



THE MAINE GEOLOGIST

THE NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

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Notes from the Newsletter Editor

You may have noticed some subtle changes in the newsletter - a new typeface and access to a laser printer will hopefully increase the readability of the text. The newsletter is being set up on an IBM compatible Word Perfect version 5.0 system. Those of you who have access to this type of system may make your submissions directly on a 5-1/4" double side, double density diskette or 3.5" double side micro diskette (which will be returned). This would greatly simplify the editor's task of retyping submissions and eliminate potential transferring errors. However, we'll take submissions any way we get them and unsolicited articles are always welcome. Suggestions for features or themes of future newsletters are welcome - we want to know what you want to read about.

Many of us that are not currently involved in academics have a hard time keeping track of what area colleges are doing, so this midwinter issue was designed to bring us up to date on some of those happenings. There will be a regular New Publications column for a brief synopsis of current publications that might be of interest to Maine geologists - this issue features two new Maine Geological Survey publications. We welcome submissions for future issues of this column - you may be aware of something we haven't yet come across.

News from The University of Maine (Orono)

It is difficult to summarize the activities of the large and diverse geosciences group at the University of Maine. Geosciences emphasis is housed in the Department of Geological Sciences, the Institute for Quaternary Studies, the Center for Marine Studies and Oceanography Program. Important ongoing studies include: (1) Appalachian bedrock structure, stratigraphy, geochronology, and geophysics programs; (2) marine geology/sedimentology; (3) Quaternary geology, climatology, and glaciology; (4) marine geochemistry; (5) terrestrial and environmental geochemistry; (6) micropaleontology and paleoceanography; and (7) experimental mineralogy/petrology. Current research totals more than \$1,000,000 per year. Cooperative programs within the state include the DEP and Federal EPA Watershed Manipulation Project and other acidic precipitation projects; ARGO Maine; Maine Geological Survey (crustal warping, offshore sedimentology for U.S. Minerals Management Service, coastal processes, and landslide project); Maine State Museum; Department of Marine Resources; and Bigelow Laboratory. In our most recent annual report, there are more than a dozen national and international projects listed. After a period of decreasing undergraduate enrollment,

we are now seeing an upswing in both the introductory classes, and an increase in majors. This seems to be following national trends in the geosciences. Graduate students who have recently finished include R. Craig Shipp, Ph.D. in Oceanography, who is now working for Shell Research in Houston, and Geological Sciences M.S. students Frederick Teichmann, Jim Brady, Ellen Wall, Margaret Burgess, Brad Hay, Dave West and Andy Walsh. We have recently been authorized by the UMS Board of Trustees to offer a Ph.D. program in Geological Sciences. As part of that process, we are advertising for two new positions, a structural geologist and a geohydrologist. We are actively seeking Ph.D. students, as well as maintaining our M.S. program. Finally, our biggest problem continues to be space. The bond issue passed in November will allow us to expand into a new addition elsewhere on campus, but the amount and configuration of that space are still being worked out. All-in-all, we are continuing to improve.

University of Maine at Presque Isle

Kevin McCartney has recently become an assistant professor at UMPI, where he teaches introductory and paleontology courses. He did his doctoral work at Florida State University (Ph.D. 1988) where he modelled mathematically the geometric skeletal configurations of unicellular silicoflagellates (an article on this is now submitted to Paleobiology). He is also part of the current controversy on the Cretaceous/Tertiary (K/T) boundary, as one of the advocates for a deep mantle explanation for this extraordinary event. In the last year he has published articles on this subject in *Journal of Geology*, *Eos*, and *Journal of Geological Education*. He was a recent participant at the Lunar and Planetary Conference meeting on Global Catastrophies in Earth History, held in Snowbird, Utah, and is currently working on two papers for the proceedings of this conference. He is also in the process of submitting chapters on silicoflagellates and ebridians for a micropaleontology textbook edited by Jere Lipps and to be published by Blackwell Scientific as a companion volume to their Fossil Invertebrates text. Kevin reports that "I like the area and, under the tutorship of Bill Forbes, am beginning to learn the local geology. My wife and I are making the adjustment to the colder climate."

