THE GREEN MOUNTAIN GEOLOGIST

QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

VGS Website: http://www.uvm.org/vtgeologicalsociety/

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The Vermont Geological Society's
Summer Field Trip

Geology Hike in Smugglers' Notch, Vermont
August 15, 2009

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SUMMER FIELD TRIP DESCRIPTION

Saturday, August 15, 2009

TITLE: Geology Hike in Smugglers' Notch, Vermont

LEADER: George Springston, Dept. of Geology and Environmental Science, Norwich University, 158 Harmon Drive, Northfield, VT 05663

TIME: 8:30 AM – 4:00 PM (approx.)

FIELD TRIP DESCRIPTION: A strenuous, day-long hike in Smugglers' Notch to examine the bedrock and surficial geology and the geomorphology of one of Vermont's most popular scenic attractions. Topics will include the influence of ductile fabrics on brittle structures, the glacial and post-glacial history of the Notch, and the geomorphic processes that operate in the Notch today.

ITINERARY: Meet at the Waterbury Park-and-Ride at 8:30 AM. We will then carpool up into the Notch. After parking some of the cars at the main parking area up in the Notch we will backtrack in the remaining cars to the Smugglers' Notch Picnic Area and begin hiking north along the Long Trail. Along the way we will examine the bedrock and surficial deposits and cross a debris flow path. The Elephant's Head overlook provides a great view of the amphitheatre of cliffs on the western side of the Notch and may serve as a good lunch spot. We will then continue north along the Long Trail, taking a short side trip to the top of Sterling Peak if time permits, until we reach the Sterling Pond Trail, where we will turn west and descend into the Notch. In the floor of the Notch we will hike about 1/3-mile south along Vermont Route 108 to examine the fallen boulders and examples of the lower portions of the debris flows. Finally, we will return to the main parking lot up in the Notch and complete the car shuttle back to the Picnic Area. Estimated ending time is 4:00 PM.

This is a strenuous 5.2-mile hike and the footing is often difficult. Although the hike is mostly on trails, you need to be able to negotiate steep rock steps and slippery roots. Wear sturdy hiking boots (no sneakers or running shoes). Bring a large lunch, plenty of water, and rain gear. The trip will be postponed to the following Saturday (August 22nd) in case of heavy rain.

Limit is 12 participants and pre-registration is required. Those interested in going on the field trip **must pre-register** between 9:00 AM on July 29th and 5:00 PM on August 12th either by calling George Springston at (802) 454-1220 or by e-mailing him at gsprings@norwich.edu. All questions about the trip and directions to the Waterbury Park-and-Ride should be directed to George.

[Editor's note: The following abstract was originally intended to be published in the Spring 2009 *GMG* but was not received before the publication deadline.]

ABSTRACT

PETROLOGY OF A MULTIPLE META-IGNEOUS INTRUSIVE OUTCROP, TUPPER LAKE, NEW YORK

Kyle Thomas Ashley, Department of Geology, State University of New York, College at Potsdam, Potsdam, NY 13676 [presently at Geology Department, University of Vermont, Burlington, VT 05405]

Numerous metamorphic rock types, Precambrian in age, occur in an outcrop on the east side of Route 30, about 10.5 miles south of Tupper Lake, New York. Rock types range from grey garnet-poor gneisses to pink garnetiferous gneisses to black hornblende-plagioclase amphibolites. The grey gneisses, common at the northern end of the outcrop, contain abundant plagioclase feldspar, hornblende, and orthopyroxene that has been partly altered to chlorite. The presence of opx and low quartz suggests these gneisses were originally mangeritic granites. Hornblende crystals are locally up to 3-4 centimeters in diameter, and garnet is largely absent.

The pink gneisses are comprised of potassium feldspar and quartz, with lesser amounts of ortho- and clinopyroxene, plagioclase, biotite, apatite, sphene, and magnetite/ilmentite. Scattered garnets, 2-3 mm in diameter, are found throughout the massive pink gneisses, with pockets containing higher densities and larger grain sizes of garnets (up to 2 cm). Microprobe analysis of the garnets gives a compositional formula of $(Fe_{2.18}Mg_{0.27}Ca_{0.37}Mn_{0.14})Al_{1.97}Si_{3.05}O_{12}$, almandine. Microprobe traverses show there is no zoning across the garnets, except around the edges where decreased iron is most likely caused by metamorphic alteration. Consumption of the mafic phases during the metamorphic reaction creating garnet could explain the low concentration of mafic mineral phases. Perthitic texture within potassium feldspar crystals suggest a low crystallization temperature for the granitic protolith, and the presence of orthopyroxene would make these charnockitic granites. Crosscutting the pink gneisses are three hornblende-plagioclase-biotite amphibolites. Most likely these were originally basaltic dikes.

Pegmatite intrusions containing large potassium feldspar and hornblende grains commonly occur as pockets in the gneiss, up to one meter in diameter. Pale green orthopyroxene and pale pink pleochroic orthopyroxene also occur within the pegmatites. The orthopyroxene is partly altered to chlorite, but crystal structure and observation of unaltered portions of grains positively identify these as such. Due to the mineralogy of the pegmatites being similar to the host rock, they are most likely the result of hot, watery fluids that recrystallized the gneiss in late stages of metamorphism.

