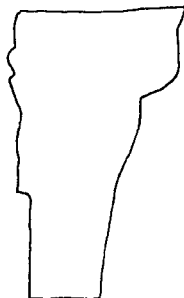


# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

WINTER 1975

Volume 2 Number 1

## A MESSAGE FROM THE PRESIDENT

The Vermont Geological Society will be one year old on February 23. Our first year has been devoted largely to initiating the organization's activities, and establishing procedures for the conduct of our business. In essence we have begun to fulfill the first stated objective of the Society by the holding of meetings and by opening a channel of communications between Vermont geologists.

As stated in our constitution, the second goal of the Society is to contribute to the public, information on the geology of Vermont, and to promote the proper use and protection of the state's resources. I feel this should be the major objective of the Society during our second year. A method by which we could begin to accomplish this goal is by devoting one of our meetings to public education. Among the possible forms this meeting might assume, a workshop format is appealing. The members of the Society possess sufficient expertise to conduct sessions on most topics of environmental concern. A few possible sessions might deal with: the general geology of Vermont, groundwater resources, the Vermont mineral industry, flood hazards, and waste disposal. Within the context of an open meeting it would be worthwhile to issue special invitations to our legislators, and the members of the numerous planning boards within the state. I hope the members of the Society will respond to this proposal with suggestions, criticisms, and alternate ideas.

As has been stated before, there are three attributes of a true profession. First, there is an accumulation of knowledge not available to the general public. Second is the recognition that as custodians of the knowledge the profession has an obligation to see that society is served responsibly in their field. And finally, the profession must be willing to make the knowledge available for public use. The Vermont Geological Society is in a unique position to serve the people of the state. This service will bring recognition of our professional status much sooner and more completely than registration forms. The opportunity is available for us to demonstrate, not simply request certification of, our professional competence.

Dallas D. Rhodes

The Green Mountain Geologist is published quarterly by the Vermont Geological Society and is sent by first class mail to all members of the Society. The Green Mountain Geologist is prepared by the Communications Committee of the Society, which includes James Ashley, John Malter, and Tim Acomb. Official mailing address for the Society is Box 304, Montpelier, Vermont 05602

#### GUEST EDITORIAL - - - THE VERMONT GEOLOGICAL SURVEY AS I SEE IT

There was a recent furor in state government as the Governor's new budget was unveiled and the hatchet was dropped on various and sundry state programs. One area that was eliminated by the Governor's budget was our own Vermont Geological Survey. Through the grape vine I understand that the Survey has now been given a new lease on life and will continue to function, but I think that it is unfortunate that the Survey is heard about only as it is about to be put to bed.

Perhaps this would be a good time for the Survey to reevaluate the impact of its programs on the State of Vermont and its populace. There are some very important issues that are geologically oriented that should be scrutinized by our Survey. Included among these are:

1. Evaluating the potential of the mineral resources at currently operating and defunct mines throughout Vermont. This information could be especially useful to the state's Agency of Development and Community Affairs in forecasting the impact of changes in the quantity and quality of ore deposits within the state and hence their effect on the economy of the state. The changes that are occurring in the G.A.F. asbestos mine with the workers obtaining ownership of the facility would present an excellent and probably very welcome opportunity for the Survey to assist this industry in future development.

2. The potential for natural gas and other energy resources in Vermont is something that is currently on many Vermonter's minds, and the Survey, not a prospector from Highgate who has a very limited perspective on geology (but who apparently has a knack for generating a great deal of publicity), should be the disseminator of responsible information concerning these resources.

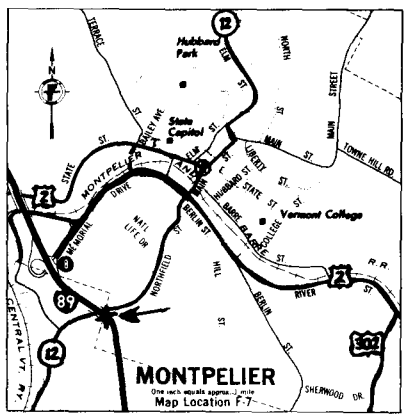
3. The environmental geology series that is being sponsored by the Vermont Geological Survey does provide a handy source of geological information to planning agencies within the state. These reports point out the need for geological evaluations before development occurs in the study areas, and taking this one step further, the need for geologists to accomplish these evaluations. I do question why when there are many competent geologists, and several colleges and universities offering degree programs in the geological sciences, located here in Vermont that these people aren't better utilized instead of having to hire people from out of state to do the field work and put out our reports.

During the serious economic crunch that we are all experiencing, the Vermont Geological Survey can and should play an important role in demonstrating the value of geology and the geologist to the people of Vermont. Lets get on with it !

John Malter

MONTPELIER PYRITE IN PHYLLITE MINERAL LOCALITY submitted by John Malter

From the junction of Northfield Street and Memorial Drive, head south on Northfield Street approximately one mile to the Interstate ~~91~~ underpass. Pull off to the side of the road and proceed to the rock fill that is located on the east side of Northfield Street directly beneath the Interstate bridge. You will find the pyrite cubes in phyllite scattered around the concrete bridge abutments. This material was placed in this area by the Vermont Highway Department after the excavation of a major road cut about 1/2 mile east of this site on the Interstate. Please note that although the road cut on the interstate is still very prolific for collecting the pyrite, it is illegal to stop and collect at this site, not to mention the fact that it is down right dangerous.



You may find some of the pyrite cubes on the exposed rock cleavages, but I find that some of the best specimens are found by splitting the phyllite along the rock's cleavage - exposing some very nice specimens. The cubes range in size from about one eighth inch across to over one inch across.

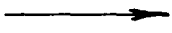
As for equipment that you will need, I would suggest a crack hammer, a small sledge hammer (for making big rocks into small rocks), some heavy work gloves, a "rock hammer", a small wedge, and some protective goggles.

Good hunting, and save a few specimens for the next guy or gal.

F O S S I L S   A R E   F U N   by J. ROCK

Fossils are critters and other good stuff  
Like flowers and plants that are quite old enough  
Fossils are fun and they're interesting too  
But you won't find no fossils down in the ZOO .....

P L E A S E   ANSWER THE QUESTIONNAIRE ON THE NEXT PAGE AND RETURN IT!!!



QUESTIONAIRE - - - SOME INFORMATION PLEASE!!

Your help would be greatly appreciated so that the Vermont Geological Society can compile some information on you as a member, associate member, or student member, and also so that we can publish results here. We therefore would appreciate it if you would take a piece of paper and fill out the questions below. Then **send** your answers to the Vermont Geological Society, Box 304, Montpelier, Vermont 05602.

Thank you in advance!

QUESTIONAIRE

General Information

Name

Address

A. Work on Vermont geology\*

1. What is the nature of your current research concerning the geology of Vermont?
2. Please list any publications or reports you have authored concerning the geology of Vermont.

B. Certification or Registration of Geologists in Vermont\*\*

1. Do you think Vermont needs a registration or certification system for professional geologists? Please feel free to comment on the reasons for your answer.
2. If the state decided to register geologists what would be your primary concern about the law?
3. Would you support a move for registration or certification of professional geologists? Please comment.

C. Public Education on Vermont Geology

1. Do you feel it would be proper for the Vermont Geological Society to pursue some form of public education on the geology of Vermont? Please comment.
2. How do you think VGS might best accomplish the goal of public education?
3. Would you be willing to assist in a program of public education?
4. Additional comments.

\* result of questionnaire will be forwarded to David L. Tarbox

\*\* results of questionnaire will be forwarded to Frank Paris.

OROGENIC UNDERTHRUSTING IN SOUTHWESTERN NEW ENGLAND - ALPINE SUBDUCTION  
OR SECONDARY EFFECTS OF IRREGULAR PLATE BOUNDARIES?

Rolfe Stanley, Department of Geology, University of Vermont

Geologic mapping during the last twenty years has resulted in a coherent stratigraphic and structural framework for western New England that involves geographically-extensive westward-directed thrusts for the western part and regionally-persistent recumbent and isoclinal folds and mantled gneiss domes for the eastern part. Although the Taconic orogeny of Middle and Late Ordovician age affected the entire region, the geological architecture of the western part was formed primarily during this time. To the east, however, most of the Taconic structures have been obliterated by severe deformation, metamorphism, and plutonism of the Acadian Orogeny of Middle to Late Devonian age.

Geologic cross-sections east of the Precambrian massifs from Vermont to western Connecticut show a marked contrast in the facing direction of major structures and the degree of Acadian deformation. In eastern Vermont and western New Hampshire major recumbent folds face westward with the exception of the Strafford nappe whose facing-sense depends on the stratigraphic position of the Waits River and Gile Mountain Formations. To the south in western Massachusetts the Cambrian and Ordovician eugeoclinal rocks including the root zone of the high Taconic sequence dip steeply eastward with apparent simplicity. In contrast, the Silurian and Devonian rocks are deformed into a series of tightly-oppressed, vertical folds with gently plunging hinges. In the northern part of this belt, these folds have been superimposed on an older apparently east-facing recumbent fold of regional extent. Although the Acadian structures deform the Cambrian and Ordovician rocks, the Taconic unconformity apparently forms a major decollement surface.

