



THE MAINE GEOLOGIST

THE NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

JULY
1989
VOL. 15
NO. 23

GSM ANNUAL FIELD TRIP

JULY 29 & 30, 1989

Saturday - Bedrock Geology of the Southeastern Margin of the Connecticut Valley-Gaspe Synclinorium in Somerset County, Maine

Meeting Place - Saint Joseph's Catholic Church, Route 15, Rockwood, 8:30 am

Sunday - Late-Glacial Stratigraphy of the Northern Kennebec River Valley from Skowhegan to Solon, Maine

Meeting Place - Gadabout Gaddis Airport/Mariah's Restaurant, Route 201 south of Bingham town center, 9:00 am

Bob Marvinney (MGS) and Hal Borns (UMD) will be leading the GSM summer field trips the weekend of July 29 and 30. On Saturday Bob will show us the stratigraphic and sedimentological aspects of units of the Seboomook Group (North East Carry Formation, Ironbound Mountain Formation), and their relation to the Frontenac Formation. We will also look at structural relationships on this margin of the synclinorium. Hal, on Sunday, will retrace his 1965 NEIGC field trip to the upper Kennebec River valley, taking a new look at the North Anson and Embden Formations and their relation to the Presumpscot Formation.

The GSM meeting and banquet will be held at the Big Squaw Mountain Resort in Greenville on Saturday night. There is a choice of lodging arrangements for the weekend. Ten double rooms have been reserved at the Big Squaw Mountain Resort for Friday and Saturday night; cost is \$29 per person per night. Lily Bay State Park has a group campsite set aside for Friday and Saturday night. The Park is about 15 miles from the Squaw Mountain Resort. Costs for camping will be approximately \$2 per person per night. The number of people attending the banquet, camping at Lily Bay, and lodging at Big Squaw must be known by July 21. Please contact Bob Johnston (289-2801), Carolyn Lepage (289-2651), or Carol White (846-5599). Contact Bob for more information on the trip.



1989/90 Society Year

Starts August 1, 1989

Please Send in Your Dues

William R. Holland Memorial Trust

William R. Holland, a geologist and friend, was killed in April 1989 in a climbing accident on the Columbia ice fields in Jasper National Park, Alberta, Canada. Bill was a senior geologist with Robert G. Gerber, Inc., and was a long-time member of the Geological Society of Maine. A trust fund has been established in his memory by his friends and colleagues. The purpose of the fund is to provide for the college education expenses of Bill's six year old daughter, Laurel Taggart Holland.

Robert G. Gerber, Inc. will match, dollar for dollar, the first \$5,000 received by the fund. If friends and institutions contribute \$5,000, Gerber will match that contribution and the fund will total \$10,000. With interest accumulating over the years, there ought to be a good chunk of money for Laurel to defray her college costs.

Contributions to the trust can be sent to: William R. Holland Memorial Trust
c/o Robert G. Gerber, Inc.
17 West Street
Freeport, Maine 04032

Checks should be made payable to: William R. Holland Memorial Trust.

The Geological Society of Maine newsletter is planning a memorial issue in honor of Bill Holland and his contributions to geology in Maine. Anyone who has a personal experience, recollection or anecdote about Bill that they wish to share with others should submit it to the newsletter editor. We are also looking for pictures to illustrate the issue. All submissions should be sent to:

Susan Corderman Weddle
GSM Newsletter Editor
11 Beech Drive
Brunswick, Maine 04011

GSM Treasurer's Report Period Ending 3/31/89

Total members:	266
Balance on hand 11/18/88	\$4715.41
Receipts:	
Dues and Application Fees	\$ 891.00
Summer Guidebook Sales	10.00
Bowdoin Dinner Receipts	41.00
Receipts Subtotal	\$ 942.00
Disbursements:	
Annual Bulk Mailing Fee	\$ 60.00
Fall Meeting Banquet	192.72
Postage	60.18
Feb. Newsletter Printing	256.80
Software Update	5.00
Honorarium to Dr. Cherry	1000.00
Accounting Services	550.00
Disbursements Subtotal	\$2124.70
Net Change	-\$1182.70
Balance on hand 3/31/89	\$3532.71

