



# THE MAINE GEOLOGIST

THE NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

MAY 1985

VOL. 11 NO. 3

## Society News:

### PRESIDENT'S MESSAGE

I near the end of my term with some regret. Not that I will miss the work of persuading people to speak at meetings and writing for this publication, but that I will miss the contact with other professionals that making those arrangements required. Being President means making lots of phone calls, writing letters and, probably most importantly, listening for ideas from the Society.

Many members (and non-members) have contributed their thoughts on what we should do; I have tried to make those "wishes come true". Ideas which worked included last summer's meeting at the Darling Center (a nice spot), the "Computers in Geology" theme from fall of '83, joint meetings with MMRA and ACS (winter and fall '84) and "Ground Water Sampling" as a topic for the ACS meeting. Presidents need input and feedback. We get some by gauging attendance and enthusiasm, but we also need phone calls and letters. Send your ideas to Steve Pollock your president-nominee or to me and we'll work on them.

In the five years I've been back in Maine, the caliber of spring student papers has become ever more impressive. This year's, I believe, continue to set a high standard of excellence. Having just returned from GSA at Lancaster, I would say that the quality of both research and presentation at Bates this spring compares favorably with any session at GSA. My thanks especially to Don Newberg for handling both the logistics and the recruiting for the spring meeting, as well as to Dave Stewart for flying up from Reston to update us on the Deep Crustal Seismic Line.

All the afternoon presenters deserve thanks and appreciation: Richard Sterling and Jennifer Pratt of Bates; David Putnam from the University of Maine, Farmington; and Mark Cotter, Jennifer Thomson, Ellen Wall, and Peter Maggiore from the University of Maine, Orono, whose common closing "M" helped remind us all where they were coming from. I am particularly happy to see more Oronovians actively participating along with our stalwarts from the more southerly schools. For those who didn't come, there are more highlights in the Secretary's report.

Details of the upcoming field trip/summer meeting in the beautiful western Maine

mountains are also in another article. Plan to come and stay at Bethel--good geology and good company.

A nominating committee met at the spring meeting. The results are:

President: Steve Pollock  
Vice President: Carol White  
Secretary: John Williams  
Treasurer: Robert Gerber  
Director (3 yr): Fred Beck  
Director (1 yr): Andrews Tolman  
Newsletter Editor (2nd yr): Chris Olson

You won't be completely rid of me--Steve and I agreed to change places. Come to the summer meeting or we might form a committee and make you head of it!

Andy Tolman



### SUMMER MEETING

The summer meeting and field trips for 1985 will be held July 27 and 28 and based in Bethel. We are excited about our trips: both Woody Thompson and Bob Moench will have some good stuff to show us.

### Schedule

July 27

- 9:00 Meet in "downtown" Bethel by Bethel Inn  
Dr. W. B. Thompson: The Androscoggin Moraine and Alpine Glaciation in Maine and New Hampshire
- 5:00 Return to Bethel: Dinner at RFD #1, Mothers' or Charlie's Place
- 8:00 Annual Meeting, Gould Academy  
Speaker: Nicholas Eyles (University of Toronto) on Classification of Tills and other Glacial Diamictons

#### Places to Stay:

Bethel Spa Motel 824-2989  
Rostay Motor Inn 824-2960  
Lone Pine Campground 824-2554

Please make your reservations early if you want a room!

(continued on page 2)

July 28

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8:00 Stay-overs meet at Bethel

9:00 Alternate meeting place at Phillips, Rte. 142 & 4  
Dr. Robert Moench, USGS: Down-the-Basin Slides and Sedimentation in Phillips and Rangeley Quadrangles

Note: For diehards, Bob may be willing to continue into Monday.

A final announcement will be out in late June, but make your plans now.

A. L. Tolman

## GSM Spring Meeting

### STUDENT ABSTRACTS

#### PALEOECOLOGY OF THE PRESUMPSCOT FORMATION, PENOBSCOT VALLEY, MAINE

COTTER, Mark P., Department of Geological Sciences, University of Maine, Orono, ME 04469

The Presumpscot Formation is a glaciomarine silty clay unit deposited in the DeGeer Sea which inundated central Maine between 13,000 and 11,000 years ago. Physical and biological conditions of this sea are inferred from an analysis of the fossils (particularly the benthic foraminifera) of the Presumpscot Formation.

