Department of Earth and Environmental Sciences

DECEMBER 2009 *issue 3*

NEWSLETTER

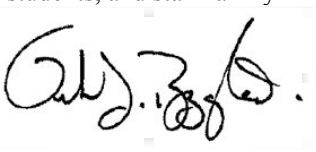
Message from the Chair

Fall 2009 ushers in a new academic year at Lehigh and with it some long-anticipated changes for EES. This is the last year for EES in its venerable Williams Hall home as the summer of 2010 will see the Department moving to its new home in the STEPS facility just down the hill. EES and its predecessor Departments have shared a long relationship with Williams Hall, but the time has come for our lab's growing scientific needs, student instructional needs, and broader scientific, technologic, and societal interactions to be brought together under the STEPS state of the art facility. It is often said that those with a firm understanding of where they come from are best poised to face future challenges. In this respect, this last year in Williams gives us pause to reflect a bit on the history of the EES Department and highlight some of its colorful personalities. We dedicate this issue of the Alumni Newsletter to the history of the Department, focusing on some of the common threads that have bound generations of students and professors together.

The last two newsletters have brought you closer to many of the faculty and graduate student research activities that are going on in the Department and we will again bring some of that information to you in this volume. But here we also will take a closer look at our undergraduate program and illustrate how it is rooted in the things that EES has traditionally done best, while still being flexible and responsive to the training that students need for the future. We are now beginning the fourth year of our revised undergraduate curriculum and the numbers look very promising. All of our general service introductory courses, labs, and recitations are full indicating the popularity of EES courses as a Natural Science elective for all Lehigh students. More encouraging, our major courses are bursting at the seams. Our core courses in Earth System Science, Earth History, and Senior Seminar have 20-30 students, and our track courses like Sed-Strat, Ecology, Hydrogeology, and Rocks and Minerals have enrollments 20+ students. These numbers are making it logistically difficult and expensive to maintain the frequency of field trips that is so distinctive of our undergraduate training. We anticipate that our carefully designed teaching facilities and labs in STEPS will attract yet more students to the major, increasing the challenge to meet student needs. It is good to have these kinds of problems and challenges.

As Lehigh and the Department continue to carefully navigate the economic slowdown that has affected everyone, I'd like to take a moment to thank all of you who continue to be generous in your giving to the Department. Many of you who have given cite a reconnection to the Department through the newsletter that we find encouraging so we hope you enjoy what's inside past the front page. The challenges to be the best Department possible and a leader at Lehigh remain. The STEPS facility and our role in making it a reality are strong statements of the commitment EES and Lehigh have taken in the fields of science, technology, energy, environment and their impacts on society and policy. Your generous giving can be directed to help us realize STEP goals, or it can be directed at some specific part of our program, like graduate research, undergraduate field trips, or field camp. As always, we thank you for your support and know that you are always welcome to visit us. We hope you have a productive and successful close to 2009 and wish you all the best for 2010.

On behalf of the EES faculty, students, and staff family



Frank J. Pazzaglia
Professor and Chair

What's Inside...

Editor, *Laura Cambiotti*, at the K/T Boundary, Gubbio, Italy

Layout design, *Nancy Roman*

EDWARD H. WILLIAMS, JR. 1875

Edward Williams was one whose continuous quest for knowledge led him to diverse fields of study throughout his life. Best known as the donor of Williams Hall, Williams also presided over the meeting that selected brown and white as Lehigh's colors.

Williams earned a bachelor's degree from Yale in 1872. He worked as a surveyor for the Pennsylvania Railroad before entering Lehigh in the fall of 1873. Williams earned two Lehigh degrees, chemistry in 1875, and mining engineering in 1876, and worked as a mining engineer before returning to Lehigh in 1881 as professor of mining engineering and geology. As a Lehigh professor, Williams translated geology texts from French and German, developed courses in biology and refereed athletic contests. He founded Tau Beta Phi in 1885 to give top students in engineering the same recognition as the Phi Beta Kappa did for top students in the humanities.