Second Annual GSM Distinguished

Lecture Series

On Thursday, May 11, the second annual Geologic Society of Maine Distinguished Lecturer Series presentation was held at the Holiday Inn in Portland, Maine. This year's speaker was Dr. Joseph F. Keely of Portland, Oregon, a well-known groundwater consultant specializing in hazardous waste site characterization and remediation, technical enforcement support, and technology transfer and training related to groundwater contamination. Dr. Keely is currently performing applied research concerning evaluation of operation performance of groundwater remediation for EPA's Robert S. Kerr Environmental Research Laboratory and providing compliance oversight for EPA at the Chem-Dyne Superfund site. He has over ten years experience investigating major hazardous waste sites and teaching workshops for EPA. His presentation was very well received by the 110 registrants who attended the lecture.

In describing plume movement, Dr. Keely reminded us that in the 1970's dispersion was thought to be an important mechanism for contaminant migration. However, the volume of data now available in the 1980's indicates that velocity variations explain much of what used to be attributed to dispersion. He recommended focussing on advection, although if strong concentration gradients exist, diffusion may outpace advection.

After describing the pros and cons (mostly cons) of various drilling methods, Dr. Keely pointed out that the materials used in constructing monitoring wells depend in part on what is in the contaminant plume at a particular location. However, studies concerning the suitability of materials (PVC, Teflon, stainless steel, etc.) for different contaminants (metals, petroleum hydrocarbons, etc.) are not in agreement. In his opinion, the well materials are not likely to be as important in obtaining groundwater samples as adequate purging and proper sampling. Regarding screen design, he prefers machined screens and cautioned that the annulus in a double-wall wire-wrapped screen distorts flow, short-circuiting well development and producing inaccurate permeability measurements. He also pointed out that redeveloping a well can change measured permeabilities significantly.

Dr. Keely discussed pump and treat scenarios, pointing out that these systems are not closed or stagnant. Using the Chem-Dyne Superfund site as a specific example, he described how changes in natural conditions (the adjacent river fluctuates 2 to 3 feet per day) and man-made influences (the pumping wells at a factory on the other side of the river are drawing a portion of the contaminant plume under the river) can affect plume dynamics. He emphasized the importance of monitoring piezometric data in addition to groundwater chemistry to evaluate the effectiveness of pump and treat operations. His personal preference is to install seven piezometers per extraction well to accurately assess components of groundwater flow, stating that the chemistry results could be "all over the map". Dr. Keely concluded the program with several case studies.

37th Annual NAGT Meeting

by Patricia Seaward
Maine DEP and President NAGT/NE

The 37th Annual Meeting of the New England Section of the National Association of Geology Teachers was held at the University of Southern Maine on April 28-30, 1989.

The first order of business is to thank the many people (several of whom are GSM members) in the professional community, both public and private, who donated their time and expertise to this meeting. All comments received have been favorable.

Topics presented included an enactment of a coastal case study by some junior high students from Mount Blue Junior High School (they are ready to go on the road - contact their teacher, Patti Millette); also lectures addressing ground water as it is affected by radon, pesticides, road salt, sludge and wood ash spreading, oil and hazardous materials, and low and high level radioactive nuclear waste. A list of the presenters, their areas of expertise, and current addresses may be obtained from Pat Seaward at Maine DEP, State House Station #17, Augusta, ME 04333.

Walter Anderson, Director of the Maine Geological Survey (MGS) described what the Survey does and the potential valuable resource it is to the teaching community. Publication lists and index maps are available by writing to MGS, State House Station #22, Augusta, ME 04333.

Maine Commissioner of Education, Eve Bither, spoke to the audience at noon addressing the issue of the shortage of math and science teachers in Maine and the nation. Mrs. Bither cited statistics confirming that there is a problem training teachers in those areas. Several solutions were discussed and the question was raised whether major changes in our educational system should be mandated by the Department. Mrs. Bither responded that any major changes take energy and that energy must come from the teachers. There is a task force being formed to work on this problem and others. More information may be obtained from Commissioner Bither's office, DECS, State House Station #23, Augusta, ME 04333.

The attempt to use the NAGT/NE as a medium to bring useful information to Maine's earth science teachers was not as successful as we had hoped. Anticipated attendance of this target group fell far short of expectations. While total registration was approximately 30 people, figures showed that 52% of the participants were from Massachusetts, 45% were from Maine, and 3% from New York (Eastern Section, NAGT). There was no representation from New Hampshire, Vermont, Rhode Island or Connecticut.

