



THE GEOLOGICAL SOCIETY OF MINNESOTA

News

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

From the President’s Desk...

Well, summer has gone, and now we are into fall. That’s good news - in-person lectures are back, and we are back in our favorite room. The upcoming lectures look great. Thank you Steve Erickson for putting them together for us. He is planning on doing one or two Zoom lectures each semester. This will ensure that we have new and different speakers.

Thanks, too, for all who took a shift at our booth at the State Fair and at the Minnesota Mineral Club show. And sincere thanks to Patrick Pfundstein for wrangling the volunteer schedules.

At the Fall Banquet, we voted in four new board members to replace the ones leaving at the end of 2022. The new board members are: Stephen Willging, Kate Clover, Dick Bottenberg, and David Kelso. I would like to thank each and every one of you and welcome you to the board. Also thank you to those leaving the board: Wolf Bielefeld, Roxy Knuttilla Janezich, Frank Janezich, and Nancy Jannik. I appreciate your contributions.

Sandy & Ed Steffner have graciously offered their home for the holiday party again this year. It will be on December 10th starting at 3pm. Please contact Sandy with what you are bringing to the party. In this age of COVID, if you are not feeling well, please stay home! There is always next year.

I can’t wait to see all the lectures in-person. Remember the doors at the University lock at 6:30 pm so arrive a little early; however, we will check the door every few minutes for late comers.

Roger Benepe



GSM President, Roger Benepe

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GSM field trip to the South Shore of Lake Superior, July 1939. Visiting a black granite quarry, Mellen, Wisconsin



GSM

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The Geological Society of Minnesota is a 501(c)3 nonprofit organization.

GSM Mail Address: Send all GSM membership dues, change of address cards, and renewals to: Joanie Furlong, GSM Membership Chair, P.O. Box 141065, Minneapolis, MN 55414-6065

Membership categories and dues:

Student (full time)	\$10
Individual	\$20
Family	\$30
Sustaining	\$50
Supporting	\$100
Guarantor	\$250

Individual and Family memberships can be renewed for 1, 2, or 3 years. Members donating at the Sustaining, Supporting or Guarantor levels will have their names highlighted in the GSM membership directory.

GSM News: The purpose of this newsletter is to inform members and friends of activities of interest to the Geological Society of Minnesota. GSM News is published four times a year during the months of February, May, August and November.

Newsletter contributions welcome:

GSM enthusiasts: Have you seen interesting geology while traveling? If so, please

consider sharing your experiences with others through our GSM Newsletter. Write a short article, add a photo or two and send it in. Deadline for submission is the first of the month before the publication date. Send your story to newsletter editor: Kate Clover, kclover@fastmail.fm Thank you in advance.

GSM Board Membership:

The GSM Board consists of members who have a special interest in advancing the goals of the society, including lectures, field trips, and community outreach. The Board currently has ten members, and our bylaws limit terms to four years to encourage turnover, and a change of perspectives and ideas.

The Board meets quarterly, on the second Thursdays of February, May, August, and November, or on a different date if conflicts arise. In-person meetings are from 7-9 PM at the Minnesota Geological Survey at 2609 W. Territorial Rd, St. Paul, MN 55114.

Board meetings are open to all GSM members. If you are a new or long-time member and Board membership is of interest to you, please consider attending a meeting. If you have a topic you would like the Board to consider, please contact Roger Benepe, rbtrilobite@gmail.com

Welcome New Members!

