**“Soon and Very Soon”: New Science Facility Nearing Completion**

For many years, there has been talk of a new science facility at Otterbein. In June 2007, talk became reality as construction began on a $20 million dollar project to renovate and expand Otterbein's science facility. After 21 months, the project is well under way and the vision for a state of the art facility with emphasis on 1) project-based learning, 2) integration of the lecture and laboratory experience, and 3) encouragement of science literacy is becoming reality. Recently, Professor Jeffrey S. Lehman, former chair of the science building project and faculty liaison, gave a talk entitled “Science Facilities in a Time of Need: Achieving More with Less” which detailed the process of curricular and building design at liberal art colleges. The presentation was given with Paul Orban, Market Leader BHDP Architecture, and Ron Seiffert, Vice President for University Resources Ohio Dominican University, at the Society for College and University Planning conference in Madison, Wisconsin.

Classes are scheduled to be taught in the new science facility in fall 2009. To see regular updates of the progress on the science building check the following Otterbein website: [http://www.otterbein.edu/giving/science_bldg.asp](http://www.otterbein.edu/giving/science_bldg.asp)

**Department offers New “Global” Integrative Studies Courses**

Otterbein College was selected with 16 other colleges and universities nationwide to share in the American Association of Colleges and Universities (AAC&U) initiative: General Education for Global Learning. Several Department Faculty rose to the challenge of creating Integrative Studies courses with Global themes. Dr. Lisa Marr and Dr. Amy Jessen-Marshall developed “Plagues, Pestilence and Pandemics” a course that focuses on diseases in the world and their outbreaks are influenced by local traditions and customs. It also deals with global epidemiological issues such as emerging diseases, multi-drug resistance and disease shifts in response to global change.

Dr. Hal Lescinsky's global science course focuses on coral reef ecology and conservation. The course builds from the basic geology and biology of reefs, to how people in different countries use reefs, to the current coral reef crisis that is associated with global patterns of overfishing, bleaching, disease, and ocean acidification. Each student in the course researches the reefs of a different tropical country and the course culminates with a UN style meeting of coral reef managers where student representatives of each country work together to devise action plans to protect the world’s reefs and the people that use them.
Turtle Research

There is a tiny new addition to the turtle lab this year with the birth of Dr. Sarah Bouchard’s second daughter. Welcome Tatum! Even with Dr. Bouchard juggling two little ones now, good things continue to come out of the lab. Mike Frank, Ethan Landau, and Maria Wheeler finished their Otterbein careers this past spring, graduating with either Honors or Distinction based on their painted turtle research funded by the Ohio Department of Natural Resources. They studied the effect of invasive reed grass on turtle foraging and found some exciting results which they shared at the Ohio Natural History Conference and the Ohio Academy of Science Annual Meeting. The lab is currently working on publishing some of their results in the Journal of Herpetology. These students have truly been transformed into field biologists while at Otterbein. Ethan is taking a few more classes before he plans to apply to graduate school. Mike is now studying snakes at Indiana-Purdue University at Ft. Wayne, and Maria is at Duquesne University where she is studying eagle migration.

We’ll look forward to following these budding young careers!

This past summer, Jamie Wilson continued the tradition of great turtle research at Otterbein. She investigated the effect of plant and animal diets on the basking behavior of our captive slider population. Jamie hooked up a video camera in the lab and watched countless hours of turtles sunning themselves under the “sunlight” simulated in the lab. All the effort paid off, as she discovered that turtles fed crickets bask three times more than turtles fed plants. Hmm…interesting. Now, we’re just waiting to hear how Jamie explains those results!

Outreach Program Touches Centerburg Elementary

Outreach Science is as popular as ever in the Life & Earth Science Department. If you haven’t heard about the Outreach Science Program, listen up. Outreach Science is offered as a LSC 250 Practicum during Winter Quarter on Thursdays from 9:00-11:50 a.m. You also can get involved with Outreach just by volunteering. Outreach is generally offered every quarter, simply contact Tara Grove and let her know of your interest. You do not need to sign up for a class to get involved with this great community engagement. If you love working with kids, and have some interest in science, you would enjoy doing Outreach Science.

In October, the Outreach Program went to Centerburg Elementary to offer a great science event to 109 kindergarteners. Otterbein students Shelly Hobbs, Natalie Mikita, Becky Williams, Kacie Miller, Lisa Fabiny, Katie Kopchak, and Alex Ailer traveled with outreach coordinators, Tara Grove and Andrea Graytock to put on this “outstanding event,” said Mrs. Tonia Gregory, a Centerburg Kindergarten teacher. Mrs. Gregory shared some of the things the kindergarteners themselves had to say about what they learned on science day with the Otterbein students.

