BIOLOGY
LAFAYETTE
VOLUME 9 WINTER 2013-14

INTER-DISCIPLINARY SOLUTIONS

Students in the biology course Environmental Issues in Aquatic Ecosystems, taught by Assistant Professor **Megan Rothenberger '02**, tackle problems using expertise and resources from both biology and civil engineering.

During a visit to a constructed wetland, **David Brandes** and **Arthur Kney**, associate professors of civil and environmental engineering, explained how aggressive invasive plants and seasonal algal blooms present potential management problems for the wetland. The students then used sampling and analytical methods to study the problems and propose solutions.

This is part of an initiative to make the biology curriculum more interdisciplinary. Biology faculty worked with faculty of other departments to infuse biology courses with modules from bioethics, computer science, engineering, health economics, law, environment, policy, globalization, and cultural attitudes.

"The infusion program gives us a reason to discuss the advantages of connecting and integrating several academic schools of thought to find better solutions to complicated issues such as global climate change, water pollution, and overfishing," says Rothenberger, whose Aquatic Ecosystems course also is infused with a geology module on paleoceanography and climate change. "It gives me the opportunity to make the interdisciplinarity of conservation issues more visible to the students."

Support for this initiative and others comes from a four-year, $800,000 grant from the Howard Hughes Medical Institute. The funding is meant to increase the number of science-based research opportunities and the number of minority and female students studying the sciences and to add elements of the sciences in other disciplines.

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INTRODUCING THE TOOLS OF SCIENCE

Melissa Homsher '14 is conducting honors research under the guidance of Assistant Professor Mike Butler.

While the average person doesn't care much for bird droppings, **Melissa Homsher '14** finds them pretty interesting. She is conducting honors research on the pigment biliverdin, which birds secrete in their waste. Under the guidance of Assistant Professor **Mike Butler**, Homsher is examining the possibility that biliverdin, which is produced from the part of hemoglobin that transports oxygen, might interact with white blood cells and affect immune response.

Butler has been working with Homsher, a biology major, and other students to better understand the physiology of biliverdin, which is responsible for making eggshells blue and green. As they work out the pigment's physiological role, they expect to be able to ask new questions relating to animal coloration and immune response.

Animal coloration is Butler's primary research interest—its physiological basis as well as its evolutionary and ecological consequences. He also has studied carotenoids, the pigments that make the male mallard's beak yellow and can also boost immune function. Homsher and **Briette Karanfilian '14** assisted with that research, which is published in the November 2013 issue of *Comparative Biochemistry and Physiology*.

Her work with Butler fits with her aspirations perfectly, says Homsher, who is applying to medical schools.

"Being at the forefront of this kind of research has been a learning process, understanding how much planning and how many setbacks it takes to form a successful experiment," she says. "I've learned how exciting it can be to discover something new, to be part of developing new knowledge. Through research, you can integrate all your areas of study and apply them to one focus."

Butler also has worked with **Heather Bauerle '14**, **Kara Falvey '13**, **Camila Moscoso '16**, and **Nathan Ritter '14**

(TOOLS continued on page 2...)

BIOLOGY

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LAFAYETTE COLLEGE

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FROM THE DEPARTMENT HEAD

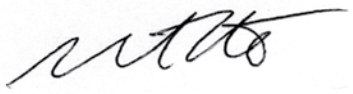
This has been a productive year for the Biology Department. Manuel Ospina-Giraldo was promoted to associate professor with continuous tenure; we hired Eric Ho, our first computational biologist; and we welcomed Lisa Pezzino as our new secretary (see "Meet Our Newest Members," page 5).

We were successful in our first HHMI grant since the 1990s, and many faculty helped achieve the aims of the project during the first year of funding. For instance, Elaine, Laurie, and Mike served as Science Horizons mentors; Nancy and Laurie developed a capstone course in biology; and Laurie, Elaine, John, Manuel, and Chu Wai Liew (Computer Science) took Science Horizons students in their labs during interim session.

This summer Laurie, Mike, Mary Roth (Associate Provost and Civil and Environmental Engineering), and David Brandes (Civil and Environmental Engineering) mentored some of the first Interdisciplinary Research Fellows, and Megan, Elaine, and Mike worked with faculty outside of the department to infuse biology courses. We are grateful to the 12 faculty from 8 different departments/programs on campus who helped us infuse 6 biology courses this year (see page 1).