University of Maine at Farmington

The 1989 New England Intercollegiate Geologic Conference will be sponsored by UMF on October 13-15, 1989. Field trip leaders are needed, including those for coastal trips starting in the south and working their way north on Friday. Contact Archie Berry at 207-778-3501, extension 459, if you are interested in leading a field trip.

Bates College Happenings

These are exciting times for the Geology Department at Bates College. We are presently in temporary housing on Bardwell Street just south of the main campus awaiting the completion of the Carnegie Science Center expansion project. Geology will occupy the first floor and half of the basement of the new complex, more than doubling our present floor space. We've all had a major hand in the design of lecture rooms and teaching labs as well as offices and research labs. The first phase of the move back to Carnegie, occupying the research lab space, will likely begin in September of 1989.

There are some recent personnel changes in the department. Roy Farnsworth is presently on sabbatical leave for the academic year. Roy is doing well and will be back teaching again next academic year. He's being replaced for a year by Dyk Eusden (Bates 1980; Dartmouth Ph.D. 1988). Dyk is currently teaching a seminar on Appalachian Geology in preparation for leading a five week short term (late April to late May) through the Appalachian orogen. The trip will begin in the Adirondacks and wind its way through Vermont, New Hampshire, Maine, and Quebec before finishing in Maritime Canada. Dyk's research interests are in the structure and metamorphism of the Appalachian orogen. He plans to begin a project on detailed mapping in the Presidential Range this summer. Last summer Dyk conducted a study of miarolitic cavities in the Conway area of New Hampshire for the U.S. Forest Service and saw some amazingly large (>2 meter) cavities filled with large smoky quartz crystals (>100 pounds) and other crystalline goodies.

Another new face in the department, though not a stranger around the state of Maine is Marita Bryant, who is in charge of our lab program. Marita received her B.A. from Boston University and was a colleague of Joe Kelley's at BU. She did her graduate work in Germany at Freie Universitet Berlin and then worked for a summer with Dan Belknap and Joe Kelley on an offshore marine study.

Mike Retelle rejoined the Bates staff last year and is currently involved in Quaternary work in Maine and the Canadian Arctic. His main interests are in glacialmarine and lacustrine environments. Mike has spent four summers on northern Ellesmere Island and last summer on Cornwallis Island working on various Quaternary mapping and stratigraphy projects and recovering sediment cores from numerous lake basins and marine inlets. This year Mike is co-leading a short term trip to Baffin Island with 11 Bates students and 8 Inuit students and staff from Arctic College in Igaluit. The focus of the field course will be on glaciological and limnological field methods in addition to traditional geological studies in two spectacular field sites on southeastern Baffin Island.

John Creasy is working on the geology of the Androscoggin Lake mafic-ultramafic pluton. A gravity and magnetic survey is planned for this winter and field work for this summer. Another current project is the mineral chemistry of the Mt. Tripyramid complex, N.H. During the last two years John spent part time at UNH working in Henri Gaudette's isotope lab sorting out the Sr isotopes of the Rattlesnake Mountain pluton (Casco, Maine). John and Mike co-lead the tenth anniversary short term to the Southwest; their students

remapped most of Arizona and adjacent parts of New Mexico and Colorado in five weeks. John and geologist Kathy Bither were married last October on the outcrop (pegmatite) at Morse Mountain with Seawall beach as a backdrop.

Colby College Communications

Don Allen's professional activities have centered on exploration for precious metals in Nevada, Arizona and Mexico, primarily as a consultant to mining and ranching companies.

Harold Pestana is continuing his studies of the early 19th century history of geology, in the libraries of the British Museum (Natural History). He is also continuing his work in describing the carbonate facies of Bermuda, and evaluating the contribution of Foraminifera to Bermuda sediments.

Bob Nelson is studying subfossil beetles from the Presumpscot Formation that were collected by Ron Davis (UMO) and Scott Anderson (Northern Arizona University), late Pleistocene specimens from Manhattan Island (NY) collected by Ed Karp of NYU, and Holocene specimens from Sandy River terrace sediments here in Maine. He continues working with USGS and University of Alaska colleagues on several Alaskan Quaternary and late Tertiary sites.

