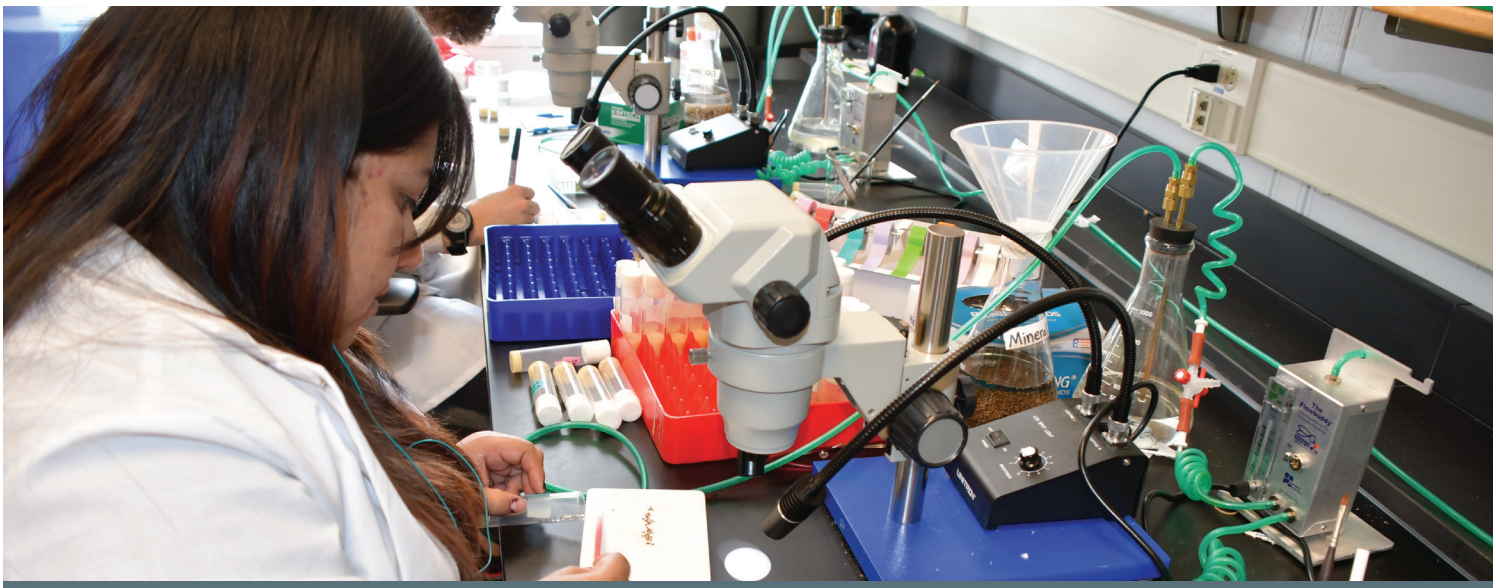

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LEHIGH UNIVERSITY

Biological Sciences

Greetings!

Linda Lowe-Krentz, Ph.D.
Professor and Chair

As I write this message, it is currently spring break, undergraduate students are mostly away from campus, all of us here are taking deep breaths getting ready to plunge into the rest of spring semester, and we remain hopeful that spring on the calendar will bring slightly improved weather. It is a time of change, beginnings and endings. Graduate students are preparing to defend their dissertations, seniors are accepting offers for graduate school, medical school, and jobs, we are eagerly awaiting acceptances from incoming graduate students and talking to undergraduates already here who wish to join our labs. From a new position as department chair, I can see these yearly events even more easily than I did as a regular faculty member.

As you heard last year, some changes are also in the works. While an addition to Iacocca is not happening immediately, plans for new dormitory space and the new College of Health are moving forward – you can find information about those on Lehigh's web site. We expect more undergraduate students next year, and every year in the near future.

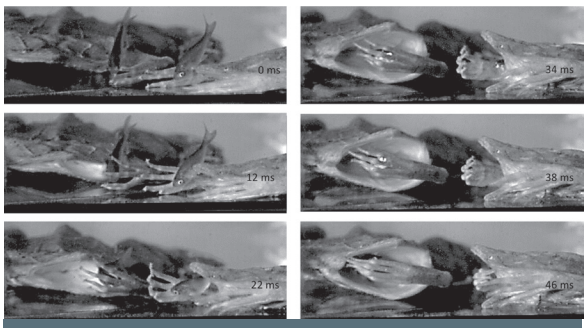
Biological Sciences faculty and students have published interesting research, started new collaborations, earned grant awards and more. Some have been politically active in working to improve funding for science and support of graduate student education. On South Mountain, we welcomed a new Professor of Practice this year. She is continuing to integrate active learning into our core courses. We plan to work towards expanding our use of these teaching and learning techniques with new faculty next year. Read about this, and more, in the current edition of the newsletter. Check out additional news (awards, additional publications, and more) on the Department web site.

Most of all, be in touch! Let us know what you are doing, stop by and visit, you can find us on Facebook, you are welcome to the annual undergraduate poster session, and we look forward to seeing you and/or hearing your news.

Linda Lowe-Krentz, Ph.D.
Professor and Chair

2017 - the department at a glance ...

- 22 faculty members
- 2 visiting assistant professors
- 10 post-doctoral / research scientists
- 7 technical and 3 administrative staff
- 37 Ph.D.-level graduate students
- 28 Master's-level graduate students
- 272 Undergraduate majors:
  - 115 Biology
  - 38 Biochemistry
  - 27 Molecular Biology
  - 92 Behavioral Neuroscience



Images from high speed video taken at 500 frames per second of the aquatic frog, Pipa pipa, catching a small goldfish by sucking it in. Numbers in each frame represent time in milliseconds from initial frame. Although the frog's fingers are flared to prevent the fish from escaping, they never actually touch the fish, showing that the frog is capable of generating suction fast enough to catch elusive prey. From research done as an extension of a project begun by Ed Fernandez and Benjamin Schwartz in Professor Cundall's herpetology course in 2012 and published in the Journal of Morphology in 2017.