- Dylan said “Our bodies are made up of lots of water.”
- Holden found out that “Sea turtles have to get away from predators to get to their nest.”
- Donnell learned that “An animal’s home is his habitat.”
- Lauren said, that “It is hard for birds to find worms when they look like the dirt.”
- Sam mentioned that “Animals can blend into the things around them and hide.”
- Olivia learned that “Fish and people can get sick from dirty water.”
- Faith found out “that ants can live in fallen logs.”

These children’s quotes were taken from the Gregory Gazette, a news line produced for Centerburg Elementary.

Next quarter, we have three Outreach events scheduled, through the LSC 250 practicum. We will be traveling to Annehurst Elementary, Hanby Elementary, both here in Westerville, and St. James the Less Catholic School, which is a Columbus Catholic School. We will be doing things like tying into the “Going Green” theme on campus, and teaching the children about the importance of recycling. The children will get to make their own paper and build landfills. If you would like to get involved, and see the eyes light up on the young kids as they are engaging in science activities, either sign up for the practicum, or simply contact Tara Grove (tgrove@otterbein.edu) to volunteer.
Dr. Hoggarth and Two Students Work on Mussel Projects for The Ohio Department of Natural Resources and City of Marysville

Joel Yankie, a senior Life Science major and Dr. Michael Hoggarth are examining the effect of the lampricide TFM on mussels in the Grand River and Conneaut Creek in northeastern Ohio. Their work is being supported by a grant from the ODNR, Division of Wildlife. TFM is known to have a narcotizing effect on mussels. Yankie and Hoggarth are looking at possible increased beaching due to this effect, and the impact the lampricide has on mussel reproduction. Their work is ongoing, but so far they have found a ten-fold increase in beaching following flooding events in Conneaut Creek, but not the Grand River. Both streams are among the most scenic in the state with Conneaut Creek having one of the highest number of covered bridges in Ohio and both streams supporting runs of steelhead trout, which were seen in abundance during fieldwork this spring.

Leslie Randall, a senior Environmental Science major is helping Dr. Hoggarth with his ongoing study of the impact of an inflatable dam on the Mill Creek mussel community. The City of Marysville is in the process of constructing the dam and upground reservoirs to increase the city’s water supply. As part of their mitigation for the dam, the city has removed one concrete dam already and will remove the last remaining concrete dam on the creek as soon as the inflatable dam is functional. Randall and Hoggarth collected mussel density data at five sites upstream of the dam (within the dam pool) and one site downstream to determine baseline data for the community. Hoggarth will monitor these sites for five years to determine if the dam and dam pool have an impact on the mussels of the creek. A Dublin, Ohio engineering firm, BBC&M, is collecting water height, water quality, and sediment load data for the project. A former Life Science student, Scott Ross (’96) is an Environmental Scientist with BBC&M and has helped with this project since it began five years ago.

Department of Life and Earth Sciences Presents to the Board of Trustees

The Department was asked by Dean Gökê-Paríolá to open the Board of Trustees meeting on May 10, 2008, with a slide show presentation to familiarize the Board with one of the exceptional programs at Otterbein. For our presentation we followed the “5 Cardinal Experiences” that are part of the new Strategic Plan: undergraduate research, internships, international experiences, public service, and leadership. At the presentation faculty and students focused on different aspects of each experience. Internships and undergraduate research are focal to our senior project requirement and were discussed by Dr. Hoggarth and Joel Yankie ’09 in regards to their project investigating the effects of controlling invasive lampreys in Ohio streams. Dr. Lescinsky and Ben Titus ’08 then presented on their investigation in the Dominican Republic on coral reef structure in pre-human reefs. Dr. Lawrance and Heather Bloom ’08 discussed their Senior Year Experience trip to Rwanda, and other international experiences offered by the Department including courses to Costa Rica and Belize. For service, Dr. Svitana presented his work with the City of Westerville developing a well field in Westerville’s new park at Otterbein Lake. Finally, Dr. Jessen-Marshall discussed her work as Chair of the Integrative Studies Committee, and also the many other leadership roles that the Department faculty and students serve on campus. After the presentation, and a few moments of silence, the Board erupted with compliments and positive feedback. It is fair to say they were very impressed! Check out our slide show on the web:  www.otterbein.edu/life earthsciences/index.asp
Dr. Lawrance Offers Own DNA for Testing in the Classroom

As we enter a new genetic era, genetic testing and genetic information are becoming increasingly available and useful in medicine and society. Genes contain information about almost all of our characteristics, from ancestry to hair color to disease susceptibility. Twenty students enrolled in Otterbein’s Human Genetics course last quarter got the opportunity to take part in this rapidly progressing field by sequencing stretches of Molecular Biology Professor Simon Lawrance’s DNA.

