Greetings! As Spring Term comes to an end and we transition into summer, we want to let you know about new developments in Biology, most exciting, some bittersweet. Among the exciting changes are adjustments to our curriculum. We have introduced a number of new courses, including Plant-Insect Interactions, Plant Physiology, and Dendrology, and "have made official" several others, including Marine Biology and Ornithology, giving us enough options to introduce electives into the Conservation Biology major.

These new courses have also given us enough plant-related courses to propose a Botany concentration (to go along with Zoology and General Biology) within the Biology major. This has been approved by the biology faculty and is working its way through the University's curricular process. For those of you who participated in the department's "seminar presentation" experience, you'll be interested to know that we have modified the process. We now have three seminar sections (Cell and Molecular, Conservation, and Zoology) in which students and faculty meet in small groups to dissect papers in fine detail. So far, so good!

Next, we have a few updates. We have received notification that the University has reached an agreement with Civil and Engineering Consultants (Franklin, TN) to take on a "wetland easement" in Carroll County, TN. This property is part of a project to reclaim farmland by planting trees that thrive in bottomland environments. Union students and faculty will be involved with monitoring flora and fauna at this site over time as succession takes place. It is exciting to be part of this longitudinal study!

For those of you who had the joy of caring for our mouse colony during your time at Union, you will be interested to know that construction is underway for a facility to house most of the mice at the Wildlife Rehabilitation Center on campus.

We also want to congratulate Dr. Jennifer Gruenke on receiving tenure and being promoted to rank of Professor!

Finally, and this is the bittersweet part, we say goodbye to Dr. Michael McMahan, University Professor, who has decided to retire at the end of this semester. It is bitter in that we will miss his excellence in the classroom and his contributions to our department as a whole, but sweet in that we know he is looking forward to a whole new chapter in his life. Please email your best wishes to Dr. McMahan (mmcmahan@uu.edu). We're sure he would love to hear from you!
“I thoroughly have enjoyed teaching,” says University Professor, Dr. Michael McMahan, “but when it’s time to retire you’ll know it.” At the end of the spring 2013 semester, the Department of Biology said goodbye to Dr. McMahan. He completed his 38th year of teaching, with 33 years at Union.

Dr. McMahan joined the staff at Union in 1980, after teaching for five years at Campbellsville College in Kentucky. He chose to come to Union for the strong academic reputation and for the location. In 1980, Dr. McMahan had a young son, and Union put his family halfway between two sets of grandparents. Dr. McMahan was one of only three faculty in his first years at Union which required him to teach as many as ten different biology courses over his career. Dr. McMahan’s main course load for close to 20 years was teaching Human Anatomy & Physiology to the nursing students. He currently is teaching Vertebrate and Invertebrate Zoology to Biology majors. His experience in the classroom will be greatly missed. Dr. McMahan also served as the Director of the West Tennessee Science Fair for several years, as well as the Chairman of the Health Professions Advisory Committee at Union.

Dr. McMahan has witnessed many changes at Union since his arrival. Growth in student enrollment has lead to an increase in faculty and expansion of the campus. The changes most significant to the biology department would be the construction of White Hall and the addition of 14 more faculty and instructional staff members. Unfortunately, according to Dr. McMahan the growth and expansion is not without sacrifice. He feels that Union has “lost the sense of community” that he remembers so fondly. Dr. McMahan recalls the days when he could “see everyone everyday whether staff, faculty or student”.

This past year, Dr. McMahan had the honor of donating his dissertation research specimens to the Department of Invertebrate Zoology at the National Museum of Natural History, Smithsonian Institution Museum Support Center in Suitland, MD. While completing his Ph.D. from Louisiana State University, Dr. McMahan’s dissertation work involved discovering and describing a new species and family of earthworm, *Lutodrilus multivesiculatus*. The Louisiana mudworm was named by Dr. McMahan (“Luto” – lives in mud, “driu” – worm, “multivesiculatus” – multiple pairs of male reproductive structures) and belongs to the Lutodrilidae family. Dr. McMahan initially sent some of his specimens from that research to the Smithsonian Institution in 1976, and his findings were published in the professional journals *Megadrilogica* and the Proceedings of the Biological Society of Washington. Believing that “a responsible scientist should pass on their research to benefit others”, Dr. McMahan donated the remainder of his specimens this past year and had the privilege of touring the Smithsonian Institution’s research facility in Maryland.

One of Dr. McMahan’s favorite experiences during his time at Union is the 12 day tropical ecology class that he took to Belize the summer of 2001. He and 12 students spent part of the trip in the rainforest outside the remote Mayan village of Blue Creek, Belize. The second part of the trip included a stay on the island South Water Caye, located directly on the Belize barrier reef. Students spent time scuba diving and exploring the marine ecosystem found on the reef. The trip proved to be challenging physically with rigorous hikes, mosquitoes and food poisoning, but greatly rewarding. While in Belize, the group attended a Baptist church service. Despite the service being held in Mayan, it was evident to Dr. McMahan that “they were worshipping the same God we do”.

