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THE PRESIDENT'S MESSAGE

The annual Spring Meeting of the Geological Society of Maine was hosted by the University of Maine at Farmington. I wish to thank Julia Daly, Dave Gibson and all of those at the University of Maine at Farmington for hosting the meeting. The student poster presentations and student speakers were excellent. Congratulations to the recipients of the Walter A. Anderson Wards: Newt Krumdieck from Colby College for his poster, *The Origins of the Norridgewock Sand Plain, Somerset County*, Central Maine, and to Marie Jenness of Bates College for her oral presentation, *Structural Controls of an Eruptive Fissure on the Revkjanes Peninsula, Southwest Iceland*. Overall, I believe the student posters and presentations as a group were among the best we have seen at a Spring Meeting. Congratulations to the award recipients, and thanks to the other presenters for a job well done.

Our evening speaker, Dyk Eusden from Bates College, provided a lively presentation on *A New Bedrock Geologic Map of the Presidential Range, New Hampshire*. The mapping was aided by numerous students and resulted in a new (revised) geological map of the area. This mapping adds detail to the previous work in the area by M. P. Billings. We are told that the map and supporting materials will be released as a two poster set later this year by the New Hampshire Geological Survey. The preprint copies are designed to be informative to both the geologist and the lay-person. Dyk encouraged audience participation by having members in the audience pose a number of geological questions during the talk, with preprint copies of the map awarded as prizes for the correct answers.

The 2007 GSM Summer Meeting and Field Trip will be at the Poland Mining camps (Mt. Apatite) on Saturday, July 28, with a trip to Mt Mica scheduled for Sunday July 29. Details for the trip are provided elsewhere in this newsletter.

With the Passing of Dee Caldwell and Jack Rand, the October 19, 2007 Fall Meeting of the Geological Society of Maine will be dedicated to their memory. We will provide more details regarding the fall meeting in the next newsletter.

Cliff Lippitt, President (2006-2008)
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THE STATE GEOLOGIST'S MESSAGE

Testing coastal regulations: the Patriot's Day Storm

It is perhaps fitting that our friend and colleague, Barry Timson, passed away as the State stared into the teeth of the fiercest Nor'easter in decades, the Patriot's Day storm of 2007. As many of you know, Mayor Timson of Hallowell was the first marine geologist hired by the Maine Geological Survey in the late 1960s. During his tenure at MGS he mapped and compiled the coast-wide map series, *Coastal Marine Geologic Environments*, a Herculean effort done with a few assistants over several years. These maps are still valuable today in discussions of sensitive habitats and for assessing the potential impacts of oil spills.

After leaving MGS in the mid-1970s, Barry opened his successful consulting business, which focused on work for clients with projects in Maine's coastal sand dune system. The gentlemen's arm-wrestle between Barry and his successors at the MGS ensured that our marine program adhered to the highest standards for quality and integrity of work!

Most recently, my interaction with Mayor Timson was through a multi-year process to review and revise the regulations that govern development in the dune system. Maine's ground-breaking regulations were first put in place in the early 1980s by the Legislature in response to the devastating winter storms of 1978. While not universally appreciated, these regulations play an important role in acknowledging the natural geologic processes of the beach system when evaluating development proposals. There have been efforts from the beginning to undermine the effectiveness of these regulations, but none as intense as during the late 1990s-early 2000s, instigated in part by changes in how the federal government views takings of private property.

In the summer of 2004, a stakeholder group convened by the Legislature, including MGS staff, Timson, and others involved in coastal issues began a nearly two-year process of regulation review and revision. It was a painful process at times, but through it we preserved many important elements of the regulations: sea-level rise is explicitly recognized and construction/reconstruction must be elevated on posts; construction/reconstruction projects must be moved back from the sea as far as practicable on the lot; and seawalls may not be enlarged. Perhaps the most important element, though, is that which prohibits

reconstruction of buildings damaged more than 50% by a coastal storm, if that building falls within an area likely to be affected by erosion over the next 100 years. For scientists, it is hard to imagine how the two homes that were destroyed in the April storm at Camp Ellis would not be within this erosion hazard area. We face an intense period over the next several months as Maine's sand dune regulations play out in the storm recovery arena, and we see who, ultimately, wins the arm wrestle.

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Geological Society of Maine
2007 Summer Meeting Agenda
July 28-29, 2007

The annual GSM summer field trip and meeting will be held at Poland Mining Camps, with field trips to Mt Apatite on Saturday (July 28) and Mt. Mica on Sunday (July 29). As described below, mineral collecting will be at Mt Apatite only. The field trip size will be limited to 30-35 due to parking restrictions at the Mt Apatite quarries **(Please no young children, due to safety concerns)**. We may be able to increase the group size to 40 if vans cans be made available to minimize the number of vehicles. (Participants with vans or sponsors to rent vans are encouraged to contact Cliff Lippitt.) ***Due to limitations on the size of the group please RSVP to Cliff Lippitt, if you plan to attend.*** Poland Mining Camps is at the end of Grove's Lane directly across from the Poland Regional High School on Route 26 in Poland. Directions are available through the Poland Mining Camps <www.polandminingcamps.com>, see also the link at the GSM web site. The current agenda is:

Saturday – July 28, 2007

8:00 am – Meet at the main hall of the Poland Mining Camps. Sign quarry liability release forms and review mineral collections from past mining seasons on display in main hall (to see what is out there if you are lucky!). If Mary Groves is available, she will be more than happy to explain the history and operations of the mining camps and what it has to offer for the rock and mineral collector.

9:00 am – Car pool and form a caravan. Drive to Mt. Apatite quarries on west side of Hatch Road in Auburn.

9:15 am – Brief tour of the quarries (there are several in a row, all within walking distance of each other); then the group can break up for collecting. If Poland Mining Camps is conducting drilling and blasting activities in one of the quarries on the day of the field trip, we will have to work closely with the blaster to assure safety of all participants.
The best tools for collecting are a rock hammer, a spade, and something to sift with. Each collector should bring gloves and appropriate footwear. *(Remember: pegmatite rocks are sharp and unforgiving!)* The lucky collectors are those who will be willing to dig. The quarry dumps (of which there are many) are fair game for the collectors.

- **THE EXPOSED ROCK IN THE QUARRY SIDEWALLS IS OFF-LIMITS TO COLLECTING!**
- **BRING A BAG LUNCH, PLENTY OF WATER, AND SOME BUG SPRAY!**

3:00 – 4:00 pm - Leave the quarries. Please note: everyone will have to leave by 4 pm.

4:00 – 5:30 pm – Clean up, review minerals at mining camps, etc.

5:30 – 7:00 pm – Dinner at Poland Mining Camps

LODGING IS ON YOUR OWN – IN ADDITION TO THE POLAND MINING CAMPS THERE ARE NUMEROUS MOTELS AND CAMPGROUNDS IN THE AREA

Sunday – July 29, 2007

10:00 am – Meet at Poland Mining Camps; form a caravan.

10:30 am - Mount Mica quarry tour by Gary Freeman (owner) will be **FOR INFORMATION PURPOSES ONLY… ABSOLUTELY NO COLLECTING!** [Please note: Due to Mr. Freeman's travel schedule there is a possibility that he may have to cancel the field trip at short notice. We have alternative sites to visit should this happen.]
Mount Mica in Paris, ME is one of the state's oldest and most famous pegmatite quarries with world class mineral specimens recovered every year. We are fortunate that the Freeman's are willing to show us their operation. The Freeman's maintain an excellent website that documents their mining operations and mineral discoveries <www.coromotominerals.com>. Creaser Jewelers on Main Street in South Paris is the exclusive dealer of tourmaline gemstones recently recovered at Mount Mica, and the field trip group is encouraged to stop there on the way back from the quarry.

