Lunch table Newsletter

GEOLOGICAL SOCIETY OF MINNESOTA

NEWS

SPRING 1994
VOLUME XLVIII, NO. 1

CONTENTS

Hardy Parties!

Despite all the severe cold weather and snow, our lecture series enjoyed tremendous turnouts. Is it because of the extreme hardiness of our membership, the compelling geologic appeal of the national parks, or an epidemic of advanced cases of "cabin fever" brought on by the weather? We're not sure, but many thanks to the members who braved the elements to make our lectures so successful!

A special note of commendation to member Barb Gudmundson who will be presenting an original research paper entitled "An array of hot-spring diatom habitats" at the annual meeting of the Minnesota Academy of Science at the Ecology/Natural Resources Paper Session. The meeting will be held in Moorhead, Minnesota on April 28-30.

Diatoms are microscopic single-celled algae. They may grow in either fresh or salt water and secrete siliceous, box-like cell walls called frustules, in a great variety of shapes. Large accumulations of frustules may produce a sedimentary rock called *diatomite*, which has some commercial value.

Barb's paper deals with diatoms she found living in hot water vents in Iceland. Good luck Barb! (See Diatoms: by Barbara Gudmundson on page 2.)

Doug Zbikowski, President

Merging Art and Science in Geology

By Dan Varner
Society of Vertebrate Paleontology
Dinner: 5:00 PM
Speaker: 7:00 PM
April 25
Old Country Buffet
Maplewood, Minnesota

Mary R. Kimball Memorial Banquet

Diatoms:
Diamond-Dust of the Water World

by Barbara J.R. Gudmundson

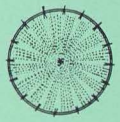
Why look for King Solomon's Mines in faraway lands? Wonders fit to bedazzle await you at the nearest high-powered microscope. Just peer down the "mineshaft" at a slide bearing the elegant plants (algae) known as diatoms. You will see more golden, sun-snaring photosynthetic pigments than green, in the golden drops of the oil they store, instead of starch stored by most other plants.

Diatoms are often *the most abundant* photosynthetic organisms in marine and fresh waters, and they create geologically significant materials, e.g. diatomaceous earth. They do this by using dissolved quartz in liquid form as "silica (SiO_2) molecules" and incorporating and transforming these molecules into cell walls of solid silicon. The living organism within its plasma membrane is contained inside this 2-part (di-atom) cell wall capturing energy from the sun or other light, and the pores which decorate the silica cell wall permit exchange of dissolved gases and liquids with the living part, the protoplast.

Rhopalodia

Two of the materials of interest to geologists which diatoms create are diatomaceous earth or diatomite, and stromatolites.

Diatom symmetry is of two general types: CENTRIC and PENNATE. Centrics are those organized radially around a point (discs, pill-boxes, cylinders, potato-chips and some more outlandish variations). Pennates are those organized around a line (canoe shaped, s-shaped, spindle-shaped, bar-shaped, and several with very fancy markings of pores, spines, grooves and chambers within the silica cell wall which show up under the microscope as changing silhouettes as the focus is moved.



A CENTRIC Diatom
Stephanodiscus sp

A PENNATE Diatom
Cylindrotheca gracilis

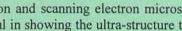
You may have seen me make collections of diatoms on field trips. Could I see diatoms you could not see? No, I am guessing where they may be, and recording date, habitat, type of sample (plant squeezings, rock scrapings, etc.) and location, so the change--if any--in diatom flora can be compared and contrasted through the years at that location. This practice had made useful small bits of diatom material I collected in the single spring of a remote cliff dwelling in Mesa Verde National Park (with ranger permission) in 1968 still useful for comparison and possibly a research paper.

One good thing about diatom collecting is that samples are not as heavy or bulky as rocks, unless, of course, you're into stromatolites!

Plasma membrane: The semipermeable membrane that encloses the cytoplasm of a cell.

The oldest marine diatoms are Cretaceous. The oldest freshwater diatom is from the Oligocene 24-34 m.y.

The cell membrane is a fine, flexible membrane immediately within the silica cell wall. Before identifying diatoms, the living part must be removed by oxidizing it, in order to see well the fine features of the frustule (cell wall). The light microscope (to 900 or 1000X) is used for identification. However, the electron and scanning electron microscopes are very useful in showing the ultra-structure that forms puzzling optical illusions.



A *Melosira* filament

Diatom studies are helpful in indicating oil-containing strata and water-bearing strata, to trace the advance and retreat of glaciers, to show subsidence of land near salt water, to trace prehistoric conditions of lakes, and to reveal some conditions of human life in archaeological digs.

References:

Gudmundson, B.J.R. 1980, Diatoms: Diamond-dust of the freshwater world. Journal of Freshwater, Fall-Winter 1980.

