



Geology Department Newsletter

**Union
College**

Newsletter 62, November 1988

Message from the Chair

You may guess from the appearance of this newsletter that the Geology Department at Union College is alive and well, and embarking on a new era. I know that **Kurt Hollocher** and **Herman Zimmerman** have kept you informed of the progress in reviving the department over the past few years. Now that the department has a permanent chair and three full-time faculty, we are ready to get on with the work of restoring the strong reputation which this department had for so many years. As the new chair, I will do my best to keep you informed of our progress.

I have known of the Geology Department at Union for over 25 years, having grown up in Scotia. **Bill McClennan ('50)** taught me earth science at Scotia High, and took me along on a Union Geology Department field trip in the early sixties. Since my arrival I have been learning about the history of geology at Union in somewhat more detail. I feel honored to have been chosen for this position, and I can see that the standards of the past represent worthy goals for us.

The reestablishment of Geology at Union is most directly tied to the generosity of **John Wold ('38)** in providing funds for the John and Jane Wold Chair of Geology. His unflagging efforts have set the stage for renewal of Geology here. At the same time, the reputation of Geology at Union has been the result of the many successes of the department's alumni. The strength of a department is most directly shown by the achievements of its graduates, and the Administration of the College is well aware of the quality of the program that was terminated in the late sixties.

The Geology Department is now larger than at any time in its history. While size alone is not a measure of a department, the complexities of modern geology require a certain minimum level of staffing. It is our hope to add one additional faculty member in the near future. At that point we will be in a strong position to give our students the kind of geological education they deserve. In the meantime we are establishing a regular curriculum on the basic principles and methods of geology. The department has also recently added a full time technician to assist with the many routine, but important, aspects of maintaining a geology department. We continue to share a secretary with Civil Engineering.

In addition to faculty, a modern geology department must provide its students the opportunity to use up-to-date equipment. I have prepared an equipment acquisition program which should accomplish this goal over the next 3 to 4 years. We expect to have facilities for X-ray diffraction, rock and mineral chemical analysis, physical properties measurements, sediment transport studies, field geophysics and rock mechanics work. We have begun to assemble a departmental computer network for teaching and research which can be linked to the College-wide computer

system. Our emphasis will be on maximizing student opportunities for hands-on work with sophisticated equipment.

Another important element in geological education is adequate field experience. We have just purchased a new 15-passenger van for field trips. We are planning a series of field excursions for geology majors which should give them at least eight, and as many as sixteen weeks (in two week segments) of experience in the field during a four year undergraduate career (in addition to numerous short trips). While we have many ideas of our own concerning appropriate two week trips, we would appreciate having suggestions from you.

Finally, it is most important that we have good students. I have been meeting with local earth science teachers, and I intend to invite them, and selected students from their schools, on local field trips. Many bright, science-oriented students don't know of geology as such, even though they are interested in geological things such as fossils and minerals. I hope to increase the number of geology students entering Union by making more high school students aware of geology.

(Re)introduction to the Faculty

This and subsequent newsletters will contain short articles about the research activities of faculty and students in the department. I hope these will give you some idea of our interests. The following bits will serve as an introduction.

George H. Shaw, age 42, married - two children, BS Chemistry (U. of Rochester, '67), MS and PhD Geology (U. of Washington, '69, '71). NSF Graduate Fellow (Seattle, Washington, '69-'71), NSF Post-Doctoral Fellow (Edinburgh, Scotland, '72-'73), Asst. Prof. (Florida International U., '73-'74), Asst. Prof./Assoc. Prof./Assoc. Head of Earth Sciences, U. of Minnesota ('74-88), John and Jane Wold Professor of Geology (Union, '88). Teaching: Env. Geol., Env. Sci., Min., Opt. Min., Phys. Geol., Intro. Geophys., Global Gravity, Min. Physics, Field Camp, Equation of State. Research: High pressure experimentation (elastic properties), structure and evolution of planetary interiors, core formation, crustal evolution, modelling of landform evolution.