Our successes and efforts are by no means limited to the HHMI project. We remain engaged and committed to programs outside of biology, such as Neuroscience, Biochemistry, Health and Life Sciences, Biotechnology/Bioengineering, and the new Environmental Science and Environmental Studies majors. Nancy has taken the reins of the Health Professions program and is doing an incredible job, while Manuel is teaching the Interdisciplinary Seminar Series in the Life Sciences with Lauren Anderson (Chemical and Biomolecular Engineering) this year.

On top of all of this we continue to teach our courses, contribute to the common course of study, present at local and national conferences, publish with Lafayette students as coauthors, all while applying for more grants and completing existing grants. We also remain committed to training the next generation of scientists. This past year biology faculty supervised 8 honors thesis projects and mentored another 56 students in research projects.



(…**TOOLS** continued from page 1)

in the EXCEL Scholars program and independent studies.

"It's energizing to work with undergraduates. For most, it's their first foray into coming up with a question and using the tools of science to answer that question, and their enthusiasm in doing this on their own for the first time is infectious," he says.

"Also, because it is their first time, it really is a learning process," he continues. "I get to watch this process in real time and provide mentorship during the stage of scientific education when they are developing the most. Those who continue in scientific fields will continue to hone these skills, of course, but it's a big motivator knowing that my interactions with students at this part of their careers set the stage for their future development."

Butler sees firsthand the value of the many opportunities Lafayette offers students to conduct meaningful research with faculty.

"There is no better way to understand how science works than by doing it, and this is one reason why an education at a school like Lafayette can be incredibly valuable," he says. "Getting one-on-one attention from a faculty member while pursuing a project that is student-developed is rare. Students tend to remember experiences like this years after graduation, even as some of the content from coursework slips away." ■

STUDENTS PRESENT RESEARCH AT PA. ACADEMY OF SCIENCE

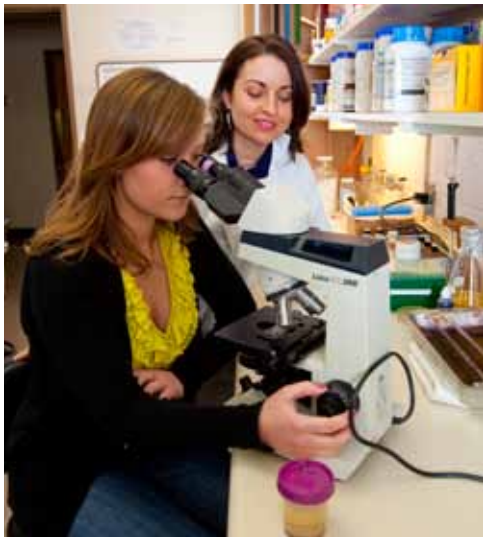
Twenty-seven students presented research papers with their faculty mentors at the 89th annual meeting of the Pennsylvania Academy of Science April 5-7 at the University of Pittsburgh at Bradford.

Mary Higgins '15, a biology major, and **Anna Peterson '15** (biochemistry) presented "Cross-Receptor Desensitization of T Cell and Chemokine Receptors in the T cells of Tumor Bearing Mice" with Professor **Robert Kurt** and **Chun Wai Liew**, associate professor of computer science and **Peter C.S. d'Aubermont, M.D. '73** Director of the Health and Life Sciences Program. Kurt also mentored the following students who presented papers:

- **Caroline Vail '13** (biology), "The Culturing and Immortalization of Murine Fallopian Tube Secretory Cells as a New Method of Studying Ovarian Cancer"
- **Antonio Serrano '13** (biology), "Construction of an Inducible Eukaryotic Expression Vector to Down-regulate MYD88 expression in a Mouse Breast Cancer Model"
- **Maria Liberti '13** (biology), "The Damaging Effects of Auranofin on 4T1Murine Mammary Carcinoma Cells"
- **Christine Vrakas '13** (biology), "The measure of damage-associated molecular pattern molecules and their role in recruiting suppressor cells in tumor-bearing mice"
- **Tiffany Phuong '16** (biology), "Creating a tetracycline inducible eukaryotic expression vector encoding shRNA specific for MYD88 using two recombination reactions"
- **Amanda Rubin '16** (chemical engineering) and **Noelle Kosarek '16** (biology), "Murine Mammary Carcinoma Cell Growth Inhibition by Auranofin"
- **Mia Spitz '16** and **Stacy Nganga '16** (neuroscience) worked with Associate Professor **Laurie Caslake** and **John Drummond**, biology lab coordinator, on "Microbes in Cosmetics: Piloting a Microbial Investigation for the General Biology Laboratory." Caslake also mentored the following students in their research:
- **Michael Mastria '16** and **Camila Moscoso '16** (both biology), "Analysis of Desert Crust Isolates for the Gene Encoding Bleomycin Resistance"
- **Tiffany Kimmel '13**, **Michael Galperin '16**, and **Jasmeen Saini '16** (all biology), "Effects of a Quorum Sensing Inhibitor on Pseudomonad Biofilm Formation in Sandy Soil"

