May 2017

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Promoting public interest and educational support in the geological sciences

The Geological Society of Minnesota News

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

GSM President, Dick Bottenberg

From the President's Desk…

Thank goodness, it's summer again! And once again, it's time to get out and see Minnesota geology up close and personal!

Although the GSM lecture series takes a break during the summer we have many activities for members looking for geological things to do. These activities are all covered in this newsletter and/or on our website at www.GSMN.org:

- Minneapolis area field trips conducted by Randy Strobel
- More distant field trips conducted by various experts
- Solar eclipse field trip to Nebraska conducted by Dave Wilhelm
- Minnesota geological marker self-guided tours
- GSM booth at the Minnesota State Fair

Once again, our lecture series for 2016-2017 was a smashing success. The average attendance was 93 people per lecture! Of special note were the "astounding" attendance of 145 at Dr. Randy Strobel's January lecture on Geology of the Mississippi River Gorge of the Twin Cities and Dr. Howard Hobbs' lecture titled**: Minnesota Glacial Geology in Song and Story.** Who knew that there was a song out there about Mothers not letting their sons grow up to be soils engineers? FYI, the lecture series will start up again at the Fall Banquet 18 September. See you there!

As you know, the GSM is an all-volunteer organization. We were proud to recognize Joanie Furlong, Alan Smith and Theresa Tweet at the Spring Banquet for their dedication and commitment to the GSM. Along with our thanks, all received a rock hammer with the GSM logo. Thanks again! If you have any interest in supporting the GSM as a volunteer please contact me, Theresa or any Board Member. We are looking for a Board Secretary and we'll need 2 new Board Members next year. Try it, you'll like it!

Finally, all members are invited to attend our board meetings. The remaining meetings this year are 18 May, 10 August and 9 November. See our website for details. Have a safe and adventurous summer!!!

Dick Bottenberg

Upper photograph: GSM Field Trip, Mark Ryan

Inside this issue:

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from the GSM archives: Field trip the Black Hills, South Dakota, circa 1947

GSM News

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Editors: Theresa Tweet; Mark Ryan; Harvey Thorleifson; Rich Lively

Web Site: *www.gsmn.org*

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.

Newsletter contributions welcomed

Of interest to our GSM enthusiasts: While out and about enjoying your vacation time – when you visit a site that you find interesting, please consider sharing your experiences with us by writing up a few words and sending it to Theresa Tweet at phoenix8185@gmail.com. Thank you in advance!

New GSM Members!

Caleb Nelson, Faribault
Tom and Marcie Hamel, Edina
Agnes Tan, Falcon Heights
Thomas Erickson, Minneapolis
D.L. Irish Rowe, St. Louis Park

GSM Board Membership

The GSM Board consists of members who have a special interest in advancing the goals of our society, including lectures, field trips, and community outreach. The Board currently has nine members. Our bylaws limit the terms of Board members to four years, to encourage a turnover of perspectives and ideas. The Board typically meets quarterly, on the second Thursdays of February, May, August, and November, or a different date if conflicts arise. We typically meet from 7 to 9 PM at the Minnesota Geological Survey at 2609 W Territorial Rd, St. Paul MN 55114.

Board meetings are open to all members of GSM. So, whether you are a new member of GSM or have been a member for many years, if Board membership is something that might interest you, or you are just curious to see what our Board does and how it works, we encourage you to attend a meeting. And, if you have a topic you would like the Board to consider, please contact Theresa Tweet at phoenix8185@gmail.com.

Position Notice: The GSM is seeking a Secretary willing to take notes at four Board meetings per year.

Also, later on in the year we will need two new Board members as well as a new Treasurer.

Please contact Theresa (phoenix8185@gmail.com) to discuss your potential willingness for any of the positions, any of which will be fun!

Member Spotlight; Roger Benepe

Roger leading a field trip at the Science Museum of MN

1. How long have you been a GSM member?

I have been a member for about 10 to 12 years. After a certain amount of time the years just run together.

2. How did you get interested in geology?

   My interest in geology started when I was a little kid. I would go up to the lake to visit Grandma, and I would find all these wonderful rocks on the shore. I would bring them in her house and my father (he was a Science teacher), would help me figure out what they were. Then I would place them on the window sill. The next time I would go up to the lake; the rocks on the sill were gone, so I would start my rock collecting all over again. Strange, but I would find very similar rocks, to the missing rocks every time. It was always puzzling to me how the rocks always looked the same. It was not until years later that I figured out that Grandma would throw them back on the shore after we would leave.

