Symbiosis

The UNCG Biology Department Newsletter

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Life Lessons from Biology - Dr. Esther Leise

Spring 2013 Biology Commencement Speech -- May 9th, 2013

I've been doing research in biology for about 40 years now. I'm interested in how marine invertebrates develop. Even though my research really falls into the category of trying to understand how the world works, I could talk about what my students and I have learned and how that touches upon the human condition, and I'll get to that, but not just yet. Before I do, I'd rather take a somewhat different approach, and step back and share with you some of the major lessons have I learned from a lifetime of doing scientific research.

What I'd rather do is find the middle view and share with you some of the ideas that have occurred to me, as I started to think about the lessons I have learned from being a biologist.

So, what is one of the first things that we learn about biological systems? It is that they are always changing. Whether you are talking about a cancer cell growing and invading an otherwise healthy organ, or a starfish slowly opening a tasty clam, the biological world is always in a state of flux. It is never static. This is true for all of our lives, but especially for you young nearly graduated almost ex-students. Now, that you have reached the end of your undergraduate careers, your lives will be undergoing enormous changes. And one of the best things you can do is to accept that, or better yet, embrace those changes and see if you can't manipulate them a bit so that you get to where you want to be.

And while we are speaking of life changing events, if you think about it, when we do experiments, we are purposely changing how cells or organisms live, so that we can understand some underlying mechanism. But to do that, to understand that underlying mechanism, you have to learn to interpret your data honestly. In our lives, as things change, we have to learn to interpret our own abilities and responses to new events honestly. The sooner you learn to evaluate the data – how you respond to particular situations – the better off I think you'll be, because there are always options in life. We just have to figure out what they are.

There's an old adage which says that "chance favors the prepared mind". Meaning that you should learn as much as you can about as many subjects as you can, because you never know where your next good idea might come from. I think this also applies to life in general, not just a research career. Thus, I urge you to get out of your comfort zones on occasion. Do something really novel and interesting every now and then. You've been doing many novel things and learning about new ideas during your years at UNCG, and now is not the time to stop. If you don't know how to swim, take a class and learn how. If you've never invested money in the stock market, take that $50 birthday present and buy a few shares of a silver mine. Your parents might even thank you some day...

What else has biology taught me? Well, those of you who have had to write reports in one of my classes may remember me telling you that 50% of doing science is communication. If you aren't communicating your findings to the rest of the world, you are only playing mental mind-games. You certainly aren't doing science. By extension, a lot of the problems that you may encounter in your lives can often be chalked up to a lack of communication. And that miscommunication often arises from fear and anger and an unwillingness to listen to other people. I urge you to learn to listen to other people and their viewpoints. We may not always agree with each other, but it can't hurt to try to communicate more effectively.

Right now, I want you to think of yourselves as crawling up the trunk of a tree that symbolizes the choices you can make in life. You can see the major branches, but until you start climbing further out, you don't know where you'll end up. So the more you know, about all sorts of things, the more interesting a person you'll become and the more easily you will be able to adapt to new situations that you either move into or sometimes have thrust upon you.

From doing research for many years now, I've also realized that you usually don't get all of the answers you want in one day, and sometimes the answers will be ones you don't like. So I say to you, you don't have to figure out your entire life tomorrow. Many students who have come and talked to me about their careers are often enormously worried because they don't have their entire lives mapped out by the age of 22. And you know what? That's ok. There's nothing wrong with moving ahead at your own pace. The only thing I ask, and I suspect your parents will ask this too, is that you keep moving.... In doing research I can usually see about 2-3 years ahead of where I am. Sometimes more. Meaning, I can figure out what I might learn from my current experiments and see the next batch or two after that. And some very astute and big-time scientists have told me the same things about their careers. They could sort of figure out maybe a 5 year plan, but not much more. But they weren't worried about it, because they had gotten used to CHANGE. They had also learned to trust themselves as people who knew how to figure things out. So, as I said to my Histology students, this semester, I want you all to go to the store over the weekend and buy some self confidence. It will go a long way towards helping you get to where you want to be. And notice I said self confidence, not arrogance.