A hearing problem forced Williams to retire from Lehigh in 1902. He returned to his native Vermont, continuing his studies in geology, foreign languages, history, and genealogy. As a board member of the town library, he read every book before it was placed on the shelf. An avid Lehigh booster, Williams served as president of the Alumni Association and funded Williams Hall, which housed the departments of mechanical engineering, mining and geology. He also provided funding for the Williams Prizes, given for outstanding work in English, journalism, and theater. Lehigh bestowed an honorary doctorate on Williams in 1913.

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http://www3.lehigh.edu/giving/campaign/lpewilliams.asp)

BENJAMIN LEROY MILLER MEMORIAL

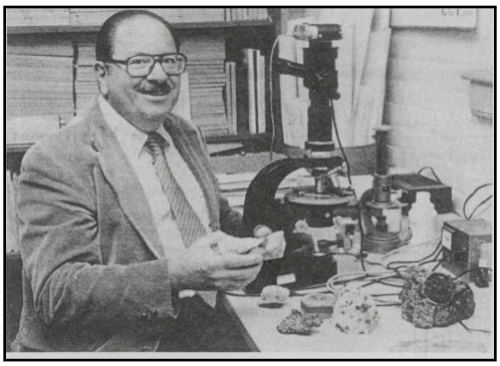
by Duncan Stewart, Jr.

Benjamin LeRoy Miller was not a mineralogist, petrologist, or petrographer in the strict use of those terms, but an eminent economic geologist and a man of unusual qualities with a host of friends. prof. Benjamin Miller died March 23, 1944, following a heart attack in Williams Hall, where for thirty-seven years he had his office.

Before coming to Lehigh University in 1907, as Professor of Geology, he had taught at Penn College and Bryn Mawr College. During a sixteen weeks' summer session, in 1943, he was on the staff of Princeton University. He had been associated with the State Geological Surveys of Kansas, Iowa, Maryland, and Pennsylvania.; also the U.S. Geological Survey. Prof. Miller was a cooperating geologist of the PA Geological Survey from 1919 until the time of his death, and a consulting geologist for many cement companies in the Lehigh Valley. He was also the consultant for the Wild Creek Gravity Water Supply System that now supplies the city of Bethlehem.

In 1927 he circled the world, and again in 1937, when he attended the International Geological Congress at Moscow, returning the the States by way of China and Japan. His trip to South America was followed in 1919 by the publication of The Mineral Deposits of South America.

CHARLES B. SCLAR



Professor Charles Sclar examines a specimen of "sclarite" in his Williams Hall laboratory.

Memorial of Charles B. Sclar, 1925-2001 **by Bobb Carson**
(*American Mineralogist, Vol. 86, pg. 771*)

Charles B. Sclar, professor emeritus of geological sciences at Lehigh University, died Saturday, January 13. He was a professor at Lehigh since 1968, retiring in 1990.

A mineral, "sclarite", was named after him in 1988 in honor of his research into the origin of the zinc ores of Franklin and Sterling Hill in Sussex Hills, N.J. Sclar and his students had extensively studied the area's zinc ore deposits for 20 years. The discoverers of the mineral were scientists at the Smithsonian Institution and the National Museum of Natural Science in Ottawa, Canada.

Sclar was one of the principal investigators for NASA on the Lunar Sample Analysis Program of the Apollo Program, from its inception in 1969 until 1978. He was one of only 142 scientists around the world who were given samples from the rocks and dust collected by Neil Armstrong and Buzz Aldrin from the Sea of Tranquility on the moon in July 1969. Sclar studied returned lunar rock samples from all the Apollo missions to learn if they have been subjected to shock waves generated by impacting bodies such as meteorites. His findings supported the theory that the predominant crater-forming process on the moon was high-velocity bombardment by meteors rather than internally generated volcanic activity.

Sclar specialized in mineralogy, igneous and metamorphic petrology, metallic mineral deposits, geochemistry, and high-pressure petrology. He served as chair of Lehigh's Geological Sciences Department from 1976 to 1985.