Bill Doll is collecting and analyzing gravity and seismic data in Maine, most recently focusing on the Bottle Lake pluton near Lincoln. He is also studying scatter of seismic waves by localized geologic bodies such as magma chambers, or by inclusions of country rock in a pluton. These studies could be useful in interpreting seismic data where the geology is more complicated than most seismic models assume.

Bruce Rueger is studying Pennsylvanian palynomorphs and clay mineralogy of the Paradox Formation of southeast Utah in hopes of developing correlations between these and climate, paleoecology, and depositional environments. He is also producing a collection of pollen slides of endemic Bermuda plants as a basis for both modern and paleoecologic studies of the island of Bermuda. In addition, he's been invited to sit on the Mayor of Waterville's committee on recycling and waste management.

Bowdoin College News

At long last it appears that Bowdoin will have a legitimate major in geology. The Curriculum and Educational Policy Committee of the College has already approved it and the faculty will vote on it at the February meeting. Until now students interested in geology had to joint major with another science to legitimize the geology part.

Art Hussey continues as Chairman of the Department, and teaches the hard rock courses - Mineralogy, Optical Mineralogy, Igneous and Metamorphic Petrology, and Structural Geology. We all share to some extent the duties of the introductory Physical and Historical Geology courses. Art continues mapping and interpreting the geology of the coastal part of southwestern Maine. He has recently completed detailed compilations of the bedrock geology of the following 7-1/2' quadrangles: Westport, Bristol, Pemaquid Point, Boothbay Harbor, and Phippsburg. These will be open filed soon by the Maine Geological Survey. Also under revision is a summary of the geology of the Bath and Portland 1x2 degree map sheets (originally issued as Open File 85-82 of the Maine Geological Survey).

Ed Laine, who has two hats, one as Director of Environmental Studies Program, and the other as Assistant Professor of Geology, teaches the popular introductory level Marine Geology course and also two upper level courses, Environmental Geology and Geophysics. Ed continues an NSF-supported inquiry into the nature of slope failure along the continental slope off the eastern United States and Canada. He is working with colleagues on the Bay Campus of the University of Rhode Island and the USGS in Woods Hole to determine whether creep is an important process in the transfer of sediments to the deep ocean basins. Presently work is focusing on refining recognition criteria for detecting creep in high resolution seismic profiles and to provide realistic boundary conditions for finite element models of creeping slopes. He is eager to talk with anyone who has experience with intraformational and intrastratal deformation, especially on the larger scale (say, 10s of meters), for the insights that rocks may give him to what he sees in his seismic records ("shaky" stratigraphy).

Connected with his duties as Director of Bowdoin's Environmental Studies Program, Ed Laine is involved in two investigations into water quality in the Brunswick region. With Ed Gilfillan, an adjunct professor of Chemistry and Director of Bowdoin's Bethel Point Marine Station, he is beginning to investigate the water quality considerations (mainly nutrients) behind last summer's shellfish mortality in Maquoit Bay. Surface and groundwater sampling will be performed this coming spring and summer and linkages will be sought between nutrient loading and land use patterns in the adjacent watersheds nourishing Maquoit Bay. This work is primarily being carried out as independent study and thesis projects by Environmental Studies students. A longer range project that the two Eds will carry out will be a comprehensive study of Merrymeeting Bay, patterned at least in spirit after K. O. Emery's work on Oyster Pond in Falmouth, MA. Once again the primary thrust will be field experience for Bowdoin Environmental Studies students.

This fall, the Geology Department added a third professor to its staff. Peter Lea comes to us from INSTAAR at the University of Colorado. He is a glacial geologist with research interests in glacial geology of Alaska (see Peter's statement at end). With his expertise we have added courses in Glacial Geology, Quaternary Geology, Geomorphology, Sedimentology, Stratigraphy, and an introductory level course on Arctic environments. Peter will have a strong input into Bowdoin's Environmental Studies and Arctic Studies Programs. From Peter: "As a recent emigré, I have been trying to familiarize myself with Maine surficial geology and to acclimatize to Maine weather and culture. I returned briefly to old haunts of Colorado to attend the Centennial Meeting of the Geological Society of America in Denver. There I presented two papers on Quaternary/geomorphological research in Alaska and acted as co-convenor for a symposium on "The Last Interglaciation/ Glaciation Transition (122-64 ka) in North America". The symposium was well attended and the presentations were generally excellent. Peter Clark (Oregon State University) and I are currently editing a symposium volume, which is

planned as a GSA Special Paper. Summer plans include a stint in southwestern and west-central Alaska, involving a collaborative lake-coring project with Linda Brubaker and Pat Anderson (University of Washington) as well as a continuation of stratigraphic/sedimentologic work in Quaternary periglacial basins."