Assistant Professor **Megan Rothenberger '02** worked with the following students who presented at the conference:

- **Thomas Swaffield '13**, **Alyssa Calomeni '11**, and **Carolyn Cabrey '12** (all biology), "Fifty years later: re-examining the cultural eutrophication problem in Raritan Bay, NJ using environmental monitoring and multivariate ordination techniques"
- **Ryan Hughes '13** (biology), "Survey of macroinvertebrate communities as biological indicators of water quality utilized for assessing the effects of dam removal along the Bushkill Creek in Easton, Pennsylvania"
- **Alex Pong '13** (biology), "Competitive interactions between the blue crab, Callinectes sapidus, and the Asian shore crab, Hemigrapsus sanguineus"



Alyssa Calomeni '11 works in the lab with Assistant Professor Megan Rothenberger '02.

Associate Professor **Elaine Reynolds** mentored the following students:

- **Jessica Baylor '16**, **Ayari Diaz-Kelly '16**, and **Kathryn King '16** (all biology), "Altered sedation but no tolerance in a Drosophila model of alcoholism"
- **David Gannon '16** and **Kofi Boateng '16** (both neuroscience), "Effects of dietary modulation in a drosophila epilepsy model"
- **Hannah Komar '13** (biology) presented "Comparative expression analysis of Phytophthora sojae Polysaccharide Lyase family 3 genes during infection of the soybean Glycine max" with Associate Professor **Manuel Opsina-Giraldo**. ■

(...**INTERDISCIPLINARY** continued from page 1)

"Students will learn to build connections with other disciplines to help make them better problem-solvers," says Professor **Robert Kurt**, head of the biology department. "We're extremely grateful to the 12 faculty members from eight different departments and programs who helped us infuse six biology courses this year," Kurt says. Along with Aquatic Ecosystems, these courses include:

- General Biology (BIOL 101) brings in perspectives from women's and gender studies and, with input from computer science, discusses cancer and modeling.
- Human Physiology, taught by Assistant Professor **Mike Butler**, includes modules on the biochemistry of receptors, channels, and transport proteins, and on fluid dynamics within the cardiovascular system.
- Physiology of Extreme Animals (Butler) incorporates a geology module on energy constraints in dinosaurs and a mechanical engineering module on using motion-capture cameras to demonstrate the biomechanics of muscle movements in humans.
- Agricultural Ethics (Rothenberger) incorporates elements of women's and gender studies and engineering studies.
- Plant Biology (Rothenberger) includes a geology module on prehistoric extreme plants and an ethnobotany module on ways plants have shaped human livelihoods and culture.

"I hope the students are able to experience the advantages of teamwork and cooperation, to critically evaluate multiple perspectives on a topic (for example, by thinking about climate change like a biologist and a geologist), and to discuss controversial issues with people who have different values, beliefs, and backgrounds," Rothenberger says.

The infusion partnerships also have given faculty new perspectives on issues in their own fields.

"Two people can look at the same optical illusion image and see completely different things," Rothenberger says. "I might see a dolphin, and someone else might see a vase. It's always really cool when someone else points out that other hidden image that I couldn't see at first. Working with my infusion partners has been kind of like that." ■

FACULTY AND STAFF UPDATE

PHIL AUERBACH, Technician III, continues to perform complex and technical jobs with exceptional skill. Students and faculty attest that he is the "go-to" person in the department. He always knows what to do or who to call to get things done. We all continue to find Phil's service and contributions invaluable. A student summed it up: "The biology building is held together by bubble gum, duct tape, and Phil."

