



GEOLOGICAL SOCIETY OF MINNESOTA NEWS

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1996 SUMMER FIELD TRIPS

June 22 - 23

Devonian Bedrock
Rochester, Minnesota

Cambrian Sandstone
Riverfalls to (Hastings, Redwing, Lake City)
Winona

July 23 - August 1

South and Southeastern Idaho
Led by Dick Uthe and Walt Blowers

(No date)

Glacial Lake Grantsburg Grantsburg, Wisconsin

PRACTICAL HINTS FOR FIELD TRIPS

GSM field trips often involve "seeing" and "doing." Use the check list below to help prepare for your trip.

1. CLOTHING: Dress casual and practical. Layering will help you ease through those daily and seasonal temperature changes for which we're famous. Hats protect against sun and rain.
2. EQUIPMENT: Plastic bags or other specimen containers, labels (masking tape works well), writing tool(s), note book, rock pick.
3. FOOD & DRINK: Plan for lunch in the field. Bring plenty of liquids.
4. OPTIONAL ITEMS: Camera, binoculars, hand lens, rain gear, sun screen, bug repellent, field guides for rocks, fossils, birds, bugs, etc.
5. OVERNIGHT: Depending on the trip instructions, plan to bring canned or dry foods for more meals in the field.
6. SCHEDULE: Plan to make a day or days of it; schedules, meeting sites, stops, restaurants and accommodations are usually suggested for overnights.

IN MEMORIAM

We were sad to learn that Don Wheeler, a longtime member of the Geological Society, passed away December 27, after more than a year of failing health. He was 90 years old. Don and his wife, Elizabeth, were often seen at lectures and the GSM banquets.

Don had an impressive history. As well as being a research chemist and inventor, with 38 patents to his credit, he was an avid environmentalist and was active in many organizations throughout his life.

A memorial service will be announced and probably held in the summer.

Arenal Volcano, Costa Rica

By far the most magnificent geological experience of my life — so far — was the night we arrived at Arenal in Costa Rica. We had just put our bags in our rooms, about 7:30 p.m., when the volcano came to life and “blew us a welcome.” I’m not certain how long I stood there with my mouth hanging open, but I do recall repeating over and over, “Wow!”

Arenal first erupted in July, 1968, killing at least 62 people, (the natives claim it was more) and spewing lava and ash for five square kilometers. It wiped out the villages of Tabacon and Pueblo Nuevo. Since that time, Arenal has been continuously active and is presently the most active volcano on Earth. Geologists estimate Arenal’s age at 3,700 years.

An observatory lodge was built in 1987 as a research station for scientists from the Smithsonian Institute and the Universidad Nacional de Costa Rica. The lodge is now open to the public and one can sit on the porch(es) and observe Arenal throwing massive plumes of magenta fire thousands of meters into the sky and dumping burning boulders (some reported being as big as a house) onto the sides of the mountain. The volcano erupts approximately 18 times every 24 hours.

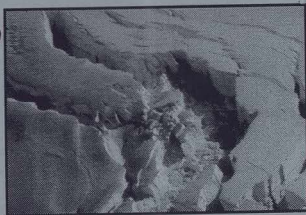
The rumbling, when the volcano is erupting, can only be described as an eerie communication between our wondrous earth and ourselves. What an experience!

Judy Hamilton



Asthenosphere: The part of the mantle from a depth of about 100 kilometers to 250 to 300 kilometers. This area is more “pliable” than the lithosphere.

Richter's Scale is on Shaky Ground



Prior to 1935, earthquakes were measured from I to XII in terms of how they "felt" and how much damage was done. How an earthquake "feels" depends on how far from the epicenter one happens to be, how deep the focus is, duration of quaking, local geology, etc. American seismologist Charles Richter set out to get a more objective measure of an earthquake's "real" size or "magnitude" - which is not affected by distance or human perceptions - by using a seismograph and a logarithmic scale.*

Richter defined the magnitude of a local earthquake as the base 10 logarithm of the maximum seismic wave amplitude (distance traveled by the recording arm) as recorded at a distance of 100 (62 miles) by a standard type of seismograph in use at the time. On Richter's scale, a shake of magnitude 3.0 would move the arm of his seismograph one millimeter (mm). A shake of magnitude 2.0 would move the 0.10 mm, 4.0 = 10.0 mm, 5.0 = 100.0 mm, 6.0 = 1000 mm and 7.0 = 10,000 mm, etc. Although the scale had no upper limit, by the time it hit 7, a very major quake was underway. So far so good but there were some serious problems with Richter's Scale.

