

Greetings from the department

This past year certainly will have a long lasting impact on the future of this Department. First, we continued to hire new faculty because of our burgeoning undergraduate program. As our undergraduate program continues to expand, more faculty are required to give these students more opportunities for individualized research



opportunities, along with more and smaller advanced classes. Greg Lang, just joined us in September. He is an evolutionary microbiologist. Next September we will be joined by both Michael Layden, a molecular/cellular developmental biologist and Krystle MacLaughlin. Krystle is a molecular biologist who will continue the evolution of our teaching program by bringing more inquiry-based education further down into our large introductory courses. Finally, perhaps in recognizing that so many of our students are interested in health-related fields and much of the research is funded by the National Institutes of Health, we are being asked to fill the University's Endowed Faculty Chair in Health Sciences. It's been a busy year.

If you haven't returned to the Department recently, I suggest a good time is when our undergraduates present "posters" of their research. This year it will be April 10. You might find that things have changed, lots of new faces, but the basics have not. The department remains friendly and extremely committed to undergraduate and graduate education. As I get older the undergraduates seem to be getting younger but they are still highly intelligent, creative, and ambitious. Also, they are often very good listeners and would be delighted to hear how your life was shaped by your Lehigh years. I believe you can make an important contribution to our program and so I hope you will visit.

Murray Itzkowitz, Ph.D.
Professor and Chair

Support awarded from Langer-Simon Endowed Fund for bioscience research

Robert & Laura Langer established the Langer-Simon Endowed Fund for Bioscience Research through a generous gift in 2012. The purpose is to support research experiences for undergraduate students in the biological sciences. The fund will support student research projects with an emphasis on lab activities that integrate multiple disciplines and perspectives.

In Fall, 2013, The Department of Biological Sciences held the first competition for support from the Langer-Simon Endowed Fund for Bioscience Research. Student applicants submitted their credentials, research plans, and recommendations from faculty. Finalists were selected by a faculty committee and interviews were conducted. We are pleased to announce the first Langer-Simon Scholars:

Joanna Warren ('15), is working with Dr. Amber Rice and Dr. Julie Miwa to investigate the evolutionary history of a gene, *lynx1*, that underlies learning potential. Her study involves sequencing and analyzing DNA from different species of birds that vary in their ability to learn song. The findings will help determine whether natural selection has acted on *lynx1* in birds that have the capability to learn songs throughout their entire lives. More broadly, the results are relevant for understanding sources of variation in learning potential in humans. Joanna will receive \$3,250 to support her research.

Francisca Onyiuke ('15), a behavioral neuroscience major, was awarded \$750 to attend the 11th International Conference on Zebrafish Development and Genetics in Madison, Wisconsin in June. She is working with Dr. Kathy Iovine on a zebrafish model that explores cellular mechanisms that regulate bone growth. Her study evolved from a project that linked developmental biology, biophysics, and bioengineering that was conducted by Dr. Iovine and Dr. Bryan Berger, a chemical engineer. Francisca is using both isolated cells and regenerating fins, focusing on interactions between a key signaling molecule, *Sema3d*, and its possible target receptor, *Nrp2a*.



(Langer-Simon 2013-2014 recipients (l-r):
Francisca Onyiuke, Joanna Warren, Aislinn Rowann)

Aislinn Rowan ('14) is a biology major working with Dr. Linda Lowe-Krentz to define changes in blood vessel cells that may lead to vascular disease, one of the most serious health problems in the United States. Aislinn is exploring whether these endothelial cells, which line blood vessels, show a response to inflammation comparable to that seen in well characterized non-vascular cells. The study was developed in part through a collaboration between Dr. Lowe-Krentz, a biochemist, and Dr. Yaling Liu, a mechanical engineer. Aislinn's experiments focus on three markers of inflammation. The results she has obtained to date have led to an invitation to present her research at the American Society for Biochemistry and Molecular Biology. Aislinn will give a talk and also present a poster at the meeting. She received a \$1,000 award to fund her travel and meeting expenses.

Department welcomes newest faculty member

The department is pleased to introduce Gregory Lang, Ph.D. as assistant professor.



Gregory Lang, Ph.D.

The department of biological sciences welcomed its newest faculty member, Gregory Lang, Ph.D. in August, 2013. Dr. Lang's research focus is microbial evolution. He was awarded a B.S. in Molecular Biology from Millersville University of Pennsylvania and went on to earn his doctoral degree from Harvard University. Prior to his arrival at Lehigh, Lang spent six years as a post-doctoral fellow in David Botstein's laboratory at Princeton University. Dr. Lang's research is aimed at understanding the molecular basis of evolution. Greg notes, "Yeast species in the 'model genus' *Saccharomyces* possess a unique set of features that make them an ideal system for studying evolution in the laboratory. Yeast is a well-characterized eukaryote microorganism with a short doubling time. *Saccharomyces* yeasts can be propagated either sexually or asexually and either as haploids or diploids. In addition, populations can be frozen creating a 'frozen fossil record' of adaptive evolution. These tools allow us to watch evolution in real time as well as to analyze the historical events that led to the modern yeast species." The Lang laboratory is using yeast to address fundamental questions in microbial evolution: (1) How does selection shape the genome? (2) How does the structure of the genome constrain evolution? (3) Are evolutionary outcomes reproducible? (4) What role do chance and determinism play in evolution?"