Welcome to new faculty!

Katie Hoffman, Ph.D.

The department welcomed Katie Hoffman, Ph.D. as Professor of Practice in 2017. Dr. Hoffman earned a bachelor of arts degree in Psychology in 2015, a bachelor of science degree in Microbiology in 2016, and her Ph.D. in Neuroscience in 2012 – all from the University of Montana, Missoula. Prior to her arrival at Lehigh, she was a post-doctoral fellow for the United States Army Institute of Chemical Defense, and an assistant professor in the department of biology at University of Great Falls in Montana.

In the classroom, Dr. Hoffman will be teaching our Core I: Cell and Molecular Biology and Core II: Genetics classes, as well as Molecular Genetics Lab and Biochemistry Lab. Dr. Hoffman enjoys using active learning exercises in her class and has begun to explore the potential of virtual reality as a classroom tool.

Hoffman is interested in exploring changes in synaptic activity in both electrical and chemical synapses. At Lehigh she has begun generating primary cell cultures and characterizing them electrophysiologically. Hoffman is excited about her current and future collaborations with other members of the department.

Katie lives with her fiancé, two cats, and a very sassy dachshund. In her spare time, she enjoys traveling, live music, and enjoying different cultures through food.

Iovine promoted to full professor

M. Kathryn Iovine, Ph.D., Professor

At their May 2017 meeting, the board of trustees granted M. Kathryn Iovine, Ph.D. a promotion to full professor. Iovine came to Lehigh after serving as a post-doctoral fellow in the lab of Dr. Stephen Johnson at Washington University in St. Louis, Missouri.

Dr. Iovine earned her doctorate from the Washington University and her bachelor of science degree from Carnegie Mellon University.

Dr. Iovine has taught a variety of courses while at Lehigh, including Core II: Genetics, Biochemistry (lecture and lab), Cell Biology, Development and Disease, Methods in Developmental Biology, and Classical and Molecular Embryology. Active in a variety aspects of service to the university, Dr. Iovine has recently served as department graduate program coordinator.

Research in the Iovine lab is focused on understanding how the vertebrate skeleton is correctly patterned, using the regenerating zebrafish fin as a model system. Recent findings suggest that Cx43-gap junctions influence where joints will be made in the skeleton by suppressing the joint-forming cell fate. These and other results provide important insights into human skeletal diseases impacting the final form of the skeleton.

Iovine's research has been funded by the National Institutes of Health (NIH), and the National Science Foundation (NSF) and the PA Department of Health. She also received a Graduate Assistance in Areas of National Need (GAANN) grant which provided support for graduate students in under-represented groups.

Accomplishments

Wonpil Im, Ph.D. was awarded the prestigious Friedrich Wilhelm Bessel Research Award from the Alexander von Humboldt Foundation, an organization of the German government that promotes collaboration between scientists from Germany and abroad.

Professor Im is the Presidential Endowed Chair in Health and a professor of biological sciences and bioengineering. He uses computational biophysics to learn how antibiotics permeate bacterial membranes and target bacteria for destruction.

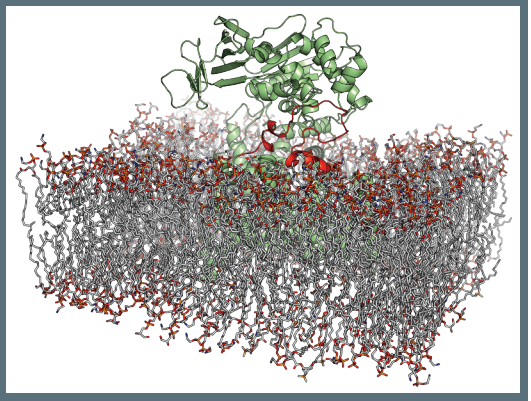
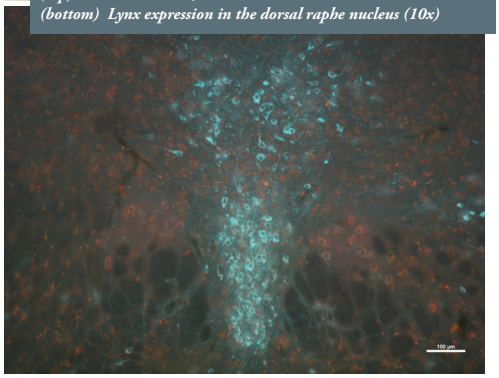


Illustration of an all-atom Campylobacter lari PglB (ClPglB) simulation system in Gram-negative bacteria plasma membrane. ***N-glycosylation, the covalent attachment of an oligosaccharide onto an asparagine residue in a protein, is a fundamental posttranslational modification that affects cellular functions. This enzymatic reaction is catalyzed by an integral membrane protein, oligosaccharyltransferase (OST). Despite the available crystal structures, the glycosylation mechanism by OST is still unknown. In particular, the role of external loop 5 (EL5) in OST, which is critical for the catalytic cycle, is enigmatic. In this project, we explore EL5 conformational changes in the apo structure of a bacterial OST, ClPglB using molecular dynamics simulations, aiming to decipher the N-glycosylation mechanism at the molecular level. In the figure, ClPglB and EL5 are colored green and red, respectively. Hydrogens, water molecules, and ions are not shown for clarity. Im Lab***

Can you provide support for a graduate student to travel to a professional meeting?