3. What do you dig about the GSM?

   The best thing about the GSM is the people that I have met over the years!

Notes from the Past

From the Fall 1999 issue of GSM NEWS

GSM ROCKERS SET NEW RECORD!

A special "thank you" to Mother Nature for the just-in-time delivery of a heat-wave crushing cold front the night before the GSM rock-box building party! The morning of Saturday, July 31 was actually beautiful. What a change from the over 100 degrees of the day before. It was a great temperature for working…and boy, did the rocks fly! Aside from the recent weather, this year was especially worrisome because the Mn/DOT rock crusher is broken and we were short of sample-sized pieces of several types of rock (including hematite, which is tough to break). Thankfully, our GSM line-up of heavy hitters kept the malls busy. Those major-leaguers were: Bill Robbins, Roger Knutson, Tom Schoenecker, and Steve Erickson. Smashing job guys! The rest of the team prepared the plastic boxes, and after a while everyone got a chance to fill the boxes. Margaret Rodina, Katy Paul, Martha Mayou and her husband Dave, Gerry Paul, and the party host Doug Zbikowski helped to keep the production lines moving at record speed. In about four hours, 198 rock boxes were built! With such blazing speed in a construction zone it was no wonder that two Band-Aids were needed! After the work, there was cold watermelon and home-made pizza to satisfy the hungry troops. Our deepest thanks to this crew for an outstanding performance in GSM's fourth year at building rock boxes for school teachers. Thousands of kids will be turned-on to Minnesota's Geology through this effort. Many thanks!

2017 MESTA Conference

The Minnesota Earth Science Teachers' Association (MESTA) Annual Conference was presented as an opportunity to "Get to know your fellow Earth science teachers from across the state". Concurrent breakout sessions featured master Earth science educators and noted geoscience professionals. Classroom resources were given to all attendees. According to the registration form, the conference supports the teaching of the MN Earth and Space science benchmarks articulated in the MN Academic Standards in Science. The meeting, the 31st Annual MESTA Conference, was held on February 3rd, 2017, at the District 287 Conference Center in Plymouth. Science teachers from around the greater Twin Cities area and beyond came together to hear professionals in the earth sciences talk about their field of study. A chance to visit the "New" Minnesota Geological Survey took place Thursday night, with host being Dr. Harvey Thorleifson. This year's keynote speaker was Jennifer Anderson of Winona State University, a planetary geologist who spoke on the "Geology of Other Worlds". Breakout sessions were on the subjects of groundwater issues, geologic mapping, watersheds, and the upcoming solar eclipse which should be visible on August 21, 2017 from various locations throughout the country. The Geological Society of Minnesota has been privileged to be a part of this event for many years, providing information, pamphlets and rock boxes as donations for the massive drawing that is held at the end of the conference. Those of you who are in the field of education can check out the MESTA web page containing past events at: http://mnearthscience.weebly.com/ , then mark your calendars for the first Friday in February 2018 for the next MESTA Conference and sign up!

At MESTA 2017-Steve Erickson (GSM); Phil Gotsch and Keith Zilinski (Mineral Club)

2017 Spring Banquet

The Geological Society of Minnesota Spring Banquet was Monday, May 1, 2017. This almost-eighty-year tradition again provided a chance to enjoy the company of other geology enthusiast through good food, conversation, and of course, the final lecture of the 2016-2017 season. Almost 100 enthusiasts were in attendance, and the crowd seems to get larger every year!

GSM President with Alan Smith

GSM President with Joanie Furlong

GSM President with Theresa Tweet

For the past decade or so, about every other year, we have recognized volunteers who have gone above and beyond in their task to make GSM the top notch organization that it is – we last did this in 2015. This year's recipients of the beautiful Estwing rock hammers were: Alan Smith for his continued, and outstanding work on our webpage, including a new work in progress at http://gsmn.geosocmn.org; Joanie Furlong for her work on the Membership Committee, Field Trips, State Fair and more; as well as Theresa Tweet for her work as past President, Vice President, as well as Student Outreach.

