



# THE GEOLOGICAL SOCIETY OF MINNESOTA

## News

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

### From the President's Desk...

Hello from your new GSM president. I would like to start out by thanking Joe Newberg, our past president. He did an outstanding job last year with the unlucky honor of serving as president and never getting to welcome lecture attendees in person. Nevertheless, the GSM continued to thrive under his leadership.

There are so many people to thank that I hope I don't miss anyone. So here we go: Dave Wilhelm for keeping us informed about lectures, socials, and cool happenings in the Earth Science realm. Steve Erickson for finding outstanding speakers from around the country. Joanie Furlong for processing all the memberships and creating the membership directory. Randy Strobel for acting as host for all the zoom lectures. Kate Clover, Mark Ryan, Harvey Thorleifson and Rich Lively for producing such an interesting and informative newsletter. Patrick Pfundstein for getting lectures on line and for his work on the Minnehaha Marker. Last but not least, Dave Kelso for keeping our books in such great shape.

I am honored to be your president for the next year. I have been a member of the GSM ever since I learned about it at the State Fair in 2004. My love of the Earth Sciences goes back to childhood when my mother and aunt took me to the Science Museum of Minnesota for the first time, and I saw my first dinosaur, a magnificent Triceratops. After that I was hooked! Then years later, I found my first dinosaur bone. The paleo bugs ran up my arm and bit me. I have been hooked ever since.

After that, I started looking for dinosaurs all the time, I happened to be in the right spot at the right time and found the 13<sup>th</sup> *Albertosaurus* which is now housed at the Museum of the Rockies. I have continued my love of paleontology, amassing a nice collection of fossils and accompanying the paleontology department at the Science Museum on two digs in Montana.

Currently, I am the Coordinator of the Collectors' Corner and the galleries at the Science Museum of Minnesota. Thank you Kate - she encouraged me to apply for a job in 2012.

This is the third time I will have held the GSM president's office. The first time was 2005-2006, and then in 2012, and now again - 10 years later. Over the years, I have led field trips, given lectures, and for the last 10 or so years, have set up the State Fair booth.

My vision for the GSM is to continue offering outstanding lectures, labs, and wonderful field trips around the region. Plus, I hope we continue the work on marker projects and get one placed at Minnehaha Falls. I'd also like to see our membership numbers increase and become more accessible. And finally, like you - I'd like to see a return to in-person lectures and banquets.

Thank you for your time. Let's have a wonderful year.

Roger Benepe



GSM President, Roger Benepe

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*from the GSM archives: Slate outcrop, Little Falls, Mn, 1940, strike N30E, Dip S80-90W*



**GSM**

**2021 Board of Directors:**

Roger Benepe, President  
 Patrick Pfundstein, Vice President  
 Nancy Jannik, Treasurer  
 Dave Kelso, Secretary

**Board Members:** Wolf Bielefeld; Pete Hesse; Frank Janezich; Roxy Knuttila Janezich; Deborah Naffziger; John Westgaard

**Field Trip Coordinator:** David Wilhelm; Joe Newberg; Nancy Jannik

**Liaison Officer:** Dave Wilhelm

**Geological Markers:** Rebecca Galkiewicz

**GSM Outreach:** Joel Renner

**Lecture Recording:** Joe Wright

**Membership:** Joanie Furlong

**Newsletter:** Kate Clover; Mark Ryan; Harvey Thorleifson; Rich Lively

**Programs/Lectures/Labs:** Steve Erickson

**State Fair:** Patrick Pfundstein

**Video Library:** David Wilhelm

**Webmaster:** Alan Smith

**Web Site:** [gsmn.org](http://gsmn.org)

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:**

<b>Student</b> (full time)	\$10
<b>Individual</b>	\$20
<b>Family</b>	\$30
<b>Sustaining</b>	\$50
<b>Supporting</b>	\$100
<b>Guarantor</b>	\$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](mailto: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 Joe Newberg, [joenewberg@gmail.com](mailto:joenewberg@gmail.com)