Graduate Student Spotlight

Stefan N. Oline is a Neuroscience Ph.D. Candidate in the Integrative Biology program

Stefan came to Lehigh after earning a Bachelor of Science in Psychology at the University of Delaware. While there, Stefan worked as an undergraduate researcher, investigating platforms to interface electrical devices with peripheral nerves. This exposure to the boundary between mind and environment fuelled an interest in sensory processing. Specifically, he was interested in how external stimuli are represented and interpreted by the brain. In the summer of 2009, Stefan entered Lehigh's doctoral program, and joined the auditory neuroscience lab of Dr. Michael Burger to investigate these questions.

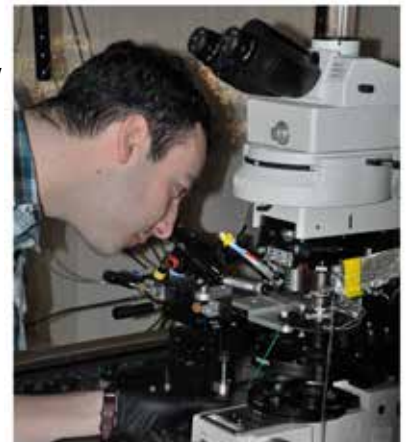
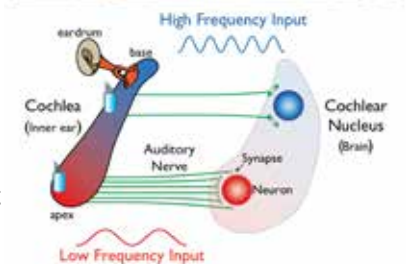
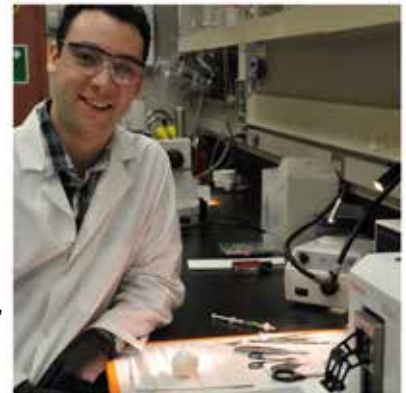
The Burger lab studies how neurons function in the hearing circuit. In addition to its clinical relevance, auditory circuitry is a powerful system for studying sensory processing because the signal (sound) is well defined, with distinct physical properties. More specifically, the Burger lab is interested in how computation in auditory circuitry imparts on listeners the ability to localize sounds in a three-dimensional environment. For instance, in order to locate a sound source on the horizontal plane, the brain compares the arrival time of sound between the two ears. Neurons in auditory circuitry have special adaptations that allow them perform this task with microsecond precision. Stefan's work, within this broader framework, focuses on how neurons that receive auditory nerve input are able to selectively filter out noise, while allowing auditory signals to pass to higher brain centers.

Sound localization requires that timing information be maintained in the first few synapses of the brain. In the ear, sound information is acquired differentially along the cochlea. High frequency sounds are represented near the eardrum, while low frequency sounds are represented near the apex (see figure). This is complicated by a vast range of audible frequencies, which spans more than three orders of magnitude. Neurons that process information on low frequency sounds (red) must therefore use different computational strategies than those processing higher frequencies (blue). Additionally, physiological constraints such as maximum neuron firing rate, number of synaptic input fibers, and neurotransmitter availability limit the range within which neurons may faithfully represent a sound. Nevertheless, the remarkably complex task of sound localization is achieved by insects, birds, reptiles, and mammals, each with different strategies.

Stefan's dissertation work has focused on synaptic auditory nerve inputs to cochlear nucleus neurons. His recent publication investigated short-term synaptic plasticity of auditory nerve synapses, or how the strength of an auditory nerve synapse onto a cochlear nucleus neuron changes in response to recent activity. He showed that synaptic plasticity of these synapses is distributed along the frequency axis. Surprisingly, auditory nerve synapses to high frequency neurons are much more robust than their low frequency counterparts. He then demonstrated that this distribution in synaptic plasticity is primarily due to a lack of neurotransmitter availability at low frequency inputs. Currently, he is investigating the subsequent effects of this differential plasticity on postsynaptic signal processing. Understanding the range of computational strategies used in this elegant circuit may allow for a more comprehensive and fundamental understanding of synaptic processing for all neurons that receive a more complex complement of inputs.

Aside from his dissertation work, Stefan served for two years as President of the Biology Organization of Graduate Students. Outside of the office, he participates in public outreach programs, such as Science Night at his niece's elementary school, and as a STEM career panelist at a local high school where his fiancée, Amanda, teaches English and Journalism. He also enjoys observational astronomy, and coaches the department's softball team, The Biohazards.

Stefan's most recent work was recently published in *The Journal of Neuroscience*.



Our Research

by Jill Schneider, Ph.D.

Most people these days are struggling to control their weight gain, but if you are a woman, you might notice that you go through regular, repeated periods when your appetite seems virtually uncontrollable. Women are more prone to obesity and binge eating than men, and their binges are more likely during a certain phase of the menstrual cycle. These differences are in part related to changes in hormone secretion from the reproductive organs, the ovaries. The ovaries secrete steroid hormones, such as estradiol and progesterone. Menstrual cycle changes in estradiol and progesterone secretion alter the steroid environment in the brain, so that when hunger strikes we might feel either "just peckish" at one stage of the cycle or ravenously hungry at another phase. After menopause, when estradiol levels fall, it might be next to impossible to lose weight. How does this work? My laboratory group just received a four-year research grant from the National Science Foundation to study how these ovarian hormones control appetite.

