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## Geology Department Newsletter

**Union  
College**

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**Newsletter 67, September 1993**

### **Message from the Chair**

As exciting and interesting as were my previous four years in the Geology Department at Union, this past year must rank number one. We graduated four more geology majors, and we will be starting fall term with fifteen majors, including at least 2 or 3 new freshmen. We have hosted two long term visitors from Russia and Romania. **John Garver** spent a month in Kamchatka, in a region previously inaccessible to westerners, where he studied geology similar to the areas he and his students have worked on in Washington State and British Columbia. We hired our fourth faculty member, who will be arriving next September. Finally, our efforts to build an endowed fund for field geology received a significant boost in the form of a major contribution from **John Dreier ('64)**.

**Nik Sobolev** will be returning to Novosibirsk in September, but we expect to stay in touch with him. He has provided invaluable contacts for the department in Russia, and as a result **John Garver** will be developing research projects in Kamchatka. We hope to develop opportunities for student field trips to Russia in the future with Nik's help. He is very excited about the possibility of showing students the unique geologic features of Siberia.

**Marion Lupulescu** joined us last February. He is on the faculty at the University of Bucharest in Romania, where his field is economic mineralogy. Marion has been helping with modernizing the curation of the mineral collection. He has been very impressed with the quality of the collection and so far has entered data on over 4000 specimens into a computer file system. He will be making digital images and storing them in the same files. This approach will not only allow us to get information on any specimen, along with a picture, but will provide additional security for the collection. By the time he is finished the catalog will probably exceed 10,000 specimens. He will be continuing with us through next year and I hope he will be able to teach or co-teach a course on economic minerals during the Spring term, to be followed by a field trip to Romania to visit some classic localities. His wife, Affina, is a graduate student in the Geology Department at RPI.

**John Garver** reports on his trip to Kamchatka elsewhere in the newsletter. We are all very interested in opportunities which have been raised by having our east European visitors this past year. We may be hosting an additional Russian geologist this coming year, but arrangements have yet to be finalized.

**Donald T. Rodbell** will be joining us as our fourth geologist in September of 1994. He was selected from an applicant pool of nearly 100, at least 20 of whom were excellent candidates. We

are very pleased that he has decided to become part of the Union College Geology Department. Don received his B.S. from St. Lawrence University and His M.S. and Ph.D. degrees from the University of Colorado at Boulder. His principle interests are in Quaternary and glacial geology, and climate change. He has worked in the Andes, New Zealand, Colorado and Canada. He was a research geologist in the Geologic Risk Assessment Branch of the USGS for nearly two years after receiving his Ph.D.. He will be spending the next year at the Byrd Polar Research Center at Ohio State University, where he is a Byrd Fellow. Don is married to Cecelia Oballe Castillo.

**Kurt Hollocher** has returned from his sabbatical leave at the University of Arizona in Tucson. He reports on his experiences in another part of this communication. It's good to have him back again; his dry sense of humor was missed.

Next year will see a lot of activity in the department. We expect to graduate another four geology majors, and the junior class now numbers six. We continue to enjoy healthy growth, which should continue when we can offer still more courses with a fourth faculty member. I have requested a formal, external review of the geology department from the administration. This is done periodically for each department in the college, and it seems especially appropriate to do such a review now. Next year is the final year of my two terms as chair of the department. A lot has been accomplished during the past five years, and as the administration considers the leadership of the department in the future, we need to know how other geologists assess our strengths and weaknesses.

It has been a pleasure to work on the development of this new department, and while I hope to continue to contribute, I consider it unlikely that I will continue as chair of the department. There is still much to be done; our space situation will become worse with the addition of the fourth faculty member, who will be taking over my office space to use as a laboratory. My effort to provide funds in support of field geology has been marginally successful, although a recent very generous donation from John Dreier raises my hopes. If we all continue to do what we can to develop this department, it can become the premier undergraduate geology department in the country.

## **Alumni News**

**Todd Smick ('91)** has been promoted to Service Manager in the Windsor, Connecticut office of Suburban Propane.

**Jon Broderick ('64)** visited the department and has subsequently donated a Scintrex fluxgate magnetometer to us. The instrument will be used for instruction in our geophysics course.

**John Parker ('51)** writes that his wife, Beverly Laing, knew Bill McClennan at Scotia High School a long time ago. Jack is retired from his position at the U.S. Bureau of Mines.

**Leslie Kahn ('91)** has left Arthur Little Assoc. to return to graduate school. She will be studying at University of California at Santa Cruz doing research using the deep diving submersible "Alvin" off the West coast.

