

# BIOLOGY

VOLUME 10

LAFAYETTE

WINTER 2014-15

## INTERDISCIPLINARY SCIENCE

“Today’s biology is an interdisciplinary science in which mathematics, physics, and computer science are highly relevant to major biological discoveries in recent decades,” says Assistant Professor **Eric Ho**, Lafayette’s first computational biologist.

This includes the sequencing of the human genome. In his classroom and lab, Ho exposes students to the latest DNA-sequencing technology, called Next Generation Sequencing (NGS).

**Maureen Carey '14**, who is pursuing a Ph.D. in infectious diseases at the University of Virginia, assisted Ho in studying the molecular pathways affected by Lyme disease infection in mice. Carey, who used the project for her honors thesis, worked with Professor **Robert Kurt** on data collection with Lyme-infected mice. She and Ho crunched the data using computational and statistical methods.

The use of NGS in the study of Lyme disease is still a relatively new approach, Ho says. His work has the potential to provide a more precise picture of the mutation profile of cancer tissue and could aid clinicians in targeting cancer treatments more effectively.

**Carter Tillquist '14**, a computer science and mathematics graduate who is pursuing a Ph.D. in quantitative biology at the University of Colorado, assisted Ho last year in building a software simulator to study DNA-sequencing technologies. They presented their work at the 90th annual meeting of the Pennsylvania Academy of Science and at the Great Lakes Bioinformatics Conference.

“My goal is for students to learn how to formulate solutions outside the box, to learn where to find relevant information and how to acquire necessary skills fast,” Ho says. “It is extremely important as the knowledge advances exponentially.” ■

## THE VALUE OF ACADEMIC CONFERENCES



Manuel Ospina-Giraldo has served as a research mentor to many students, including Andrea Parish '15 (L-R) and Emma Brenner '15.

**F**orget Comic Con. Undergraduates encounter biology superheroes at national and international academic conferences and workshops. That’s important for those aiming for graduate school, says Associate Professor **Manuel Ospina-Giraldo**.

“Giving students the opportunity to meet scientists who are conducting the world’s most important research in our field allows them to get an accurate idea of what research means in terms of time, commitment, goals, and achievements,” Ospina-Giraldo says. “In addition, they can compare their work with that being done at institutions similar to ours and develop original research ideas based on their own observations and what they hear and read at these meetings. Networking is another huge benefit too.”

Ospina-Giraldo’s research focuses on the study of pathogenicity-related genes in fungal and oomycete (water mold) pathogens that cause disease in life-sustaining agricultural crops, the plant

genes involved in the defense mechanisms, and the genetic diversity of specific plant pathogens currently found in Pennsylvania.

He has brought students to Virginia Tech’s Virginia Bioinformatics Institute since 2008. Last summer, biology majors **Emma Brenner '15**, **Brandon Ross '16**, and **Andrea Parish '15** attended and participated in the oomycete bioinformatics training workshop. Parish also traveled with Ospina-Giraldo to the Oomycete Molecular Genetics Network international meeting in the United Kingdom, where she presented a poster on her bioinformatics analysis of genes that code for enzymes involved in carbohydrate metabolism in an oomycete plant pathogen.

Ospina-Giraldo’s students prepare hard to deliver successful presentations. They must complete at least one semester of independent study and an entire summer of full-time research in his lab. About six months before a conference, students work

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# BIOLOGY

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Biology is published annually by the Department of Biology, Lafayette College, Easton, PA 18042 for current biology majors, prospective students, and biology alumni with the assistance of the Division of Communications.

**Editors:** Wayne Leibel and Bob Kurt

**Photographer:** Chuck Zovko

**LAFAYETTE**  
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## FROM THE DEPARTMENT HEAD

This has been another productive year for the Biology Department. We supervised nine honors theses, and 78 different students conducted research with us during the academic year, interim session, and summer. We proudly recognize Professor Nancy Waters, recipient of the Marquis Distinguished Teaching Award; Brad Bormann '14, winner of the Pepper Prize; and Mary Higgins '15, winner of a Goldwater Scholarship.

We welcomed Daniel Strombom as our new teaching postdoc (see "Meet Our Newest Member," page 5). And once again, as part of our HHMI project, we worked with faculty in other departments and programs to make biology courses more interdisciplinary. We are extremely grateful to the faculty from six different departments and programs who helped us infuse biology courses this year.

This past year we began taking a more serious look at inquiry-based experiences in the classroom and teaching lab. We were pleasantly surprised to find that many of us were already using some form of course-based research in upper-level classes. This year we will begin assessing the impact of this approach in some of



these courses, and plans are in the works to offer a course-based research experience to select students enrolled in General Biology next year.

