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The President's Message

Dear Members,

I am honored to have been chosen as the Society's president and am very much looking forward to the next two years in office. I am grateful for all of Dave Gibson's work during his term as president and look forward to serving with him and the other directors, as well as the rest of the Council and our new Vice President, Tom Weddle. A big thanks to the University of Farmington for hosting the Fall, 2002 meeting and to Tom Weddle (MGS) for giving us a guided tour of the Quaternary geology of the area. Thank you as well to Ethan Brown and John Glowa (UMF students) for their presentation on the sediment budget of the Sandy River and to Peter Koons (UM) for the fascinating and enlightening keynote address on the world of geodynamics.

Increasing Communication: One of the Society's goals over the next few years will be to greatly increase the level of communication among our membership. Geology is such a diverse science that it is impossible for all of us to keep up with one another's work. One way that we thought we could achieve this is by having people submit a brief (or long - you choose) article to the Newsletter outlining the current state of the science in their given field, the questions that are being asked, new technologies/innovations used to address these, and a summary of the member's current work. We are looking for submittals from each of the three segments (academia, the consulting world and government agencies) for each Newsletter, and invite all to participate. I am happy to announce that the first round of articles in this series can be found within this Newsletter.

I hope that I can persuade all of you to submit. The articles need not be lengthy and can be limited to a particular subject if that is all that time permits. Subsequent submissions by the same authors are always welcome. At the very least, this will make us a more informed and educated membership. At the best, these exchanges will serve to stimulate future collaboration and/or inspire ideas for future projects.

All submissions should be sent to our Newsletter Editor, Dan Belknap (UM) at belknap@maine.edu. Looking forward to hearing from you all!

Spring Meeting: Joe Kelley and Dan Belknap have graciously offered to host the Spring Meeting this year at the University of Maine, in Orono. The

meeting will be held on **Friday, April 4, 2003** and Dr. Jennifer Shosa of Colby College will deliver our keynote address. A preliminary schedule of events can be found in this issue. ***Please bring your badges/name tags.*** We'll provide tags at the door for those who may have forgotten theirs or do not already own one.

As most of you know, the decision as to the hosting institute for these meetings has been a fairly casual affair. While this method has never failed us in the past, it has come to the Council's attention that what seemed like such a convenient and effortless procedure may have generated bad feelings for those individuals and/or institutes who were not chosen. So in response to this, the Society is revisiting our protocol on the ways in which host institutes are chosen. Our primary focus is to create a more formalized set of standards that will be known to all and ensure equality among all individuals and institutions when it comes to making this determination. Comments, suggestions or advice from the membership at large regarding this reformatting would be greatly appreciated. They can be directed to the Council at large, or individually to any one of the officers.

Summer Field Trip: As many of you already realize, the proposed joint spring meeting with NHGS and GSM was not possible this year due to scheduling conflicts. However, Woody Thompson has gone through great efforts to arrange a joint field trip between our two societies for this summer.

The trip is planned for **July 26th-27th** in the White Mountains Region. Tim Allen (Keen State College), Dyk Eusden (Bates) and Woody Thompson (MGS) have agreed to lead the trip and will guide us through the bedrock and surficial geology of the area. In addition, it may be possible to have a guided tour through the Mount Jasper Paleoinian site by someone from the New Hampshire Division of Historical Resources. Many thanks to Woody, Tim and Dyk. More details on times and logistics will be posted on the GSM website.

Short Course in October: As a follow up to Pat Seward's suggestion at the fall meeting, the Society has organized a Short Course on the Geology of Maine to be held this October. The venue for the course will likely be in Augusta, probably at the University of Maine at Augusta. The date of the

event is October 14, 2003 (Tuesday) and was chosen to coincide with Earth Science Week. It will be an all day event and organized in a similar fashion as previous courses. A preliminary schedule of topics and speakers can be found below (additional details will be posted on the web and included in future mailings). It is really shaping up to be a great course for professionals, teachers and the general public alike. Hope to see you all there.

Lisa Churchill-Dickson, paleo@zwi.net



Geological Society of Maine Spring Meeting

Friday, April 4, 2003, 1:00 PM
University of Maine
Orono, ME

Bryand Global Sciences Center
(Department of Geological Sciences and
Institute for Quaternary and Climate Studies)

Agenda:

- 1:00 - 3:00: Student poster sessions - 2nd floor atrium
- 3:00 - 4:30: Student oral presentations - BGSC 100
- 4:30 - 5:30: Business Meeting - Important!! and social hour - BGSC
- 5:30 - 6:30: DINNER - York Commons
- 7:00 - 8:00: Evening Speaker - Dr. Jennifer Shosa, Colby College:
A Hydrogeochemical Retrospective"

The Spring Meeting of the GSM will be held at the University of Maine, in Orono on Friday, April 4. Following our long-standing tradition, this meeting will involve student presentations and posters in the afternoon, and a key-note speaker in the evening. All advisors of undergraduate and graduate students should encourage their students to participate and present their work orally or by poster. Please submit your abstracts as soon as possible by e-mail to:

Daniel F. Belknap
Dept. Geological Sciences
University of Maine
Orono, ME 04469-5790
<belknap@maine.edu>

Abstracts will be compiled and handed out as a Program and Abstracts supplement to the newsletter at the meeting.

For those of you unfamiliar with the Bryand Global Sciences Center, the following are directions:

Driving north on I-95, take Exit 50, turn right (east) on Kelly Road. At T intersection with Main St. (Rt. 2), turn left (N), proceed 2 mi. through Orono, through first traffic lights, and over Stillwater River. At top of hill turn left at traffic lights onto College Avenue. Continue approx. 3/4 mi to N to first University of Maine entrance (large brown sign). Stop at Public Safety in white clapboard building on that corner for a visitors parking permit (you can get a campus map there if necessary). Go NE on Munson Road to the top of the hill and take the first road to the right (Sebago Road, at Merrill Hall). Take your next right, heading south on Grove Street Extension, past the greenhouses and parking lot. Bryand Global Sciences Center is the 3-story brick building with arched atrium windows, on the left (East). Park behind the building. Ask for parking passes at the main office on the first floor, 111 BGSC. Call 581-2152 if you get lost.