The talk was presented by GSM's own Steve Erickson M.Sc., whose subject was "Boom Times, the Early Days of the Oklahoma Oil Industry". Steve's Lecture began with Oklahoma history regarding the Native American territories and the 1889 Land Rush. I have to say that I found the historical aspects of the early days of the Oklahoma "Boom" quite fascinating. In these early days of the 1900's, you would drill for oil, and if you found nothing you would simply walk away. These dry wells came to be known as "dusters". However, if you would instead find something, you could develop the oil resources in the area you're at. Unfortunately, many people over-developed the area (Steve had many pictures to share showing this) which could flood the market, and drop the bottom out of the sale of the oil barrels – which is exactly what happened in the 1930's. In fact, we were told that in the early 1930's, the National Guard was called into both Texas and Oklahoma to get people to stop flooding the market with the crude oil. Also, too many wells too close together produced a stress on the oil reserves and destroyed the drive of the oil field as well as the landscape of the city. But with experience being the great teacher, these developers soon learned that instead of flooding the market and making 10 cents on a barrel of oil, you could cut your production in half and charge 50 cents per barrel of oil and make more money, cut costs, and slow the threat of the sprawl of the oil wells.

Steve also talked about different methods for retrieving oil. Oil does not simply flow to the ground; it needs to be forced out of the ground. This force is referred to as the "drive". In this situation, the oil flows out with both water and gas mixed in with the oil. On average for Oklahoma, this produces about 7 barrels of water for every barrel of oil. The water must be disposed of, so it frequently is re-injected into the layer the oil came from. This helps push oil out of the pumping well. Sometimes this is not possible, and the water is injected into deeper rock layers. This appears to be the cause of many earthquakes in Oklahoma in the past 10 years. There is so much more that I can write about the talk, but I will stop here, and instead invite those who were unable to attend to join us at our Fall Banquet, as we begin our 2017-2018 Lecture season on September 18! Thank you for the terrific lecture Steve and thanks to everyone who attended for such a wonderful closure on the 2016-2017 lecture season!

Theresa Tweet

Lecture Attendance Summary

In my role as Video Librarian, I am in a good position to "count the room" during lectures, which I have done the past few years. This past year (2016-2017), total attendance for 15 lectures (including 2 banquets) was 1400, which averages to ~93 persons per lecture. This is just slightly below 2015-2016, which averaged 95 per lecture, and well over 2014-2015 with 73 per lecture. We had 3 lectures with 100 or more, including an astounding 145 for Randy Strobel's January lecture on Geology of the Mississippi River Gorge of the Twin Cities. Another 6 lectures had attendance in the 90s. Around 63 persons identified

themselves as first-time attendees throughout the year, although I'm sure the true number is above that. The most common reasons given by new attendees are: referral by friend or relative, State Fair, and website (either ours or a U of MN calendar). The most intriguing reason was a recommendation from a geologist leading a Grand Canyon rafting trip; good to know our name gets around! Kudos to Steve Erickson for again putting together an outstanding, diverse, and broadly interesting slate this past year, and for successfully dealing with three short-notice cancellations by lecturers, each of which he filled with a very capable substitute on a topic related to the original.

Dave Wilhelm

2017 State Fair Booth

Dan Japuntich invites all GSM members to volunteer and pick your time at our 2017 GSM Minnesota State Fair Booth. Please show your enthusiasm for our GSM Organization at the Great Minnesota Get-Together.

Our most important source of funding for GSM comes from new membership generated from our State Fair Booth! We are in our 79th Year and are very proud to be Supporting and Promoting Public Interest in the Geological Sciences since 1938!

The evolving sign-up sheet will periodically be broadcast to members through email or sent upon request. Please email Dan with your choice: danjap7@gmail.com or leave a text/voicemail at **651-216-6678**. Dan Japuntich will also be at lectures for sign-up.

State Fair Volunteer Info:

- The State Fair dates are Thursday, August 24 to Labor Day, September 4.
- You do not need to know geology to volunteer. Instructions will be provided!
- Volunteers hand out our 2017-2018 Lecture Series handouts and chat about our Lectures, our Field Trips, and our "MN Rocks".
- We need 2 people for each of the 3 shifts per day.
- Four hour shift times are 9 AM- 1 PM, 1 PM- 5 PM and 5 PM- 9 PM in the Education Building.
- You get to eat cheese curds, milkshakes and foot-longs on your way to the booth!!

Summer Fun – Finding GSM's Geology Markers

Starting around 1950 and continuing to the present, the GSM has installed 51 geology markers around the State of Minnesota. These markers are located in some of the most scenic areas of the state, where fantastic geological processes have occurred. Wouldn't you like to visit some of these? Now you can!

GSM marker at Mankato

GPS coordinates for the marker

You can find the 51 geology markers by going to the GSM web site (www.gsmn.org). On the GSM home page, find "GSM Road Markers" in the left-hand column and click. This will take you to the GSM Marker Home Page.