Of the Maine contingency, 86% were secondary earth science teachers (42% NAGT members) and 14% were college teachers (100% NAGT members).

We will still be working on ways to improve the educational lines of communication in Maine. The earth science community has much to offer to teachers at all levels.

Maine Geological Survey

Summer Field Work

Fourteen bedrock and surficial geologists will be employed under the Maine Geological Survey's basic mapping program this summer, including three bedrock mappers funded through the MGS/USGS COGEOGMAP project in Northern Maine.

Bedrock mappers will be widely scattered across the state. Lindley Hanson (Salem State College), Steve Pollock (USM), and Dave Roy (Boston College) will continue their mapping in the Allagash-Saint John River region under the COGEOGMAP program. Gary Boone (Syracuse University) will continue detailed mapping of the pre-Silurian section near Patten. Allan Ludman and John Hopeck (Queens College) will continue unraveling the complex geologic history of the Miramichi anticlinorium. In coastal areas, Ollie Gates (SUNY Fredonia, Emeritus) will map the rocks of Vinalhaven Island, and Art Hussey (Bowdoin College) will continue his work on the Casco Bay Group. Additionally, the MGS will partially support a study of seismicity in the Milo area by Bill Doll (Colby College). When things slow down in the office, Bob Marvinney (MGS) will spend some time mapping in the Seboomook Lake region.

MGS surficial quadrangle mapping is slightly reduced this year, due to lack of available federal funds, but will nevertheless include five geologists. Mike Clinch (University of Dayton), Andres Meglioli (Lehigh), and Jeff Smith (Ohio University) will continue the detailed surficial mapping of 7.5-minute quads that has been progressing in York and Cumberland Counties for the last several years. Steve Kite (West Virginia University) will be working in the Telos Lake area; and Tom Lowell (University of Cincinnati) will continue his detailed mapping on Mount Desert Island, using newly available 7.5-minute base maps.

Woody Thompson (MGS), Tom Weddle (MGS), and Glenn Prescott (retired USGS) will contribute to the surficial program through their mapping of gravel aquifers in the Rangeley-Rumford region of western Maine this summer. Part of the aquifer mapping field area includes the western Flagstaff Lake basin, and test borings of the program should shed some light on the extent of Glacial Lake Bigelow. Newly published 7.5-minute topo sheets of the area clearly show ice-contact deposits which are not as well shown on the old 15-minute sheets. The recent paper in *Geographie Physique et Quaternaire* by Michel Parent and Serge Occhietti (1988, v. 42) calls for a re-evaluation of the style of deglaciation in this region as proposed by Hal Borns and Parker Calkin (GSA Bull. 1977, v. 88). Observations made during the reconnaissance aquifer mapping will provide more evidence to evaluate whether the ice stagnated in the valleys, or if it actively retreated up the valleys to the international boundary.

In association with the gravel aquifer mapping program, several students from various schools have been hired as summer help. These include Lauren Foster (Colby) and Julie Poitras (Tufts) who are returning for a second stint with MGS, and Ben Williams (UM Farmington) and Jake Schepps (U Colorado). Tammy Parker, recently graduated from Colby, is the Governor's Intern to our office, and besides pounding the ground on the single-channel crew has plans to be married this August. Helping Marc Loiselle organize the bedrock ground water resource inventory are Sally Cole (Colorado State), Lisa Churchill (Colby), and Valerie Gurney (Cornell), who

has come back for a second year. Jason Edwards (U Mass) has been hired to assist Steve Mabee with field work on Georgetown Island as part of the bedrock ground water resource characterization project. Last but not least, grad student Julie Friez (UM Orono) is working with Joe Kelley on marine core studies.

MGS marine division geologists Joe Kelley and Steve Dickson have several summer field programs along the coast and offshore. They are collaborating with Dan Belknap of the University of Maine and several graduate students. Summer survey work will be located in the following project areas: (1) upper Penobscot Bay and Belfast Bay for seafloor pockmark distribution and origin; (2) Frenchman Bay and Blue Hill Bay for surficial sediment and seafloor physiographic mapping; and (3) Saco Bay and Kennebec River mouth parallel studies of nearshore sedimentary processes and dredged materials dump sites (to be repeated in the winter season).

