Greetings at the start of Spring Semester

That’s right, Otterbein is now officially on semesters. This meant that summers were cut short for everyone since fall classes commenced 3 weeks earlier than usual. The new calendar meant a longer fall (14 weeks of instruction spread out over 15 weeks with a 3 day fall break and Thanksgiving) which, from my faculty perspective, was thankfully a bit more relaxed. Students, however, tell us otherwise. They now each take 4 courses at a time instead of 3 and they have to muscle through a few extra weeks until Christmas break. Despite our angst over the first run-through of semesters, I have no doubt that we will all get used to them eventually—as most schools across the country now do.

Another aspect of the quarter to semester change is that we now have a designated J-term. For some students this meant a concentrated time to stay around campus and work on undergraduate research projects. For example, 6 students pursued cell biology research with new professor Jennifer Bennett. Others pursued off-campus activities, including the students that traveled with me to Belize on a course co-taught by Michele Acker, Chair of the Psychology Department. We studied the science and psychology of how people relate to nature on reefs and in the rainforest and we had an adventure or two along the way.

In addition to our new calendar, this year has brought some other changes to our department and Otterbein. We have a new Provost, Dr. Victoria McGillin who comes to us as a clinical psychologist and the recent Provost of Linfield College in Oregon. We are all very excited to start anew with her. Also Dr. Amy Jessen-Marshall, the Department’s previous cell biologist has taken a position at Sweet Briar College as VP and Dean of Faculty, after serving for a year as Otterbein’s interim provost. We are sure she’ll do a great job there. We are also excited to be starting a new direction for the University- the Zoo and Conservation Science Program. The program is joint venture with the Columbus Zoo and our Department, and we are very excited to have just hired our first director for the program. Dr. Anna Young who works on parrot vocalizations and comes to us from New Mexico State. Now we just have to figure out a place to house her birds.

Enjoy this 2012 Issue of Life Line and stay in touch!

Hal Lescinsky, Chair

Anatomy and Physiology Class Increasing in Size

Next year, the Anatomy and Physiology (BIO 1810 and BIO 1820) sequence will be its largest size ever. Cindy Davis of the registrar’s office estimates 210 students will be enrolled in the 2 course sequence, as compared to 160 at the start of this year. The increase is primarily due to the increasing size of the Allied Health Major, as well as some Allied Health students who would normally have taken the sequence this year deferred taking it until next year. Other students enrolled in this service course include Pre-Nursing Students, Athletic Trainers, and students interested in Medical School, Physician Assistant programs, and Dental School.

With the increased demand, the lecture sections will grow from 3 to 4 and the number of lab sections will increase from 7 to 10. This year we have had 3 MDs assisting Professors Sarah Bouchard and Lisa Marr with the sequence: Dr. Jeff Vasiloff, Dr. Ralph Graham and Dr. Leanne Bertani. Next year, Dr. Vasiloff will move from being an adjunct to part-time assistant professor. We hope Bertani and Graham will continue as adjuncts, and we likely seek additional instructors as it will take the equivalent of approximately 4 full-time faculty members’ teaching loads to meet the sequence’s demands.
Lescinsky Teaches New Freshman Year Experience Course

Another feature of the new Semester Curriculum is that all incoming freshman take a course designed to introduce them to University life and the necessary study skills, from the vantage of each professor’s particular passion. Dr. Lescinsky designed his “Trilobites, Dinosaurs and Cavemen” course as an introduction to evolution, with special emphasis on the biology and evolution of humans. In addition to visiting the zoo to watch ape behavior and learning about Lucy fossils and Neanderthal DNA, students also manufactured their own stone tools in order to make dinner (barbeque lunch) and drilled holes in shells to make beads and necklaces. Each group had to manufacture four different types of ancient tools, and then the class voted on “The Best Caveman Award”.