Annual Student Presentations GSM Spring Meeting

Attention: Upper class geology and earth science majors

Students in Maine colleges are invited to present papers on their geologic projects, generally following the style of the Geological Society of America technical sessions. The thought here is to provide students an opportunity to discuss their work before a group of "outside" geologists, to give them some experience in preparing a technical paper, in writing a concise and informative abstract, and in making an oral or poster presentation before a professional audience.

In connection with this program, you are invited to consider preparing a paper on such of your projects as may be far enough along to be shaped up for a formal presentation either orally or in a poster session. Presentations will be limited to 15 minute length with an additional 5 minutes for open discussion. A total of eight oral presentations will be allowed. Poster sessions will be held during the social hour. Limitations on number and information regarding available space will be determined on the basis of number of submissions.

An important part of the student presentations will be the preparation of abstracts for publication in THE MAINE GEOLOGIST in a subsequent issue of the newsletter. Depending on the size of type used by the author, the space will permit a 200-250 word abstract, with a column width of 4-1/2". Abstracts should use the Geological Society of America format, and be neatly typed with black mylar ribbon on white bond paper or with word processor (near letter quality printer). Do not fold.

DEADLINE: MARCH 10, 1989
Submit an original and two copies (unfolded) of CAMERA READY ABSTRACT to:
Professor Mike Retelle
Department of Geology
Bates College
Lewiston, ME 04240
For more information call 207-786-6155.

"Shake, Rattle, & Roll"

by Mike Foley and Bob Johnston
Maine Geological Survey

On December 27, 1988, central Maine was shaken by another moderate (3.9 magnitude) earthquake. The epicenter was located in Albion, about 12 miles east of Waterville in Kennebec County. It was the third earthquake of this magnitude to be centered in north-central New England in the past two months. On October 20, a 3.9 magnitude earthquake was centered on the Maine/New Hampshire border in Milan, New Hampshire, and on November 14, a 3.8 magnitude earthquake occurred in Sumner, Maine in Oxford County.

Maine is part of the Northeastern United States Seismic Network. Eleven permanent seismic stations are located throughout the state. These were installed by Weston Observatory of Boston College to monitor the seismic activity in Maine.

Portable seismographs were recently set up in the towns of Albion, Unity, and Freedom by the Maine Geological Survey and Weston Observatory to monitor aftershocks of the December 27 event. No aftershocks were recorded during the time that these instruments were operating.

In conjunction with the monitoring stations, individuals who notice an earthquake or what they think is an earthquake are asked to fill out an "Earthquake Questionnaire Form". These data are utilized by Weston Observatory to conduct intensity studies to monitor the effects earthquakes have on manmade structures and objects in the northeast.

Penobscot Nation Resource Exploration

by Theresa K. Secord

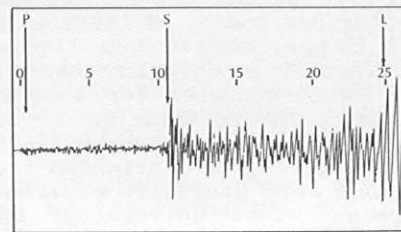
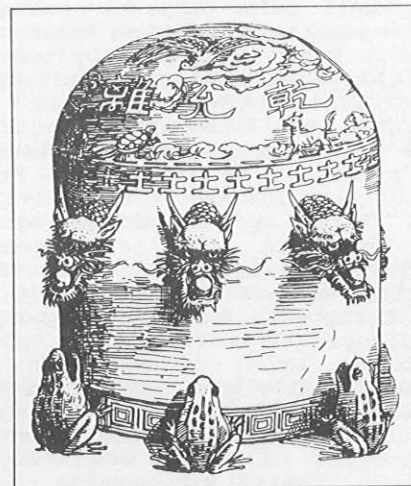
Since late 1984, the Penobscot Indian Nation has contracted with the Bureau of Indian Affairs to perform mineral resource assessment work on Penobscot Nation and Passamaquoddy Tribe trust lands in the State of Maine. The land base of interest has grown from a total of 140,000 acres in 1984 to 175,000 acres currently.