On a final note, the two new MGS publications reviewed in the last newsletter have been nominated for recognition as outstanding state publications in the American Library Association's annual Notable Documents List. Those publications are "The Geology of Mount Desert Island: A Visitor's Guide to the Geology of Acadia National Park" and "A Collector's Guide to Maine Mineral Localities". The price of both of the bulletins is \$8.00 each (plus \$.40 tax on in-state purchases), payable to Treasurer of State of Maine. Orders can be sent to the Maine Geological Survey, State House Station 22, Augusta, ME 04333.



The State Geological Surveys -

A History

The Association of American State Geologists has published this comprehensive volume in recognition of the major role which the State Geological Surveys have played in geologic mapping and research accomplished in the United States over the past 150 years. Diverse in size, name and detailed functions, each of the 50 State Surveys has the basic responsibility to delineate the geologic framework and resources of the respective state.

Edited by retired Pennsylvania State Geologist Arthur A. Socolow, this illustrated hard-covered, 500 page book contains the history, organization, and functions of the 50 State Geological Surveys in individual chapters prepared by the respective Surveys. It is a record replete with scientific achievements, human drama, bureaucratic struggles, and most important, service to the public. The State Geological Surveys - A History may be ordered from the Geological Survey of Alabama, P.O. Box 0, Tuscaloosa, AL 35486. The \$20.00 price includes shipping; make check payable to Association of American State Geologists.

GSM Spring Meeting Minutes

March 31, 1989

The Spring Meeting featured the annual student presentations at Bates College; abstracts of the work presented are featured below. The business meeting began at 4:15 pm. In the Secretary's absence, the minutes were taken by the Newsletter Editor. First order of business was the summer field trip to Moosehead Lake region. It will be led by Bob Marvinney (MGS) and Hal Borns (UMO), and be held the last weekend in July. Members were reminded that the field trip will not be the annual meeting this year, as the annual meeting was changed to the fall meeting by a general membership vote.

The Spring Hydrogeologic Lecture Series will feature Dr. Joseph Keeley of the Oregon Graduate Center discussing remediation of groundwater through pumping and treatment. It was tentatively scheduled for sometime in May at a cost of about \$50. USM also announced their Dinosaur Film Festival on April 22, billed as "the first of its kind in Maine". The feature film is "1,000,000 BC" with Victor Mature. Archie Berry announced that UMF was sponsoring NEIGC on October 13-15 and that they could still use three or four more field trip leaders. Finally, enough interest has been expressed to proceed with GSM Bulletin #4 on Hydrogeology in Maine; potential contributors should contact Carol White for details.

The Treasurer's Report was presented, with the bulk of expenditures being the honorarium to John Cherry for last year's lecture series and accounting fees for the 1986 tax return. Irwin reminded members to check their mailing address for correctness and to make sure that their dues are paid up. Those members whose dues are significantly in arrears will be cut from the mailing list without advance warning. The complete report is included below.

State Geologist Walter Anderson took a few minutes to update members on current legislation and MGS programs. Bills pending included LD 883 to establish a marine geologist position for the survey, LD 173 for expansion of the wetlands program, LD 655 to establish a 16 member Water Supply Board to enhance the water use component, and legislation to license water well drillers and require drillers to submit logs of all wells drilled. He encouraged attendance from the geologic community when these bills are heard in the legislature to show our support. The GIS system is now working with a natural resource program. \$500,000 (10% of the total cost) has been appropriated to implement the system and Low Level Waste money will be used to digitize the maps and basic data information. Bob Marvinney of the MGS can be contacted for further information on the GIS system. There is a proposal in for a \$300,000 NSF grant for CREST, an intern program entitled Curriculum Resources for Earth Science Teachers. Walter reported that ARGO Maine has gotten a research vessel and April 4 has been named National Earthquake Awareness Week. In terms of housekeeping, the Survey may be moving to the Burleigh Building and is trying to get its core library "up to snuff". Finally, Senator Mitchell has revived a bill for regional research centers, including one for the Maine coast.