Paradise of Bombs; Revisited

A few years ago the Common Book here at the university was The Paradise of Bombs by Scott Russell Sanders. The book was a series of essays influenced by his time in northern Ohio near the Ravenna Arsenal, where his father worked to make bombs. He was there in the early 1950s. In the summers of 1993 and 1999, I was fortunate enough to make my own forays into the arsenal as part of a biological inventory of the land encompassed by the walls of this place and the Army National Guard Logistic Center next door. My job was to help inventory fish under the lead of Dan Rice (ODNR, Division of Natural Areas and Preserves) in 1993 and help with the fish and aquatic invertebrates in 1999. In 1999, Megan Michael, an Otterbein graduate who worked with Dan but now is with The Ohio Department of Transportation, assisted also. During the two surveys we determine the distribution of fish, aquatic mollusks, crayfish, and land snails at the facility. Dan and I, along with two undergrads from the university returned to re-inventory the aquatic species during the summer of 2010. Our two student assistants were Chris Shockley and Ben Ellsesser, who learned how to pull a seine and use the electroshocking equipment. Everyone will all be happy to hear that very little has changed for the aquatic communities in the former arsenal (it is now operated by the Army National Guard as a Logistic and Training Center), although it is a much more busy place than it was 10 or so years ago. The biggest differences were non-wildlife related. On many occasions we had to wait for huge “training convoys” to proceed ahead of us down the dusty roads of the property, and all the bombs that once filled the underground “igloos” as well as many properly distributed railroad cars, were gone. More dangerous to us this time than bombs were the tanks moving at 50 mph or more over bridges we just happen to be under or the occasional whitetail deer or turkey trying to avoid those same tanks or the approaching convoy and then into our path. Other highlights of the summer were the discovery of eastern sand darters (Ammocrypta pellucida) and the large number of mountain brook lamprey (Ichthyomyzon greeleyi) that still inhabit the streams of the facility. The full report by Hoggarth, M.A. and D.L. Rice. 2011. Aquatic Surveys for the Ravenna Training and Logistic Site (Ohio National Guard), is available from ODNR.

Dr. Michael Hoggarth
Dr. Lawrance presented his Winter quarter sabbatical research project at the The Genomics of Common Diseases 2011 Conference, 30 August-2 September 2011 at the Wellcome Trust Conference Centre, Wellcome Trust Genome Campus, Hinxton, Cambridge, UK.

The research which focused on large-scale variation in the structure of the major histocompatibility complex was conducted in the Department of Molecular and Human Genetics at Nationwide Children’s Hospital in collaboration with Dr. Chack Yu. Aba Bransah, an Otterbein senior molecular biology major also participated in the project.

**They Know My Name?**

One of my first, of many, eye opening experiences I encountered when I transferred to Otterbein was the idea that my Professors would know my name, and things about me, outside of class. When I transferred from Miami University, a much larger University in comparison to Otterbein, my first semester was filled with many of these eye-opening experiences. The best experience I have had so far was being able to be apart of the glorious Department of Science.

From the smaller, more personalized, lectures, to the entertaining labs my experience in Otterbein’s Biology and Earth Science Department has been superb. My Professors not only remember my name, but remember things about me that make me unique, such as my health issues or my fascination with the strikers used to light the bunsen burners, and the most impressive thing to me, knowing my class schedule. Attending the Department meetings, and have my input and opinions heard has been a privilege. All of these things, rolled into one place, have helped reaffirm my decision to transfer. No ifs, ands, or buts about it.

Chelsea Menke
Dr. Gahbauer Spends Sabbatical Observing in the OR

Dr. Mary Gahbauer was back in the bustle of the hospital environment for her Fall semester sabbatical leave. In preparation for teaching about significant diseases that patients bring to surgery in addition to their primary surgical complaint, she spent many hours in the operating rooms at Grant Medical Center and Mount Carmel East hospital.

Every day in the hospital practical lessons in the physiology of the respiratory system, the cardiovascular system and the nervous system take place as patients are made unconscious and paralyzed for the purpose of repairing their anatomy through surgery. Some techniques used in the operating room are very recognizable as those we use in the physiology lab at Otterbein, for example recording the electrical activity generated by the brain (electroencephalogram), and measuring the carbon dioxide exhaled at the end of a breath (end-tidal CO2). These are both techniques used in measuring the progress of anesthesia, as is the electrocardiogram (ECG), another recording device available to us in our physiology labs at Otterbein – although of course we don’t make anyone unconscious. And although we can record the rate, rhythm, axis, and cardiac output of a student’s heart in lab, we certainly don’t stop the heart as anesthetists do to allow the surgeon to perform the delicate needlework of replacing blocked sections of coronary arteries.