**Welcome New Members!**

Kathleen Reitz, Eagan  
 Rodneyq Reeve, Robbinsdale  
 Robert Fraser, Lombard, Il  
 Xavier King, Roseville  
 Ann Belleman, Grand Marais

**ILSG Meeting in May at Sudbury, Ontario**

The Institute on Lake Superior Geology (ILSG) plans to hold its 68<sup>th</sup> annual meeting in Sudbury, Ontario from Monday, May 9 to Thursday, May 12, 2022. (You might recall that Sudbury is the site of the third-largest known impact crater on Earth, as well as one of the oldest (1.849 billion years ago). The bolide causing it is estimated to have been 6 to 9 miles across, and rock fragments ejected by the impact have been found as far away as Minnesota.) The proposed in-person meeting would consist of technical sessions on May 10 & 11, and field trips on May 9 and/or on

May 12. Possible field trips include: 1. Grenville Front (rocks on both sides of the Grenville Front and in the Grenville Front tectonic zone); 2. Sudbury structure (geology of the Sudbury impact structure); 3. Southwest Sudbury (Huronian volcanic and sedimentary rocks and structure, Sudbury offset dikes); 4. Elliot Lake (cross-section through the Huronian Supergroup stratigraphy). However, uncertainties regarding the COVID-19 situation has led the organization to poll its membership with respect to their preferences for the 2022 meeting, so the meeting might instead be held virtually or as a hybrid. I will let GSM members know by e-mail when ILSG makes this decision. Further information will also be posted on the ILSG conference website: <https://www.lakesuperiorgeology.org/Sudbury2022>.

ILSG is a non-profit professional society with the objectives of providing a forum for exchange of geological ideas and scientific data and promoting better understanding of the geology of the Lake Superior region. The major activity of the Institute is its Annual Meeting with geological field trips and technical presentations. While ILSG is primarily aimed toward professional geologists and geology students, it is open to interested laypersons. There is plenty for us to learn, as I and dozens of GSM members who have attended past conferences can attest.

Dave Wilhelm

### GSM Member Profile Dave Wilhelm



*Dave at Zabriskie Point, Death Valley*

#### How long have you been a GSM member?

I have been a member of GSM since before 2005. Long-time member John Jordan, a friend and co-worker, long ago mentioned that I might like to attend a GSM lecture. I said it sounded interesting but didn't act on it. Some months later, John asked again, with the same result. After a third ask, I decided I just needed to make a firm plan to go, which I did that time. I have been attending lectures ever since, and soon became a member.

#### Have you served on the GSM board or held any offices? If yes, what years?

I was a "passive" member for many years, enjoying the lectures, labs, and field trips, but not contributing back to GSM. Around 2011, Theresa Tweet finally persuaded me that I should join the Board as she thought I could contribute (and it seems the Board is always looking for members). Two years later, I was elected President of the Board, serving in 2014 and 2015. After Dick Bottenberg served as President for two years, I returned to the Board and served as President again from 2018 through 2020. My last year as President was the most challenging, as the COVID-19 pandemic had begun, and we as an organization had to figure out how to operate in that environment, which I feel we have done fairly well. Besides serving on the Board, I have also served as Video Librarian, Field Trip Coordinator, and Liaison Officer.

#### How did you get interested in geology?

I have always been interested in all sciences and math. However, I will admit, unlike most members, I did not have a strong pull toward geology before I joined GSM. Of course, I very much enjoyed the spectacular scenery that geology provides for us, but attending lectures, then participating in field trips, opened up a whole new understanding of this fascinating planet we call home. Now I am always looking for further opportunities to learn and see geology first-hand, such as a planned trip to Iceland this summer.

#### What do you like about the GSM?

The lectures, of course. Every other week, I enjoy hearing expert geologists take us to far-flung places around the globe (and occasionally beyond), describing varied topics and current research. I really like the diversity of the lectures that Steve Erickson puts together, and the expertise of the presenters.

The field trips. Since I have been in GSM, we have visited a wonderful diversity of places, from as local as Minnehaha Falls and stone buildings in St. Paul to as far away as Ontario, Michigan, Colorado, Nevada, and California. I very much enjoy being the unofficial photographer on many field trips and sharing my photos online with the organization.