Graduate Student Spotlight

Kristin Anderson, Ph.D. Candidate in the Integrative/Neuroscience Program



(top) Kristin Anderson, Miwa Lab
(bottom) Lynx expression in the dorsal raphe nucleus (10x)

Kristin came to Lehigh in 2013 from Rider University where she earned a B.S. in Neuroscience. At Rider she joined a research lab and quickly fell in love with the research process and thrill of discovery. Through this she knew she wanted to pursue a research career and she set her sights on graduate school. Two days after graduation, Kristin moved to Bethlehem to start her first summer at Lehigh as a graduate student mentor for the Biodynamics Summer Institute (BDSI) program with Drs. Julie Miwa and Amber Rice. After the summer project ended, Kristin wanted to continue working in the multidisciplinary neuroscience lab that is the Miwa Lab and officially joined. At the time, it was a new lab and she looked forward to the challenge of helping to build up a lab, set up new techniques, and to explore new avenues within the vast framework of possibilities in scope of the Miwa lab research.

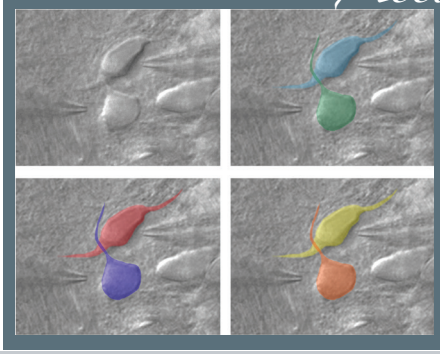
The broad research question of the Miwa lab asks what is the cellular basis of behavioral adaptation that allows an individual to successfully navigate a complex environment. One such behavior that is essential, but can hinder individuals, is anxiety. The anxiety response is a normal and adaptive reaction to a stressor; however, disorders can develop when individuals cannot properly regulate the response. Currently, anxiety disorders rank amongst the most prevalent and disruptive diagnosed mental disorders while simultaneously having largely ineffective treatments. To address this, Kristin has developed a thesis studying the role of a candidate gene, lynx2, in anxiety mechanisms.

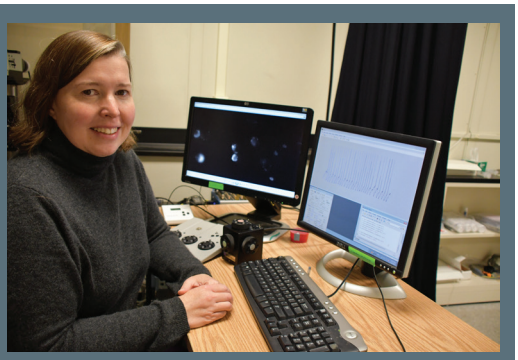
The lynx genes are regulators of the cholinergic system, an influential neurotransmitter system that is implicated in many important complex processes and behaviors such as learning, memory, and anxiety. The cholinergic system operates on a continuum of activation and the lynx genes exert top down control, acting like brakes, on the system. This braking action helps to maintain an optimal level of activation and functioning. In the case of lynx2, when removing the brake via genetic engineering, there is an increase in generalized anxiety-like behaviors in mice. Kristin was very interested though in expanding this beyond generalized anxiety by understanding how learning plays a role in developing anxiety over time. In addressing this, Kristin discovered mice lacking a lynx2 gene have the inability to quell a learned fear. This mimics post-traumatic stress disorder where there is an inappropriately large response to triggers. She has shown that normal anxiety can be restored through a combination of pharmacology targeted at the cholinergic system and behavioral training. Additionally, Kristin focally delivered therapeutics directly into the anxiety region of the brain and also restored normal levels of anxiety. To connect this knowledge of lynx2 from mouse models to humans, she began to look at the lynx2 gene in humans where she found naturally occurring mutations in the human lynx2 gene that affected behavior, suggesting that understanding the mouse model is applicable to human anxiety. This novel human-mouse study can one day be used to help anxiety sufferers. Through this research Kristin has been awarded with the Marjorie Nemes Fellowship, Lehigh University College of Arts and Sciences Graduate Student Summer Fellowship, and the Lehigh University Graduate Student Research Grant.

In the Miwa lab, Kristin, along with Dr. Miwa, have endeavored to provide an environment in which undergraduates can engage in research and develop scientific thinking. She has taken joy in mentoring undergraduates through research, and in seeing the students experience scientific discovery for the first time. Through programs such as BDSI, Lehigh's Mountaintop Initiative, and from student lab members she has trained over 30 undergraduate students at Lehigh. Kristin has also served as vice president of BOGs, the biology graduate student organization, and along with her fellow officers, helped to setup a guidebook for incoming students along engaging in outreach events such as the Bio Fair at Broughal Middle School and the LV Science Fair. Through such outreach events Kristin developed a passion for public outreach and advocacy. She joined the Society for Neuroscience advocacy team and began immersing herself in advocating for science funding and science-based policy. Kristin has spoken out on Capitol Hill with Congressional leaders and Appropriations Committee members at events such as the Rally for Biomedical Research and Society for Neuroscience's Hill day to advocate for robust and sustained funding for the National Institutes of Health. She has also spoken out in local papers and town hall meetings as a science advocate.

In her free time Kristin enjoys cooking, finding new coffee shops, training for and competing in Spartan Races, and eating delicious treats from Vegan Treats Bakery!