2009 FIELD CAMP

The summer of 2009 marked the 35th consecutive year of Lehigh Field Camp. As usual, our June was marked by adventure, mishaps, good camp food, and some pretty spectacular geology and scenery. Forty-five students, including eight from Lehigh, participated in the camp. The students come from all parts of the country which makes the experience all that much more interesting as new friendships are forged. One of the big stories for June, 2009 was the weather. In a word, it was "challenging". It was the wettest field camp in recent memory, which is a good thing for the farmers and ranchers, but bad for students trying to learn how to make a map or gage a stream. The precipitation was not restricted to rain as we had plenty of snow and pelting sleet as well. The students pretty much took it in stride and now after the fact, they frequently email recounting what a good time they had. It is a good thing that our memories tend to be dominated by the fun and adventure.

The camp is in a pretty healthy situation in terms of its reputation and finances.

Field camp alumni have been very generous in donating to the Vic Johnson fund which provides scholarships to deserving students. A particularly generous gift has allowed us to underwrite the cost of taking High School Earth Science teachers to learn the camp curriculum and then bring that curriculum back to their classrooms. The idea is that field camp can have an important outreach mission in inspiring the next generation of Earth Scientists. If you are a field camp alumnus and in a position to help keep its role in the EES curriculum strong, please consider a gift to the Vic Johnson fund or the Department, earmarked for field camp.

In keeping with the many changes and updates field camp has seen over the past six years, the 2010 camp will be an experiment in a smaller, more mobile, and more adventuresome camp. We will deviate from our traditional northern Rockies haunts and visit instead the southern Rockies of New Mexico and Colorado, with a cross country trip more or less at the latitude of I-40. Since we have not been to these places before, a small group of students, probably 12 or less, will be learning geology, mapping, and environmental science as apprentices to the teaching staff. There will be a healthy dose of discovery that has been lacking from the well-worn northern Rockies venue. If the 2010 summer is successful, we may adopt alternating venues between the northern and southern Rockies that will keep the camp fresh and exciting for staff and students alike.

Visit the camp website for updates and information regarding the 2010 trip.
http://www.lehigh.edu/~fjp3/fieldcamp/index.html

ARCHEAN VOLCANISM, HYDROTHERMAL ALTERATION, AND MICROBIAL COLONIZATION

Lauren Anderson (B.S. ’09, M.S. candidate, ’10) and Gray Bebout began a new project in the summer of 2008 that is being continued this academic year in collaboration with a team at the University of Western Ontario, headed by Neil Banerjee. They are investigating the effects of hydrothermal and microbial alteration on rocks from the Abitibi Greenstone Belt using a variety of methods including field mapping, petrography, major and trace element geochemistry, and stable isotopic analysis of O, C and N.

The Abitibi Greenstone Belt is a large, metamorphically altered volcanic province that formed around 2.7 billion years ago, at the end of the Archean Eon. It is the largest of its kind, presently spanning 700 x 300 km across the Ontario–Québec border in Canada, and contains mafic to felsic volcanic rocks that were erupted on the seafloor and subsequently uplifted during a collisional event. The project focuses on mafic to intermediate volcanic sequences in the Blake River Group at two field sites in Ontario & Québec. The two outcrops contain a variety of massive, lobate, pillow, and hyaloclastite volcanic flows, which were relatively protected from regional deformation and thus preserve their original low-temperature hydrothermal fluid alteration (subgreenschist facies) signatures.

If the mere age and history of these rocks do not seem cool enough, some of the chloritized glass shards in the hyaloclastite samples contain micron-sized tubes filled with titanite. These tubes closely resemble trace fossils found in older greenstone belts such as the Barberton (3.6 Ga) in South Africa and the Pilbara Craton volcanics (3.45 Ga) in Australia, as well as textures observed in modern seafloor glasses. *What are they?* Although their exact origin is unclear, they are potentially mineralized trace fossils left behind by chemoautolithotrophs who inhabited the glass shards soon after magmatic eruption. These microbes corrode the glass, which releases reduced elements such as Fe^{2+} and Mn^{3+}, and use the transfer of electrons during oxidation of the fluid-mobilized elements for energy to drive their metabolism.