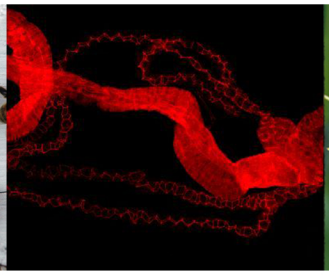
One of the corollaries to not having to figure out your entire life tomorrow, is to remember that your life may not

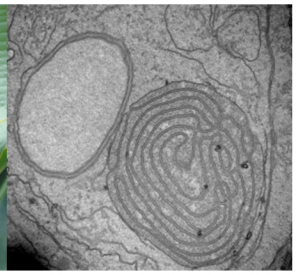
(Continued on Page 3)

Editor: Dr. John Lepri
Published by: Anna G. Smith

Symbiosis

What's in this issue of Symbiosis?



Meet our Staff

Joseph Ramos - Lab Manager & Lecturer

Joseph Ramos began his academic career at North Carolina State University. After working several years in the chemical analytics industry, he decided to try something new. He came to the UNCG Biology Department as an undergraduate transfer student in the spring of 2006. During his undergraduate studies, Joseph completed 2 years of undergraduate research with Dr. Yash Patel. Upon graduation, he joined the staff of the UNCG Biology Department as the Human Physiology Lab Manager. After working here in the department for several years, Joseph was able to complete his MS in Biology -- again with Dr. Patel -- while managing over 30 sections of Physiology Lab per year! His Master's work was on examining the mechanisms of drug-resistance in breast cancer and he completed his thesis and graduated in the fall of of 2012. Joseph is also a member of the Spartans Act program where he has received extensive training from both the UNCG Office of Emergency Management and the Federal Emergency Management Agency to enable him to help manage a response in the event of a campus wide emergency. This fall Joseph has taken on yet another role in the department -- that of lecturer -- and is currently teaching Human Physiology Lab (BIO 277L) while still managing all the laboratory sections of the class! His dedication to the department is inspiring to everyone here!

Biology Seminar Series

UNCG Biology Department seminars are held on Wednesdays, whenever classes are in session, from 4-5 PM in room 200 of the Sullivan Science Building.

The biology department seminar series is open to the public and we invite alumni to attend.

Parking is available in the McIver Street Parking Deck and refreshments are served at 3:45 PM prior to seminar.

The current semester's seminar schedule can be found at the biology department website:

http://biology.uncg.edu/bioseminars.html

For directions to the department or other general inquiries about the seminar series please email the Biology department:

bio@uncg.edu

A Message from the Head - Stan Faeth

Welcome to the second issue of the re-animated Symbiosis, the Department of Biology's newsletter. After a decade-long hiatus from publication, we are now back on track with new issues appearing every semester.

Since our issue last Spring, we are pleased to have Dr. Tsz-Ki Tsui (*See page 5.*) join the faculty as a new assistant professor. Tsz-Ki earned his PhD from the University of Minnesota and was then a postdoctoral fellow at the University of Michigan. In addition, Austin Craven and Rick Stall became full time lecturers for us. Austin and Rick are both products of our Master's of Science program.

In other news, the department is undergoing withdrawal pains as Dr. Rob Cannon begins his phased retirement. Rob has been an incredibly interactive and energetic researcher, teacher and advisor since 1973 when he arrived at UNCG as an assistant professor. Faculty and staff who have only partially assumed his duties keeping asking – "you mean Rob did that, too?" Many of you who are reading this newsletter have been positively affected by Rob in some way. His full retirement begins this summer. He will be sorely missed by all. I hope you enjoy reading about the many past and current faculty, staff and fellow students who you may have encountered during your career at UNCG. The Department would like to hear from you and what paths your life has taken you.

Cheers, Stan Faeth - Head and Professor of Biology

Life Lessions From Biology - Spring Commencement 2013

(continued from Page 1)

be like everyone else's life. This is another lesson I have learned from doing science. Your lives may not be just like those of everyone around you, even though you may have taken courses together or lived down the street from each other. Get used to the idea that your life will indeed be unique, with its own challenges and rewards, just like every good research program is individualistic.