Drag your cursor to the Information drop-down menu. Here's what is available when you click:

- An Introduction slide show
- Background information on geographic coordinates (aka GPS coordinates)
- A description of the 2016 summer "treasure hunt" to find markers

Click on the Do-It-Yourself Geology Field Trips to find a map of the entire state. Markers are grouped into 12 different regions to make it easy for you to find the ones close to you. Choose the area you are interested in and click on Apply. Another smaller map will pop up and show you the markers present in that region. Move the cursor on top of a red dot to find out which marker it is. Click on the red dot and information about the marker will pop up, including the following:

- County in which the marker is located.
- Driving directions to get you there
- The text of the marker
- The GPS coordinates – click here to go to a Google map that will show you how to find the marker

When you visit a marker, send information – a photo and GPS coordinates – to the Marker Team so we can improve the database. Use a GPS app on your phone to get the GPS coordinates. That's it! Prepare yourself for an adventure!

Currently, there are 34 markers that have been inspected and found in good condition. Another 17 markers have not been visited yet – these are a high priority for this summer so we can determine correct driving directions and GPS coordinates. In the future, we plan to seek outside funding so we can install more markers.

The Marker Team has a goal of maintaining and expanding the network of markers and making them better known to everyone. We need your help! Please participate in finding the GSM Markers and helping us improve the marker database on the web-site. We'll send up-dates through the summer.

Marker Team: Becky, Alan, Dan, Dick, and Ed

GSM Field Trips and Tours

We have had three excursions since the February 2017 Newsletter. On Feb. 11, Steve Erickson organized a two-hour tour of the **American Engineering Testing Company** in St. Paul. This informative tour was conducted by Dan Vruno and Dale Hunt of AET, and 18 GSM members participated. Look for Deborah Naffziger's report in this Newsletter. Photos from this tour are at https://goo.gl/photos/GWGvEab6T2ZDngnJA.

Dave Wilhelm scheduled another tour of **St. Anthony Falls Laboratory** on **Wednesday, April 12**. Look for Deborah Naffziger's report in this Newsletter. GSM plans to continue arranging one or more weekday tours to SAFL each semester as member interest dictates, so you will be notified of another possible opportunity during the Fall of 2017.

Bill Robbins invited GSM members to a talk on April 18 hosted by the Minnesota Section of the Optical Society of America on the history of the **Goodsell Observatory** at **Carleton College** in Northfield, MN. The three GSM members who attended learned the history of Goodsell and its current imaging techniques; the importance of observations and timing, both historically and up through current work on pulsars (the best celestial clocks); and details of the Observatory's clocks and the work being done to refurbish them. The talk was followed by a tour of the Observatory, where we saw these fine historic instruments up close, the largest of which is an 1890 16.2" Brashear refractor 22 feet long weighing 12,700 lbs., the largest telescope in Minnesota until 1969. Unfortunately, the skies were cloudy that night, so we were unable to observe the heavens though these beautiful instruments.

Randy Strobel intends to organize up to three field trips to **Minnehaha Falls** and the **Minneapolis Riverfront**, as follow-ons to the lecture he presented February 6. The first of these will likely be a tour in June led by **Mill City Museum** personnel that explores St. Anthony Falls' historic use a power source for milling and other industry in Minneapolis. As dates and other details are determined, we will make them available by e-mail and the GSM web site.

Dave Wilhelm continues to plan our field trip to see the **total solar eclipse** in Nebraska on August 21, 2017. If you are interested and have not yet responded, contact him immediately at dewilhelm53@msn.com, as further e-mails on this trip are directed only to those who have indicated interest.

To see other trips we are considering, select the "GSM Field Trips" link on our web site home page and click 2017. Members will receive an e-mail on these possibilities and any others that arise when there is sufficient detail. As always, contact Dave Wilhelm with ideas for other field trips that would interest you. Our past field trips are also described in this area of the web site, sorted by year. These summaries provide a good way to learn more about GSM.

The Wonderful World of Cement—a tour of American Engineering Testing in St. Paul

On a relatively balmy Saturday in February, 18 people gathered to learn about concrete and other engineering matters. A person might think that learning about cement is about as fun as watching paint dry - but concrete is a material that we could not live without! It has many forms and formulations, which makes it an amazingly versatile material for our modern civilization.

Originally called Geotechnical Engineering Corporation (GEC in 1971), this corporation was renamed American Engineering Testing, Inc. (AET) in 1990 after moving to St. Paul. It is a company that's in between the engineer/designers and contractors. They take the plans and translate them into concrete formulas and other physical building materials. The company has been instrumental in most of the tall buildings in the Metro area, the new Stillwater Bridge, as well as other projects around the world. At present, they are working on the Corpus Christi Bay Harbor Bridge, which has to be re-built due to the Panama Canal being enlarged; allowing larger tankers to come into that harbor. The old bridge (which was built with a 175 year life) is too short for those larger tankers. So

it must be replaced, hopefully with room for more advances in shipping.

