Chair’s Message

This year, the Department of Biology completed a self-study process and department representatives have met with a visiting team of reviewers from four distinguished universities. The most recent review, in 2005, produced many positive developments. This year’s review process will also provide invaluable insight into how we pursue our mission as a premier center of education and research excellence in biological sciences.

We continue to broaden our range of teaching and research with three new tenure-track faculty members, Sergei Kosakovsky-Pond, Matthew Helmus and Joshua Schraiber. The department also welcomes four full-time instructional faculty: Craig Brumwell, Peter Huwe, Robert Jennings and Frank Nelson.

Our undergraduate program continues to attract students from diverse backgrounds and with diverse career goals. New courses in computational genomics, genetics, evolution and data science are providing cutting-edge knowledge and training at the undergraduate and graduate levels. Our graduate offerings continue to gain popularity and were strengthened with the recent approval of a Professional Science Master’s in Scientific Writing.

Please visit the Biology Department, either in person or online at bio.cst.temple.edu to learn more about our growing educational and research activities, which are gaining international attention. And please also accept our invitation to join the many alumni and friends who are providing much-appreciated financial support to the department, its programs and its students.

Allen W. Nicholson, PhD
Chair

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New faculty strong in ecology, evolutionary genomics and computational biology

Matthew Helmus, assistant professor
Matthew Helmus is an ecologist whose research interests lie at the intersection of evolution, ecology and global change science. Helmus earned his PhD degree in zoology from the University of Wisconsin in 2008. He comes to Temple from his position as a postdoctoral fellow in the Amsterdam Global Change Institute at Vrije Universiteit, The Netherlands. He is co-PI of an international collaborative research grant focused on understanding the spread of exotic species in the Caribbean, particularly lizards. He develops novel statistical applications, using large data sets, to understand human impacts on biodiversity.

Sergei Kosakovsky-Pond, Professor
Sergei Kosakovsky-Pond, who focuses on evolutionary genomics, is a member of CST’s Institute for Genomics and Evolutionary Medicine (iGEM). He develops models and computational approaches for comparative analysis of sequence data, and in software development, including analyses of evolving pathogens such as HIV-1, influenza A virus and hepatitis C virus.

After earning an undergraduate degree in computer science at Kiev State University, Ukraine, he received a PhD degree in 2003 from the interdisciplinary program in applied mathematics at the University of Arizona. Before joining Temple, Dr. Kosakovsky-Pond was an associate professor in the Division of Infectious Diseases and Biomedical Informatics at the University of California, San Diego’s Department of Medicine.

Joshua Schraiber, assistant professor
Joshua Schraiber is a computational biologist with research interests that focus on population genetics and related problems in evolutionary biology, with the long-term goal of deciphering mechanisms that contribute to patterns of variations that occur in genomes and organisms. He received his PhD degree in integrative biology from the University of California, Berkley in 2014, and was then awarded an NSF postdoctoral fellowship to study in the Department of Genome Sciences at the University of Washington. Schraiber also has over a dozen publications in journals such as Nature and Theoretical Population Biology.

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Michelle Repetto investigates sessile marine invertebrates

Since arriving at Temple as a doctoral student in fall 2015, Michelle Repetto has served as a research assistant on a NSF-funded collaborative research project, led by Associate Professor Amy Freestone. They are investigating biotic interactions in sessile marine invertebrate communities across a latitudinal gradient. The work has involved several field research trips, from Alaska to Panama. “I was thrilled to learn that I have been awarded a 2017 NSF Graduate Research Fellowship,” says Repetto. “My project, ‘Biotic factors influencing competitive intransitivity across a biogeographic gradient,’ will be complementary to the larger group project and seeks to investigate competitive interactions in greater detail.”

Previously, Repetto was a technician with the Smithsonian Environmental Research Center and worked on a number of similar projects involving marine fouling communities. “I have grown particularly fond of this system and its tractability for answering broad ecological questions,” she says.

Schnell probing transport mechanism of the β-catenin protein

After a U.S. Army career and seven years as a study coordinator with Charles River Laboratories, Steve Schnell, CST ’13, is nearing completion of his doctorate in Associate Professor Weidong Yang’s laboratory. He is using cutting-edge, super-resolution light microscopy to characterize the transport mechanism of β-catenin and its cofactors into the nucleus through the nuclear pore channel under stimulation of Wnt signaling in live human cells. As a collaboration between the Yang lab and Professor Raymond Habas’ lab, the major goal of the project is to shed light on the role played in this transport by a novel protein, Custos, discovered in the Habas Laboratory.

A U.S. veteran of the Somalia conflict, Schnell is being supported by both the Veterans Administration and a three-year NSF Graduate Research Fellowship. “β-catenin is the primary signal transduction molecule for a lot of early developmental processes, as well as cancer, and I’m really fascinated with birth defects because my mother had congenital rubella syndrome, which causes birth defects,” says Schnell.

Graduating senior Jose Moreno to enter MD/PhD program

Supported by a university scholarship, Jose Francisco Calva Moreno, CST ’17, entered Temple four years ago, believing that majoring in biology here would give him an early start toward his dream profession: physician/scientist.