Accomplishments





Julie Haas and former undergraduate students Jessica Sevetson, Emily Heckman, and Sarah Fittro recently showed that calcium channels are the key link between brain activity and the strength of electrical synapses in the thalamus. Their paper was published in the Journal of Physiology, with a highlight on the work by Debanne and Russier

Sevetson J, Fittro S, Heckman E and Haas JS (2017). A calcium-dependent pathway underlies activity-dependent plasticity of electrical synapses. *Journal of Physiology* 595: 4417-4430.

Yeast genetics could offer clues to cancer's growth

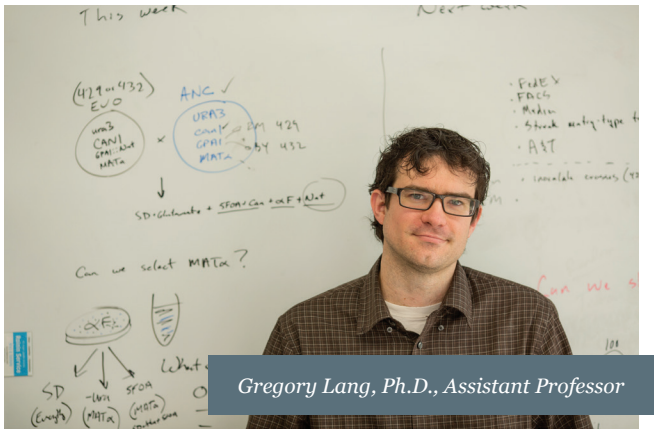
Lori Friedman
University Communications

Genes provide instructions to cells in the body telling them what to do and not do in order to function optimally. Small changes in genes, called mutations, can have major consequences. Like a glitch in a computer's coding, a glitch in gene coding can cause a cell's system to go haywire. Not all mutations are bad, however. The process of adaptive evolution selects for mutations that promote rapid and unchecked growth, both in yeast populations and in cancer.

As a cancer cell reproduces by cloning itself, a number of mutations are passed along to successive generations. Some of these are "hitchhikers"—along for the ride, but basically harmless. Others are "driver" mutations, responsible for cancer's growth. Such mutations may be cancer's greatest strength, but they could also be its Achilles' heel: targeting driver mutations with treatment could inhibit the cancer's growth.

Precision medicine in cancer treatment proposes to use genome sequencing to identify which gene mutation or mutations are responsible for driving the growth of a patient's cancer cells. For this to be practical, however, it must be possible to identify the cancer-causing driver mutations.

Unfortunately, identifying exactly which mutations are drivers in the human genome is like trying to find a needle in the proverbial haystack. One possible solution is to look at mutations in a smaller haystack.



Gregory Lang, Ph.D., Assistant Professor

Gregory Lang, an assistant professor of biological sciences, and his team are exploring how genomes evolve over thousands of generations using laboratory populations of yeast, which has a genome that is one thousandth the size of the human genome. Yeast, the same one used in baking and in brewing beer, reproduces rapidly by division making it a good model system for studying adaptive evolution in an asexual population, like cancer.

"Yeast undergoes one generation every 90 minutes—ten generations within 24 hours," says Lang. "Unlike human cancer cells, we can maintain hundreds of identical yeast populations in the lab and then evolve them for thousands of generations."

Lang and his colleagues recently applied such a large-scale approach to quantify its effect on the growth of 116 mutations from 11 lineages of experimentally-evolved yeast populations. They found that only 20 percent of the mutations that succeed are drivers; the rest are along for the ride. Their results have been published in an article in Proceedings of the National Academy of Sciences (PNAS) titled "Hitchhiking and epistasis give rise to cohort dynamics in adapting populations," coauthored with Sean W. Buskirk, a postdoctoral research scientist, and Ryan Emily Peace.

"If you want to get a realistic picture of the evolutionarily significant spectrum of mutations that promote growth, a comprehensive study of individual mutations is needed—something that would be very difficult to conduct using the human genome," says Lang.

"In our experiments with yeast, we are able 'shuffle the deck' to isolate thousands of spores—all from the same ancestor—each with a random combination of evolved mutations to analyze. This large-scale approach allows us to measure, with great precision, the fitness effect of each mutation. We can then quantify how important certain mutations or combinations of mutations were to growth."

"Shuffling the deck" to understand gene mutations

After Lang and his colleagues shuffled the yeast population's genetic deck, they used whole genome sequencing to infer which mutations or combinations of mutations were driving growth.

"The hitchhikers would not increase in frequency," says Lang. "The drivers would increase at a rate that's proportional to their fitness effect."

Instead of searching for common mutations—as is being done for some cancer genomes—and then inferring that those mutations must be the drivers, Lang's approach measures the effects of all mutations, enabling the identification of subtler dynamics.

By directly measuring the fitness effects of all mutations in 1,000 generations of a single yeast strain, the researchers were able to unambiguously identify and quantify the fitness effects of driver mutations that could otherwise be missed by recurrence-based methods.

"Comparing our results to previous recurrence-based methods we had tried, we found that we had missed dynamics that had 'weak' or small effects, as well as rare mutations," says Lang.

The team identified one mutational group in which mutations combined to provide a fitness benefit greater than the sum of their individual effects. In other words, the interaction of two mutations that were passed down together positively impacted growth. Neither had a substantial effect on its own.

Though the yeast genome has been studied extensively, this genetic interaction had not been previously identified. According to Lang, the discovery illustrates the power of experimental evolution to select for combinations of mutations that increase growth. The discovery also confirms the effectiveness of his group's approach for identifying such interactions.

Lang says it is unlikely that the exact mutations his team discovered in yeast occur in cancer. However, he believes that understanding the dynamics of adaptation in yeast could provide insight into gene mutation dynamics in other systems, such as cancer.