MIKE BUTLER taught Human Physiology and Physiology of Extreme Animals (fall) and General Biology (two sections, spring). He supervised two ARC research assistants, two independent study students, and three summer researchers. He had five manuscripts accepted for publication, made an oral presentation and served as a session chair at the 5th North American Ornithological Conference in Vancouver, and gave two invited seminars. He also served on the College's Alcohol and Other Drugs Standing Committee, was elected to the Student Life Committee, served on Honors Thesis Committees for the Biology and Chemistry departments, and ran a workshop on producing museum-quality avian specimens.

LAURIE CASLAKE taught Microbiology and Molecular Medicine (fall) and Plagues, Progress, and Bioterrorism (spring). She supervised four research students in the fall, five during interim session (including four Science Horizons students), and five in the spring. Three students worked on interdisciplinary research projects in the summer, one co-advised by Prof. Waters. Interdisciplinary Research Fellowships from HHMI supported two students who were co-advised by Prof. Mary Roth (Civil Engineering). Research results from several projects were presented at the Pennsylvania Academy of Science meeting and the General Meeting of the American Society for Microbiology. She is serving as chair of the Education Division of ASM.

JAMES DEARWORTH taught Neuroanatomy and his First-Year Seminar, This is Your Brain on Drugs, and supervised three independent research students and two honors students

(fall). During a spring sabbatical he supervised an advanced research student and two honors students. Nine students were co-authors on a manuscript accepted for publication by the *Journal of Comparative Neurology*. Six students were co-authors on four abstracts presented at the Optogenetics and Pharmacogenetics in Neuronal Function and Dysfunction: 7th Brain Research Conference, Society for Neuroscience Meeting, Faculty for Undergraduate Neuroscience Poster Session, and 4th Annual Lehigh Valley Society for Neuroscience Undergraduate Research Conference. He finished a three-year term as Neuroscience program chair and presented, with Prof. Butler, a brownbag for junior biology majors on careers in the life sciences.

JOHN DRUMMOND taught Biology 101 Laboratory (eight sections, fall) and Biology 102 Laboratory (six sections, spring). He supervised eight teaching assistants (TAs) and eight teaching assistant assistants (TAAs) in the fall, and six TAs and six TAAs in the spring. He also supervised two Science Horizons students as they piloted a new unit for Biology 101L and presented a poster at the Pennsylvania Academy of Science meeting. He presented monarch butterfly biology and conservation programs at Hawk Mountain Sanctuary (Kempton, Pa.), Blue Mountain Elementary East (Orwigsburg, Pa.), and Fox Environmental Center (Bethlehem, Pa.). He also coordinated the 10th Annual Lehigh Valley Ecology and Evolution Symposium, held at Lafayette, and presented a workshop, "Podcasts in the General Biology Laboratory—Not Just a Communication Tool," at the 35th Annual Association for Biology Laboratory Education at the University of Calgary.

ANNA EDLUND, on leave in the fall, taught Developmental Biology and Biological Pattern Formation in the spring. With Prof. Tara Gilligan (Women's and Gender Studies), she co-taught Midwifery: Knowledge and Praxis. She supervised an EXCEL student and five independent research students in the fall and one EXCEL and six independent research students in the spring. She presented three research posters and three invited research lectures. She managed one NSF research grant and was on the steering committee for two NSF Research Coordination Network grants. With Mellon Foundation stART funds, she attended a workshop at Darling Marine Center in Maine on using art to teach science to undergraduates. She served on the Women's and Gender Studies Steering Committee and Health Professions Advisory Committee.

BERNIE FRIED continues his long tradition of mentoring research students and publishing with them as co-authors. He was invited by the journal *Acta Parasitologic*a, published in Warsaw, to review the topic of fish-borne trematodiasis with fellow parasitologists Nguyen Manh Hung of Vietnam and Henry Madsen of Denmark. Their review, "Global Status of Fish-Borne Zoonotic Trematodiasis in Humans," is Acta Parasitologica 2013, 58 (3): 231-258.

Emeritus Professor **CHUCK HOLLIDAY**, enjoying his second year of retirement, has added a new research area. In addition to studying the biology of a campus population of cicada killer wasps, he is studying surface and subsurface feeding in salmonid fishes. (Philistines call this "trout fishing.") The picture shows the results of an experiment conducted August 15 on the Shoshoni River near Cody, Wyo.

CATHRYN KUBERA, who joined the department in January as a one year visitor, holds a B.S. in cell and molecular biology from Cornell University and a Ph.D. in neuroscience from the University of Pennsylvania. Her postdoctoral research at Yale University was funded by an NIH Ruth L. Kirschstein National Research Service Award. She taught Neurobiology and a special-topics seminar, Cells and Signaling of the Nervous System, in the spring. She mentored an EXCEL student in the summer and collaborated with Prof. Dearworth and his student on developing new microscopy imaging techniques. Her research examines cellular signaling controlling the development of cells of the cerebellum.