“I used my own DNA because I wanted to offer the students the opportunity to do genetic testing on a real person and also because I was curious to learn about myself,” said Dr. Lawrance.

The possibility of discovering negative results about Dr. Lawrance’s DNA was a subject that the class discussed, but he feels that this would not be an invasion of his privacy. “The class agreed to keep my information confidential. If there were negative results, I felt comfortable enough keeping it private with the class,” he said.

There are many ethical issues surrounding genetic testing. Questions are raised about who should have access to information obtained from testing, such as potential employers or insurance companies, and what constitutes genetic discrimination. Also, there are questions about what people should or should not be allowed to do with the information. These issues are developing along with the science itself.

“I like to be on the cutting edge,” stated Dr. Lawrance and cutting edge definitely defined what the students were able to do. Just two years ago, the research provided by the Human Genome Project, an international effort to compile a bank of genetic composites, was not developed enough to allow students to do this project. Now the information for the project is readily available to anyone on-line.

Students were required to choose a characteristic that they were interested in and then complete in-depth research to identify genes that influence the characteristic. Next, the structure of the relevant gene including where in the 23 chromosomes that make up the human genome the gene is located was investigated. Once the gene was located, students were able to carry out experiments to focus in on and amplify that gene using a sample of Dr. Lawrance’s DNA.

The next step was to determine the sequence of the nucleotides. Each individual’s genes are made up of four nucleotides (A,G,C & T) that are arranged on a double helix in a order that is unique to each individual. The sequencing was done using a Genetic Analyzer that was purchased with a National Science Foundation grant in 2002. The Genetic Analyzer has been used for many experiments, but the new information available from the Human Genome Project on genetic variants has made it much more powerful now, in terms of its ability to reveal genetic information about individuals.

The students’ last step in the project was to analyze the data and determine the results for the characteristics that were tested. About half of the groups were able to get reliable data that gave some intriguing results. For the first time at Otterbein, students were able to read Dr. Lawrance’s maternal ancestry (Perpignan, France), his low susceptibility to Alzheimer’s disease, heart attack & alcohol dependence and a variation in his DNA that adds two points to his IQ.

Students were enthusiastic about the experience. “I liked this class because I got to do more experimentation and it allowed room for more self-teaching, which I enjoy,” stated Gretchen Ruhe, a senior Molecular Biology major.

Genetic counseling is a rapid growing profession, one that many of Dr. Lawrance’s students are interested in. Senior Molecular Biology major, Jared Bailey said, “This project made me feel I was actually doing genetic counseling because I was providing genetic information for a ‘patient.’”

Lawrance is continually working to keep Otterbein’s Molecular Biology program up to par on current scientific technology. He is currently applying for grants and looking for contributions to upgrade and further Otterbein’s technical abilities. DNA sequencing technologies are rapidly advancing, which is bringing costs down and will make it possible for more students to do research.

Several students now want to look at their own DNA. Melody Pomeroy, a senior molecular biology major, said, “I would consider having my own DNA sequenced. It is always interesting to find out new information about yourself, especially regarding genetics.” For Dr. Lawrance, the key is for students to understand not only the biology but also the implications and ethical dilemmas that may arise from the information that students’ DNA reveals. Another possible future activity is providing genetic screening for Otterbein students of all majors, which is beginning to happen at campuses across the nation. He plans to explore these and other avenues for human genetics and has little doubt that Otterbein students will soon be sequencing their own genes.

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Dr. Jessen-Marshall spreads the word about Otterbein Science Teaching Innovations:

Dr. Amy Jessen-Marshall was invited by the National Science Foundation to lead a workshop entitled: “Improving the Scientific Literacy of All Students” in Washington D.C. during the summer of 2008, based on the work related to the NSF grant for Integrative Studies Curriculum Revision that she and other members of the science faculty have been developing for the past several years.

Her workshop focused on the idea that it is increasingly important in today’s global society for all students, including non-science majors, to become scientifically literate and understand the processes and limitations of science. Models of General Education vary, often including introductory major’s courses as options for non-majors to meet science requirements, however creative course models designed for all students with an emphasis on problem solving and scientific methodology are offered as a successful alternative. Dr. Jessen-Marshall’s breakout session was designed to discuss and share the innovative practices and ideas developed at Otterbein to improve scientific literacy through team-taught interdisciplinary lab-based courses within the Integrative Studies core curriculum.

