

THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

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*The Vermont Geological Society's
Summer Field Trip*

*Aquifers of Woodstock, Vermont
Mesozoic Dike in Quechee Gorge, Vermont*

August 11, 2007

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SUMMER FIELD TRIP DESCRIPTION AND ROAD LOGSaturday, August 11, 2007

TITLE: Aquifers of Woodstock, Vermont and Mesozoic Dike in Quechee Gorge, Vermont

TIME: 9:00 AM – afternoon

MEETING POINT INFORMATION: Assemble to leave around 9:00 AM from the Quechee Gorge State Park Visitor's Center, Route 4 east of Gorge. (Travel west on Route 4 from I-89 exit #1.) Those arriving from the north, east and south should meet at the Gorge. Members driving from the west (Rutland direction) may meet us at the Bridgewater Mill Mall, east end of the parking lot, around 9:30 AM. Those doing so, however, should be aware that the final stop is close to the Quechee Gorge Visitor's Center—not the Mall. WE WILL CAR POOL AS MUCH AS POSSIBLE.

LEADERS: Peter J. Thompson and David DeSimone (Woodstock area)
J. Gregory McHone (Quechee Gorge area)

FIELD TRIP DESCRIPTION: The main purpose of this trip is to visit key sites that demonstrate findings of our recent project to characterize aquifers in the town of Woodstock. Theoretical considerations of bedrock geology will logically lead to two stops in the Quechee quadrangle to the east. We will end at Quechee Gorge, where a Mesozoic dike may have played a role in the formation of the Gorge. Research supported in part by the Vermont Geological Survey and the USGS National Cooperative Mapping Program.

Bring water and lunch, although we will be near a country store (with a restroom) around noon. Wear shoes you don't mind getting wet and muddy.

If you wish to join us to stay at the Quechee Gorge State Park campground Saturday night, make reservations soon, as weekends are busy at the campground. For reservations visit the Vermont State Parks website www.vtstateparks.com or call 802-295-2990 (Quechee State Park, in season).

FIELD TRIP ROAD LOG: (See above for information on departure location)

- 0.0 Leave Visitor's Center, drive west across the Gorge.
 - 0.2 Pull into parking lot west of Gorge to further consolidate vehicles.
 - Follow Route 4 through Woodstock village (there may be some detour signs).
 - 13.8 Turn left into Bridgewater Mill Mall, proceed along river to bridge.
 - Left across Ottauquechee River, left onto Curtis Hollow Road.
 - Keep straight onto Larry Curtis Road.
 - 14.6 TURN AROUND BEYOND ONE-WAY BRIDGE AND PARK OFF THE TRAVELED WAY. OUTCROPS IN THE RIVER.
-

Stop 1 Barnard Gneiss: Ordovician metavolcanics, less strongly jointed than most other rock units in Woodstock, but several wells in Curtis Hollow have high yields.

- Retrace route and proceed east on Route 4.

16.4 Note outcrops along the south bank of the river—these are garnet schist of the Silurian “Northfield Slate.”

17.0 After Ottaquechee Motel turn left on Meadow Way. Drive up past till exposures (dug wells at the sand/till interface provided water to the farm which formerly stood here).

17.2 PARK ALONG RIGHT OF THE GRAVEL ROAD; DO NOT BLOCK DRIVES.

Stop 2 Kame Terraces: Sand and gravel deposits on the north side of the valley overlie thick till, which in turn overlies a buried sand and gravel aquifer. Dave will present an overview of the surficial geology at this stop.

17.4 Continue east on Route 4.

~18.8 Turn right across covered bridge, turn left downstream. (*Lincoln Bridge, 1877, is unique in that the builders modified the Pratt arch by using both wood and iron in the truss. Pratt’s bridges were entirely of steel.*)

~19.5 Bear right and right again onto Fletcher Hill Road.

19.8 PARK ON RIGHT OF ROAD, BUT AVOID DITCH. LANDOWNER PERMISSION REQUIRED. (*Note stone house made of Waits River Fm.*)

Stop 3 Glacial till: Tall brook exposure of till and possibly lacustrine clay.

- Continue up Fletcher Hill to height of land.

~22.2 Turn left into second blind driveway on left—DANGEROUS TURN!

Stop 4 Silurian Waits River Formation in South Woodstock syncline: Garnet schist interlayered with sandy, punky brown-weathering limestone. Round, open hilltops are typical of this formation all through eastern Vermont—hilltop farms have continued because of the rich limy soils. Strongly jointed and often deeply weathered, this unit is the most permeable in Woodstock. Peter will present an overview of the bedrock geology at this stop.