Heading South on I-95, take exit 51 onto Stillwater Avenue. Continue approximately 1 mile on Stillwater Avenue, cross the Stillwater River, and take a right at the light (McDonalds and Kentucky Fried Chicken) onto College Avenue. Proceed approximately 1 mile south on College Avenue past the first entrance (hockey arena), the steam plant and second entrance (Sebec Rd.) to the third entrance (Munson Road) on your left, at Public Safety. Continue as above.



The Editor's Message:

In this issue we begin a new section entitled **GSM Member Profiles**, following directly after the long-time column **GSM Member News**. This column is intended to provide a more in-depth look at projects and careers of GSM Members, and is just part of new President Lisa Churchill-Dickson's drive for better mutual awareness, communications, and support among our membership. In addition, as always, we intend to highlight recent developments in Maine geology. If you would like to contribute a submission or request a column from someone you know, or would like to know more about, please send your suggestions to Lisa or me.

Thanks,

Dan Belknap, Newsletter Editor (1998-present)
<belknap@maine.edu>

The Geology of Maine

Geological Society of Maine Short Course

October 14, 2003
Preliminary Schedule

Moderator – Walter Anderson (GSM)

I. The Paleozoic and Mesozoic

Overview – Bob Marvinney (MGS)

TALKS

- (1) The Coastal Magmatic Province – Dave Gibson (UMF)
- (2) Maine's Fossil Record – Lisa Churchill-Dickson (GSM)
- (3) The Odyssey of Maine's Bedrock – Doug Reusch (UMF)
- (4) Ordovician to Devonian Sedimentary Environments, Volcanism, Paleogeography and Tectonic Setting, northwestern 1/4 of Maine – Steve Pollock (USM)
- (5) The History of Metamorphism in Maine – Rachel Beane (Bowdoin)
- (6) Origin and Evolution of Maine's Mountains – Chris Gerbi (UM)

II. The Cenozoic (i.e., The Quaternary)

Overview – Tom Weddle (MGS)

TALKS

- (1) Overview of the Geomorphology of Maine – Joe Kelley (UM)
- (2) Coastal Geology – Steve Dickson (MGS)
- (3) History of Sea-Level Change in Maine – Dan Belknap (UM)
- (4) Glacial History of Maine – Julia Daly (UMF)
- (5) The Science of Geology as a basis for Modern Life...Or Don't Mess with Mother Nature – Liz Champeon (S.W. Cole)
- (6) Geoarchaeology: Investigating the Link Between People and Landscapes in Maine - Alice Kelley (UM)

GSM Web Site

www.gsmmaine.org

Webmaster, UMF < megan.macdonald@maine.edu >

GSM Newsletters online! We are pleased to announce that Megan has just completed posting all the GSM Newsletters (dating back to 1974) online. There are a few missing issues, so if any of you still have the originals in your collection somewhere, we would appreciate the opportunity to add them to the site.

Improving our Web presence: One of the Society's goals over the next year or so will be to greatly improve our web pages. Here are a few of the

areas we will be focusing on. As always, we appreciate members' comments and suggestions.

Calendar of Events: We are looking at creating a more comprehensive and up-to-date calendar of events for *ALL* geologically-related events that may be of interest to anyone in our membership. Therefore, we would ask that you send any information pertaining to upcoming meetings and conferences to the webmaster (please cc: Dave Gibson - dgibson@maine.edu) so they can be posted on the online calendar.

Basic Geology and Current Research/Projects: We would also like to add some more geological information to the web. Information pertaining to basic geological principles (e.g., geological time scale, plate tectonics, etc.), supplemented with brief synopses of Maine geology and member profiles that highlight specific work/research/projects, etc. currently being undertaken by some of our members.

Photographs: A very significant part of web page appeal is the graphics that go into them. Therefore, we would greatly appreciate any geological snapshots (especially of Maine geology) that you might share with us to be posted on the website. Photo credits will be listed for each picture used. They may be sent electronically or via snail-mail (to be scanned) to our webmaster (please cc: Dave Gibson - dgibson@maine.edu). Thank you all in advance!

As with any project, the finished product will not appear immediately. We are hopeful, however, that significant changes and improvements will occur on a monthly basis. Make sure to check in once in a while to see how things are progressing and let us know what you think.

The State Geologist's Message:

Budgets continue their free-fall

When I last wrote in June of 2002 about the budget situation, the speculation at the time was that the revenue shortfall would be a short-term one. In the past 6 months you have all heard how the shortfall has extended into the 2004-2005 budget cycle to the tune of \$1 billion! Again, I wonder who those revenue forecasters are and why their forecasts are consistently poor! Certainly most states are facing shortfalls and Maine's is small in comparison to some. Still, it will mean very difficult times for the Department of Conservation (DOC), which includes the Maine Geological Survey.

As part of the budget-balancing strategy, the Baldacci Administration has directed all departments in the next biennial budget to self-fund increases in salaries and benefits above the 2003 levels. At first blush this may seem fairly simple, but with scheduled

salary increases and soaring medical premiums, this comes to \$8 million for DOC, a whopping 15% of our budget! The MGS's part in this exercise comes to about \$170,000 each year. For perspective, the Department represents only 0.85% of the state budget. We're going to see just how much blood you can squeeze from a stone!

Because the DOC is so heavily weighted toward personnel, it is difficult to come up with this type of money without cuts in positions. You may have heard in the news that other departments will have few position cuts and this is because their budgets are not as heavily weighted toward personnel. If the Governor's budget proposal passes the Legislature, in DOC more than two-dozen positions will be cut from the Maine Forest Service causing a reduction in fire suppression activities, Parks would lose 8 positions and de-staff some parks, and the Land Use Regulation Commission would lose 7 positions and close regional offices.