Dr. Jessen-Marshall was also invited to present a summary of this work for the American Society of Microbiology, Council of Undergraduate Education conference held in Boston Massachusetts in May of 2008.

But that’s not all, this fall, Dr. Jessen-Marshall shared the stage with Dr. Lisa Marr from Life Sciences and Dr. Wendy Sherman Heckler from Education in Rhode Island where they presented an overview of the work the Otterbein Science and Education departments have been doing to assess the Value of Science and Technology in relation to Global Learning in the curriculum. They presented at the American Association of Colleges and Universities meeting on Engaging Science, Advancing Learning: General Education, Majors and the New Global Century in November. Their panel presentation was entitled: From design to practice: Development of a two-course sequence in Integrative sciences -- from scientific inquiry to global applications.

And finally Dr. Jessen-Marshall will be presenting this January at the National American Association of Colleges and Universities meeting in Seattle Washington, with Otterbein VPAA, Dean Abíódún Gòkè-Paríolá, as well as Tammy Birk and Suzanne Ashworth from English on the topic of: Becoming Cosmopolitan: At the Core, As a Community, and in the Classroom.”

New Travel Course: Costa Rica in the 21st Century: Balancing Sustainability and Globalization

Professor Jeffrey Lehman from Life Science has joined with John Volkmar (Business and Accounting) and Marjorie Cornell (Foreign language) to develop a new course that addresses the interplay between globalization and sustainability. Specifically, the course is designed to enhance student understanding of the interaction between the imperatives of business and economic development and the sustainability of both natural resources and cultural tradition in Costa Rica.

The course will combine classroom work with a travel experience to Costa Rica, and will draw on theory and literature from life science, international business, and language/culture. While in Costa Rica, students will visit diverse agricultural production systems for coffee, pineapple, and banana including: 1) large corporations, 2) small, local cooperatives, and 3) local subsistence farmers. In particular, students will be exposed to the impact of “fair trade” policies relating to the production, processing, and distribution of such products on community development. Development for the course and faculty members was generously supported with an International Enrichment Grant from the Otterbein College Faculty Development Committee. The course will be offered in fall 2009 as SYE 477: Costa Rica in the 21st Century: Balancing Sustainability and Globalization.
Caitlin Joy Pilots a Structured Internship

The mission of Life and Earth science holds that science is learned by doing, and for the last several years we have had a research requirement for graduation, performed at the Honors and Distinction, or Senior Seminar level. This was what Caitlin Joy planned to do when she arranged through Projects Abroad to spend two months in Ghana, working in a rural and later a city hospital setting. But for logistical and social reasons, gathering research data to answer a specific original question became impossible, and so Caitlin became one of the first students to perform a Structured Internship, our new alternative to research. The purpose of the internship is to study how the results of investigative science are applied in various other agencies; in Caitlin’s case, this was health care in Ghana. In a Structured Internship a contract is set up ahead in which students consider what exactly they will be looking for in the setting of the internship, and how they will compare the applied science they see with their four years of science education at Otterbein. Such questions as, “What is the type of thinking used in the setting observed, and how does it compare with the empirical thinking in basic science?” and “What is the source of information used to make decisions, and how do professionals weigh the information in designing protocols?” An element of prediction is also required, so that the student becomes aware of how science knowledge changes clinical or other professional practice.

Caitlin saw much, learned much, made many friends, and came back with a new understanding of what we mean by scientific thinking, how western medicine is developed directly from it, and what economic and social barriers can exist that make the application of science to medicine fraught with difficulties. She made her senior presentation twice, giving a fascinating account of her internship first to an AED meeting, and later to Dr. Lawrance’s and Dr. Glenna Jackson’s students, who were themselves on the eve of traveling to Rwanda as the culmination of their Senior year Experience.

Remodeling of McFadden Hall Complete

The remodeling of the McFadden portion of the science building was completed in December of 2007. The Department of Equine Science and the Department of Nursing were able to return to these quarters to start winter quarter classes in 2008. The new spaces have been updated with standardized modular work stations and furniture. There is even a new color scheme, with subtle shades of gray/blue/green throughout. The administrative assistants for Nursing, Life and Earth Sciences, Equine Science, Chemistry and Physics share a common area on the second floor with a work room/break room nearby. The large windows in this area are a welcome change from the old building. Work continues on the Shearer portion of the building with an eagerly anticipated opening sometime in the spring of 2009.