Kurt T. Hollocher, age 33, married - no children, BS Geology (Antioch, '78), MS, PhD, Geology (U. Massachusetts, '81, '85). Instr. (Mt. Holyoke, '84-'85), Asst. Prof./Acting Chair (Union, '85-'88) Teaching: Phys. Geol., Min., Opt. Min., Petrol., Geochem. Research: Petrology, Geochemistry, structure and stratigraphy of metamorphic rocks and associated intrusives (especially in the northern Appalachians), Geochronology of metamorphic and related intrusives, Geochemical modeling.

Paul T. Ryberg, age 36, single, BS Geological Sciences (Lehigh '74), MS Geology (U. of Oregon '78), PhD Geosciences (U. of Arizona '84). Geologist (Union Energy Mining Div. '77-'80), Vis. Asst. Prof. (U. of Montana '84-'85), Vis. Asst. Prof. (U. Lehigh '85-'86), Vis. Asst. Prof. (Union '86-'88). Teaching: Phys. Geol., Hist. Geol., Env. Geol., Structure, Tectonics, Geomorph., Sedimentology. Research: Tectonostratigraphic analysis of orogenic sedimentary rocks, Basin analysis, deformation structures in sedimentary rocks.

Alumni list

The following are two lists of Union College Geology Alumni and Friends. If you receive this newsletter, your name is already on one of the lists. As institutional memories are sometimes deficient, it is quite possible that some names are missing or on the wrong list. I would like to reach all of our geology alumni and friends, so if you know names and/or addresses of anyone who should be added please let me know. You may also find that your name is on the wrong list (they came from different sources), and I would like to correct those errors as well.

Geology Alumni

T. Yates Wilson '29
Henry W. Dill, Jr. '33
Jack Friedman '35
William H. Parsons '36
Raymond F. Robinson '36
Alvin Van Valkenburg, Jr. '36
John R. Bergstrom '38
Willard L. Hagedorn '38
John S. Wold '38
George F. Hanson '43
Brruce G. Gillies '44
Harold D. Fox '45
Oscar R Kruesi, M.D. '45
Robert T. Brady '47
Harrison G. Demgen '47
Harrie W. Mallery '47
Bernard D. McGrath '47
Leo C. Carpenter '49
David C. Fosmire '49
Robert M. Fuller '49
John H. Imrie '49
John J. Palmer, Jr. '49
Robert G. Wisner '49
George R. Macaulay '50
William E. McClennan '50
Robert A. Navias '50
John G. Niblock '50
Clement B. Tomlins '50
John H. Ostrom '51
John G. Parker '51
James H. Scott '51
Donald M. Hoskins, PhD '52
Kenneth G. Johnson, PhD '52
Charles E. Scovil '52
E.R. Sawtelle '52

Donald R. Akerblom '53
John M. Boardman '54
Richard B. Clary '54
David W. Glamm '54
Edward A. Laskowski '54
Donald H. Zenger, PhD '54
Herbert N. Benson '55
John M. Bird, PhD '55
John W. DeGoeyen '55
Ronald A. Dickson, Jr. '55
Carl J. Metzger '55
Sebastian T. Morabito '55
Peter Pirnie III, PhD '55
Edward J. Zimmerli, Jr. '55
Wesley E. Lemasurier, PhD '56
Louis M. Martucci, PhD '56
William P. Benjamin '56
Clifford C. Hartelius, Jr. '57
Lynn W. Hinman '57
Richard E. Lounsbury '57
Ronald R. Revette '57
Richard E. Winslow III, PhD '57
John D. Hatheway '58
Thomas F. Allen '58
Robert J. McCune '58
John T. Seward '58
Frank H. Crum '59
John L. Fauth, PhD '59
Kenneth O. Hasson, PhD '59
Osborne B. Nyr, Jr. '59
Ronald E. Ombremski '59
Lawrence I. Benson '60
Caryl E. Buchwald, PhD '60
Donald H. Cady '60
Edward B. Hatfield '60
William R. Cox '60
William Potter '61
Anthony Alworth '61
M. Raymond Buyce '61
William T. Kirchgasser '61
Ross P. Sangster '61
John F. Schroder, Jr. PhD '61
Laszlo Z. Valachi '61
Norman G. Lavery, PhD '62
William E. Peabody '62
Philip L. Perkins '62