MGS will lose one position and some operating funds. This may seem like a minor scrape but, taken in the context of the last decade, it is severe. Since 1990 the MGS will have lost 7 of 19 positions, or 37% of its staff! Obviously, we cannot be doing as much as we were before the cuts, but some improvements in technology have at least partially compensated for this. We all use personal computers now, and GIS has made our map production system more efficient so we can manage without some positions. Others have been difficult to get along without. Through this latest cut, we will reduce our rate of aquifer mapping, eliminate our ambient groundwater quality program, and reduce our Sebago Lake profiling program. Our contribution to the Atlantic Salmon Conservation Plan will be eliminated, our cooperative with U Maine squeezed, and other funds for mapping reduced.

However, we will continue to aggressively pursue other sources of funding and cooperatives in order to meet the mission of the agency. Outside funding has been a tremendous benefit to our agency and has increased three-fold in the past 5 years. Funding from the USGS, for example, has made it possible to maintain a rigorous bedrock and surficial mapping program. Funding through NOAA has added a 2-year Coastal Fellow to our program. Cooperatives with DEP augment our aquifer mapping and water use programs. Most of these will continue.

As always, I thank the members of the Geological Society of Maine for their continued support. Should the Maine Geological Survey face further cuts than those I outline here, I will call on each of you to express your concerns to your representatives.

Robert G. Marvinney, Maine State Geologist:

<Robert.G.Marvinney@state.me.us>

GSM MEMBER NEWS

Charlie Fitts (University of Southern Maine), had his textbook, "Groundwater Science", published in June by Academic Press. The book covers physical, chemical, and contamination aspects of hydrogeology. Check it out at <www.apnet.com/groundwater>. To celebrate the end of the book project, Charlie and Claire took their five boys in the minivan to Wyoming this summer for great geology, hiking, and fishing.

Chris Dorian writes that he is now performing High Intensity Soil Surveys, Wetland Determination and Delineation, Quaternary Geology mapping/investigations, Lake and Peatland Paleohydrology, Geoarchaeology, and Recreational Trail Design, Construction, and Permitting. He is a Maine Certified Soil Scientist and can be reached at: <cdorian@infi.net>.

Andy Tolman (Dept. of Human Services) is now the Treasurer of the National Association of State Boards of Geologists.

Dyke Eusden (Bates College) and **Woody Thompson** (Maine Geological Survey), along with **Tim Allen** (Keene State) and **Dick Boisvert** (New Hampshire State Archaeologist) are organizing the joint summer field trip for GSM and Geological Society of New Hampshire. The trip will be the last weekend of July in the Gorham-Berlin-Mount Washington area. Highlights include a trip to Jasper Cave, a site where Paleo-Indians tunneled back into a rhyolite vein.

Woody Thompson also reminds us that the **Northeastern Friends of the Pleistocene** trip will be held in Vermont May 23 - 25 (Memorial Day weekend).

Please send member news to:

Carolyn Lepage, Member News Correspondent
(1996-present) <clepagegeo@aol.com> or
PO Box 1195, Auburn, ME 04211-1195 or
Fax: (207)-777-1370 ; Phone: (207)-777-1049

GSM MEMBER PROFILES

Geology at S. W. Cole Engineering

S. W. Cole Engineering, Inc. is an experienced Maine-based Scientific Consultant and Geotechnical Engineering firm with a team of over 75 engineers, scientists, and technicians. We provide services on over 1700 projects each year, including Scientific and Environmental Consulting, Geotechnical Engineering, and Field and Laboratory Testing. We have four offices in Maine and one in New Hampshire. Our Corporate office is in Bangor, Maine.

Our company was established in 1979 in Bangor as a geotechnical engineering firm. Services expan-

ded to include construction materials testing, geology, hydrogeology, and related environmental services in 1980. Wetland and soil-science services were added in 1989.

We have seven geologists on staff. Our geologic services include soils and bedrock mapping, gravel resource investigations, geophysical investigations, water resource investigations, contaminant transport investigations, dredge spoil studies and hydrologic investigations. We have worked on many interesting geologic projects in Maine, including evaluations of proposed underground pipeline river crossings, investigations for proposed geothermal heating and cooling systems for schools and finite-difference modeling of the ground application of wastewater through liquid spray and snowmaking processes.

We have conducted many in-house research projects at our Bangor office to aid in our modeling and design of proposed projects. These projects have included constructing physical models of compacted till landfill liners and even a cranberry bog.

The parking lot and back yard of our Bangor office are currently instrumented with arrays of thermocouples and moisture sensors to investigate the effects of frost penetration beneath exposed asphalt, insulated asphalt, ground vegetation and snow cover. Data gathered during our study has been used in developing a frost penetration model and in our modeling of snow effluent melt.

Gary Creaser" <gcreaser@bangor.swcole.com>

Hillier & Associates, Inc.

Hillier & Associates, Inc. (HAI) received The 2001 Drinking Water Protection Business Honors by The Environmental Protection Agency (EPA) for its efforts in implementing erosion control Best Management Practices (BMPs) in the Maranacook Lake Watershed. James E. Hillier, C.G. of HAI accepted the award from the EPA and the New England Water Works Association at the 2002 EPA Annual Meeting in Portland, Maine. The Program recognizes those businesses that demonstrate current or future protection of drinking water supplies by promoting non-point source pollution prevention for drinking water, land preservation, conservation and protection, innovative agricultural operations, environmental education, pollution prevention by reducing or eliminating pollution at the source and the use of BMPs to reduce the risk of contamination to drinking water.