In southern Massachusetts and western Connecticut the vertical axial surfaces of the isoclinal folds dip westward below the line (Cameron's Line) that abruptly separates the rocks of the miogeocline and the eugeocline. To the east a series of elliptically-shaped domes cored with felsic volcanics and volcanogenic flysch severely deforms these isoclinal structures. Thus from northern Massachusetts to southern Connecticut the facing sense of the isoclinal folds changes from a neutral position (upward, vertical axial surfaces) to an east-facing position. This geometry is compatible with horizontal east-west compression in the north and westward directed *underthrusting* to the south during part of the Acadian orogeny - - a marked contrast with the westward *overthrusting* of the earlier Taconic orogeny.

In terms of plate tectonics the geology of southwestern New England interpreted to result from the interaction of non-parallel plate boundaries during continental collision of Acadian age. During this time the older east-dipping Taconic root zone and possible regional subduction zone was rotated westward and thrust under the craton in southwestern New England as a result of the scissor-like convergence of the eastern edge of the Grenville basement and the western edge of the Avalonian platform of Late Precambrian age.

## VERMONT GEOLOGY REFERENCE COLLECTION TO BE ESTABLISHED

At the October meeting of the Vermont Geological Society, it was decided that a worthwhile undertaking of the Society would be to attempt to assemble in one central location, all references, both published and unpublished, that have anything to do with the general subject of geology in Vermont. To accomplish this objective, an ad hoc committee was established.

To begin the project, a call is being made for both committee members and for references. It is hoped that a committee member can be found from each of the colleges in the State, as well as from the Highway Department, the Department of Water Resources, the Health Department, and from private firms involved with geology.

To initiate the assembly process, it is requested that the committee members, and any other who wish to help, forward a list of the references to which they have access. Included on the lists, should be an indication of which references are still in print or of which there are extra copies. It is hoped that wherever possible, actual copies of the references can be held with the reference lists at a central drop - probably the State Library in Montpelier.

Please send your name, if you can be a committee member, a list of references and where they are located, and any suggestions regarding the work of the committee to:

David L. Tarbox  
P.O. Box 435  
Bristol, Vermont 05443 802-453-3176

## REPORT OF THE PROFESSIONALISM COMMITTEE

The professionalism committee, which consists of Frank Paris, Bill Siok, Phil Wagner, and Tim Acomb, held its first meeting in December 1974. At this time it was decided to investigate registration for geologists in the state of Vermont. Phil Wagner contacted various state who have either registered or are in the process of registering geologists, for information pertaining to bills and process steps. Various states responded with copies of their bills and ideas.

Bill Siok contacted the Attorney General of Vermont and found that it was necessary for a Legislator to sponsor a registration bill in the Legislature.

The second meeting of the committee was held in February of 1975. The various bills were discussed. These bills indicate that some states found it necessary to adopt some type of registration. Is registration applicable to or necessary in Vermont?

Registration of any profession is adopted for two reasons - advancement of the profession and protection of the public. There are many instances in Vermont where geologic pre-evaluation would have been beneficial - e.g. road cuts on some highways. Geologic evaluation may have prevented some rock slides and subsequent short term road closures.

The registration of geologists is not meant to be in lieu of registration of engineers, but in addition. Geology can be a great asset to engineering and in combination can render a great deal of projects more successful.

The committee is in the process of drawing up a model registration law for the State of Vermont. When this law is completed, a copy will be sent to a member of the Society in each area so that he may circulate it among area members for comment.

The committee would appreciate any comments members have regarding registration of geologists in Vermont. Please address responses to:

Frank Paris  
Mutton Hill  
Charlotte, Vermont 05445

VERMONT GEOLOGICAL SOCIETY

Preliminary Announcement  
and  
Call For Papers

Spring Meeting  
Middlebury College  
Middlebury, Vermont

April 26, 1975

The Spring Meeting of the Vermont Geological Society will be held on Saturday, April 26, 1975 at the Science Center, Middlebury College, Middlebury, Vermont.

Call for Student Papers: Abstracts are hereby solicited from students. Papers may deal with any relevant aspect of geology; those concerned with the geology of New England are particularly welcome.

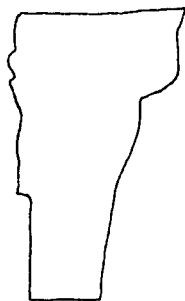
Abstracts are limited to 250 words. The abstract will be the sole basis for judging the acceptability of a paper, so it should be as informative as possible. All accepted abstracts will go directly for publication and will not be returned for revision. A copy of G.S.A. Abstracts with Program should be consulted for correct style.

Due date for Abstracts is April 5, 1975. Send two copies of abstract to either of the Meeting Chairmen:

Dr. John W. Creasy  
Department of Geology  
Middlebury College  
Middlebury, Vermont 05753

Dr. Rolfe S. Stanley  
Department of Geology  
University of Vermont  
Burlington, Vermont 05401

# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

SPRING 1975

Volume 2 Number 1

## PROGRAM

VERMONT GEOLOGICAL SOCIETY  
SPRING MEETING  
MIDDLEBURY COLLEGE  
Room 117, Science Center  
26 April, 1975

### Morning Session - John Creasy and Rolfe Stanley Presiding

Coffee and Doughnuts . . . . .	0900-0945
1. Kenneth Bartlett: Recent Sediment Dating Through Cinders . . .	0945
2. R.S.C. Munier: A Study of Button Bay, Lake Champlain, Vermont Using SCUBA . . . . .	1005
3. Peter Moreau: A New Normal Fault Along the Eastern Limb of the Hinesburg Synclinorium	
4. Sally A. Wood: Petrology of the Hart Ledge Complex, South-Central Crawford Notch quadrangle, New Hampshire . . . . .	1025
5. Jeffrey Noyes: An Evaluation of Permeability Tests and Test Data	1105
6. Ellen I Davie: Petrology of a Composite Ring Dike, White Mount- ain Batholith, New Hampshire . . . . .	1125
Lunch: Brown bag or dine out	1145-1310

### Afternoon Session - Rolfe Stanley and John Creasy Presiding

1. Andrew Cohn: Paleocology of the Glens Falls Limestone . . .	1310
2. Eric Rosencrantz: The Geology of the Colchester Pond Area (N.E.)	1330
3. Roderic A Parnell: Geology of the North-Central portion of the North Conway Quadrangle, New Hampshire . . . . .	1350
4. Rod S. March: The Paleomagnetic Record of Lake Sediments in Vermont: 11,600 Years B.P.-Present . . . . .	1410
5. Timothy Acomb: A Watershed Analysis: The Mendon Brook Watershed	1430
Coffee Break . . . . .	1450-1510
6. Robert Peale: Environmental Geology of a Proposed Power Plant Cooling Pond in Orwell, Vermont . . . . .	1510
7. Peter Thompson: Stratigraphy and Structure of Shattick Ridge, Bakersfield and Waterville, Vermont . . . . .	1530
8. Matthew Higgins and Janeann Rogers: Ground Water Rights in Vermont	1550
9. Denise Pieratti: The Origin and Tectonic Significance of the Tibbit Hill Volcanics of Northwestern Vermont . . . . .	1610



THE VERMONT GEOLOGICAL SURVEY - A REPLY

The editorial in the last issue of the Green Mountain Geologist was largely incorrect, written in poor taste, and certainly not representative of the members of the Vermont Geological Society. As one member who would like to see the Society achieve some degree of quality and distinction, I view this editorial as nothing more than the result of some idle thoughts of an individual who has not taken the time to read the Reports of the State Geologist, or the vast array of high-quality bulletins published by several world-renowned geologists (E-an Zen, Cady, Thompson, just to mention a few). Fundamental, high-quality geologic mapping must first be done before such derivative efforts as economic, land use planning material can be published. It is this high level of professionalism that Dr. Doll has demanded over the years that has brought the Vermont Geological Survey into national and even international prominence. -- And it should be pointed out that he has done it with part-time professional help, with no secretarial service, and at a very, very modest personal salary. The devotion of this man to the profession and to Vermont is truly remarkable. Let those that criticize first make sure their own house is in good order.

As to the specific allegations:

1. Mineral resources - There are currently 8 publications in the Economic Geology series - 3 on ultramafics, 2 on kaolin deposits, 2 on geochemical surveys, and 1 on a pyrrhotite deposit.

2. Petroleum deposits are limited in Vermont. The Survey has been on top of this situation along with major oil companies and the United States Geological Survey. Furthermore, the Survey has no control over the enthusiasm of prospectors.

3. The environmental series has been placed in the hands of Dr. David Stewart who was largely responsible for the Surficial Geologic Map of Vermont. He, probably better than anyone else, could put together this series whose main purpose is an overview of Vermont geology for the regional planner or environmentalist. It does not take the place of more detailed mapping or on-site evaluation. Such a program for the area of Vermont would be far too costly and involve too many man-years for our current environmental efforts. If the Survey had additional support, it could address itself to specific environmental problems needing immediate attention.

The last paragraph of Mr. Malter's editorial needs no comment except that he failed to do his homework. Let us hope that future publications of the Green Mountain Geologist show the quality and maturity that the profession deserves.

*Rolle S. Stanley*

A WATERSHED ANALYSIS: THE MENDON BROOK WATERSHED  
Acomb, Timothy, Dept. of Geology, University of  
Vermont, Burlington, VT 05401

The Mendon Brook basin is used as the municipal watershed by the city of Rutland, Vermont. Because this water is a valuable and renewable resource, a proper knowledge of it's occurrence and of its management is necessary to protect the supply from impairment and contamination.