As seafloor volcanism and subduction zone nitrogen cycling are among Gray’s recent interests, the newest addition to the suite of Archean volcanic geochemical data sets is the nitrogen isotope record from the Ontario outcrop, which shows positive shifts of $\delta^{15}N_{air}$ ($^{15}N/^{14}N$ ratios of a sample normalized to that ratio in atmosphere) to about 12‰ greater than average mantle and fresh basalt values (~ –5‰). As determined from previous work performed on modern altered oceanic crust by Gray, Neil, and others, these elevated values suggest alteration by fluids enriched in biologically fractionated nitrogen. This work is being completed as Lauren‘s M.S. thesis research and seeks to provide a more complete geological context for the possible occurrence of ancient microbial life, the implications of which could affect future searches for early-Earth and extraterrestrial life.

Lauren Anderson, M.S. ’10, (on hood) pursuing her other passion – field modeling – in 2008 with fieldwork collaborators from the University of Western Ontario. Disclaimer: The rental truck depicted in this photograph was not officially off-roaded… there was a trail somewhere.

TOOTIN’ OUR HORNS!

EES is very proud to announce the news of its graduate students that were recognized at the recent GSA national meeting in Portland, Oregon. For context, GSA contains about a dozen disciplinary divisions. Each division has one or more student awards that recognize the best student research project. The awards carry monetary gifts, in addition to the standard GSA grant-in-aid. This October, two of our PhD students, Ryan McKeon and Julie Loisel received the student division awards for SGT and Sed/Lim respectively. For two of our PhD students, in a department with a graduate population of ~25, to earn TWO awards at one GSA meeting is a VERY big deal. We would like to recognize Julie and Ryan for their achievements.

Alaska Project

Petersville peatland, near the foothill of Mount Denali. This study site, in the Susitna River Watershed, is located about 120 Km NW of Talkeetna, Alaska

While driving around south-central Alaska in 2007, Zicheng Yu and Robert Booth took a dirt road which led them to a magnificent landscape where large sloping peatlands had developed in the vicinities of glaciers. Once back at Lehigh, they convinced Joan Ramage-Macdonald and Bryan Mark (Ohio State) to write a research proposal with them on the effects of glacier recession on peatland growth. It did not take a lot of effort to convince students Julie Loisel and Eric Klein, and Research Associate Daniel Brosseau to join their team!

Most mountain glaciers worldwide have been receding over the last century. It is well known that glacier meltwater plays a critical role in the global sea level rise, but its effects on structure and functioning of lowland ecosystems remain poorly understood.

In the field, we have observed that many peatlands are actively expanding in the Susitna Basin near Denali, Alaska. Since a high moisture level is required for peatlands to grow and expand, we hypothesize that climatically-induced glacier melting is modifying the local/regional air humidity, especially in summers, promoting the expansion of these moisture-dependent ecosystems. This idea is supported by instrumental climatic data from this region, which show no increase in precipitation but an increase in temperature (and presumably evaporation) over the last decades. By acting as water sinks, peatlands located in glacierized watersheds may mediate the contribution of meltwater to present and future sea-level rise. Increases in peat accumulation rates due to favorable hydroclimatic conditions are also expected to promote carbon sequestration by these ecosystems. In contrast to the expected desiccation of peatlands under a warmer climate, enhanced growth due to glaciers-climate feedbacks in high-latitude regions may thus promote peatland expansion, even just temporally.

To evaluate the response of peatlands to meltwater-induced hydrological changes at the watershed scale, our team of environmental scientists is 1) characterizing the modern ecological and hydrological status of peatland sites located in a glacierized watershed (Ph.D. student Eric Klein, assistant professor Dr Robert Booth, and assistant professor Dr Bryan Mark from Ohio State University); 2) identifying recent changes in vegetation cover using satellite imagery and historical aerial photos (research associate Daniel Brosseau, and assistant professor Dr Joan Ramage), and 3) documenting vertical accumulation and lateral peatland expansion by dating and analyzing several peat cores (Ph.D. student Julie Loisel, and associate professor Dr Zicheng Yu). The latter objective will be achieved by reconstructing past ecological (vegetation) and hydrological (water table depth) changes from peat sediments using several proxy indicators. Associated peat accumulation rates will be compared to documented glacier history. Preliminary results revealed a change in the vegetation assemblages associated with a decrease in groundwater inputs in 1993 (± 2 years), suggesting a very recent modification of the local hydrologic regime. A simultaneous increase in moisture was recontructed from the water table depth record. Given that a major increase in glacier wastage has been recorded in this region since 1988, our results support the hypothesis that climatically-induced glacier melting is increasing air humidity during the growing season, hence limiting peatland water losses through evapotranspiration. This work is funded by the National Science Foundation's Emerging Topics in Biogeochemical Cycle program. For additional information on this project, please refer to the following articles: http://dsc.discovery.com/news/2009/05/28/peat-bogs-warming.html and http://www3.lehigh.edu/News/V2news_story.asp?iNewsID=3347