1:00 pm – Field Trip ends.

Cliff Lippitt, President (2006-2008)
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GSM SECRETARY'S REPORT

Spring Meeting, April 13, 2007
Dept. of Natural Sciences, UMAINE – Farmington

The GSM spring meeting, following tradition, was devoted to student research presentations. The meeting program began at 2 pm with student poster presentations, which were followed by student talks, a brief business meeting, a social hour, dinner, and an evening speaker, Dr. Dykstra Eusden, of Bates College. The meeting adjourned at 8:30 p.m.

Abstracts of the student poster presentations and talks are included in this newsletter. Winners of the Walter A. Anderson Award, recognizing outstanding student presentations at the 2007 spring meeting, were Newton Krumdieck of Colby College for his poster presentation titled "The Origins of the Norridgewock Sand Plain, Somerset County, Central, Maine"; and Maria H. Jenness for her talk titled "Structural Controls of an Eruptive Fissure on the Revkjanes Peninsula, Southwest Iceland". Congratulations to these two students for their outstanding presentations.

GSM President Cliff Lippitt opened the business meeting with warm thanks to Julia Daly and the Natural Sciences Department at University of Maine Farmington for organizing and providing the meeting place; and to the speakers and poster presenters for sharing their research.

Announcements:

- Summer Field Trip to the quarries at Mt. Apatite, to be held on July 28th, and led by Gary Bucklin of S. W. Cole. The number of attendees will be limited to 30 to 40 due to parking at the quarries.
- GSM is planning to establish a Jack Rand and Dee Caldwell Memorial Fund to honor the contributions of these two founding GSM members to the geology of Maine and to the geologic community. Both passed away within the last few months. GSM has already received a contribution towards the fund, and more are welcome. The fund is intended to support student research through small grants to help with field work, travel and other research-related expenses.
- The fall GSM meeting at Poland Spring will be dedicated to Jack Rand and Dee Caldwell.
- A donation of $100 was made by GSM to support the Waterville High School Science Olympiad team. The team is raising money to represent Maine at the National Science Olympiad Meet in Kansas this May. GSM member Robert Johnson coaches the team.
- The 2008 GSM Spring Meeting will be hosted by Bowdoin College. According to the established rotation, the 2009 spring meeting will be at Colby, and the 2010 spring meeting will be at the University of Maine at Orono.
- Treasurer Rob Peale was not present. The traditional appeal from members to keep up with their dues was made for him by Cliff Lippitt.

The business meeting adjourned to the social hour and dinner at the dining hall.

The evening's speaker, Dr. Dykstra Eusden of Bates College unveiled "A New Bedrock Geologic Map of the Presidential Range, New Hampshire" as the topic for his evening talk. The Presidential Range is part of the Central Maine Terrane, a belt of Silurian and Devonian metasediments that were complexly folded and metamorphosed during the Acadian orogeny. Metasedimentary formations identified on the map, from oldest to youngest, include the Rangely, Perry Mountain, Smalls Falls, Madrid and Littleton Formations.

According to Dyk, one of the most significant contributions of this mapping effort has been the delineation of members of the Littleton Formation based on percentages of schist and quartzite. The lithologies and structures suggest a west-dipping subduction system against the Bronson Hill Anticlinorium that bounds the Central Maine terrane to the northwest. The tectonic history that compressed the sedimentary units into their present map configuration included several phases of folding and one of thrust faulting.

Dyk credited 31 of his students at Bates College who have participated in the mapping and interpretation of the stratigraphic and tectonic history of the Presidential Range over a number of years. Several of these students have gone on in geology-related careers. Dyk also credited earlier work of Marland and Kay Billings and others who worked in this area and laid the groundwork for the new map.

Several preprints of the map were awarded during the talk to participants who correctly answered geologic questions from "plants" in the audience.

For those of us who failed to win a preprint, the map should be available for purchase through the NH Geological Survey later this year.

Abstracts GSM Spring Meeting UMAINE-Farmington, April 2007

ANALYSIS OF BLUE COLOR IN QUARTZ GRAINS FROM CUSHING FORMATION, PEAKS ISLAND, MAINE

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The anomalous blue color of quartz grains found in the Cushing Formation, Peaks Island, Maine, is attributed to inclusions of varying composition, and to crystal plastic deformation. The Cushing Formation is felsic to intermediate in composition and, as exposed in the northeast portion of Peaks Island, includes deformed volcanic pyroclasts. In hand specimen, blue quartz grains are 1 to 2 mm in diameter and appear milky blue.

Five grains were picked from the rock, embedded in epoxy, and polished for analysis with the petrographic microscope and scanning electron microscope (SEM). Under plane polarized light, quartz grains are clear with visible inclusions, most commonly from 3 to 50µm. SEM-EDS analysis, performed on four of the grains, showed that the majority of inclusions are biotite and muscovite, with minor albite, labradorite, and titanite. Two grains are plagioclase feldspar surrounded by a thin layer of quartz, indistinguishable in hand specimen from the fully quartz grains.

Using the SEM-EBSD, maps of grain misorientations and grain boundaries were made on these two fully quartz grains. The misorientation maps show 20 and 35 degrees of variation in the crystal lattice orientation from the center to the edge of the two grains. Grain boundary maps show the presence of Dauphine twins, and sub-grain (2-5 degree) boundaries indicative of post-crystallization deformation.

Blue quartz is found globally, but the source for its blue color is most commonly credited to inclusions of rutile, ilmenite, and tourmaline – inclusions not found in the grains from Peaks Island. Instead, the blue color of the quartz grains on Peaks Island is due to mica, plagioclase, or titanite inclusions; the effect of later deformation; or the combined influence of inclusions with deformation.

LATE PLEISTOCENE CLAYS, AVON, MAINE: GLACIOMARINE OR GLACIOLACUSTRINE?

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A small exposure of grey-brown silty clay can be found at the bottom of a shallow abandoned meander of the Sandy River in Avon, Maine. This clay is not shown on the 1:24000 surficial geologic map of the Phillips Quadrangle where the exposure is located. The oldest sediment found on the surface in this quadrangle is considered Late Pleistocene coarse glaciofluvial or glaciolacustrine sediment (Syverson and Greve, 2003). Two potential interpretations for the origin of the clay are: 1) glaciolacustrine, likely from ice damming, or 2) glaciomarine from a shallow estuary environment, a finger of the post-glacial De Geer Sea.

This investigation compares samples from several representative deposits: a glaciomarine sample from an exposure of Presumpscot Formation in Norridgewock, a modern marine sample from mudflats in Wiscasset (as a reference for identifying foraminifera, or forams), and a sample from Avon as the unknown. Samples are analyzed for the presence of forams, and the Avon sample is also given a basic

grain and stratigraphic examination. Each sample will later be analyzed for salinity via XRF analysis of major salt water ions.

The Avon clay is found to have no presence of forams. The sample has fine bedding that appears to be varves. This would lean towards the glacial lake hypothesis, and further sample and field analysis will provide more concrete evidence.

INTRA- AND INTERSPECIFIC VARIATION IN STOMATAL PROXIES FOR *QUERCUS* AND *NYSSA* IN THE SUBTROPICAL SOUTHEASTERN USA

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Since the industrial revolution, Earth has experienced a warming climate linked to rising concentrations of atmospheric gases. Observations from the Mauna Loa Observatory over the past 55 years show that pCO2 has risen ~60 ppm. It is thought that a 1% pCO2 increase will result in a warming between 1-4.5C, with serious global implications. It is uncertain whether the observed pCO2 rise is a direct result of anthropogenic activity or natural variability. Evaluating recent and deep past pCO2 records will help to resolve these uncertainties. Stomatal density (SD) and stomatal index (SI) are used as proxies for past atmospheric concentrations of CO2 based on empirical and laboratory data. Both have been used to reconstruct Holocene pCO2 trends and shifts in the deep past. Previous studies evaluated the response of one taxon over time, while others used the nearest living relative (NLR) or nearest living equivalent (NLE) taxon to calibrate stomatal features. The present study identifies SD and SI variations between two genera and species of commonly fossilized taxa, the leaves of which were collected under a known pCO2.