- Return to Fletcher Hill Road, turn left (NOTE MIRROR ON TREE TO AID IN WATCHING FOR TRAFFIC)

22.7 Bear left at triangle.

23.8 Right at next triangle (view of pond).

23.9 Left at next triangle (Kendall Road in South Woodstock), and immediately left onto Randall Road.

(You may wish to visit the country store in South Woodstock before lunch at Stop 5.)

- Follow Randall Road north to dead end.

24.8 PARK BEYOND STONE HOUSE. DO NOT BLOCK ROAD SOUTH OF STONE HOUSE. LANDOWNER PERMISSION REQUIRED. *(Where did the builders find stone for houses such as this? I have found no old quarries in the Waits River Fm.)*

Stop 5 Waits River Formation in steeply dipping zone, with important implications for water availability: This zone is noted for either high-yield wells or dry wells. Lunch on outcrops in the abandoned road. Glacial striae on woods road to east.

- Retrace road to South Woodstock.

25.6 Turn left onto Route 106 north. Pass first golf course parking area, turn right into second country club parking lot (includes restaurant).

30.2 Walk west up driveway to steep slope. LANDOWNER PERMISSION REQUIRED.

Stop 6 Mt. Tom member of Waits River graded beds: The Mt. Tom member lacks significant punky brown layers. Here bedding is overturned and tops face east. The implication is that the Standing Pond and Gile Mountain Formations lie stratigraphically above the Waits River Formation, a matter of debate among geologists for decades.

- Continue north to Woodstock village, turn right at the Green, then left onto Route 12 north.

- Turn right onto Pleasant Street and watch for Free Parking sign on left—at old mill site on Kedron Brook. Walk back to Elm Street to the north side of the steel bridge.

Stop 7 Standing Pond Volcanics under bridge: Garbenschiefer with 1- and 2-cm garnets and large amphibole fascicles, interlayered with various rocks. This is the most heterogeneous unit in town.

- Continue north on Route 12.

32.1 Turn right at Y onto Pomfret Road.

32.5 Turn left onto Stimets Road.

- Park along right side of Stimets Road.

Stop 8 Woodstock well field: These wells tap the buried aquifer.

- Continue west on Stimets Road, turn left onto Route 12.
-

-
- Turn left before the Billings Farm Museum and follow the River Road to Taftsville, cross the Ottauquechee (*Taftsville Bridge, 1836, third oldest in state, “mongrel” style*).
 - Rejoin Route 4 (left at dangerous intersection), continue east more than two miles.
 - Turn right on Gilson Avenue, then right again onto Marsh Family Road, go up hill to Frost Lane.

Stop 9 Devonian Gile Mountain Formation: Feldspathic quartzites and garnet schist. Similar rocks in the Hartland quadrangle on strike to the south were mapped by Walsh (1998) as a member of the Waits River Formation. (*I disagree for reasons that will be explained on the trip.*)

- Return to Route 4, proceed east to Quechee Gorge.

Stop 10 Mesozoic dike in Gile Mountain Formation: Follow trail from parking lot on northwest side towards the dam and down to the river. Discussion about how the Gorge formed. Also note that the country rocks here contain calcareous layers—we can speculate as to whether they represent a facies of the Gile Mountain Formation, or structural infolds of Waits River Formation.

PRESIDENT’S LETTER

Greetings,

First, I want to remind everyone that the VGS Summer Field Trip to the Woodstock-Quechee Gorge area is August 11th, the general topic being hydrogeology. I understand that at some point the weather might dry out this summer and so I hope everyone will make it to the trip.

The Society is financially strong, and on that note I encourage you to help students submit applications to our Research Grant Program. An intriguing development for the Society is the implementation of the VGS ListServ, which should be up and running soon, thanks very much to John Van Hoesen and a server at Green Mountain College. Once running this can serve as a clearinghouse for information about the Society and a place for anybody who has questions to ask them of the membership.

We had a wonderful set of student papers at the Spring Meeting, hosted by UVM (thank you to Char Mehrtens, especially).

Jon Kim, of the Vermont Geological Survey, is the current VGS Lecturer and he is available, free of charge, to your school to give a talk. See the VGS website or the “Announcements” section of this *Green Mountain Geologist* for his topics and contact information.

And one last reminder, the Fall Field Trip will probably be in October in the Middlebury vicinity. Looking forward to seeing people on August 11th. Enjoy your summer!

Best regards,
Rick Dunn, President

SPRING MEETING MINUTES

The Executive Committee of the Vermont Geological Society met following the student presentations during the very successful Spring Meeting held at the University of Vermont on April 28, 2007. All of the officers, except for Dave West, and all of the Board of Directors, were present. Steve Howe took the minutes for Dave.