The Mendon Brook watershed is a deep, glacially scoured basin enclosed by the high walls of four major peaks. The surface cover is primarily glacial till and ice-contact sands and gravels. The glacial tills and ice-contact gravels have a moderate to high hydraulic conductivity that varies according to soil type, vegetation, land use and elevation.

The hydrology of the watershed is a complex system of groundwater, deep interflow, and stream runoff through which 923 million cubic feet of water moves annually. Fluccuations in flow occur annually with lows during the summer months and highs during the late spring and early fall. Baseflow in the Mendon Brook varies from 55 c.f.s. to 17 c.f.s. and regularly carries a flood peak of 72 c.s.f. or higher. Groundwater storage amounts to more than 615,000 cubic feet while groundwater discharge is 2.7 c.f.s. (84 million cubic feet per year).

The water quality through most of the watershed is quite good with most constituent levels below those standards set by the Environmental Protection Agency. High levels of iron and chlorides are often recorded in the Beaver Pond basin. Their origin is not believed to be related to human presence within the watershed.

The limitations to potential development are centered around three factors: soil depth and permeability, water supply, and the effect on the quality of the water supply for Rutland. These factors indicate that the central Rooney basin is best suited for limited and environmentally well designed development. There are several alternatives for the municipal water supply and for land development that are evaluated.

RECENT SEDIMENT DATING THROUGH CINDER DETERMINATIONS  
Bartlett, Kenneth, Dept. of Geology, University  
of Vermont, Burlington, VT 05401

Analysis of two Lake Champlain cores has revealed the presence of engine by-products (anthrasite, bituminous coal, cinders) from the steamboating era (1809-1900 approximately). These by-products have been separated from the cores through labwork using three tests: 1. visual test; 2. hardness test; and 3. density test. The density was determined by differential floatation using heavy liquid bromoform. The lower bounds of these intervals are not precise, but have zones or gradations.

Dates of when these by-products were first introduced into the sediments may be found by retracing the maritime history of the Lake. For example, the United States was the first steamer to burn coal in 1858. These known historical dates may be correlated to these intervals and gradations referred to above. From this information, sedimentation rates of recent sediments in Burlington Harbor, as well as other areas with similar maritime histories may be determined.

#### PALEOECOLOGY OF THE GLENS FALLS LIMESTONE

Cohen, Andrew, Dept. Geology, Middlebury College, Middlebury, Vermont 05753

Using field, thin section and insoluble residue data, the environments of deposition and paleoecology of 40 feet of the Glens Falls Limestone (Middle Ordovician-Treton) were reconstructed. Four subtidal environments can be observed in the study section at Crown Point State Park, New York, based on increasing water depth, decreasing mechanical energy and varying substrate type. Four paleocommunity responses can be distinguished in this section:

1) shallow subtidal community #1 (affected by both surf and storm activity; medium faunal diversity, firm substrate);

2) shallow subtidal community #2 (subject to storm, but not surf activity; low diversity, soft substrate);

3) shallow-mid subtidal community (affected to a minor degree by storm activity; moderate diversity, soft substrate),

4) deeper subtidal mixed substrate communities (below storm and surf base; high diversity).

The apparent contradiction of reducing environments of black argillaceous partings within a largely oxidizing bottom lime mud (as observed at Crown Point) is considered and two alternative models of development are proposed.

Paleoecological data and sedimentation rates suggest the beginning of rapid subsidence of a formerly stable continental shelf during Glens Falls time.

#### PETROLOGY OF A COMPOSITE RING DIKE, WHITE MOUNTAIN BATHOLITH, NEW HAMPSHIRE

Davie, Ellen I., Dept. Geology, Middlebury College Middlebury, Vermont 05753

Detailed mapping of a portion of a ring dike, 1.5 km in width, indicates it to be a composite intrusion. There are three and possibly four co-magmatic intrusions along a gently dipping arcuate fracture; these intrusions preserve successive differentiates of an underlying magma body. Abundance of feldspar phenocrysts and of total quartz increases with decreasing age of the rocks. A pyroxene syenite, the oldest rock preserved, solidified and was shattered by intrusion of a pyroxene quartz syenite. Ferroaugite and inverted ferropigenoite are present in both units. The Albany Porphyritic Quartz Syenite intruded along the margins of the incompletely

solidified pyroxene quartz syenite. Ferrohedenbergite is present as phenocrysts in the Albany.

The relative age of other rocks of the White Mountain magma series is revised. Field evidence indicates the Conway Granite is older than the Albany. Biotite granite aplites are both older and younger than the Albany. The Conway Granite and the biotite granite aplites may not be comagmatic with, even though temporally and spatially related to, the syenite or quartz syenite.

#### A DETAILED GRAVITY STUDY OF THE LEMON FAIR RIVER VALLEY

Farmer, Harlow, Dept. Geology, Middlebury College, Middlebury, Vermont 05753

A detailed gravity survey was made of the Lemon Fair Gravity Low (Bowman, unpublished Middlebury College Thesis, 1974) in the vicinity of Snake Mountain. The feature is a long, winding north-south negative anomaly that parallels the Champlain Thrust zone and roughly coincides with an absence of outcrops.

A Bouguer anomaly contour map and east-west profiles show a -4 to -6.5 mgal residual imposed on a regional gradient of +0.4 mgal/km south of Snake Mountain to +1 mgal/km across central Snake Mountain. Initially, the low seems genetically related to the Thrust, but calculations of the maximum depth to the anomalous body eliminate it. A relatively good fit is obtained, within the geologic constraints, when the anomaly is modelled as a steep-sided bedrock valley with approximately 100-200 meters of low density fill. Drill hole data supports this. However, the axis of the low is skewed toward the eastern cliffs, and can not be accounted for by the "edge affect". This suggests asymmetry of the bedrock topography, and possibly a localized decrease in density of carbonate rocks bounding this side of the valley. A syncline, trapping low density Hortonville slate, is a minor contributor to this eastern low. This study, therefore, confirms Bowman's hypothesis within the limits of gravimetric data.

#### GROUND WATER RIGHTS IN VERMONT

Higgins, Matthew, Rogers, Janeann, Dept. Geology, Middlebury College, Middlebury, Vermont 05753

In 1855, the first U.S. case involving ground water rights was brought before the Vermont Supreme Court in Chatfield v. Wilson. The ditching of a stream caused a spring on adjacent land to dry up. The court declared the unknowable nature of ground water and gave the landowner absolute ownership of ground waters underlying his property.

In a later case, damming raised water table, flooding a nearby garden and cellar. In a 1897 case, one well's cone of depression interfered with another's. In a 1973 case, high yield wells of the Salisbury Fish Hatchery dried up a neighboring spring. These and several other cases have reaffirmed the common law ruling.

With increasing reliance on ground water, Vermont will see more and more instances of competition for water. Existing statutory law establishes the state's separate jurisdiction over surface waters and ground waters but as yet has no provision for ground water rights.

Proposed legislation is patterned after that of other states. Vermont should declare jurisdiction over surface and ground water together. Historic levels need not be maintained; rather, the goal would be maximum beneficial use. An individual would be allowed reasonable use of ground water, up to 25,000 gallons per day. Where that use competes with use by another person, the law of correlative rights should take precedence. Where necessary, the court would determine compensation. A state officer would delineate areas where regulation is needed.

THE PALEOMAGNETIC RECORD OF LAKE SEDIMENTS IN VERMONT:  
11,600 YEARS B.P. - PRESENT

March, Rod S., Dept. Geology, Middlebury College,  
Middlebury, Vermont 05753

The remanent magnetism of 260 samples from a 5.5 meter piston core from Lake Champlain, Vermont has been studied using standard paleomagnetic methods. This is the first sediment core from Lake Champlain in which the paleomagnetic inclinations have been measured. The remanent intensity is about an order of magnitude greater than that typically found in deep sea sediments and has been shown to have high stability. Thus cores from Lake Champlain should be reliable recorders of the paleomagnetic field provided the core itself has not disturbed the record. A single significant field excursion occurs between 10,300 and 9,000 years B.P. and has been attributed to dipole wobble. If the event can be found in other cores in the area, thereby confirming its validity, then it will be important as a stratigraphic tool for future dating of other sediments in the New England area.

A NEW NORMAL FAULT ALONG THE EASTERN LIMB OF THE  
HINESBURG SYNCLINORIUM

Moreau, Peter, Dept. of Geology, University of  
Vermont, Burlington, VT 05401

Recent mapping in the southern part of the Hinesburg synclinorium, near the village of Hinesburg, has revealed a major normal fault which cuts and displaces both a major F2 anticline and the Hinesburg thrust. The nearly linear map pattern of this fault and minor associated faults indicate a steep easterly dip, with down-drop to the east. The fault displays 3400 feet of right lateral motion with a minimum dip slip motion of 1100 feet.

The fault may be partially responsible, along with a series of parallel normal faults, for the westward salient of the trace of the Hinesburg thrust north of the village of Hinesburg. The kaolinite deposits within the Cheshire Quartzite south of the village of East Monkton may be associated with this fault.