The purposes of the assessment are: (1) to improve the likelihood of locating a significant base, strategic and/or precious metals deposit on Passamaquoddy Tribe and/or Penobscot Nation trust lands, (2) to promote metals prospects to improve the Tribes' positions with respect to negotiations for profitable mineral agreements with mineral exploration and development companies, (3) to provide each Tribe with more detailed information on exploration targets for the mineral inventory data base established in 1985, and (4) to provide mineral resource awareness and training and job skills to members of both Tribes.

The assessment has traditionally focused on metals exploration, but certain non-metals commodities, such as sand and gravel, peat, building stone, and hydro-power have been addressed as well.

Exploration methods and techniques employed in the Penobscot Nation Mining and Minerals Program are based on those developed by John S. Cummings of Bangor. In general, reconnaissance geochemical sampling of soil, seep and stream sediments is employed as the major exploration tool. Elements analyzed in geochemical analyses are dependent upon the respective geologic terranes. Geochemical grids are constructed with closely spaced lines and sample intervals in anomalous geochemical zones detected by reconnaissance geochemical sampling and geologic mapping. Ground geophysical methods including induced polarization, resistivity, electromagnetics and proton magnetometer survey are usually employed in the grids to delineate drilling targets. Finally, core drilling is used to locate the bedrock metals responsible for the surficial geochemical anomaly.

The program is directed by John S. Banks, Penobscot Nation Director, Department of Natural Resources and is managed by Theresa K. Secord, Staff Geologist. The project has employed between two to four Indian field technicians and one to two geologists per field season.



New Publications from the Maine Geological Survey

The Maine Geological Survey has just published two bulletins of special interest to both geologists and the general public. Bulletin 38 is titled "The Geology of Mount Desert Island: A Visitor's Guide to the Geology of Acadia National Park", by Richard A. Gilman, Carleton A. Chapman, Thomas V. Lowell, and Harold W. Borns, Jr. This book is written in a style easily understood by the non-scientist. It provides a comprehensive, up-to-date description of the geology of the Acadia Park region, intended to give park visitors a greater appreciation and enjoyment of Acadia's natural history.

Most of the "Acadia bulletin" is concerned with the bedrock and glacial geology of Mount Desert Island. There are numerous photos illustrating geologic features discussed in the text, and sequences of diagrams are used to help explain the complex plate-tectonic history and Quaternary sea-level changes that have affected this part of Maine. The bedrock geology of Schoodic Peninsula and Isle au Haut are also included in the volume.

Geologists will be especially interested in the maps accompanying Bulletin 38. There are two large, full-color maps showing the bedrock and surficial geology of Mount Desert Island. The bedrock map, compiled by Dick Gilman and Carleton Chapman, updates Chapman's earlier work. The surficial map is largely the product of Tom Lowell's recent investigations on the island. Both folded maps and the text are conveniently packaged in a zip-lock plastic envelope.

Bulletin 41 is "A Collector's Guide to Maine Mineral Localities", by Woodrow B. Thompson, Donald L. Joyner, Raymond G. Woodman, and Vandall T. King. This 131-page book is written primarily for the mineral-collecting hobbyist, but also contains information useful to anyone wanting to know more about Maine minerals. An introductory chapter describes the geologic settings of Maine minerals, such as granite pegmatites, metamorphic rock assemblages, and placer deposits. This section also includes tips on mineral collecting techniques and lists of museum displays and informative journals.

The mineral guidebook contains detailed descriptions of 45 of the best collecting sites in Maine. There are 1:24,000-scale topographic maps pinpointing the localities, along with detailed driving and walking directions. Site descriptions include validated lists of mineral species and comments on notable discoveries. The authors have field-checked all of the localities, and have included information on their current ownership status.