1. The Treasurer's report was given by Steve Howe, who indicated that the Society had a balance of \$6,036.64 in its checking account, and that Char Mehrstens' bills for the refreshments at the Spring Meeting were the only bills outstanding.
2. Steve reported that no Research Grant Program applications were received by the March 31, 2007 deadline. The deadline for the next round of applications is October 1, 2007.
3. Jon Kim, the Society's 2007 Lecturer, reported that he had presented talks at Alfred University and Mt. Abraham High School. Other talks would be scheduled in the fall.
4. The VGS Summer Field Trip is scheduled for Saturday, August 11, 2007. Pete Thompson and Dave DeSimone will lead a trip concentrating on the hydrogeology of the Woodstock-Quechee Gorge area. Steve reported that Dave West had agreed to lead the VGS Fall Field Trip to the Middlebury area in October.
5. John Van Hoesen reported that a single server at Green Mountain College would be dedicated to the VGS ListServ, once it is up and running.
6. The succession of officers and directors in the fall was discussed, with Rick Dunn to be appointed to a one-year term on the Board of Directors, as Immediate Past President, per Society By-laws, replacing John Van Hoesen, who would vacate his elected position on the Board to stand as a candidate for Vice President of the Society.
7. The officers and directors discussed the scheduling of the Society's meetings, noting that the Spring Meeting had been scheduled to avoid conflicting with the Lake Champlain Research Consortium held the previous week at St. Michael's College. It was agreed that every effort would continue to be made to avoid scheduling future Winter, Spring, and Fall Meetings on dates that would conflict with other meetings of interest to the Society's members.

Respectfully submitted,
Stephen S. Howe

TREASURER'S REPORT

The financial condition of the Society continues to be very strong. As of July 20, 2007, the Society's checking account balance was \$6,035.50. To my knowledge, there are no outstanding bills.

Respectfully submitted,
Stephen S. Howe, Treasurer

ADVANCEMENT OF SCIENCE COMMITTEE REPORT

The Society's Spring Meeting was a showcase for the excellent research carried out by 12 undergraduate and graduate students from Dartmouth College, Green Mountain College, Middlebury College, and the University of Vermont. The following students received awards for their presentations:

1st Place Award (\$100): Paul Betka, University of Vermont
2nd Place Award and Doll Award (\$75): Danielle Eastman, University of Vermont
3rd Place Award (\$50): Lee Corbett, Middlebury College
3rd Place Award (\$50): Michael Gleason, Middlebury College

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.

The Committee received no applications to the Society's Research Grant Program by the deadline of March 31, 2007. Applications for the second round are due October 1, 2007. Please see the Society's website or the "Announcements" section of this *Green Mountain Geologist* for details.

The theme of the Society's upcoming Winter 2008 Meeting will be "Holocene Climate Change." Members are encouraged to contact me with any suggestions they may have for speakers.

Respectfully submitted,
Stephen S. Howe, Chair

VERMONT STATE GEOLOGIST'S REPORT

Northern Vermont Cross-Sections submitted for New State Bedrock Map

The Vermont Geological Survey (VGS), the U.S. Geological Survey (USGS), the University of Vermont (UVM) and contractors have participated since the early 1980's in a cooperative venture (COGEOMAP and STATEMAP) to produce the new bedrock geological map of Vermont. The map, at a scale of 1:100,000, incorporates field studies conducted over 30 years by more than 60 geologists. Editors for the Vermont map are Nicholas Ratcliffe (USGS), Rolfe Stanley (posthumous), Marjorie Gale (VGS), and Peter Thompson (UNH). The one-degree sheets were compiled by Rolfe Stanley, Barry Doolan, and Charlotte Mehrtens of UVM; Marjorie Gale, Jonathan Kim, and Peter Thompson (contractor) of VGS; and Nicholas Ratcliffe, Norman Hatch, Douglas Rankin, and Greg Walsh of USGS. Vermont State Geologists involved in the project include Laurence Becker, Diane Conrad, and Charles Ratté. Many other geologists have also made significant contributions to the new map.

The map was recently produced for review in Adobe Illustrator. The correlation of units chart (CMU) and unit descriptions (DMU) have also been digitized for scientific review. M. Gale and P. Thompson delivered four cross-sections for northern Vermont this week to the USGS. The cross-sections are interpretive and portray the geology at depths to 5 km. The sections are key for understanding the geology as shown on the map and represent a milestone in the overall project. The map and cross-sections, once through scientific review and publication, will be used for all land-based analyses of environmental issues in Vermont including groundwater, biodiversity and habitat, land management and hazard assessment, and mineral resources.