Prescott, G.W. 1968. The Algae: A review. Geneva, IL, Houghton Mifflin. 436 pages.

Colony of 9 Cells
Asterionella sp

Board News

The Board met in March at President Doug Zbikowski's home to discuss GSM business. One of Doug's ideas--a GSM Video Library--has created a lot of interest among members as well as the Board.

A sub-committee was formed to develop the operational aspects of the library and their recommendations were brought to the Board. Fees, deposits, lengths of rentals, and so forth were discussed. A motion was passed that $1,000 be donated from the GSM Educational Fund to get the video "club" off the ground. More information will be available in the next issue of the *News*.

The Treasurer reported that GSM is very much in the black, the books have been audited and membership was reported at 199 members.

The Field Trip Committee has leaders and dates for the summer trips. All but one trip is confirmed. (See Field Trip Schedule on page 5.)

The 93/94 lecture series is now over. As a finale to this series, see A Brief History of our National Parks by Susan McGuire on page 6.

Hope to see you at the Spring Banquet and a field trip or five. Have a great summer!

Respectfully submitted,
Judy Hamilton, Secretary

MONTANA-IDAHO-WASHINGTON FIELD TRIP
Second Pre-trip Meeting
Marlys & Alex Lowe's
2206 Caroline Lane, South St. Paul
Saturday, May 21, 7 p.m.

Protoplast: The living material in a cell as opposed to inert portions such as the cell wall in plants.

Marvelous Mammals: Our Hair Raising Legacy

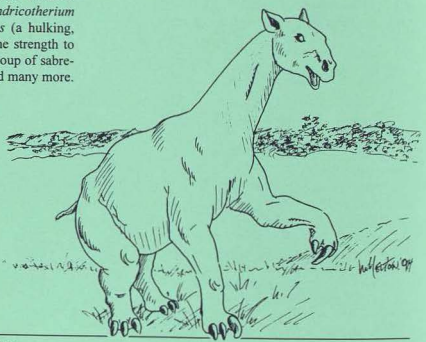
by Dwight Robinson

Did you ever wonder why some 65 million years after their demise, dinosaurs continue to eclipse mammals in our collective imagination? Maybe ontogeny (individual development) does recapitulate phylogeny (evolutionary development of a species). Perhaps the "awe full" truth is that remnant neural traces in our minds hark back to those scary days when our ancestors scurried furtively around, between and into claw and fang of the eagle-eyed, terrible lizards. According to the April 1994 special issue of *Natural History* magazine (The Rise of Mammals), "the first two-thirds of the entire history of mammals was played out in the Mesozoic" and "we" (our progenitors) were there.

Now we can go back to where..."the survivors [overcame] countless trials and accidents and squeezed through many [evolutionary/geologic] keyholes over the past 200 million years." *Natural History* invites us to peek through a few of those keyholes to meet such characters as *Indricotherium* (largest land mammal ever), *Moropus* (a hulking, horselike vegetarian with claws and the strength to use them), the nimravids (an extinct group of sabre-toothed cat look-alikes but not cats) and many more.

The story opens with bone-bearing, Brazil nut sized concretions eroding out of sandstone cliffs in the Gobi Desert in Mongolia that date to about 80 m.y. By this time the tiny, shrew-like triconodonts (triple cone teeth) of the mid-Mesozoic, had given way to a diversity of multituberculates (many lumped teeth). These were the "rodents" of the Mesozoic and they took over their gnawing and chewing niches with gusto until some 15 m.y. into the Cenozoic when the real rodents took over. These nuggets from the Gobi reveal mammals on the move. Braincasts suggest "limited intelligence" but keenly developed senses of hearing and smell exercised in a wide variety of habitats. All of which belies the popular image of the timid, slinking shrew subsisting on dinosaur eggs.

By 80 m.y, there were mammals which laid eggs (monotreme or "single hole" types), had pouches (marsupials) and were placental (young developed internally being fed blood-borne nutrients from the mother through a membrane). Interestingly, we placentals (self-classified as the "Eutheria" or "good" mammals) have relegated the marsupials to the



***Moropus*, a Calicothere from the Miocene. Calicotheres were most closely related to horses and rhinos but had claws for feeding and probably defense. They went extinct in the early Pleistocene.**

Cytoplasm: The living material in a cell outside the cellular nucleus but within the plasma membrane.

subset "Metatheria" or "between" mammals. Of course we "know" that due to certain design flaws and their slightly inferior minds, marsupials can only make it in such geographical "backwaters" as Australia. However, new evidence from Australia shows that marsupials very likely ran the placentals out of town 70 to 55 m.y. Now about that classification. Was it a case of "pouch envy?"

