

BEDROCK GEOLOGY OF VERMONT

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Classes: 11am Tuesday and Thursday, BIH 417

Labs: 1:30 pm Thursday, BIH 419*

Website: <http://cweb.middlebury.edu/f00/gl201a>

The geology of Vermont is amazing in its variety and complexity. Without driving too far, it is possible to study a wide range of geologic features of both bedrock and surficial (glacial, post-glacial) geology, ranging in age from 1 billion to 10,000 years.

GL 201 uses this setting to accomplish several ends. In the process of learning about the bedrock geology of Vermont, you will study a variety of rocks in their native habitat, instead of just in drawers. The field labs are examples of real geological problems, so you will be a geologist. You will learn to relate the geology of several different areas into a coherent picture. In the last couple of weeks, the disparate field problems and other information will fall into place as you prepare your synthesis. This is a college writing course so you will work at writing clearly and concisely using fairly specific formats. Good grammar and correct spelling are essential to presenting your ideas clearly.

Class time provides the essential information for identifying and describing rocks, studying their structures, and, most importantly, understanding processes leading to their formation. It also looks at the larger picture of Vermont geology, in terms of plate tectonics. Useful references for background information on plate tectonics and geology in general are available in BIH Science Library. Two appropriate books, *Earth's Dynamic Systems* by Hamblin and Christiansen (1998), and *Exploring earth: an introduction to physical geology* by Davidson et al. (1997), are on reserve.

Materials

Textbook: Centennial geologic map of Vermont (shared and in map drawer in BIH 419)

Hand lens (10x)**

Notebook** for field use

Pencil and eraser for field and lab use

C-Thru 6" ruler and protractor -- in inches and mm (clear plastic, W-8)

Schedule

The course meets in BIH 417 on Tuesday and Thursday from 11:00 am to 12:15 pm, and on Thursday afternoons in the field or in BIH 419 from 1:30 to 4:15. For every lab, bring hand lens, pencil, notebook, ruler.

For weeks 1 through 9, we'll combine class and lab time on Thursdays so that we can have an extended field trip. On those days, please meet at west entrance to Bicentennial Hall at 11:00 am. You will be responsible for bringing your own bag lunch. Be prepared for lousy weather. We'll leave at 11:05 at the latest and will return usually by 4:15 pm. Be sure to bring your notebook, hand lens, ruler, and pencil.

* - except field trips begin at 11 am from west entrance of Bicentennial Hall

** - essential for field and lab work, available at the College Store

Written Reports

The report for each field trip will be due one week following the field trip; lateness will be penalized. The text for each report will be double-spaced and written on a computer to simplify making revisions. The print-out must be easily readable. Check carefully for grammar and spelling. Each report will include appropriate maps and other diagrams; if those done in the field are messy, get a clean copy of the base map or other handout. Staple each field and lab report in the upper left corner.

I plan to return your reports as soon as I can to serve as a guides for future reports. Four of the early reports **must** be re-written and re-submitted (if your grade is below the A category). These four re-writes can be handed in at anytime before **November 9**. Other reports **may** be re-submitted at any time up to the final report due date.

I encourage you to work with others in the field and in the lab. You may discuss the preliminary organization of material that will go into the field and lab reports. You may also discuss some aspects of the final paper. *However, what you turn in must be your own work. You will not look at reports written in previous years. Using your classmates labs or reports from previous years will be treated as plagiarism and referred to the Judicial Council.*

Format

The text of reports will be done on a computer, as noted above. For illustrations, *leave a 1" left margin for stapling (keep this in mind during the preparation of field reports)*. Those illustrations that are in portrait format should be oriented so that they will have the top to the left.

The Final Paper

You will write a final paper that contains an abstract, an introduction, and a text that analyzes and synthesizes data on the geologic evolution of Vermont.

Abstract: This will be no longer than 250 words. Write it after you have completed the text. Write it (and re-write it) to be concise and to include as many data and conclusions as possible. It should carry its own weight; it should not depend on the remaining material in the report.

Introduction: This will be 1 page (no longer than 2 pages). Include a statement on the nature of the study -- part of a course, sources of data, list of dates for field study, index map for field locations. Also, the introduction should have a brief statement of your model; I suggest that you assume the proto-Atlantic model of Baldwin's "Geology of Vermont". Though this model provides for the closing of an ocean basin, you need not devote much space to discussion of what types of plate tectonic settings existed. Rather, your task is to use data to place useful constraints on this or any other postulated model.

Text: This will be no more than 9 pages long. It will use diagnostic data to draw inferences about the geologic evolution of Vermont. It will be the synthesis of information.

At the end of the course, you will submit a neatly organized packet that includes the final paper, to which is appended the pertinent field and lab reports. Put the reports in what you choose as a geologically desirable order (probably not the order in which you did the field problems). You may then wish to number the pages and put in a Table of Contents. The packet is *due on Thursday December 7*. After grading, I will return the entire packet to you. It will be a useful reference anytime you in the future you want to know about the bedrock in Vermont.

Course Grade

The course grade reflects the grade on the final paper and the grades on the field reports.

Nature of Data

Sources of Data

This is not a course organized around library research. Instead, the focus is on having you put together what you have learned from field trips, lab work, some lecture material, and the Centennial Geologic Map of Vermont. Some other departmental handouts include Baldwin's "Geology of Vermont" and an index map.

Kinds of Data

The writing and re-writing of reports should stress clear simple language in describing data and in using the data to draw inferences. "Do not write to be understood; write so that you cannot be misunderstood."

It may help you to distinguish **diagnostic data** from **consistent data**. Diagnostic data are here defined as data that allow you to draw firm and significant inferences. An example is the occurrence of mud-cracks, which indicate that the sediment surface dried out and cracked. The inference is that these sediments were above sea level. Consistent data are those that fit a particular interpretation but do not in themselves demand that interpretation. Red-colored sediments, for example, indicate oxidation; they usually form in sub aerial environments but could finally be deposited below sea level. In general, you will present consistent data solely in the field reports, but the diagnostic data belong in the final paper as well as in the field reports.

Some data bear on the origin of the rocks and other data bear on the geologic ages of events.

Origin: for sedimentary rocks, the origin includes the probable source area and also the probable environment of deposition. For igneous rocks, the origin includes the probable source of the magma, as well as the manner and location of emplacement. For metamorphic rocks, the origin includes the protolith (the inferred original or igneous rock), and the metamorphic conditions imposed on the protolith.

Geologic Age: the age of deposition of sedimentary rocks, age of intrusion of igneous rocks, and age of deformation and metamorphism can be treated in terms of

pre-Taconic events
 Taconic orogeny
 post-Taconic events (including Acadian orogeny)