Finally, don't be afraid to follow your heart. Or, in scientific terms, don't be afraid to guess and follow the lead of a good guess. Here's where we come to the biology lesson: I work on the neural regulation of metamorphosis in marine snails, and in the course of my work, my students and I discovered that the gas nitric oxide inhibits metamorphosis. Now this molecule has become pretty famous. It was only discovered to be a brain chemical, that is a neurotransmitter, in about 1988. But we now know that it is ubiquitous throughout the animal kingdom, and is indeed a major neurotransmitter in our own brains. Since my students and I published our results, other researchers have demonstrated that this same gas has similar actions in animals from several other major phyla. Thus, unknowingly, we made a seminal discovery in the field of developmental biology. But in 1996 we didn't know that. We had suspicions about how nitric oxide functioned in our snails, but we had not had time to do all of the experiments we wanted to. That year I bumped into a senior colleague of mine at the annual meeting of the Society for Neuroscience. Dr. Senior Colleague was a distinguished neuroanatomist at a substantial university on the West Coast, and he advised me, in no uncertain terms that I should NOT jump onto the nitric oxide "bandwagon". No, no, he insisted. Don't get involved in this nitric oxide stuff. It's just a flash in the pan. Which is why, 2 years later, 3 guys got the Nobel prize (1998) for discovering the actions of nitric oxide as an important mammalian signaling molecule (Ignarro, Murad, Furchgott). Since then, literally thousands of researchers have been studying the actions of this molecule in a variety of animals, including humans.....Yeah I really should have gotten out of that backwater field when I had the chance..... So that's why I say, don't be afraid of a good hunch. You never know awaits you. That's also why I say, your road may not be the same one travelled by everyone else.

Let me recap my "scientific" advice for you - the advice I cull from years of doing biological research, that I think applies to our lives every day. First -- Don't be afraid of change. Learn to interpret you abilities correctly. Always work to improve communication with people around you. Learn as much as you can about as many different things as you can.

Don't worry if you don't know exactly where you'll be in 30 years. You'll get there eventually. But do plan for retirement. It'll make your parents happy. And if you are going to invest in the stock market, remember, buy low, sell high.

And finally, seek out your own path and don't be afraid to go boldly into the unknown future.

Dr. Esther Leise

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From the Associate Head...

Teeming and Teaming with Undergraduate Biologists

Though we are certainly excited about our graduate programs, especially the new Ph.D. program in Environmental Health Sciences, here I will share with you some information about our undergraduate programs, including the Bachelors of Art and the Bachelors of Science, including concentrations in Biotechnology, Environmental Biology and Human Biology. We also have important roles in the preparation of high school science teachers, supporting the Comprehensive Science licensure, and teaching in the Integrated Sciences program.

More than a thousand UNCG undergraduate students have their primary academic homes in the Department of Biology, making this is a very busy place (crowded, too!). Throughout my 25 years as a member of this faculty, the Department has zealously dedicated itself to providing hands-on experiences and laboratory courses for its undergrads, and this emphasis has produced thousands of degree recipients who understand how science is done, how data are analyzed, and how knowledge grows. The academic rigor in our programs is high. Our graduates are well-informed citizens in their communities because they appreciate this view of life.

You may well wonder why I stated "zealously dedicated" regarding lab experience - - here's why. A total of 2,606 seats/bench spaces were offered in 110 lab sections for undergraduates in the fall 2013 schedule. Instruction and laboratories ranges from professors who teach upper-level biology courses to non-tenure-track faculty who teach mid- and frosh- level laboratory courses, and, of course, our gifted and ambitious graduate students who serve as Teaching Assistants. The 17 non-tenure-track faculty members in the biology department are full-time employees of the University. Most hold the rank of Lecturer but three of them, Ellen Lamb, Robin Maxwell, and Ann Somers hold the title of Senior Lecturer. There are 23 tenure-stream full-time faculty in our Department, as well.

Several of our lab exercises are done in outdoor settings, but the majority of the work is done in the teaching laboratories of the department. These labs don't simply set themselves up! There are five full-time laboratory management and preparatory staff working in our department. Our investment in our students' aptitude to think scientifically and to become scientists is evident in every hallway of the Sullivan Science Building and in the Eberhart life Sciences Building.

Delivering all these lab sections, paying all the faculty, graduate students, and staff, and operating all the varied measurement devices, is expensive, but we strongly believe that our undergraduate students and our scientifically-informed society gain tremendous returns on this investment. At the time when the University's funding is stretched to the point of breaking, we would like you to join us in emphasizing the importance of tangible experience in preparing for life after graduation. Share your stories with us and tell us how your experiences have shaped your progression in your career. Share your stories with anyone who needs to know.