Education

In April, the State Geologist spoke about “Groundwater Mapping and Opportunities for Town Planning” to the Town Officers Education Conference held in Lyndonville, Colchester, Fairlee, and Rutland. Municipal officials in Vermont are requesting maps that identify groundwater resources to provide a base for planning and protection. The talk covered how the mapping is conducted, how the maps are used, and how a town can become a mapping partner.

On April 10th Jon Kim of the Vermont Geological Survey gave a presentation to an Environmental Science class of juniors and seniors at Mt. Abraham Union High School in Bristol on nitrate contamination of a bedrock aquifer in the vicinity of a large dairy farm in central Vermont.

On April 23rd Jon Kim led a field trip to the North Branch of the Winooski River in Putnamville for a Structural Geology class from Norwich University. The field trip area was mapped by the Geology Division in 2003.

Northeast Geological Society of America Meeting

Vermont Geological Survey (Division of Geology) geologists and project collaborators were authors on nine papers presented at the 42nd Annual Meeting of the Northeastern Section of the Geological Society of America in Durham, New Hampshire. Papers covered a variety of topics including an overview of recent Survey activities and applied studies, groundwater resources and contaminants projects, rockfall hazards, tectonics, and glacial geology. Collaborators from Middlebury College, the Vermont Department of Agriculture, University of New Hampshire, the Vermont Department of Transportation, and Norwich University were co-authors on the presentations. Geologists from the Division also attended a full-day USGS–State Geologists cluster meeting which fostered discussions for future cooperative work. The outcome is that projects have been developed with base science so when applied to the protection of health, safety, and the general welfare the underlying science is known to be defensible. The public wants to know that the base science is sound but focuses on the societal outcome.

Respectfully submitted,
Laurence R. Becker, State Geologist

ANNOUNCEMENTS**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.

Jon Kim, Ph.D., Geologist/Environmental Scientist, at the Vermont Geological Survey in Waterbury, Vermont, is our 2007 Lecturer. Jon is offering the following two lecture topics: “Nitrate Contamination of a Bedrock Aquifer in Central Vermont” and “Application of Tectonics to Groundwater Problems in Vermont.” For scheduling information, see the Society's website at 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, 2007. Downloadable Research Grant Program applications are available from the Society's website at www.uvm.org/vtgeologicalsociety/grantpolicy.html. For those without Internet access, forms may be obtained by writing to Stephen Howe at the Dept. of Earth and Atmospheric Sciences, University at Albany, ES-351, 1400 Washington Avenue, Albany, NY 12222-0001. Tel: (518) 442-5053; e-mail: showe@albany.edu

VERMONT GEOLOGICAL SOCIETY CALENDAR

- 8/11/07 VGS Summer Field Trip, Woodstock to Quechee Gorge, Vermont
 9/28-30/07 NYSGA Annual Meeting, Cortland, New York
 10/1/07 Student Research Grant Program Applications due
 10/5-7/07 NEIGC 99th Annual Meeting, Quebec City, Quebec, Canada
 10/14-20/07 Earth Science Week
 10/28-31/07 GSA Annual Meeting and Exhibition, Denver, Colorado

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Executive Committee

| | | | |
|----------------|-------------------|----------------|--|
| President | Richard Dunn | (802) 485-2304 | rdunn@norwich.edu |
| Vice President | George Springston | (802) 485-2734 | gsprings@norwich.edu |
| Secretary | David West | (802) 443-3476 | dwest@middlebury.edu |
| Treasurer | Stephen Howe | (518) 442-5053 | showe@albany.edu |
| Board | Les Kanat | (802) 635-1327 | les.kanat@jsc.vsc.edu |
| of | Jon Kim | (802) 241-3469 | jon.kim@state.vt.us |
| Directors | John Van Hoesen | (802) 287-8387 | vanhoesenj@greenmtn.edu |

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Vermont Geological Society
P.O. Box 1224
Saint Albans, VT 05478-1224

ADDRESS CHANGE?

Please send it to the Treasurer at the above address

Vermont Geological Society
Summer Field Trip
August 11, 2007, 9:00 AM
Quechee Gorge State Park Visitor's Center

From I-89, take US Route 4 at Exit 1. Go 3 miles west on Route 4. We will meet at the Quechee Gorge Visitor's Center at 9:00 AM. Those arriving from the north, east and south should meet at the Gorge. Members driving from the west (Rutland direction) may meet us at the Bridgewater Mill Mall, east end of the parking lot, around 9:30 AM. Those doing so, however, should be aware that the final stop is close to the Quechee Gorge Visitor's Center—not the Mall. WE WILL CAR POOL AS MUCH AS POSSIBLE.