The guidebook also contains Van King's updated checklist of Maine minerals and the towns where each mineral has been found. Abundant bibliographic data and photographs of mines and quarries round out the volume. The authors intend to revise this publication periodically, and a book on the mineralogy of Maine is in the planning stage.

The price of both of the above bulletins is \$8.00 each (plus \$.40 tax on in-state purchases), payable to Treasurer of State of Maine. Orders should be sent to Maine Geological Survey, State House Station 22, Augusta, ME 04333.

Upcoming Events

Thursday, February 9

1:30 pm Drowning of America's Coastline
3:30 pm Engineering Geology of Egypt
Orrin Pilkey, Duke University
University of Maine (Orono), Boardman Hall

Thursday, February 16

7:30 pm Erosion and Sea Level Rise: Why Your Favorite Peninsula May Become Your Favorite Island
Dan Belknap, University of Maine
Bowdoin College, Beam Classroom

Thursday, March 2

7:30 pm Peopling of the Gulf: Prehistoric Archaeology
Bruce Bourque, Maine State Museum
Bowdoin College, Beam Classroom

GEOLOGICAL SOCIETY OF MAINE SPRING MEETING BATES COLLEGE/CHASE HALL MARCH 31, 1989

2:00-5:00 pm	Student Presentations
5:00-6:00 pm	Business Meeting/Social Hour
6:00-7:00 pm	Dinner
7:00 pm	Evening Program - TBA

\$ ¢ \$ ¢ \$

GSM Treasurer's Report Period Ending 11/18/88

Total members: 250	
Balance on hand 8/31/88	\$5127.23
Receipts:	
Dues and Application Fees	\$371.00
Summer Guidebook Sales	34.00
Bulletins	5.00
Receipts Subtotal	\$400.00
Disbursements:	
Mailing program	\$ 30.00
Summer Meeting Banquet	369.40
Postage	90.23
Oct. Newsletter Printing	248.00
Letter Systems, Inc.	74.00
Disbursements Subtotal	\$811.63
Net Change	-\$411.63
Balance on hand 11/18/88	\$4715.41

\$ ¢ \$ ¢ \$

Secretary's Report Fall Business Meeting of the Society November, 1988

Approximately 100 persons were present. Items proposed by the officers were as follows:

To change the annual meeting from the Summer Field Meeting to the Fall Meeting. Accepted unanimously.

To add the Newsletter Editor to the slate of officers. Accepted unanimously.

To update the current dues assessments to the following:

Regular members	\$7.00/yr
Associate members	\$6.00/yr
Student members	\$4.00/yr

with the traditional \$2.00 initial application fee for all new members.

There was considerable debate on the issue of how changes in dues assessments should be made. Several motions were proposed, clarified, withdrawn, or amended. Unanimous accord, however, was reached on a motion to strike Article V, section 2 from the Bylaws. This leaves the officers free to set and publish dues, with no requirement to change the bylaws every time the dues change.

It was noted that the back cover of The Maine Geologist does not make it clear where to send dues checks. Irwin Novak (Treasurer) said that would be rectified. He also reported that the Society's kitty stands at a healthy \$4715.41 (see Treasurer's report).

"Hydrogeology of Maine" is the title of the next GSM Bulletin. If you wish to contribute, please send in titles and abstracts to Carol White or Carolyn LePage before the spring meeting.

In May, the hydrogeology seminar will be given by Dr. Joe Keeley of Oregon Graduate Center on the topic of "Fate and Transport of Contaminants in Groundwater".

Woody Thompson challenged all certified geologists to help him overhaul the Geologists Certification Exam. What are needed are new questions, new structure, and new specialist topics (e.g. engineering geology, environmental geology, etc.). Woody warned that those who did not volunteer might be drafted!

One suggestion from the audience was that teams be put together for developing questions. There were also questions about reciprocity with the 14 other states which have a certification program, but no clarity on the reciprocity issue was to be found.

Secretary's Report GSM Fall Meeting-November 18, 1988 Bowdoin College

The meeting was well attended (about 60 people), and well arranged by Carolyn LePage, the Society's Vice President and Program Chairman. The subject of the meeting was "Perspectives on Maine Geology".