The meeting was adjourned at 4:50 pm, followed by social hour, dinner and the evening program. Carl Francis of the Harvard University Mineralogical Museum gave an excellent presentation entitled "Maine Minerals: A Museum Curator's Perspective". Many a "rockhound" was seen drooling over his slides of exquisite specimens.

GSM SPRING MEETING

STUDENT PRESENTATIONS

A Ground Water Investigation of Surficial Deposits Surrounding Taylor Pond, Auburn, Maine

DAVIS, Allison K., Department of Geology, Bates College, Lewiston, ME 04240

Taylor Pond is located in Auburn, Maine, in the northeast quadrant of the U.S.G.S. Minot 7.5 minute quadrangle. The compact drainage basin is approximately 32 km² and is confined by a series of bedrock knobs and ridges. Seven seismic refraction and electrical resistivity survey lines were employed within the Taylor Pond watershed to determine 1) sediment types; and 2) the depths to bedrock, water table, and sedimentary horizons. The seismic refraction surveys revealed a saturated thickness of sand, clay, and/or till ranging from 8 - >40 meters above bedrock. Analysis of the data from the electrical resistivity surveys, suggests that the thickness of materials is divided into, in ascending order: till and/or ice contact sand and gravel, sand, interbedded(?) silty clay, capped by sand. This stratigraphy is typical of that produced during retreat of the Laurentide ice sheet in the coastal zone of Maine. From these data, a three dimensional model of sediment distribution can be deduced. Knowledge of the geologic structure will aid in the determination of the hydrologic characteristics of the aquifer, should the need arise for the Taylor Pond area to be evaluated as a resource for public water supplies.

A PRELIMINARY INVESTIGATION OF THE SEDIMENTOLOGY AND GEOMORPHOLOGY OF THE SANDY RIVER:

HALL, Brenda L., Department of Geology, Bates College, Lewiston, Maine 04240
The Sandy River, located in west-central Maine, descends from the western highlands in Sandy River Plantation to the central lowlands near Norridgewock, where it discharges into the Kennebec River. Along its course, the river downcuts through various materials - bedrock, till, Holocene fluvial deposits, lake sediments, glacial outwash, and glaciomarine clay. The geomorphology and sedimentology of the Sandy River is controlled by the local physiography and geology. Along its upper reaches (Sandy River Plantation to Phillips), the gradient ranges from 3.7 to 30.3 meters per kilometer. The bedrock channel is straight and waterfalls are common. The only stable depositional features in this area, lateral cobble and boulder bars, occur where the river cuts through till. In the middle and lower segments of the river, the gradient rarely exceeds 3.7 meters per kilometer. The wide, sinuous channel cuts through Late Wisconsinan ice-contact stratified drift and glaciomarine clay, and Holocene fluvial deposits. Sand and gravel point bars commonly form on the meander curves.

The mineralogy of the sediments along the entire reach of the river is controlled primarily by the local bedrock and surficial sediments. Exotic grains in the mineral assemblages are common and may reflect a combination of glacial and fluvial transport.

AN INVESTIGATION OF POTENTIAL WATER RESOURCES IN FRACTURED BEDROCK NEAR TAYLOR POND, AUBURN, MAINE:

ANDERSON, Erik D., Department of Geology, Bates College, Lewiston, Maine 04240

A preliminary model of groundwater flow through fractured bedrock has been made in an area north and east of Taylor Pond, Auburn, Maine. Due to the anisotropic nature of crystalline bedrock, infiltration and groundwater flow is restricted to movement along interconnecting fractures. The local fracture geometry has been assessed through joint measurements at rock exposures and by the stereoscopic interpretation of air photos for fracture traces and lineaments. Depth to bedrock was determined by seismic refraction surveys. Azimuthal resistivity measurements were used to locate groundwater transmissive zones and to determine their relationship to bedrock joints and fracture traces. The correlation of this data with existing bedrock wells suggests localized groundwater flow and delineates potential areas of high-yielding water sources.

COMPUTER ASSISTED SEAFLOOR MAPPING, PERSPECTIVE VIEWING, AND MODELING OF PORTIONS OF CASCO AND SHEEPSHOT BAYS, SOUTH-CENTRAL MAINE

ROBBINS, Donald H.W., Dept. of Geological Sciences, 110 Boardman Hall, University of Maine, Orono, Maine, 04469

A Autocad computer drafting station, a 3-d surfacing program, and a parabolic wave modeling program, were utilized to investigate marine geology in Casco and Sheepscot Bays, south-central Maine.