The team of Dale Hunt and Dan Bruno, both geological engineers, were our presenters. Dale Hunt is also a geologist and an expert in rock petrography, and is familiar with the microscopic analysis of how rock is cemented together. Dan Bruno has been on staff the longest at AET, and he brings this considerable expertise to the table.

Dan gave a brief history of concrete. It was first developed from mud bricks in various civilizations, and later evolved into a type of cement mixture in Rome. The Pantheon in Rome is all concrete without any reinforcement - a truly amazing structure! After the fall of Rome, concrete was no longer used as a building material, and the formula was forgotten. It was rediscovered in the 1700's, when it began to evolve into the various super-concretes we use today. Concrete is rated by PSI units—how many pounds per square inch of pressure it can endure without failure. The more PSI a concrete can take, the more sellable space a building has because the pillars for support can be smaller, and the building can be taller. And it's all about having more space to sell.

We toured several labs. There was a lab for cryogenic testing—they have giant freezers where they place samples of concrete, and cycle it from 0-40 degrees. It takes about 4 ½ hours per cycle, and they leave the samples there for about 10 weeks. They test shrinkage, height, width and use sound testing to measure integrity. There was a cement laboratory, humidity controlled where they test admixture with salt water and measure how steel corrodes in the cement depending on which admixture is used. They test creep—how much the concrete deforms as it cures through the year. The St. Croix Bridge had to have slightly more bridge added because it crept less than anticipated, and there would have been gaps. There is a rain room where they place 4" diameter 8" long cylinders and rain on them. We watched a 3-day -old cylinder of concrete being crushed in a hydraulic press to measure endurance. The aggregate labs measure durability of various aggregate—and size alone can be a factor. For winter safety to melt ice, magnesium chloride is best but most detrimental to concrete. Calcium chloride is next best and less destructive. Sodium chloride (salt) is least effective but also least detrimental to the concrete. You should allow new concrete to cure for at least a year before using salt, but here in Minnesota we can hardly do that. They have XRF—X-ray fluorescence - to determine composition, and a chemical lab for composition testing. They also have a consulting laboratory division, and forensic labs that measure failure and other factors in concrete. In the labs and hallways there were several posters highlighting some of their accomplishments. One showed how they tested the cement used in a body dump in Las Vegas. They analyzed the Pentagon post-911 for stress. They measured deicer distress for MN and WI highways. They even analyzed the Kensington Rune Stone. This is pretty diverse stuff for a forensic lab!

From 1985-1996, all the tall buildings in the Metro area were built except the IDS, and no building will be higher than the IDS because of the broadcasting transmission tower there—any higher building would have to host a new broadcast tower, and the costs and inconveniences to metro broadcasting would be prohibitive. (The saga of KQ 92 by highway 100 is a fun and illustrative story.) In 1980, 4000PSI was the strongest concrete. In 1982 Galtier Plaza was built with 8000PSI. 1984, 9000PSI; 1985, 10,000 PSI; by 1989: 14,000PSI was formulated. Nowadays 16,000-22,000 PSI concretes are available. The formula contains various water reducers and retarders that make the concrete stronger. In concrete, a basic idea is that the less water is in the mixture, the stronger the concrete. But you also have to be able to pour it, so there's a balance. Also the aggregate—the sand/rock mixture—can affect the strength. Using granite makes for weaker concrete, and limestone a stronger concrete. Limestone absorbs water and makes for a better bind than granite which does not absorb water. Using fly ash will also affect the strength. Ph is important, but Ph also affects strength. It's a big balancing act formulating a concrete for optimum strength, Ph, and heat generated as the concrete cures—and it can take a year or more to cure fully.

Dale then took over and explained the freeze-thaw durability factor. You need bubbles of air—voids—in the final product to allow for space for water which seeps into the concrete as it freezes, otherwise the freezing water will expand, cause cracks to form and the concrete will eventually fail in various ways. They add detergent to the mix to make bubbles for voids. Indoor and tropical settings don't require voids.

By now we realized that cement or concrete was anything but boring. I will never look at a sidewalk or building again without realizing all the considerations that went into deciding what formulation was best for the application at the time. They are researching and learning more every year, so the science of concrete is always evolving. Each big project has its own considerations, and AET is rigorous and exacting in their testing and findings, showing that firms like AET can assure you that your project will last for the ages. We stayed past the allotted time, but with all our questions, it was okay.