The people. I have made many great friends through GSM and enjoy stimulating conversations on many subjects. Back when we could do them, dinners at U Garden before lectures and the holiday parties at the Steffner's were highlights, and I look forward to those again.

#### What is your favorite geology-related travel destination? And why?

My favorite geological destination is the Grand Canyon (although GSM has not done a field trip there, at least not since I have been a member). Besides multiple visits to the South and North rims and a two-day hike to the bottom and back up, I have had four opportunities between 1997 and 2005 to raft through the Canyon, led by an expert geologist (the late Len Weis of University

of Wisconsin-Fox Valley). Those week-long trips provided expert guides, spectacular scenery, billions of years of geology, the excitement of running rapids, hikes to parts of the Canyon that most visitors never see, and the camaraderie of like-minded travelers. If you ever get an opportunity to take such a trip, don't pass it by.

### Bruce Erickson 1930—2022



Paleontologist Bruce Erickson helps preparator Dick Wolszon adjust the mount of a *Bambiraptor* skeleton

Notice came out in January of the passing of Bruce Erickson, long time paleontologist and curator for the Science Museum of Minnesota. He died on Sunday, January 16th and is survived by his wife, Lois, three sons, and one granddaughter.

Born in Minneapolis and raised near Riverside Park, Bruce's interest in paleontology was ignited at age 10 when he crossed paths on the nearby Mississippi river bluffs with a geologist who was fossil hunting, and who showed the youngster some of the fossils he had collected. From that point on, fossils became Bruce's passion.

After serving in the Korean War, Bruce spent the rest of the 1950s pursuing his interest in paleontology. He enrolled at the University of Minnesota where he studied under professors Robert Sloan and John Gruner. Over summer breaks he'd head out to western South Dakota to collect fossil mammals with Dr. Ray Lemley, a local physician whose family owned property in the badlands. After a two year hiatus working as a fossil preparator under the guidance of paleontologist Dr. Rainer Zangerl at Chicago's Field Museum, Bruce returned to Minnesota to complete his studies and graduated with a degree in Zoology in 1959.

That same year Bruce was hired by the Science Museum of Minnesota as curator of its nascent paleontology department and spent the next 58 years leading annual expeditions into the American West, Canada, and Southeastern US amassing fossils to fill the museum's vaults. Several tons of dinosaur remains were shipped from the Hell Creek Formation of Montana and the Morrison Formation in Wyoming, resulting in the

impressive *Triceratops*, *Diplodocus*, and *Camptosaurus* skeletons seen mounted today in the museum. Additional dinosaur material came from his quarry work in the Red Deer River Formation in western Canada, or was acquired through trades with other museums.

In 1970, the family of Philip W. Fitzpatrick established the Fitzpatrick Chair of Paleontology, a position Bruce held until his retirement in 2017.

Crocodylians became Bruce's specialty and he became a highly regarded expert in their study. Twenty-six seasons excavating and mapping a subtropical prehistoric environment in the badlands of western North Dakota produced a wide variety of flora and fauna including crocodylians *Wanagansuchus brachymanus* and *Borealosuchus formidabilis*, two new species Bruce named and described in several publications. During winter months, Bruce headed to



*Wanagansuchus brachymanus*, one of Bruce's discoveries from Wannagan Creek Quarry

the warmer climes of South Carolina and Georgia where he studied the behaviors of extant crocodiles and alligators, and collected remains of prehistoric whales, crocs, turtles and seabirds along the South Carolina coastline.



Bruce's research took him abroad, as well, to visit museums and fossil sites in Europe, South Africa, Japan, and Australia. He also served as delegate to symposiums and conferences, exchanging ideas and sharing his research with his scientific peers. His family often accompanied him on these extensive travels.