The project was located on and around Maranacook Lake, a tributary to Cobbosseecontee (Cobbossee) Lake, the secondary water supply for Augusta. Water quality in Cobbossee Lake is directly affected by that of water entering from Maranacook Lake and its sister water body Annabessacook Lake. The Kennebec Water District

(KWD) manages the use of water drawn from Cobbossee Lake for drinking, and the Cobbossee Watershed District (CWD) monitors the water quality and undertakes efforts to protect the lakes and watersheds in the Cobbossee surface water system.

During the winter of 1999, HAI met with Readfield's Selectmen, Code Enforcement Officer and CWD to identify new ways of protecting water quality in the Maranacook Lake north basin from the effects of non-point source pollution. HAI provided over 100 hours of voluntary assistance from 1999 to 2000, helping secure a matching grant from the EPA and the MDEP to complete the two-part project.

Part one of the project consisted of a watershed survey of Maranacook Lake North Basin. Part two was a demonstration of Best Management Practices (BMPs) applied at a gravel road identified as a significant source of silt that migrated to the lake.

Eroding ditch, before and after:



Local agencies including the CWD, Kennebec Soil and Water Conservation District (KCSWCD) and volunteers from the MDEP and MDOT participated in training volunteers to identify problem areas within the watershed. Local conservation groups, Youth Conservation Corps, the Friends of Maranacook and the Maranacook Lake Association, were trained to perform a watershed survey of non-point pollution sources in the north basin watershed and construct BMP improvements on the selected gravel road that leads to shore front properties.

Jim Hillier of HAI, a former Boy Scout Master in Readfield, founded the Youth Conservation Corps (YCC). He enrolled several Boy Scouts, their family

members, and others in the new organization. YCC members received training and worked with Engineer Rob Mohlar to help survey eroded roads and ditches, and to construct erosion control features in the demonstration project area.

Project Location, Sign Constructed by YCC.



Two of the Boy Scouts who participated in the Readfield YCC took leadership roles in the Demonstration Project construction, electing to perform Eagle Award Projects within this program.

One Eagle candidate led a group of YCC members in constructing an open box culvert and rubber razor water diversion structure. The other designed and built all the signs for the project including one large 4-foot by 8-foot project description sign (right), and five smaller signs identifying BMPs constructed in the road drainage system.

The newly established Readfield YCC intends to assist local property owners to construct erosion stabilization features in road drainage systems and eroding shorefronts in this and coming years.

HAI would like to thank all of those who volunteered their time and expertise to help protect the North Basin of Maranacook Lake and the drinking water of Maine.

James E. Hillier <jhillier@hillierinc.com>

**Peter Slovinsky,
NOAA Coastal Management Fellow
Maine Geological Survey**

In August of 2001, Peter Slovinsky joined the Maine Geological Survey (MGS) for a 2-year fellowship through the National Oceanic and Atmospheric Administration's Coastal Services Center (NOAA-CSC) Coastal Management Fellowship Program to work on a project entitled "Creating a Sustainable Beach Community at Camp Ellis, Maine". Camp Ellis is a small ocean-side community in Saco, Maine, that has seen some of the highest erosion rates in the State; this erosion

appears to be the result of the construction of jetties by the Army Corps of Engineers in 1869 to stabilize the entrance of the Saco River for ship traffic. Pete has been working on this project with his mentor, MGS Marine Geologist Stephen Dickson, Ph.D. Originally slated to examine erosion hazards within the town of Saco, Maine, the project has grown to encompass shoreline processes along all of Saco Bay. Erosion and accretion rates, in addition to other physical characteristics such as maximum profile elevations, slopes, volume changes, and dry beach widths, were determined in order to help develop a hazard mitigation plan for communities along Saco Bay. This work has resulted in the completion of a technical open file report, soon to be available as an MGS publication.

As part of Pete's work on Saco Bay, he developed a scoring system to determine sections of the shoreline that require beach management. The system utilizes physical characteristics of the shoreline and applies a ranked score (i.e., 1-4, with 1 being the best) for each characteristic, in order to determine an overall "management need" score, which is the normalized score. The system has also been adapted to indicate which sections of shoreline are in most need of different management techniques, such as beach nourishment and dune restoration. The scoring system is currently being applied to the Wells Embayment.

Since arriving, Pete has also been part of the Saco Bay Implementation Team – a partnership of State and Federal agencies, local City managers and stakeholders that is working with the United States Army Corps of Engineers to determine a method to alleviate erosion problems at Camp Ellis Beach. The Team is developing a mitigation plan under the authority of Section 111 of the Rivers and Harbors Act of 1898, which allows the expenditure of up to \$5 million to mitigate for erosion caused by the federal jetties. The Team is currently reviewing different structural modifications to the jetty.

As part of his Fellowship project, Pete has also been working on developing a policy for beach nourishment within the State of Maine. This work has evolved into more broad policies for Beach Erosion Management, which includes a specific Beach Nourishment Rule. Draft policies are currently under review for comment by other State agencies.

He is currently helping MGS construct a Nearshore Survey System (NSS), based on a personal watercraft platform. MGS received a grant from the Maine Marine Research Fund to purchase equipment for and to construct the system. The system will be outfitted with a high-precision depth sounder, in addition to a Real Time Kinematic Global Positioning System (RTK-GPS). The NSS will be used to monitor and quantify volumetric changes in the nearshore and surf zone along select Maine beach

systems, areas extremely difficult to currently collect data in.

In his free time, Pete helped start the Northern New England Chapter of the Surfrider Foundation, where he serves as Volunteer Coordinator. Pete and his wife Mindy currently live in South Portland.

Tom Weddle, Maine Geological Survey

Multiple Striation Sets in Farmington and Phillips, Maine

The fall meeting of the Geological Society of Maine included a field forum that included stops at interesting sites in the Farmington 7.5-minute quad, and an overview of field activities by Maine Geological Survey staff, and by students from UMaine Farmington (Ethan Brown and John Glowa, who will be presenting their work at the Annual Meeting of the Geological Society of America Northeastern Section:

http://gsa.confex.com/gsa/2003NE/finalprogram/abstract_51167.htm).