PRESENT

CURRENT GRADUATE STUDENTS

Lauren Anderson: I am studying 2.7 Ga metabasites from the Abitibi Greenstone belt, which I collected during the summer of 2008 near the Ontario-Québec border in Canada. These Archean volcanic rocks were altered to sub-greenschist facies by circulating hydrothermal fluid penecontemporaneously with magmatic eruption at the seafloor. Some volcanic glasses were also altered by chemoautolithotrophic microbes whose presence are inferred from micron-sized ichnofossils found in some chlorite-replaced glass shards. Using an array of geochemical, petrographic, and field observation techniques, I am investigating ancient seawater-rock interactions, with a particular emphasis on nitrogen isotope behavior, and their comparison to modern chemical reservoir cycling. From the results, I hope to infer the optimal environmental conditions that ancient microbes inhabited in the ocean hydrothermal systems of a young and heavily bombarded Earth. This has implications for the search for life on extraterrestrial bodies, such as Mars and Europa. **Advisor: Bebout**

Matthew Bennett:Watersheds today differ from centuries ago in terms of water quality, hydrology, production, transport, and export of organic carbon, both in the particulate (POC) and dissolved (DOC) form. A multi-proxy study of environmental conditions and watershed responses over the past 400-500 years is needed relating present climate, watershed hydrology and processes, affixed by the tree ring data, to the carbon fluxes. During my PhD program, I will be focusing on using the biological environment, tree rings, to tell me about how the physical environment, watershed/stream channels, manage carbon export over changing vegetation and/or urbanization. **Advisor: Pazzaglia**

Johanna Blake: Studying the fluxes and transport mechanisms of contaminants in groundwater and surface water of the Lehigh River around Palmerton, PA. Using geochemistry and hydrology to assess the water balance of the area. **Advisor: Peters**

Christopher Bochicchio: New to both EES and North America this semester. I finished the M.S. in geology at University of Hawaii over the summer and am now working on the first of a series of Holocene paleoclimate reconstructions. Currently, I'm planning the collection and analysis of Arctic lake sediment cores. The study is part of a collaborative effort aimed at creating a high-resolution dataset of Western Arctic climate proxies spanning the last 8,000 years. Particular emphases is on the rapid onset of the Holocene Thermal Maximum in western North America. **Advisors: Booth/Yu**

Lucy Brown: I am using local seismicity to study strain in the eastern Himalayan syntaxis. **Advisor: Meltzer**

Jill Burrows: I am assessing the natural attenuation of metals at the Lehigh Gap Wildlife Refuge in Palmerton, Pa, using a watershed mass balance approach focusing particularly on perturbations observed in the concentration-discharge relationships of contaminants compared to conservative tracers. **Advisor: Peters**

Andrea Daman: Studying the paleomagnetics of 200 Ma sedimentary rocks from the Colorado Plateau for inclination shallowing correction, and comparing the corrected paleopole from the Western US to the corrected paleopole of the same age from the Eastern US. **Advisor: Kodama**

Christopher Dempsey: I am studying the effects of nutrient limitation on microbial respiration in freshwater streams through the use of bioreactors. In addition, I will be looking at DOC lability across a spectrum of watersheds ranging from natural to disturbed.