Why antlers? Where did the whales come from? Why are cats considered hypercarnivores? What's so compelling about sabre-toothed canines? What was life like at the close of the Pleistocene? What ocean lasted 500 m.y. to incubate such creatures as distant in time as trilobites and whales? For answers to these questions and a whole lot more, you might want to visit the nearest news stand. I think you will be glad you did. "The Rise of the Mammals" is a darn good read.

Summer 1994
Field Trip Schedule

May 14 - One day trip - Crystal Cave, Wisconsin. Leaders: Blaze & Jean Cunningham

June 11 & 12 - Two day trip - Pipestone, Minnesota. Leader: Rebecca Seal **(Not confirmed)**

July 9 - One day trip - Glacial Twin Cities. Leader: Gary Meyer

July 23 - Aug 3 - Two week trip - Missoula Flood Plain, Montana, Utah, Washington. Leaders: Dick Uthe and Walt Blowers

Sept 10 - One day trip - Our own "Fire and Ice" self-guided tour. Starts at the visitor center on 94 in St. Paul

Mark Your Calendars Now!

More information by mail prior to each Field Trip

Submitted by Galen O'Connor

GSM Video Watch:
"True North"

by Dwight Robinson

To the discerning eye of the geologically inclined, the world is a moving feast. Mountains stand like rotting manuscripts speaking to us of ages past, glaciers flow like rivers in slow motion; water churns, carves, transports and nurtures. Day in and day out, *terra firma* is chipped away by air, water and oxygen only to renew itself from within by means of mid-ocean ridges and volcanic eruptions.

GSM members know there is no better show in town, but that doesn't mean there aren't some very good videos. In fact, GSM President, Doug Zbikowski has assembled the makings of a small video library. Enough members have shown an interest to prompt formation of a GSM Video Lending Library Committee. (See more details in Board News on page 3.) Many excellent tapes are available. Look for quarterly reviews in this column of your newsletter.

"True North" by Mirimar Prods, BMG Video, 1992 captures more beauty than basics. Sail on the wind over ice laden mountain rivers, watch ice cleave off glacial faces. Get a bird's eye view of crevasses in blue glacial ice. Travel downstream with the ice as it melts into spring. Soar with the eagles over mountains and forests. Rise in heart thumping rhythm with the sun and follow it through the day into night all to the glittering and exciting musical track of Paul Speers, James Reynolds and Tangerine Dream. This video is not in the GSM collection but should be available in your favorite video store for purchase. Look for it under "Geological Therapy."

A Filamentous Colony
Chaetoceros sp

Cell wall: Rigid outer covering of plant cells composed of cellulose, chitin, lignin (wood) or silica (diatoms). These looked like rooms or "cells" to early microscopists hence the name cell.

As a finale to our 93/94 lecture series "Jewels of the Landscape - - Geologic Tours of our National Parks", Susan McGuire provides some parting notes as we leave the parks.

A Brief History Of Our National Parks

by Susan McGuire

1869 - John Muir, considered the father of the national park system, first visits what becomes Yosemite and is awed by its beauty; visitors also report on the beauty of the Yellowstone area.

1870 - Photographer William Henry Jackson and painter Thomas Moran visit Yellowstone. Their portraits of Yellowstone rouse interest in the Yellowstone area.

1872 - The Yellowstone Park Act becomes law creating Yellowstone as the nation's--and world's--*first national park*.

1889 - John Muir publicizes the impact of overgrazing in the Yosemite area and lobbies for its preservation as a national park.

1890 - The high country of Yosemite becomes a national park. Also, General Grant National Park and Sequoia National Park are established to protect giant sequoias.

1910 - Glacier National Park is established. George Bird Grinnell, editor of *Forest and Stream*, argues for national parks as wildlife sanctuaries. Other popular magazines take up the cause, too, and are influential in the fight for national parks - *Century, National Geographic and The Saturday Evening Post.*

1903 - President Teddy Roosevelt visits Muir at Yosemite and decides to expand park boundaries. Crater Lake, Mesa Verde and Wind Cave become parks under his administration. He advocates the wilderness experience as important for personal renewal.

1916 - National Park Service established.

1919 - First national park established in eastern United States (Acadia). Prior to this all were previously-owned federal property in the west accessible only to rich visitors.

Park philanthropists emerge. Among others, George B. Dorr gives much of his fortune to Acadia, and John D. Rockefeller donates large tracts of land to Grand Teton, Great Smoky Mountains, Acadia, and Shenandoah.

1920's - 1930's Parks now accessible by automobile and become nation's 1930's playground.

1934 - First park established specifically to preserve wildlife (Everglades).

1950's - Another bigger boom of visitors. To answer the demand, more parks are established--Arches, Biscayne, Canyonlands, Capitol Reef, Channel Islands, Guadelupe Mountains, North Cascades, Redwood, and Voyaguers; most other parks are expanded.

1959 - There are now 180 National Park units.

1961 - Congress authorizes funds for the first time to buy land to establish a new national park--Cape Cod National Seashore.