During the 2002 MGS STATEMAP program, two excellent sites with multiple striation sets derived from different ice-flow directions were recorded during field surficial geologic mapping of the Farmington 7.5-minute topographic quadrangle. The first site (the one visited by the GSM group) is in Farmington, on Granite Heights Road, about one mile northeast on Maple Avenue from its junction with Route 2. Granite Heights Road is on the left. There are several striated bedrock pavements about 0.1 miles after making the turn onto Granite Heights, on either side of the road where a cul-de-sac (Heritage Circle) joins the main road.

The group also focused its attention on striations, the exposed bedrock geology, and a post-glacial structure, a “pop-up,” displaying about an inch of vertical offset of striations by a fracture with an upward displacement of its northwest side. Similar features have been reported elsewhere in Farmington, and other places in Maine (Koons, 1989).

The multiple sets of striations at this locality are not found at any one, but rather on several different outcrops. The oldest and most deeply gouged set trends from 155–175° and is the dominant set with the largest grooves and directional indicators. A younger set that crosscuts the stronger set ranges in trend from 190–209°. Finally, a third wider-ranging set is present in a few places. It is faint and cuts both earlier sets with azimuth trends of 45–80° (225–260°). This set may actually be two separate sets, 45–65° (225–245°) and 70–80° (250–260°), as they are not found together on any one surface. At two sites striations are found with trends of 125° (305°) degrees at one location and 115° (295°) at another.

The second site is located in the town of Temple on Intervale Road, which parallels Temple Stream. It

can be found west on Route 43 out of West Farmington to Temple Village. Turn left onto Intervale Road, and about 0.75 mile to Mitchell Brook Road on your left. Continue over the bridge crossing Henry Mitchell Brook and 0.1 mile on left to the second house. This single-story building is built on a bedrock pavement that is strongly striated, showing three separate striation sets all with ice-flow direction indicators.

The striations on this outcrop include a strong set, the most robust and deeply eroded, with a trend range of 135–145° (the 135° trend appears younger by cross-cutting the 145° trend, and may be a later shift). A younger trend, 154–162°, cuts the strong earlier trend. Another younger faint set, trending 115–127°, is superimposed on the older 135–145° and the other younger 154–160° sets.

The striations at these two sites record changes in ice-flow direction. Their age relationships are determined by strength (robust, deeply gouged being strongest and hence most likely the oldest; faint, light scratching being younger), and by crosscutting or superposition relationships. At the first site in the Cascade Brook valley east of Farmington, the main phase of the Laurentide Ice Sheet is represented by the 155–175° striation trend. This trend is strong, and is common throughout much of southwestern Maine. The next younger set (190–209° trend) may reflect the initiation of deglaciation and the influence of local topography on the waning ice sheet as the ice was gutted out of the Androscoggin River and Kennebec River valleys by the glacial sea that flooded inland during deglaciation. The youngest striation set, the 45–80° (225–260°) trend, may be a response to the ice margin being drawn down locally when the sea was in the Farmington area in the Cascade Brook and Sandy River valleys. Glaciomarine deposits in the Sandy River valley are found as far north as Strong.

The second site in the Temple Brook valley west of Farmington can be interpreted with a sequence of ice-flow events similar to that found at Cascade Brook valley. The strong 135–145° trend may represent the onset of Laurentide ice advancing through the region, its flow trend controlled by local topography of the Temple Stream valley, which is 135–140°. The next younger set, 154–162°, is parallel to the trend of striations found at higher elevations and elsewhere in the quadrangle, and may represent the regional flow at the glacial maximum, similar to the 155–175° strong trend at the Cascade Brook site. However, here in the lowest part of Temple Stream valley that regional trend isn't the strongest striation set, possibly due to local topographic influence. The youngest set, 115–127°, like the youngest set in Cascade Brook valley, may be a response to draw-down of the ice when the margin was in Farmington in contact with the ocean during late stage deglaciation. The ice would have thinned considerably by late deglacial time, and tongues of ice

would have occupied the valleys where the ice flow would be controlled by local topography and the marine influence at the ice margin.

MGS contractor Kent Syverson and field assistant Rachel Greve, both from the University of Wisconsin – Eau Claire, mapped the surficial geology of the Phillips 7.5' quadrangle in 2002. Similar to the Farmington quadrangle, multiple striation sets recording the impact of surface topography on ice-flow direction during deglaciation were reported, and will be presented at the Annual Meeting of the Geological Society of America North Central Section (in press, but found at the GSA website http://gsa.confex.com/gsa/2003NC/finalprogram/abstract_49536.htm).

Although multiple striations have been reported from west-central Maine, the discernment of relative age and directional sequence to this degree has not been reported at other sites. Pictures of the striations and location maps of the Farmington quadrangle sites are found at the Maine Geological Survey August 2002 Site of the Month website (<http://www.state.me.us/doc/nrimc/mgs/sites-2002/aug02.htm>).

Koons, D., 1989, Postglacial bedrock faulting in Maine, in: W.A. Anderson and H.W. Borns, eds., Neotectonics of Maine, Studies in Seismicity, Crustal Warping, and Sea-Level Change: Maine Geological Survey Bulletin 40, Augusta, p. 149-155.

PROPOSED STATE MINERAL COLLECTING PARK AT NEWRY

An Invitation to Mineral Collectors, Science Teachers, and everyone interested in Maine's Natural History to help establish the

NEWRY MINERAL PARK

A new State property that will include several of Maine's most famous mineral localities, including the Dunton tourmaline mine, in a beautiful mountain setting!

The Oxford Hills in western Maine are known throughout the world as a prolific source of gems such as tourmaline, amethyst, and aquamarine, as well as many rare mineral species. Thousands of people come to Maine every year to search for these minerals in the rock piles left behind from earlier mining operations. Historic mining for feldspar and gem tourmaline in the town of Newry opened up several deposits rich in uncommon minerals. These mines are located on a scenic mountaintop that also offers great opportunities for hiking, geologic studies, and other outdoor recreation.