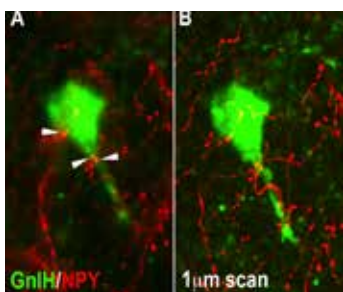
One clue is that estradiol has the opposite effect on sexual desire. In the middle of the menstrual cycle, when estradiol levels are highest, the appetite for food falls to its lowest level. This is the time when females are most fertile and sexual desire is at its peak. As women approach menstruation, the appetite for food rises while sexual desire tends to fall. Similarly, after menopause, as the ovarian hormones wane so does sexual urgency (to different degrees, depending on the individual).

Given these clues, I suspected that there is a brain hormone that might increase the appetite for food, decrease the desire for sex, and have different effects depending on the levels of estradiol and progesterone secreted from the ovary.

It's virtually impossible to study human food intake and sexual behavior because people lie about how much and what they eat. Don't even get me started on measuring their sexual activity. I like to study Syrian hamsters because I am in control of what they eat, and they ovulate like clockwork every 4 days, unlike women who ovulate every 24-32 days. Plus, hamsters have a great way to demonstrate their hunger. After a period of dieting (say, we feed them only 75% of their normal daily food intake for a week), they increase their food hoarding. They carry food in their cheek pouches from a distant source and hide it in their home cage. We can measure both sexual desire and hunger for food quite easily and accurately.



One brain hormone we are studying is GnIH (gonadotropin inhibiting hormone). The figure to the right shows a hamster brain cell (neuron) that produces GnIH (a neuropeptide), which is stained green. I got interested in GnIH when my colleague, Lance Kriegsfeld at the University of California at Berkeley, showed that GnIH inhibits reproduction in Syrian hamsters. Thus, I approached Lance about studying the effects of GnIH on the appetites for food and sex.



Together, our graduate students Candice Klingerman (Lehigh) and Wilbur Williams (UC-Berkeley) found that hamsters limited to 75% of their normal food intake showed very high levels of sexual motivation and very low levels of food hoarding, but only at the time of ovulation. As predicted, the activity of GnIH cells was quite low at this time. When

Sex & Food

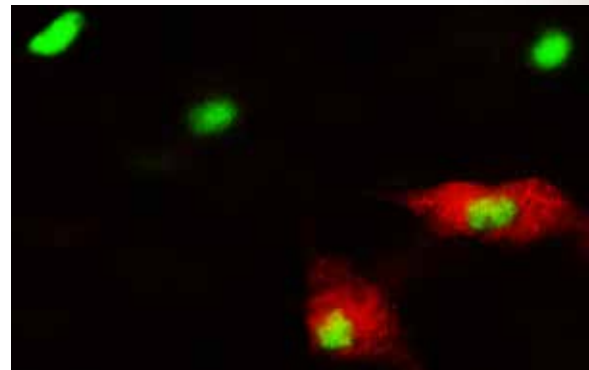


Jill Schneider, Ph.D.
Professor

females were at the nonfertile periods of the cycle, food restriction induced very high levels of food hoarding with no interest in sex, and this high interest in food vs. sex was associated with increased activation of GnIH cells. What some people might find surprising is that in females fed as much food as they wanted, sexual motivation was high and food hoarding was low over the entire ovulatory cycle!

When Noah Benton (Lehigh) and David Piekarski (UC-Berkeley) administered GnIH to the brains of well fed females, the hamsters acted like they were starving. Their sexual appetites were lowered and their hunger for food was increased by GnIH treatment in the brain.

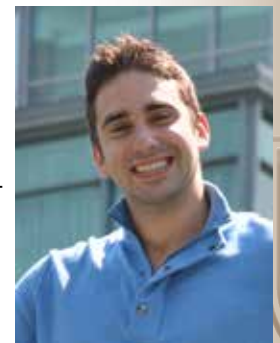
My student, Noah Benton, is finding that in food-restricted females, the activity of GnIH is elevated only during the nonfertile periods of the female cycle. In the figure below, GnIH cells are shown in red, and the activation of those cells is indicated by the central dot stained green for Fos, a protein that shows up in cells that have been activation. GnIH



activation is elevated in the nonfertile period, but is not elevated by food restriction at the time of ovulation, when females are fertile, sexually aroused, not interested in food, and ready to optimize their chances of getting pregnant and contributing their genes to the next generation.

GnIH activity is usually elevated in food restricted females, except at ovulation. We think the effects of GnIH are dampened by one of the hormones that is high around the time of ovulation. Noah Benton's dissertation work will determine which ovarian steroid hormones and receptor are important for these effects.

Many obesity researchers think that appetite suppressing hormones are suppose to function to preserve our youthful figures and keep our body weights in fashionable and healthy limits. The work of my students shows that an unsuspected function of these hormones is to orchestrate the appetites for food and sex so as to maximize reproductive success. These effects are short-lived and change rapidly in the small window of fertility. It is probably unrealistic to expect one of these neuropeptides to be a long-term or permanent cure of obesity. Our work demonstrates that basic information about hormones and the brain is critical for the application of data to clinical problems.



Noah Benton
Ph.D. Candidate

Every year the department of biological sciences sees many prospective students and their families walking the halls, meeting with faculty, and learning about what makes Lehigh University different from other quality research institutions. Thirteen years ago one such student came to campus so she could learn more about our department. This student saw that the research opportunities available for undergraduates in the department are unique and decided to call Lehigh home for the next four years. She would go on to become a Goldwater Scholar ('04), graduate with highest honors with a degree in molecular biology ('05), move on to Yale University to earn her doctoral degree in genetics ('11). She would then become a postdoctoral researcher at the National Institutes of Health.