Cell wall: Rigid outer covering of plant cells composed of cellulose, chitin, lignin (wood) or silica (diatoms). These looked like rooms or "cells" to early microscopists hence the name cell.

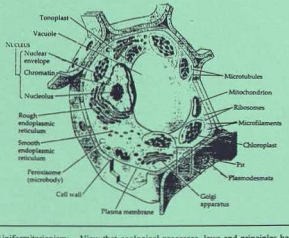
1970's - Parks suffer from overuse. They can no longer simultaneously be wilderness sanctuaries and public playgrounds. Park management responds by restricting usage.

1980 - There are now 300 National Park units.

1981 - 44 million acres of Alaska become national parks, doubling the size of the park system. Whole mountain ranges and river basins are included so that animal ecosystems are protected, i.e., enough space for caribou to migrate unmolested and grizzlies to maintain large territories.

Anatomy of a Plant Cell

A plant cell consists of a protoplast enclosed in a cell wall. The protoplast--the whole cell, excluding the cell wall--is bounded by the plasma membrane. Outside the plasma membrane is the primary cell wall and in some plants a secondary cell wall, constructed from cellulose fibers and other components. Between the primary walls of adjacent plant cells is the middle lamella, a sticky layer that comments the cells together. The protoplasts of neighboring cells are generally connected by plasmodesmata, cytoplasmic channels that pass through pores in the walls. The plasmodesmata may be concentrated in areas called pits, where the distance between adjacent protoplasts is narrowed.



When mature, most living plant cells have a large central vacuole that occupies as much as 90% of the volume of the protoplast. A membrane called the tonoplast separates the contents of the vacuole from the thin layer of cytoplasm, in which the mitochondria, plastids, and other organelles are located. Within the vacuole is the cell sap, a complex aqueous solution that helps the vacuole play an important role in maintaining the turgor, or firmness of the cell.

Minnesota Geology: 3.6 Billion Years and Counting

Discover where volcanoes erupted onto a lifeless landscape, where an inland sea teemed thick with algae, where a mountain chain rose to unrivaled heights, where a great valley was filled with lakes of lava, where oceans lapped against white sand beaches and where mile-thick ice caps slowly carved a new landscape. Discover the long, diverse, and often calamitous geologic history of Minnesota. Includes two all-day field trips to the Minnesota River Valley (**April 30**) and to local areas (**May 21**), and a weekend trip to northeastern Minnesota (**May 6-8**) which involves 1-2 nights camping in state parks (**additional cost of about $15 for group meals and camping fees for weekend trip; participants provide own camping equipment and transportation and may choose to carpool**). (Limited to 25)

Day: Thursday **Time:** 6:30-8:30 p.m.
Dates: Apr. 21-May 19 (4 meetings plus 3 field trips--no class May 12)
Location: Minnesota Geological Survey, 2642 University Ave., St. Paul
Tuition: $165 (age 62, $148.50)
Instructor: Jim Miller, Senior Geologist, Minnesota Geological Survey, specializes in the billion-year-old geology of the Lake Superior region

Reprinted from *The Compleat Sch*
Continuing Education and Ex
University of Minnesot

Uniformitarianism: View that geological processes, laws and principles have not changed so that the present can be seen as they key to the past.

1994 Committee Chairpeople

Program/Lectures - Dick Uthe (784-0282)
Field Trips - Galen O'Connor (522-2538)
Membership - Fran Corcoran (724-2101)
Newsletter - Dwight Robinson (227-3394)
Public Service - Jan Mitchell (224-3242)
Exhibits - Jane Richardson (639-8184)
Public Info. - Susan McQuire (721-6849)
Social Activities - Don Swensrud (522-2538)
History, Archives &
Librarian - Jan Mitchell (224-3242)
Video Library - Doug Zbikowski (786-7316)

If any of these committees look interesting to you, contact the chair of interest to join in.

SHAKE UP At GSM!

Hang on to your hats and grab your seismometers. GSM is going catastrophic! The 1994-95 lecture series entitled "Catastrophic Geology" will feature those major events in days past which punctuate the history of our planet. These include major eruptions of volcanic "zits," earth shattering faulting, extraterrestrial impacts, continental collisions, the teeter totter of glacial ice and seawater, tsunamis and more.

Get ready for an earth-shattering series!

Look for more exciting new features in upcoming issues of your newsletter.

The purpose of this newsletter is to inform members and friends of the activities of the Geological Society of Minnesota. *NEWS* is published four times a year - Feb. 15, May 15, Aug. 15, Nov. 15. Deadline for article submission is the 1st day of the month of publication.

Judy Hamilton
1439 Sargent Avenue
St. Paul, MN 55105

First Class

Geological Survey of Minnesota
2642 University Ave.
St. Paul MN 55104

VARD

This seasons's color: Spring Green