This fault may be a northward continuation of the Monkton thrust, which would then make the entire system a rotational fault.

The age of the fault is in doubt, and depends on the age of F2 folding in the Hinesburg synclinorium. Regionally these folds are dated as Acadian (Zen, 1962), however there is no definitive radiometric age available. A Taconic age for F2 folding cannot be ruled out. Thus, the maximum age of the fault is Late Ordovician. A Mesozoic age may be more likely. The fault may cut, or be cut by, Cretaceous dikes in the area.

#### A STUDY OF BUTTON BAY, LAKE CHAMPLAIN, VERMONT USING SCUBA

Munier, R.S.C., Dept. Geology, Middlebury College,  
Middlebury, Vermont 05753

The post glacial and recent sedimentary environments of Button Bay were studied in the Fall of 1974 using a variety of techniques. Secchi disk readings and underwater observations indicate that turbidity is highly variable and ranges from .3 to 3 meters. High turbidity is associated with common southwest winds that erode the northeast margin of the Bay. Sessile algae, photographed and collected, include: rhizobenthic plants at depths of 3 or less on bedrock, sand, and mud bottoms; haptobenthic blue-green algae found in 20 cm patches throughout the bay; and haptobenthic green algae at depths up to 5 adnate to sand, silt, and clay bottoms. Among the latter, *Cladophora* "Balls" (*C. holsatica* and *C. sauteri*), heretofore unreported in Lake Champlain, are abundant along the northeast margin of the Bay. The bottom sediments were observed, photographed, and sampled using SCUBA. Silt and gravelly silt is found throughout the Bay except parallel to the northeast shore where there is a 100 wide strip of sand. The underlying stratigraphy was evaluated with 12 piston cores and 14 echo sounder traverses. Beneath 3 to 8 cm of recent sediment is Lake Vermont clay. Clay from the Champlain Sea marine interval is missing except in the southwest part of the Bay. However, marine clay overlies Lake Vermont clay in the cliffs adjacent to the north shore. Apparently it and some of the Lake Vermont clay has been eroded to form the present Bay.

#### AN EVALUATION OF PERMEABILITY TESTS AND TEST DATA

Noyes, Jeffrey, Dept. of Geology, University of Vermont, Burlington, VT 05401

During the summer of 1974, comprehensive field research was undertaken to evaluate the utility of and relationship between various soil permeability

tests These tests included the Bouwer Double Tube Test, the Air Entry Permeameter, the Crust Test, the Modified Tube Test, and the Percolation Test. Special emphasis was placed on the following goals: to establish a practical yet accurate procedure to determine permeability; to define a mathematical relationship between the percolation test and one of the permeability tests; to determine the number of accurate tests which would be necessary to adequately characterize the permeability of a soil mass.

Test results showed complex tests such as the Bouwer Double Tube Test, the Air Entry Permeameter Test and the Crust Test are difficult to operate as well as time consuming. Therefore, in order to obtain the data base for this thesis, a relatively simple test was developed and designated as the Modified Tube Test. Originally proposed by Kirkman (1945) for conductivity studies below the water table, this thesis shows that the test is also applicable to above water table determinations. The relationship between the Modified Tube Test and the Percolation Test was computed by a least squares fit programme and found to be  $P = 1.76 (P_r) - 1.22$ , where  $P$  is the permeability rate in ft/day and  $P_r$  is the percolation in min/in. The correlation coefficient for the line produced by the above equation is 0.92. Statistical analysis for establishing adequate testing is presented through the confidence limits. These results are for soil with permeability values ranging from .1 to 30 ft/day.

GEOLOGY OF THE NORTH-CENTRAL PORTION OF THE NORTH  
CONWAY QUADRANGLE, NEW HAMPSHIRE

Parnell, Roderic A., Jr., Dept. Geology,  
Middlebury College, Middlebury, Vermont 05753

A series of syenites, quartz syenites, and granites present in the northeast part of the White Mountain batholith crop out in a crudely concentric manner. Four small isolated bodies of pyroxene syenite are interpreted as fragments of a ring dike. Inside the perimeter defined by the pyroxene syenite are five small (100 m) bodies of Albany Porphyritic Quartz Syenite. These bodies of pyroxene syenite and of Albany define a roughly elliptical area five miles on the north-south axis. Cropping out in the northern part of this elliptical area are two additional rock types: 1) a syenite transitional both in mineralogy and in texture to the Albany and the pyroxene syenite and 2) a quartz syenite. The southern half of the elliptical area is comprised of a group of amphibole granites. The composition of the amphiboles in the granites ranges from ferrichterite to riebeckite. Bordering the transitional syenite and the quartz syenite is a ferrichterite granite. The ferrichterite is increasingly altered to riebeckite to the south. A stock of riebeckite granite two km across is centered on Mount Doublehead. The proposed

sequence of intrusion in order of decreasing relative age is: pyroxene syenite, transitional syenite, Albany quartz syenite, ferrorichterite granite, riebeckite granite.

#### ENVIRONMENTAL GEOLOGY OF A PROPOSED POWER PLANT COOLING POND IN ORWELL, VERMONT

Peale, Robert, Dept. of Geology, Middlebury College, Middlebury, Vermont 05753

A proposed cooling pond on East Creek below Hough Crossing would serve a power generating plant with an output capacity of 1200 MW (fossil fuel) or 800 MW (nuclear) according to the Vermont Electric Power Company, Inc. The pond surface area of 1500 acres would be less than 2 acres per MW output.

The Cambro-Ordovician bedrock is overlain by clay deposits up to 120 feet thick. Sand and gravel deposits of unknown extent are located under the clay on the southwestern corner of the cooling pond and may let water seep from the pond.

Ground water will flow into the pond everywhere except on the western side where water may flow down the water table gradient out of the cooling pond. The clays have very low permeability, perhaps  $10^{-4}$  cm/s according to Solomon (personal communication, 1975). Soil creep and minor slumping occur on slopes of more than 12% in the cooling pond area. Structures should be located and designed with this in mind.

The pond capacity is about 70,000 acre feet. Initially the pond would be filled from Lake Champlain; Fast Creek's flow of 42 ft<sup>3</sup>/s would take over 2 years to fill the pond. If the pond level is maintained 5 feet below maximum level, the pond can contain floods of slightly higher magnitude than the highest flood of the past fifty years.

#### THE ORIGIN AND TECTONIC SIGNIFICANCE OF THE TIBBET HILL METAVOLCANICS, NORTHWESTERN VERMONT

Pieratti, Denise D., Dept. of Geology, University of Vermont, Burlington, Vermont 05401

Recent work on compositional variations of basic rocks from different tectonic settings (ocean ridge, island arc, continental) suggests that chemical differences exist between compressional and extensional volcanics (e.g., Engel et al., 1965; Kay et al., 1970; White, et al., 1971; Pearce, J., 1975). Various petrologic models for basaltic rocks are applied in an evaluation of the tectonic setting and origin of the Tibbet Hill volcanic member of the Pinnacle Formation, and compared with recent plate tectonic models of Bird and Dewey (1970), Cady (1969) and Rodgers (1972) proposed for New England. Major element variation of 37 samples of greenstones and associated rock types suggest protoliths ranging from basaltic to andesitic in composition. The volcanics plot as oceanic tholeiites on an AFM diagram. The metabasalts are characterized by high titanium contents (average 2.4%), and



correspond to the composition of typical mid-oceanic ridge basalts. Discrimination on a  $TiO_2$ - $K_2O$ - $P_2O_5$  diagram after T.H. Pearce, et al. (1975) support this data. Selected trace elements (Nb, Ti, Y, Zr) are also used to distinguish between magma types following the criteria of Pearce and Cann (1973). Calculated Y/Nb ratios suggest that the petrologic character of the Tibbet Hill ranges from tholeiitic to slightly alkalic. Plots of Ti-Zr-Y and Ti-Zr indicate an ocean floor affinity.

On the basis of chemical data, tentative conclusions support the eruption of the Tibbet Hill metavolcanics in a tensional zone, perhaps best correlated with the initial rifting of the Proto-Atlantic during the Eocambrian. This origin is consistent with the interpretation of the surrounding rocks (Pinnacle Formation) as originating in a graben during the early part of the Wilson Cycle (Bird, 1975; Dewey, 1975).

#### THE GEOLOGY OF THE COLCHESTER POND AREA (NE)

Rosencrantz, Eric, Dept. of Geology, University of Vermont, Burlington, VT 05401

Immediately north and east of Colchester Pond the Hinesburg thrust is extensively exposed, and outlines a north-pointing finger of the east limb of the Hinesburg synclinorium. This area was remapped and analyzed with the intent of precisely locating the thrust and defining its character and history.

The stratigraphic units in the area are Cambrian in age and include the Cheshire, Dunham and Skeels Corners Formations. The Cheshire occurs as two facies, an argillaceous lower member and massive upper member. The Dunham Dolomite is subdivided into seven members which are all conformable to each other and the underlying Cheshire and overlying Skeels Corners Formations. Breccias previously assigned to the Rockledge Formation have been reassigned to the Skeels Corners.