You would have every reason to ask, just how did

Katherine Donigan

find herself in the halls of the United States Senate working in the office of Senator Elizabeth Warren? Dr. Donigan graciously agreed to answer this, and other questions.



WHY DID YOU ATTEND LEHIGH UNIVERSITY?

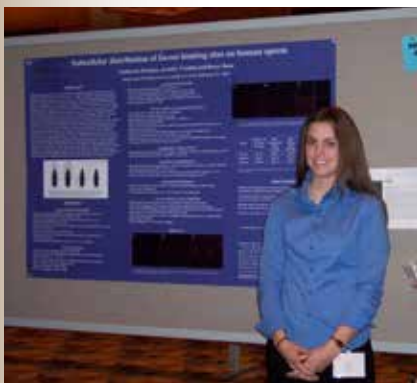
I chose to attend Lehigh specifically because of the emphasis that Lehigh places on the undergraduate research experience. When I visited Lehigh in 2001 as a prospective biology major, I was given a tour of the labs at Mountaintop Campus by Dr. Lowe-Krentz and met with several faculty members, all of whom emphasized Lehigh's commitment to providing undergraduates with the ability to pursue an independent research project with a faculty mentor. After visiting several other top tier research universities, it became clear that the research opportunities available for undergrads at Lehigh were unique and would well-position me to apply to graduate school.

HOW DID BEING A GOLDWATER SCHOLAR IMPACT YOUR TIME AT LEHIGH?

The Goldwater Scholarship application was one of my first experiences with developing a scientific proposal. I learned a great deal during that process, including how to read and analyze primary literature and how to draft a hypothesis-driven research proposal. These skills were really valuable as I continued my undergraduate research work and drafted my final thesis, and continued to be used in graduate school, particularly when I was preparing for my qualifying exams.

HOW DID RESEARCH PLAY A ROLE IN YOUR TIME AT LEHIGH?

I started working in Dr. Bean's lab the summer after my freshman year, studying the subcellular localization of a human sperm transmembrane protein, alpha-L-fucosidase. This enzyme is thought to play a role in sperm-egg interactions during fertilization. Using a fluorescently labeled substrate and confocal microscopy, I was able to localize the enzyme to different regions of the cell, and show that the enzyme's location changed depending on the cell's physiological state. The dynamic nature of alpha-L-fucosidase suggests that it has a specific function during fertilization.



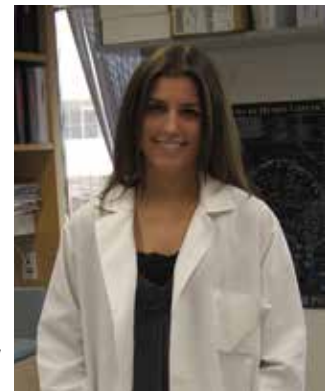
Kate Donigan ('05) presenting her research at the American Society of Andrology meeting

I worked in Dr. Bean's lab through graduation, and the summer before graduate school. Being able to work on an independent research project continuously for over two years allowed me to really develop the project and generate meaningful results. With Dr. Bean's support, I was able to present my work at the annual meeting of the American Society of Andrology, which was a fantastic experience to have as an undergraduate. I was also able to collaborate with Dr. Bean's graduate student, Jennifer Venditti, and serve as a contributing author on one of her publications.

DESCRIBE YOUR RESEARCH WHILE AT YALE UNIVERSITY.

I was in the genetics department working for my adviser, Dr. Joann Sweasy. My graduate work focused on base excision repair, one of several DNA repair mechanisms that fix around 10,000 damaged DNA bases in each cell every day. If left unresolved, these damaged bases can lead to DNA mutations, and ultimately, cancer.

I studied DNA polymerase beta, the primary enzyme that puts the correct base back into DNA after the damaged base has been removed. I sequenced POLB, the gene coding for DNA polymerase beta in a large collection of human tumors and identified variants present in tumors but not in normal tissue. I then evaluated the biochemical and cellular properties of these variant enzymes and determined that many of them had altered behavior that led to increased mutations and cellular transformation, two hallmarks of cancer. Cells expressing these variants also showed increased sensitivity to specific chemotherapeutic agents, compared to the wild-type enzyme.



Katherine Donigan in her lab at Yale University

These results suggest that variant forms of DNA polymerase beta may drive cancer progression, and that chemotherapeutic regimens could be optimized based on which variant is expressed in a patient's tumor. Since the variant enzymes are only expressed in the tumor cells, the drugs would kill tumor cells with less side effects on the normal cells in the patient's body.

WHAT KIND OF RESEARCH DID YOU DO AT THE NATIONAL INSTITUTES OF HEALTH?

I trained as a postdoctoral fellow for two years with Dr. Roger Woodgate in the Laboratory of Genomic Integrity at the National Institute of Child Health and Human Development (NICHD). The NIH intramural research program is a wonderful place to do a postdoctoral fellowship - it provides top-notch scientific training, opportunities to do a detail in other offices (including policy offices), as well as career counseling, with equal emphasis on academic and non-academic jobs. I was able to engage with my policy interests at NIH by joining a science policy discussion group and writing for the group's blog (sciencepolicyforall.wordpress.com).