Write, email or text us! John Lepri, jjlepri@uncg.edu

BIOLOGY DONATION OPPORTUNITIES

Make an impact. Support the Biology department by using our online form and your Visa or MasterCard to make a gift.

http://biology.uncg.edu/gifts/

Help UNCG forge new possibilities for students, faculty, programming and research.

What's growing in our Greenhouse?

Orchid, *Phalaenopsis sp.*
Family: Orchidaceae

Orchid, *Phalaenopsis sp.*
Family: Orchidaceae

Orchid, *Cattleya sp.*
Family: Orchidaceae

Dr. Martin Tsz-ki Tsui

Associate Professor, UNCG Biology

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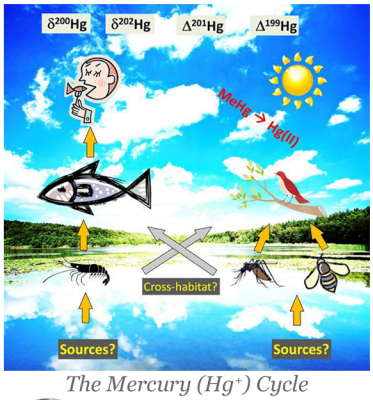
Faculty Spotlight
Dr . Martin Tsz-ki Tsui

Dr. Tsui joined the UNCG Biology faculty in August 2013. He is now developing new courses in Environmental Toxicology and his research program on Ecotoxicology and Biogeochemistry. His current research focuses on mercury, a global pollutant with widespread societal concerns. His lab is located on the third floor of the Sullivan Science Building and is currently under renovation (see image below). His lab will be quipped with facilities to carry out ultra-trace analyses of mercury and methylmercury in a variety of environmental samples, and to also process samples for stable mercury isotope analyses through external collaboration. In addition, Dr. Tsui's research group will work on projects related to toxicological aspects of different chemical pollutants in aquatic and terrestrial organisms.



The Mercury (Hg^+) Cycle

Current projects in his group include: Examination of the coupling of methanogenesis and mercury methylation in stream ecosystems by EHS Ph.D. student Josh Brigham (co-advised with Dr. Anne Hershey, UNCG Biology), elucidation of sources of toxic methylmercury in forest ecosystems, and stable isotope ratios of mercury in vegetation across the North America. Dr. Tsui's group is recruiting students interested in his research at all levels, and a postdoctoral scientist is anticipated to join his group in early 2014.

Dr. Tsui received his Ph.D. from the University of Minnesota and his postdoctoral training from the University of Michigan.

Dr. Tsui's Lab - Renovations Under Way

Dr. Olav Rueppell

Professor, UNCG Biology

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Faculty Spotlight
Dr . Olav Rueppell

Honey Bee, Apis mellifera

As one of the few insects that humans love not loathe, the honey bee is the center of Dr. Olav Rueppell's research program. The honey bee serves the UNCG Social Insect Lab as a scientific model to study fundamental biological problems, such as the genetic basis of complex phenotypes, life history syndromes, meiotic recombination, stress, and aging. Evolution has resulted in a complex social organization in honey bees that makes them an excellent model to study these subjects. For example, honey bees exhibit the highest genomic recombination rate of all animals, which provides the rationale for multiple current projects. Honey bees also display an incredible variability in aging rates and another current project aims at identifying behavioral and molecular correlates of alternative aging trajectories of individuals in a social environment.

Honey bees are also studied by Dr. Rueppell and his students in their own right to help sustainable beekeeping. Honey bees are the most important commercial pollinator and their health continues to decline, as seen during recent years. Among the potential culprits are bee diseases, pesticides, and stress. The causation of honey bee health decline is most likely complicated. Therefore, the triangle between the honey bees, parasitic mites, and multiple viruses that are vectored by these mite presents an applied research focus in the Rueppell lab. Overall, fundamental and applied science are coming together in this research to offer many UNCG students various research experiences that span mathematical modeling, bioinformatics, molecular biology, genomics, behavioral and mortality analyses, and sociobiology.

Dr. Rueppell received his Ph.D. from the University of Wuerzburg and was promoted to Professor this fall semester (Fall 2013).