Fred Beck gave an account of "Mineral Exploration in Maine". Begin with a geologic concept, he said. The concept might be that metallogenesis is associated with paleotensional features such as in the present day Red Sea or Sea of Cortez: in such areas as these, copper zinc deposits are believed to be forming today. Or certain tin deposits might be associated with plutons intruded high in the crust. The trick of exploration is to identify such areas in ancient geologic terrains.

Then take this concept with you into the field, and if it seems to work, purchase or lease a likely prospect. Get out your soil auger and take hundreds of samples across the area, analyze them and check for geochemical anomalies. If there are, get your company to finance geophysical surveys (magnetism, gravity or some kind of resistivity). If there are suggestive geophysical anomalies, shell out more money and drill those anomalies.

99% of prospects that get this far go no further. The Bald Mountain prospect was among the 1% considered as a candidate for development. But Superior Mining, who financed the initial discovery, was not convinced that they could make the prospect into an economic proposition. They tried to sell it to others, but those others share their pessimistic opinions. All, that is, except for Chevron, who figured it still had potential. But the original estimates of 35 million tons of minable ore are now perhaps as low as 9 million tons.

It may all hinge on two peculiarities of the Bald Mountain ore deposit. One is that it lies beneath 100 feet of till. The other is that the minerals that comprise it are a fine-grained mixture of sphalerite (ZnS) and chalcopyrite (CuFeS₂). The problem is that the copper smelters don't want the zinc and the zinc smelters don't want the copper, and even when ground down to 10 microns and flow-separated, the separation is never clean.

Such are the problems of determining "when is an ore not an ore" in Maine. But, according to Fred, it is not only Chevron that is interested in mining in Maine these days. Other companies with other geologic concepts are busy, usually secretly, in various parts of the state, and at least two large land owners (the Penobscot Nation and Diamond International) are doing large-scale mineral evaluation work on their own lands.

Joe Kelley gave a rapid-fire overview of marine research along the coast of Maine. He summarized the basics of beaches, bays, bluffs, and estuaries, and referred us to several new publications. News to most of us were the following points:

(1) A house built a few years ago on Popham Beach without a permit was recently ordered to be removed from the site. It was probably the first such refusal of a permit-after-the-fact that has ever occurred along the coast of the United States. In addition, new Board of Environmental Protection regulations prohibit high-rise buildings along any section of the sandy coast of Maine, because the inevitable rise of sea level will mean that such buildings can never be moved, that they will only break up in the waves where they stand. And it seems as if the dredging of Wells Harbor will soon cease too. Wells Harbor sports an active tidal delta which continually silts it up. There is no acceptable location to dump the dredge spoils. So nobody seems in favor of dredging any more, except that is, the Town Fathers of Wells.

(2) Bluff erosion has been known for many a year. But only recently has it been shown to be a source of export of muddy sediment from Casco Bay, and, in fact, bays all along the Maine coast. Very recently it was discovered that the eroding edge of salt marsh peats was where baby lobsters lie. Thus, there is a direct relationship between the erosion of bluffs and the continued health of our lobster fishing industry.

(3) New marine research includes detailed studies of sedimentation rates on the sea floor, heavy mineral analyses in the delta sands of Maine's major rivers, the gathering of seismic evidence of post-glacial sediment movement in the Gulf of Maine, and a better definition of the post-glacial sea level curve.

Joe and his crew have not run out of ideas for research topics yet.

John Williams covered the "Hydrogeology of Maine", starting, inevitably, with the sand and gravel aquifer mapping program. He assured us that the quality of the mapping was considerably better now than it had been in the early days. And so, when the less important mapping of the northern aquifers was complete, the survey would no doubt return to York County and do it all over again, with better definition and more detail. Mapping of sand and gravel aquifers may continue forever!

John described studies of the occurrence of pesticides in worst-case wells in or down-gradient of agricultural fields. Results had shown (the initially counter-intuitive fact) that both pesticides and nitrates more commonly contaminate bedrock wells than wells in either sand and gravel or till. This discovery, along with other similar findings, caused a reevaluation of the DRASTIC method.