With regard to Dr. McMahan’s time at Union, Dr. Wayne Wofford comments, “I have taught with Dr. Michael McMahan for almost 26 years! What can I say about him? Michael has been a great and constant friend. We have always shared what is going on in our lives, both the good and the bad. I always know that he is there to talk to about what is bothering me. He is a family man. I have seen him many times exhausted after staying up very late grading papers after taking care of his two boys and tucking them in. The boys came first. Michael has a deep love of the subject of biology. He is always sharing something that he has just learned with us. Students; remember, you never stop learning. He is a man of God who always puts his belief in God as Creator up front in his courses. Michael has been a conscientious advisor and mentor of students. I have seen countless students in his office talking to him over the years. His eye for detail has been invaluable to the department in the preparation of documents, scheduling of classes, and other aspects of the daily running of our department. He can give you a critique of every restaurant in West Tennessee! Michael will be missed by the department, his friends, and his students. Alas, this creates a real vacuum for the department. Who will step up with the really bad puns and updates on what happened in Wyoming on April 23, 1822?”

Dr. McMahan’s plans for retirement are simple—“enjoying life”. He is looking forward to spending more time with his wife, Brenda, and pursuing his hobbies of collecting various antiques, e-baying and travelling. The biology department thanks Dr. McMahan for his 33 years of dedicated service and wishes him many happy years to come!
PROPOSED BOTANY CONCENTRATION
by Dr. Michael Schiebout

The Biology Department recently made the decision to offer a botany concentration for our majors. This is in addition to the zoology and general biology concentrations currently offered within the Biology major, and alongside the Conservation Biology and Cell and Molecular Biology majors. Having a botany emphasis will enable students to pursue a wide range of possible careers. Additional courses have been added to the curriculum along with current courses to accommodate students wishing to follow this route and prepare them for occupations in plant science.

Plant sciences have interested people for years and have been critically important in providing food resources for humanity. Working with and experiencing plants is also an aesthetic experience. Many of us enjoy hobbies such as gardening and hiking. Much of the joy gained through these pursuits is from interacting with the botanical creation. This wonder is experienced by the observation of vegetable seeds germinating in our gardens or bees pollinating summer flowers. The grandeur can also be seen by walking through the magnificent redwood forest in northern California or the old-growth forests of the Pacific Northwest. Much of this connection to flora can be traced back to Genesis with God giving Adam the task of caring for the garden (Gen 2:15). This task of caring for creation continues today, and through plant science, students can develop skills to help others in areas of conservation, food production, alternative fuel sources, pollution mitigation, and pharmaceutical development. Studying botany can develop in students a wonder and awe of God’s creation.

The US labor department estimates that jobs in plant science will grow by 7-10% between 2010 and 2020 (http://www.bls.gov/ooh/home.htm). Some of these jobs will include developing more efficient crops, conservation of natural resources, and plant-related education. Other plant-related professions include plant ecologist, plant taxonomist, forester, biophysicist, plant physiologist, plant biochemist, molecular biologist, microbiologist, horticulturist, landscape designer, plant pathologist, and plant breeder (www.botany.org/bsa/careers/what_is_botany.php).

Courses that have been recently added to the catalogue include Plant Physiology, Dendrology, and Plant Insect Interactions. These are in addition to courses that have been offered for some time, including Botany, Microbiology, and Taxonomy of Vascular Plants. The new campus arboretum and future greenhouse will complement these courses and give students an opportunity to design and conduct individual research projects which could serve as stepping stones for future careers or educational opportunities. In addition, our “conservation easement” in Carroll County will provide opportunities for plant-based field research. Finally, we are developing relationships with a number of different local organizations, including the West TN Research and Education Center, and Cypress Grove Nature Park, which should provide additional opportunities. Through this concentration we hope to prepare students for careers where they can study plant science as well as become actively involved in taking care of creation and serving mankind.

RESEARCH UPDATE
by Julie Cobb

Dr. Jennifer Gruenke, who teaches Immunology at both the undergraduate and graduate levels, has been directing several projects that aim to optimize the process of generating B-cell hybridomas. The production of these hybridomas relies on the stable fusion of a murine B-cell and an immortal myeloma cell. If successful, these hybridomas will generate an unlimited supply of monoclonal antibodies that can be used for a wide variety of other laboratory work.

A previous student researcher (Lucas Littleton) tested several adjuvants for their effectiveness in initiating an antibody-producing immune response and their safety in animal models (Littleton and Gruenke, “A Comparison of the Effect of Three Adjuvants on the Antibody Response to Ovalbumin in Mice”, BIOS, in press). Dr. Gruenke has just finished overseeing two student researchers whose projects dealt with cell fusion. One project, undertaken by Julie Cobb, examined growth enhancers for their effect on the growth of fused cells. While the compounds have been examined in previous studies, they have not been compared against one another to identify the conditions under which hybridomas grow best. The results of this research will be used to optimize the hybridoma generation process by allowing for more stable fusion of the cells and a larger number of monoclonal antibody-producing hybridomas.