Sun leaves of 12 species of Quercus and 3 species of Nyssa were collected in the Auburn University Arboretum in the 1991 growing season (pCO2 = 357 ppm). SD and SI were calculated for each taxon based on counts of a 0.8 mm2 area, extrapolated to the 1 mm2 standard. Confidence intervals (95%) were calculated for sample means and results compared with published values of Quercus evaluated in the same year. SD and SI varied significantly between taxa at both the specific and generic levels, with greater variation found in SD than in SI. Results for Nyssa were lower than published and empirical values for Quercus, while data for Quercus species ranged from below to above minima and maxima reported in the literature. Several taxa plotted outside the range of sun-and-shade leaf limits for Q. petraea.

The present study confirms the conclusion that SI displays more consistent relationships within and between genera than SD, but variation amongst species of the same genus grown in the same locality under the same climatic conditions is greater than expected. This observation casts serious doubt on the validity of using stomatal characteristics of NLRs or NLEs in the reconstruction of past atmospheric CO2 levels.

LATE HOLOCENE VS. MODERN ENVIRONMENTS OF CENTRAL MAINE: COMPARISON OF POLLEN, PLANT MACROFOSSIL AND COLEOPTERAN ASSEMBLAGES WITH THE HISTORICAL RECORD

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Precise natures of pre-Colonial habitats in North America are important in defining what is environmentally natural. This reports initial results of such a study in central Maine. The Sandy River cutbank study site in Starks, Maine, was sampled for pollen, plant macrofossils, and coleopteran remains. Modern river sediment samples were taken for comparable organic remains. Historical records yielded reliable data for this area from the mid-18th century, predating significant European impacts. Pollen from the sediments is dominated by Tsuga and Betula, with minor Abies and Pinus. Modern river sediment samples show a shift to Betula dominance with decreased Tsuga, Abies and Pinus; Ambrosia, Alnus, Tilia, Thuja, Asteraceae and Poaceae all increase. The plant macrofossil record was dominated by graminoid stems and blades; suggesting the depositional site was an herbaceous marshland devoid of regular flooding. Plant macrofossils from this section add Panicum latifolium type, Carex spp., Scirpus spp., Najas flexilis, Potamogeton spp., Rubus spp., and Sambucus canadensis to the late Holocene flora. The modern river detritus sample, however, was dominated by woody debris, including leaves and seeds of the introduced Acer saccharinum, needles of Abies balsamea, Pinus strobus, Thuja occidentalis and Tsuga canadensis, and macrofossils of Betula populifolia, Quercus rubra, Carex, Scirpus, Najas flexilis and Poaceae. Coleopteran remains were sparse in both the Holocene and modern specimens, but were dominated by remains of Elmidae, Staphylinidae and Carabidae. The Holocene fauna was typified by a greater diversity in Elmids; Carabidae include Bembidion frontale, a species of wet organic substrates, and Agonum extensicolle, of more open sand or gravel; Sphaeroderus lecontei is a forest species. Bembidion castor and Schizogenius sulcifrons in modern detritus are characteristic of open sand and gravel substrates; Xanthania decemnotata feeds on Quercus. Historical records suggest pre-European uplands were pine-dominated, but lowlands by hemlock and cedar, consistent with this study. Macrofossil changes may reflect changes in depositional environment, but are consistent with a shift towards more hardwoods in the post-Colonial forest.

CHAOTIC STRATA NEAR PERIPHERY OF THE RUMFORD DOMAIN, NEW VINEYARD, MAINE

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During an effort to document paleocurrent features within the Day Mountain Formation, a zone of chaotic strata was discovered 2 miles SW of New Vineyard, Maine. The zone occurs within a large 100 m x 80 m exposure (19T 409563, UTM 4958563). The strata are dominantly medium to thickly bedded turbidites, with sharp bases, locally cross-laminated, and containing rare shale rip-up clasts. Bedding surfaces typically display flame and load structures. Beds in the chaotic zone are buckled, boudinaged, and show internal convolutions. Despite excellent exposure, beds can not be followed more than ten or so meters; they merge into chaotic shale-rich zones that contain discrete sandstone blocks. Locally, sub-angular sandstone olistoliths up to 25 cm in diameter are completely enclosed within a shale matrix. Three major relatively open synclines have highly variable

orientations, facing north, northeast, and west. At least one of three large synclines is transected by the NNE-striking cleavage. The presence of a small syncline truncated by a sedimentary contact and the presence of non-cylindrical fold patterns point to a soft sediment slump origin. A 5 cm-thick rubbly-textured sandstone bed, which occurs between coherent graded beds, suggests this disruption was caused by either sliding or the passage of fluid through the permeable sand. The chaotic zone overlies black, sulfide-rich shale (Temple Stream Formation), which raises the possibility of a methane trigger for the slump. Elsewhere around the perimeter of the Rumford domain, an occurrence in Farmington of 10 to 20-cm sandstone blocks within shale as well as several large map-scale lenses of Madrid Formation suggest that this chaotic zone may be regionally extensive mélange.

ANTITHETIC CROSS FAULTING AND BLOCK ROTATION OF THE CLARENCE-ELLIOTT WEDGE, MARLBOROUGH FAULT ZONE, NEW ZEALAND.

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Detailed structural mapping via DEM, aerial photography, and field observations was carried out within the Clarence – Elliott wedge, defined by the Clarence and Elliott dextral-strike slip reverse faults of the Marlborough Fault Zone. Mapping revealed the existence of two sigmoidal linking cross faults. The Acheron and Dillon cross faults display sinistral normal motion and generally strike to the NNE. These faults define the boundaries of two separate clockwise rotated fault blocks within the Clarence – Elliott wedge with rotational axis trending and plunging to the southeast. The compression and thrusting on the eastern sides of these blocks in contrast to the extension and collapse on the western sides is a direct result of reclined axis of rotation and is clearly resolved by DEM and Slope-Angle analyses. Spatial analysis of an approximated block surface confirms a northwest dip for the Acheron, Guide River, and Dillon Cone Blocks. Furthermore the blocks show variable degrees of compression/thrusting and extension/collapse with minimal geomorphologic and topographic variance in the west of the Clarence-Elliott wedge to maximal variance on the wedge's eastern boundary. The variance in deformation of the block edges is directly related to the eastward plunge of the axis of rotation. The Hope fault is the partitioning boundary between the thrust fault dominated piedmont region to the south and the strike-slip oblique dominated faulting to the north, including the Hope, Elliott, Clarence, Awatere, and Wairau faults (Marlborough Fault Zone). A southward progression of the strain partitioning boundary is suggested by the decrease in slip rate along the MFZ faults towards the north. The cross-fault and block rotation interaction between the Clarence and Elliott faults, as examined within the CEW, indicates that these processes play a critical role in the southward expansion of the strain partitioning boundary and the MFZ.

MINERALOGICAL ANALYSIS OF CERAMIC PERIOD POTTERY FROM RUMFORD FALLS, MAINE WITH COMPARISONS TO CASCO BAY CERAMIC SITES

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Ceramic period pottery from the Rumford Falls sites are controlled by radiocarbon dates which demonstrates that the two sites were active between A.D. 300 and 1500. The sites are variously interpreted to represent late summer and early winter occupations. Pottery is consistent with the middle and late ceramic period pottery styles. Rumford pots consist of two grain size fractions. The majority of the material in the vessels is silts with minor clay. This size portion of the vessels is interpreted to have been collected from varved silts which crop out in the upper Androscoggin River drainage in the vicinity of Rumford, Maine. In contrast, paste for the pots from the Casco Bay area was derived from the local glacial marine clays. X-ray diffraction of the clay and silt sized portion demonstrates that the finer grained portion of both Rumford Falls and Casco Bay pottery have variable mineralogies that consisting of differing proportions of quartz, 2M1 mica, albitic plagioclase, microcline, and orthoclase.