PRESIDENT'S LETTER

I'm sure that most VGS members would agree with me when I say that maps have a tremendous influence on how we view the world. I can lose myself in a map for long periods of time while trying to understand some geographic pattern. Well, I was recently given a beautiful book of maps, graphs, and images that is going to give me much to think about in the coming months: *Where the Great River Rises: An Atlas of the Connecticut River Watershed in Vermont and New*

Hampshire (edited by Rebecca Brown, Dartmouth College Press, Hanover, New Hampshire, 263 p., 2009.)

I haven't yet had time to read through this special project of the Connecticut River Joint Commissions, so I can't really give you a proper review, but my first impressions are that it is quite an achievement. The section on *The Physical Landscape* has a chapter on *Physiography and Bedrock Geology* by Jon Kim and David Wunsch, *Glacial Geology* by Laurence Becker and David Wunsch, and *Soils* by Thomas Villars. I could be expected to be excited about those, but this is so much more than just a geology and soils book. The 36 chapters in 7 sections include a chapter on *Weather and Climate* by Steve Maleski, *Groundwater* by Sarah Flanagan, *Forests* by Charles Cogbill, *Native Space* by Lisa Brook and others, *The Postindustrial Economy* by Preston Gilbert and Rebecca Brown, *Water Travel* by Sharon Penney, and *Cultural Institutions* by Rebecca Brown, to name only a few.

Flipping through, I see a map of the chronology of glacial retreat in Vermont and New Hampshire, graphs showing changes in mean annual temperature and annual precipitation over the last century, a map of effective stream runoff in the Upper Connecticut River watershed, a map of forest composition circa 1800, a graph of salmon returns over the last 40 years, a graph comparing the numbers of sheep and humans in Connecticut River valley towns circa 1840, and a map of early turnpikes circa 1820. There are photos or woodcuts of everything from the Ely Copper Mine to the steamboat "Barnet" and a 1912 log drive at the Ledyard Bridge at Hanover.

By weaving together so many disparate themes, this volume should add greatly to our understanding of the natural and human history of the watershed of the mighty Connecticut. Whether or not you actually live in the watershed, I encourage you to buy a copy and to also make sure there's a copy in your local library. There's something in it for everyone.

Respectfully submitted,
George Springston, President

SPRING MEETING MINUTES

The Executive Committee did not meet following the student presentations of the Spring Meeting held at the University of Vermont on Saturday, April 25, 2009.

The Society's Spring Meeting was a showcase for the excellent research carried out by 14 undergraduate and graduate students from Middlebury College and the University of Vermont. The following students received awards for their presentations:

1st Place Award ($100) and Doll Award: Charles Cavness III, Middlebury College
2nd Place Award ($75): Charlotte Bemis, Middlebury College
3rd Place Award ($50): Marissa Saccente, University of Vermont

The Charles G. Doll Award, given for the top undergraduate student presentation, is a plaque with the student's name and school engraved on it that is kept at the student's school until the following year's Spring Meeting.

Respectfully submitted,
Stephen S. Howe

TREASURER'S REPORT

The financial condition of the Society continues to be very strong. As of July 21, 2009, the Society's checking account balance was $6,900.83. To my knowledge, there are no outstanding bills.

The following members have been approved for membership in the Society since the last report: Kyle Ashley, Burlington, Vermont; Lauren Chrapowitzky, Burlington, Vermont; Halen Earle, Burlington, Vermont; David Gross, East Hardwick, Vermont; Laura Webb, Burlington, Vermont; and Jonathon Wells, Minneapolis, Minnesota.

Respectfully submitted,
Stephen S. Howe, Treasurer

ADVANCEMENT OF SCIENCE COMMITTEE REPORT

Two research grant proposals were funded by the Vermont Geological Society during the spring of 2009. Both proposals were well written, had reasonable scopes of work, and had exemplary references.

Halen Earle, an undergraduate in the Department of Geology at the University of Vermont, received an award of $687.40 for his proposal entitled "Analysis of Ductile and Brittle Bedrock Structures in the Town of Charlotte, Vermont."

Lauren Chrapowitzky, an M.S. candidate in the Department of Geology at the University of Vermont, received an award of $700.00 for her proposal entitled "Sedimentology, Stratigraphy, Paleoenvironments, Burial History, and Diagenesis of the Valcour Formation (Middle Ordovician, Chazy Group), Vermont and New York."

Both students were reminded of their obligation to report their research findings at the Vermont Geological Society Spring Meeting in April 2010 and/or at a professional meeting such as the Northeastern Section Meeting of the Geological Society of America.

The Advancement of Science Committee is currently looking into the possibility of having another invited lecturer and potluck dinner in November 2009. This was discussed at the last Executive Committee Meeting in April.