Seismographs were rarely stationed precisely 62 miles from an earthquake, but the expected readings could be calculated based on comparing the arrival of slow versus fast seismic waves. However, the original index was based on Southern California crust and only worked for quakes within a few hundred miles of Richter's particular brand of seismometer - pretty severe limitations, since earthquakes do occur other places.

To measure more distant quakes, Richter and Beno Gutenberg developed another magnitude measure based on surface waves traveling through the earth's crust at about 20 second intervals called M_s . Richter's original or local magnitude based on wave intervals of 0.1 to 3.0 seconds then became M_L . Both measures missed or underestimated deep quakes which produced few surface waves. So a new measure was developed: M_b based on "body waves" which travel through the earth's interior. But then in the 1970s, the experts began to realize really large quakes were underestimated by all these measures, so a new one was developed: M_w .

Using M_w also known as moment magnitude, seismologists use long interval waves coming in cycles of over 200 seconds to measure the very dimensions of the fault rupture causing the quake. Since M_w can take one to two hours to compute, the USGS National Earthquake Information Center will release one of the other "M" measurements for starters and finish off with the moment magnitude. This may fall above or below the other Ms and is by every measure a far cry from the original Richter.

Diapir: a bendable body such as the core of an anticline or salt dome that intrudes upward piercing through the overlying layers of rock.

Even moment magnitude falls short according to its inventor, Hiroo Kanamori (successor to Richter and Gutenberg at Caltech). Trying to shoe horn such a complex process into a single "size" fits all is the real problem. Meanwhile, people are actually asking to see and get pictures of a Richter "Scale" while scientists are quietly trying to "bury" it. Trying to translate magnitudes into something comprehensible has prompted some scientists to consider explosives, not out of frustration, but because explosive force can be quantified. For example a quake of magnitude 7.2 = one million tons of explosive or a little less than the energy inside the swirling winds of a typical hurricane. Or take perhaps the world's largest recorded quake of moment magnitude 9.5, Chile, 1960. That one equaled about 3 billion tons of TNT. Now isn't that perfectly clear?

BOOK REVIEW: Treasure in the Air

When young Meg and her father take a walk in the woods, Meg gets more than she ever bargained for when they happen upon some "pancake" shaped rocks. She is looking for gemstones but finds something even better: stromatolites! Through the medium of her father, the ancient rocks come back to life to relive the tale of the great oxygen revolution. Along the shores and bays of the Archean micro continents nestled the dome-shaped colonies of cyanobacteria. Meg's father invites her to go back to that impossibly remote past to sit on the shore. The air is very "thin" forcing Meg to hold her breath against the toxic atmosphere.

And that air was what the revolution was all about. This rag tag army of stromatolites established the beach heads for all of the life forms to come. Strange "soldiers," they sat like rocks growing and consolidating their territory armed only with the power of photosynthesis. The fossil record attests to those times the more massive geologic forces would overtake the green troops and wipe them out. But as Meg was to learn, slow and steady can indeed win the race. But there may also be another lesson

*Regarding scales: The logarithmic scale in powers of ten (just happens to match our digital appendages; what a coincidence) provides a handy, "intuitive" way to record, measure or calculate things such as size from very small (atomic size) to very enormous (astronomical distances). That fact that the logarithmic scale works well for measuring earthquakes simply reflects the wide range of energy that can be released during any particular tectonic "adjustment."

*Dwight Robinson
(with much appreciated technical and editorial
review by Val Chandler, U of M, Geological
Survey)*

here for organisms that become too successful and perhaps "complacent" for their own good.

With its engaging text and delightful illustrations, this book is in itself a treasure inviting the reader young and "older" alike to join the rabbit on the dedication page and jump off into a novel and exciting adventure in learning. The story is made all the better by the fact that it is grounded in real world events - albeit removed by a couple billion years. What could be more exciting than time travel and what better vehicle than geology especially at the hands of GSM member Lisa Westberg Peters who keeps bringing geology to life for the most important audience in the world!