Bruce often spoke of his indebtedness to his past mentors, and like them, he paid it forward, lecturing in paleontology and historical geology at local universities and colleges, sharing his knowledge and expertise with the next generation of students, and over the decades, serving as mentor to the long line of budding paleontologists and fossil enthusiasts (including myself) who came through his museum lab, or who joined his fossil hunting expeditions, helping each of them along in their own quest for paleontological knowledge.

At the end of each night during my six years in the paleo lab, as we all headed home, Bruce would always thank us volunteers for our help, followed by a friendly and slightly sing-song "Cheerio!" as he headed down the hallway toward the exit.

Cheerio to you, Bruce! And thank you. Mark Ryan

## GSM Seminars for Winter/ Spring 2022

Great news! The lecture schedule for winter and spring 2022 has now been (mostly) completed. You can find the schedule on the [GSM website](http://gsmn.geosocmn.org): [http://gsmn.geosocmn.org]. Lectures will all be presented online, with the possible exception of May 9.

Steve Erickson has worked diligently putting this schedule together, and we have a diverse set of topics and speakers from various parts of the country to look forward to. There are still a few gaps, and the abstracts and presenters' biographies are not yet available; we will post these online when we get them.

Also, a reminder: Randy Strobel recorded many of our lectures, and Patrick Pfundstein has uploaded them to the [GSM YouTube channel](#). Check out any you might have missed or wish to revisit.

02/14/22 **Mining Perspectives in Minnesota** George Hudak, Ph.D., Minerals and Metallurgy Research Group Manager, Natural Resources Research Institute

02/28/22 **Young Canyon, Old Rocks: a Journey Through the Geological History of the Grand Canyon.** Steven Semken, Ph.D., Professor, School of Earth and Space Exploration, Arizona State University

03/14/22 **40th Anniversary of Mount St. Helens.** Sheila Alfsen, M.A., Adjunct Professor of Geology, Portland State University

03/28/22 **Geology of Georgia.** Reba Brumbeloe, Interpretive Ranger, Georgia DNR

04/11/22 **Title TBS.** Cheryl M. Seeger, R.G., Ph.D., Missouri Geological Survey, Tri-State Mineral District

04/25/22 **Dakota County Impact Crater.** Julia Steenberg, M.Sc., Phanerozoic Geologist, Minnesota Geological Survey

5/9/22 **Still pending.**

## Hill Annex Paleontology Project unearths dinosaur bones

### Mining opens up access to fossils on the Iron Range

Jim Romsaas  
Mesabi Tribune  
[Mesabitribune.com](http://Mesabitribune.com)

*Reprinted by permission.*

**Oct 28, 2021**

CHISHOLM — Did dinosaurs exist on the Iron Range 80-110 million years ago? Yes, they did, according to Minnesota Discovery Center paleontologist John Westgaard. After Minnesota's first dinosaur bone was found in Crow Wing County, another bone from a raptor-like dinosaur was located about six years ago at the Hill Annex Mine in Calumet, he said. "That was just the second dinosaur bone ever found in Minnesota."

The bone was from the end of the toe in a dromaeosaur dinosaur, which would have been 5- or 6-foot tall.

Combined with finding a humerus bone from a *protostega*, one of the largest turtles to ever swim in the ocean, Westgaard and research partner Doug Hanks knew they were on to something with their Hill Annex Paleontology Project. "Every year since 2014 — with the



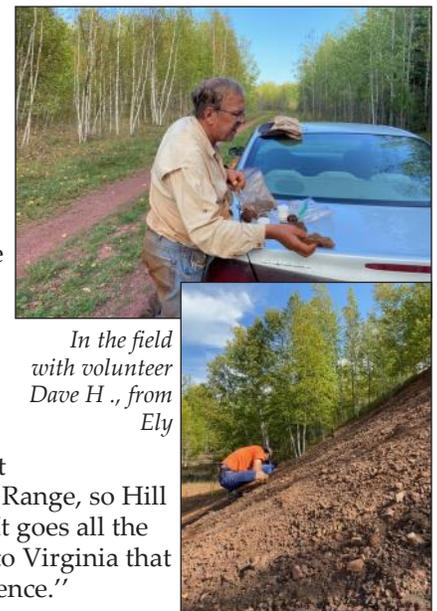
*Water filled Hill Annex Pit*

*protostega* and the *dromaeosaur* claw — we find something new that hasn't been documented here in the Coleraine' area, Westgaard said. That continued in 2019 when a vertebra from an ostrich-like dinosaur was found. The vertebrae "is very likely dinosaur bone No. 3 from Minnesota."