Vanessa May, Saint Paul
 Kristina Lloyd, Minneapolis
 Steven Pinta, White Bear Lake
 Rosemary Ernst-Itchner, Minneapolis
 Hannah Marik, Long Lake
 Jennifer Ellingson, Maple Lake

**Notes from the Past
 GSM News, January 15, 1944**

DR. LESLIE O. DART

The subject of this sketch is DR. LESLIE O. DART, one of our most outstanding and enthusiastic members. Dr. Dart is a real authority on minerals, particularly, but is equally familiar with birds, plants and animals of land and sea. He is a Charter Member of our Society and rarely misses a meeting,

Dr. Dart, says he, was born "So long ago that I don't remember". However, don't take that too seriously. He was born in Meeker County, Minnesota, and attended the public grade and high schools there. He took some of his academic work at Columbia University, New York City, but later transferred to the University of Minnesota. He took Medicine at the



University of Minnesota, graduating in 1901. He comes from a family of long “livers”. His grandfather lived to the extreme age of 109. His grandmother lived to within three days of being 100 years old, and an uncle lived to be 98. He has one brother and four sisters,

Dr. Dart was born with a keen observation and an abiding interest in nature. As a boy, he closely observed and investigated natural phenomena, and at the early age of 14, was conducting scientific correspondence with Dr. Elliot Couse, Secretary of the United States Geological

Survey, a great naturalist and traveler, who rewrote the History of the Lewis and Clark Expedition. Dr. Dart also became acquainted with Dr. William Bebe, the great Naturalist, at an early age, and was greatly impressed by this association. Later, he was with Dr. Bebe on a trip to the Galapagos Islands, a group of islands West of Equador. While here, they investigated an erupting volcano, and fell into imminent danger of destruction. Approaching the source of the eruption from the sea, the water was so hot that it literally cooked the fish and seals. The real danger, however, came from the fact that the water, greatly heated, lost considerable of its buoyancy, causing the ship to settle dangerously deep in the water.

Dr. Dart has made in all 9 or 10 trips to South and Central America in the interest of Science. He was a personal friend of President Theodore Roosevelt, with whom he became acquainted while the former president was ranching in North Dakota, and was invited by the Ex-president to accompany him on his trip to Africa. Dr. Dart was appointed by Grover Cleveland as the Naturalist with the Venezuela Boundary Commission, and while there, had bestowed upon him the honorary degree of Doctor of Medicine by the Governor of Venezuela, in recognition of his services in treating the natives and other people in the communities visited by the Commission.

He has had many thrilling and exciting adventures while in pursuit of scientific facts. On one occasion, while investigating the Mayan Civilization remains, he stumbled into a pit, having a single opening at the top, then to find himself and a large Boa Constrictor sole occupants of the pit. He was rescued by his companions who lowered strong vines to him. On another occasion, he investigated stories of people being bitten by sharks, but was never able to find on authentic case. He attributes all such bites to the Barracuda.

While exploring the Delta of the Orinoco, he collected many varieties of mosses. When those where scientifically identified, it was found that more than 50 varieties had been previously unknown to science. Upon another occasion, he conducted a scientific expedition, cruising along both coasts of the Peninsula of Lower California for the purpose of investigating certain species of birds that nest on the Cape. On this trip, he found, also, an unusual species of large mountain sheep,

inhabiting the craigs on the highlands. He has lived through 4 or 5 revolutions in Venezuela and has traveled extensively in Venezuela, Bolivia, Columbia, the states of Central America, and Brazil.

For 18 years, Dr. Dart was a member of the faculty of the Medical School at the University of Minnesota, teaching Internal and Clinical Medicine.

How Dr. Dart has found time in such a busy professional life to accomplish, explore, and enjoy so much is a mystery. Small wonder, then, that he has never found time to investigate the fairer sex, as he remains single. Dr. Dart is most interesting and entertaining as a conversationalist with friends in a small group. He is a man of broad views and tremendous tolerance for the faults of others. His humility is outstanding. If you would like to know someone really worth-while and to spend a very profitable and pleasant hour, just corner Dr. Dart when he is not too busy. He is extremely approachable and will leave you with the feeling that you are doing him a favor.

GSM Member Profile Stephen Willging



Stephen volunteering at the Science Museum of Minnesota

1. How long have you been a GSM member? What got you involved? Why do you stay involved?

I think I joined GSM in 2017. But I have periodically attended the biweekly lectures for over 20 years. I continue to be a member because of the lectures.

2. Have you served on the GSM board or held any offices? If yes, what years? Were you involved in any projects, or initiatives?