The low-diversity fossil fauna indicated initial conditions of cold (3°C) near-normal marine (34 ppt) and deep (120 m) waters in Maine. High suspended sediment concentrations created turbid water conditions that initially kept organisms from migrating inland. As the Laurentide Ice Sheet melted away, glacial meltwaters diluted the sea and a more brackish fauna developed. The sea also shallowed continuously as the land rebounded isostatically once the ice cover was removed. So the foraminifera in the higher levels of Presumpscot Formation deposits reflect more dilute (30-32 ppt) and shallower (20 m or less) conditions than do the species of the lower, earlier levels. Based upon the ecology of its mollusc shells intertidal conditions characterize the highest level samples of the Presumpscot Formation. Radiocarbon dates from these shells indicate that this intertidal phase occurred around 12,400 yrs. BP in Penobscot Valley.

Distribution of key foraminiferal species in the deposits of Penobscot Valley reflect gradients in temperature, salinity and substrate in watermasses whose thicknesses were controlled by paleobathymetry. A lowlying basin north of Bangor during the marine inundation was separated by areas above sea level from a deep coastal area to the south. The northern basin was characterized by more brackish, shallow, and possibly warmer, waters than was the coastal area, due to a stronger freshwater and estuarine influence from the glacial meltwater. Salinities were also lower on the west side of the Penobscot Valley embayment than on the east side due to the effect of the Coriolis force upon an estuarine-type of circulation system.

#### GLACIAL LAKE SHORELINES AROUND LOBSTER LAKE, PISCATAQUIS COUNTY, MAINE: POSSIBLE CLUES TO THE STYLE OF REGIONAL DE-GLACIATION

PUTNAM, David E., University of Maine at Farmington, Farmington, Maine 04938

Through a stereoscopic analysis of aerial photographs from the Lobster Lake locality, a complex sequence of geomorphological features was identified. These features are suggestive of ancient lake shorelines and glacial meltwater channels. This evidence was included in a synthesis of information concerning regional glaciation and a conceptual model of the mode of regional deglaciation was constructed.

The downwasting of Laurentide ice left isolated ice masses in the large basin west of Mount Katahdin. This basin ice underwent a major re-advance at approximately 11,000 yrs. BP and a subsequent receding succession of oscillations of the ice front independent of Laurentide influence. Evidence of such an event is demonstrated in the regional topography, superimposed glacial striations, the family of terminal moraines in the Millinocket area, and lake shorelines in the Lobster Lake basin.

Further study to establish "ground truth" (i.e., substantiation and delineation of glacial lake activity) for this reconstruction is essential.

#### A GRAVITY STUDY OF THE BLINN HILL GRANODIORITE, WHITEFIELD, MAINE

PRATT, Jennifer A., Department of Geology, Bates College, Lewiston, Maine 04240

A gravity study was conducted over the northern portion of the Blinn Hill granodiorite to determine its subsurface form. The Blinn Hill, a Devonian aged New Hampshire Magma Series pluton, intrudes the Cape Elizabeth Formation. The pluton is considered to have been emplaced by forceful injection along fractures formed during the Acadian Orogeny. The Blinn Hill is also cut by a N55E trending splay of the Eastern River Fault.

The study involved three traverses trending approximately east-west across the pluton. Gravity was measured with a Worden Gravimeter at 182 stations on the three traverses. Free Air, Bouguer, latitude, and instrument drift corrections were made on the gravity data. In addition, the regional gradient was removed in order to obtain residual gravity. Residual gravity was modelled in two dimensions with the BASIC computer program TALGRAV2.

Previous work has shown that granite plutons emplaced in high grade metamorphic rock tend to have thin plate-like shapes and exhibit small Bouguer anomalies, usually less than ten milligals. Gravity models for the Blinn Hill pluton conform well to these expected results. Bouguer anomalies over the Blinn Hill ranged from two to four milligals. Proposed models, calculated with residual gravity, show the maximum thickness of the pluton to be 2500 feet. Displacement along the fault, which has a dip of 30° east, has a magnitude of 400 to 600 feet, the eastern side having moved down.



SILURIAN-DEVONIAN STRATIGRAPHY IN THE GORHAM  
AND MT. WASHINGTON QUADRANGLES, NEW HAMPSHIRE  
WALL, Ellen R. Department of Geological  
Sciences, University of Maine, Orono,  
Maine 04469

New mapping of metamorphic rocks on the eastern slopes of Mts. Madison and Washington shows that the rock units, originally mapped as Littleton Fm. of Devonian age by M. P. Billings, can instead be correlated with the stratigraphic sequence as mapped by Hatch, Moench and Lyons in central New Hampshire (1983). This Hatch, et al. sequence correlates with the Rangeley sequence established by Moench in western Maine.