Westgaard and Hanks had the idea for the Paleontology Project in 2013 and the name was officially coined in 2014.

Hill Annex is not the only location where fossils have been found, Westgaard said. Thanks to scientific literature, "we've been able to confirm at least eight other sites along the Range, so Hill Annex is not alone. It goes all the way from Cohasset to Virginia that there is fossil occurrence."

Westgaard utilizes more than 40 volunteers to hunt for the fossils in the waste rock stockpiles at Hill Annex. "Anybody is welcome" to volunteer if they like. The volunteers just have to get trained in so Westgaard and Hanks assist them out in the field. "It's just mostly a lot of weather and bugs and dirt, so if you can handle those



*In the field with volunteer Dave H., from Ely*

*Dr. Andrew Havelle (UW River Falls) and Jason K. at Hill Annex Mine*



Volunteer Mark S. from Ham Lake on the field site

three things, we can teach you how to find a fossil." It still takes a lot of practice to pick out fossils from the big rock piles.

"The vast majority of my volunteers had no experience fossil hunting ever before. Some of them are really good."

Westgaard said samples are brought out to the hill so the fossil hunters can see what they are supposed to be looking for.

"We don't fail when we help people find a fossil." If something is found, the outer

layers are cleaned off or removed with a mini pick or a micro jackhammer. With some of the waste rock being in place for decades, new finds are sometimes stabilized with a special glue, according to Westgaard.



A crocodile vertebra, likely *Terminonaris* sp. 1st or 2nd sacral vertebra. On loan from the collector for study

The method is similar to what he did when he started volunteering in paleontology at the Science Museum of Minnesota's paleo lab. The work can be difficult and time-consuming, but can also be extremely rewarding. "Whatever you reveal, you are the first eyes that see it. You don't always know what you're revealing. It could be something brand new."

For three years before the coronavirus, interpretive tours were given. However, that has not been the case in the last two pandemic years, he added. "We never have a group come out and get shut out. Almost everybody finds something. There's a lot," Westgaard said. "A lot of them are snails, especially the public pile. You never know what else you'll find out there."



Finding evidence of stromatolites on the Mesabi

The dinosaur fossils were something Westgaard never expected to find at Hill Annex.

"That was part of what drove me when I first started at the Science Museum. Part of our training was that Minnesota doesn't have dinosaurs," and they were all being found out in the West, Westgaard said. However, he started doing some

research and soon found a picture on the Science Museum wall of the duck-billed dinosaur that was found in Crow Wing County in a river deposit. He was able to see the sample and was surprised to see it was collected in Crow Wing County, where he was born and where he spends all of his summers on the Cuyuna Iron Range.

"My first thought was 'My God I was probably running up and down all those dump piles and ran right over a dinosaur bone and I never knew it,'" he said. "That's kind of where the Hill Annex Paleo Project started with me tracking down what is really in Minnesota."

While the Iron Range was once not associated with dinosaurs, Westgaard knew the area had to be investigated based on the Western Interior Seaway, which flooded the center of North America from about 100 million to 68 million years ago during the Cretaceous Period (from 145 to 66 million years ago). That put western portions of Minnesota under water, while northeastern Minnesota was just on the edge of the seaway.

Fossils in this area have been known about for around 140 years, but there have only been two dozen scientific papers done in that time for the eastern landmass known as Appalachia, Westgaard said. For the western landmass known as Laramidia, there have been 200 papers written every year about dinosaur finds. That includes the Hell Creek Formation in Montana and Wyoming, he added.