Rumford Falls thin sections demonstrate that the temper consists of non undulatory quartz, augite, microcline and albite, plus composite grains consistent with, biotite granite, quartzite and diabase. Thin sections from Casco Bay sites demonstrate that the temper consists of both undulatory and non undulatory quartz, microcline and oligoclase, soft shell clams and coarse – grained muscovite, plus lithic grains consistent with granite pegmatite, biotite granite, sillimanite quartz schist, calcsilicate and quartzite. The temper is has been derived from local rock types. Based upon regional geology the sillimanite schist grains are suggestive of a source in northern Casco Bay.

Variations in temper component between Rumford Falls and Casco Bay sites suggest that manufacturing was not limited to a single locality, but occurred at several sites throughout the greater Casco Bay area. Mineralogical differences between the Rumford Falls and Casco Bay sites of similar age suggest that the pottery from both areas was manufactured locally and that completed pots were not transported to or from either area.

GEOLOGY AND GEOCHEMISTRY OF THE FISH POND VOLCANICS

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The Fish Pond Volcanics crop out along the southeastern flank of the Lobster Mountain arch in northwestern Maine. This thin unit is well-exposed along the ridges north and east of Fish Pond, located 4 miles northwest of The Forks. In order to constrain the tectonic setting of these rocks, we are currently documenting field relationships and their major and trace element compositions. The unit includes flows, thin intrusions, and pyroclastic deposits. The flows are dark green and aphanitic. Bimodal intrusions, including mafic and felsic varieties, are interpreted as feeder dikes to the volcanic rocks. The pyroclastic deposits include dark to light green tuffs and lapilli tuffs. The dikes intrude the underlying calcareous strata of The Forks Formation that crops out to the southeast. Crinoids present within this calcareous unit indicate a shelf facies. Along the upper contact, tuffs grade into green slates beneath black slates of the Devonian Carrabassett Formation to the northwest. A Siluro-Devonian age is based on conodonts collected from The Forks Formation. Preliminary

XRF data places the unit in the within-plate field on Ti-Zr-Y and Ti-Mn-P tectonic discrimination diagrams. We correlate The Forks Formation and the Fish Pond Volcanics with, respectively, the calcareous Ripogenus Formation and the West Branch Volcanics of the Chesuncook Dome. We are unaware of an obvious equivalent of the red Frost Pond Shale, although minor hematitic slate is present in this stratigraphic position. The tentative within-plate signature and passive margin (lower plate) setting are consistent with a slab breakoff mechanism, as proposed by Schoonmaker et al. (2005) for the West Branch Volcanics. Alternatively, the late Silurian Salinic disturbance may be related to breakoff of the northwest-dipping Ganderian slab.

STRUCTURAL CONTROLS OFAN ERUPTIVE FISSURE ON THE REVKJANES PENINSULA, SOUTHWEST ICELAND

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The Reykjanes Peninsula is an oblique segment of the mid-Atlantic ridge system where it comes on shore in Southwest Iceland. Oriented 060° to 075°, approximately 30° oblique to the direction of absolute plate motion, the peninsula is an ideal location to study the interplay between the volcanism and tectonics that occur in mid-ocean ridge systems. The dominant structures on the peninsula are normal faults striking primarily between 030° and 050° and en echelon, right-stepping eruptive fissures trending an average of 045°, although there is significant local variability of strikes of both the tectonic fractures and eruptive fissures. Volcanic activity on the RP has been dominated by fissure eruptions during the last 8,000 years, with a proposed recurrence time of 1,000 years.

The 2,000 year old Sundhnukur eruptive fissure in the western part of the Reykjanes Peninsula developed within an overall left-handed strike-slip shear zone. A new GIS-based map of the crater row shows 22 segments, varying in length and azimuth. Azimuths range from 006° - 052°, with a mean direction of 033°. Detailed mapping of the geometry of crater row segmentation is used to evaluate the local influence of pre-existing fractures and bedrock structures during magma propagation. There are numerous north trending, dextral strike-slip faults, as well as normal faults in proximity to the fissure. In total, length and strike data were collected for 137 tectonic fractures, with a mean strike of 056°. The interaction of these faults with the fissure is significant in determining if magma may have used pre-existing fractures as pathways to the surface. Finally, variations in crater row geometry and fracture orientations are correlated to models for temporal and spatial partitioning of strain on a regional scale.

THE ORIGINS OF THE NORRIDGEWOCK SAND PLAIN, SOMERSET COUNTY, CENTRAL MAINE

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The Norridgewock sand plain of central Maine is a broad, gently sloping feature covering *ca.* 15 km^2 in southern Somerset County, Maine, in the Norridgewock and Hinckley, ME, USGS 7.5-minute quadrangles.

A study to determine the probable origin of the sand plain was conducted using topographic maps, aerial photographs, outcrops, test auguring, unpublished borehole data, grain-size and mineralogic analyses, and ground-penetrating radar (GPR). Sands of the plain have a maximum thickness of at least 15 m (50 feet) and pinch out both to the south and southeast. The sand is predominantly moderately well-sorted subrounded fine to medium sand of lithic fragments, quartz, and feldspar; in the central sand plain, it contains scattered pebbles to 2 cm diameter at the surface, with occasional larger pebbles and rare cobbles.

The sand plain is encircled by higher ground, including an esker, higher plain, subaqueous fan, moraines and bedrock ridges. Rare dunes mineralogically identical to the main sand plain occur on the margins; slip face dips indicate winds from the NW and SW.

Basal Quaternary sediment is a late Wisconsinan till, overlain by postglacial Presumpscot Formation silts and fine sands; uppermost Presumpscot sediments have yielded marine fauna indicative of shallow, at least seasonally brackish waters, and ^{14}C ages correlated to 13,800-14,200 cal years BP. Maximum thickness of Quaternary deposits is locally as much as 51 m (170 feet).

GPR lines run in late March show surprising complexity in the subsurface, with multiple cross-cutting channels cut into the Presumpscot Fm.; the largest NW-SE-trending channel is *ca.* 100 m wide and up to 7 m deep. This is tentatively interpreted to have been an early post-regression channel cut into the marine sediments by at least a portion of the ancestral Kennebec drainage, which was clogged with coarse sediments, fining upwards, and abandoned. The only likely outlet for such a channel is the modern east-flowing lower course of Martin Stream where it exits the southern margin of the Plain and flows to the Kennebec River, but this seems inadequate to have accommodated more than part of the Kennebec discharge.

Initial interpretations were that the surficial sands represented emergent nearshore marine sands of the Presumpscot Formation. However, sand plain material may in fact be distal Embden Formation fluvial sediments; continuing study will be necessary to resolve the question.

RECENT SEDIMENTATION CHRONOLOGY OF LINNÉVATNET, A HIGH ARCTIC PROGLACIAL LAKE: SVALBARD, NORWAY

LEON, Bennet H., Dept. Geology, Bates College, Lewiston, ME

Due to the sensitivity of high latitude regions to global climate change, it is important to understand the role and response of the arctic environment to past climatic events. Lacustrine sediments can provide an ideal archive of past environmental change preserved in structural, textural, and compositional variation. Linnévatnet, a large proglacial lake on Svalbard in the Norwegian High Arctic, contains a long record of annually laminated or varved sediments. This study has developed a high resolution sedimentation chronology from the lamination stratigraphy since 1963. Sediment cores were retrieved during fieldwork conducted in 2006 from sites along two transects. Using digital images of thin sections manufactured from these cores, annual sediment couplets and intra-annual deposition laminae were identified. Laminae were visually correlated from proximal to distal coring sites and

down to the depth of a 1963 ^{137}Cs age (~20cm). The data indicate a complex sedimentary environment across the basin affecting varve formation. Tentative relationships were drawn between varve thicknesses and weather data recorded in Longyearbyen over the past four decades.