ROBERT KURT taught Immunology (fall), A Modeling Based Approach to Biology, and Cell Biology (spring). He supervised three independent research students in the fall and four in the spring, along with four honors students. Two manuscripts were published, one

with a student as co-author. Nine research students presented at the Pennsylvania Academy of Science meeting. He presented student research results at the 100th American Association of Immunologists meeting in Hawaii, served as an academic adviser to 31 students, and worked on his NIH grant with his research students. He served as Peter C.S. d'Aubermont Director of the Health and Life Sciences Program, chair of IACUC, chair of FCC, and head of the Biology Department.

WAYNE LEIBEL taught Evolutionary Biology with lab (fall and spring) and Evolutionary Genetics (spring). He advised 12 students in the fall and 18 in the spring. He served on two students' Honors Thesis Committees. He attended a professional meeting last summer and published an article on cichlid fishes. He continued as associate editor/technical editor of the *Journal of the American Cichlid Association*, chair of the Guy D. Jordan Endowment Fund of the American Cichlid Association (which administers small grants for for graduate and postdoctoral students), and editor of *Cichlid News*.

SHYAMAL MAJUMDAR, Kreider Professor Emeritus, supervised a research student, co-authored two articles with research students, and co-edited a conference proceedings. He has been serving as chair of the International Scientific Advisory Committee of the Ecotoxicology and Environmental Sciences Conference, to be held in New Delhi in February, where he will present a plenary lecture. He served on the editorial boards of the journals *In Vitro: Cellular and Developmental Biology* and *Advances in Pharmacology and Toxicology*. He will attend the annual Cell Biology meeting (New Orleans, December 2013).

MANUEL OSPINA-GIRALDO, taught Molecular Genetics and a First-Year Seminar, supervising one honors student and six independent research students. He supervised six EXCEL scholars, all funded by external grants. Some of the student research was presented at the Pennsylvania Academy of Science meeting and resulted in a published abstract. He served on the College's Enrollment Planning Committee, Biotechnology and Bioengineering Advisory Committee, and Institutional Review Board. He advised 30 students. With funding from two federal grants, he supported his summer EXCEL students' travel to the Bioinformatics Workshop at Virginia Tech. He attended Pennsylvania Academy meeting and the OMGN meeting in Pacific Grove, Calif.

ELAINE REYNOLDS taught General Biology (three sections), Intro to Neuroscience (two sections), and Advanced Neuroscience. She supervised 10 students in research projects and was an academic adviser for about 30 students and a mentor for the HHMI Science Horizons Program. She authored two papers and submitted two grants to support collaborative research projects. She co-authored five poster presentations at the Society of Neuroscience meeting, Pennsylvania Academy of Science meeting, and annual Community-Based Learning and Research expo. She served on the biology search committee, many campus-wide committees, and the Teagle Foundation diversity group. She was president of Faculty for Undergraduate Neuroscience (FUN). She is on sabbatical this year.

On academic leave in the fall, **MEGAN ROTHENBERGER** supervised an honors student and two independent research students. She began preparing three manuscripts with students as co-authors. In the spring, she taught Plant Form, Function, and Adaptation and supervised four independent research students to continue environmental monitoring of Raritan Bay and the Bushkill Creek. Three research students presented work at the Pennsylvania Academy of Science meeting and Lehigh Valley Ecology and Evolution Symposium. She served on the Honors Thesis committee of a geology student and mentored a summer EXCEL student. She served on the Sustainability Committee, Student Appeals Committee, and FYS/VaST Advisory Committee.

NANCY WATERS taught Ecology and Advanced Aquatic Ecology (fall) and Topics in Environmental Biology (spring). She was co-facilitator of Technology Clinic and mentored two research students each semester.