Featured Alumni

David Gifondorwa, Ph.D.

After completing his BS in Biology at UNCG in 1998, David returned to UNCG to pursue his master's degree in Biology under the direction of UNCG Biology Professor, Dr. Esther Leise. His master's thesis was titled "Programmed Cell Death during the Metamorphosis of *Ilyanassa obsoleta*." After his master's degree, David pursued his doctoral degree in the Program in Neuroscience at the Wake Forest University School of Medicine. His dissertation research was focused on a mouse model for Lou Gehrig's Disease. While a postdoctoral research fellow in the Department of Neurobiology and Anatomy at Wake Forest University School of Medicine, David worked as a lecturer for our Biology Department teaching cell biology and introductory biology lab. Currently, David is a Research Scientist at Eli Lilly and Company in Indianapolis, Indiana. He is pursuing research in muscle atrophy to identify novel targets relevant to human diseases, and performing research to explore the integration of muscle, bone, and/or cartilage molecular pathways as they relate to mobility impairments.

Maureen Maurer, M.P.H.

Maureen graduated from UNCG in 1997 with a B.S. in Biology. After graduation, she spent six months working as a laboratory technician studying *Neisseria gonorrhea*, but soon thereafter joined the U.S. Peace Corps in Mali, West Africa. From 1998 to 2000, Maureen lived in a small town called Manantali, where she learned French and Bambara, the local language. Working in collaboration with primary school teachers, Maureen developed an environmental education curriculum in French and Bambara and coordinated two Earth Day events involving more than 400 students. She also delivered weekly radio programs on environmental and health issues, in Bambara, reaching a 45-mile radius. In 2001, Maureen pursued her Master of Public Health (M.P.H.) from the University of North Carolina at Chapel Hill in the Department of Health Behavior and Health Education. As part of her graduate work, Maureen conducted a needs assessment of female refugees in Raleigh, Durham and Chapel Hill, identifying physical and mental health concerns as well as need for continued follow-up. In 2003, Maureen joined the Chapel Hill office of the American Institutes for Research (AIR), a not-for-profit behavioral and social science research organization, where she has remained for 10 years. As a Senior Researcher in AIR's Health Policy and Research group, Maureen currently leads large research projects and tasks related to engaging patients and consumers in health care, health policy, and research; explaining medical evidence to consumers and clinicians; and eliminating health disparities. She is a highly experienced qualitative researcher, responsible for designing research studies and program evaluations, conducting interviews and focus groups, and analyzing the results of large-scale qualitative research. Maureen treasures her time at UNCG. Her course work, professional opportunities, and interactions with students and professors ignited her passions in health care, social justice, research, and international travel. She is especially thankful for Rob Cannon's mentorship and support.

UNCG Biology Faculty Publications

The publications authored by the faculty in the UNCG Biology Department range in topics from molecular biology to ecology and everything in between.

The biology website keeps a comprehensive list of the current and past publications published by faculty.

web: http://biology.uncg.edu/publications.html

Did you know?

The UNCG Biology Department graduated 50 undergraduate students and 6 graduate students in the Spring of 2013.

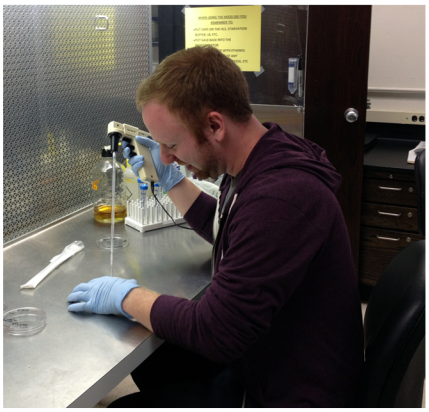
There are currently 1,055 undergraduate Biology majors.

Three of our undergraduate research assistants have obtained over $750 in research grants from the University to complete their research.

14 new graduate students were accepted this fall into the Biology Department to pursue Master and Ph.D. degrees.

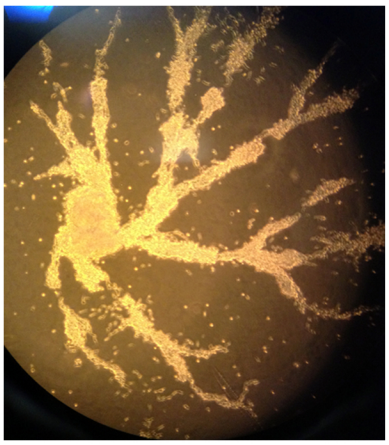
UNCG Biology Faculty members received over $2 million dollars in grant funds for departmental research in the 2013 fiscal year!