Advisor: Morris

Tsering Dhundup: Interests are currently focused on developing expertise in methods including Seismology and Remote sensing to study the crustal structure of my homeland, Tibet. **Advisor: Meltzer**

Matthew Gentoso: I am comparing pebble macrofabrics and AMS microfabrics within drumlinized and fluted tills in North Central New York to determine if the maximum principal axis of the AMS magnetic fabrics align with the orientations of flutes, drumlins and pebble macrofabrics. **Advisor: Evenson**

Kellen Gunderson: Investigating the potential modulating effect of surface processes on deformation rates in the Northern, Apennines, Italy. ***Advisors:*** **Anastasio/Pazzaglia**

Alex Ireland: I am testing the classical model of bog mat development in North American glacial kettles using paleoecological, photogrammetric, and modeling approaches. **Advisor: Booth**

Eric Klein: My research involves studying changes to wetland ecology over various time periods. Various wetland parameters (including spatial and vegetational), and the potential factors influencing them (including precipitation and evaporation) are analyzed over time periods ranging from decades to millennia. One interest includes whether retreating glaciers influence expansion of wetlands within their watersheds. My work is primarily located in the vicinity of the Alaska Range, but will also compare wetland dynamics in other regions to those in high northern latitudes. **Advisors: Booth/Yu**

Julie Loisel: A 2nd year PhD student interested in past climatic changes and their effects on high-latitude ecosystem dynamics. My current work focuses on Holocene carbon accumulation rates in peatlands from Alaska and Patagonia. **Advisor: Yu**

Ryan McKeon: Staying close to home developing new techniques for low-temperature thermochronology to better understand the evolution of the Appalachian Mountains. **Advisors: Pazzaglia/ Zeitler**

Patricia Monahan: My research used passive microwave satellites and remote sensing techniques to detect surface melt on the Southern Patagonian Icefield. Investigating the spatial distribution of surface melt and melt timing assists further analysis and modeling efforts to quantify changes in the volumetric loss rates for all temperate ice masses. **Advisor: Ramage-Macdonald**

Tara Redding: My research focus is on mercury and dissolved organic carbon interactions. Especially important to my study is the correlation of these two components over varying land uses and stream flows. **Advisors: Peters/Morris**

Kathryn Semmens: Measuring and monitoring particulate matter in the atmosphere using ground sensors and remote sensing techniques. Assessing correlations between ground level air pollution, dirty clouds, and health problems in the region. Other research includes analyzing the extent to which black carbon deposition on snow affects snowmelt timing for incorporation into streamflow models. **Advisor: Ramage-Macdonald**

Shree Ram Dangal: I am interested in modeling how increasing temperature, changing precipitation, elevated CO2, nutrient limitations, and ozone pollution will affect below-ground respiration. This issue is important because warming will ultimately lead to enhance respiration and decomposition rates, which will increase the amount of CO_2 in the atmosphere. Based on data from the Harvard Forest soil warming experiment, I hypothesize that while warming increases respiration rates, both root and microbial respiration acclimatizes to the warmer climate. It is also possible that what appears to be greater microbial acclimation is actually more decomposition occurring at a slower rate. I will use the Terrestrial Ecosystems Model (TEM) or the Community Land Model-Carbon/Nitrogen version (CLM-CN) to consider the effect of seasonal and inter-annual variations in temperature and precipitation on the fluxes of carbon and nitrogen within deciduous forests. **Advisor: Felzer**

PRESENT

CURRENT GRADUATE STUDENTS, CONT.

Kevin Smith: I am in the second year of pursuing a master's degree. My thesis research is investigating the competition of common and toxic anion adsorption onto an iron-based hybrid anion exchange material. I'm taking courses to advance my knowledge of environmental hydrogeology. also I am involved in several environmental soil and water studies through LEO, EI and Dork Sahagian, and Steve Peter's lab group. **Advisor: Peters**

Zachary Spahn: I will be working on the magnetostratigraphy of Rio Sacuz section of the Cernera Platform, Dolomites, Italy. This project aims to shed light on the Latemar Controversy where U-Pb single-zircon dating and cyclostratigraphy suggest order of magnitude differences in the time interval represented by the Latemar, ~2.2 Ma and ~11 Ma respectively. Previous magnetostratigraphy of the Latemar yielded ambiguous results as many of the specimens showed evidence that suggested that they had been struck by lightning. It is important to resolve which timing is more likely as there will be important implications for either U-Pb single-zircon dating or cyclostratigraphy and accepted ideas about limestone deposition. **Advisor: Kodama**

Maura Sullivan: I'm investigating the role of intra-seasonal variability in structuring testate amoebae assemblages, the ecology of testate amoebae in the New Jersey Pine Barrens, and paleoecological applications using testate amoebae to reconstruct hydrologic conditions. **Advisor: Booth**