The upper thrust plate is composed of two sheets, displaced penecontemporaneously: a continuous upper plate of argillaceous Cheshire Quartzite, and a lower discontinuous plate of Dunham Dolomite slivers possibly representing semicomplete sections of the eastern belt of Dunham. F1 folds occur primarily within the Skeels Corners Shales and are interpreted as being related to movement on the thrust. Their axial surfaces are recumbent with hinges plunging gently to the southeast. Numerous F2 folds plunge gently to the south and are responsible for the map pattern. Their axial surfaces trend northward and dip at moderate angles to the east. F3 kink folds are confined to the western part of the area and appear to be associated with a north striking, east dipping normal fault which may be a continuation of the Monkton fault recently discovered in the southern part of the Hinesburg synclinorium. The kink-band boundaries trend to the north and are inclined at steep angles.

The Hinesburg thrust and F1 folds appear to have developed during the Taconic orogeny of Middle and Late Ordovician age, whereas the F2 folds may either be late Taconic or a product of the Acadian orogeny of Middle to Late Devonian age. The age of the Monkton fault is still in doubt, although a Mesozoic age may be possible.

STRATIGRAPHY AND STRUCTURE OF SHATTUCK RIDGE,  
BAKERSFIELD AND WATERVILLE, VERMONT

Thompson, Peter J., Dept. of Geology,  
University of Vermont, Burlington, VT 05401

Detailed mapping in the area north and south of the Enosburgh Falls-Mount Mansfield quadrangle boundary in northern Vermont has differentiated between the silver-green Underhill Formation and the rusty Hazen's Notch Formation to the east. Further west, graphitic and dolomitic rocks surrounded by the Underhill are interpreted as isoclinal anticlines of White Brook Member equivalents. The Peaked Mountain Greenstone and a chloritoid-bearing unit lie entirely within the Hazen's Notch, and form continuous layers parallel to the Hazen's Notch/Underhill contact. On the basis of structural evidence, the Hazen's Notch Formation is younger than the Underhill, rather than an eastern facies within the Camel's Hump Group. The Hazen's Notch may even be equivalent to lower Ottauqueche Formation.

Three sets of folds are distinguished: an early east-west set of uncertain origin, and two northeast sets. The early north-east trending folds are isoclinal and overturned to the east, and probably are related to large-scale east-directed folds of Taconic age. A large east-verging nappe-like structure with a root zone in the Enosburgh Falls anticline may explain complicated silver-green and rusty patterns further east. The later northeast-trending folds are related to the broad Green Mountain arching that occurred during the Acadian disturbance.

At least two periods of metamorphism accompanied the deformation events. The first, closely related to the pervasive Taconic bedding schistosity, probably produced an almandine-amphibolite facies. The second, related to Acadian spaced schistosity, retrograded the rocks to lower greenschist facies.

PETROLOGY OF THE HART LEDGE COMPLEX, SOUTH-CENTRAL  
CRAWFORD NOTCH QUADRANGLE, NEW HAMPSHIRE

Wood, Sally A., Dept. Geology, Middlebury College,  
Middlebury, Vermont 05753

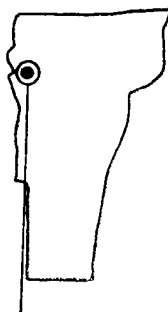
The Hart Ledge Complex lies within the White Mountain batholith. This complex is a 37km<sup>2</sup>, elliptically shaped composite stock of several syenites and quartz syenites and of a reibeckite granite. Units were distinguished by their amphibole

compositions and quartz content. Thin section study, whole rock analysis, and the compositions of the amphiboles suggest that these units are genetically related. Euhedral grains of microperthite and interstitial grains of quartz and amphibole that comprise the syenites and quartz syenites suggest that these are cumulus rocks. Variations in the composition of the amphiboles and the content of quartz also suggest the relative ages of the units to be, in decreasing age, syenite, quartz syenite, riebeckite granite.

The syenites and quartz syenites and the riebeckite granite of the Hart Ledge Complex represent the accumulated crystals and a residual liquid, respectively of a differentiated chamber of magma. An arcuate fracture may have tapped this residual liquid resulting in the presently exposed, arcuate shape of the riebeckite granite.

GREEN MOUNTAIN GEOLOGIST  
VERMONT GEOLOGICAL SOCIETY  
BOX 304  
MONTPELIER, VERMONT 05602

# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

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SUMMER 1975

Volume 2 Number 2

SECOND ANNUAL MEETING SET FOR BURLINGTON ON OCTOBER 18TH. COME!!!

Host for the second annual meeting of the Vermont Geological Society will be the University of Vermont at Burlington. Two field trips will be available during the day, with a banquet and speaker in the evening. Dr. Rolfe Stanley will lead the hard rock trip to examine some aspects of the Champlain Thrust, while Dr. Dallas Rhodes will lead the soft rock trip to examine recent processes of fluvial geomorphology. Dr. Stanley will also be guest speaker at the banquet.

TURN TO PAGES 4 & 5 FOR DETAILS AND REGISTRATION FORM



WELCOME TO THE GEOLOGICAL SOCIETY OF MAINE

We were very pleased to receive a copy of the MAINE GEOLOGIST, the quarterly newsletter of the Geological Society of Maine. The newsletter contains some interesting information and notes. It should be noted that GSM managed to pick the very hot date of August 1st for their annual meeting instead of the more reasonable weather of August 8th when we had our summer meeting and picnic. Like ourselves, GSM was formed in 1974. Their annual dues are: \$5 for Regular Members; \$4 for Associate Members; and \$2 for Student Members. There is also a \$2 application fee. For more information write to: J. R. Rand, Treasurer, Cundy's Harbor, RD2-Box 210A, Brunswick, Maine 04011. Good Luck GSM!!!

QUESTIONNAIRE STILL NEEDED !!!

In the Winter 1975 (Vol 2 # 1) issue of the Green Mountain Geologist you were asked to supply some information on your geological activities to the Society. Not too many of you responded. PLEASE, take time and answer the questionnaire and bring it to the annual meeting or send it to Rox 304, Montpelier, Vt. 05602. If you can add information to information previously sent, we would be interested in that too. Thank you.

ARTICLES REQUESTED

If you have an article, or any other item of interest to your fellow Vermont geologists? We would like to hear about it.

N E I G C - - October 10 - 12. - - Great Barrington, Mass.

## MEMBERSHIP DIRECTORY

The following is the list of members of the Vermont Geological Society whose dues were paid for the 1975 Fiscal Year (Sept. 1, 1974 to Sept. 1, 1975). If there are any errors in addresses - please let us know at Box 304, Montpelier, Vt. 05602.

## MEMBERS:

Anderson, Vermon H.	R.F.D.	Thetford Center, Vt.	05075
Ashley, James W.	R.F.D.	W. Danville, Vt.	05873
Bailey, Donald	67 Delmont Ave.	Barre, Vt.	05641
Baldwin, Brewster	Department of Geology Middlebury College Middlebury, Vt.		05753
Billings, Marland	c/o Dept. Geol. Sciences, Harvard Museum 24 Oxford Street, Cambridge, Mass.		02138
Butterfield, David	P.O. Box 765	Montpelier, Vt.	05602
Cady, Wallace	348 S. Moore St.	Lakewood, Colorado	80226
Corneille, Stanley	4 Terrace Street	Randolph, Vt.	05060
Creasy, John			
Detenbeck, Jeanne C.	Collamer Circle R.F.D. # 1	Shelburne, Vt.	05482
Doll, Charles	Perkins Hall University of Vt.	Burlington, Vt.	05401
Drake, John C.	Department of Geology University of Vt. Burlington, Vt.		05401
Ebbett, Ballard	Kirby, R. F. D.	Lyndonville, Vt.	05851
Ebbett, Sandria	Kirby, R. F. D.	Lyndonville, Vt.	05851
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Gillespie, Richard	164 Harris Road	Nashua, N. H.	03060
Grazulis, Thomas	Box 302	St. Johnsbury, Vt.	05819
Hall, Jamie	R.F.D. # 2	Randolph, Vt.	05060
Hepburn, John C.	Dept. of Geology and Geophysics Boston College Chestnut Hill, Mass		02167
Heyburn, Malcolm	Barre View St. R.F.D. # 2	Barre, Vt.	05641
Hodges, Arthur L., Jr.	Minister Brook Rd.	Worcester, Vt.	05682
Howe, Charles C.	360 Waterman Building University of Vt. Burlington, Vt.		05401
Lanza, Frank	38 Terrace St.	Montpelier, Vt.	05602
Larsen, Frederick	9 Slate Avenue	Northfield, Vt.	05663
Malter, John	23 Hubbard Street	Montpelier, Vt.	05602
Marcotte, Ronald	Box 71	Bakersfield, Vt.	05441
Mento, Mary Ann	216 Yorkshire House 2730 South Chautauqua Norman, Ok.		73069
Merry, Carolyn	190 Hanover Street	Lebanon, N. H.	03766
Moore, John	Seismograph Serv., Box 1478, Cody, Wym.		82414
Myers, Allen C.	P. O. Box 111	Kingston, R. I.	02881
Ogden, Duncan	Landgrove	Londonderry, Vt.	05148
Paris, Franklyn D.	Mutton Hill	Charlotte, Vt.	05445
Pieratti, Denise	4000 Rombouts Ave.	Bronx, N. Y.	10466
Ratte, Charles A.	25 New England Dr.	Battleboro, Vt.	05301
Rhodes, Dallas D.	Department of Geology University of Vt. Burlington, Vt.		05401
Setright, Lynn M.	348 Amber St., Apt. 1 Pittsburgh, Penn		15206
Siook, William J.		Middlesex, Vt.	
Skehan, James W.	Weston Observatory Boston College Weston, Mass.		02193