TEXTURAL AND PETROCHEMICAL VARIABILITY ACROSS A SHEARED PLUTON MARGIN, NORTHEASTERN APPALACHIANS, USA

MARSH, Jeffrey, Dept. Earth Sciences, UMAINE, Orono, ME 04469

Tectonic strain within the northeastern Appalachians Mountains, USA is heterogeneously distributed across and along strike during Paleozoic orogenesis. Much of the strain is localized along orogen-parallel shear zones, which commonly display strong penetrative fabrics that include textural and mineralogical transformations. A distinct textural, mineralogical, and petrochemical variation has been identified across a strain gradient within the sheared margin of the Lincoln Syenite in south-central Maine. The igneous assemblage of megacrystic alkali feldspar + clinopyroxene + orthopyroxene + biotite is transformed to a strongly foliated, actinolite + biotite + alkali feldspar + quartz + sphene assemblage near the contact with the Washington Shear Zone. A transitional, non-foliated zone has been identified that displays various dis-equilibrium microstructures and mineral associations. Microstructural evidence for plastic strain and early-stage mineralogical instability is observed in the igneous assemblage, whereas foliated samples exhibit a texturally stable mineral assemblage.

Electron microprobe data show that distinct petrochemical variations in biotite (and to a lesser degree amphibole) track various continuous reactions, and are in-step with the degree of foliation development (strain) in sheared marginal rocks. Data collected from amphibole and biotite within the transitional zone have complex petrochemical variations. Thus, chemical data and microstructural interpretations suggest that coupling of strain and reactions led to the observed mineralogical changes and resultant weakening of the bulk rock.

INFLUENCES ON WATER COLUMN STRUCTURE AND WATER QUALITY EVALUATIONS OF MEETINHOUSE POND AND SPRAGUE POND, PHIPPSBURG, MAINE

MONSULICK, Stephen, Dept. Geology, Bates College, Lewiston, ME

During the summer, fall and winter 2006/2007 limnological monitoring took place at Meetinghouse Pond and Sprague Pond in Phippsburg, Maine. Meetinghouse Pond (43.76N, 69.83W) sits at 25 m a.s.l. and is the smaller of the two sites featuring a surface area of 0.030 km^2. Its mean depth is 2.7 m with a maximum of 6m. Sprague Pond (43.78N, 69.83W) is at an elevation of 33 m a.s.l. and is now part of the Phippsburg Land Trust land holdings. Sprague Pond has an area of 0.033 km^2 with a mean depth of 3.35 m and a maximum depth of 7 m. Data was collected with water quality probes, in situ temperature loggers, and in the lab using various methods of determining ion concentrations of water samples. This study was designed to monitor modern limnological processes that would provide baseline data for the Phippsburg Land Trust, as they pursue the preservation of coastal lands such as these.

Results from this study showed the process of destratification throughout the progressing season and fall overturn typical of dimictic lacustrine environments. Dissolved oxygen and specific conductivity also featured changes typical of the environment. The fall overturn in these two ponds occurred 6 days apart in late October. This was the result of higher water clarity in Sprague Pond (where overturn occurred earlier). Higher water clarity caused greater heating of the hypolimnion and allowed the water column Sprague Pond to reach a stage of instability at a warmer temperature. Analysis of major ions revealed higher concentrations of Na^+, K^+, and Cl^- in Meetinghouse Pond and higher concentrations of Ca^{2+} and Mg^{2+} in Sprague Pond. The higher concentrations of Na^+, K^+, and Cl^- in Meetinghouse Pond are due its closer proximity to the Sea, while the lower concentrations of Ca^{2+} and Mg^{2+} are the result of its lower pH.

MAGNETIC CHARACTERISTICS OF THE TEMPLE STREAM AND DAY MOUNTAIN FORMATIONS: METAMORPHIC PYRRHOTITE OR DETRITAL MAGNETITE?

O'BRIEN, William D., Dept. Natural Sciences, UMAINE – Farmington, Farmington, ME 04938

Correct interpretation of the contact between the Temple Stream and Day Mountain Formation of the Seboomook Group is critical to understanding the regional geology of west-central Maine. In order to locate this contact more precisely, pilot magnetic surveying was conducted on a barren hill 3 kilometers north of Fairbanks, Maine. Large reproducible anomalies on the order of 10 meters by 100 meters and up to 6000 nanoteslas occur over a 2 meter thick sandstone bed within the Day Mountain Formation. Detrital magnetite, therefore, is the likely cause of the anomalous magnetic field.

3-D NUMERICAL MODELING OF ULTRAHIGH PRESSURE METAMORPHIC TERRANE EVOLUTION IN THE NORWEGIAN CALEDONIDES

RODDA, Charles, Dept. Earth Sciences, UMAINE, Orono, ME 04467

We present the results of 3-D numerical modeling of the creation and exhumation of ultrahigh pressure metamorphic (UHPM) terranes. The Western Gneiss Region (WGR) of Norway likely represents the most well exposed UHPM terrane in the world, and as such, offers the best chance to constrain the physics of UHPM terrane evolution. Previous research in the WGR indicates that roughly 100km of vertical motion has occurred to bring UHP materials to the surface; however, all exhumation related fabrics observed during this study are subhorizontal. Recent fieldwork in the northern portion of the WGR explored a large (wavelength ca. 6km in the field area) cylindrical, NE-SW oriented, orogen parallel syncline in the quartzofeldspathic orthogneisses of the Baltica basement (the Surnadal Syncline) that contains thin slices of overlying thrust sheets in its core. This syncline appears to be part of a major subduction related syncline that can be traced for roughly 100km. A mineral lineation of very consistent orientation (trend 61˚ plunge 14˚) overprints all other fabrics in the field area, with occasional reversals in plunge direction and is taken to be exhumation- related. Coupled thermal/mechanical numerical models evaluate various stages of terrane evolution in the WGR. Specific attention is given to the separation of buoyant, crustal material from the subducting oceanic slab. The kinematic and mineralogical implications of

Moho-parallel delamination and Moho-normal rupture are considered in terms of controlling (disequilibrium?) metamorphic reactions, strength of crust/mantle coupling, dynamic feedback mechanisms and trajectories through P-T-t space. A major focus in our current modeling is the transition from subduction to exhumation during UHPM terrane evolution. A critical change in buoyancy-related driving forces occurs where the ratio of the thickness of continental crust to the thickness of underlying lithospheric mantle is approximately 1/10. Where the ratio is less than this, the net buoyancy of the slab is negative, and continental material can be subducted. Where the ratio is greater than 1/10, the net buoyancy of the slab is positive, and continental material is unable to be subducted. In a tectonic setting, this transition occurs during the subduction of passive continental margins, which may be critical for the development of UHPM terranes.

PIGEONITE MICROSTRUCTURES IN MARTIAN METEORITE EETA79001

RODRIGUEZ, Astrid and BEANE, Rachel, Dept. Geology, Bowdoin College, Brunswick, ME 04011

Martian meteorite EETA79001, collected in Antarctica, is unique among basaltic shergottite specimens, because it contains two lithologies separated by a linear contact. Lithology A (Pgt, maskelynite, Aug, Ol, Opx) has smaller matrix grains (0.15mm) than Lithology B (0.3mm; Pgt, maskelynite, Aug). The two hypotheses previously posed for the observed contact are 1) Lithology A is an impact melt rock that incorporates Lithology B as a clast, or 2) the contact is a boundary between successive flows.