I have just been voted to the GSM board at the annual meeting in September.

3. How did you get interested in geology? What interests around the geosciences do you have today?

I was born and raised in Dubuque, Iowa. I became interested in geology when as a kid I learned of the lead mining that took place in the Dubuque’s early history and started collecting local galena, pyrite and agates in the area. I became interested in fossils when as a kid I would find Ordovician fossils along the banks of the

Mississippi River while fishing.

4. What do you dig about the GSM?

Lectures, labs and field trips.

5. What is your favorite geology-related travel destination? And why? What field trips have you taken with GSM?

It is difficult to identify a favorite geology-related destination. The top of my favorites list include: The Grand Canyon, Yellowstone National Park, Grand Teton National Park, Arches National Monument, Denali National Park, Minnesota's North Shore, Volcanos National Park in Hawaii, and Iceland where one can stand on the Mid Atlantic Rift. GSM field trips include this year's Wolf Center in Isanti, MN and the 2019 and 2022 field trips to The Floyd County Fossil and Prairie Park in Rockford, IA which I co-lead.

6. Favorite geology related book, movies, topics, website?

I do not have a favorite book, movie, topic or website. However, I have found the following books and publications useful in identifying fossils from Minnesota and Iowa and understanding the associated geology: 1) Robert E. Sloan, *Minnesota Fossils and Fossiliferous Rocks*, private printing, 2005; 2) Richard W. Ojakangas, *Roadside Geology of Minnesota*, Mountain Press Publishing Co., 2009; 3) Wayne I. Anderson, *Iowa's Geological Past, Three Billion Years of Change*, University of Iowa Press, 1998; 4) Constance Jefferson Sansome, *Minnesota Underfoot*, Voyageur Press, 1983; 5) Richard W. Ojakangas and Charles L. Matsch, *Minnesota's Geology*, University of Minnesota Press, 1982; and 6) Minnesota Geological Survey publications.

7. Anything else? careers? interests? hobbies? sports? collections?

I am a retired chemist from H.B. Fuller Company. Besides fossil collecting I enjoy fishing and agate collecting. I volunteer at the Science Museum of Minnesota in the paleo lab doing fossil prep and on the SMM floor talking to the public about Minnesota fossils. I have also participated in the 2021 and 2022 SMM paleo field trips to Montana.

Winter-Spring 2023 Lecture/ Lab Schedule

Great News: We have confirmed a lab at Macalester College with Jeff Thole scheduled for Saturday morning, February 18, 2023. These are always great learning experiences, so mark your calendars and stay tuned for more details.

Steve Erickson, the wizard who rounds up our speakers, is still working on scheduling for winter/spring 2023. He is also trying to schedule one or two remote speakers who will present via Zoom — just perhaps, to avoid a weather-canceled lecture.

We will email the schedule and post the information on the GSM webpage (www.gsmn.org) when it becomes available.

The University Doors on Lecture Nights

We just learned that the U of M is now locking doors at

6:30 pm, not 7 pm anymore. If you arrive for a lecture, and find the door locked, hang tight, we'll have a greeter there shortly to let you in. We will also continue to check the door every 5 minutes after 7 pm until 7:20.

GSM Fall Banquet 2022

The 2022 GSM Fall Banquet and Annual Meeting was held Monday September 19th at the U Garden Restaurant. Sixty-one people attended, enjoying the buffet and reconnecting with other members before the lecture.

As Roger mentioned in his President's Note, we also held our annual meeting and elected new board members. See Roger's letter for details.

Mark Jirsa, a senior scientist and geologic mapper with the Minnesota Geological Survey — and recently retired, was our speaker. He spoke about the Sioux Quartzite in southwestern Minnesota and similar deposits scattered about the northern midcontinent area. His presentation was largely a photographic tour that highlighted features of deposition, alteration, deformation, erosion, global paleoclimates, tectonic significance, microbia, and historic and modern land use.