Department Hosts Fall Fling

The Department of Life and Earth Sciences held its annual Fall Fling on September 25, 2008 on the rear lawn of its temporary quarters at 60 Collegeview. The purpose of this event is to welcome new and returning students and to relax and have some fun with members of the department and their families. About 50 people attended, 30 of them students. Everyone enjoyed a pizza dinner followed by fun and games: “Natural Oddities Quiz”, “What Am I?” and “Who Bingo”. Local merchants graciously supplied products for door prizes.
Otterbein Students Present at the Ohio Academy of Science in Toledo

The dawn’s early light on April 15th saw Dr Mary Gahbauer and four students traveling up Route 23 to the University of Toledo for the 117th Annual Meeting of The Ohio Academy of Science. Ariane Djeussoung, Mina Makary, Heather Shannon, and Maria Wheeler were about to present their research in Life Science at the morning poster session. Public presentation of scholarly work is another mark of academic achievement, when the long months or even years of original work have stood the test of peer-review, and are condensed onto a printed poster for dissemination.

Once arrived at the splendid Nitschke Science Hall we met Mike Frank, who was about to give a podium presentation of his work with Dr Sarah Bouchard. Students from all over Ohio, at both high school and college-level, filled the easels in the hallway with their posters and stood ready to describe and defend their work. Over the morning they would explain their work to other attendees, and take the opportunity to learn about other projects. Elsewhere in the building concurrent presentations were offered in many branches of science, and the All-Academy Lecturer Mark R Shanahan, PhD, Energy Advisor to Ohio Governor Ted Strickland, spoke on the topic of Ohio’s energy future.

What does it mean to the student to take his or her work to a scientific meeting? The following comments are from this year’s presenters: “Presenting at the Ohio Academy of Science has been a great experience since it introduced me to the world of professional science. It is particularly valuable since one of the ultimate goals of a scientist is to share findings with others to help contribute a small piece to the bigger puzzle. At the conference, I was able to share insights from my work with fellow researchers as well as learn from them and gain ideas for my own research. For me, there could be no greater privilege.”

“Although I was really nervous to go at first, I’m glad I ended up presenting because in the end, it gave me confidence. I realized that I was able to relay the various aspects of my research to people with little background in the sciences, and I loved talking also with people who shared similar passions to mine.”

“Going to the OAS meeting was a rewarding experience in the sense that it exposed me to a wide range of knowledge. It is always great to learn something new and even greater to have the opportunity to share what you know with other people. Overall I had a great deal of fun.”

Student projects:

Enhancing comprehension of molecular biology’s “central dogma”
clay models, computer simulations,
concept maps, or free time? Ariane Djeussoung, Andrea Graytock (advisor Simon Lawrance).

Effects of invasive reed grass (Phragmites australis) on painted turtle (Chrysemys picta) foraging efficiency. Michael R Frank (advisor Sarah S Bouchard).


The role of PITX2 in anterior segment dysgenesis in mountain horse breeds. Heather Shannon (advisor Simon Lawrance).

The effects of invasive aquatic plants on the ontogenetic diet shift of freshwater turtles using stable isotopes as diet indicators. Maria S Wheeler (advisor Sarah S Bouchard).
Otterbein Lake Part of Water Resources Outdoor Laboratory

The Life and Earth Sciences water resources program has recently benefited from the addition of six monitoring wells around the perimeter of Otterbein Lake. The monitoring wells will enable faculty and students to explore the groundwater connection between Alum Creek and Otterbein Lake and evaluate how water chemistry changes between the Creek and the Lake as a result of groundwater recharge/discharge. The water chemistry can be linked to the biological diversity of the different aquifers environments.

The monitoring well drilling, which was completed by Geotechnical Consultants, Inc. of Westerville was finished in July 2008. Dr. Kevin Svitana and Environmental Science student Beth Downs '09 worked with the drillers, logging the sediments recovered during drilling, and assisting with the construction of the monitoring wells. “It was a great opportunity to have a student be involved with exploring subsurface features and making decisions regarding the placement and construction of monitoring wells,” said Dr. Svitana. “It’s unfortunate that drilling occurred during the summer when most students were off-campus,” Dr. Svitana added. The well construction was made possible by department funding and a generous donation from GCI. The City of Westerville gave the College permission to construct wells on city property and access the wells for short term use as in-the-field teaching and research opportunities.

The department has also purchased data loggers that will be placed in the wells to continuously record water levels and temperatures. This data can be used to assess temporal fluctuations in ground water flow and help determine how seasonal variations in water level and water temperature affect the ground water resources in the vicinity of Otterbein Lake.