Many popular mineral collecting sites in Maine have been closed to the public in recent years due to

encroaching development and other factors. But the State of Maine now has the opportunity to acquire a 100-acre tract of land in Newry that encompasses the famous Dunton tourmaline mine and six other neighboring quarries.

The Maine Geological Survey (of the Department of Conservation) has launched a fundraising drive to purchase the Newry mines for a permanent park whose principal use would be for recreational mineral collecting. Partners in this effort include the Maine Mineral Symposium Association, the Federation of Maine Mineral and Gem Clubs, and the Threshold to Maine Resource Conservation and Development Commission.

All mineral hobbyists, earth science students, educators, and outdoor enthusiasts will benefit from the Newry Mineral Park. The Land for Maine's Future board has made a generous pledge toward the purchase price, but most of the funds to acquire the property must be raised from other sources. The Maine Geological Survey is committed to this effort, and we are asking mineral clubs and individuals to help by donating to the park acquisition fund.

Contributions are tax-deductible and will be acknowledged. Donations of \$100 or more will receive a special recognition certificate! Please copy and fill out the form below:

Enclosed is my donation in the following amount to help establish the Newry Mineral Park:

\$25 \$50 \$100
\$500 \$1000

Other amount: \$ _____

Name(s) _____

Address: _____

City: _____

State: _____ Zip: _____

Phone number / e-mail address: _____

Please make your check payable to "Newry Mineral Park" and send with this form to:

Newry Mineral Park
c/o Maine Geological Survey
22 State House Station
Augusta, ME 04333-0022

Visit the Maine Geological Survey's website for further developments and progress reports:

<<http://www.state.me.us/doc/nrimc/mgs/mgs.htm>>

New England Society for Microscopy

Steve Stokowski, President of Stone Products Consultants in Ashland, Massachusetts, has been elected Materials Director of the New England Society for Microscopy (NESM). NESM is a local affiliate of the Microscopy Society of America (MSA), a professional organization dedicated to the promotion and advancement of the science and practice of all microscopical imaging, analysis, and diffraction techniques.

Stokowski, who will serve a three-year term for the New England organization, said "NESM's biggest challenge is to bring all users of microscopes into the current NESM fold of biologists, medical researchers, and material scientists. We must encourage conservators, archeologists, and geologists to join and contribute to NESM so that all will benefit from the technology and techniques developed within each professional discipline," said the 27-year industry veteran.

Stokowski began his career in the basic materials industry shortly after graduating from George Washington University in Washington, DC. He worked at Martin Marietta Labs (Baltimore, MD), Genstar Stone Products Co. (White Marsh, MD), and Vulcan Materials Co. (Birmingham, AL), before starting Stone Products Consultants in 1985.

About Stone Products Consultants

Stone Products Consultants specializes in the in the technology of products produced from geologic materials. They provide petrographic (microscopic) examinations of concrete, building stone, brick, cast stone, mortar, tile, roofing slate, etc. They identify the reasons for deterioration, reverse-engineer building materials, and analyze rocks and minerals from existing or new sources to identify new product opportunities or potential problems.

SPC's facilities are located at 10 Clark St., Ste. A., Ashland, Mass., 01721. Telephone: (508) 881-6364. Fax: (508) 881-6364. Web site:

<http://www.members.aol.com/crushstone/petro.htm>

SECRETARY'S REPORT

The Geological Society of Maine Fall Meeting
Friday, November 8, 2002
University of Maine, Farmington

A departure from the past two years, this fall's meeting began as a field trip to Granite Heights Road in Farmington to view an outstanding bedrock pavement strewn with glacial striations with up to three preferred orientations.

Stop 2 was a visit to a gravel pit near the Pismo Bar in the Sandy River. The edge of the pit slumps

right into the Sandy River, activity from previous operations in the pit.

Stop 3 was cancelled because of snow. In its stead, Ethan Brown and John Glowa presented 'Sandy River Bar Project', a Power Point view of their work-in-progress with classmates Ryan Hersey and John Markham. Although assembled on very short notice, the presentation effectively showed, through aerial photography, the migration of several sandbars in the Sandy River. The study includes the Voter Bar, Avon; the Crandal Bar, Strong; the Tyler and Pismo Bars in Farmington; and the Pilsbury Bar in Farmington Falls. There is a long history of mining gravel bars in the Sandy River, and the study is far from over, but it is thought that much of the sand eroded from bluffs in the Sandy River moves laterally to build bars, rather than being transported farther downstream.

BUSINESS MEETING

David Gibson called the meeting to order at 4:19 p.m.

Dave stated that the social hour would be from 5:00, and dinner at 6:00 in the North Commons; and then the evening presentation with Peter Koons, would be back in the auditorium after that.

Bob Marvinney reviewed the status of the Maine Geological Survey with respect to the incoming administration and State budget problems. He may call on the geological community to support MGS programs, and Bob Marvinney as State Geologist. The last new position authorized for MGS was in 1989. Since then staff has decreased from 20 to 14.

Bob also presented the group placemat-size maps of a simplified bedrock geology of Maine.

Dan Belknap, again, solicited student news for the newsletter that is published three times a yet. Dan also informed us that the results of the University of Maine external 10-year review, emphasized forming partnerships with such entities as GSM and MGS.

Lisa Churchill-Dickson suggested that the Spring Meeting be held at Bates. Discussion about the potential joint meeting with the New Hampshire GS centered on a possible summer venue in northwestern Maine. Plans need to be made soon to make sure adequate accommodations are available.

Marita Bryant presented the new slate of officers:

President:	Lisa Churchill-Dickson
Vice President:	Tom Weddle
Secretary:	Pat Seaward
Treasurer:	Liz Champeon
Newsletter Editor:	Dan Belknap
Directors:	Dave Gibson
	Walter Anderson
	Joe Kelley

The vote of support was unanimous.