In contrast to the audacious interference of opening the chest of a living person, other technologies have made minimally invasive surgeries possible. Endoscopic surgery allows the gall bladder or other organs to be removed through a small hole in the abdominal wall by manipulating videorecording, cauterizing, irrigating and stitching tools through others. Dr Gahbauer observed these procedures, in addition to “robotic” surgery. It is not actually the robot that performs the surgery of course, but the surgeon who manipulates the robot to perform the operative techniques. This looks strange since the surgeon is remote from the patient, and appears to be playing arcade games in the corner of the room as s/he works the robotic videogame-like console. No longer is a youth spent playing Nintendo called mis-spent, as studies show that it actually gives an edge in learning robot-assisted surgery.

A special technique in use at Grant is “cell saving” through which a patient’s own red cells can be restored to him if lost during surgery. This is especially important in treating patients who for religious reasons can not accept transfusions of blood or blood products such as platelets from donors, and Grant has become a center in central and southern Ohio for the management of such “bloodless surgery”. It will not be a surprise to hear that centrifuging and separating the red cells without damaging them mechanically or osmotically is an expensive process – but potentially lifesaving.

Anatomy truly comes to life when joints, arteries and body cavities are opened, but nothing is so interesting as viewing the interior of the brain, especially when CT or MRI scans are displayed nearby to make comparisons between the image and the real thing. The skilled surgeon performing neurosurgery at Mount Carmel east was Dr Brad Mullin, an Otterbein graduate of 1984. He remembers Otterbein with gratitude for the strong basis in science he received here before gaining acceptance into OSU medical school. As do many alumni Dr Mullin likes to keep in touch with us, and he graciously agreed to give the farewell after-dinner speech to our departing seniors at the Old Bag of Nails last June – which he did to great effect.

Svitana and Students Study Salty Water

Kevin Svitana, Assistant Professor of Biology and Earth Science, delivered a research presentation at the 2011 Annual Meeting of the Geological Society of America (GSA), held in Minneapolis, MN in October. The conference is one of the largest for the geosciences with approximately 6,000 scientists from across the country attending the exposition. The paper was co-authored with Lauren Kopas, a Senior Environmental Science major.

The paper, “Real Estate Development and the Effects of Deicing Compounds on the Water Quality of Alum Creek” looks at the effect of deicing compounds (road salt) on the water quality in Alum Creek. Alum Creek is the main supply of drinking water for the city of Westerville. The increase in salt is related to the extensive development that has occurred along Polaris Parkway in the last decade. Ms. Kopas and Dr. Svitana collected stream water quality data through the winter of 2010/2011 using a combination of automated data loggers and periodic manual readings with hand-held meters along the flow path of Alum Creek. Throughout the winter, the stream water had salinity concentration measurements more than three times greater than the 500 milligrams per liter taste threshold recognized by Ohio EPA.

Svitana also completed work with Otterbein Environmental Science student Alex Boester (’11) assessing recharge from Alum Creek to groundwater in the Otterbein Lake area. The study results show that floods and releases from the Alum Creek Reservoir maintained by the ACOE raised groundwater levels and recharged the waters of Otterbein Lake. Building on these results, Svitana and Patrick Conley (’13) are developing a study to determine if the salt present in Alum Creek from road deicing affects groundwater in the Otterbein Lake area.
Fecal Matters

Exciting things continue to happen in Dr. Bouchard’s nutritional ecology lab. Last summer, she was off again for another adventure in a Panamanian rainforest with the red-eyed treefrogs. Two students had the opportunity to join her this year. Chelsea Jenney made her second trip to the field station and became intimately acquainted with the ins and outs of tadpole and frog guts. This was right her up alley after all the fecal investigations she did last year. Chelsea also helped initiate Lindsay Wargelin on life at the forest. Lindsay was able to experience all aspects of frog nutritional work including rearing tadpoles, analyzing growth rates, checking feces, and running her own study measuring the oxygen consumption of these amazing frogs. Both students recently presented the results of their research at the annual meeting of the Society of Integrative and Comparative Biology. Plans are in the mix to expand the frog research to include local Ohio species, so stay tuned for more student opportunities.

