



THE GEOLOGICAL SOCIETY OF MINNESOTA

News

Volunteer opportunities, field trips, lectures, and public service, since 1938

Dates to remember:

- Aug 23 - Sep 3—State Fair
- September 8 — Stone Arch field trip
- September 17 — Fall Banquet
- September 20 — Energy plant tour
- October 1 — First Lecture

**Stone Arch Bridge Field Trip
10 a.m. to Noon
Saturday, September 8, 2012**



Please come along on a 2-hour field trip in downtown Minneapolis to visit the Stone Arch Bridge, built in 1883 by railroad magnate J. J. Hill, and now a pedestrian bridge.

- **Tony Runkel**, Minnesota Geological Survey Chief Geologist, will talk about regional geology, St. Anthony Falls, and the stone used to build the bridge - local Platteville limestone, magnesian limestone from Mankato and Stone City, Iowa, and Sauk Rapids granite.
- **David Wiggins**, National Park Service Ranger and Historian, will describe the cultural history of the bridge, the quarrying of the stone, the challenges of building a masonry bridge, the floods of 1965 which caused the bridge to sag, and the current condition of the stone blocks and the bridge.

Free parking on neighborhood streets can be found east of the bridge, if you don't mind the walk across the bridge to where we will meet. Closest parking, a city lot with a small fee, is at the west end of the Bridge, where we will meet. To get there:

From southbound I-35W: take the Washington Avenue exit, drive west toward downtown; turn right on Portland Avenue S (toward the river, away from downtown); turn left on W. River Road, go one block, turn right into city parking lot.

From northbound I-35W: take the Third Street S exit, drive west toward downtown; turn right on Portland Avenue S (toward the river, away from downtown); turn left on W. River Road, go one block, turn right into city parking lot.

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STATE FAIR**August 23 thru Sept 3**

It takes a lot of Volunteers to staff our booth at the State Fair. By now all volunteers should have received their calendars and booth information. If anyone has further questions or feels left out and wants to be a substitute, please call Sandy Steffner. Some stand-by contacts would be good to have in case of last minute emergency cancellations.

Sandy Steffner
(612-201-2092) or
ssteffner@comcast.net

from the archives: two geologists along Minnesota's North Shore; GSM Field Trip, September 1939

**GSM News****Officers:**

Roger Benepe, President
Theresa Tweet, Vice President
Sherry Keesey, Treasurer
Allen Bowles, Secretary

Board Members: Deb Preece; Lisa Peters; Alan Smith; and David Wilhelm

Editors: Katy Paul and Harvey Thorleifson

The Geological Society of Minnesota is a 501(c)3 nonprofit organization. The purpose of this newsletter is to inform members and friends of activities of interest to the Geological Society of Minnesota.

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

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

Membership dues are: \$10 Full-time students; \$20 Individuals; \$30 Families

GSM News is published four times a year: **February 15, May 15, August 15, and November 15.** Deadline for article submission is the first of the month, before the date of publication.

Send all material to:

Katy Paul
keystone517@hotmail.com

New Members!

Mitchel Fischer—Burnsville
Gary D. Gray—Burnsville
Bill Haralson—Shoreview
Steve Swantz—Burnsville

FROM THE PRESIDENT'S DESK

Summer is winding down; the State Fair is quickly approaching. Hope to see everyone at the fair. The Summer field trips were a great success. (Thank you Randy & Bill)

This is our 75th Anniversary year. In 1938, two groups came together to form the Geological Society of Minnesota. It was made up of the earth science club that met at the Minneapolis Library and a consulting group led by Edward P. Burch. The purpose was to stimulate the public's interest in geology. And for the last 75 years that is what we have been doing, and we will be doing for the next 75 years or more.

This year's upcoming Lecture Series, included in this newsletter, looks Top Notch. From Plate Tectonics out to the Planets, back to Glacier National Park to the history of Urban lakes, off to the East African Rift Zone, and back to the Duluth Complex for Nickel and Copper, and much, much more. The year's series has something for everyone. (Thank you Steve.)