Tom Eastler reintroduced the topic of fees being charged to Certified Geologists. Bob Marvinney noted that the fees being paid are still very high compared to the services provided, and that the mass exodus that had been threatened did not materialize. Most folk who are certified need to keep their certification current to protect their livelihood. There may be an opportunity to reopen the discussion with the new administration to change the formula through rule making. Bob Marvinney, Rob Peale, Dan Locke, and Tom Eastler volunteered to pursue this, perhaps to encourage other small boards (e.g., foresters, soil scientists, surveyors) to work together toward a more equitable solution.

Dan Belknap commented on the fact that the GSM budget is shrinking because dues alone do nothing to build the treasury. The workshops and short courses GSM has sponsored in the past have done the most good in this regard. We concluded that we each should think of a topic to bring to spring meeting for discussion; and determine who our audience is to be.

The meeting was adjourned at 4:52.

Respectfully submitted,
Patricia O. Seaward, Secretary (1999 – Present)
<Patricia.O.Seaward@maine.gov>

Evening Program

Peter O. Koons talk: "Exposing Mountains: Geodynamics in Maine"

(I offer sincere apologies to Peter Koons for my inability to summarize his presentation from my notes. Too much time had elapsed between the taking of the notes and my attempts to decipher them. Dr. Koons was kind enough to forward me the following abstracts that pertain to his presentation. These include the references for those wishing to study the topic further. Dr. Koons' email address is: <peter.koons@maine.edu> if you have questions.)

Koons, P.O., R.J. Norris, D.Craw, A.F. Cooper, 2002, Influence of exhumation on the structural evolution of transpressional plate boundaries; An example from the Southern Alps, New Zealand. GEOLOGY, In Press Abstract

Concentration of erosional activity along transpressional plate boundaries can significantly alter the pattern of mechanical behavior through the influence of exhumation on crustal strength. Three-dimensional numerical modeling of an obliquely convergent orogen shows that a single oblique plate bounding structure is stable if asymmetric erosion

patterns, such as those observed in orographic mountain belts, pertain, and if the earth's crust has a strong on weak rheology. In early stages of oblique convergence of an initially laterally homogeneous material, lateral (boundary-parallel) strain is accommodated along a near vertical-structure and convergent (boundary-normal) strain is concentrated on structures dipping at moderate angles into the orogen. Exhumation of deep crustal material along the convergent structure results in thermal weakening along this dipping structure. When the upper crust beneath the orogen is significantly weakened by exhumation, lateral strain abandons the vertical structure and shifts to the dipping structure, combining with the convergent strain to form a single oblique fault that accommodates the plate motion in the upper crust as is the case along the Alpine fault, New Zealand. The process of thermal thinning is controlled by advection and occurs on time frames of ~ 1 to 2Ma. The two components of strain remain separate in the lower crust. During active convergence, exhumation of lower crustal material occurs only along those structures accommodating convergent strain. Consequently, material exhumed from lower regions of ductile deformation, as is the case along the Alpine fault, contains lineations that indicate a greater component of convergence than predicted from the total plate motion. Post-orogenic exhumation of the roots of an oblique plate boundary will expose two, parallel shear zones, one dominantly convergent and one dominantly strike slip. Widely reported orogen parallel transport in the late stages of ancient oblique convergence may represent not a change in plate vector, but the exhumation of the lateral transport zone.

Koons, P.O., P.K. Zeitler, C.P. Chamberlain, D.Craw, A.S.Melzer, 2002, Mechanical Links Between Erosion and Metamorphism in Nanga Parbat, Pakistan Himalaya: American Journal of Science, v. 302, p. 749-773

ABSTRACT: The mechanics and petrological signature of a collisional mountain belt can be significantly influenced by topographic and erosional effects at the scale of large river gorges. The geomorphic influence on crustal scale processes arises from the effects of both stress localization due to existing topography, and also erosional removal of advected crustal mass. The shear stress concentration and normal stress amplification due to topographic gradients and loads divert strain away from existing topographic loads, while concentrating strain into topographic gaps. Efficient erosional removal of material within topographic gaps with widths of at least the thickness of the brittle crustal layer results in differential advection of crustal material. Concentrated exhumation within a gap leads to thermal thinning of the upper brittle layer of the crust, removing the highest strength part of the continental

dates from the Victorian age, and has become deeply embedded in our psyches – both at a cultural and (I regret to say) at a professional level as well. These early discoveries did play an important role in establishing paleontology as a science. Their very existence provided the only evidence of past life. However, as with all other aspects of geology, the emphasis of the modern science differs markedly from that of the 19th century.

Fossils as data points

It is true that paleontology is necessarily specimen-based – without fossils we have no data. However, the distinction to be made here is that *fossils are the raw data; they cannot, by themselves, provide the answers*. While discoveries of new species and the recoveries of the “smallest”, “biggest”, “oldest”, and “rarest” specimens are undeniably exciting they can do nothing to advance the science if they are treated in isolation.

Detangling the web of life

Just as physicists are interested in determining underlying laws that dictate the behavior of natural phenomena, so are paleontologists. Despite the fact that the number and types of life forms have varied considerably throughout time, there are still certain basic truths that dictate how life can exist. Furthermore, seemingly unrelated groups of organisms can be standardized in such a way that allows for quantitative comparisons to be made. In doing so, paleontologists look for trends that occur across groups in an effort to pinpoint the common denominator(s) responsible for generating the given pattern.

For the last 60 plus years, even before the publication of Simpson’s seminal work (Simpson 1944), paleontologists have been interested in large-scale phenomena. Nonetheless, it was the work of Sepkoski, Raup, Valentine and others in the 1970s and 80s that paved the way for serious quantitative analyses of these patterns and trends. A familiar example of such is Sepkoski’s diversity curve for the Phanerozoic (Sepkoski 1981; 1997). This curve was compiled by noting the first and last occurrence of 2800 families from the Cambrian through present day (see Figure 1). Although new data and revisions are constantly being added, its overall shape has remained robust even in the face of these additions and corrections (Sepkoski 1997; Adrain and Westrop 1997).