In the Mt. Washington area, the lowermost unit consists of moderately rusty-weathering granulites and schists. The rocks are well-bedded, though irregularly so, and graded beds are only moderately common. Horizons of calcareous concretions are also present in this unit (Rangeley Fm.). The lower part of the unit consists of migmatitic gneisses with alternating dark, biotite-rich bands and lighter, quartzofeldspathic ones. Similar gneisses are present in the Bethel and Bryant Pond quadrangles. The overlying unit consists of strongly rusty-weathering sulfidic schists and calcareous, flaggy granulites and quartzites. The schists are typically poorly bedded but the quartzites and calc-silicate granulites are well bedded (Smalls Falls Fm.). A distinctive, green to buff weathering, thinly interbedded calc-silicate and biotite granofels unit (Madrid Fm.) overlies the Smalls Falls Fm. Above the Madrid Fm. is a unit composed of well-bedded (commonly graded), grey-weathering biotite schists and granulites (Carrabassett Fm.). Commonly, coarse muscovite and quartz<sup>±</sup>/sillimanite forms pseudomorphs after andalusite and staurolite. The base of this rock unit is considered to be the boundary between the Silurian and the Devonian age rocks. Hence, in contrast with Billings (1941), only the uppermost part of the section can still be equated with the Littleton Fm.

An "island" of staurolite grade rocks, surrounded by sillimanite grade rocks, has been mapped on the 2584' knob below Mt. Madison (Gorham 15 minute quadrangle). The metamorphism is of a static nature and the presence of staurolite within a sillimanite zone may be a result of polymetamorphism.

STRATIGRAPHY, STRUCTURE, AND METAMORPHISM IN  
AN AREA SOUTH OF THE SEBAGO BATHOLITH, MAINE  
THOMSON, Jennifer A., Dept. of Geology  
University of Maine at Orono, Orono,  
ME 04469

An area within the Portland and Gray quadrangles just south of the Sebago batholith is represented by regionally metamorphosed rocks of Siluro-Devonian age, specifically the Vassalboro and Windham Formations. Previous mapping by Hussey (1971, 1984) has provided the geologic framework within which this study has been conducted.

Structures observed indicate at least two deformational events and the presence of pseudomorphs indicates more than one metamorphic event. Minor folds are not common, however those observed have a tight isoclinal nature. Both deformation and grade of metamorphism increase near the Sebago batholith.

The Vassalboro Formation is typically well laminated and consists of biotite granofels, biotite quartzite, and calc-silicate beds interbedded with more schistose layers. The Windham Formation consists of three lithologies, but the principal one is a muscovite-biotite-quartz schist, +/-garnet, +/-staurolite. This pelitic unit also locally contains kyanite, the high pressure alumino-silicate polymorph. This may have some interesting implications regarding the metamorphic history and areal variation of the geothermal gradient of southern Maine.

Metamorphic grade in the area ranges from garnet zone to the sillimanite zone, the grade increasing toward the Sebago batholith. Post-tectonic helicitic overprint textures are observed in both garnet and staurolite indicating that they grew after deformation had ceased. Coarse grained muscovite pseudomorphs after staurolite become more abundant as the Sebago batholith is approached. All of these observations indicate a complex metamorphic history of the area.

MICROFAUNAL AND PALEOCEANOGRAPHIC ANALYSIS OF  
THE GULF OF MAINE  
STERLING, Richard S., Department of Geology  
Bates College, Lewiston, Maine 04240

Microfaunal analysis of a core from Crowell Basin in the Gulf of Maine indicates that drastic changes in the environment have occurred since 14,000 yrs. BP. By 14,000 yrs. BP, Crowell Basin was apparently ice free. The dominance of the foraminiferal species *Elphidium clavatum* and *Islandiella islandica* near the bottom of a 9.5 meter core imply shallow water depths, with cold brackish water and some indrafting of continental slope water. Up core, *Islandiella helenae* and *Nonionellina labradorica* dominate the fauna signifying the continuation of shallow water depths but with wider water temperature fluctuations and more typical marine salinities. By 8,000 yrs. BP, the dominance of *Islandiella teretis*, *Globobulimina auriculata*, and the increase in planktonic foraminifera indicate that water depths, salinities, and the amount of deep water influx into the Gulf of Maine all increased.