I look forward to seeing everyone on September 17 as we hold our annual meeting and Fall Banquet at Grand City Buffet. Allan Bowles has resigned his board position since he is moving to Arizona. Thank you Allan, for all your work on the Board. Mark Ryan has generously accepted nomination to the board to fill this vacancy. Alan Smith will be completing his term on the board at the end of the year. We will be voting on board member nominees at the meeting. Thank you Alan for all the great work you did on our website and more! Harvey Thorleifson will complete the program by updating us on the status of the Minnesota Geological Survey investigations.

Hope your summer has been fun productive and safe. Looking forward to seeing every one at the fair, the Fall Banquet, and the lectures.

Roger Benepe, GSM President



SAN ANDREAS FAULT GSM FIELD TRIP

APRIL 14—22, 2012

An Outstanding Success—Part II!

In the previous newsletter (Summer 2012), we featured photos and notes from the GSM Group's adventures in California, surveying the San Andreas Fault and other geological features. We split their story into two parts so that we could cover all of it. The rest of their story unfolds below.

For those of us who flew from warm spring weather in Minnesota to Los Angeles on April 14, we were pleasantly surprised to see snow in the mountains near LA, more than a month after we had seen any in Minnesota. Although the snow disappeared within a day or so, we were treated to very pleasant temperatures the first few days of our trip. The temperature climbed to 102° F on

Friday near the Salton Sea, and then after the remainder of us had left California, Randy and Joan experienced 113° F in Death Valley a few days later. Our leader, Dave Lynch, had specifically requested the trip be in mid-April to avoid extremely high temperatures of summer.

During the first full day of our trip in the Carrizo Plain National Monument, we visited the Painted Rock formation, led by Adam Schmidt, guiding us on an excellent Bureau of Land Management (BLM) tour. Painted Rock is a cross-bedded horseshoe-shaped marine sandstone formation approximately 250 feet long by 280 feet wide and 45' tall. This fossilized underwater sand dune

formed when the Carrizo Plain was submerged beneath a shallow sea during the early Miocene Epoch, about 20 million years ago. It is of special interest because of the stunning pictographs and petroglyphs created by Native Americans. The pictographs were painted in red, black and white pigments with yucca and rodent tail hair brushes and sometimes just by simple finger painting. Unfortunately, they are very fragile and now only hint at their former beauty and detail. The formation provides shelter to owls, quail, jack rabbits, and lizards, all of which we spotted during our walk.

On Wednesday (Day 4 of our trip), Dave Lynch led us to the Palmdale Road Cut, provided to geologists by courtesy of the California Department of Transportation and by the presence of the San Andreas Fault. This road cut exposes



Field trip participants stand atop the famous Palmdale Road Cut, which exposes deeply folded shale and siltstone.

deeply folded Pliocene Anaverde shale and gypsiferous siltstone deposited in an ancient lakebed. Absolutely spectacular!

Later during Day 4, we entered Devil's Punchbowl Park which is a Los Angeles County park within the Angeles National Forest on the northern slopes of the San Gabriel Mountains. The Devil's Punchbowl is a deep canyon, a V-shaped folding and tilting of sandstone layers caused by compression. The peculiar up-tilted rock formations found in the area are layers of



The Devil' Punchbowl canyon is 300 feet deep from the vista point, 125 feet higher than Niagara Falls, and deep enough to engulf a 22 story building.

sedimentary rocks formed long ago by water depositing loose material in horizontal layers. Later they were squeezed into their present, steeply tilted form by ongoing uplift action along the Punchbowl and Pinyon Faults and by pressures along the San Andreas Fault. The Punchbowl Fault is to the south of the rock formation, while the Pinyon and San Andreas Faults are to the north. Short trails within the park showcase the geologic features along the Punchbowl and San Andreas Faults.

For Thursday, most of our group went on to Joshua Tree National Park and learned that the transverse mountain ranges were formed when a spreading center was subducted. Luke Sabala, the Chief Physical Scientist at the park also talked about the pressures on the park including invasive grasses and helium balloons which land in the park. A focus of his talk was urban sprawl with its attendant energy use causing air pollution and nighttime light



Joshua tree in Joshua Tree National Park

pollution, and urban water demand. Also mining with its water needs and ground water pollution can affect the park. Luke also mentioned that invasive grass species are producing a change in ground water balance and contribute to fire susceptibility.