As a rising junior, he participated in a clinical research project headed by Raul DeLa Cadena, William Foster and Ajay D. Rao of Temple’s Lewis Katz School of Medicine. The project focused on understanding how miRNA expression is associated with the development of proliferative diabetic retinopathy. Fascinated by biochemistry, during his junior year he also joined the laboratory of Allen Nicholson, professor and chair of biology, on a project that elucidated the role of a conserved ribonuclease in bacterial ribosome turnover.

“I believe,” he says, “that both of these experiences have prepared me to have the wonderful opportunity, and to meet the challenge, of continuing my studies at the University of Texas Southwestern Medical Center’s Medical Scientist Training Program (MD/PhD).”

Research experience for graduating neuroscience major Carolina Cabán

Last December, neuroscience major Carolina Cabán, CST ’17, was the lead author of a paper published in The Application of Clinical Genetics: “Genetics of tuberous sclerosis complex: implications for clinical practice.” Prior to her May 2017 graduation, she was also a MARC U STAR (Maximizing Access to Research Careers Undergraduate Student Training in Academic Research) scholar. Mentored by Matthew Hudson, assistant professor of kinesiology in the College of Public Health, she was seeking to identify blood biomarker(s) indicative of sub-concussive head impact by looking at changes in the levels of circulating microRNAs. She also collaborated with Jaqueline Tanaka, associate professor of biology, to evaluate a high-throughput calcium influx assay that monitors cyclic nucleotide-gated channel activation with mutations linked to achromatopsia, a hereditary visual disorder.

“During a gap year, I’m going to attend a one-year research program or become a mentor for City Year Americorps,” says the Puerto Rico native, “but I also will be applying for fall 2018 admission into an MD/PhD program.”
protein biophysics to characterize these principles from population genetics and mathematical models that combine
David Liberles’ research group is building.

In NSF-funded research, Associate Professor David Liberles’ research group is building mathematical models that combine principles from population genetics and protein biophysics to characterize these changes, and to predict when they may have led to changes in protein function under selective pressure.

“Better models to describe protein evolution will more generally enable a better understanding of the genetic changes that underpin changes in organismal phenotypes,” says Liberles.

**Tonia Hsieh: Foot usage on complex surfaces**

Nature is filled with surfaces that deform and flow in unexpected ways upon impact. Over the past decade, Assistant Professor Tonia Hsieh’s research has revealed that the feet of running lizards are surprisingly multifunctional, and that the interactions involving foot-surface dynamics, and the control of locomotion on natural media, are more complicated than currently appreciated.

In October 2015, NSF awarded her a five-year, $991,873 Faculty Early Career Development (CAREER) Program award to further pursue her research. She is using biological experimentation, simulation and physical modeling to understand how foot shape and stiffness affect its interactions with the ground and facilitate stable movements across complex surfaces.

“My ultimate goal,” she says, “is to design self-stabilizing, legged robots for search and rescue.”

**Susan Patterson: Vulnerable memories and the aging brain’s immune system**

Mental function in older individuals often declines precipitously after events such as surgery, infection, or injury that trigger activation of the immune system. Even in cases where this decline—often associated with delirium—is temporary, its occurrence is associated with a greatly increased probability of eventually developing Alzheimer’s disease or other forms of dementia.

“Very little is known about the underlying mechanisms,” says Associate Professor Susan Patterson. Funded by the National Institutes of Aging, she and her lab’s collaborators are examining how interactions between the immune and nervous systems affect memory-related processes.

She will be describing her research in a keynote address in June at the 2017 Annual Meeting of the American Delirium Society.
Department welcomes four new instructional faculty

Craig Brumwell’s expertise focuses on gene expression in the brain. Brumwell, who was involved with the Brain Gene Expression Map at St. Jude Children’s Research Hospital and Children’s Hospital of Philadelphia, received his PhD degree from the University of Connecticut Health Center in 2005.

Passionate about pre-med pedagogy, Peter Huwe joins the department after completing a post-doctoral fellowship at Temple University’s Fox Chase Cancer Center. His research expertise is in computational biophysics and molecular modeling—particularly to investigate the functional effects of missense mutations in cancer-related proteins.

Rob Jennings, who earned his PhD at the Woods Hole Oceanographic Institution, is a marine biologist whose research focuses on the population genetics and phylogenetics of marine invertebrates, particularly deep-sea species.

Frank Nelson, who earned his PhD from Oregon State University in 2006, focuses his research on the mechanics and energetics of animal movement. Some of his measurements of muscle adenosine triphosphate (ATP) has led to new understandings of the Fenn Effect, the increased liberation of heat in a stimulated muscle.

The new Professional Sciences Master’s (PSM) degree program in scientific writing was developed in response to the growing need of companies, non-profit organizations and news outlets to write and communicate science clearly and succinctly.

Headed by Associate Professor Karen Palter, the program will incorporate the input of both an internal steering committee and an external advisory panel. The program will join existing biology-related PSM programs in biotechnology, bioinformatics and bioinnovation.

Students with diverse STEM backgrounds will be able to develop the expertise to pursue scientific writing careers. It also will give professionals currently employed in science and technology fields an opportunity to enhance and broaden their skills for their career advancement.

For information about scientific writing or other Biology Department PSM programs, contact Associate Professor Seema Freer at seema.freer@temple.edu.

For more news, go to bio.cst.temple.edu