As a postdoc, I was able to build upon my graduate work by studying mechanisms of DNA damage tolerance, specifically the ways that cells can continue to replicate their DNA through damaged regions. I focused on two specialized, error-prone DNA polymerases (iota and eta) that are capable of bypassing damaged DNA. Using biochemical techniques, I evaluated the ability of these polymerases to incorporate ribonucleotides (NTPs) instead of (continued....)

deoxyribonucleotides (dNTPs) during DNA synthesis. I determined that DNA polymerase ϵ is capable of incorporating NTPs when copying both damaged and undamaged DNA. Incorporation of NTPs in DNA generates strand breaks, which results in genomic instability that may lead to cancer. I further investigated the structural basis for NTP incorporation by selectively mutating specific enzyme residues near the active site and identified the single amino acid that acts as a steric gate to limit NTP incorporation.

HOW DID A SCIENTIST END UP WORKING ON CAPITOL HILL?

In 2013, I was fortunate to have been selected as the 12th Genetics & Public Policy fellow. This fellowship is co-sponsored by the American Society of Human Genetics (ASHG) and NIH's National Human Genome Research Institute (NHGRI). The fellowship is designed for early-career genetics professionals who are interested transitioning to a policy career focused on genetics health and research policies at the national level. I spent the first five months of my fellowship working in the policy office at NHGRI, where I drafted policy briefs and attended Congressional hearings on issues related to genetics and genomic medicine. I began the second part of my fellowship in January 2014 as a Congressional health fellow in Senator Elizabeth Warren's office. As a Congressional fellow, I work with Senator Warren's health policy team on a wide variety of legislative issues, including healthcare and biomedical research. This fall, I will conclude my fellowship by working at ASHG to gain experience in the area of non-profit science advocacy.

HOW HAS WORKING ON CAPITOL HILL IMPACTED YOUR LIFE?

The fellowship has provided me with a way to bridge my experience as a bench scientist with my longstanding interest in policy, and my research background has really helped me during my fellowship. Scientists are trained to review and analyze data with a critical eye, skills that are important for working in policy. It's been exciting to interact with people who share my passion for supporting scientific and biomedical research, and the experience has reinforced my interest in a policy career. After my fellowship concludes this year, I hope to continue my career in science and health policy, either within the federal government or in the non-profit advocacy sector.

CAN YOU SHARE THE IMPACT UNDERGRADUATE RESEARCH HAD ON YOUR EDUCATION WHILE AT LEHIGH, AND HOW IT PREPARED YOU FOR YOUR TIME AT YALE, AND NOW IN YOUR CAREER?

Lehigh's advanced undergraduate courses and labs in molecular biology, biophysics and biochemistry provided a solid foundation that prepared me very well for my graduate courses. As an undergraduate, I was able to take what I was learning in my coursework and apply it to what I was doing in the lab. My undergraduate research experience helped to solidify my passion for science

and gave me the skills and the confidence that helped me succeed in graduate school. Getting early exposure to primary literature, writing research proposals, and presenting data at a national meeting provided ideal preparation for entering graduate school. The analytical skills developed during my scientific training are incredibly useful in my current position when I am analyzing data related to an issue that will provide background and inform policy recommendations.

WHAT ADVICE YOU CAN GIVE TO TODAY'S GENERATION OF LEHIGH STUDENTS?

I would advise students to make sure they are taking full advantage of all the opportunities that Lehigh offers. In addition to conducting independent research and attending a conference, I was able to get introductory teaching experience leading study sessions for organic chemistry. By having diverse experiences, you will learn more about what you like and what you don't like (which is just as important!)

I would also advise today's Lehigh students to think about what it is that they like to spend their free time reading and talking about, what really excites them. When considering your future career, try to find a way to merge your academic interests with your personal ones. There are lots of ways to be involved with science outside of the lab, and if the lab is what you love then go for it!

I think the most important piece of advice I could give is to recognize the importance of having a great mentor who provides meaningful support and a balance between guidance and independence.

IN THE SPRING OF 2013 WE WERE HONORED THAT YOU ATTENDED THE DEPARTMENT'S UNDERGRADUATE RESEARCH SYMPOSIUM AND SPOKE WITH STUDENTS ABOUT YOUR CAREER PATH. HOW DID IT FEEL COMING BACK?

Returning to Mountaintop campus was wonderful, and even though it had been 8 years since I graduated, it felt like I'd never left. It was great to see that there are still so many students involved in research, and I was really impressed by the level of work they were doing and by how it was presented. I was happy to discuss the impact that Lehigh had on my graduate and postdoc experiences. I also wanted to let the students know that there are many different career paths available to them, and that the training they were getting in biology at Lehigh would leave them well prepared for whatever path they chose. It was also great to reconnect with many of my former professors, to update them on my current work and to credit my undergraduate experience for launching my career in science.

Any interested alumni with advanced degrees in genetics or a related field (which includes genetic counseling or molecular biology) can obtain more information about the Genetics & Public Policy fellow at <http://www.genome.gov/10003979>. This year's application is open through April 25, 2014.



Katherine Donigan, Class of '05

A tribute to a mentor and teacher

by Katherine Donigan, '05

When I arrived at Lehigh as a freshman in 2002, I was fairly certain of two things - I wanted to major in biology and I wanted to do independent research. At the end of my freshman year, I started contacting faculty members in the Biology department to discuss opportunities for undergraduate research in their labs. Barry was the first to respond and was very enthusiastic about the possibility of working in his lab. When we met a few days later, we talked about his lab's research interests and potential projects I could work on. Barry had a knack for describing complicated concepts in a way that conveyed his confidence that I could understand them, regardless of the fact that I was a freshman with no formal lab experience. He said I could start in the lab the very next semester and I accepted the position immediately.