The Joshua tree for which the park is named is a species of yucca, which is a branch of the agave family. The Joshua tree is a good indicator that you are in the Mojave Desert. We found their grotesque appearance fascinating. The tallest Joshua trees in the park are forty feet high and are estimated to be about 300 years old. Luke told us that the Joshua tree seeds were spread by giant ground sloths, now extinct. With climate change, should the region become intolerably hot, Joshua Trees will likely disappear forever.

The national park also contains many exposed granite monoliths and rugged canyons that testify to the tectonic and erosional forces that shaped this area. Washes, playas, alluvial fans, bajadas, desert varnish, igneous and metamorphic rocks interact to form patterns of stark beauty and ever changing complexity. One of the larger monoliths provided us welcome shade for lunch. In the eastern part of the park, we came across an area densely populated with teddy bear cholla. From a distance, they do somewhat resemble cuddly teddy bears, but closer inspection reveals an extremely spiny cactus that you would deeply regret touching.



Shoreline of the Salton Sea

Near the eastern shore of the Salton Sea is Salvation Mountain. It is a human-made mountain of praise created over many decades by one of the



Salvation Mountain

Salton Sea’s most well-known characters—Leonard Knight. The spirits stayed outside, while we enjoyed our lunch inside, protected from the heat of the day (102° F). Perhaps a better name is Han Shan, Mandarin for Cold Mountain.

On Saturday, the remnants of our group visited the La Brea Tar Pits and Page Museum, built to include a petroleum seep in the heart of Los Angeles proper that overlies a large petroleum deposit. We



Partially excavated skull in La Brea Tar Pits

saw dozens of examples of large mammal skeletons, including mammoths, horses and camels, giant ground sloths, saber-toothed cats, and dire wolves. One wall displays over 400 dire wolf skull fossils. We learned that carnivores are over-represented in the fossils because as herbivores became trapped and distressed in the seep, multiple predators were attracted, and they

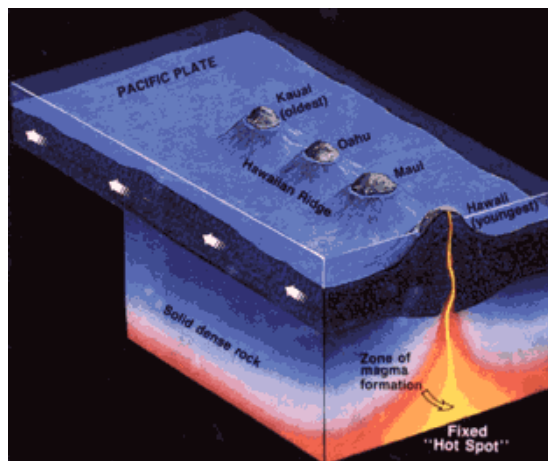
would in turn become trapped. Only one such trapping event every decade is sufficient to account for the huge number of fossils in the sediments. We watched as paleontologists worked on Ice Age fossils right before our eyes in the Fishbowl Lab. And we toured some of the active excavation sites on the property.

Long after they are over, many trips take on a dream-like quality, as did this one. But this trip also has many concrete memories of the places seen, and the explanations heard, all due to the excellence of our primary leader, Dave Lynch and our secondary leader, Randy Strobel.

This article was a joint effort by: Diane Lentsch, Bill Robbins, and David Wilhelm

Photos by David Wilhelm

Mantle Plumes Under Investigation



Professor Hans Thybo has taken on Mantle Plumes. He intends to provide new data that will settle the question of whether mantle plumes exist or not. Under the aegis of the DanSeis Center at the University of Copenhagen, along with a 3 million euro grant received from the Danish Ministry of Science, he should get a good start.

The theory of mantle plumes, or “hot spots” was first put forward by the Canadian geophysicist, J. Tuzo Wilson in the early 1960s. Wilson looked at

the Hawaiian Island chain and theorized that the linear shape of the island chain indicated that the Pacific tectonic plate was moving over a stationary spot in the earth’s crust that continuously spewed hot magma onto the ocean floor. Over time the magma built up into a volcanic island. After several million years of plate movement, each island moved beyond the hot spot, cutting off its source of magma. A new volcanic island formed, repeating the cycle and creating the chain that we see today.