The April Fool's Day flood in 1987 caused a reevaluation of the need for an extended stream gauging network throughout Maine. Nine more stations have been added to bring the total to 54 state-wide. Many are on tributary streams, and many are equipped with remote controlled data relays. The idea is to give better advanced warning of floods in the making. The number of observation wells has also been increased.

Research on identifying high yields in the bedrock aquifer is continuing slowly using various resistivity methods, as well as gravity, seismic, and magnetics.

There is also a state-wide wetland survey coming. It is to be based on the need to identify all wetlands greater in area than one acre for the purposes of comprehensive planning.

The need to consider all angles on the disposal of radioactive wastes from Maine has kept John very busy in this past year. In southern California and Nevada, he confirmed that burial of wastes will not be hampered by the generation of leachate. In Canada he heard a very different idea of how to site low-level radiocative waste storage, or for that matter any solid waste disposal site. The Canadians are tending towards above ground storage in concrete bunkers. But they are also considering shallow land burial in eolian sand deposits where the water table is far below the surface and the site is adjacent to some surface water body. The idea is that should it leak (and there will be engineered barriers to prevent leakage), the larger dilution should insure that leachate is never a serious nuisance.

Mark Hyland gave us his "Perspectives on the Glaciology of Maine". He summarized the two principal objectives of glaciology, namely to establish the directions of ice movement during glacial periods, and to reconstruct the shapes of former ice sheets.

In order to reconstruct former ice sheets, it is necessary to know not only the direction of ice movement, but also the location of the margins of the ice sheet, and the basal topography over which it moved. Finally, and hardest to get evidence for, is the condition of the ice at the base of the sheet.

If the bottom of the ice is completely frozen, no erosion can take place. The result can be that even easily erodible soils can be left in place (as they are in parts of New Brunswick). If the ice sheet has a wet base, then till is deposited.

Erosion at the base of an ice sheet can only occur when conditions at the boundary oscillate between freezing and thawing. This condition only exists under somewhat limited conditions of ice thickness, snow accumulation, and ice movement. But, of course, when erosion does occur, it is usually a very rapid process.

Because of the constraints on the operation of glacial erosion, and because ice sheets often disintegrate from the top down, it is possible for deeply weathered bedrock to stay in place throughout an entire glacial cycle with no erosion, and no new deposition.

Mark concluded his talk by issuing a challenge to field geologists to identify areas where surficial deposits are capped by old soils, or bedrock deposits are still in their weathered condition from earlier interglacial periods or even from preglacial times. Needless to say, Mark got some pretty skeptical questions from the audience.

The evening was capped by Phil Osberg's holding forth on the "Architecture of the Northern Caledonides". He started by giving credit to the other 100 geologists whose ideas he was plagiarizing.

But where to begin? With a definition, I suppose. The Caledonides are a mountain range with a SW-NE trend which is continuous from the Appalachians through the Maritimes and East Greenland to Britain, and bifurcating to Poland.

It has an old core. In this region the oldest rocks seem to come from the Chain of Lakes pluton. But the dating is somewhat tentative. Zircon ages for the mineral cores come out at greater than 1.6 billion years.

The Caledonides were built as a complex of mountain building and metamorphic events ranging in age from late Precambrian through Ordovician (Taconic) to the main Devonian event. There are also overprints of later happenings in many parts of the range. Like the Hercynian orogenesis of the southern Appalachians, and the Triassic post-orogenic basins and volcanics signalling the end of the Caledonian building and the long period lasting up to the present, of erosion and continental separation.

And what of collision? Many geologists have as many theories. They range from subduction, to horst and graben, to island arc basins to continental collision. Evidence for all can be found in different places at different times, helped or hindered by the presence or absence of faunal provinciality. Provinciality has been taken to indicate the separation of two continents which later collided. But Silurian provinciality has also been interpreted to indicate the collision of a "dodgem" continent, rather than a big buster.

Finally, the present structure. We are still coming up with new information, especially with the several long distance seismic profiles. But much of the interpretation is speculative. For instance, the marine traces off Long Island could be picking up Hercynian structures. And the COCORP data misses the salt-dome-like gneiss domes. But at least the overland profiles are constrained by surface geology of east dipping faults at the Maine coast, and west dipping faults along the Maine/Quebec border.

The story is not all told yet.

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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 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 memberships:

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