Comparison of the microfauna from Crowell Basin with that from a Wilkinson Basin core and a Platts Basin core indicate similar faunal successions down core. The faunal record of the past 8,000 years in the Wilkinson Basin core is missing from the Crowell Basin core while lesser but still significant amounts are missing from the Platts Basin core. Strong bottom currents since 8,000 yrs. BP have apparently halted deposition at the Crowell Basin core site.

## Legislative Notes:

### A SUMMARY OF PROPOSED LEGISLATION CONCERNING GROUND WATER RESOURCES

Governor Joseph Brennan is asking the Legislature to pass three bills related to ground water this spring. The proposals are part of a series of recommendations developed this winter for the Governor by the Ground Water Policy Review Committee of the Land and Water Resources Council.

The legislation ranges from providing legal recourse for ground water interference, to controlling contamination from salt storage facilities, and requiring well drillers to report ground water information.

The liability bill is sponsored by Senator Richard Trafton who has offered the Energy and Natural Resources Committee the Administration's draft bill as a substitute for his earlier version, LD 731. In its new form, the bill clearly establishes that the pre-existing use of ground water for normal residential uses has priority over subsequent newer uses. It provides special protection for pre-existing domestic uses, and allows landowners to seek compensatory damages through the courts in the event of interference.

The Legislation, if enacted, will not resolve all of the important issues relating to the allocation of ground water. For this reason, the Governor has directed the Council to develop additional public policy that will guide decisions related to a broad range of competing uses for ground water, especially as new agricultural and industrial practices emerge. He has asked the Council to make recommendations to him by January 1, 1986.

A second bill, LD 1406, is aimed at obtaining ground water and geological information from well drillers for use by the Maine Geological Survey. The bill does not include the registration of contractors who construct dug wells, nor does it institute water well construction standards. The bill is sponsored by Senator Judy Kany.

Regulatory measures to control contamination from road salt and sand-salt storage piles are also proposed. The Administration is completely redrafting its first version of the bill which the Energy & Natural Resources Committee heard as LD 931.

Other recommendations of note of the Ground Water Policy Review Committee include:

Establish through executive order of the Governor a standing Ground Water Committee of the Land and Water Resources Council. The committee would make sure state ground water policies are met and agencies coordinate ground water programs. Federal funds totaling \$30,000 would be used to hire a state aide to work with the committee.

Speed up mapping of state ground water systems through the Maine Geological Survey to complete work by July 1988. A geologist would be hired at MGS for \$30,000 and \$110,000 in federal funds would be applied to the study.

Study the relationship between farming practices and ground water contamination. The study will cost the state \$30,000 in 1986 and \$50,000 in 1987.

Use \$33,000 in federal funds to hire a geologist

to work with town planners in analyzing development impacts on ground water. In addition, \$20,000 is set aside in 1986 and \$30,000 in 1987 to provide state grants for similar work.

Hire for \$30,000 a geologist to work with water districts in identifying the extent of ground water resources and developing management plans.

Persons wanting additional information should contact Andy Tolman or Mark Sullivan, Executive Secretary of the Land and Water Resources Council

Holly Dominie  
Policy Development  
Specialist  
State Planning Office

### REGULATING EXISTING UNDERGROUND OIL TANKS - GROUNDWATER ISSUE OF THE DECADE

Hidden on p. 55 of the fat LD 395 (the Sunset Review bill for the DEP) are seven lean lines of text. They would authorize DEP to register existing underground oil tanks, to write rules regarding their monitoring, maintenance and operation, to outline remediation procedures, and to certify tank installers.

Considering the following facts: a) that over 200 tank leaks have been reported since 1979; b) that over 100 wells have been contaminated by oil in the same period; c) that this problem is far greater than that caused by "hazardous waste", d) that gasoline, once in the ground, is a "hazardous waste", and e) oil is commonly stored close to habitation and wells, the regulation of underground oil storage tanks is long overdue.

In 1984 the Underground Tank Act passed the Legislature, and rules promulgated under it have been through a public hearing and will soon be adopted by the Board of Environmental Protection. But these rules only cover installation, operation and abandonment of new tanks. They are sufficiently strict in that they should protect groundwater resources throughout Maine against potential spills from tanks installed from now on.

But 99% of the problem of gasoline vs. groundwater, derives from existing tanks: the tanks which have been in the ground for who-knows-how-long and which may or may not be leaking now.

Problem #1: is that we don't know where all the tanks are, nor how many there are. Estimates range from 25 - 40,000 in Maine.