"In yeast we have the tools to answer types of questions that we would love to be able to answer for cancer populations," says Lang. "Future work will include identifying additional genetic interactions in yeast. Experimental evolution is a good way to enhance our current understanding of the role in adaptation of individual mutations and the interactions between them—knowledge that could one day lead to advances in human healthcare."

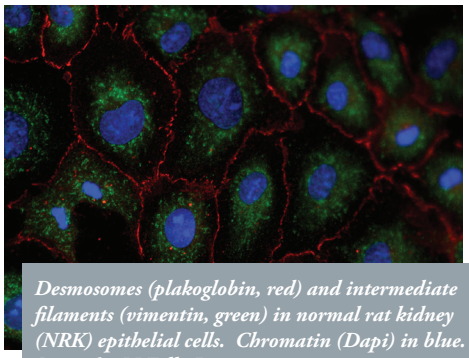
2017 Selected Research Publications

Bold = Faculty
***Bold+Italic*s** = Graduate Student
Italics = Undergraduate Student
*= Former Student

Faculty Publications

Cundall, D., E. Fernandez, F. Irish. 2017. The suction mechanism of the pipid frog, Pipa pipa (Linnaeus, 1758). J. Morphol. 278, 1229-1240.

S. Jo, X. Cheng, ***J. Lee***, ***S. Kim***, ***S-J. Park***, D.S. Patel, ***A.H. Beaven***, K.I. Lee, H. Rui, S. Park, H.S. Lee, B. Roux, A.D. MacKerell Jr, J.B. Klauda, Y. Qi, and **W. Im**, CHARMM-GUI 10 Years for Biomolecular Modeling and Simulation. J. Comput. Chem. 38:1114-1124 (2017).



Desmosomes (plakoglobin, red) and intermediate filaments (vimentin, green) in normal rat kidney (NRK) epithelial cells. Chromatin (Dapi) in blue. Bios 368 M Falk, Instructor

Rajeswari Banerji*, **Robert V. Skibbens** and **M. Kathryn Iovine**. Cohesin mediates Esco2-dependent transcriptional regulation in a zebrafish regenerating fin model of Roberts Syndrome. Biology Open (2017) 6, 1802-1813 doi:10.1242/bio.026013

Black, A.*, ***Snekser, Jennifer L.**** & **Itzkowitz, M**. 2017. Preservation of behavior after fifteen years of isolation: comparisons of wild and captive endangered pupfish in their natural habitat. Environmental Biology of Fishes. DOI 10.1007/s10641-017-0662-6.

Farwell, S.L.N., Reylander, K.G.*, **Iovine, M.K.** and **Lowe-Krentz, L.J.** 2017. Novel Heparin Receptor Transmembrane Protein 184a Regulates Angiogenesis in the Adult Zebrafish Caudal Fin. Front. Physiol., 07 Sept 2017 doi.org/10.3389/fphys.2017.00671

McQuillan, M. A., ***Huynh, A. V.***, Taylor, S. A., **Rice, A. M.** 2017. Development of 10 novel SNP-RFLP markers for quick genotyping within the black-capped (*Poecile atricapillus*) and Carolina (*P. carolinensis*) chickadee hybrid zone. Conservation Genetics Resources 9: 261-264.

Donglai Shen & **Robert V. Skibbens** (2017): Temperature-dependent regulation of rDNA condensation in Saccharomyces cerevisiae, Cell Cycle, DOI: 10.1080/15384101.2017.1317409

Publications that include undergraduate students

*Gabrielle Dardis**, Robert Tryon, ***Quynh Ton***,* Stephen L. Johnson, and **M. Kathryn Iovine**. Cx43 Suppresses evx1 Expression to Regulate Joint Initiation in the Regenerating Fin. Developmental Dynamics; DOI: 10.1002/DVDY.24531.

*Fernandez, E.**, F. Irish, **D. Cundall**. 2017. How a frog, Pipa pipa, succeeds or fails in catching fish. Copeia 105, 108-119.

Ed Fernandez is now in medical school--Cooper Med, Camden, NJ. That project was a class project in herpetology started in 2012.

Thevenin, Anastasia F., *Margraf, Rachel A.*, ***Fisher, Charles G.***, ***Kells-Andrews, Rachael M.****, **Falk, M.** 2017. Phosphorylation regulates connexin43/ZO-1 binding and release, an important step in gap junction turnover. Molecular Biology of the Cell.

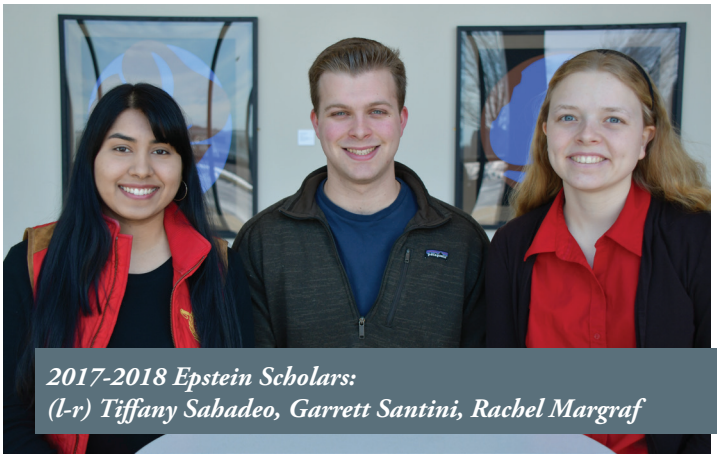
Sevetson J, Fittro S*, Heckman E** and **Haas JS** (2017). A calcium-dependent pathway underlies activity-dependent plasticity of electrical synapses. Journal of Physiology 595: 4417–4430.