There have been very few communications from alumni during the past year. No doubt you are all as busy as we are. Still we enjoy hearing from you, and your fellow alums also like to read about your latest exploits, so please keep those postcards coming in.

## **New Graduates**

**Pnina Miller** has begun graduate study at Boston College. Her senior research, "Bedrock topography beneath the Red Lake peatlands", was directed by Prof. Shaw.

**Victoria Palmier** did her senior research under Prof. Shaw on trace element chemistry of limestones of the Helderberg Group and the Onondaga Formation. Her results help to explain differences in water chemistry of springs emerging from different formations. She has taken a position as a geologist with Groundwater Technology, Inc.

**William van Order** (J.R. to his friends) completed a senior thesis under Prof. Garver on "Fission track evidence for late Eocene uplift of the Marshall Creek Fault, British Columbia, Canada". He has taken a position using his double major in Geology and Civil Engineering at a consulting company Syracuse.

**T. Jeffrey Scott** joined the Peace Corps and will be spending the next two years working on a forestation project in Sierra Leone, Africa. Jeff's senior thesis (under the direction of Prof. Garver) was entitled "Trace element geochemistry of shale as a provenance indicator of mid-Cretaceous terrane accretion, southern British Columbia."

## **Student presentations and publications**

**Pnina Miller** presented a poster at the Cincinnati meeting of the GSA based upon her senior research. She enjoyed talking with other geologists interested in her work.

**Vicky Palmier** presented the results of her senior research "Trace element chemistry of Devonian Limestones and its relation to spring water chemistry" at the Union College Steinmetz Symposium.

**Robert Maranville** gave a paper at the Vermont Geological Society meeting: "Fission-track dating of detrital zircons from modern rivers in the Pacific Northwest: implications for the provenance of the Olympic subduction complex

**Jeff Scott** also attended the VGS meeting and presented his work on: "Shale geochemistry as a provenance indicator of mid-Cretaceous terrane accretion, southern British Columbia". He also attended the GSA Cordilleran section meeting to present results on: "Rare-earth and transition elements in shale of the Tyaughton Basin, southern B.C.: provenance evidence for mid-Cretaceous terrane accretion."

## **Russia-US (Union!) collaborate on the Kamchatka Peninsula**

by John Garver

Fieldwork in Russia? Three years ago I would have never thought it possible, likely, or even desirable. Having grown up during some of the coldest years of the Cold War, I have viewed the Soviet Union and Russia with a bit of fear and distrust. However, times change and we find ourselves watching astounding transformations in the Former Soviet Union (FSU) and in all of the independent countries, including Russia.

In 1991, when disintegration of the FSU was proceeding at an rapid pace, an anonymous Union College alumnus donated funds to the College to bring FSU scientists to the college for one year visits. The Geology Department was fortunate to be able to bring in Nikolai Sobolev from the Institute of Petrology and Mineralogy in Novosibirsk, Siberia. Nik has had a fruitful year and the Department has benefitted tremendously from his presence. In Russia, however, these are serious times for geologists - budgets and salaries are low, and inflation is high. As a result, many of Russia's geoscientists have been paralyzed by the disintegration of the FSU. Aware that US-Russian scientific collaboration is crucial to the future of fellow scientists, Nik Sobolev offered to establish contacts in Russia for collaborative research.

For a geologist interested in terranes and convergent margin tectonics, the Kamchatka Peninsula stirs the imagination. Because of its strategic location for defense for the USSR, the Kamchatka Peninsula has been closed to westerners for years - it has only been "opened" recently. Likewise, although geologic studies have been conducted on the Peninsula, very few papers have appeared in English. In a sense, the geology of the Kamchatka Peninsula is a continuation of the geology of central and southern Alaska, which in turn is a continuation of the outboard geology of British Columbia and Washington State. In part, this was the reasoning that Mark Brandon (Yale University) and I used to convince the National Science Foundation and Union College to fund a month-long reconnaissance trip. Mark and I have both worked extensively in British Columbia and Washington on problems centered around understanding Mesozoic and Cenozoic tectonics of the Pacific Northwest. Currently we are working on the geology of the Olympic Mountains in Washington State. The opportunity to establish a similar field program in the Northwest Pacific was enticing. Neither of us, however, spoke any Russian. My wife, Jacqueline Smith, is a geologist with a local geologic consulting firm, has several years of Russian, and was enthusiastic to join the expedition provided she could get time off from work.