Problem #2: many may be leaking. The American Petroleum Institute estimates that 25% of the existing tanks leak. The most common reason given for replacement is to increase capacity, but up to a certain point, it is cheaper to lose product than to replace a leaker.

Problem #3: daily inventory, which if kept carefully, can detect leaks down to 1-3 gals/day, is not mandatory.



Problem #4: remediation at spill sites is still very much a seat-of-the-pants judgement.

Problem #5: anyone can install a tank. Joe Schmoie with the backhoe should be certified for the new tricks of electrical isolation of tanks, cathodic protection, fill selection, and preventing piping leaks.

All these problems will be addressed by proposed DEP rules which are spelled out in a Contingency Plan. But the Plan will be so much waste paper until these seven lines on p. 55 of LD 395 are ratified by the Audit & Program Review Committee (on May 1st), and the House & Senate (later).

This is definitely the groundwater issue of the decade. Please write or call Senator Bill Diamond (Windham) and Rep. Neil Rolde (York) who chair the A&PR Committee. Also express your opinions to your local representatives. This bill needs all the support it can get, to counter the six-figure lobbying of the Maine Oil Dealers Association, who seem unaware that the liability costs would doubtless greatly exceed the costs of prevention through regulation.

As many of you are aware, Marcel Moreau, one of our geological fraternity, has been the driving force behind the investigation of the problem of oil in groundwater. He deserves most of the credit for discovering its dimensions, making it an issue in Maine, and putting together a slate of remedial & preventive solutions. Save your applause until you've written to your legislators, please!

Peter Garrett  
Senior Geologist  
Bureau of Oil & Hazardous Materials Control  
DEP

## MEETINGS:

NWWA SOCIETY  
OF GROUND WATER SCIENTISTS AND ENGINEERS  
EASTERN REGIONAL  
GROUND WATER CONFERENCE

July 16, 17&18, 1985

Portland, Maine

For information contact:

Linda Aller  
National Water Well Assoc.  
500 W. Wilson Bridge Rd.  
Worthington, Ohio 43085  
(614) 846-9355

TERRANES IN THE CIRCUM-ATLANTIC  
PALEOZOIC OROGENS

Atlantic Geoscience  
Society

May 27 - June 2, 1985

Liscomb Lodge  
Liscomb, Nova Scotia

SIXTH ANNUAL CHAMPLAIN VALLEY  
GEM AND MINERAL SHOW

Vermont Geological Society

August 3&4, 1985

So. Burlington H.S.  
Burlington, Vermont

The 84-85 Society Year

Ends Soon

Please

SEND IN YOUR DUES

MEMBERSHIP DUES STATEMENT

THE GEOLOGICAL SOCIETY OF MAINE, INC. is a non-profit Maine 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 dialogue 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, early spring and (with the Annual Meeting and sometimes field trips) in mid-summer. A newsletter, THE MAINE GEOLOGIST, is published for all members four times a year (more or less), approximately on a quarterly basis starting in September. The Society year runs from August 1st to July 31st. Annual dues and gift contributions to the Society are tax deductible. There are three classes of annual memberships:

- \$7 REGULAR MEMBER - Graduate geologists, or equivalent, with 1 year of practice in geology, or with an advanced academic degree in geology
- \$6 ASSOCIATE MEMBER - Any person or organization desirous of association with the Society
- \$4 STUDENT MEMBER - Persons currently enrolled as students in college who are interested in geology
- \$2 APPLICATION FEE - A one-time fee to all new members, payable when applying for membership

ANNUAL RENEWAL or APPLICATION FOR MEMBERSHIP - THE GEOLOGICAL SOCIETY OF MAINE

|  |  |
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THE GEOLOGICAL SOCIETY OF MAINE, INC.



84-85 SOCIETY YEAR STARTED - AUGUST 1st - PLEASE SEND IN YOUR DUES

THE GEOLOGICAL SOCIETY OF MAINE  
c/o Arthur M. Hussey, Dept. of Geology,  
Bowdoin College, Brunswick, Maine 04011

THE MAINE GEOLOGIST is published four times a year, more-or-less, in early Fall, late Fall, late Winter, and maybe June or July, for members of the Geological Society of Maine, a non-profit educational Maine corporation interested in all aspects of the geology of the State of Maine.

Correspondence about membership in the Society should be mailed to Robert G. Gerber, P.O.Box 270, South Freeport, 04078. Items for inclusion in the newsletter may be directed to Chris Olson, RFD 3, Box 3070, Winthrop 04364.

|                   |                  |
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