Buskirk SW, *Peace RE**, and **Lang GI**. 2017. Hitchhiking and epistasis give rise to cohort dynamics in adapting populations. Proc Natl Acad Sci USA. 2017 Jul 18. pii: 201702314. doi: 10.1073/pnas.1702314114.

Generous gift helps fund undergraduate research

Through a generous gift, Michael Epstein, Esq. ('75, B.A. Bio) established the Epstein Family Endowment for the purpose of supporting undergraduate research. Michael Epstein was featured in the 2011 edition of the department newsletter ("The Law of Nature, pages 4-5). He and his wife, Lisa, have three children: Jesse, Emily and Eric.

In Fall, 2017, the department of biological sciences announced the first recipients of the Epstein Family Endowment for undergraduate research. All of this year's recipients are members of the department's honors class and are members of the Class of 2018. We are pleased to announce the first Epstein Scholars.



2017-2018 Epstein Scholars:
(l-r) Tiffany Sahadeo, Garrett Santini, Rachel Margraf

- **Rachel Margraf** (Molecular Biology) - Rachel is an undergraduate researcher in the lab of Professor Matthias Falk. Her research proposal is "Phosphorylation and Ubiquitination Events in the Connexin 43 Gap Junctions Internalization Pathway."

- **Tiffany Sahadeo** (Biochemistry) – Tiffany is an undergraduate researcher in the lab of Professor Linda Lowe-Krentz. Her research proposal is "Deciphering the Activity of Endothelial Nitric Oxide Synthase in Endothelial Cells Subjected to Heparin Treatment and Fluid Shear Stress."

- **Garrett Santini** (Behavioral Neuroscience) - Garret's research is supervised by Professor Jennifer Swann. His research proposal is "Sex Differences in Androgen Receptor Expression and Localization in Mesocricetus aurautus."

Margraf, Sahadeo and Santini received funding for materials and supplies to complete their research. They will present their research at the department's annual undergraduate research symposium on April 19, 2018.

Department hosts two neuroscience symposia

New Orleans site of first event

Hosted by Professor Jill Schneider, the department of biological sciences sponsored a neuroscience symposium at the annual meeting of the Society for Integrative & Comparative Biology in New Orleans. The symposium's focus was "molecular and neuroendocrine approaches to understanding tradeoffs: food, sex, aggression, stress and longevity.

Schneider gathered neuroscience leaders from around the country and Canada to present their research. Talks included:

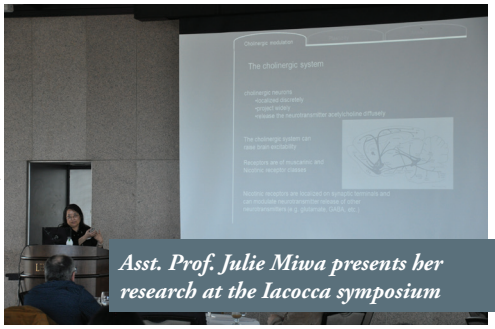
- "Food supply and the timing of reproduction," presented by Pierre Devich, Ph.D. from Arizona State University
- "You make me sick: Energetic signals regulating seasonal sickness responses," presented by Greg Demas, Ph.D. from the University of Indiana
- "Hormones and hibernation: Tradeoffs governing physiological ecology of hibernation in endangered bats," presented by Craig Willis, Ph.D. from the University of Winipeg

Professor Schneider also presented her research, "The role of GnlH in the tradeoff between reproductive and ingestive behavior." Also representing Lehigh was Ph.D. Candidate and student in the Schneider Lab, Jeremy Brozek, who spoke on "How do maternal programming strategies differ in the Syrian hamster, a seasonal breeder?"

"We are so grateful to the department and Provost Farrell for funding this symposium on trade-offs," Schneider notes. "We learned that trade-offs (giving up one behavior to engage in another) are key to understanding 1) side effects of medical treatments and therapeutic drugs, 2) how animals are responding to environmental changes (like climate change), and 3) how evolution happens. We got to compare and contrast the neuroendocrine mechanisms that operate in a wide array of different species (hamster, mice, bats, birds, snakes, and worms). We even learned how trade-offs are involved in white nose disease, the infection that is killing off bats in record numbers. After the full day of talks, a great time was had by all in New Orleans."

Iacocca Hall welcomes neuroscientists in April

Lehigh's first interdisciplinary neuroscience symposium was held in April, 2017. Hosted by Assoc. Prof. R. Michael Burger, the event drew more than 80 attendees from Lehigh and from several states around the region, including Maryland, Delaware and New Jersey. The symposium included one-hour presentations from four distinguished extramural guests:



Asst. Prof. Julie Miwa presents her research at the Iacocca symposium

- Scott C. Baraban, Univ. of California, San Francisco, presented "Zebrafish models for epilepsy research and drug discovery"
- Dwight Bergles, Johns Hopkins University, presented "Oligodendrocyte dynamics in the adult CNS"
- Nace Golding, University of Texas at Austin, presented "Life in the fast brain: dendritic structure and function underlying auditory computations"
- Sabine Kastner, Princeton University Neuroscience Institute and department of psychology, presented "Neural dynamics of the primate attention network"

Four Lehigh faculty members gave 30-minute presentations on their work:

Graduate student Lashaka Jones was awarded first place for her research poster

- Yevgeny Berdichevsky, assistant professor of electrical and computer engineering, presented "Epilepsy-on-a-chip"
- Julie Miwa, assistant professor of biological sciences, presented "Promoting behavioral adaptation by lynx cholinergic modulation"
- Nancy Carlisle, assistant professor of psychology, presented "The Sources of Attentional Templates: Human ERP Measures"
- Julie Haas, assistant professor of biological sciences, presented "Electrical synapse plasticity: a theme and variations"

The event also featured a mid-day poster presentation showcasing the work of graduate and undergraduate students.