So we learned a lot about concrete and other things, and a good time was had by all.

Go here if you would like to read more: http://www.amengtest.com/files/6714/2539/3989/Transportation_Experience.pdf

Deborah Naffziger

Tour of St. Anthony Falls Laboratory

Photo credits: Jim Mirick

On April 12, twelve GSM members met at the St. Anthony Falls Laboratory for a tour led by Dr. Ajay Linaye, who earned his PhD at Caltech, and who is now doing post-doctoral research on rivers at the lab.

SAFL Display

The St. Anthony Falls Lab was finished in 1938, and was constructed for the University of Minnesota as a hydrology lab by the Works Progress Administration (WPA). Originally, the lab was created to test dams and spillways, which are now done by computer. A scale model of the Mississippi river once existed there, but it was dismantled decades ago to make space for more experiments. The lab is funded by the NSF, DOE, oil companies, and the state of Minnesota, MnDOT, the City of Fargo, and others. It is not tied to any one department at the U, but has people from several departments working on projects. Civil engineers, biologists, earth scientists, and computer engineers all work at the lab. There is also a fabrication shop with a dedicated staff of 5-6 to make materials for use in experiments.

GSM members on the SAFL tour

A SAFL Experiment

Modeling hydrological research takes a good deal of computer power. Results don't always match reality, but can provide pretty good information. We were able to observe this firsthand in their experimental stream area where a stream is built over an old sluice, with meanders and pipes poking out of the ground. This experiment is between a natural environment and a lab recreation. The stream is flooded at will and the experiment measures how microbes in a floodplain break down nitrogen in the soil.

Down in the lab we visited Jurassic Tank—AKA the Experimental Earthscape Basin or XES. This is where they model river deltas, where a river meets the sea. The tank has a special floor that can be raised or lowered to model subsidence or a thrust fault. Also, with these experiments, they can examine how

SAFL outdoor stream lab

sedimentary rocks are deposited over time. These aren't just flat layers, so they get an idea of how the actual sediments may have been laid down based on the patterns they get from their lab simulations.

This modeling of the water/sediment interaction by computer is still pretty new. Dr. Ajay showed us his experiment which involves measuring turbidity currents where a river meets the ocean. The sediment laden river water makes a 'river' underneath the ocean. This research is funded by the Japanese Oil and Gas Mineral Group, a corporation exploring for methane and other hydrocarbons embedded in the deep flow sediments. This research is also useful in locating aquifer boundaries.

This tour was markedly different from the one last spring. That tour included many experiments for MnDOT, and was more small-scale. I guess it depends on who is using the lab at any one time. One thing is for sure, the St. Anthony Falls Laboratory is always a good place to see the cutting edge in water and science technology!

Deborah Naffziger

February 26, 1979 Solar Eclipse in Winnipeg

We stayed at the home of a friend to view this eclipse. Although I had seen several partial eclipses before, I had never seen a total solar eclipse. We had the welders' glass and pinhole projectors for the before-totality views. Before totality, it was getting dimmer, as more and more of the sun was blotted out—similar to twilight, but a weird twilight as the sun was above, and not at the horizon.

The day was cold, and lightly overcast, but the sun was still quite visible, with the appearance of a dark 'bite', similar to what you would see in a partial eclipse. As it grew darker, the wind died down and things got eerily quiet. The skies had been clearing as darkness progressed, and it seemed cloudless before totality. Approaching totality, we saw Bailey's beads, the bright glimpses of the sun behind the irregular lunar terrain. Then it was totally quiet and very still. I looked and saw 'twilight' all around, but it was dark above. The stars came out, though dimly, and it was strange to see the stars of fall in February. Some eclipses have giant and irregular coronas; but this one was relatively small and quite circular. I can see why ancient peoples thought an eclipse was the end of the world. There were no howling dogs, as we had been advised, and the dogs belonging to our friends were safely ensconced in the house away from windows. They had been getting a bit agitated as it progressed, but those dogs were somewhat nervous anyhow.


Baileys Beads (Fred Espenak)

Totality was at 10:48 am, and it got colder, or maybe it just felt colder, lots colder.

As the sun reappeared, we saw Bailey's beads again, but the rest was anticlimatic. The feeling during totality made me understand I was watching something very special and ephemeral, as well as unique. I worked hard to keep the memories of it all, and I think of it from time to time—usually when another total solar eclipse is due. It is not like anything I had seen before, and I really wanted to become an eclipse chaser, but life and finances made that impossible.