Pyroxene microstructures are commonly used to interpret magmatic, shock, and annealing processes. Bands in A are well-defined, vary from 3-35µm wide, continue across fractures and melt, and extend to the grain boundaries. Bands in B are patchy, vary from 3-11µm wide, and rarely extend to the grain boundaries. Band presence and position do not correlate to compositional variations in pyroxene. In Lithology B, the patchy nature of the bands and their absence near the grain boundaries suggest partial annealing. The observed bands do not appear to be exsolution lamellae, because they are much thicker than described pyroxene exsolution lamellae, they occur in a variety of crystallographic orientations, and they do not correspond with compositional differences.

Quantitative EBSD orientation maps of pyroxene from Lithologies A and B reveal bands with misorientations of 178±2° about variable axes. Crystallographic orientation maps and pole figures show that bands plot as separate clusters on <100> and <001> and appear to rotate about <010>. Lithology A figures display clustering while Lithology B figures display dispersion. The dispersion in Lithology B and the presence of low angle grain boundaries in Lithology B in the pattern of bands, suggests that B was similar to A and that the ejection from Mars' surface caused differentiation.

THE TEMPLE STREAM FORMATION, WEST-CENTRAL MAINE: DEVONIAN OR SILURIAN?

WAY, Bryan C., and REUSCH, Douglas N., Dept. Natural Sciences, UMAINE - Farmington, Farmington, ME 04938

The Temple Stream Formation comprises a 250-m thick sequence of dark pelitic strata, locally strongly graphitic and sulfide-rich, within the Rumford domain between Farmington and Phillips, west-central Maine. Moench and Pankiwskyj (1988) included this unit within the Devonian Seboomook Group. Alternatively, Solar & Brown (2001) correlate the Temple Stream Formation with the Late Silurian Smalls Falls Formation, implying a significantly different stratigraphy and regional structure. A study of black shales in the Maritime Appalachians found greater geochemical variability across the transect than within stratigraphic sections (Fyffe and Pickerell, 1993). In an attempt to better constrain the age of the Temple Stream Formation, samples have been collected to compare their major and trace element concentrations with fossil-dated samples (e.g., Middle Ordovician Partridge Formation, Late Silurian Smalls Falls Formation, and Early Ordovician Penobscot Formation). Preliminary XRF spectrometry data suggest an inverse correlation between Zr/(Al+Ti), an indicator of grain size, and sulfide content. This is consistent with surface area control on organic carbon preservation and subsequent sulfate reduction. A speculative explanation for the minor calcareous horizons within and above the Temple Stream Formation invokes carbonate precipitation caused by the alkalinity produced during sulfate reduction. An attempt is also underway to construct a Re/Os isochron from Temple Stream samples.

GSM WEBSITE: www.gsmmaine.org

The GSM website contains copies of present and archived Newsletters, a calendar of events, and other items of interest to the Society, including the updated Bylaws. There are many important links to geology items in Maine and elsewhere. There is a page on Maine geology and the Photo of the Month. Let us know what you think.

Webmaster, Mike Lerley

<mike@rentageekme.com>

NAGT CALL FOR PROPOSALS

National Association of Geoscience Teachers – New England Section Annual Meeting and Conference: "Sharing Best Practices in Geoscience Teaching"

October 13, 2007 at Manchester Community College, Manchester, CT, Co-sponsored by Manchester Community College Science Department

You are invited to submit proposals for talks, demonstrations, workshops, or half-day field trips in the following theme areas:
1. Teaching K-12 Geosciences
2. Teaching Undergraduate Geosciences
3. Teaching with Local Geology & Environment

Proposals may be submitted on-line through the conference website at:
http://www.nagt.org/nagt/organization/new-england/index.html
or by requesting a Proposal Form from:
Christine Witkowski
Conference Program Coordinator

teaching@professorwitkowski.com
Proposal Deadline May 25, 2007

NEWS FROM THE COLLEGES AND UNIVERSITIES

Dan Belknap has stepped down after 7 years as chair of the earth Sciences Department at the University of Maine. He is on sabbatical for the academic year 2006-2007. **Joe Kelley** has become the new chair. The Department has added a new petrologist, **Chris Gerbi**, to fill **Charlie Guidotti's** position. We are also hoping to begin a search soon for a person to replace **Steve Norton** who began phased retirement in January, 2007.
Joe Kelley has also published a new book "Atlantic Coast Beaches: A guide to Ripples, Dunes and other Natural Features of the Seashore" (Mountain Press, 2007).

New England Intercollegiate Geological Conference
Quebec City, October 5-7, 2007

The 2007 joint meeting of the New England Intercollegiate Geological Conference (NEIGC), Friends of the Grenville, and Association Québécoise des Sciences de la Terre will be held in Quebec City, Quebec, Canada on the weekend of October 5 - 7, 2007. It will be hosted by the Geological Survey of Canada, Natural Resources Canada (GSC-Quebec), the Institut national de la Recherche scientifique - Eau - Terre-Environnement, and Ministère des Ressources naturelles et de la Faune, Bureau de l'exploration géologique du Québec. It is organized by Louise Corriveau (lcorrive@nrcan.gc.ca), Tom Clark (thomas.clark@mrnf.gouv.qc.ca), and Michel Malo (mmalo@ete.inrs.ca) who may be contacted for more information, or go to the NEIGC website for registration information http://neigc.org/NEIGC/, or to the GSM website for a preliminary description of field trips. This meeting will be the first NEIGC to be held in Québec City in thirty years; it will be a great opportunity for students and geologists from the northeast to catch up on our Canadian colleagues progress with the geology in the Québec City area. Bienvenue à Québec!

GSM MEMBER NEWS

Don Robbins and his business partners at EnviroInvestigations & Remediation, Inc., purchased the East Vassalboro water utility in early April. It is classified as a very small water system (82 meters and about 310 persons) and is now called the East Vassalboro Water Company LLC. Don is the local contact person, as well as a customer, and says that he must be a glutton for paperwork, having to deal with both the DHHS drinking water program and the PUC.

The memorial service for **Dee Caldwell** will be held August 13th-14th, 2007 in Millinocket, ME. All friends and colleagues of Dee who may be interested in participating are welcome to attend. For further information, please contact Dee's widow, Marvin Caldwell <mjcaldwell@verizon.net>.

Keith Taylor wrote: **Barry Timson**, a long time geologic consultant in Maine, died on 4/15/07 after a short illness. He graduated from Bowdoin College in 1966 and received a master's degree in geology from University of Massachusetts in Amherst. Barry returned to Maine to work for the Maine Geological Survey and eventually opened his own geology and environmental consulting business. He was the mayor of Hallowell (as well as holding many other City positions) and was very involved in many community charities. Barry was a well-respected geologist and will be missed by many. The full obituary for Barry is found at <http://www.legacy.com/mainetoday-kennebecjournal/Obituaries.asp?Page=LifeStory&PersonID=87310065>. According to **Mark Cenci**, Barry was a great, long-time, Maine geologist, well-loved and highly regarded who was a coastal expert, and will be greatly missed. Mark is working to resolve, finish and close Barry's business.