The generation of this curve has made diversity through time one of the most intensely studied subjects in paleontology today. Particular attention has been paid to the identification of mass extinctions, radiations and the waxing and waning of particular groups through time. In addition, these studies have also inspired - or been inspired by - other research, of which a *very* brief sampling follows

(see Briggs and Crowther 2001 for a detailed overview):

- (1) guild-level analyses of niche occupation through time (e.g., Bambach 1985)
- (2) the concept of tiering and the phenomenon of finer niche partitioning through time (e.g., Ausich and Bottjer 1982; Droser and Bottjer 1989)
- (3) acquisition of new traits and the associated escalation of predator and prey interactions - the “arms race” (e.g., Vermeij 1977; Steneck 1983)
- (4) analyses of traits that determine survivorship during times of mass and background extinctions (e.g., Jablonski 1986; Raup and Jablonski 1993)
- (5) role of environmental perturbations (climate change, tectonics, impacts, etc.) in fueling radiations (e.g., Miller and Mao 1995), or inducing extinctions (e.g., Erwin 1993; Hallam and Wignall 1997)
- (6) resiliency of communities to environmental changes and recovery times after various events (e.g., Hart 1996; Erwin 2001; Kirchner 2002)
- (7) standardization of diversity metrics and correction of sampling and preservational biases within the fossil record (e.g., Raup 1976; Peters and Foote 2001, 2002)

Applications to present-day ecological, environmental and evolutionary studies

The players may change, but the rules governing them remain unchanged at some scale. In fact, there are significant lessons from the fossil record that can be applied to the discipline of conservation biology – specifically diversity-dependent phenomena. What traits make an organism or community particularly vulnerable or resilient to extinction? How much can the environment be changed before large-scale changes to the biota are made? What is the recovery time from different levels of perturbation? Will those recoveries be elastic (returning to the status quo), or brittle? How does competition work among native and invasive species? Who is more likely to succeed? Does a cosmopolitan fauna carry inherent adaptive disadvantages? Is diversity an adequate measure of the health of an ecosystem? These are the sorts of questions that paleontology has addressed in the past and continues to do so today.

What paleontology is

Paleontology is the science of life, not of fossils. It is concerned with life as a whole: how it evolved; what it looked like at the individual, community, ecological and evolutionary scales; how organisms interacted with each other and their environment; how that environment was modified by these organisms; and, lastly, what lessons from the past can be applied

to the present to better understand the current and future state of life on this planet and others. That is what paleontology is.

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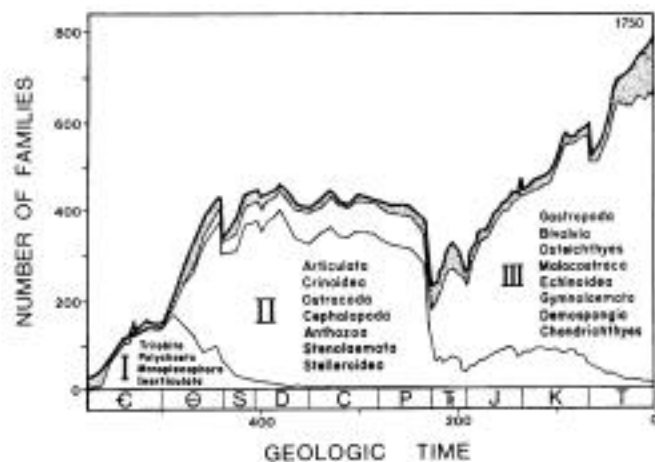
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Figure 1: The Sepkoski diversity curve highlighting the three Evolutionary Faunas (from Sepkoski 1981). The Cambrian Fauna (I) is dominated by trilobites, polychaetes, monoplacophorans and inarticulate brachiopods. This fauna is replaced by the Paleozoic Fauna (II) which is dominated by articulated brachiopods, crinoids, ostracodes, cephalopods, corals, stenolaemate bryozoans and starfish/brittle stars. The Modern Fauna (III) supercedes that and is dominated by snails, clams, bony fish, shrimps/crabs, echinoids, gymnolaemate bryozoans, sponges and cartilaginous fish.



MEMBERSHIP DUES STATEMENT

The GEOLOGICAL SOCIETY OF MAINE, INC. is a non-profit corporation established as an educational Society to advance the professional improvement of its members; to inform its members and others of current and planned geological programs in Maine; to encourage continuing social contact and dialog among geologists working in Maine; and to further public awareness and understanding of the geology of the State of Maine; and of the modern geological processes which affect the Maine landscape and the human environment.

The Society holds three meetings each year, in the late fall (Annual Meeting), early spring, and mid-summer (usually field trips). A newsletter, *The Maine Geologist*, is published for all members three times a year. The Society year runs from August 1 to July 31. Annual dues and gift or fund contributions to the Society are tax deductible. There are three classes of memberships:

- \$7.00 REGULAR MEMBER Graduate geologists, or equivalent, with one year of practice in geology, or with an advanced degree.
- \$6.00 ASSOCIATE MEMBER Any person or organization desirous of association with the Society.
- \$4.00 STUDENT MEMBER Persons currently enrolled as college students.

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(please write gift or fund on check)				
TOTAL ENCLOSED		\$ _____	_____	

(Geological Society of Maine funds include the Walter Anderson Fund, the Education Fund, and discretionary gifts as noted by contributor)

2003/2004 SOCIETY YEAR BEGINS AUGUST 1 - PLEASE SEND DUES TO TREASURER

THE GEOLOGICAL SOCIETY OF MAINE
c/o Daniel F. Belknap, Newsletter Editor
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