Photos by Mark Ryan

GSM Field Trip to Cedar Creek Ecosystem Science Reserve

On Saturday, September 10th, 16 GSM members went on a field trip to the Cedar Creek Ecosystem Science Reserve in East Bethel MN, about 40 minutes north of the Twin Cities. Cedar Creek is owned and operated by the University of Minnesota and used to study the long-term consequences of human-caused environmental

changes.

Geologically, Cedar Creek is located on the Anoka sand plain, a sandy outwash plain from the Wisconsin Glaciation 11,000 years ago. The lakes and bogs on the property resulted from the melting of large stranded blocks of ice and the deposition of sand. One hundred years ago, settlers thought they would be able to farm on the sand plain, but soon found out it wasn't possible. Gradually, the land has been acquired by the University of Minnesota and is now used for research.

What makes Cedar Creek unique? It hosts many of the ecosystems and plant communities found in the forests and grasslands of North America. And it is where exciting ecology experiments are taking place, including studies on:

- food webs
- the impact of prescribed burning on oak savannas
- biodiversity
- effects of bison grazing on oak savannas
- the use of wildlife cameras to study animal behavior
- the invention and use of telemetry to track wildlife
- effects of nitrogen deposition on native plants
- impact of elevated carbon dioxide
- invasive species
- warming and changes in precipitation

At the Lindeman Research & Discovery Center, Associate Director Caitlin Potter explained their research. She then led us on a walk through several different environments, including the Cedar Bog Lake. This lake is well-known among ecologists. It is where Raymond Lindeman, back in the 1940s, demonstrated the "10% Rule" of energy loss from one trophic level to the next highest. Imagine a pyramid – at the bottom (primary producers) are large numbers and types of plants. At the next level up are the



Dr Potter leading GSMers on field trip

herbivores (primary consumers). The next level higher are the carnivores and omnivores (secondary consumers) which includes the apex predators at the very top. At every level, the efficiency of energy transfer from one level to the one above it is about 10%.

Finally, Dr. Potter showed us the many plots of land



Field trip participants at Cedar Bog Lake



Participants exploring biodiversity plots

planted with native grasses and wildflowers that are being studied regarding the importance of biodiversity. These are maintained by researchers and student assistants.

We visitors asked many questions and were impressed by the research studies and their importance to understanding global climate change. Those who want more information can tune into "Lunch with a Scientist" (live-streamed once a month at cedarcreek.umn.edu). Many thanks to Dave Wilhelm for arranging the field trip. Photos by Dave Wilhelm and Caitlin Potter. More photos at: <https://tinyurl.com/GSMCedarCreek>.

Rebecca Galkiewicz, Photos by David Wilhelm

It's Alive! GSM was back at the State Fair and the MMC Show!

After a two year absence, GSM made a triumphant return to the 2022 State Fair! The Fair has long been a mainstay for spreading knowledge of the Society and recruiting new members, which is essential to sustain our organization. We made great progress on that front by talking to thousands of fairgoers, while handing out nearly 1300 lecture schedules and 400 marker brochures. Nothing this big happens on its own. I'd like to thank Deborah Naffziger, whose time and vehicle made set-up possible, and the 42 GSM volunteers who staffed 61 shifts covering 244 hours during the 12 day run of the Fair. You are all truly stars in the GSM firmament!

Another tip of the cap goes to David Schaaf who pointed GSM to a great online volunteer sign-up system. There were a few hiccups in our first go-around (mainly user errors on my part), but the flexibility for members to sign up on their own with real time views of availability was generally a winner.

Post-Fair, we trotted out another Sign-Up Genius grid for the MN Mineral Club's Annual Show at the Fairgrounds just a couple weeks after the Fair, and recruited a solid crew to represent GSM at that two day rock-extravaganza. Seven fair volunteers returned, covering 11 shifts and 24 hours while handing out another 400 schedules and 150 marker brochures. Many thanks to these rock stars!

A State Fair recap is bound to be on the November board meeting agenda, so if any folks reading this have feedback on our booth contents, the signup process, or the Fair in general, I invite you to send it on to me, your favorite board member, or possibly attend the meeting yourself. We are all stronger together!