Nikita Bogdanov, who is director of the Institute of the Lithosphere (part of the Russian Academy of Sciences), has worked on the Kamchatka Peninsula for over 20 years. He had planned to send a small field team to the Olyutorsky Peninsula for the summer field season. With the help of Nik, we made arrangements with Bogdanov to join his field party of eight geologists for part of the summer. Because the logistics and future prospects of such collaboration are complicated, it was agreed that prior to and after the field season, we would meet with Bogdanov in Moscow. This rather simple arrangement resulted in almost perpetual jet lag because Moscow is 9 hours from New York (8 time zones), and the Kamchatka Peninsula is 10 hours from Moscow (10 time zones). This was a little like meeting in Hawaii to do fieldwork in Nova Scotia. (It would have been shorter to go the other way, but it was important to meet at the Institute of the Lithosphere in Moscow).

In Moscow we were met by Vadim Chekhovich, a seasoned veteran of the Kamchatka Peninsula, who traveled with us to the field. We were disappointed to learn the he spoke no English, but

delighted to discover that he spoke fluent French - Mark, Jacquie and I all know some French. After a five day weather-induced delay in the village of Korf we boarded a massive Russian helicopter and flew about 4 hours to our field site on the eastern edge of the Olyutorsky Peninsula (see "8" on figures). Camped at the edge of the Bering Sea on Arctic tundra at a latitude of 61; we spent two weeks investigating the structure, depositional setting, and provenance of rocks of a thick olistostromal unit (large blocks of different rock types in a "flysch" matrix) tectonically juxtaposed with the Olyutorsky arc (latest Cretaceous to early Tertiary). Although we had few expectations concerning the amount of science that we would accomplish in such a short time, we discovered that the this olistostromal unit and its history are at the center of understanding the nature of the collision of the Olyutorsky arc complex.

The Olyutorsky arc is inferred to have collided with the northeastern Asian margin in the Tertiary. Presently, however, few data are available concerning the nature and exact timing of collision. Collision occurred either in the Eocene or in the Miocene - two camps seem firmly established. At the center of the controversy, is an obvious lack of data, which is not surprising considering the remote nature of this area. Having successfully ventured to the Kamchatka Peninsula (and returned), we plan to submit a proposal to the National Science Foundation which will be aimed at understanding the nature and timing of collision of the Olyutorsky arc. The exceptional exposures and young age of this suture (we suspect Miocene collision) make the northern Kamchatka Peninsula ideal for understanding the dynamics of a young collision zone. If funded, we will not only have full logistical support from our Russian colleagues, but our research programs will dovetail for at least three years giving us and Union students a unique opportunity to interact with Russian geoscientists in Russia. We hope this is only one of many collaborative projects between Russian and American scientists, because both sides have much to offer.

### **Kurt Hollocher's Sabbatical Report**

I spent the past year on sabbatical leave at the University of Arizona in Tucson. I planned to work in the lab of Joaquin Ruiz, using a new inductively coupled plasma mass spectrometer (ICPMS, similar to our own) connected to a laser ablation sampler. The sampler uses a pulsed ultraviolet laser that is focused through a microscope onto a sample in a small chamber. The laser light vaporizes a bit of the sample, and the vapor is whisked away by a stream of argon gas to the ICPMS for analysis. Laser ablation ICPMS allows analysis of trace elements in solids on a microscopic scale, with cost and performance better than other available techniques. This technique has applications in geology, metallurgy, ceramics, forensics, biology, and the semiconductor industry, to name a few.

Unfortunately, the Tucson laser system never showed up. However, while visiting Union College in February I assembled our own laser ablation system and analyzed several apatite crystals. A few weeks later I presented these analyses and a description of laser ablation ICPMS at a meeting of the Geological Society of America in Burlington, Vermont.

Other projects in Tucson kept me busy, and I managed to write or contribute to eight papers that are in print or in various stages of writing or review. One of the larger projects involved looking at the changes in chemical composition that occurred to a rhyolite welded tuff during

hydrothermal alteration in late Tertiary time. The results indicate that these and other altered volcanics in the Basin and Range Province were the source of manganese, copper, lead, zinc, silver, and other ore metals in the Western Arizona Manganese Province.

My wife and I also saw much of the Tucson area, and visited many of the wonderful sights in the western United States including Grand Canyon, Yellowstone, Sequoia, and other national parks. We also had fun at our Tucson apartment feeding hummingbirds and catering to a flock of roadrunners that regularly visited us (they adore meatballs). All-in-all this was a very enjoyable and productive year!