In Casco Bay, < 1/2 km. west of Halfway Rock, a bedrock controlled "valley" is clearly seen at -40 to -70 meters on N.O.A.A. bathymetric charts. Three paleodrainage systems, from western, central, and eastern Casco Bay, converge at the northern end of this valley. At the map scale available no exiting paleodrainage is seen for this valley with 75 m. of local relief. Autocad's programing automated the digitizing process, saving time, increasing resolution, and manipulated contours, revealing a narrow exit channel at the valley's southern end. The digitized bathymetry was then utilized to create 3-d perspectives of the valley, aiding visualization of geomorphology and relationships between seismic profiles and seafloor surface expressions.

In Sheepscot Bay, the Kennebec River Paleodelta's sandy surface is characterized by linear depressions (1-2 m.) with mega-rippled bottoms (1.5-2 m.λ, and 15-25 cm. amplitudes), in water depths of 10-40 meters. These features could form from storm wave refraction and their energy interference patterns, after Black & Healy (1988); or from storm induced downwelling jets, after Cacchione (1987). The digitized bathymetry was combined with historical wave height, and period data to model wave refraction and diffraction patterns. The output wave heights were contoured allowing for comparisons to the observed bedform patterns and wave orbital energy. These problems were easily investigated, utilizing drafting, surveying and engineering computer techniques currently available.

SEISMIC STRATIGRAPHY AND HOLOCENE EVOLUTION OF PEMAQUID BEACH AND JOHNS BAY, MAINE.

YOUNG, Robert S., Institute for Quaternary Studies, University of Maine, Orono, Maine, 04469.

A series of paleogeographic reconstructions have been constructed that trace the Holocene transgressive history of the coastal and nearshore depositional environments of a section of west-central Maine coastline. Modern Pemaquid Beach is a sandy, pocket barrier fronting a small *Spartina alterniflora* salt marsh. It is an anomalous, sandy beach in a region of higher energy cobble beaches. This study uses over 25 km of offshore seismic profiling along with 13 vibracores taken from the back barrier marsh, the beach, and the nearshore to reconstruct the position of the paleoshoreline and related coastal depositional environments at 10,000 BP, 6000 BP, 3000, 2000 BP, 1000 BP. Radiocarbon dates performed on the freshwater and saltwater peats from the vibracores are used to develop the chronology and to construct a detailed sea-level rise curve for the last 3000 years. There is an archeological site adjacent to Pemaquid Beach. The fact that humans occupied the area several hundred years ago places certain restrictions on the paleo-environmental reconstructions.

At the beginning of the Holocene, the shoreline in this part of the Maine coast was several kilometers seaward of its present position. At that time, the entire Johns Bay region was emergent, exposing recently deposited Pleistocene glacio-marine sediments. The area was drained by a narrow fluvial system. By 9000 BP the Holocene transgression was under way, and a narrow embayment had begun to form. At 6000 BP the embayment had widened considerably, becoming pinned by bedrock on its eastern margin and by a bedrock ledge 500 m off of Pemaquid Beach. By 3000 BP the bedrock ledge was submerged and the beach, with its back barrier environments, had formed shoreward of the ledge. As sea level has continued to rise during the last 3000 years, Pemaquid Beach has migrated shoreward as a pocket barrier system with bedrock control on its flanks. Vibracores from the beach and offshore show a transgressive sequence of Pleistocene mud and silt unconformably underlying an upland bog peat which grades into an increasingly sandy salt marsh peat, finally overlain by back barrier and then berm sands.