Afterward, we went to a restaurant where it became obvious that some people there weren't interested in watching the eclipse or to even make note of it. We


Coronal streamers (Suresh Sreenivasan)

Diamond ring effect (Suresh Sreenivasan)

were really puzzled by this - it was such a big thing, and why wouldn't anyone go outside and watch it?

I am eager to see the eclipse in August, to compare it to Winnipeg, and see what is different about it, and what is the same.

Deborah Naffziger

Newton Horace Winchell

Newton Horace Winchell was born in 1839 in New York State. He began his formal education within the public school system in Connecticut. After his graduation in 1858, he continued his learning at the University of Michigan where his brother Alexander was a Professor of Geology. His brother Alexander had done work on the paleontological and stratigraphical studies that defined the Michigan Basin and the salt and petroleum-bearing strata therein and later studied the Archean rocks of the Lake Superior region. Newton alternated studies at the university with teaching in public schools, and received his M.A. degree from the University of Michigan in 1867 (1).

From 1867-1869 N.H. worked as superintendent of schools in Adrian, Michigan; he worked at the Geological Survey of Michigan 1869-1870 as an assistant to his brother, and also at the Geological Survey of Ohio as an assistant John S. Newberry, chief of the Ohio geological survey (2).

In 1872, Winchell became the director of the newly organized Geological and Natural History Survey of Minnesota which at the time was responsible for mapping the counties and the natural resources of the state. During 1874, he took a leave from the University for a couple of months to accompany Lieutenant Colonel George A. Custer as the geologist on the survey of the Black Hills of South Dakota. He prepared the first geological map of the interior of the Black Hills. An unintended result of this trip was the discovery of gold by members of the survey party. Custer broadcast this find to the newspapers and soon the Black Hills Gold Rush was on. Winchell had seen no gold and his report on the rocks that composed the Black Hills contained the statement that he had "… taken the gold reports with a large grain of allowance."(1)

As Director of the Minnesota Geological Survey, Newton Horace Winchell was responsible for many pioneering studies of Minnesota Geology published between 1872 and 1899.

One of Winchell's outstanding contributions was his estimate of the length of time since the last ice sheet retreated from Minnesota. He calculated the recession rate of St. Anthony Falls based on historical records of its past locations, on the assumption that the falls began near Fort Snelling and eroded upriver to its present location in Minneapolis after the retreat of the last ice sheet. The evidence was first published in 1877 as an article entitled "The Geology of Hennepin County", and became part of the fifth annual report of the Survey. The gorge formed by the upriver migration of St. Anthony Falls is the only true gorge along the entire Mississippi River. Later, a foot trail (it was believed that it was originally a Dakota trail) that ran below the bluff (Franklin Avenue south to 44th street) was renovated by WPA crews and officially named the Winchell Trail. This trail was named after Winchell because of his geological studies of St. Anthony Falls. A large glacial boulder with a brass plaque stands at Franklin Avenue on the west rim of the Mississippi gorge as a memorial (4)

Winchell and his Survey staff had completed its projects by 1897 and the Survey was shut down. In 1911, the Survey was re-established with a new Director (William Harvey Emmons 1911-1944 (5)) and under its new name of the Minnesota Geology Survey whose new purpose was to map the geological portions/properties of the state.

In 1888, Newton headed a group of geologists, including his brother Alexander, who established the American Geologist, a geological journal. He served as

the Editor of that journal until 1905. Throughout the 1880s Newton championed the establishment of an American geological society. He used the American Geologist to issue a call to all geologists to assemble at Cleveland during the August, 1888 meeting of the American Association for the Advancement of Science, for the purpose of organizing a new geological society. This proved successful, and the new society was born on Dec. 27, 1888 as the Geological Society of America (GSA). Newton served as a member of the first Advisory Committee to GSA's Executive Council, and as Councilor (1892-1894), as Second Vice-President (1900), as First Vice-President (1901), and as President (1902).

N.H. Winchell also taught courses at the University in botany, zoology, and geology. He remained at the University/Survey until 1900. From 1906 until his death in 1914, he worked at the Minnesota Historical Society where he was in charge of the Department of Archaeology. In 1911 he completed the task of assembling all the earlier work on Indian mounds and published a monumental study entitled "The Aborigines of Minnesota".