Stanley, Rolfe	Department of Geology University of Vt.	Burlington, Vt.	05401
Stewart, James B., II	P. O. Box 424	Bristol, Vt.	05443
Tarbox, Davkd L.	P. O. Box 435	Bristol, Vt.	05443
Thompson, Roger B., Jr.	R.F.D. # 1	Woodstock, Vt.	05091
Thompson, Thelma B.	31 Water St.	Lebanon, N. H.	03766
Wagner, W. Philip	48 Henderson Ter.	Burlington, Vt.	05401

ASSOCIATE MEMBERS:

Manning, Winona	Route 1	Williamstown, Vt.	05679
Nye, J. Richard	R.F.D. # 4	Montpelier, Vt.	05602
Oski, John P.	9 Oak Hill Rd.	Greenfield, Mass.	01301
Taplin, Winn L.	American Embassy	APO San Francisco, Ca.	96346
Watson, Bruce G.	16 Scotsdale Rd.	S. Burlington, Vt.	05401

STUDENT MEMBERS:

Acomb, Timothy James	R.F.D. # 2	Dansville, N. Y.	14437
McHone, James Gregory	Geology Department Univ. of North Carolina	Chapel Hill, NC	27514
McIntosh, Mary E.	UVM Married Student Housing Apartment 48	Winooski, Vt.	05404
Shinehouse, Linda	27 S. Willard St.	Burlington, Vt.	05401
Schwarm, Thomas E.	Perkins Geology University of Vt.	Burlington, Vt.	05401

THE 1976 DUES ARE NOW DUE!!

As a reminder to members of the Society who may have forgotten, the dues for the fiscal year 1976 (September 1, 1975 to September 1, 1976) are now due. For MEMBERS and ASSOCIATE MEMBERS the dues are \$ 8.00 per year. For STUDENT MEMBERS the dues are \$ 4.00.

AMMENDMENTS PROPOSED ON DUES.

The following two ammendments have been proposed by the Executive Committee for action by the membership at the Annual Meeting. Both deal with ARTICLE II: DUES

C. Existing: Dues shall be payable on or before the first of September of each year.

Proposed: Dues shall be paid on or before the date of the Annual Meeting.

E. Existing: Any member, associate member, or student member whose dues remain unpaid for a one year period and who fails to pay said dues within 30 days after written notification of said arrears shall be dropped from membership.

Proposed Any member, associate member or student member whose dues remain unpaid for a 30 day period after the annual meeting will receive written notification by the treasurer, and if the dues are not paid within 30 days of this notification, the person will lose his privileges as a member of the Society. If dues remain unpaid for a one year period from said notification, his name will be dropped from membership.

VERMONT GEOLOGICAL SOCIETY  
ANNUAL MEETING AND FIELD TRIPS  
SATURDAY, OCTOBER 18, 1975

LOCATION: East Monkton - Essex Center and points between

HOST: Geology Department, University of Vermont,  
Burlington, Vermont 05401

REGISTRATION: Early registration by mail is required for those wishing to attend the banquet meeting Saturday evening (use the enclosed form).

Mail registration to:

DR. DAVID P. BUCKE  
DEPARTMENT OF GEOLOGY  
UNIVERSITY OF VERMONT  
BURLINGTON, VERMONT 05401

A registration desk will be set up in Perkins Geology Building, UVM, for late registrations and for early registrants to pick up registration materials.

Registration Desk Hours:

Friday, October 17 7 - 9:30 PM  
Saturday, October 18 8 - 9:30 AM

Registration Fee

Members of Society FREE!!  
Non-members \$1.00

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FIELD TRIPS

TRIP A Recently-discovered high angle faults in west central Vermont

LEADER Rolfe S. Stanley, University of Vermont

Detailed mapping during the last several years has uncovered a system of major, north trending normal faults along the eastern limb of the Hinesburg synclinorium. The Monkton thrust of Cady (1945) is part of this system and is reinterpreted as a west dipping normal fault which isolates the Cheshire Quartzite of Monkton Ridge and East Monkton as a horst. Although one of the splinter faults is cut by a lamprophre dike, the system is thought to have developed during the Mesozoic in conjunction with the early opening of the Atlantic. Application of this information to such environment problems as groundwater and earthquake hazards will be discussed.

References

Doll, C. G., et al., compilers and editors, 1961, Centennial Geologic Map of Vermont: Vt. Geol. Survey, Montpelier, Vt.

Starting Point

East Parking Lot, Gutterson Field House, UVM

Starting Time

10:00 AM, Saturday

TRIP B Effects of stream capture and suburban development - Alder Brook, Vermont.

Leader Dallas D. Rhodes, University of Vermont

Until July 26, 1830, Alder Brook was a tributary of Browns River. On that day flood waters overtopped a small dam and instead of following the established channel, sought a new course southward through a small tributary of the Winooski River. Within minutes the Winooski tributary acquired additional drainage area nearly five times larger than the size of the original basin. Furthermore the lower reach of Alder Brook shortened its course by more than a mile, and established a new local base level at an elevation approximately 185 ft. lower than its previous position. For the past 145 years the stream has made adjustments to compensate for these changes. Recent suburban development of the basin has affected and been affected by the new stream regimen.

Starting Point

Parking Lot, Perkins Hall, UVM

Starting Time

10:00 AM, Saturday

NOTE: Both field trips will be by private car. It is expected that participants will "car pool" at the starting point.

RAIN DATE (sprinkles, showers don't count) FOR FIELD TRIPS WILL BE SUNDAY, OCTOBER 19. BANQUET-MEETING GOES, RAIN OR NOT.

ACCOMMODATIONS: It's your own responsibility. A list of local motels is enclosed. We recommend you make reservations immediately.

ANNUAL MEETING AND BANQUET:

The annual meeting will take place at the Sheraton Motor Inn, Coach Room (just east of the UVM campus).

A cash-bar social hour (free cheese & crackers)	6 - 7 PM
Banquet	7 - 8 PM
Meeting	8 - 9 PM

Dr. Rolfe Stanley will speak on "Environmental and Geological Implications of Newly-Discovered High-Angle Faults in Western Vermont".



## SUMMER MEETING CONVENED

The second annual summer meeting of the Vermont Geological Society was again hosted by Art Hodges on August 9th at his ranch (also called the "Poor Farm") adjacent to the gold laden waters of Minister Brook in the Town of Worcester (of which Art is also chief Selectman). Although about 30 participants descended on the rapids of the brook, only about six persons attempted to divest the brook of its gold with pans. Being only geologists, plenty of fools gold filled the pans along with a number of small garnet crystals. Having thoughtfully avoided the heat wave of the previous weekend, swimming was not a major activity. However, draining the half keg and talking was! Also when the roast corn was ready, everyone helped divide the many hot dishes each person brought. Some of the food dishes didn't survive until the corn was ready.

Following the picnic and gold panning, everyone adjourned to Art's house for the summer meeting:

1. The treasure has \$ 291.27 in the account.
2. Professionalism Comm. - Legislation is being drafted for review by the Society for future presentation.
3. Membership Comm.- Have four applications ready for Exec. Comm. action.
4. Nominations Comm. - The nominating committee (Art Hodges, Brewster Baldwin and David Tarbox) presented a recommended slate of officers and standing committee chairmen: President - John Malter; V. P. - Carolyn Merry; Secretary - Brewster Baldwin; Treasurer - Charles Fox; Director for 2 years - David Butterfield. Added by extension of the meeting: Membership Ch.- Jack Drake; Professionalism Ch. - Bill Siok; Meetings Ch. - David Bucke; Communications - James Ashley.
5. Library Comm. UVM theses have been sent by Dallas Rhodes to Dave Tarbox. Terry Frank expressed her desires to help out.
6. An idea of seminars being held in the future was brought up for the following topics: the registration of geologists; groundwater problems in Vermont; aims of the Vermont Geological Society.
7. The annual meeting will be held on October 18, 1975 (see this issue).
8. Future meetings/seminars/symposium or the winter meeting or an additional 5th - 6th meeting was suggested to be held when the Vermont legislature is in session, or at various district environmental offices.
9. Not decided to lower dues. A savings account is to be started and special uses of extra funds will be developed.
10. Jack Drake brought up that payment of dues in the bylaws is not clearly defined (see proposed ammendments on page 3).
11. Recommendations were made concerning the Green Mountain Geologist and developing a good mailing list.
12. The meeting was ajourned for coffee and desert and an excellent talk by Brewster Baldwin.