Turtle research is also still going strong at Otterbein. Heather Crather continues to work on her Honor’s thesis examining how turtles process fruit diets. She knows more about the composition of turtle feces than anyone on campus, so direct any sugar, fiber, or mineral questions her way. Annie Garrett and Katie Kaiser are wrapping up their investigations into chitinase digestive enzymes and factors influencing their activity. This has been part of a great collaboration with Dr. Tansey’s biochemistry lab, and Annie is heading to San Diego with him this spring to present her findings at the annual meeting of the American Society of Biochemistry and Molecular Biology.

Chelsea, Annie, Heather, and Katie will all finish their theses this spring and move on to bigger and better things. Lindsay will continue her work through this spring’s frog breeding season and help usher in another group of aspiring young scientists. We’ll look forward to seeing where the nutritional questions take us. So much feces, so little time…

Science and the Art of Microscopy

The Department has been busy updating the Olympus BX-40 phase-contrast microscope to include state-of-the-art phase-fluorescence and a new camera and image capture software. Students in the Department of Biology and Earth Science and Department of Chemistry are now using the scope. Bobby Geiger, a sophomore BMB (Biochemistry and Molecular Biology) major has been conducting independent research in Dr. Jennifer Bennett’s microbial genetics lab and has been using the scope to examine the lifecycle of the pharmacologically important bacteria Streptomyces coelicolor. Phase fluorescence photos will be included in one of the labs recent publications. The scope has also been used by Dr. John Tansey’s Molecular Biology lab to examine DNA, Cell Membranes, and Perilipin after each was labeled a different fluorescent color, and by Dr. Halard Lescinsky’s Coral Reef Ecology course to examine coral symbionts and nematocysts. We are excited to have the updated scope and can’t wait to use it in many more courses and research projects.
Department Gets Salt Water Aquarium

Anyone touring the Science building now has something new to peek in on. A 300 gallon saltwater aquarium now fills the glass window into the ecology lab. The aquarium, funded by donations from alumni over the last several years, will hold corals and coral-like animals such as anemones, sponges and zooanthids. It will also have a few small fish but in general corals and fish are hard to keep in the same tank. The tank will be used in many courses including freshman biology, coral reef ecology, and the Integrative Studies course of Dr. Lescinsky which focuses on the science and social issues surrounding coral reef ecosystems today. It will also be a favorite stopping point for campus tours.

The idea for the tank came when Dr. Lescinsky stumbled on a video of a local coral farm. He had no idea it was possible to raise corals in Ohio, but it turns out that in New Albany, Todd Millman runs Reef Systems Coral Farm, where he raises and sells corals, anemones and related organisms in a green house. One advantage of this aquaculture is that all of the corals are sustainably produced and none are plucked from natural reefs. After numerous discussions and class fieldtrips to the coral farm, the Department and Millman decided to build a tank on campus to showcase the possibility of a 100% sustainable coral tank. All organisms will be farm raised, and even the rock used in the tank is from a land quarry, rather than a reef. We got the tank up and running during the fall term, and we will be adding more and more organisms to it in the next few months.

What changes should you look for in the coming year? Watch for added representatives from the biological classes or physiological adaptation categories. Economic botany collections have been formed and additions are expected. Interesting species could showcase medicinal, edible, bio-filtering, or biofuel categories which, as they are electronically indexed, could be quickly identified for educational presentations. We have added rain barrels and organic gardening techniques and want to expand those utilities and the role that the greenhouse plays in the Otterbein community. This spring, a student-led group will start seeds in the greenhouse and raise transplants to be used at the Otterbein Community Garden, which supports the local food bank. Otterbein’s campus-wide commitment to sustainability inspires the staff to research new indoor gardening developments. We aspire to grow and be a teaching model as we do so.

Growing...the Otterbein Greenhouses Take Root

On the south side of the first floor of the Science Center, visible from the interior hallways and the Commons on Park Street, the greenhouses are looking good! Two separate structures house the teaching plant collection and various research projects.

Built during the Science Center renovations, which were completed in 2009, the greenhouses have a dual purpose: supporting classes and providing an area of controlled temperature and light for research projects. Genetics students are provided with Tradescantia pallida flowers to learn about chromosome structure and meiotic segregation. Biology students learn about classification, complexity, and evolution of plant diversity through laboratory activities focusing on mosses and liverworts, ferns and conifers, and monocots and dicots. Environmental science students research the effects of pollution on plant growth, comparing different soil contaminants for class projects. Ecology students conducted experiments investigating the effects of intra- and interspecific competition on plant growth rates. Student researchers from the turtle physiology lab used the greenhouse to grow duckweed for their turtle nutrition projects. The Otterbein Greenhouses are helping science take root.