Respectfully submitted,
Jon Kim, Chair

VERMONT STATE GEOLOGIST'S REPORT

Radon and the Health Department
The Health Department's (VDH) radon program is distributing 1,000 free long-term radon-testing kits. They consulted with the Vermont Geological Survey (VGS) as to where previous testing and bedrock geology might suggest levels are higher. We worked in cooperation with Lori Cragin and Peter Young of VDH, and Jon Kim of VGS developed additional GIS data. We reviewed maps of radon test results by town and cooperatively produced maps of geocoded radon results and bedrock and surficial geologic maps. In both data sets, it is apparent that rocks of the Connecticut Valley Belt (Waits River and Gile Mountain formations and New Hampshire Series granites) have a greater percentage of indoor radon in air tests greater than or equal to 4 picocuries/liter than the surrounding bedrock belts. On these cooperative maps, 14-21% of radon tests in this belt had radon levels greater than or equal to 4 picocuries/liter. Certain towns in the Northeast Kingdom are under-tested but have the geologic indicators above and some towns have >20% of all tests exceeding the 4 picocurie/liter action level for radon. Twenty-two towns are recommended by VGS for the free test distribution. The Health Department will work with the Fairbanks Museum's radon program to distribute the tests.

Smugglers' Notch
George Springston of Norwich University and the State Geologist met with the Secretary of the Agency of Natural Resources and the Commissioner of Forest Parks and Recreation to present the results of a geologic study undertaken to assess rockfall and debris flow risk in Smugglers' Notch. The study will help guide management decisions in the Notch. The Agency Secretary asked the VGS to propose ways to continue to monitor the Notch, to be a clearinghouse for rockfall and debris flow data for the Notch from other information sources, and to develop a plan to inform decision-making if an earthquake event occurs that has the potential to destabilize the potential rockfall source areas.

Respectfully submitted,
Laurence R. Becker, State Geologist

ANNOUNCEMENTS

VERMONT GEOLOGICAL SOCIETY'S NEW LISTSERV

The Society hopes that the ListServ will develop into a central portal used to disseminate information regarding educational opportunities, pertinent local and regional meetings, workshops, and talks. It will also serve an educational role by allowing members and non-members to ask the geologic community questions.

If you are interested in joining the Society's new ListServ, please visit this link:
http://listserv.greenmtn.edu/scripts/wa.exe?SUBED1=VGS&A=1

You will be able to control the way and how frequently you receive information via the ListServ during registration. Please contact John Van Hoesen at vanhoesenj@greenmtn.edu if you have any questions regarding the ListServ.

VERMONT GEOLOGICAL SOCIETY LECTURER PROGRAM

The goal of the Vermont Geological Society Lecturer Program is to offer local colleges, universities, and high schools the opportunity to invite a member of the VGS to speak at their institution on timely topics within the broad realm of earth and environmental sciences. The program is primarily intended to reach those departments which either do not hold a regularly scheduled seminar series or

whose finances do not permit them to invite external speakers to present talks on a regular basis. Any costs associated with the Lecturer's travel, lodging, and meals are borne entirely by the Vermont Geological Society.

Stephen Wright, Ph.D., Department of Geology, University of Vermont, is our 2009 Lecturer. Stephen is offering the following lecture topic: "Glacial Geology of Northern Vermont: Ice Flow, Water Flow, and Glacial Lake History." For scheduling information, see the Society's website at http://www.uvm.org/vtgeologicalsociety/lecturer_program.html

STUDENT RESEARCH GRANT APPLICATIONS

Students and secondary school teachers are encouraged to apply to the VGS Research Grant Program by October 1, 2009. Downloadable Research Grant Program applications are available from the Society's website at http://www.uvm.org/vtgeologicalsociety/. For those without Internet access, forms may be obtained by writing to Jon Kim at the Vermont Geological Survey, 103 South Main Street, Logue Cottage, Waterbury, VT 05671 or by calling him at (802) 241-3469.

VERMONT GEOLOGICAL SOCIETY CALENDAR

8/15/09	VGS Summer Field Trip, Geology Hike in Smugglers' Notch, Vermont
9/25-27/09	NEIGC 101st Annual Meeting, Lyndonville, Vermont
9/25-27/09	NYSGA 81st Annual Meeting, New Paltz, New York
10/1/09	Student Research Grant Program applications due
10/11-17/09	Earth Science Week
10/18-21/09	GSA Annual Meeting and Exposition, Portland, Oregon

The **Vermont Geological Society** is a non-profit educational corporation.
The **Executive Committee** of the Society is comprised of the Officers, the Board of Directors, and the Chairs of the Permanent Committees.

Officers

President	George Springston	(802) 485-2734	gsprings@norwich.edu
Vice President	John Van Hoesen	(802) 287-8387	vanhoesenj@greenmtn.edu
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Advancement of Science	Jon Kim
Geological Education	Christine Massey
Membership	Stephen Howe
Public Issues	Laurence Becker
Publishing	Stephen Howe

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ADDRESS CHANGE?
Please send it to the Treasurer at the above address

Vermont Geological Society
Summer Field Trip
August 15, 2009, 8:30 AM
Geology Hike in Smugglers' Notch, Vermont

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