"What we know about the Coleraine formation up here in Minnesota is very scant. It needs a ton more work." Part of the importance is this is what North America kind of looked like 90 million years ago, Westgaard said. "This is where we get sharks (teeth have been found at Hill Annex) because Minnesota is right on the edge of that seaway and actually at some point about 90 million years ago, we could be standing in the ocean or standing on the beach or we could be standing just off shore."

The result was that all of the fossils sit right on top of the iron formation, according to Westgaard, but they sit right below the glacial sand and gravel. Ultimately they are



John Westgaard preparing specimens



A tiny fossil

from 50-150 feet below the surface, which does not allow for digging that deep.

"But they're right in the way of mining which is going for the iron ore down below," he added. "Only because of open pit iron mining have we been able to access the suite of fossils we can find up here."

Regarding Appalachia, "we don't hear a lot about the dinosaurs at all." There have been several discoveries along the Eastern Seaboard and a few along the Gulf Coast in the last 10 years. At the same time, there has been just one in Iowa and another in Missouri, according to Westgaard.

"Otherwise, this whole corner of Appalachia is darkness," he said, "besides what's been printed in 12 or 15 papers in 100-plus years."

Westgaard said what the Paleontology Project "can do is help shed a light on another corner of this continent and perhaps fill in gaps on what was living on our side of the seaway." He is confident more dinosaur fossils will be found in the area. "They've always been there and more come out every year because mining hasn't stopped and we're way behind. We've been doing it for eight years and mining has a 100-year head start."

Further evidence that Appalachia (including the Iron Range) was on the eastern edge of the Western Interior Seaway, is shark teeth fossils that have been unearthed.

"We find a whole number of different ones," said Westgaard. Only two months ago, some of the shark teeth examples found at Hill Annex were shared with a worldwide shark fossil expert from DePaul University.

"He's very certain that we have a new species of shark in our collection already that has not been described. We're anticipating in the next two years there will be an official scientific paper" on it.

Westgaard would like to see the new shark species named after Minnesota or Mesabi "so we can have a Minnesota shark forever." Such a naming would be significant. "That's exactly what we're aiming for," he said.

Being near the Western Interior Seaway, has also led to fossilized ammonites, part of a crocodile that was up to 20-feet long, fossilized shark poop and a plesiosaur bone from what was a marine reptile being found at Hill Annex. The plesiosaur bone was found by a citizen around 1985 and donated to the Paleo Project in 2015. Other citizens are donating their collections from the area, as well.

The findings all further define what the project is all about. "That's part of our mission, the Hill Annex Paleo Project, is just to describe more fully all the different types of plants and animals that existed during this time."

Now several years into the project, Westgaard and those working on the project are settling in.

"We should be up to 20,000 fossils counted by the end of the year." Certain fossils will be permanent numbers and they will start being put on display.

"The field season's not over yet," said Westgaard, who wants to get as much out of the ground as he can before winter sets in. The freeze/thaw cycle could have notable fossils in 100 pieces by April if they are still in the ground.

In addition to research, writing papers, cleaning fossils and organizing, the winter is also spent going to schools and talking about paleontology, holding public lectures and preparing for the March and summer Fossil Days. The Paleontology Project will also have an exhibit at the Minnesota State Fair DNR building for the next two years "When the snow goes away, we'll be back scratching at the dirt."

## Highland Springs

Greg Brick

Highland Spring was the most famous bottled water in St. Paul, Minnesota (1900-1965). But a recent investigation of the site, which is now the Montcalm Apartments, near Randolph and Lexington, indicates that not all was as it seemed. The story began to unravel with a simple spring flow measurement. Read more about it in the current *Minnesota Ground Water Association Newsletter*:

<https://www.mgwa.org/newsletter/the-secret-history-of-highland-spring-in-st-paul-minnesota/>



*Bottles from the Highland Spring Water Company*

## A Short Trip to SW Minnesota

In November 2021, Joanie and I made a short trip to SW Minnesota to view, among other things, the Morton Gneiss in the field. This report

describes the two best sites with outcrops of this rock: Alexander Ramsey Park in Redwood Falls and the nearby River Warren Outcrops Scientific and Natural Area (SNA).