## EXECUTIVE COMMITTEE MEETING - - SEPTEMBER 11, 1975

1. Annual meeting plans reviewed.
2. Decided to offer mail ballots for elections for those who can not attend annual meeting.
3. Certificates of Membership will be handed out at annual meeting.
4. The method of handling membership application reviewed.
5. The following were voted into membership

5. The following **were** voted into membership:
  - John P. Oski            associate member
  - Winn Taplin            associate member
  - Bruce G. Watson       associate member
  - Thomas E. Schwarm     student member
6. Dues - will remain the same. With extra income honorariums, student awards, etc. can be set up.
7. Two amendments to the Bylaws of the Society were proposed (see page 3).
8. A letter from the Vermont Natural Resources Council was discussed. Seward Weber requested the Society to set up a special committee of maybe four members to assist in the evaluation of an existing list of "Natural Areas" in terms of priority of geologic significant. The Society was also invited to become a member organization of VNRC. It was decided to place a hold on any action until we know what membership entails, what the Society can contribute, what VNRC does and represents.
9. A proposal by Terry Frank for the development of a publications committee to prepare an annotated bibliography of all published and unpublished literature on the geology of Vermont was briefly discussed. It was decided to establish a special committee - the Reference Committee. The State Library has already indicated willingness to house the collection. Terry Frank's proposal will be reviewed by the Executive Committee in more detail.
10. Balance as of 29th of August was \$ 286.27.
11. The meeting was finally adjourned.

#### EARTHQUAKE FRIENDS

In a recent issue of THE MAINE GEOLOGIST, a small article noted that James Skehan of the Weston Observatory of Boston College is holding a semi-annual meeting of an informal group known as "Friends of the Northeastern Seismic Network", and is composed of users of seismic data from a wide variety of areas of interest. The Friends have been particularly helpful to the Northeastern Seismic Network, in many ways. Father Skehan does not believe that his current mailing list includes all who might be interested in the Friends organization, and requests that we advise our readers to get in touch with him if they wish to know more about FNSN. Weston Observatory is located in Weston, Massachusetts 02193. A visit of their excellent seismic facilities can prove very interesting to the seismic buff, but call ahead.

#### NEW PUBS

Two new publications have recently been printed which may be of interest to Society members.

Geologic map index of New Hampshire and Vermont, 1972, compiled by W. L. McIntosh and H. F. Eister. 1974 (1975). Scale 1:1,000,000 (1 inch = about 16 miles). Sheet 23 by 29 inches. 50¢. Address map mail orders to Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202.

Depth to bedrock, Heath quadrangle, MA-VT by Clark J. Londquist, 1975: USGS Misc. Field Studies Map MF-663 A. Scale 1:24,000 50¢. Also order from Branch of Distribution, U.S.G.S., Arlington.

THE GREEN MOUNTAIN GEOLOGIST is published quarterly for the members of the Vermont Geological Society, a non-profit corporation, registered in the State of Vermont.

President Dallas Rhodes

Vice President John Malter

Secretary Carolyn Merry

Treasurer Charles Fox

Directors Arthur Hodges  
Brewster Baldwin  
Charles Ratte

Committee Chairmen

Communication James Ashley

Professionalism Frank Paris

Membership John Drake

Meetings David Bucke

The official mailing address for the Vermont Geological Society is:  
Box 304  
Montpelier, Vermont 05602

GREEN MOUNTAIN GEOLOGIST  
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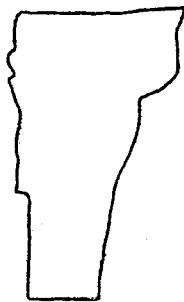
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# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

FALL 1975

Volume 2 Number 3

## A MESSAGE FROM THE PRESIDENT

The Vermont Geological Society is now entering its third year. During this time, we have experienced the joys and frustrations that are common to all newly created organizations.

The Society is now faced with the important issue of the existence of the Vermont Geological Survey, a matter of great concern to all geologists in Vermont. A discussion of the status of the survey occupied a considerable portion of our annual meeting. As a result of this discussion, an ad hoc committee of volunteers was organized to develop a Society position on the Survey. The results of this committee's activities are found in the position paper included in this issue.

The position paper is going to be presented to a number of representatives within state government, with the sincere belief that our voice as a unified group of geologists will be heard. Our Society is a working force in Vermont that can effect change; change that will be beneficial to the interests of the state and its people.

*John Malter, president, VGS*

## WINTER MEETING TENTATIVELY SET JANUARY 22nd

The winter meeting of the Society has been tentatively set for the 22nd of January at the Tavern Motor Inn in Montpelier in the evening. A round table discussion is being considered to examine the needs of geology in Vermont, from which a special Society paper will be developed. Details will be mailed Jan. 9th.

## POSITION PAPER ON SURVEY PREPARED

The special committee of the Society has completed and printed a Position Paper on the Vermont Geological Survey which is included in the center of this issue. Separate copies of the Position Paper are available on request. After reading the Position Paper you may have some specific comments you would like to make public as a member of the Society. Many, many comments have already been included in the Position Paper. If you would like to forward additional comments we will include them in the next issue of GMG; on Jan. 9th. We would like comments by January 5th.

## EXECUTIVE COMMITTEE MEETING SCHEDULED JANUARY 7th.

John Malter has called a meeting of the Executive Committee (and interested members) for 7:00 P.M. at the Agency of Environmental Conservation engineering division office at 660 Elm Street in Montpelier on January 7th. Principle items on the agenda include reporting on the meeting between Brewster Baldwin, John Malter and Dr. Martin Johnson on December 2nd, and subsequent events; and establishing the format and participants in the proposed winter meeting roundtable to examine the needs of geology in Vermont.

## WATER QUALITY SEMINAR SET FOR JANUARY 22nd.

The Society has invited William Silvey of the Boston office of the United States Geological Survey to lead a training seminar on the Ecological Aspects of Water Quality. It is anticipated that this seminar will be particularly valuable to those geologists interested in the Fe and Mn problem and in the effects of road salting, both primary and secondary. The seminar will be all day at the Tavern Motor Inn in Montpelier on January 22nd. Those members and others interested in attending the seminar should notify Jim Ashley in Montpelier at 828-2393 or via the Society, Box 304, Montpelier. A complete outline will be sent on request.

## MINUTES OF MEETINGS - OCTOBER 18, 1975

Executive Committee - held preceeding the regular annual meeting

### Old Business:

- Bylaws - additional amendments (dues payment)
- Prize at spring meeting of VGS - discussion
- Reference committee - headed by Terry Frank - decision to support this committee
- Membership Certificates

### New Business:

- Vermont Geological Survey - Impoundment of funds on 1 November, 30K allotted
- Potential total fund cut - discussion
- \$25 cash money - voted upon for prize for Vermont student paper.
  - Board of directors as judges
- Field trip to Thetford Mines, Quebec

### Annual Meeting

#### Old Business:

- Bylaws - changes to bylaws - both passed unanimously
- Treasurer statement: \$442.57
- Student paper prize of \$25. Motion: only for the undergraduate (by D. Tarbox, seconded by R. Stanley); defeated. Amendments followed as to \$25 prize for each graduate and undergraduate (C. Merry); defeated. Executive Committee to decide on best paper at the spring meeting, with prize of \$25; passed.

Reference Committee - report by Terry Frank

**continued after Position Paper**

# VERMONT GEOLOGICAL SOCIETY

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POSITION PAPER

VERMONT GEOLOGICAL SURVEY

NOVEMBER 11, 1975

## THE VERMONT GEOLOGICAL SURVEY

A Position Paper of the Vermont Geological Society  
November 11, 1975

### Introduction

The Vermont Geological Survey, created in 1884, has had a long and useful history of service to the State. In the years since 1947, when Dr. Charles G. Doll became State Geologist, the Survey has published reports and maps that summarize the fundamental aspects of bedrock and surficial geology of the state. In recent years, more detailed studies of selected areas have been published on the surficial geology, environmental geology, and mineral resources. These reports are used daily in development of earth resources, in teaching, and in research.

In 1975, legislative and administrative actions threatened to diminish the Survey to a token existence. Members of the Vermont Geological Society gave special attention to this problem at their annual meeting on October 18, 1975. This position paper is based on that open discussion and on later discussions by the Ad Hoc Committee on the Vermont Geological Survey and by the Executive Committee. It summarizes thoughts on the functions and future of the Survey.

### The Problem

There is urgent need to reduce state expenditures, and the mood in Montpelier is to eliminate all but the most essential programs. A common opinion in Montpelier is that the Vermont Geological Survey of recent years has not been sufficiently productive. The January session of the legislature may result in

termination of the Survey. The Survey has been successful in conducting and publishing geologic studies on a low budget, but has not effectively apprised legislators and the public of the nature and value of the program.

#### Vermont Geological Society

The Vermont Geological Society was founded in February 1974. Our membership of about seventy persons includes geologists working for governmental agencies, faculty of institutions of higher education and secondary schools, geologists in mineral industries, and consultants. Although the members represent diverse aspects of geology, there is widespread and strong agreement on the need for an active Vermont Geological Survey; we rely on the information generated by the Survey. This position paper reflects our views as to priorities and the future of the Survey.

#### PRIORITIES

The Vermont Geological Survey and the State Geologist have several functions important to development and use of the state's earth resources. The order of priorities reflects the Society's discussion in October.

#### Coordination

The highest priority for the office of State Geologist is to act as a clearing house concerning investigations related to the geology and water resources of the state. This role includes the following:

to identify the major geologic and hydrologic problems;



to encourage a focused attack by appropriate agencies and individuals;

to prevent duplication of effort;

to disseminate information.