Results of student research were presented at the Merrill Creek Reservoir Invitational Program (in conjunction with Phillipsburg (N.J.) High School AP Environmental Science students), Community-Based Learning and Research expo, and 10th Annual Lehigh Valley Ecology and Evolution Symposium. She co-supervised, with Prof Caslake, a summer Nalven Fellow. The chair of the Health Professions Advisory Committee, she also served on the Faculty Academic Policy Committee and Staffing Advisory Sub-Committee. She compiled and revised an eight-poem compendium of poetry that is undergoing review, and reviewed grants for NSF. ■

MEET OUR NEWEST MEMBERS

ERIC HO joins the department after working briefly as a senior bioinformatics scientist in the translational medicine division of a leading DNA sequencing company. He has an affiliated appointment with the Computer Science department. He holds a B.S. and M.S. in computer science and Ph.D. in biochemistry. He was awarded a NIH IRACDA postdoctoral fellowship that supported research at his *alma mater*, Rutgers University, and teaching training at New Jersey City University. He will teach a new course in bioinformatics—which emphasizes computational tools, statistical models, and use of biological knowledge-bases in studying important biological problems—and computational science. His research lab takes a computational approach in studying two topics, the regulatory role of non-coding DNA elements in gene transcription, and the application of Next Generation Sequencing (NGS) technology in elucidating cancer causing genetic alterations, transcriptome studies, and genome assembly.

LISA PEZZINO joined the department as secretary in June. She enjoys working with everyone. She previously served five years as secretary for Civil and Environmental Engineering, Chemical and Biomolecular Engineering, and Engineering Studies. ■

ALUMNI UPDATES
we'd love to hear from you!

Thanks to those who keep us updated. We would love to know how you are, what you are up to, and ways you have used your biology knowledge in your careers or everyday life.

SAUL PRESSNER '75 is a dentist in New York City. He received his DMD from the University of Pennsylvania in 1979. He is President of the Academy of Biomimetic Dentistry, an organization dedicated to preserving tooth structure and preventing bacterial contamination of restored teeth. He has co-authored an article about this field that appeared in the April edition of the Pennsylvania Academy of General Dentistry news publication.

MEVAN JAYASINGHE '08, a double major in biology and economics & business at Lafayette, completed his Ph.D. in management and human resources at the University of Wisconsin-Madison. He recently began as a tenure-track assistant professor of human resources and labor relations at Michigan State University.

RC PEOPLES '08 is working at the Biomedical Research Institute, Rockville, Md. Operating since the late 1960s and funded through the National Institute of Allergy and Infectious Diseases, this lab maintains the life cycles of three main schistosome species that affect humans. It contracts to supply private investigators across the nation (and in other countries) with schistosome material—infected snails, adult worms, DNA primers of any of the schistosome stages, infected mice, etc. Peoples has been working at the institute for one year, and he has also been able to do a bit of research. He recently presented a poster at the 88th Annual Meeting of the American Society of Parasitologists in Quebec. The study focused on the growth patterns and mortality rates of *Oncomelania hupensis* spp. snails (the snail hosts to *Schistosoma japonicum*) fed various diets of diatoms and/or algae.

ELIZABETH RENTSCHLER '13 recently took a job as a skincare chemist at Avon Cosmetics. She will create formulas for new skincare products (sunscreens, acne treatments, wrinkle reducers, etc.) and improve formulas for existing products. She may also work on projects in the company's personal care and hair departments. ■

ALUMNI VISITS

Last year three alumni returned to the biology department to give talks and meet with current students.

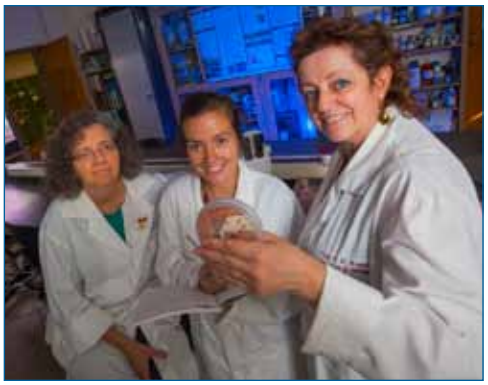
Fabiola Rivas, Ph.D., **Class of 1997**, University of Chicago, Director of Research and Operations of the Institute for Genomics and Systems Biology, "A Career in Editorial"

Barry Sleckman, M.D., Ph.D., **Class of 1983**, Professor of Pathology and Immunology and Conan Professor of Laboratory and Genomic Medicine, Washington University School of Medicine, St, Louis "DNA Damage Response in Cancer: Opportunities for Targeted Cancer Therapies"

Roger Newton, Ph.D., Honors in Biology, **Class of 1972**, Founder, Executive Chairman, and CSO, Esperion Therapeutics, Inc. "The Labyrinthine Career Path of a Lafayette Biology Student: From Academia to Big Pharma to Biotech" ■

GOING GREEN?