The second research project, undertaken by Andrew DiBenedetto, was the development of an assay to better determine whether cell fusion has occurred. The project involved using different fluorescent labels to tag the cytoplasm and the lipid membrane of the B-cells. Using a fluorescent microscope, the movement of the tags can be tracked during the fusion process. Because the myeloma cells are much larger than the B-cells, transfer of the dye to the larger cells indicates fusion has occurred. This project builds on previous research (Lauren Maples) which used fluorescent labels to test potential fusion enhancers.

This research will continue in the coming years as new students become involved in various portions of the project. The hope is that this research will enable the production of hybridoma cell lines that generate monoclonal antibodies, which can be used for other research projects within the department.
ALUMNI PROFILE: KATY WILLIAMS- GENETIC COUNSELOR
by Jenna Ward

After graduating from Union, Katy Williams attended the University of Arkansas for Medical Sciences. She “thought it was a pretty challenging program that did really prepare [her] for the ‘real world’”.

Q: Where are you currently working?
Katy: I technically work with the University of Tennessee Health Science Center in Memphis, but we do all of our clinics through LeBonheur Children’s Hospital.

Q: Could you describe what it is that you do?
Katy: I work with geneticists in their clinic. I’m essentially a go-between for the doctor and patients/families we see. I take family histories, go over the family’s concerns for the child we are seeing, and explain to them how the appointment will go. I may also bring families back in to go over test results and explain their diagnosis of a certain genetic disorder to them. When I’m not in clinic, I’m scheduling clinics, reporting results to families, writing follow-up letters, and tracking down patient information. I also do newborn screen (NBS) follow-up for all of West Tennessee. We get the reports of any abnormal newborn screen for any baby born in the area. We then either have the test repeated or get the child in for additional testing.

Q: How hard was it to prepare for this position?
Katy: I think the hardest part about getting here was finding out what I had to do to become a genetic counselor. Training to become a genetic counselor requires a Masters in genetic counseling. Getting into a grad program can be challenging; there are currently only 31 genetic counseling programs in the US. In order to even get an interview at the programs, you must have taken the GRE, done some kind of advocacy work, and have shadowed a genetic counselor as well as having good grades in college. Once you do get into a program, it just becomes about surviving grad school... doing well in classes, passing clinical rotations, and completing a thesis.

Q: What are your future goals or career goals?
Katy: Biggest goal right now is to pass my Boards in August to become a certified genetic counselor. I am fortunate enough to work in a field that really encourages you to [gain experience before becoming] certified. [I also] really want to get the career of genetic counseling out in the public eye. I think it is a wonderful, growing field and there is a real need for more genetic counselors. I’m so glad that you guys are featuring it in your newsletter. You are helping me reach one of my goals! Another goal I would like to accomplish in the next few years is to research how integrating different forms of media might impact a patient’s understanding of the genetic information we are covering in a counseling session. I’m also really interested in setting up a genetic counseling-only clinic like one that was set up at Vanderbilt to aid with the doctors’ patient load.

Q: What influenced you to take this career path?
Katy: I knew from a young age that I was interested in genetics. I had an exceptional biology teacher in high school who really sealed the deal for me. Getting to college I knew I was going into biology. My mom had suggested genetic counseling since she knew I also liked helping people out. At Union, Dr. Weaver really took me under her wing, helping me decide what classes would most prepare me for grad school and what internships to do. I came to a crossroads my junior year of college where I was trying to decide if I wanted to do research or work in a clinic. I did an internship over that summer and knew for sure I wanted to do clinical work. I missed working with people when I was in the lab! From then on it was all about getting into genetic counseling programs and I haven’t looked back.

Q: Do you have a favorite professor from Union that influenced you in a positive way?
Katy: Dr. Weaver has really done so much to push me to become what I am over the years. She likes to check in on me too and has been kind enough to let me speak to her classes on more than one occasion to discuss a career in genetic counseling. I also love Dr. McMahan. His vertebrate class really helped me to learn how to study my freshman year. He is just a wonderfully sarcastic professor that I enjoy talking to when I have the chance.

CONSERVATION TECHNIQUES
by Taylor Maylott

Conservation Techniques is a new course designed to give hands-on experience to Conservation Biology majors by teaching “the many and varied techniques that conservation biologists employ in the field to sample wildlife, fish, and other biological communities” (from the course syllabus). Many of the methods and techniques taught in this class will be very useful to students who hope to eventually pursue a career in this field. Much of the material studied in this course can be related back to concepts learned in other biology classes such as Ecology and Conservation of the Vertebrates, Wildlife Biology, and Conservation Biology. This course is team-taught by Dr. James Huggins, Dr. J.R. Kerfoot, and Dr. Andy Madison. It is a field-based class, consisting of one lecture period and two lab sessions per week. A variety of topics are covered throughout the semester. These include: trapping, radio telemetry, wildlife photography with trail cameras, chemical immobilization, estimating wildlife populations, aging wildlife, vegetation and invertebrate sampling, habitat management, wildlife disease, and use of 4WD vehicles and boats. Students are evaluated in this course by means of exams, lab practicals, lab and field assignments, and overall participation and active involvement.