Ashma Vaidya: My research is basically about improved bio-optics techniques for measurement of phytoplankton abundance in aquatic ecosystems. Calibration and improvement of pQFT_TR technique and C6 Fluorometer for better estimation of phytoplankton absorption and fluorescence, respectively, are two of my primary objectives. Through the measurement of optical properties and hence abundance of phytoplankton in a variety of ecosystems, I also intend to acquire a better understanding about their physiology and responses to various environmental parameters. **Advisor: Hargreaves**

Kenneth Wiles: I am working on the optical properties of aquatic environments. My focus is to determine if organic content and iron are both positively correlated to mass-specific attenuation rates of soil particles suspended in water. I am also working on an improved estimate for a pathlength amplification factor, and improved correction for changes in scattering and reflectance when the mineral fraction is high. The Shimadzu UV-VIS 1601 dual beam spectrophotometer (*QFT* method) and the *pQFT-TR* spectrophotometer (*pQFT* method) will be used to determine this. **Advisor: Hargreaves**

Elizabeth Wolyniak DiCesare: I am studying the interactions between Cryptosporidium (a waterborne pathogen) and environmental biofilms. I am looking at infectivity of Crypotosporidium when associated with biofilm material and exposed to solar radiation, the transport of Cryptosporidium in a system with biofilms, and the potential use of biofilms as a tool for monitoring Cryptosporidium in a watershed. **Advisors: Hargreaves/Jellison**

Our undergraduate program remains healthy and vibrant, with about 40 EES majors currently making Williams Hall their intellectual home. Our field-intensive curriculum has been carefully designed to provide these students with critical thinking skills, a firm grounding in earth-system science, and the interdisciplinary perspective needed for success in a broad range of career paths. Resent graduate such as Sue Nee Tan (B.S.'09) is in the graduate program at Cornell, Jesse Vavrek (B.S.'09) is at Scripps, Laura Deutsch (B.A.'09) is currently in Lehigh's gradaute program, Nicholas Johnson (B.A.'09), and Jennifer Lofaro (B.A.'09) got an internship with Dolphin Quest in Kahala, Hawaii training dolphins. Our current group of EES majors is a dynamic and diverse bunch and we fully expect similarly big things from them!

Bob O'Neill (M.S.'85) serving in the Southwestern Asia Theater of Operation on the water well-drilling team near Fallujah at Camp Baharia

The 2008 Graduate Student Symposium was held in the University Center. Twenty grads and undergrads reported on their research and alumni Al Benimoff (Ph.D.'84), Val Holliday (M.S.'85), Bob Bond (M.S.'85), Allan Blanchard (M.S.'86), Peter Sudano (M.S.'82), and Geoffrey Seibel (B.S.'80, M.S.'82) also attended.

Roy Redmond (M.S.'82) and Valerie Holliday (M.S.'85) met up at the PA Council of Professional Geologists talk in Wildes Barre,PA this past summer.

PRESENT

IN MEMORIAM: **PROFESSOR GEORGE STEPHENS**

Prof. George Stephens (Ph.D.'72) died on Nov. 2. George was a professor of geography and geosciences at George Washington University where he earned both his bachelor's and master's degrees in geology. He joined the GW faculty as assistant professor of geology in 1978, after holding teaching positions at Bryn Mawr and LaSalle Colleges.

George was regarded by students and colleagues alike as a caring and dedicated teacher and mentor.

Throughout his life, George spent much of his spare time in the field. For almost two decades he co-taught field camp in Wyoming and Idaho with Ed Evenson. He

conducted mineral exploration in British Columbia, the Yukon Territory, and Nevada, geochemical sampling the the Dry Valleys of Antarctica, glacial studies in Alaska and Spitsbergen, structural and regional geology studies in Argentina, and surveyed a potential railroad line through Algeria and Morocco. George led field trips to the Grand Canyon, Blue Ridge and Appalachian Mountains, and examined coral reefs in Bermuda and Costa Rica, always drawn by an intriguing geological puzzle or geological feature. James Starrs recruited George to apply his geologic expertise to assist Starrs' forensic investigations examining the graves and remains of such historical figures as Lizzie Borden and Jessie James.