"The neuroscience symposium was a great venue to show Lehigh's expanding strengths in interdisciplinary neuroscience with speakers from several Lehigh faculty representing bioengineering, biological sciences, and the department of psychology, along with our prestigious invited speakers," said Burger. "Many of our behavioral neurosciences undergraduates attended the symposium, and I think this helped broaden their views as to the vast diversity of research approaches that are being applied to understanding the brain and neural function."

You are invited to our annual

Undergraduate Research Symposium

Thursday, April 19, 2018
4:00 to 6:00 p.m.

Poster Presentations by our undergraduate researchers

Iacocca Hall, Iacocca Conference Center

Alumni Updates

Check out our website:
www.lehigh.edu/~inbios

Dick Bell, MD ('68, B.A. Bio.) "The biological sciences department has grown since I was an undergrad. There were eight Ph.D in the department who were excellent educators. Bradford Owens, Hayden Pritchard and the one and only Frances Trembly who taught us about life and biology. They were inspirational. It is good to see a department become more notable. It makes my degree more valuable."

Robert Hampson ('82, M.S. Bio.) has a website, "Science and Science Fiction – Science Fiction /Science Fact." Check it out here: http://teddroberts.com/science.html

Kenneth Spina ('84, B.A. Bio.) earned his D.V.M. from University of Tennessee College of Veterinary Medicine 1989. He has been a small animal clinician in private practice since.

Alan Harrison ('89, M.S. Bio.) is CEO of ToolBank USA in Atlanta, GA.

Daniel Shelly ('91, B.S. Bio.) is the Director of Business Development, R&D Externalization, and Clinical Development at Albumedix a developer of novel recombinant albumin enabled therapeutics and immunotherapies. Daniel also earned his master's in Biology from the College of William and Mary, and a PhD (Molecular Physiology) at the Florida State University.

Karen Flam ('92, B.S. PreDental Sciences) is an IT Manager and Technical Communicator in the Biotech/Pharma industry.

Bart Liguori ('97, B.S. Mol. Bio.; '02 M.A. Sociology) taught physics and chemistry in the New York City school system for 4 years. He returned to Lehigh in 2000 to earn his master's degree in sociology. He then went on to earn his Ph.D. in sociology in 2011 from Cornell University. He is now Research Division manager for the Office of Education Accountability at Kentucky's Legislative Research Commission.

Aubrey Fitch ('98, B.S. BNS) graduated from University of Pennsylvania School of Veterinary Medicine in 2003. "I am currently working as an associate veterinarian at Bethel Veterinary Hospital in CT practicing small animal medicine with special interests in exotic animal medicine and animal behavior medicine."

Kerri-Lynn Sheahan ('98, B.S. Biochem.) earned her PhD in 2006 from Northwestern's Integrated Graduate Program with her focus on Immunology and Microbial Pathogenesis.

John Grason ('99, B.S., Biochem.) obtained his PhD in Biochemistry from the University of Maryland, College Park in 2003. For the past 13 years, he has worked at the National Institutes of Health in Bethesda, Maryland. "I'm currently the Chief of Science Policy and Legislation at the National Institute of Nursing Research, one of the NIH's 27 Institutes and Centers."

Allison Porman ('09, B.S. Mol. Bio.) is currently a postdoctoral fellow at the University of Colorado Denver Anschutz Medical Campus in Aurora, CO. where she is working in the laboratory of Dr. Aaron Johnson on a project studying the lncRNA HOTAIR and its ability to regulate chromatin and gene expression in breast cancer. "I started in February and am excited to be back in the lab after over two years of organic farming and permaculture. I still have a garden in my backyard, though!"

Sean Keck ('03, B.S. Mol. Bio.) has been employed by Novartis Pharmaceuticals since 2003. He has followed a strong career path in drug development. Sean went to school part time and received his master's degree in Biomedical Science from UMDNJ, with a concentration in Pharmacological Sciences. "Thank you to Lehigh for all of the support and for the solid foundation that I have fallen back on many times throughout my career!"

Jonathan Havel ('05, B.S. Biochem.) received his Ph.D. in 2013 from Emory University.

Heather Lindberg (Wilson) ('08, B.S. Bio.) graduated from SUNY Albany in 2013 with a PhD in Biology. Heather just began an assistant professor position in the biology department at Virginia Western Community College that will began in Fall 2017.

Jennifer Therkorn ('09, B.S. Bio.) recently received her PhD in Environmental Science at Rutgers University. "For my research, I designed a new type of sampler for airborne bacteria, mold and pollen that doesn't need an air pump or any external power. I'm now a Postdoctoral Fellow at the Johns Hopkins University Applied Physics Lab in Laurel, MD."

Christa Frodella ('10, B.S., Biochem.) is a graduate student at Mississippi State in the Ph.D. program in veterinary medical science. "I'm still doing asthma research, but now with horses!"

Valerie Estela ('11, B.S. Bio.) is a 3rd year PhD candidate in Neuroscience at Brown University working in Rebecca Burwell's lab studying attention and memory. "I received the NSF GRFP fellowship in 2014."

Jafar Hussain ('11, B.A. Bio.) recently completed a internal medicine internship at Hahnemann University Hospital in Philadelphia and has since started his four year Diagnostic Radiology Residency at Temple University Hospital with plans to specialize in Interventional Radiology.