Over the summer, Barry sent me numerous reviews and research articles to get me up to speed on the field of andrology. Initially, I wasn't sure that I was quite up to the challenge of reading primary literature, but Barry encouraged me to press on and was happy to answer any question I had, no matter how basic or simple. After I started working in the lab, he would meet with me weekly to discuss my results and the literature I had been reading. He always made me feel comfortable asking questions and proposing my own ideas, and encouraged me to present my work at a national meeting. The thought of presenting to experts in the field was intimidating at first, but Barry guided me in preparing the abstract and the poster and assured me that it would be an invaluable experience. He was right, of course - presenting data at a national meeting was one of the highlights of my Lehigh education.

Looking back, it is clear that as a mentor, Barry knew how to strike the right balance between providing guidance and enabling independence. His expectations were always high, but I knew it was only because he was confident I could meet them. He provided support with both kindness and a sense of humor, and encouraged me to extend myself beyond what I thought was possible. I can only hope that future Lehigh students will be as fortunate as I was to have had such an exceptional mentor so early in my education.



Barry Bean, Ph.D.
Nov. 2, 1942 - June 25, 2012

2013 Publications

Faculty publications

Behe, M.J. 2013. Getting There First: An Evolutionary Rate Advantage for Adaptive Loss-of-Function Mutations. *Biological Information: New Perspectives*, edited by R. J. Marks II, M. J. Behe, W. A. Dembski, and B. L. Gordon. World Scientific Publishing, Hong Kong, 450-473.

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Fong, J.T., Kells, R.M., Falk, M.M. 2013. Two tyrosine-based sorting signals in the Cx43 C-terminus cooperate to mediate gap junction endocytosis. *Mol. Biol. Cell* 24:2834-2848.

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Ton, Q. and Iovine, M.K., 2013. Determining how defects in Connexin43 cause skeletal disease. *genesis*. doi:10.1002/dvg.22349.

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Lang GI, Rice DP, Hickman MJ, Sodergren E, Weinstock GM, De-sai MM, and Botstein D. 2013. The dynamics of genomic sequence evolution in experimental populations of *Saccharomyces cerevisiae*. *Nature.* Aug 29;500(7464):571-4. Epub 2013 Jul 21.

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Kearse, Ware, et al cover image. *Nucleus*



Ton, Iovine cover image. *genesis*



Nimlamool, Bean, Lowe-Krentz cover image. *Molecular Reproduction and Development*

Rice, A. M., Vallin, N., Kulma, K., Amtsen, H., Husby, A., Tobler, M., and Qvarnström, A. 2013. Optimizing the trade-off between offspring number and quality in unpredictable environments: Testing the role of differential androgen transfer to collared flycatcher eggs. *Hormones and Behavior* 63: 813-822.

Royce J. Lee, Emil F. Coccaro, Henk Cremers, Rosemary McCarron, Shi-Fang Lu, Michael J. Brownstein and **Neal G. Simon.** A novel V1a receptor antagonist blocks vasopressin-induced changes in the CNS response to emotional stimuli: an fMRI study. *Front. Syst. Neurosci.*, 12 December 2013 | doi: 10.3389/fnsys.2013.00100.

Schneider, J.E., Wise, J.D., Benton, N.A., Brozek, J.M., Keen-Rhinhardt, E. 2013. When do we eat? Ingestive behavior, survival, and reproductive success. *Hormones and Behavior* 64 (2013) 702-728.

Rudra, S., and Skibbens, R. V. (2013). Chl1 DNA helicase regulates Scc2 deposition specifically during DNA replication in *Saccharomyces cerevisiae*. *PLoS One* 8(9): e 75435.

Kearse M, Ireland J, Prem S, Chen A, Ware V. 2013. Rpl22e, but not Rpl22e-like-PA, is SUMOylated and localizes to the nucleoplasm of *Drosophila* meiotic spermatocytes. *Nucleus* 4: 241-258; <http://dx.doi.org/10.4161/nucl.25261>.

Class publications

Graham F. Hatfull, Science Education Alliance Phage Hunters Advancing Genomics and Evolutionary Science (SEA-PHAGES) program2, KwaZulu-Natal Research Institute for Tuberculosis and HIV (K-RITH) Mycobacterial Genetics Course1,3,4, University of California Los Angeles Research Immersion Laboratory in Virology5, Phage Hunters Integrating Research and Education (PHIRE) program1 . 2013. The complete genome sequences of 63 mycobacteriophages. *Genome Announc.* November/December 2013 vol. 1 no. 6 e00847-13; doi: 10.1128/genomeA.00847-13.

Vassie Ware and Lehigh students are a part of the SEA-PHAGES program and contributed 2 phage genomes [Butters, Wanda] to this announcement.)

Skibbens, R. V., Colquhoun, J. M., Green, M. J., Molnar, C. A., Sin, D. N., Sullivan, B. J., and Tanzosh, E. E. (2013). Cohesinopathies of a feather flock together. *PLoS Genet* 9(12): e1004036.

This publication was the result of work done by students in BioS 396/496 (Advanced Topics in Cell Cycle and Division), led by Professor Skibbens.

Alumni Updates

John Dobrota (BA, Bio, 1961), now retired, earned his medical degree from Hahnemann Medical College in 1965 and went on to practice gastroenterology for 40 years at Grand View Hospital in Sellersville, PA. He is now retired. "Thank you LU Dept. of Biology. Pre-med courses had me very well prepared for medical school." While a student at Lehigh, John tutored other freshmen in Histology. "I appreciate all that LEHIGH did to prepare me for med school."

Mike Kostelnik (BA, Bio, 1961) "After med school at Hopkins and five years of training in internal medicine (Pitt) and Gastroenterology (Tufts), I retired from 40 years of practice in Roxbury, NJ. I maintain season tickets from football and wrestling, and recently attended the 36th NCAA wrestling tournament."