Thomas M. Pike '62
Elkanah A. Babcock '63
Charles M. Welden '63
Jon P. Broderick '64
John E. Dreier, Jr. '64
Timothy F. Freeman '64
William H. Older '64
Richard F. Risely, Jr. '64
Richard J. Wagner '64
Harold D. Nilsson '65
Richard L. Foland '66
Stephen W. Forster '66
Edward J. Kodl '66
Donald A. Werner '66
Joseph C. Whitney '66
Carl H. Hobbs III '68
William F. Priscott '68
Jeffry A. Smith '68
James H. Stratton '68
William D. Warcholik '68
Edwin J. Chambers, Jr. '60
John R. Dadeo '60
John M. Andrews '69
Paul G. Costello '69
Jeffrey Callister '70
John H. Jackson '70
Richard O. Sack '70
Robert B. Stone '70
Donald P. Krutenat '71
Richard Major '73
Peter Schiffman '73
Mark P. Dobday '75
Paul Emsbo '86
Andrew Lent '87

Friends

Nadine Gagnier '84
Jonathan Jameson '84
Robert Nesbitt '74
David Thurber '56
Angelo G. Angeledes '54
E.A. Hallman
Gwen Young
Norman Thompson '74
Daniel Silver '75

Danielle Cherniak '83
Carl Snyder '80
Lloyd Saberski '77
Thomas Engel '76
George W. Putman '51
Jon Titus '83
Dabra Seiken '84
Elizabeth Meyer '84
Thomas McKibbin '83
Elmer Rowley
Corinne A. Smith '83
Brant Bottum '75
Joseph Monkofsky '74
Maurice Deul '42
Herman Zimmerman
Richard W. Reeks '48
Randy Nisiobincki '79
James R. Lawrence '64
Lisa Korner '75
Jeffrey Gerst '80

Aspects of Northern Appalachian Geology

by Kurt Hollocher

During the Taconic Orogeny there was a narrow ocean basin and a volcanic island arc off the eastern seaboard of North America. Eastward subduction of oceanic crust generated magmas that fed the magma chambers and surface volcanoes of the arc. The closing of the ocean basin and collision of the island arc with North America in Ordovician time resulted in the fold and thrust structures of the Taconics, Green Mountains, and Berkshires. After the collision ceased, the magmas cooled and the volcanoes eroded away. Later, Ordovician, Silurian, and Early Devonian sedimentary rocks were deposited on top of the eroded plutonic roots of the Taconic island arc. During the Acadian Orogeny in Devonian time, all of the rocks from the central Berkshires east into Massachusetts were deformed and metamorphosed to sillimanite grade, turning the original diorite, granodiorite and basalt of the Taconic island arc into gneisses and amphibolites.

When I came to Union College in 1985 I had just begun a project on the petrology, geochemistry, and structural geology of the metamorphosed roots of this Taconic island arc. During Acadian metamorphism the hot, low density gneisses rose to form structural domes reminiscent of the pattern of the original subvolcanic plutons. Recent erosion has exposed the Taconian gneisses and amphibolites in the cores of the domes, about 20 of which form a north-south trending belt known as the Bronson Hill Anticlinorium that extends from Long Island Sound into western Maine.

The work I have done involves studying the mineralogy and chemistry of these rocks in order to better understand their origins and place in the tectonic development of the Northern

Appalachians. It turns out that most of the rocks are indeed similar to modern island arc igneous rocks, and that they have igneous structural relationships and chemical compositions that survived metamorphism. However, I have been able to show that the Taconian gneisses in Massachusetts are more complex than similar rocks elsewhere in the Bronson Hill belt, and that the geologic history of western New England still holds some surprises.