AN ANALYSIS OF DUCTILE DEFORMATION AT INDIAN POINT, GEORGETOWN, MAINE

LATHROP, Alison S., Department of Geology, Bates College, Lewiston, Maine 04240

Indian Point is the southernmost point of Georgetown Island, Georgetown, Maine. For approximately one-half mile the shoreline encompassing the point consists of nearly continuous exposures of three members of the Cape Elizabeth Formation. From east to west the members are: 1) a thin-bedded/layered, garnet cotecule-bearing, quartz-plagioclase-biotite-garnet schist and granofels; 2) an extremely narrow, discontinuous band of rusty weathering muscovite-biotite-garnet-quartz schist; and 3) a black to dark green amphibolite. The metamorphic rocks are intruded by tourmaline-rich pegmatitic to aphanitic lenses and veins. A detailed study of the ductile deformation exposed at Indian Point was performed at a scale of approximately 1:20. Nine outcrop maps were made and clearly demonstrate spectacular polydeformation. Three sequences of folding have been recognized. F1 folds are recumbent folds or nappes coaxially refolded by F2, which is the dominant fabric in the region. F3 folds are rarely seen in outcrop but are argued to be present based on the observed orientation of F2 axes. Microstructural analysis of oriented thin sections corroborates this. Though a major fault has been mapped in the area based on stratigraphic discontinuities, there appears to be no structural fabric related to it. The whole zone has been moderately mylonitized and displays fabrics indicative of extensive shearing.

FLUID INCLUSION ANALYSIS OF SMOKY QUARTZ FROM MIAROLITIC CAVITIES IN THE WHITE MOUNTAIN NATIONAL FOREST:

LATHROP, Alison S. and EUSDEN, J. Dykstra, Department of Geology, Bates College, Lewiston, Maine 04240

The Conway granite is the exclusive host of miarolitic cavities within the White Mountain Batholith. The miarolitic cavities are found exclusively in a band parallel and immediately adjacent to the contact between the Conway granite and the Moat volcanics to the east. Among other minerals, these cavities contain very large (up to 260 lbs.), euhedral, smoky quartz crystals which are rich in fluid inclusions. Occurrence of the cavities and fluid inclusions indicate the presence of fluid and vapor phases within the last stages of crystallization of the host granite. Several generations of smoky quartz crystals were taken from three large miarolitic cavities and were examined in thin section from core to rim. Primary fluid inclusions were analyzed to determine the heats of formation and the average wt % sodium chloride. The observed temperatures of homogenization before pressure correction range continuously from 100°C to 400°C; when corrected for pressure they will rise substantially. wt % NaCl range from 3 to 9%. In one pocket, fluid inclusions from the last stage of crystal growth contain at least two types of daughter crystals, implying an increase in salinity in the final fluid phase. The temperatures of homogenization are lower than the estimated magmatic temperatures of crystallization for the host Conway granite. We conclude that the geothermal system within the Conway persisted over a wide range of temperatures.

MEMBERSHIP DUES STATEMENT

The GEOLOGICAL SOCIETY OF MAINE, INC. is a non-profit corporation established as an educational Society to advance the professional improvement of its members, to inform its members and others of current and planned geological programs in Maine; to encourage continuing social contact and 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 (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:

- \$7.00 REGULAR MEMBER Graduate geologists, or equivalent, with one year of practice in geology, or with an advanced degree.
- \$6.00 ASSOCIATE MEMBER Any person or organization desirous of association with the Society.
- \$4.00 STUDENT MEMBER Persons currently enrolled as college students.
- \$2.00 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

NAME	_____	Regular Member	\$7.00/year	\$ _____
	(Please print or type)	Associate Member	\$6.00/year	\$ _____
ADDRESS	_____	Student Member	\$4.00/year	\$ _____
	(Permanent mailing address)	Application Fee	\$2.00 one time	\$ _____
	_____	TOTAL ENCLOSED		\$ _____
	zip code			

Please make checks payable to: THE GEOLOGICAL SOCIETY OF MAINE, INC.
 c/o Irwin Novak
 Department of Geosciences
 University of Southern Maine
 Gorham, ME 04038

88/89 SOCIETY YEAR STARTED - AUGUST 1st - PLEASE SEND IN YOUR DUES

THE GEOLOGICAL SOCIETY OF MAINE
 c/o Arthur M. Hussey, II, Department of
 Geology, Bowdoin College, Brunswick, ME 04011.

THE MAINE GEOLOGIST is published four times a year, more-or-less, in early Fall, mid-Winter, Spring, and maybe Summer, 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 Irwin Novak, Department of Geosciences, University of Southern Maine, Gorham, ME 04038.

Items for inclusion in the newsletter may be directed to Susan Corderman Weddle, 11 Beech Drive, Brunswick, ME 04011.

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