Robert Varnum (BA, Bio, 1965) went on to earn his medical degree in 1969 and then went on to do a residency and fellowship in pulmonary medicine. He was in the army for two years and then started a pulmonary practice in Colorado Springs in 1976.

H.L. Skip Nelson (BA, Bio, 1974) graduated with a VMD from the Univ. of Pennsylvania in 1978. "Lehigh prepared me well for veterinary school's rigorous course work. I have enjoyed 35 years of general practice in Clarks Summit, PA – small town America. I have great memories of Professor Owen, comparative vertebrate anatomy, histology, and embryology."

Peter Auerbach (BA, 1979) is a practicing obstetrician/gynecologist.

Thomas Koch (BA, Bio, 1986) "I had the best of times doing research with Murray Itzkowitz, spending hours looking at fish. From the fish tanks in the dungeons of Williams Hall, Murray graciously promoted me to open water diver in Discovery Bay Jamaica, leaving me to believe that academic life would continue with similar exciting experiences. I decided to understand more about the neural structure behind neural networks and its failure and engaged in PhD work in neurobiology at the University of Heidelberg in Germany. Ever since I have been with Procter & Gamble, moving from Germany to Brussels and now to Brazil."

Alumni Updates (continued)

Linda Wimpfheimer Loeve (BA, Bio, 1986) received her Masters in Food Science from Cornell University. She worked as a food microbiologist/product developer for General Foods in New York and M&M/Mars in New Jersey. "My family moved to Scottsdale, Arizona 10 years ago (unfortunately, there are not a lot of food companies in the desert). I am now working as a financial analyst for an engineering firm (Michael Baker Jr., Inc.); the company headquarters is in Pittsburgh."

Cailin (Cordon) Pachter (BA, Bio, 1990) has been employed at Muhlenberg College since 1999 in various roles, and is presently director of pre-professional advising. "I have worked in higher education since 1992 and received an MA in Counseling in 1993."

Janet Boyle (BA, Bio, 1990) "In 1989, during the fall of my senior year at Lehigh, I had an on-campus interview with Merck. It turned out to be a life-changing opportunity. I spent the next 22 years at Merck pursuing a rewarding career in Clinical Research. I earned a MS in Clinical Research Organization & Management from Drexel University and in 2011, I partnered with two colleagues to launch our own consulting business, BCH Research Solutions, LLC. My Lehigh degree gave me the knowledge and credentials I needed to get my career started and my Lehigh education gave me the confidence to pursue my passionate interest in the life sciences."

Michelle Casale (BA, Bio, 1993) "After graduation, I took a position at Memorial Sloan-Kettering Cancer Center as a research tech in Dr. Schantz' Head and Neck lab. After two years there, I started in a Physician Assistant program in Brooklyn. I graduated from that program in 1997 and began working as a Cardiac Surgery PA at Hospital of the University of Pennsylvania in Philadelphia. In April 2000, I left and began working as a Clinical Specialist for Guidant Corporation, teaching endoscopic vein harvesting techniques and beating heart (CABG) surgery techniques. About six years later, Boston Scientific acquired us, then Maquet Cardiovascular in 2008. I have held a variety of positions throughout my years there and am currently an Account Manager for the Cardiac Surgery division of Maquet in and around the Philadelphia area."

Adam Levin (BA, Bio, 1988) "After graduating I received an M.D. at the Albany Medical College before becoming a 'damn yankee' as a resident in ob/gyn in Charleston S.C., at the Medical University of South Carolina. I followed with a fellowship in Reproductive Endocrinology and Infertility at Johns Hopkins and then moved to Tampa Bay and went into a private practice for the next 12 or so years. During a mid-life crisis I took the LSATs and went to Stetson University College of Law at night. After graduating I gave up medicine and opened a law firm. I primarily practice health and administrative law and civil litigation."

Chris Jewell (BS Mol Bio, BS ChemE, 2003) completed his postdoc at MIT and Harvard and in the fall of 2012 became an assistant professor at the Univ of Maryland, College Park, in the Bioengineering Department. "My lab is studying the interactions between biomaterials and the immune system,

and how these interactions can be exploited to promote tolerance and combat autoimmune disease. I visited Lehigh last April and it was great to see many familiar faces around the department!"

Nir Patel (BA, Bio, 2004) earned a doctor of podiatric medicine from New York College of Podiatric Medicine in New York in 2012. Nir is currently a podiatric surgical resident with a specialty in reconstructive foot and ankle surgery at Metropolitan Hospital.

Vera Partem (BS, Bio; BA, Int. Com, 2006) has been selected as a Fellow in the Thomas R. Pickering Graduate Foreign Affairs Fellowship Program. "I will be completing a graduate program in public policy and international affairs at the University of Pennsylvania - Fels Institute of Government. After the completion of graduate studies, I will enter the United States Department of State in an appointment as a Foreign Service Officer, embarking on a diplomatic career."

Takahiro Sato (BS, Bio, 2007) received a PhD in Molecular Pharmacology from Thomas Jefferson University in 2013 and is currently a postdoctoral researcher at Temple University studying cancer epigenetics.

Amber Horner (BS, Bio, 2008) is a 3rd year medical student at Temple University School of Medicine and is doing her third year clerkship at St. Luke's Hospital in Bethlehem.

Colin McLeod (BA, Bio, 2008) completed graduate studies in Environmental Engineering and has been working for URS Corporation working on groundwater remediation at large industrial sites.