I have recently been working with Bob Tucker of the Royal Ontario Museum and Peter Robinson of the University of Massachusetts to measure the ages of these Taconian rocks using uranium-lead geochronology of zircons. These ages show that the "Taconic island arc" mentioned above is actually of Upper Ordovician to Lower Silurian age, younger than the Middle Ordovician age generally believed to be the time of development of the classic Taconic fold and thrust structures. In addition the gneisses contain dikes of Lower Silurian age that crosscut structures that were previously thought to be Devonian. It seems that there is a previously unrecognized Lower Silurian episode of metamorphism and deformation! Also, Silurian and Devonian metamorphism caused some of the gneisses to melt, producing pegmatites and other varieties of light colored dikes that cut the gneisses.

Last year **Andrew Lent ('87)** and I did some work showing that some amphibolites which lie unconformably above the Taconian gneisses are systematically rich in garnet and iron-magnesium amphiboles, in contrast to amphibolites in the Taconian gneisses that are systematically poor in these minerals but rich in epidote, augite and sphene. Andrew presented this work at the Northeastern Section meeting of the GSA in Pittsburgh, and we have published a paper in *Northeastern Geology* as well.

In Memoriam

John R. Bergstrom '38.

Professor had retired from the Geology Department at the University of Wisconsin - Eau Claire.

Stephen J. Egemeier '66 .

It is my melancholy task to inform you of the death of Stephen Egemeier in 1985, after a brave battle with cancer. I knew Steve personally, as he was a graduate student at Rochester while I was an undergraduate. We went caving together, and I distinctly remember one trip where we did a little "cave enlarging" with the assistance of a few sticks of dynamite. He was an avid spelunker, and was involved in important work on speleogenesis. Our community has been deprived of an energetic and imaginative individual.

Faculty Activities

Prof. Shaw attended meetings of the American Geophysical Union Public Affairs Committee and the American Institute of Physics Committee for Public Policy in October. He is serving his fourth term on the AGU Public Affairs Comm. and is in his second term as the AGU representative on the AIP Comm. for Public Policy. He is also chair of the AIP subcommittee for selection of AIP's Congressional Science Fellow.

Prof. Ryberg attended the Eighth International Conference on Basement Tectonics in Butte, Montana from August 8-12. He presented an invited paper: "Comparison of Sedimentary Petrologic Sequences Produced in Mesozoic Extensional and Convergent Tectonic Settings in North America" His results will be published as a paper in the conference proceedings.

All three of us attended the Centennial GSA Meeting in Denver during November. **Prof. Hollocher** presented a paper entitled "Partial Melting of Tonalitic Gneisses during Regional Metamorphism, Bronson Hill Anticlinorium, West-central Massachusetts." The requirements of scheduling inexpensive airline travel gave us a few extra days after the meeting. We rented a car and took a "departmental" field trip through western Colorado and eastern Utah, during which we examined the structures at the northeastern edge of the Ancestral Rockies uplift near Gunnison, the Oligocene volcanics of the San Juan Mtns., the late Tertiary faulting which gave rise to the Black Canyon of the Gunnison River, Unaweep Canyon (an abandoned drainage of the Colorado River), The Mesozoic sediments of the Colorado Plateau, the laccolithic Sierra La Sal, the striking weathering and joint controlled features in Arches National Park, and the escarpments and cuerdas developed on the late Mesozoic and early Tertiary rocks of the northern Colorado Plateau. It was a very stimulating trip, and we will be including these areas on field trips with students in the future, as well as using examples from these areas in our lectures.

Geology at Union

Union College will celebrate its bicentenary in 1995. This would seem to be an appropriate time to piece together at least a rough history of Geology at Union. In addition, I feel that is important for this revitalized department to know something about its past. I have started on this effort and have already turned up some things of interest. For example, conventional wisdom dates the beginning of Geology at Union to around 1821-2. In fact, mineralogy was being taught as early as 1809, and Thomas C. Brownell (the first Union "geologist") left a partially catalogued collection of 2000 mineral specimens with the college when he left in 1819 to become Bishop of Connecticut! I am sure that most of you have contributions that would be useful in this effort, whether in the form of interesting anecdotes or details concerning course offerings, field trips, etc.. I would greatly appreciate your assistance in providing me with such information. In addition, if you have any documentary material, I would very much like to have copies for the archives. I will include interesting items in future issues of this newsletter.