Would you like to go green? Let us know and we'll add you to the list of alumni who will receive electronic copies of the newsletters instead of paper copies. ■



A Nalven Fellowship enabled Lindsay Marko '14 (center) to do research with Associate Professors Laurie Caslake (left) and Nancy Waters.

NALVEN FELLOWSHIP: HANDS-ON LEARNING

This summer, **Lindsay Marko '14** rolled up her sleeves and got her hands dirty on a project that could help alleviate local water pollution. She and fellow biology majors **Briette Karanfilian '14** and **Rebecca LaRosa '15** were this year's recipients of the College's Nalven Summer Research Fellowships.

Founded in 1991 in memory of **David M. Nalven '88**, the fellowship program provides opportunities for students to assist biology professors in field-based ecology research. Established by Arthur Nalven, his wife, Rami, and their daughter, Lisa, it commemorates the powerful experience that David Nalven had as a summer research assistant for Associate Professor **Nancy McCreary Waters**.

"It's a living tribute to David," says Waters, the program's adviser. "This program exemplifies the Lafayette community aspect in education at its finest."

Nalven Fellowships have benefited more than 40 students. Nearly half of them have worked under Waters' guidance on projects that include how pesticides affect monarch butterfly development, how disturbances in lake littoral zones impact vegetation patterns, and the role of invertebrates in processing stream debris.

Marko's summer project was studying mercury-resistant bacteria in a section of the Delaware River and Oughoughton Creek with Waters and Associate Professor **Laurie Caslake**. The researchers believe a spill of coal ash, which contains metal contaminants, in the area a decade ago may be contributing to the presence of these bacteria.

LaRosa researched an invasive species of turtle, the red-eared slider. Under

(**NALVEN** continued on page 7…)

COMPUTATIONAL BIOLOGY: EXPANDING OPPORTUNITIES

This semester, the biology department welcomed Lafayette's first computational biologist, Assistant Professor **Eric Ho**. It's a sign of the College's commitment to a growing field that is already heavily used in its labs and classrooms.

Ho, who has an affiliated appointment in the Department of Computer Science, plans to create an up-to-date curriculum that will give students a comprehensive picture of the field "from sequence analysis to protein structure to phylogeny." He hopes to inspire students to incorporate more computational elements into their junior and senior research projects. Lafayette has equipped Ho's research lab with a high-performance computing facility.

"Biologists know the research questions, but may not have the necessary computational skills to solve them. On the other hand, computer scientists have the skills to build computational tools, but may not be able to choose the right problems to solve," he says. "Computational biology provides partnership opportunities for biologists and computer scientists to work with one another to create impactful solutions for complex biological problems."

Many students and professors on campus are taking part in research that merges biology and computational methods. Associate Professor **Elaine Reynolds** has two ongoing projects. The first aims to understand how the pattern of active connections in the brain determines its ability to process information. The second involves creating a computational model of a cell-to-cell interaction during neural development that determines whether a cell becomes a neuron or a skin cell.

"Data in biology is often collected and analyzed with the aid of computers, and if you want to look at complex biological systems, you often can use modeling as a tool to help sort out the effect of any single component," Reynolds explains. "Modeling allows us to take a complex system, make changes in the program that change the interactions between cellular components, and predict the role of the component in the system."

Reynolds believes that having Ho as a resource will provide new opportunities for students and faculty.

"Dr. Ho has formal training and research skills in biology, math, and computer science and has the expertise to teach this field to our students within the context of their biology courses," she says. "Our students will get a more complete view of the field rather than just the parts I might have some experience with in my work."

Jeffrey Pfaffmann, associate professor of computer science, sees the ever-expanding potential that computers have to analyze data and assist in solving research problems.

"Computational biology is important because it represents the future of all data-intensive fields," he says. "Before digital computers existed, humans were sometimes called computers, where they were doing complex numerical work with pencil and paper. With computers, we are free of this menial work and can think about the important problems."

Pfaffmann also stresses the importance for students, since computational techniques are becoming part of mainstream biology.

"Having faculty like Eric Ho allows students access to this computational world and provides them essential understanding of how computers are used to solve problems. Computers are everywhere. Being able to fully utilize these devices will allow their users a greater ability to reach any goal they wish to achieve." ■

(...**NALVEN** continued from page 6)

the guidance of Associate Professor **James Dearworth**, she examined turtle populations and environmental parameters throughout the Northeast.