Winchell's wife, Charlotte, was "instrumental in editing Winchell's work on various articles and publications." (6) Their passion for geology was passed to their children. His two sons went on to become geologists: Horace, a mining geologist contributed much to the discovery of ore along Minnesota's Mesabi Range, and Alexander became a professor of geology at the University of Wisconsin. His daughter Avis married Ulysses Sherman Grant (the son of Lewis Addison Grant, a distinguished soldier in the Civil War) who graduated from the University of Minnesota in 1899 and worked with N. H. Winchell in northern Minnesota. Grant also inspected and reported on prehistoric copper mining in northwestern Wisconsin, in the Brule River area. Grant later became the Head of the department of geology at Northwestern University. The youngest daughter, Louise, married David Draper Dayton, son of George Draper Dayton, founder of Dayton's department stores and great-grandfather of Governor Mark Dayton.

Newton Horace Winchell's legacy in Minnesota is memorialized in the school that bears his name, and in the vast number of publications and surveys he supervised. In 2008, Minnesota's Sesquicentennial celebration included a U of M exhibit that debuted at the Minnesota State Fair. Among the artifacts on display were Winchell's hammer and spyglass, and a field notebook from the Custer Expedition to the Black Hills in 1874. In 1988 the University of Minnesota renamed its Earth Sciences Department to the Newton Horace Winchell School of Earth Sciences to honor the outstanding contributions Minnesota's First State Geologist.

If you would like more information , continue with the links below.

1) Department of Earth Sciences; Newton Horace Winchell School of Earth Sciences: Online Source: https://www.esci.umn.edu/winchell

2) N.H. Winchell, Pioneer of Science: http://collections.mnhs.org/MNHistoryMagazine/articles/32/v32i04p214-225.pdf

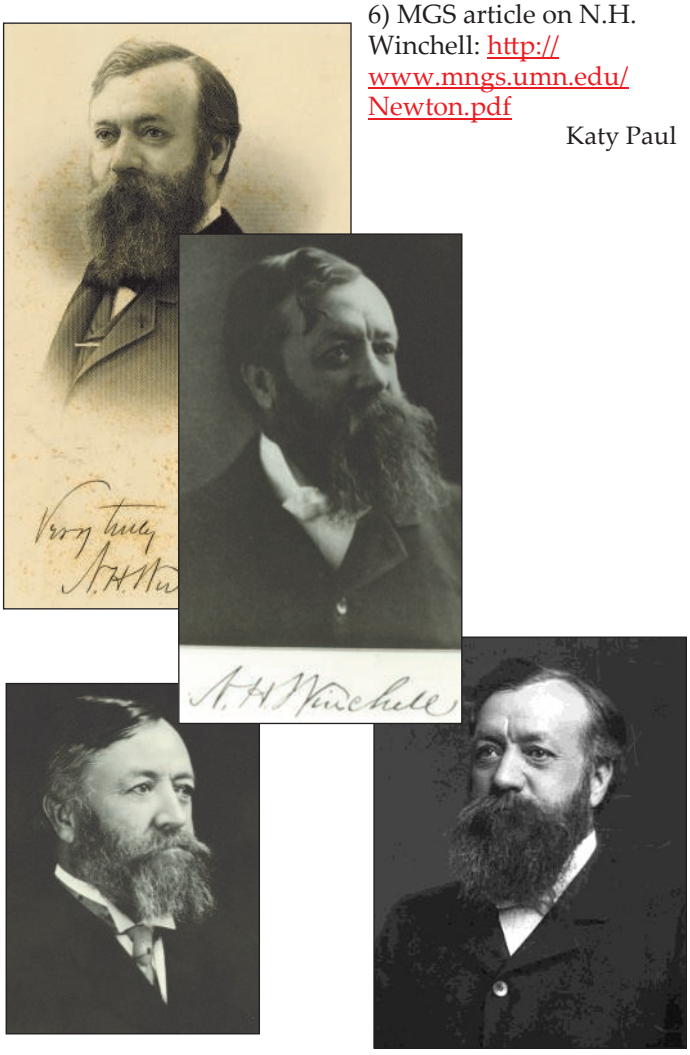
3) G.B. Morey (1999) Newton Horace Winchell, The George Armstrong Custer Expedition of 1874, and the "Discovery" of Gold in the Black Hills, Dakota Territory, U.S.A. Earth Sciences History: 1999, Vol. 18, No. 1, pp. 78-90. http://dx.doi.org/10.17704/eshi.18.1.t0281688171970mk

4) Winchell Trail information: http://www.placeography.org/index.php/Winchell_Trail,_Minneapolis,_Minnesota

5) MGS Directors since 1872: http://www.mngs.umn.edu/photos.html

6) MGS article on N.H. Winchell: http://www.mngs.umn.edu/Newton.pdf

Katy Paul



Steve Erickson speaking at the Spring 2017 Banquet

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