Patrick Pfundstein
GSM VP and State Fair
Jim Mirick volunteering at Chair
the 2022 State Fair



Lowell Hill engaged with a visitor to the Fair



Steve Erickson and Dave Wilhelm at the Fall 2022 MN Minerals Club Show.

A Trek to Laki, Iceland

In late July/early August 2022, I was one of 16 to tour Iceland as part of an Institute on Lake Superior Geology (ILSG) Field Trip - six of us were GSMers. The goal of the trip was to learn about the many manifestations of the island's volcanic history. I'd had a life-long dream to visit the island, and I jumped at the opportunity to join the group. Geologist Phil Larson lead the trip with assistance from Peter Hinz and Allan MacTavish; all were exceedingly knowledgeable about Iceland's volcanic history and all were great teachers, plus kind and patient trip leaders. It was fun to share the experience with other curious and interesting field trip participants.

Since returning, I've been asked, "What was my favorite destination?" That is a tough question. Every day offered fascinating in-your-face geology, stunning landscapes, and for me, an amateur botanist, an opportunity to observe the flowering plants growing on the various volcanic landscapes. Hands down, though, the highlight was the Day Five visit to the Laki craters in Vatnajökull National Park, not to mention the lengthy drive into the highlands to reach the trailhead.

Before driving to Laki, we stopped at the memorial chapel in the little town of Kirkjubæjarklaustur (referred to locally as Klaustur), where Phil Larson told the story of the minister, Jón Steingrímsson, who gave his "Sermon of Fire" on July 20, 1783 as the lava flowed and threatened to overrun the settlement and then stopped in its tracks. Steingrímsson not only cared for his parishioners, he kept a near daily diary of the months that followed the eruption. His daily chronicle, known as the Eldrit or "Fire Treatise," documented the black clouds, the cinders that fell from the sky, the lightning in the volcanic plumes, and the rain that fell and killed the plants and scorched the hides of newly shorn sheep. His stated purpose in writing the Eldrit was to serve as a warning to other Icelanders about the wrath of God; however, more importantly, it has endured as a scientific document about the eruption, and it has inspired research.

Laki, short for Lakagígar, is the name used for both the Laki crater row and the site of the eruption which began on June 8, 1783 and continued until



Klaustur Church. Kirkjubæjarklaustur Chapel, consecrated in 1974, and built in memory of Jón Steingrímsson, the minister of the parish during the Laki eruptions. Steingrímsson buried many who perished in the adjacent graveyard. Photo by Dave Wilhelm

February 1784. The eruption emitted lava from a fissure stretching 25 km (15.5 miles), and poured out tremendous amounts of lava, eventually covering 565 km² (218 miles²). The

ash and poisonous gases from the volcano had devastating effects as well, killing 20% of Iceland's inhabitants and over 75% of the farm animals. Additional death, suffering and devastation followed as the volcanic plume—the ash cloud and poisonous gases drifted across Europe. Beyond there, the eruption affected the climate and the health of people living all over the Northern Hemisphere.



Crossing a river on the F Road. Photo by Kate Clover



On the F Road to Laki. Photo by Dave Wilhelm



Iceland's classic landscape: stark, rolling fields of black lava, gray-green moss and pockets of lingering snow. Photo by Kate Clover

Laki is just 35 km (22 miles) as the crow flies from Klaustur, the nearest town along the Ring Road in southeast Iceland. Driving to the eruption site was part of the experience. To reach Laki's craters, you need the proper vehicle and drivers. The Ring Road (aka Route 1) around the island is paved, but the infamous "F Roads" are narrow, twisty, unpaved, ungraded, and cross over lava highlands, sand plains, gravel areas and through streams. Fortunately our drivers, experienced as exploration geologists, were used to such roads and were not intimidated. Plus, we were driving high-profile, 4-wheel drive vehicles which easily navigated the rough terrain. We passengers, however, endured being majorly jostled and were constantly re-adjusting our seatbelts. Nonetheless, we were rewarded on the two-hour drive with gorgeous views of small old volcanoes, lava and ash fields, and dense tufts of beautiful green to gray moss-covered rocks and low-growing tundra plants—classic Icelandic landscape. Each of the four vehicles had a walkie-talkie radio, and trip leader, Phil Larson, would occasionally share information about what we were seeing off to the right or left. Eventually after passing kilometers of surreal volcanic landscapes on the F206 and F207 roads, we reached the Laki trailhead parking lot with a ranger's