Cassandra Tuttman ('12, B.S. Biochm.; '13 M.S. Mol. Bio.) graduated from the University of Pennsylvania School of Veterinary Medicine in May, 2017. She is currently a veterinarian at the Nutley Animal Hospital in Nutley, NJ.

Brandon Bensel ('13, B.S., Mol. Bio.) is in his 5th year of PhD studies at Rensselaer Polytechnic Institute. He has been focused on a novel interaction between the kinesins which serve as major intracellular transporters in the brain and general anesthetics. "My aim is to graduate in May of 2018."

We are always delighted to receive letters from former students!

To all of the hard working, caring and supportive professors. staff and faculty of the biology department! Thank you so much for providing me with a stellar education that has allowed me to not only think critically, analyze effectively, and think outside the box, but also do so with confidence. Although it has only been about two months since I started veterinary school, it has become obvious that my Lehigh education prepared me well. Your care in my education helped me get to the next step, and you helped me develop the self-assurance to continually push myself. Thank you for having faith in your students and for challenging us to always do better. Please never feel under-appreciated, and know that you are positive influencers, genuine life-changers, and spectacular mentors. Thank you for everything.

Caitlyn Wilson '17, UC Davis School of Veterinary Medicine

Professors Matthias Falk, Greg Lang, and Mike Layden were recognized as outstanding graduate student mentors by the Lehigh University Graduate Student Senate.

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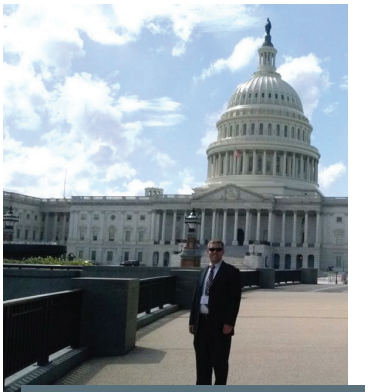
Graduate students engage in advocacy

The last year has been a very difficult one for scientists, science policy advocates, and graduate students across the country as there has been a swift infusion of uncertainty regarding the federal government's support of science with the election of the new presidential administration. Funding for the National Science Foundation (NSF) and National Institutes of Health (NIH), tight beforehand, has been faced with the prospect of utter decimation based on preliminary budget proposals and revised federal priorities. It has been in the atmosphere of concern and uncertainty that biological science graduate students Kristin Anderson and Chuck Fisher have been taking their talents for communicating science to a new level by reaching outside their disciplines to advocate for science funding and policy directly with federal lawmakers and with the public at large.



Chuck Fisher (above)
Kristin Anderson (below0

Kristin, a fifth-year neuroscience student, and Chuck, a seventh-year cell and molecular biology student, along with scientists from around the country traveled to Washington D.C. last September as a part of the Rally for BioMedical Research where they both met with Senators and Representatives in person and lobbied for increased funding for the NSF and NIH. In addition, when Congress was moving to pass tax overhaul legislation last December that would have raised graduate student taxes unsustainably into the thousands of dollars, Kristin and Chuck initiated and organized letter writing campaigns to our local Congressman Charlie Dent and PA Senators Bob Casey and Pat Toomey on behalf of grad students from across Lehigh University. Both were later featured in a Morning Call article where they explained the impending grad student tax crisis to residence of the Lehigh Valley. Through the combined effort of Kristin, Chuck, and anxious grad students across America, the grad student taxation clause was stripped out of the final version of the tax bill.

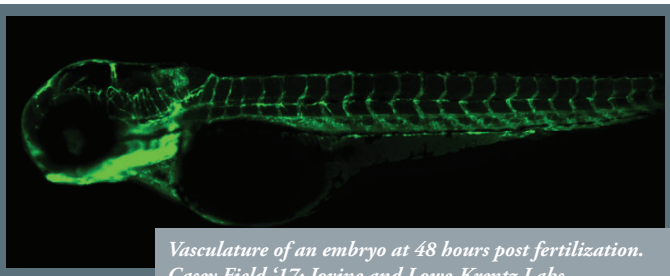
In addition to these specific efforts, Kristin and Chuck are both working on other projects for science and grad student advocacy. Kristin is a member of the Society for Neuroscience Advocacy Team, she has spoken at a citizen town hall at Senator Pat Toomey's office, and she and her advisor, Dr. Julie Miwa, have operated a booth at Musikfest to make the public aware of their research and to get them involved in it. Chuck is the director and organizer of the Lehigh Valley, PA BioPharma Networking Group, an organization that seeks to connect undergrads and grad students from across the Lehigh Valley with local biotech and pharmaceutical companies looking to hire.

Kristin and Chuck are both planning to continue advocating for science and working for the public good following their upcoming graduations. "I believe that everyone in the public is a scientist at heart, wanting to improve the current status quo through new discovery," said Kristin, "It is just a matter of scientists stepping away from our jargon and into the bigger picture goals of our projects. Through this we can communicate to the public about what it means to be a scientist, how the results and implications of scientific research benefit society, and that continued scientific progress can only occur if we work together."

"The ones who control the purse strings of science, are very rarely scientists themselves," said Chuck. "That is why it's so important for us as scientists to make our work understandable and relatable for the betterment of society as a whole."

Kristin and Chuck are going to do great things for spreading the word of science in America and the department is glad they could be a part of their journey and adventure.

Accomplishments



Vasculature of an embryo at 48 hours post fertilization. Casey Field '17; Iovine and Lowe-Krentz Labs

The Iovine and Lowe-Krentz labs published research on the function of heparin receptor in zebrafish.

Farwell, et al. Novel Heparin Receptor Transmembrane Protein 184a Regulates Angiogenesis in the Adult Zebrafish Caudal Fin. *Frontiers in Physiology*, 07 September 2017