"Treasure in the Air" was written by Lisa Westberg Peters, nicely illustrated by Debra Durand DeSaix and published in 1995 by Henry Holt and Company. The book should be available at most fine bookstores everywhere and sells for \$15.95.

Dwight Robinson

Caldera: a large, hollow space roughly circular in shape formed by the collapse inward or explosion outward of the summit of a volcano.

CD REVIEW: Evolution

*"Well, here's some anthropology talk,
Don't you see we're all descended from
the Family Tree...*

*Brothers and Sisters here on earth;
Now before it's too late you better dig
what it's worth!"*

And dig you can along with the Ms. Kitty Margolis - on her truly inspired new CD simply entitled "evolution." What you dig is life/evolution itself-ala Jazz. And what better way can there be to speak to the human condition? Listening to Kitty during her recent visit to the Dakota Bar & Grill in St. Paul, it struck me that of all forms of music, Jazz is the most truly transcendent. Skilled Jazz artists with a quick nod to that old gene-driven moon, spoon and croon routine proceed like cosmic tricksters to do it one better. Yes, life can be a "bitch," but "we've got rythm and who could ask for anything more?!" Good Jazz is more, and despite Gershwin's spritely refrain, it is hardly news that things could be a lot better than they are for most of human kind. Here's Kitty from the title track (and if I had to choose, this would have to be my favorite):

*"We can travel to the planets,
Drive a mile through solid granite,
Thrive in all kinds of weather,
But we cannot live together...
We have pondered our existence,
Tracked the comets in the distance,
But we're overcome with blindness,
By an act of human kindness..."*

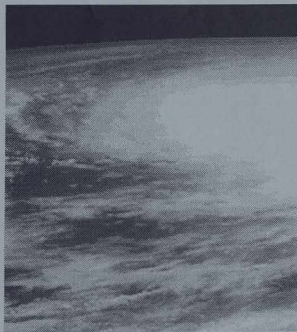
Delivered in Kitty's husky but agile contralto, this piece reminds me vaguely of Janis Ian's "Seventeen" in tone and sincerity. Other cuts carrying the evolutionary theme include an uptempo, bossa-nova rendition of "I'm Old Fashioned," "Ancient Footprints" a la Lucy (who also found herself in the sky with diamonds): "

*"We call on the past to show us where to
go;
We're closer to then than we may want to
show...
than we may really want to know."*

Shorter term "evolution" hasn't been overlooked and provides some rocking good fun in a lively version of "Someone Else is Steppin' In" and the swinging, "When the Lights are Low."

The CD closes with lyrical and searching, "Where Do you Start?" featuring the backup artistry of piano man Dick Hindman whose mid ballad interlude on the piano is worth the price of admission. So, where do you start? Start by giving "evolution" a listen. It's available under Kitty's own label, Mad Kat Records PO Box 420253, San Francisco, CA 94142-0253. But better still, ask for it at your local CD store. If it's not in, it should be.

Dwight Robinson



Lithosphere: The outer, solid part of the earth including the crust and the upper mantle to a depth of about 100 kilometers

Picture books by Lisa Westberg Peters

"The Sun, the Wind and the Rain"

My first experience with GSM Member, Lisa Peter's books, was when I purchased two of them for Christmas gifts for my two eldest granddaughters.

The first one was "The Sun, the Wind and the Rain." This is the story of two mountains. One was made by the earth and the other was made by a little girl named Elizabeth.

This wonderful picture book is the first lesson in geology for children as they learn to understand how Elizabeth's little sand hill and the majestic mountain made by the earth, are transformed by the sun, the wind and the rain.

Beautifully illustrated by Ted Rand, this book will delight children of all ages. (I keep my copy of the book on my coffee table to read to the other grandchildren coming along.)

"Water's Way"

This delightful and colorful picture book is about a little boy named Tony who is waiting for snow so he can go sledding. The book tells how water changes, such as when mist from the sea becomes clouds in the sky, and how steam from Tony's bathwater collects on the window glass.

This is another educational book that teaches children about how water changes from one form to another due to climate. This book is also illustrated by Ted Rand.

Lisa Westberg Peters has published 11 other children's books and you can frequently see her and her husband, David, at GSM lectures or on a summer field trip.