hut, an interpretative sign and a toilet. From there, we began the hike. As 40 to 50 mph winds and gusts and horizontal rain were often parts of each of our days, we were happy the Laki trail was mostly on the leeward side of mountain which allowed us to more easily clamber up and over rocks on the well-marked path. Halfway up at the crater overlook, we stopped to view the crater row and were assaulted by the wind. We took a wide stance and braced



Laki Chain of Craters. The fissure eruption stretched 25 km (15.5 miles) and includes at least 130 separate craters, all created during the 1783-1784 eruption. Photo by Dave Wilhelm.



Fermented Shark is an Icelandic "delicacy." Perhaps to be tried just once. Photo by Kate Clover

ourselves and were rewarded with a stunning birds-eye view of the Laki crater row. After standing for pictures, some in the group continued to Laki's peak, while the rest of us retreated to the leeward side of the crater overlook to eat our lunches. At this lunch spot, Phil Larson opened his backpack and took out a container of fermented shark, a local delicacy and a bottle of

Brennivín, the local distilled liquor, Aquavit. We sampled the shark and had a communion-size cup of the Brennivín as a chaser. Just opening the shark package and smelling it was enough for some. I found it exceedingly fishy tasting and very chewy. Part of the experience! After climbing Laki



Lunching on the Laki hike. Photo by Kate Clover



GSM members Barb Heideman and Duane Hasagawa, from Grand Marais, on the descent from Laki. Yes, dressed for chilly temps and windy conditions. Photo by Kate Clover



Gray-green moss covers the lava formation and contrasts with the blue water of Tjarnargigur



Our camper cabins near Klaustur. Each cabin slept four. Photo by Kate Clover



Hot dogs and fries for dinner

and seeing the row of craters, we drove to see one of several lakes in the Laki crater area. From the parking lot, the ten-minute hike to Tjarnargígur Crater Lake was easy on the wide trail.

There the terrain included more gray-green moss covered rock plus a few low-growing tundra plants including pink-flowered creeping thyme (common around the island), a few mushrooms

and creeping sedums. After that, it was time to head back to our camper cabin in Klaustur, then more bumpy roads, river crossings, sheep sightings, and Mars-like

landscapes with volcanic sand plains juxtaposed against gray green moss-covered rock. Once off the F Road, we knew our red camper cabins weren't far away. It was an excellent day. It wasn't just seeing Laki. It was the whole day's experience: driving into Iceland's interior on the F Roads, driving through rivers, seeing the flowering plants. Then for dinner, I had to decide between fish and chips, which I'd eaten multiple times or Iceland's famous hot dogs— which I hadn't eaten yet— served with crispy fried onions under the dog and fresh onions on top. I chose the hotdogs with a side of fries. It tasted better than any hot dog I remember. And yes, I would love to return to Iceland; there is far more to explore.

Kate Clover

See Dave Wilhelm's photos from Laki, Day 5 of the Iceland trip: <https://tinyurl.com/ILSG2022IcelandDay5>

Read more on Laki and Vatnajökull National Park: <https://www.vatnajokulsthjodgardur.is/static/files/svaedin/>

[Laki-Eldgja-Langisjor/70x48_laki-langisj-eldgj_ensk_feb2019-vefir.pdf](#)

Witze, Alexandra and Kanipe, Jeff. Island on Fire. Profile Books, 2017.

