory to have people working the booth at all times—FAIR ADMINISTRATION ORDERS. If we don't have proper staffing, we could be shut down.

The Minnesota State Fair is our major source of new members. By smiling at all those friendly visitors from behind the "Rock Table", talking to the kids (who love our rock display), handing out lecture series flyers, and inviting folks to a free lecture, you are doing the GSM a great service.

If you ride a bus to the Fairgrounds, you will receive a coupon from the driver for a reduced rate at the gate. Our booth is located on the back aisle in the Education Building. The building is near the main entrance on Snelling Avenue. Hope we see you there!

Judy Hamilton, Chair

State Fair Exhibit

Broddingnagian Crystals

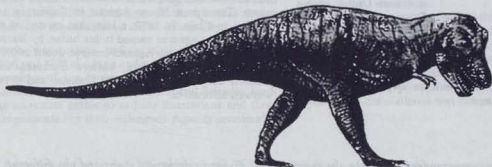
A geode—a rock cavity lined with crystals—is ordinarily something you can hold in your hand. But a Spanish geologist has found a whopper, the size of a cave, in an abandoned silver mine, on the northeast coast of Spain. Javier García-Guinea, a geologist at the National Museum of Natural Sciences in Madrid, made the extraordinary find last month, following up on rumors from rock collectors. The geode is 8 meters long and 1.7 meters high and is studded with half-meter-long crystals of gypsum. Scientists say the cave may have been formed about 6 million years ago when portions of the Mediterranean were evaporating, leaving behind large, crystal-forming mineral deposits. But sightseers will have to wait: The cave entrance has been blocked with rocks and guards while scientists examine the crystal palace.

Science Volume 288 - 23 June 2000

That Dino Named Sue

That highly publicized and eagerly awaited dinosaur exhibit, Sue - the *Tyrannosaurus rex*, was unveiled at the Field Museum in Chicago, on May 17th. Discovered in August 1990 in the Black Hills of South Dakota, this *T. rex* turned out to be the largest, best-preserved, and most complete specimen ever found. Traveling exhibitions will be making the rounds of various U.S. museums including our own Science Museum in Saint Paul. The Sue Exhibit will be at the Science Museum from November 4th through January 21, 2001. If you visit the exhibit, you will be able to view video footage, colorful graphics, and interact with exhibits and touchable casts of Sue's bones. There are also models of her daggerlike 12-inch-long teeth. To learn more about Sue, and the exhibit, visit her website at: www.fmnh.org/sue

Katy Paul



ROADSIDE GEOLOGY OF ONTARIO: North Shore of Lake Superior

A new guidebook by Edgar G. Pye was published in 1997. *Roadside Geology of Ontario: North Shore of Lake Superior*. This book will be appreciated by rockhounds and geology buffs who intend to explore the region along Lake Superior's northern shore between Thunder Bay and Sault Ste. Marie, Ontario.

The first part of the guide book summarizes the general geology of the Lake Superior region and it is organized into two main sections. The section on the Precambrian focuses on the Canadian Shield. Geologists have divided the Canadian shield into several geological provinces, which in turn have been subdivided into smaller units. The section on the Proterozoic Eon describes the various rock groups and formations within the Southern Province, and tables provide the age of each group. Different rock types, such as volcanic, sedimentary, and intrusive rocks are also discussed. Other topics, such as folding, faulting and gold deposits are mentioned.

The second part of the guidebook is divided into 12 trip sections that cover the route between Thunder Bay and Sault Ste. Marie. Each trip provides a list of important geological and scenic features of interest,

accompanied by explanations and maps showing the underlying geology. Trips include tours to nearby water falls, mines, ridges, canyons, mesas, gorges, and outcrops. The famous amethyst deposits are described in one of the trips to the Nipigon area. Part 2 gives the reader lots of tips for planning enjoyable and educational side trips as the tour progresses around the top of the lake.

Part 4 of the guidebook provides a glossary of geological terms, which will be of help to readers with no background in geology. More serious collectors will appreciate the list of selected references to geological literature in Part 5. References on gold deposits, fossil sites, mineralogy, mineral localities, and geological features pertaining to northern Ontario are provided.

Rockhounds will appreciate the user friendly, spiral-bound format of the guidebook. You can have the book open while driving, or while collecting in the field, since it can be laid flat on the ground or a level surface. If you plan to collect minerals or make a scenic tour of the Lake Superior region, or just want to learn more about the geology of this area, this book would make a valuable addition to your collection.

MEMBERSHIP RENEWAL

A reminder that 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. As an added membership bonus, this year GSM is offering our new Minnesota mineral collection #1. This set consists of six minerals common to Minnesota (quartz, magnetite, muscovite, selenite, staurolite & calcite) packaged with a descriptive key in a six-compartment, polystyrene box. The collection is available to all members for the postage and handling fee of \$7 per box. The collections make great gifts so order now for an early start on your holiday shopping.

Geological Society of Minnesota
c/o Gail Marshall, Membership Chair
12232 Allen Drive
Burnsville, MN 55337

Name _____
(as you would like it to appear in the GSM Directory)
Address _____
City _____ State _____ Zip _____
Phone _____ E-mail _____

Membership Renewal - October 1, 2000 to September 30, 2001:

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

Minnesota Mineral Collection #1:

Quantity @ \$7.00 Postage & Handling each \$ _____
Ship to: (if different from directory address) \$ _____

Total Paid \$ _____

SUMMER FIELD TRIP 12 JUN - 21 JUN, 2001

GEOLOGY OF THE EASTERN COLORADO PLATEAU

The geography of eastern Utah is a desert landscape of vibrant colors, towering rock walls, and deeply incised canyons carved by the Colorado and Green Rivers and their tributaries. The rock layers tell stories about shallow seas, coastal plains, volcanoes, and vast deserts long past. They also tell us about the forces that created upheavals in the American West which resulted in several episodes of mountain building and uplift. The rugged beauty of this spectacular countryside prompted the establishment of several national parks (Arches, Canyonlands), national monuments (Dinosaur, Colorado, Natural Bridges), and a tribal park of the Navajo Nation (Monument Valley), all of which we will visit on our ten-day field trip.

Trip participants use private automobiles and stay at motels or campgrounds of their choice. Participants may enter or leave the field trip whenever they wish. Most days include several stops, with picnic lunch brought by participants. Several partial days (just a couple of field stops) and/or transit days are included. A field trip guidebook (at nominal cost) will be available for purchase. There are no other costs. Two pre-trip meetings will be scheduled, probably during March and May of 2001 (date, time, location TBA); attendance is not required for participants. The March meeting will include an introduction to the trip, a slide presentation, and a detailed list of suggested motels and campgrounds. The co-leaders for this GSM field trip are Walt Blowers (651.645.3553) and Rick Uthe (763-522-5029).

BOOKLET AVAILABLE

The Society for Mining, Metallurgy and Exploration (SME), Inc., is offering a free copy of its new booklet, *Careers in the Minerals Industry*, upon request. Additional copies are 60 cents each, plus shipping and handling. Orders can be placed by phone (800-763-3132 or 303-973-9550), by e-mail (sme@smenet.org), or online (www.smenet.org).

The booklet was designed primarily for students, teachers, guidance counselors, and parents. Careers in geology, mining, mineral processing, the environment, and health and safety are covered.

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