First some background on the Morton Gneiss. At about 3.5 billion years old, the Morton Gneiss is the oldest dated rock in the United States. For a long time, it was thought to be the oldest rock in the world. However, that record now belongs to a zircon crystal about 4.4 billion years old from the Jack Hills in



*Close-up of Morton Gneiss in outcrop. Note the light and dark flow banding, which along with the mineral composition make this a gneiss.*

Australia. Since the Earth is dated at about 4.6 billion years old, the Morton Gneiss is still a very old rock. It represents some of the earliest continental crust that can be found on the surface of the Earth today.

The minerals found in the rock are potassium (pink) and plagioclase (white) feldspar, quartz (smoky gray), and biotite (black). Although the mineral composition is the same as a granite, the prominent flow banding betrays its metamorphic history and hence its classification as a gneiss. There are also black xenoliths of amphibolite scattered throughout the rock, greatly enhancing its beauty.

Quarrying of the stone started about 1886. Cold Spring Granite acquired the operation in 1930 and still quarries the Morton Gneiss in nearby Morton for use as a dimension stone that they market as "Rainbow." You may have seen it as a facing stone on several buildings in downtown St. Paul during one of the GSM walking tours. If you are thinking about getting a natural rock counter top or tombstone, "Rainbow" is an option.

The Morton Gneiss is exposed in several places in the Minnesota River Valley, but not outside the Valley. This is because it was exhumed by erosion from the Glacial River Warren. This huge post-glacial river drained glacial Lake Agassiz about 12,000 years ago. This river removed all the glacial tills and Cenozoic sedimentary rocks and exposed the ancient Archean bedrock in what is now the Minnesota River Valley.

Alexander Ramsey Park is a 256-acre city park in Redwood Falls. Most of the park lies in a deep valley of the Redwood River. The Morton Gneiss is exposed along the riverbanks in several places. A GSM interpretative marker can be found at one of the best exposures;



GSM Marker in Alexander Ramsey Park. Pedestal is made from Morton Gneiss. Note the bank of tropically weathered Morton Gneiss in the background. The inscription on the marker can be read at the following link:

<http://roadmarker.geosocmn.org/content/geology-redwood-falls-region>

appropriately, the marker's pedestal is made of blocks of Morton Gneiss. The marker indicates that an exposure of



*Ramsey Falls in Alexander Ramsey Park. The Redwood River is flowing over a ledge of Morton Gneiss. The red clay to the right of the falls is tropically weathered Morton Gneiss.*

clay across the river is Morton Gneiss that was deeply weathered when the rock was exposed to tropical weathering. Another highlight in the park is Ramsey Falls which tumbles over a ledge of Morton Gneiss. The Dakota called the falls Chanshayapi.

Another site we visited was River Warren Outcrops SNA. This is a small (89 acres) but picturesque SNA located along the

banks of the Minnesota River. It is mostly wooded and has several outcrops of eroded but unquarried Morton Gneiss. A roughly one-mile hiking trail loops through the site and provides excellent exposure to a variety of outcrops.

We also visited several sites managed by the Minnesota Historical Society (MHS). Many were related to the US Dakota Conflict of 1862. Another site was near Morton, my Great Uncle Charles and Aunt Ann's farm, Gilfillan Estates. My family frequently visited



*Outcrops of Morton Gneiss in the River Warren Outcrops SNA. This was photographed from the hiking trail that loops through the site.*



*Another view of Morton Gneiss outcrop along the hiking trail in the River Warren Outcrops SNA*



*Gilfillan Estates, managed by the Redwood County Historical Society. The annual Minnesota Farm Fest is held on the site in August every year.*

her at the farm when I was young. The farm is now managed by the Redwood County Historical Society. The Minnesota Farm Fest is held annually on the farm during the first week in August.

Joanie and I hope to lead a field trip to SW Minnesota in the future. Hopefully the pandemic will get under control, and this will be possible sooner than later!