John R. Rand, Mining and Engineering Geologist, 82, Of Elmwood Road, Pownal, Maine, died of Lou Gehrig's Disease on March 15, 2007 at the Maine Veteran's Home in Scarborough. He earned a degree in Geological Sciences at Harvard in 1949 and followed with a year at graduate courses in mining geology. His work in geology spanned more than 57 years, including early positions as Chief Geologist for a copper mining company in northern Michigan, and as the State Geologist of Maine. Going into consulting in 1959, as a sole proprietor, his practice dealt with many varied engineering geology and mining projects. He was Principal Geologist for five pump-storage hydroelectric projects and more than a dozen nuclear power projects including Maine Yankee, the Seabrook Station and Central Maine Power's project at Sears Island in Penobscot Bay. With geologist Carol A. White of Chebeague Island, he performed numerous groundwater studies for the Maine Department of Environmental Protection, both for remediation of contaminated groundwater and in searches for new water supplies. In mining, he did coal lands management in Kentucky, and exploration for metals and industrial minerals throughout the United States. In 1960, Ed Lowe, the inventor of Kitty Litter and founder of the cat litter industry, retained him to find adsorbent clay deposits for his new company (now

part of the Nestle Company), and to plan and design all of its mine developments, and he continued in that position for more than 4 decades.

John married Sally Ann Wallace of Lunenburg, Massachusetts on June 23, 1951, and they moved immediately to Michigan's Upper Peninsula, where their two sons were born, Robert Wallace Rand of Freeport, Maine and William Baker Rand of Pownal, Maine and Torre Vieja, Spain, all of whom survive him. Also surviving are his granddaughter Katherine Alden Rand and his sisters Emily Rand Herman of Georgetown, Maine and Lucy Everts of Wayland, Massachusetts and his brother Dr. Peter W. Rand of Cape Elizabeth, Maine and many beloved nieces and nephews. He was predeceased by his brother William M. Rand, Jr. of Raymond, Maine. The family is most grateful for the many kindnesses and love given by the staffs at Togus and Midcoast Hospitals and the Maine Veteran's Home in Scarborough. His family and collegues gathered in April to celebrate his life. In lieu of flowers, please send donations to the puppy dogs at Coastal Humane Society, 30 Range Road, Brunswick, Maine 04011.

Bob Gerber asked that the following announcement be included in the newsletter: During the period 1974-76, Central Maine Power Company (CMP) proposed to build a nuclear power plant on the south end of Sears Island in Searsport. Bob Gerber was working for CMP at the time, managing the geologic and geotechnical studies for the project, and **John (Jack) Rand** was retained as the Project Geologist. A well-defined bedrock fault in the Penobscot Formation was found to cross the entire Island and can be traced by offshore geophysics and lineament analysis to both the northeast and southwest. To characterize this fault, a number of borings were made and a series of trenches were excavated across the fault exposing faulted glacial till over the bedrock fault and many other unique surficial features. This report was never published for various reasons at the time and CMP decided to cancel the nuclear plant.

With the passing of Jack Rand, it seemed timely to release some of Jack's important work. The original report has been scanned and compiled into one bookmarked PDF file of about 40MB. Bob Gerber wants to make this available, particularly to the academic community, because there is a lot of unpublished factual material, let alone interpretation: plan maps of the fault location; figures and pictures of the faulting; geophysics, detailed trench mapping, whole rock and C-14 age dating; photos and descriptions of various surficial geology features (including the extension of the fault up into the till); and a thorough literature review of what was known about glaciotectonic features as of 1976. The report also contains a lot of analysis and hypotheses, which, given the passage of 30 years, should be re-evaluated in light of what we know today. This information might make a good starting point for one or more thesis projects. Contact Bob Gerber at <rgerber@stratexllc.com>.

Please send member news to:

Carolyn Lepage, Member News Correspondent (1996-present) <calepage@adelphia.net>

PO Box 1195, Auburn, ME 04211-1195
Fax: (207)-777-1370; Phone: (207)-777-1049

Jack Rand, the Mentor

by Bob Gerber

Jack Rand meant many things to his family, friends, and professional acquaintances. He was a well-educated person, accomplished in life, and admired by many for his professional knowledge. To me, Jack was my professional mentor, and a superb one in all aspects.

I first met Jack in 1967. I was working on the pre-construction surveying of the Maine Yankee nuclear plant and Jack was mapping its geology. At some point I made it over to Jack's house, which was in South Freeport at the time, and I was introduced to the world of maps. Being myself trained as a civil engineer and mathematical modeler, I had not done much work with maps up to that time. I was fascinated with the size of the maps Jack had laid out on his drafting table and the orderliness and clarity of presentation. I was looking for a project for my college geology class and thought that mapping the movement of the sand dunes at the Desert of Maine since the last mapping around 1950 might be something both close to home and interesting. Jack drew from his vast collection of geological reports and found several past articles for me on the geology of the Desert of Maine. As a former State Geologist he knew the Maine geological literature well.

My next encounter with Jack was when I was working for Consumers Water Company in the summer of 1970. Freeport was just starting to grow and Freeport would need more water. Peter Johnson, the Chief Engineer for Consumers at the time, had used Jack before for some water supply work so he paired me up with Jack to do an inventory of the groundwater potential of Freeport. In that summer Jack taught me the fundamentals of identifying the potential groundwater yield of surficial aquifers, principles that I still use today.

After several years of doing other things, I found my way into the group at Central Maine Power Company that was trying to site a new nuclear plant in Maine. I became CMP's in-house person in charge of the geotechnical and geological studies. Jack became the project geologist and Dick Holt of Weston Geophysical became the project seismologist. My education into hard rock geology was just beginning as we identified a fault through Sears Island, over which the soil was ruptured since the last glaciation.

Although I had originally just planned to be a manager of studies, the feasibility of the whole project hung on the outcome of the fault investigation and I became the principal investigator of the surficial geology while Jack focused on the bedrock. I was helped along the way on the surficial aspects, incidentally, by Dee Caldwell, another Harvard grad, whom Jack suggested I have view the 300-foot long, 35-foot deep trench we excavated across the fault to fully expose the shear zone in the overlying glacial till deposits. It was Dee who spotted the calcium carbonate concretions that enabled us to date the glaciomarine unit that occurred above the till.

The fault at Sears Island was serious not only to the proposed new project, but to other operating nuclear plants in northern New England where no young "capable" faults had ever been discovered and therefore were not factored into the seismic design criteria of the plants. Therefore, there was no expense spared to document the Sears Island conditions. Jack and Dick and I met constantly to discuss the latest information as it was being produced in the field. These were fascinating discussions and I absorbed the knowledge like a sponge absorbs water.

Jack and I worked for many days together on Sears Island mapping the surface, logging borings, and mapping the trench faces. Those were long days, as Jack was a very hard worker and he worked long days. Jack, always a thrifty sort, stayed in a relatively cheap motel in Searsport and when I was working at the site with him we often roomed together. We ate our meals together and drank beer together at night, too. But after dinner, it was back to the motel for a couple more hours of discussion of the lessons of the day and what needed to be done next. He was the teacher and I was the student, but we related as professionals and friends. It was also during this time that Jack introduced me to the Geological Society of Maine and the wealth of information that was available from both NEIGC and GSM field trip guides. Jack was the editor of the GSM newsletter for many years and produced a "finest kind" (one of Jack's favorite sayings) newsletter.

After Sears Island, I left CMP to become a private consultant, following Jack's model. And, like Jack, I was determined to work by myself, with no employees. One of my first major projects was with Weston Geophysical, mapping landslides and predicting the size, likelihood, and consequences of landslides along the Deerfield River near the Rowe Nuclear Power Plant in northwestern Massachusetts. Jack was also working with Weston on that project and Jack and I spent several weeks mapping the valley walls upstream of Sherman and Harriman Reservoirs. Jack would focus on the bedrock, and I would focus on the soil. Again, those were long, long days of mapping. Jack, although 24 years my senior, had equal or better stamina than I for those long days.