Judy Hamilton

FROM THE CAPROCK:

Still curious about how those massive plates on which we ride out our lives got to be what and where they are? Looking for summer adventure in some hot, rocky location? Have you always wanted a geological "one stop shop" - a comprehensive guide to geological resources along with the names of your friends in GSM in one handy directory? Have all the same old movies you see again and again on TV got you craving some real, solid, geological video adventure? Well, you have come to the right place.

Next year's lecture series promises a bumpy ride as we get to the bottom of plate tectonics. Summer field trips over and above the Idaho adventure are nearly set. And President Doug Zbikowski has revolutionized the GSM

roster. With its new information-rich format, it is just about worth the price of membership. And don't forget the video library. For those down times between lectures and field trips, there is nothing like a good video. And our video library is packed with winners.

Special thanks to long time member Bob Handschin and to Val Chandler, Minnesota Geological Survey for his review and comment on earthquake measurement and the Richter Scale.

Atmosphere: The area occupied by gases surrounding the earth.

VID WATCH:

From the Earth revealed series: **Volcanism**

Different types of volcanoes can erupt in different ways. With some eruptions, magma pours out in molten rock called lava flows; magma under high pressure erupts explosively and is spewed into the air as volcanic ash. There are 500 known active volcanoes on dry land and probably thousands on the ocean floor.

Video #13 in the Earth Revealed Series discusses fissures, rift zones, convergent plates, and composite volcanoes and contains interesting footage of research done at Mt. Katmai, Alaska, which became known as valley of 10,000 smokes because of still steaming vents after its eruption in 1912.

(GSM Video Library #7)

From the Miracle Planet series: **The Heat Within**

Our planet, although covered by cool oceans, is hot enough inside to shine like a star. TV journalist Bill Kurtis travels to the far corners of the earth, visiting places where the heat from within breaks forth — Yellowstone, Iceland, Africa, the Himalayas and great rift valleys and underwater volcanism on the ocean floor.

See Earth as it once was and watch as the seething power of the planet's inner furnace breaks it apart on one side while pushing it up into great mountains on the opposite side.

There is an interesting discussion on the earth's interior and how it got that way. This 55 minute video is fascinating. You might want to watch it more than once as I did.

(GSM Video Library #43)

The Story of America's Great Volcanoes

This video reveals the fascinating story of America's volcanoes, most of which are only quiet, not dead. Included are Mt. St. Helens and Mt. Ranier, Washington; Crater Lake, Oregon; Lassen California; Katmai, Alaska; Kalauea and Haleakal on the Hawaiian Islands; Sunset Crater, Arizona; Craters of the Moon, Idaho (one of the locations to be visited by field trippers this coming summer); and Yellowstone National Park. You will be spellbound by the immensity, diversity and power of America's great volcanoes.

(GSM Video Library #29)



Geosphere: one of two physicochemical systems in which the earth's permanent and invariant stock of ore metals are found. Outer geosphere includes: atmosphere, biosphere, hydrosphere, lithosphere and asthenosphere. Inner geosphere: mantle and core.

AN ANNOUNCEMENT:

Have you noticed anything different in this edition of the *NEWS*? Does the kerning look off? Is the typeface a little different looking? You could be on to something. After many years of diligent service, Charles Brennecke has decided to relinquish his duties as desktop publisher and pass them on to his grandson, David Yaffe.

Now, David doesn't have all the experience that Charles does, nor does he have all the time on his hands that a retired person enjoys; so things could be a little rough around the edges to start with. But not to worry, David is a bright boy and soon the *NEWS* will be looking as professional as ever. In the Interim, next time you see Charles tell him how much you appreciated his work in the past.

The purpose of this newsletter is to inform the members and friends of the activities of the geological society of Minnesota. *NEWS* is published four times a year—February 15th, May 15th, August 15th and November 15th. Deadline for article submission is the first day of the month of publication.

Officers: Doug Zibrowski, *president*, Marilyn Lowe, *Vice president*, Ed Hupples, *Treasurer*, Pat Johnson, *Secretary*

Directors: Charles Brennecke, Dick Heglund, Rick Hosterman, Alex Lowe, Don Swensrud

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FIRST CLASS

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