It has been a busy year for general maintenance and greenhouse improvements. Controlling temperature and lighting despite changing outside conditions requires upkeep on multiple equipment systems. Heavy vents must be greased, glass must be cleaned, algal growth must be limited, and misting systems utilized while protecting the computers that control the programs.

This past year, the plants were inventoried electronically, recording names, growth preferences, and native location information. Eye-catching waterproof labels were printed for the plants within the teaching collection. The staff arranged the teaching plants by watering requirements. This led the way for a project between the Otterbein service department and the greenhouse staff, activating our automatic misting system to create an ideal environment for plants requiring high humidity. The plants responded with a thunderous applause. No. The plants did not applaud. But, they did look green, healthy, and show some nice responsive growth.

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J. Whitehill, Ph.D.: Defender of Ash Trees

The Department wants to congratulate alum Justin Whitehill ('06) on receiving his Ph.D. from the Department of Plant Pathology at Ohio State University. Justin’s dissertation, “Investigations into mechanisms of ash resistance to the emerald ash borer”, addressed the devastating emerald ash borer (EAB) that has been killing ash trees throughout the eastern deciduous forest. Specifically, he used proteomic and metabolomics approaches to study species of ash that are susceptible and resistant to attack by EAB. To date, Justin has authored or co-authored 6 peer-reviewed publications on EAB control, the latest of which appears in the journal *PLoS ONE* 6 (9): e24863. doi:10.1371/journal.pone.0024863.

Currently, Justin is a postdoctoral fellow at the University of British Columbia working in the field of terpenoid metabolism.biochemistry. Justin’s long-term goal is to become a faculty member at a land grant institution and “to have a research program focused on dissecting mechanisms of defense/resistance in trees to insects and pathogens using the most current functional genomic, transcriptomic, proteomic, and metabolomics approaches”. Justin states, “I had always been interested in natural history, but until I began my courses in life science at Otterbein, I did not know that I could take that interest and turn it into a career in plant science. Otterbein helped me believe in myself and realize my potential to be a scientist.” While a student at Otterbein, Justin also majored in music, was active in Greek life, and participated in men’s tennis. “Otterbein was extremely rewarding. Only at a school such as Otterbein, would I have been able to pursue multiple interests while still getting a high-quality science education.”

Alicia Campbell completes study of Island Development and Mangrove Deforestation in Belize

Over the past year, Alicia Campbell ‘11 has worked tirelessly to complete her Distinction Project quantifying mangrove deforestation and island development in and around the South Water Caye Marine Reserve, a part of the Belize Barrier Reef World Heritage site. Alicia worked with Otterbein Professor Hal Lescinsky and Smithsonian Institution researcher Ilke Feller to compile a GIS basemap for the Belizean cays and to then warp and attach over 13,500 aerial photographs taken by Feller annually since 2003. She then quantified changes to the islands in annual increments over the last 9 years. Alicia’s study documented widespread illegal cutting, dredging and filling within the Belize world heritage site, and her data was requested by World Wildlife Fund researchers and the Belize “Healthy Reef Initiative” for use in persuading the UN and other organizations to put international pressure on Belize to fulfill the terms of the World Heritage Designation. After successfully defending her Otterbein thesis in June, Alicia moved to Ohio State, where she will continue to look at the mangrove peat islands of Belize and compare them to peats in Alaska and elsewhere as a graduate student. She is hoping to join Feller for the annual fly over of the Cayes in March and intends to keep the data base updated.