Similar mantle plumes are thought to exist beneath Yellowstone and Iceland. The Deccan Traps—a 200,000 square mile area in India covered with basalt lava flows—may also have been created by a mantle plume while India paused over a hot spot (now the island of Réunion) during its voyage through the ocean on its way to join Asia. The Columbia River basalts of the northwestern United States may have been deposited by the same mantle plume that today resides beneath Yellowstone. Evidence abounds for the existence of mantle plumes.

Proving the existence of mantle plumes lies in defining the source of the magma, and the depth from which it flows. Professor Thybo plans to lower advanced seismographic equipment to the ocean floor in a 1000 kilometer radius around Iceland where it will remain for at least two years. It is believed that these instruments will be able to record seismographic data from as deep as 500 to 1000 kilometers. Oil companies using current methods can only capture data from 6 to 10 kilometers.

Seismographic instruments can identify the hot magma chambers in the earth since hot materials have different properties than cooler ones. If Thybo’s instruments are able to prove the presence of mantle plumes and fit them into the accepted body of knowledge, maybe those cartoon drawings used to illustrate mantle plumes will prove to be accurate. Or not.

Katy Paul



Morey, Glenn B. age 76, of Roseville, MN, passed away August 2, 2012. Morey received his Ph.D. in geology at the U of MN in 1965 and had a very distinguished career as a Professor in the Dept. of Geology & Geophysics at the U of MN and as the Chief Geologist at the Minnesota Geological Survey (MGS). In 1986 he received the Goldich Medal of the Institute of Lake Superior Geology in recognition of his numerous contributions in geology including hundreds of publications for the MGS and in national and international professional journals. Upon his retirement in 2001 he became Professor Emeritus at the U of MN.

**Geological Society of Minnesota
Field Trip to District Energy in Saint Paul
Thursday Sept 20, from 1:30-3:30**

A tour of the District Energy heating and cooling and solar thermal plants in downtown Saint Paul has been arranged. District Energy uses biomass, fossil fuels, and solar to generate heat and cooling for clients in the downtown area. The plant is located on Kellogg Blvd. next door to the Minnesota Science Museum.

The tour will be on Thursday Sept 20, from 1:30-3:30. We will meet at the District Energy St. Paul plant on 76 Kellogg Blvd. Recommended parking is in the parking lot of the Minnesota Science Museum. If you are a member of the museum you can park all day for \$5. It can be accessed from either Kellogg or Shepard. There will be a short presentation (20-30 minutes), the

CHP (combined heat and power) plant tour and then the solar thermal tour at the Saint Paul River Centre. If you wish to participate, send an email to Randy Strobel at the address below indicating the names of participants you are registering. A cell phone number that you can be reached at on the day of the trip would also be useful in the event of logistical problems. You will be sent an email confirming your registration. The tour will fill at 25 participants. An email will be sent out when the trip is full. If the tour fills and there is sufficient interest, another tour might be arranged.

Trip coordinator: Randy Strobel
Randy.Strobel@metrostate.edu (use this address to register)
 Home phone: 651-731-0458
 Cell phone: 651-285-7710

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. If you have not already done so, please renew your membership by filling in the form below and mailing it to the address given, or bring it to the Annual Meeting on Sept. 17 or one of the lectures.

**Geological Society of Minnesota
P.O. Box 390555
Edina, MN 55339-0555**

Membership Renewal — October 1, 2012 to September 30, 2013

- Ⓞ\$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 _____

GSM Fall Banquet and Annual Meeting

September 17

Grand City Buffet
8912 Hwy. 7
St. Louis Park

5:00 – 6:30 PM Dinner

6:30 – 7:00 PM Meeting and Election of Board Members

7:00 PM: **Status of Minnesota Geological Survey Investigations**

Harvey Thorleifson, Ph.D.,
Director, Minnesota Geological Survey



P.O. Box 390555
Edina MN 55439-0555

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