"The Nalven Fellowship gave me an opportunity to do research that I would not have had otherwise," she says. "It was an invaluable learning experience."

LaRosa's research is important because the red-eared slider has been known to out-compete native species of turtles, and the movement of the turtle from its original habitat in the Southern United States to the Northeast could be affected by changes in the climate. As the most common pet turtle, red-eared sliders are often released into the wild and then take over.

Karanfilian conducted research with Assistant Professor **Mike Butler** on the blue-green pigment biliverdin. Meeting the Nalven family and discussing the work with them was one of her favorite opportunities.

"Biliverdin results from the degradation of senescent red blood cells and is responsible for the pigmentation of bile and eggshells in many bird species," she explains. "Until recently, biliverdin was thought to be a waste product with no crucial physiological function. However, recent research suggests that it may have immune defense properties."

Karanfilian worked on developing protocols to quantify biliverdin in various tissues and used those methods to measure biliverdin levels in birds, specifically European Starlings to which she had issued immune challenges. Since biliverdin is also present in humans before it is converted to a different structure, this research could have implications for humans.

"These fellowships allow us to expand our research experience and develop valuable skills that will help us throughout our scientific careers," she says. ■

BIOLOGY STUDENT AWARDS AND SCHOLARS

WILLIS ROBERTS HUNT PRIZE
Tiffany Kimmel '13
Alex Pong '13

JOSEPH WATT KUEBLER JR. MEMORIAL PRIZE
Alex Pong '13

DR. LORRAINE MINEO TEACHING ASSISTANT AWARD
Dana Purdy '13

NALVEN SUMMER 2013 RESEARCH FELLOWSHIPS
Briette Karanfilian '14
Rebecca LaRosa '15
Lindsay Marko '14

LAFAYETTE COLLEGE

Biology Department
109 Kunkel Hall
Easton, PA 18042

BIOLOGY AT LAFAYETTE: 1915–1942

1915 Beverly Waugh Kunkel, although not primarily a botanist, rather a zoologist, is appointed Jesse Chamberlain Professor of Botany and becomes the first head of the department of biology. He organizes the offerings of the department to his liking, establishing a full-year introductory course in general biology for all degree programs, as well as courses in his particular fields—zoology, physiology, and embryology. He goes on to teach and mentor two students who later win the Nobel Prize.

1916 Biology courses involve five hours of laboratory work per week and a one-hour recitation or quiz. For the first time general biology has become a required course for the other offerings except for sanitary biology, which is required for mechanical and mining engineers, civil engineers, chemists, and students in the general scientific course track. Invertebrate zoology and plant physiology are added to the course roster.

1922 Course offerings expand with general biology going from a one-semester course to a two-semester course. The hygiene course, which was listed separately, is included in the biology section. Also added are advanced classes in bacteriology, evolution and genetics, and an industrial hygiene course. Over the next several years other classes are developed, including cryptogamic botany and seminar classes.

1923 A two-year premedical course is offered through the biology department. Many students go on to medical colleges and contribute to the medical field including Jo Ono of Tokyo, class of 1926, who becomes a leader in the field of bronchoscopy and the executive officer of several international congresses, and H. Keffer Hartline, class of 1923, winner of the Nobel Prize for Medicine.

1930 Willard L. Wachter is promoted to professor after joining the College in 1922. Besides developing

courses in genetics, he received a grant from the John and Mary Markle Foundation to build a small brick wing on the east side of Jenks Hall to house a mouse colony, which becomes known as "the mouse house."

1935 This is the last year the catalog has the biology department under the listing of the Pardee Scientific Department, though the course offerings remain similar.

1938 A grant from the John and Mary Markle Foundation is used to appoint a research fellow in genetics. Ernst Caspari, who had been at the University of Istanbul, is well known for his work on the genetics of the meal moth when he is invited to join Lafayette. He is promoted to assistant professor with a promising career at the College. However, the threat of war and declining enrollment results in a leave of absence, so he continues his research at a large laboratory where he becomes one of the foremost geneticists in the United States.

1942 With the onset of the U.S. involvement in World War II, the biology department suffers greatly. Between the first term of 1942 and the winter term of 1944, the number of students declines from 107 to 22. The College is used to train men for the U.S. Air Force. The biology department staff is reduced with a single small section of general biology being taught to enable the medical students to continue enrollment. ■