A sample of the aerial photos and GIS analysis of Belizean Islands completed by Campbell as part of her Distinction thesis. The figure shows deforestation of Norval Cay, and her quantification of cleared area, buildings, and docks.
A Welcome Recollection of Students Past

The dramatic hills and valleys of Athens County were a wonderful sight in the winter sun, as Dr Mary Gahbauer drove down to Ohio University for a meeting of the Central Association for Health Professions Advisors. The visit included an informative tour of the Physical Therapy School and of the Heritage Osteopathic Medical School. Medical students spend two years in Athens in the didactic portion of their training before dispersing to hospitals around the state for clinical experience, finally qualifying as DO or Doctor of Osteopathy. Stressing the difference from MD schools as a greater focus on the “body, mind, and spirit” aspect of patient care, the Director of Admissions said The DO emphasis is on the preparation of primary care practictioners, and to this end a new OU medical school will be established in Dublin, Ohio. She then provided a record of Otterbein students who have matriculated at OU since 1980: Ronald C. Moomaw, Elmer F. Diltz, Jr., Timothy Bright, David Lance, Matthew Frantz, Lary Korn, Peter Martin, Janet Hawkins-Kegley, Michael R. Bressler, James E. Wilcher, Victor A. Trianfo, Kathy A. Horava, Joseph A. Trapp, Jr., Donald J. Rohl, Lisa Hoover Casey, Patrick E. Muffley, Jason T. Weihl, Connie A. Haines, James D. Hedlesdon, Brian W. Korn, Melissa A Lenko, Steven D. Shell, Denise K. Gruber, Mike Huang, Ryan G. Foer, Michael D. Jordan, Michael D. Skeels, Mary W. Lawley, Leslie A. Tuttle, Tracy M. Ander, Mikael P. Schill, Michelle L. Hobbs, Brian L. Colopy, Carly M. Dent, Joshua D. Ozbolt. We would be delighted to hear from any of you – we would be glad to know how your careers are progressing or better yet, pay us a visit and see the new science facility! mgahbauer@otterbein.edu

J-Term: Student Experience

This January Otterbein has provided students with the opportunity to take up to 5 credit hours with no additional charge. J-term was originally intended for study abroad and other such classes, but it was extended to include many different classes, including language, math, science and INST courses. This means that the courses need to cover all the information normally covered in a full semester (15 weeks) into roughly 15 days. Classes are held everyday for 3 hours, with each day being equivalent to one week, calling. Most of the classes are worth 4 credits, so students cannot take multiple classes, but some have taken advantage of the opportunity to do research for one credit. The schedule is very different than what most students are used to, with just one class that takes up so much time. Some courses require many hours of work outside class, whereas some others have little. Just having one class per day allows students some extra time to participate in other activities, such as work, research, and internships among other things. Most students that are taking a course view it as a good way to either catch up or get ahead on course requirements. It’s a strange schedule to adjust to, but is an effective way to squeeze in an additional class and other activities. —Brooke Weisenburger

Maria Wheeler Soars with Eagles

My dissertation project focuses on the population genetics of bald eagles (Haliaeetus leucocephalus) and golden eagles (Aquila chrysaetos canadensis). Within a relatively similar time span, both species were the subjects of broad-scale translocation/reintroduction projects. However (and luckily for scientific exploration!) the respective introduction projects were carried out very differently. This presents a unique opportunity to determine how the two reintroduction approaches have impacted the genetic structuring of modern populations. My methods include mitochondrial cytochrome b gene sequencing and microsatellite amplification, and as a point of reference, I compare modern birds to their historic counterparts—using 100+ year-old museum study skins to represent eagle populations past. Maria Wheeler, Duquesne University, Expected Graduation 2013, Wheeler3@duq.edu

Dr. Lawrance celebrating with his three honors students, L to R Thad Kandel, Meredith Lum and Anri Benco. Thad and Meredith both worked on gene copy number variation (CNV) in the major histocompatibility complex (MHC) in collaboration with Dr. Chack Yung Yu at Nationwide Children’s Hospital. Thad’s research asked whether MHC CNV is a factor in the autoimmune disease systemic lupus erythematosus. Meredith examined the significance of MHC CNV for the conservation of endangered species. Anri’s thesis, “Health Assessment and Prevalence of Brucellosis in Eastern Chuckchi Sea, Alaska Beluga Whales (Delphinapterus leucas)" was completed in collaboration with Dr. Tracey Spoon at the Mystic Aquarium in Mystic, Connecticut.

Alumni Notes

Devin (Smith) Byard (’11) was accepted to OSU dental school. Michael Frank (’08) completed his Master’s degree from Purdue University.

Wanted: Alumni Reprints

If you are a department alum and have a recent publication, please send us a copy. We are proud of what our students are doing and want to put together a sampling of what you have done for display in the Science Center.