As my consulting practice grew, I looked for places to bring Jack into my projects so I could continue to work with and learn from him. From 1978 until 1985 I lived in Harpswell, as did Jack. I became a frequent visitor to Jack's house and Sally, ever the gracious hostess, always made sure I had lunch if that hour happened to intervene in the business day. I won a major contract with Georgia-Pacific that actually involved four separate major issues that were the subject of a consent decree with the Maine DEP. A lot of work needed to be done in a short amount of time: finding and repairing a leak in the primary treatment lagoon; closing an old landfill on an esker; closing an old bark pile landfill; and obtaining a permit for a new sludge landfill. Jack continued to be the map maker extraordinaire. He drafted individual mylars with black ink and letter guides, then, using a specialty photo shop and a separate printing company, produced beautiful multi-color maps that would be the envy of any geologist.

The problem of the leaky lagoon was particularly instructive to me. Jack's approach to tackling a new geologic problem is still the best, but has been forgotten over time by younger geologists: 1) gather all the literature references, maps and aerial photos; 2) build a base map and put all the pertinent material from the literature on the base map; 3) go to the field and thoroughly map the geology, planning each day's work in advance and evaluating the field work at the end of each day; 4) return to the office, evaluate data, and plan any field explorations and other testing needed; 5) do the field work and testing and re-evaluate, then do more mapping or field work and testing as needed (may take several cycles); 6) build final maps and tables; and 7) write a report. Somehow the first three steps in the process have been forgotten by many geologists—so many, in fact, that clients, now accustomed to the "modern geologist," look askance at you when you propose the first three steps instead of immediately getting a drill rig on the site.

The problem of the leaky lagoon was in a permeable bedrock fault that was not identified during the original design. During the initial filling of the lagoon, wastewater leaked under the earthen dikes at something like 1000 gallons per minute. After a million dollars of grouting in rock and placement of a clay blanket at the inside base of the lagoon, the leakage rate dropped to 100 gallons per minute. But the DEP was not satisfied because the wastewater leakage was emptying into the headwaters of a stream that fed pristine Meddybemps Lake. Jack and I were once again out in the field from dawn to dusk, mapping geology, and sharing a cheap motel room at night. Jack found the fault and developed a conceptual model of the hydrogeologic system. I built a computerized groundwater model that simulated the system according to Jack's conceptual model and we solved the problem and developed the solution that

worked at reasonable cost. My knowledge of surficial geology had expanded under Jack's tutelage, and now I added this new computer modeling capability that Jack admired.

Throughout the 1980's, Jack and I continued to work on many projects together. Of particular note were projects for the DEP involving the study of petroleum tank leaks and the location of replacement groundwater supplies. It was in this work that Jack completed the education that I would receive from him. Jack taught me how to map and interpret bedrock geology to pick out the important features of bedrock that controlled the movement of water. He also knew what features were not important and I clearly recall his frequent statements that certain things were "not important to the problem." I learned how to map bedrock, then develop conceptual models of bedrock hydrogeology, and then turn that into computerized groundwater models, a capability that has served me well in my career.

Jack and I used joint stationery over a period of 6 years or so and we even owned a fancy copy machine together at one point. But as Jack stayed solo in his practice, I began to build a company. I found I liked working on the large projects and to do so required more than just what I could do myself. So I added gradually to my staff, adding field people to log drill holes and run field tests, drafters, administrative people, and finally other professionals to whom I now became the mentor. I became more and more engrossed in the day-to-day workings of the business, doing less field work and having less time to discuss the fine details of a project with Jack. I started to substitute other people in my stead in working side-by-side with Jack and that was not to Jack's liking so our working relationship faded, something I have since often regretted. Fortunately, Jack took my first employee, Carole White, as a new mentee and they both found that a very rewarding relationship.

In summary, Jack taught me how to interpret geology so I could model the movement of water within it. But as any good mentor will do, he also taught me many other things that went beyond the technical subject matter. He taught me the ethic of hard work and long days. He taught me the value of making other professional acquaintances as there can be many symbiotic relationships among the community of geologists. He taught me how to provide good client service and write reports that a client can understand. He taught me that the value of working with colleagues is not just to get work done but to enjoy the relationship along the way at the same time. Jack was my mentor, of the finest kind, and I am proud of it.

GSM TREASURER'S REPORT

Balance On Hand December 31, 2006

Anderson Fund Savings	$476.94
Anderson Fund CD	$5,387.36
Education Fund Savings	$822.38
General Fund Money Market	$3,846.25
General Fund Savings	$26.11
General Fund CD	$5,156.81
General Fund Checking	$0.00
Total	$15,715.85

Balance On Hand April 30, 2007

Anderson Fund Savings	$1343.39
Anderson Fund CD	$5465.89
General Fund Money Market	$4276.33
General Fund Savings	$39.92
General Fund CD	$5,231.99
General Fund Checking	0.00
Total	$16357.52

Due to a computer problem, the treasurer was unable to access information to put together the full report for this writing. The usual report will be generated later and forwarded to the officers. It will also be posted on the website.

Respectfully submitted,
Rob N. Peale, Treasurer (2004 -present)
<Rob.N.Peale@maine.gov>

THE EDITOR'S MESSAGE

I am pleased to have filled in for Dan Belknap while he was on sabbatical during academic year 2006-2007. Dan will be returning to the position with the publication of the Fall Newsletter. Please send any items from individuals, schools or organizations for inclusion in the Newsletter to his e-mail address, <belknap@maine.edu>. **Remember that the date on your mailing address refers to when your current dues run out**. Please help the Society by paying up to date or beyond, and most especially, making good on any arrears.

Thanks.

Charlotte Lehmann, Interim Newsletter Editor (2006 - present)
<clehmann@bates.edu>

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MEMBERSHIP DUES STATEMENT

The GEOLOGICAL SOCIETY OF MAINE, INC. (often referred to as **GSM**) 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 modem 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:

$12.00	REGULAR MEMBER	Graduate geologists, or equivalent, with one year of practice in geology, or with an advanced degree.	***PLEASE NOTE NEW***
$12.00	INSTITUTIONAL MEMBER	Libraries, societies, agencies, businesses with interests in or practicing geology and related disciplines.	***FEE SCHEDULE AS OF***
$10.00	ASSOCIATE MEMBER	Any person or organization desirous of association with the Society.	***August 1, 2003***
$ 5.00	STUDENT MEMBER	Persons currently enrolled as college or university students.	

THE GEOLOGICAL SOCIETY OF MAINE ANNUAL RENEWAL / APPLICATION FOR MEMBERSHIP

Regular Member $12.00 $__________ Name ____________________________________
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Contributions to GSM $__________ ____________________________________
(Please write gift or fund on check.)
TOTAL ENCLOSED $__________

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Email Address ____________________________________

Make checks payable to:
Geological Society of Maine
Rob Peale, Treasurer
Maine Dept. Environmental Protection,
State House Station 17
Augusta, ME 04333-0017

(GSM funds include the Walter Anderson Fund___, and discretionary gifts ___ as noted by contributor)

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2007/2008 SOCIETY YEAR BEGINS AUGUST 1 - PLEASE SEND DUES TO TREASURER.
The DATE on your mailing address refers to PAID UP DUES DATE

THE GEOLOGICAL SOCIETY OF MAINE
c/o Charlotte Lehmann, Interim Newsletter Editor
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THE MAINE GEOLOGIST is the Newsletter of the Geological Society of Maine, published three times a year, in mid-winter, summer, and early fall, for members and associates.

Return Service Requested

Correspondence about **membership** in the Society, **publications** and **dues** should be mailed to:
Rob Peale, Department of Environmental Protection,
State House Station 17, Augusta, ME 04333-0017 <rob.n.peale@maine.gov>

Items for inclusion in the **Newsletter** may be directed to:
Charlotte Lehmann, Geology Dept., Bates College,
Lewiston, ME 04240 <clehmann@bates.edu>