Some musings about the ILSG trip to Iceland, 2022

I expected the ILSG trip to Iceland would be educational and here are a few of the things I learned:

Descending into a 200 meter deep volcanic magma chamber offered a singular experience, but getting off the mountain in 60+ mph winds with horizontal rain and grapple rendered a completely different memory! I still can't pronounce Náttúrufræðingurinn.

There are more volcanic manifestations than any normal person needs to know.

I actually could manage to sit in the backseat of a car for 3,502 km over 14 days.

One can survive the belly shaking of god-knows how many miles of unimproved 4x4 tracks in the hinterlands where only a skilled fiction writer would call them "roads".

Discovering I could cook for 16 with only my left hand (since the right hand kept the broken burner turned on).

It is a lot easier to walk on pahoehoe than a'a.

Sleeping with 14 fellow explorers in a 16-unit common area is actually possible.

Learning that Phil was right....you can't un-see a Fuglabúfur.

I finally figured out the difference between a tuyas and tindars.

Circling a 23 million year old volcanic island with a group of smart, curious and memorable people during the summer of 2022 – priceless!

(Editor's note: Tuyas are flat-top, steep-sided volcanoes that erupted sub-glacially. Tindars, are similar to tuyas, but are elongated ridges formed during a sub-glacial eruption.)

Jack Matlock, GSM member for over 25 years

The Fish Grotto of Cairo, Egypt

A well-known cave author, Bill Halliday, who published the 1966 book Depths of the Earth: Caves and Cavers of the United States (among many other works) made two attempts to visit the Fish Grotto in Cairo, Egypt, in 1998 and 2001. Both times he was thwarted because it was



Fuglabúfur is a tuft of grass on a high point, often rocky. When birds perch on high lookout points, they often defecate the seeds they've eaten. Over time, "soil" builds up, the seeds germinate and the tufts grow taller. Photo by Kate Clover

under renovation, and he was refused access. He published brief reports on both visits (Halliday, 1999; 2001) which became the inspiration for my own visit during a recent trip to Cairo, in December 2021 (Brick, 2022). Fortunately, everything was open for business and well patronized—especially by young, courting couples seeking some privacy from the bustling city around them.

This unusual attraction, officially known as the



Aquarium Grotto Garden. Photo by Hatem Moushir, CC via Wikimedia Commons

Aquarium Grotto Garden, is situated on an island in the Nile River, in the fashionable part of Cairo containing fancy hotels and foreign embassies. It comprises a pair of artificial conical hills, about 50 feet high, constructed of brown cement over wire mesh, sitting in the middle of the garden.

One of the hills contains the bat chamber, echoing with the shrieks of living fruit bats and carpeted with fragrant black guano. The interior walls are adorned with artificial stalactites. There are two levels of aquaria inside



Shell grotto inside the bat hill. It is about the size of a large flat-screen TV. Author's photo

this hill: the lower dry aquaria containing stuffed reptiles with a shell grotto and the upper live aquaria, featuring a

type of carp called koi, which are bred in a separate building on the grounds. Historically, the aquaria were stocked with genuine Nile River fishes, relics of which may still be seen in jars of preservative.

The other, higher hill does not have aquaria. Khedive Ismail, the ruler of Egypt from 1863 to 1879 (Fig. 3), hired a Parisian landscape architect, Barillet-Deschamps, to create this fantastic grotto landscape, beginning in 1871, but it was not opened to the public until 1902 (Wilkinson 2010)

Rather than reading this verbal description, it's probably just easier to watch the 12½

minute mini-documentary that I posted on YouTube, titled, "Aquarium

Grotto Garden, Cairo, Egypt, 2021: Bats, Cats, Fishes, and Lovers" at <https://youtu.be/nWRGx7rilmw>