## **Donors to the Field Geology Fund**

John Dreier '64  
Robert T. Brady '47

James H. Scott '51

Donald M. Hoskins '52

Philip L. Perkins '62

Bernard McGrath '47

Andrew D. Lent '87

Todd Smick '91

Carl H. Hobbs III '68

Philip Royce '92

## **Faculty activities**

**George Shaw** has been appointed to the Geology and Public Policy Committee of the Geological Society of America. He attended the GSA Annual Meeting in Cincinnati, where he was co-author of a poster presented by Prina Miller, one of his students. He also attended the Fall meeting of the American Geophysical Union in San Francisco. The weekend before that meeting he met with colleagues from U. of North Carolina and MIT for a field trip to examine a possible research site in the Central Valley of California, and to collect preliminary samples. He also attended the Spring meeting of AGU in Baltimore where he presented some preliminary results on samples from the Great Valley Sequence.

**Kurt Hollocher** had a number of papers published or accepted for publication during his sabbatical leave: "Geochemistry and origin of volcanics in the Ordovician Partridge Formation, Bronson Hill anticlinorium, western New England" in American Journal of Science; "Laser ablation-inductively coupled plasma mass spectrometry for microscale trace element analysis of

solid geological materials" in Geological Society of America Abstracts with Programs; "Iodine as a Tuning Standard for Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry" in Review of Scientific Instruments; "Chemical composition of surface and high-uranium well water, Lake Sunapee area, New Hampshire" in Northeastern Geology (co-authored by Amie Yuskaitis ('92)); and "Composition Changes in an Ash Flow Cooling Unit During K-Metasomatism, west-central Arizona." in Economic Geology. Kurt presented results of his work on laser ablation analysis at the meeting of the NE Section of GSA in March.

**John Garver** presented three papers at the GSA meeting. Two of these were co-authored by Phil Royce ('92) {Chromium and nickel in shale of the foreland deposits of the Ordovician Taconic Orogeny: using shale as a provenance indicator for ultramafic rocks} and Jeff Scott ('93){Rare-earth elements in argillites indicate a continental provenance for clastic rocks in the Bridge River complex, southern B.C.}. He was also co-author on two other papers presented at the meeting: "Time integrated history of cooling and denudation of the Coast Plutonic Complex, B.C. based on isotopic ages of detrital minerals", and "Timing and rate of modern denudation of the Olympic Mountains based on new apatite fission-track ages".

## Field Trips

**John Garver** took a group of seven students to the Bahamian Field Station on the island of San Salvador in the Bahamas for two weeks in December. The field trip was the culmination of his new course in "Carbonate Sedimentation". John had previously participated in a National Science Foundation Workshop to develop interest in courses which would make use of the facilities and uniquely exposed geology of the Bahamas. Students looked at Paleozoic carbonate rocks in New York during the fall term, and then were able to study the equivalent modern environments in the Bahamas on the field trip. In addition to student contributions to the cost of the trip, expenses were partially defrayed by grants from NSF and the Union College internal education fund. The response to the course and field experience was overwhelmingly positive.

Last September **George Shaw, Pnina Miller, and Bill Neubeck** (our department technician) joined Paul Glaser of the University of Minnesota's Limnological Research Center for some field work in the Glacial Lake Agassiz peatlands of northern Minnesota. We were doing shallow seismic refraction and reflection to determine depth to bedrock beneath the peat and underlying quaternary lake clays and glacial till. The area is very difficult to traverse, as it is almost entirely water-saturated bog and fen. The helicopter rides from site to site were a thrill, and the views of the patterned vegetation were fascinating. The seismic work was highly successful, and confirms ideas which have been proposed concerning the relationship between bedrock topography, groundwater hydrology and vegetation patterns.

This past summer **George Shaw** returned to the peatlands, with a Union student, **April Bemis**, two students from Colgate University, Lori Clark and Kim Seidsma, and **Bill Neubeck**. We were conducting additional shallow seismic tests, this time along the major highway running north-south through the region. Our sites were chosen near test boreholes and were aimed at determining whether we could distinguish changes in the sediment covering the bedrock. Preliminary results suggest that we can detect sand and gravel layers within the lake clays, probably either tills from glacial readvances, or outwash gravel and sand. Although the mosquitoes were fierce enough,

and the bogs were certainly wet, it was the gentle rain which put an end to our fieldwork (fortunately after we had collected virtually all of the necessary data. Water percolating into the seismic recorder rendered it temporarily inoperative. (It's fine now, having dried out sufficiently so that its "nervous system" is once again functional.) On the way out to Minnesota we visited Van Hise Rock, a classic geologic site near Madison, Wisconsin. The research and field expenses for this and the previous trip were funded by an NSF grant directed at understanding the geologic controls of peatland ecology.