Who's Who Amongst Our Undergradute Students, Jonah Nikouyeh



Jonah passing his Dictyostelium cultures

Jonah Nikouyeh is a senior UNCG Biology major with a busy schedule. He's finishing up his final semester here at UNCG, doing research in UNCG Biology Associate Professor Dr. Paul Steimle's lab, and also tutors all levels of chemistry in the Learning Assistance Center on campus. Jonah came to UNCG from East Davidson High School, in Thomasville, NC in 2009 and he will graduate this December, 2013 with a B.S. in Biology with a concentration in Biotechnology. While here at UNCG, Jonah has maintained a high grade point average, been on the Dean's and Chancellor's list every semester and is a member of Beta Beta Beta, the Biology Honors Society. His undergraduate research has focused on diacylglycerol kinase, an enzyme that has upstream activity from myosin heavy-chain kinases. He has found that diacylglycerol plays an important role in cellular movement in *Dictyostelium discoideum*, a social amoeba that is used in Dr. Steimle's lab to study specific directed cellular movement. Jonah has presented posters at UNCG's Undergraduate Research Symposium, the North Carolina Academy of Science Annual Meetings and the Annual International Dictyostelium Conference, in Asheville, NC this August. Upon graduation, Jonah plans on attending the Joint School of Nanoscience and Nanoengineering, a joint venture between UNCG and NC A&T, to complete a Master's degree in Nanobiology with Dr. Chris Kepley, an opportunity he was able to explore in the Summer of 2013 because he was selected to be the Semiconductor Research Corporation Intern for the JSNN, a project funded by the Intel corporation. Jonah cites the availability of undergraduate research opportunities and the close relationships students develop with their faculty mentors in the UNCG Biology Department as a reason for his success: "The opportunity to do undergraduate research in the Biology Department at UNCG helped me to develop the critical-thinking and problem solving skills necessary for success in the science community." Eventually Jonah hopes to use the knowledge and research experience he has gained at UNCG to enhance his candidacy for medical school.



When starved, Dictyostelium cells emit a chemical signal that others follow to the founder cell of the colony, forming the streams seen above.

Want to receive this Newsletter? Have any noteworthy information to share? Fill out the form below and return to the Biology Department or visit the Symbiosis website: biology.uncg.edu/newsletter/

Name: _____
First Middle Last Maiden

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Class of:_____, Undergrad__ or Grad__ Advisor:_____

Present Occupation_____ Firm, Institution, etc_____

Feel free to attach a sheet with more detailed information or send an email to the department at bio@uncg.edu

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Our Graduate Students are Doing Great Things!

These are the successful Thesis Defenses from our Master's students this summer:

Andrew Jennings - The Effects of Preformed Scour Holes on Anuran Biodiversity in the north central Piedmont Region.

Kristy King - Landscape-scale Effects of Intercropping Switchgrass (*Panicum virgatum L.*) and Loblolly Pine (*Pinus taeda*) on Rodent Community Structure and Population.

Christopher Hylton - Effects of dtopors on Soma and Germline Aging in Male Drosophila.

Himani Vaidya - Role of DNA methylation in WNT5A Promoter B expression in Osteosarcoma cells.

Halley Shah - Protection of HepG2 cells from acrolein toxicity by CDDO-Im via glutathione-mediated mechanism.

Both Christopher Hylton and Halley Shah have decided to enroll in our Environmental Health Sciences Ph.D. Program.

And these students advanced to Ph.D. candidacy in our Environmental Health Sciences Ph.D. program with these Dissertation Proposals:

Kaira Wagoner - Behavioral and Molecular Studies to Enhance Varroa-Specific Hygienic Behavior of Honeybees (*Apis mellifera*).

Kirsten Trowbridge - Chronic triclosan exposure in wastewater-associated periphyton communities: mitigation, community effects, and antimicrobial-resistance.

Matt Marshall - The genetics of thermally sensitive phenotypic plasticity in *Plantago lanceolata*.