Photos and story-Randy Strobel

#### Related Links:

<https://www.coldspringusa.com/building-materials/colors-and-finishes/rainbow/>

<https://redwoodareacommunitycenter.com/area-parks/ramsey-park/>

<https://www.onlyinyourstate.com/minnesota/secret-waterfall-mn/>

<http://roadmarker.geosocmn.org/content/geology-redwood-falls-region>

<http://roadmarker.geosocmn.org/content/geology-minnesota-river-valley>

<https://www.dnr.state.mn.us/snas/detail.html?id=sna00001>

[https://www.agupdate.com/minnesotafarmguide/news/state-and-regional/friends-of-gilfillan-preparing-for-2021-with-timely-upkeep-projects/article\\_66b04716-db7d-11ea-9683-bf26637e017d.html](https://www.agupdate.com/minnesotafarmguide/news/state-and-regional/friends-of-gilfillan-preparing-for-2021-with-timely-upkeep-projects/article_66b04716-db7d-11ea-9683-bf26637e017d.html)

### Notes from the Past – December 1949

The Contribution of Mr. E. P. Burch  
to the Geological Society  
By Chas. H. Preston

Any account of Mr. Burch's contribution to the Geological Society of Minnesota during its early years would be a history of this Society for that period. Mr. Burch was the Society.

Early in 1938 Mr. Burch found 20 followers who listened to him lecture on the subject of Geology at the Public Library during February and March. During the summer and

autumn these 20 followers, several of whom are here today, followed Mr. Burch, tramping over the fields along the St. Croix and its tributaries, along the Mississippi river, along the Minnesota river and in the North Country, to find and identify fossils and to become familiar with the sedimentary rocks of these regions, and above all, to secure inspiration from a study of nature at first hand.

Mr. Burch was a tireless leader, devoting practically his entire time in the interests of his new hobby. He painstakingly prepared data sheets describing in detail the structure of the region to be visited and always, after a picnic lunch, would give a lecture in the open air. The nucleus of this Society was formed in that year, 1938.

Mr. Burch was a consulting electrical engineer of some prominence. When employed by the Twin City Rapid Transit Co., he was in charge of installing the 10,000 horsepower plant at St. Anthony Falls. In Detroit, he had been consulting engineer for the Detroit Electric Railway Commission. While there he gathered material for two books which he later published. He also installed the Electric Utility in Stillwater Minn. He earned the right to be listed in "Who's Who in America" while a consulting engineer and was so listed until his death.

He retired from active professional work in 1932 and devoted the next twelve years to travel and acquiring a new hobby, the study of Geology. He took several Geology courses at the University of Minnesota, and later studied at the University of Arizona where the idea occurred to him to interest others in the study of Geology.

About September 1st of 1938 Mr. Burch announced a series of lectures on Geology with special reference to the Geological History of Minnesota, to be given at the Public Library.

These lectures began on September 12th and continued throughout the balance of the year. They were well prepared with the elaborate care always characteristic of Mr. Burch and each lecture was accompanied by an instructive data sheet outlining the subject matter of his lecture. From the original 20 members the group increased to a total of 147 by the end of the year. I well remember Mr. Burch telling me early in the series that if he could interest a group of 50 he would be satisfied. Imagine his elation when the attendance passed that number.

The field trips went on just the same. Every Saturday and every Sunday throughout September and October, and even into November, Mr. Burch lead a group of enthusiasts to points near and far to study and to interpret this formation or that phenomenon. Yes, it got chilly at times but it would take more than temperature changes to cool the enthusiasm of Mr. Burch and his group. A total of 43 week-end trips were made that season. Membership fees were \$1.00 per family and a charge of 10 cents per person was made on the trips to defray expenses. Membership fees were almost enough to pay for typing and mailing out notices that year, but not quite.

*End of part 1, Part 2 of Notes from the Past—December 1949 will appear in the May 2022 newsletter*



GEOLOGICAL SOCIETY OF MINNESOTA  
Black Hills Field Trip  
1947

On the next page is a group picture of those who went on the Black Hills field trip, June 21st-29th, 1947. The picture was taken at the entrance of the Sylvan Lake Hotel. The picture was taken by J. Orval Engen.



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