The need for coordination is suggested by the many agencies and individuals studying earth resources in Vermont:

U.S. Geological Survey - water resources, stream-gaging stations, topographic mapping  
U.S. Corps of Engineers - flood control, ERTS  
U.S. Soil Conservation Service - mapping and characteristics of soils  
Agency of Environmental Conservation - site evaluation for possible pollution of surface and ground water (sanitary landfill; disposal of septic tank waste and municipal sludge; oil spills and hazardous materials; municipal water supplies), file of water well logs  
State Department of Health - analyses of water supplies  
State Highway Department - gravel deposits, alluvial fill under bridges  
Lake Champlain Basin Commission  
Vermont Water Resources Research Council - at UVM, funded by U.S. Department of the Interior  
Attorney General - monitoring Lake Champlain near IPC  
Academic institutions - research by faculty and students (graduate and undergraduate--in-state and out-of-state)  
Mineral industries - granite, marble, slate, talc, asbestos, limestone, gravel  
Municipalities - geologic and engineering studies for water systems and landfills  
Utilities - geologic and engineering studies for generating sites  
Consultants for developments  
Water well drillers  
New England Intercollegiate Geologic Conference - annual field conference--in Vermont 1959, 1961, 1972

#### Public Information

The Vermont Geological Survey must serve as a central office for storing and retrieving data on earth resources. Tourists, industries, developers, governmental agencies, school teachers, planners, recreation groups, conservation groups, and individuals regularly seek information on local geology and water resources.

### State Consultant

The State needs a geologist to serve as a resource person for the occasional legislation that pertains to earth resources and who can monitor the quality of geologic reports demanded by environmental legislation.

### Publications

Publications of the Vermont Geological Survey are an established and honored set of library references on the geology of the state. These publications are fundamental to all geologic investigations. Future publications on earth resources should be continued through the Survey rather than through a newly created source.

### Contracting Authority

According to 10 V.S.A. 103, the Vermont Geological Survey is the state agency that contracts with the U.S. Geological Survey for topographic mapping and earth resource studies. Though the topography of the state is already represented on old maps at the scale of one mile per inch, the U.S. Geological Survey has a program for remapping at 2,000 feet per inch; about forty percent of the state is now remapped at that scale. Such maps are important to community planning and to tourists, hunters, and others.

### Research

As money becomes available, the Survey should resume basic and applied research. This research is needed for exploration of energy sources, mineral deposits, construction materials, and water resources. Vermont's earth resources influence every aspect of our daily lives.

THE FUTURE

Members of the Vermont Geological Society have discussed the future of the Vermont Geological Survey. Three aspects have unanimous support:

- 1) The head of the Survey should remain a functioning geologist, even though many of the duties involve administration;
- 2) the Survey should remain independent of other governmental agencies, in order to serve each impartially;
- 3) there should be a Board to whom the State Geologist is directly responsible.

These aspects bear on the choice of "administrative home" and on the proper fulfillment of the State Geologist's duties. They also bear on whether the State Geologist should have an office at the University of Vermont or in Montpelier.

Administrative Home and Location

Members of the Society strongly support locating the office of the Vermont Geological Survey at the University of Vermont, as an independent agency. The physical location will ensure that the State Geologist has ready access to the wide-ranging talents of the UVM geology faculty, and to the considerable geology library, facilities, and equipment. Cognate disciplines are found in other departments of the University. In this setting, the State Geologist will be able to keep up with the techniques, concepts, and information that are continually evolving in the field of geology. A physical location in Montpelier would make the State Geologist more readily available for consultation on State matters, but the range of talents among the geologists at Montpelier is focused around water resources and there is real

danger that the State Geologist would lose contact with advances in other kinds of geology in this location. As mentioned earlier, the State Geologist must work with many different agencies and individuals, and impartiality would be difficult if the main responsibility is to one of these agencies.

#### Board of Review

Independence is important, but so also is responsibility. The Society recommends that a Board be appointed by the Governor to ensure that the Survey works in the best interests of the state. The Board should include geologists. It can help in liason with the legislature. It would review the State Geologist's program and fulfillment of the duties of the office. It would review manuscripts and maps prior to publication by the Survey. The Board would monitor the quality of work submitted under environmental regulations of the state.

#### Program

The priorities listed on the first few pages give a broad structure to the office of State Geologist. Particular programs within this structure will evolve as a result of the coordination of what is now being done.

Ad Hoc Committee on the  
Vermont Geological Survey  
Brewster Baldwin (chairperson)  
John C. Drake  
James W. Ashley  
Terry Frank  
John Malter  
Charles A. Ratté  
William J. Siok

Executive Committee of the  
Vermont Geological  
Society  
John Malter, President  
Carolyn J. Merry, Vice-Pres.  
Brewster Baldwin, Secretary  
Charles Fox, Treasurer  
Dallas D. Rhodes, Past-Pres.  
David Butterfield, Director  
Charles A. Ratté, Director

Vermont Geological Survey - discussion concerning the budget having been cut; this discussion took the place of the scheduled lecture by R. Stanley.

Motion prepared for a committee to draft a letter to show consensus and position of the Society concerning this issue. This is to be drafted and sent to the Governor plus appropriate people in the Legislature (Lt. Gov., Martin Johnson). Motion passed to continue discussion on this (Jack Drake and Bill Siok). R. Stanley stated that the Vermont Geological Survey is one of the oldest State Surveys in the U.S. He has letters attesting to the need and quality of work of the Vt. Survey from all other states commending the accomplishments of the Vt. Survey (this occurred 6 years ago when the Survey was facing money constraints). Potential areas of exploration of geological applications in the State of Vermont (uranium resources; high angle faults, cataclastic faults in bedrock with good producing wells with a recharge area; publication medium, information exchange). We need to separate the functions of research and regulatory activities of Survey. Also, need to augment the resources in Burlington as opposed to Montpelier office location. 10K of budget goes to USGS for topographic mapping; need independent State Geologist with office and staff. We need to present an argument as to what the State Geologist's function is in Vermont and how it relates to everything else. We need to have the Survey for: coordinating efforts, publishing articles, cooperative programs with Federal Government (ie., USGS), research oriented, the future functions of the State Survey (bedrock, surficial, mineral resources?), and coordinations. Chairman of committee to draft this letter is Brewster Baldwin with members of Jim Ashley, Chuck Ratte, John Malter, Jack Drake, and Bill Siok.

Election results were: President, John Malter; Vice President, Carolyn Merry; Secretary, Brewster Baldwin; Treasurer, Charles Fox; Publications, Jim Ashley; Director, David Butterfield; Professionalism, Bill Siok; Membership, Jack Drake; Meetings, Dave Bucke.

Vermont Natural Resources Council has some literature concerning inventory update.

Meeting was adjourned.

Carolyn Merry, Secretary, VGS

#### MINUTES OF EXECUTIVE COMMITTEE MEETING - NOVEMBER 11, 1975

Present: Malter, Baldwin, Fox, Merry, Rhodes, Siok, Ashley

Agenda: Minutes of previous meeting  
Treasurer's Report  
Membership applications  
Vermont Natural Resources Council  
Editing of position paper on the Vermont Geological Survey  
Ground-water seminar  
Winter Meeting  
Nominating Committee

The meeting was called to order by President Malter at 7:07 pm, at the Environmental Engineering office of the Agency of Environmental Conservation in Montpelier.

The Secretary read the minutes of the previous meeting and Annual Meeting, and after corrections the minutes were approved.

The Treasurer reported a balance of \$ 511.88 on 11 November. The Society realized \$ 4.36 from the banquet in October. The Treasurer's report was accepted. It was moved (Baldwin) and seconded (Fox) to put \$ 300 into a savings account.

Three applications for membership were approved by the Membership Committee and then by the Executive Committee.

Byron Stone	member
Robert D. Cushman	member
Richard E. Willey	member

The Vermont Natural Resources Council has received replies from 8 geologists and wants a wider response on identification of natural areas of geologic interest.

More than 2 hours was spent on the topic of the Vermont Geological Survey. A week before, there was a rescinding of the administrative action to remove funds from the Survey as of 1 November, but there is a move to do this legislatively in January. Baldwin, as chairman of the Ad Hoc Committee on the Vermont Geological Survey, presented a preliminary draft of a Society statement on the Survey. This draft includes comments of the committee members.

The paper was thoroughly discussed and freely edited; it was retitled "A Position Paper of the Vermont Geological Society"; and it was endorsed by all present, with the understanding that a new State Geologist would have to be appointed. (See text of Position Paper in the center of this issue of Green Mountain Geologist).

President Malter appointed a committee of three (Malter, Baldwin, and Stanley) to meet with Dr. Martin Johnson (Secretary of the Agency of Environmental Conservation) to discuss ways of maintaining the State Geologist and the Vermont Geological Survey. Meeting would be early in December.

Ashley proposed that the Society sponsor a one-day workshop by Bill Silvey, U.S.G.S., on problems and techniques related to quality of water. This would be in December. (Now tentatively scheduled for Jan 22).

It was agreed that the Winter Meeting be held in January in Montpelier, while the legislature is in session. The meeting would perhaps be the third Saturday of the month and would be designed to inform legislators of the role that geology plays in the every-day affairs of the state. (Meeting tentatively set for the evening of January 22 or 23rd.)

The Executive Committee is to meet before then. (Meeting set for January 7th).

President Malter appointed a Nominating Committee of Rhodes, Siok and Larson.

The meeting was adjourned at 11 pm, with no dissenting votes.

Brewster Baldwin, Secretary, VGS