George was a modest man known for his dry perceptive humor, his wordplay, and his enjoyment of a good story. He passed away on November 2, 2009 following a stroke. He was 66 years old.

FUTURE

STEPS SCIENCE TECHNOLOGY ENVIRONMENT POLICY & SOCIETY

The new home of Earth and Environmental Sciences is about halfway complete. As of late October, all of the major structural elements are in place, including stairwells, exterior walls, many of the windows, exterior brick, and roof. Building utilities such as electrical, The new home of Earth and Environmental Sciences is about halfway complete. As of late October, all of the major structural elements are in place, including stairwells, exterior walls, many of the windows, exterior brick, and roof. Building utilities such as electrical, plumbing, and heating are more than halfway complete. With the onset of autumn and cooler weather, work continues inside with interior framing of walls, drywall installation, and the application of room finishes. Heating will come online by Thanksgiving and permit installation of cabinetry and fume hoods as the interior spaces take shape. If the schedule holds true, the EES department will move into the new building starting in early summer, with the first courses taught in the fall semester.

Plumbing, and heating are more than halfway complete. With the onset of autumn and cooler weather, work continues inside with interior framing of walls, drywall installation, and the application of room finishes. Heating will come online by Thanksgiving and permit installation of cabinetry and fume hoods as the interior spaces take shape. If the schedule holds true, the EES department will move into the new building starting in early summer, with the first courses taught in the fall semester.

Specific to our department, the shielded magnetic room is framed and the shielding is installed. This room provides an environment without Earth's magnetic field so that the magnetic fabric of geologic samples can be accurately measured. A shared computer server room will house the high-horsepower computers that enable our GIS and Remote Sensing software to support our research and teaching. An updated Earth Materials Processing facility will enable our students and faculty to work seamlessly between crushing, sieving, and sawing geologic samples.

The biogeochemistry, paleoecology, geochronology, and stable isotope labs will all include modernized fume hoods and lab benches that enable state of the art research while increasing lab safety. Colleagues from Engineering and the Social Sciences who teach and do research in environmental areas will join us in occupying the STEPS building, and we look forward to new opportunities for interactions between all disciplines of science, technology, environment, and policy. The building includes new facilities for undergraduate biology and chemistry instruction which will supplant the aging class labs now in Williams Hall and Mudd Building. We hope that the opportunities created in the various public spaces of STEPS will encourage students from different disciplines to gather, study, and make new connections. The building will also integrate the art of the natural world into its structure.

You can follow our progress online via two live webcams at the STEPS Initiative website: http://www3.lehigh.edu/steps/index.html

An invitation to get involved in your Department

The faculty and staff would like to extend an invitation to alumni to stay in contact with EES and to get involved with your Department. Contact us and let us know how you would like to be involved. Some activities and events open to all alumni include:

- The weekly Friday lunch and seminar (11 AM-1:00PM)
- The Graduate Student Seminar (typically the second week in February)
- Undergraduate and Graduate thesis defenses (typically near the end of the semester)
- Graduation (3rd Monday in May)
- Field Camp (see http://www.lehigh.edu/~fjp3/fieldcamp/index.html for the schedule)
- The Department Field Trip and field trips during the semester

Many of the programs we offer in EES that allow us to excel in education and research are made possible by endowed accounts and donations established by alumni. We are always looking to augment our resource base for graduate and undergraduate research, EES Field Camp, faculty development, and/or Departmental labs, equipment, and educational facilities. If you are in a position to donate, please fill out the form below with your gift and send it to us. We will acknowledge receipt as soon as it arrives. Please make your check payable to Lehigh University and we thank you in advance for your consideration and support.

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I would like to make a donation to support the EES graduate program in the amount of $_____

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Send the completed form with your check to:
Laura Cambiotti, Department of Earth and Environmental Sciences, Lehigh University,
31 Williams Drive, Bethlehem, PA 18015-3126.

Please let us know what you're doing...email us at ljc0@lehigh.edu

2009 department field trip at the Gubbio k-T boundary outcrop

Lehigh University
Earth & Environmental Sciences
31 Williams Drive
Bethlehem PA 18015-3126