Caitlin (Katrinic) Brown (BS Bio, 2010) worked for two years as a research lab technician in Baltimore, Maryland and is now living in New Orleans after getting married. "I am currently taking prerequisite classes to apply for physician assistant school and am getting certified as a nursing assistant."

Laura Schafer (BS, BNS, 2010) attended UMDNJ School of Public Health where she earned her M.P.H. in Health Systems and Policy. She is currently at LECOM-Bradenton pursuing a Doctor of Osteopathic Medicine degree.

Steven Bialick (BS, BNS, 2010) and **Jena Andreu** (BS, BNS, 2011) are both medical students at UMDNJ School of Osteopathic Medicine.

Kristen Morgado (BA, Bio, 2012) is attending Cooper Medical School. "Dr. Swann, Thank you so much for volunteering to write a letter on my behalf. Your faith in me contributed to the fulfillment of my lifelong goal of pursuing medicine and for that I am very grateful."

Gina Notaro (B.S., BNS, 2012) is a PhD student in the biomedical engineering program at Dartmouth College.

Thursday, April 10, 2014
4:00 to 6:00 p.m.

*Poster presentations
by our undergraduate researchers*

Refreshments provided

Iacocca Hall, 111 Research Drive
Mountaintop Campus, Siegel Gallery

You are invited to our annual
**Undergraduate
Research Symposium**

Grad student educates politicians

All too often, the policy makers in Washington who set funding levels for agencies like the NIH and NSF do not comprehend the importance and critical nature of the research these agencies fund. That is why Falk Lab graduate student, Chuck Fisher, set off to Washington D.C. this past September to help them better understand. Chuck participated in an event called "Capitol Hill Days" put on by the Coalition for the Life Sciences (CLS), an umbrella organization for the American Society for Cell Biology, the Neuroscience Society, and the Howard Hughes Medical Institute among other societies that lobbies on behalf of the life sciences. Chuck met in person with the Lehigh Valley's Congressman Charlie Dent as well as with Congressman Jim Gerlach from near Philadelphia. In addition, he met with staffers from the offices of Pennsylvania Senators Bob Casey and Pat Toomey. Lobbying as a team with grad students and post-docs from Thomas Jefferson University in Philadelphia, Chuck explained his cell-cell communication research and its relevance to cancer and heart disease, as a means of giving the lawmakers a firsthand account of why federal research funding is needed to create jobs and keep our country on the cutting edge of science and technology.

.....
Chuck Fisher (second from left) in Washington, DC



Remembering two pioneering women

Anne Peters McGeady, Ph.D.

Dr. McGeady was a lifelong resident of Bethlehem. She graduated from the College of New Rochelle. In 1950, Dr. McGeady earned her doctoral degree in Bacteriology at Lehigh, the first woman to earn this degree in the department of biology. She was an associate professor of Microbiology and Chemistry at Moravian College. She left that position to raise a family and participate in civic activities in Bethlehem, where she went on to hold many leadership positions, including president of the Bethlehem chapter of the AAUW, coordinator of the Know Your Neighbor Panel, a group which spoke against discrimination, Bicentennial Coordinator for the City of Bethlehem, and executive director of the Sun Inn Preservation Association. In addition to serving as a member of numerous boards across the Lehigh Valley, Dr. McGeady was a member of the first organizing committee for Musikfest. She was awarded the Outstanding Woman of the Year award by the Bethlehem Jaycees and the Martha Washington Award by the Sun Inn. She was predeceased by her husband, Leon McGeady (Ph.D., 1950), a professor of metallurgy at Lafayette College, and is survived by six children. Dr. McGeady died on January 30, 2013. She was 91.

Marjorie M. Nemes, Ph.D.

Dr. Nemes grew up in Fountain Hill and received her diploma in nursing from St. Luke's Hospital School of Nursing, her B.S. from Lebanon Valley College, an M.S. in Biology in 1951 and her Ph.D. in Biology in 1955. After graduating from Lehigh, she spent three years at the Rockefeller Institute and spent some time teaching at the Women's Medical College in Philadelphia. She worked as a supervisor and research scientist for Merck and Company and was a bio-medical consultant to hospitals and nursing homes. Upon retiring from Merck she spent several years working the midnight shift counseling troubled youth at Northwestern Hospital, now NW Institute of Psychiatry. Not one to go quietly into retirement, she traveled extensively participating in several expeditions to the Arctic. While she was able to, she made bi-annual trips to the Amazon and the Peruvian rainforest collecting plants for medicinal purposes, studying pre-historic birds and even negotiating with bandits. She loved to learn and was curious about all things. Referring to the rainforest and its fragile ecosystem, she said, "You can thank Fran Trembley for that," recalling the late, legendary Lehigh professor of biology who was responsible for cultivating her interest in ecology. "He was studying ecology when no one knew what the word meant." Dr. Nemes was a generous benefactor to the University, including generously providing an endowed fellowship fund to the department of biological sciences to support graduate students in their studies. She is survived by cousins. Dr. Nemes was 91 and died on May 22, 2013.

Please take a moment to update us on your activities!

Name: _____ Year(s) of Lehigh degree(s) _____

e-mail address: _____

News about you and your professional work: _____

Please send to: e-mail: inbios@lehigh.edu

-or- fax: 610-758-4004

-or- Department of Biological Sciences
Alumni News
111 Research Dr., B217
Bethlehem, PA 18015

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Would you like to see for yourself how the department has grown? We would love to welcome you back for a visit! Simply call Vicki Ruggiero (610-758-3680) to make arrangements and we'll make sure someone is available to give you a personal tour!