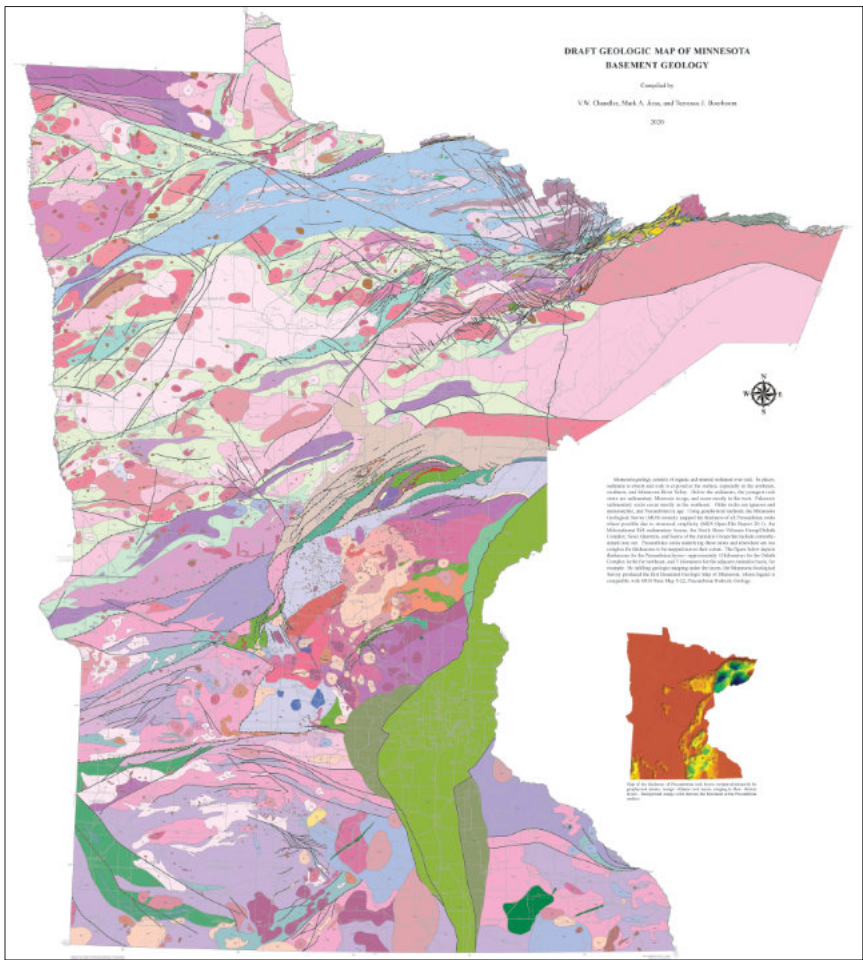
Khedive Ismail, ruler of Egypt from 1863 to 1879, commissioned the construction of this grotto landscape. Author's photo of a bust in the nearby Cairo Marriott Hotel

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- Greg Brick

The MGS has produced a draft basement geology map

Minnesota geology consists of organic and mineral sediment over rock. In places, sediment is absent and rock is exposed at the surface, especially in the northeast, southeast, and Minnesota River Valley. Below the sediments, the youngest rock strata are sedimentary, Mesozoic in age, and occur mostly in the west. Paleozoic sedimentary rocks occur mostly in the southeast. Older rocks are igneous and metamorphic, and Precambrian in age. Using geophysical methods, the Minnesota Geological Survey (MGS) recently mapped the thickness of all Precambrian rocks where possible due to structural simplicity (MGS Open-File Report 20-1): the Midcontinent Rift sedimentary basins, the North Shore



Volcanic Group/Duluth Complex, Sioux Quartzite, and basins of the Animikie Group that include currently-mined iron ore. Precambrian rocks underlying these strata and elsewhere are too complex for thicknesses to be mapped across their extent. By infilling geologic mapping under the layers, MGS staff Val Chandler, Mark Jirsa, and Terry Boerboom – all since retired - produced the first Basement Geologic Map of Minnesota, whose legend is compatible with MGS State Map S-22, Precambrian Bedrock Geology.

An inset figure on the draft map shows the depth to basement, approximately 15 kilometers under the Duluth Complex in the far northeast, and 5 kilometers for the adjacent Animikie Basin. The background orange color denotes the basement at the Precambrian surface.



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