Several capital project requests were approved last year, including an update for the vertebrate anatomy lab. We now have three air conditioners in the room and refrigerators

to store the animals when not in use. We also received a much needed air conditioner for one of the research labs. Part of our greenhouse was converted into an aviary, and the administration also came to our rescue when one of our old ultra-centrifuges finally died.

This is the 10th edition of our newsletter, designed to spread the news about great things happening in our department and great things our alumni are accomplishing, and to strengthen connections between alumni and faculty. I hope the publication has helped accomplish this. As always, we love hearing about the great things you are doing, so please keep in touch.



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## INSTILLING CONFIDENCE, INSPIRING PASSION

As a graduate student, Associate Professor **James Dearworth** discovered a passion for research and mentorship that is at the heart of his career.

Thanks to his mentor, the late Allen Granda of the University of Delaware, Dearworth became fascinated by the idea of doing experiments that address how a turtle's eye and brain work. He also was inspired to provide the same kind of guidance to future students that was so pivotal in his own academic development.

"I hope to inspire Lafayette students to find a passion for something that they will want to do for the rest of their lives," he says. "They are our research collaborators. We get to take young, talented, and motivated students and shape them into confident citizens who can move to the next level. I want them to develop academic confidence and the ability to become independent learners."

Dearworth uses the common freshwater red-eared slider turtle as a model for studying vertebrate vision. A popular pet worldwide, the red-eared slider is among the most invasive species on the planet, endangering other native turtle populations. Dearworth concentrates his research on what makes the red-eared slider so adaptable to different environments, specifically the function and anatomy of its visual system.

Biology majors **Sze Cheng '17** and **Olivia Erdman '17** are using confocal laser microscopy with Dearworth and electron microscopy with Assistant Professor **Christopher Anderson** (Chemical and Biomolecular Engineering) to identify the location of melanopsin, a photopigment found in all vertebrates, including humans, in different tissues of the eye.

"The photopigment is just beginning to be understood as it plays a role in non-image forming processes such as the pupillary light response and circadian rhythm," Dearworth explains. "We are interested in revealing how melanopsin works in the red-eared slider, as its differences compared



James Dearworth (left) and Brian Selvarajah '12 collaborated on two articles on the red-eared slider turtle published in *Vision Research*.

to other turtle species could possibly be involved in reasons for its success."

**Kofi Boateng '16**, a double major in neuroscience and anthropology & sociology, and **Rebecca LaRosa '15**, a biology major, are working with Dearworth and Assistant Professor **Megan Rothenberger** to survey turtle populations in the Lehigh Valley. The red-eared slider is native to the Mississippi River Basin.

The team is collecting data to correlate the frequency of different turtle species with the water chemistry where they are found. Last year, Dearworth used funds from a Delta Upsilon Distinguished Mentoring and Teaching Award to survey turtle populations at the University of Michigan Biological Station in Pellston, Mich. Last summer, Boateng and LaRosa collected data with Dearworth at Lacawac Sanctuary in Lake Ariel, Pa.

Cheng, Erdman, and Boateng's

summer work was part of the HHMI-funded Science Horizons Program, which provides significant mentoring for 20 first-year students each year in all aspects of scientific research. LaRosa's work was supported by the David M. Nalven '88 Summer Research Fellowship. They are all continuing their projects this year.

Neuroscience major **Steven Nesbit '17** worked with Dearworth as an EXCEL scholar, developing an electrophysiological method to record from the turtle's optic nerve to determine whether the red-eared slider can detect motion-in-depth stimuli. The research team, which is continuing its work this year, hypothesizes that the turtle's retina can detect looming cues that tell the turtle how close an object is and could be responsive to images growing in size on the retinal surface. The red-eared slider's visual ability could be superior to that of native turtles, providing yet another reason for its extraordinary adaptability. ■

(CONFERENCES continued from page 1)

with Ospina-Giraldo to draft an abstract outlining their research objectives and findings for submission to conference organizers. They also organize their data and produce publication-ready images and illustrations. In the weeks leading up to their presentations, they finalize their presentation materials and practice

several times with Ospina-Giraldo.

Learning how other researchers—from fellow undergraduates to established scientists—approach their work is crucial for students embarking on a research career, Ospina-Giraldo says.

"Frustrating, unexpected, or poor results will always be part of scientific

research. The key to success is figuring out how to move to the next step."

Students working with other biology faculty presented their research results at the Great Lakes Bioinformatics Conference, the annual meeting for the Society for Neuroscience, and the National Conference on Undergraduate Research. ■

# FACULTY AND STAFF UPDATE



**PHIL AUERBACH**, Technician III extraordinaire, performs miracles to keep the building and equipment functional for our teaching and research programs. His duties are too numerous to mention (or keep track of), and he takes the never-ending complex and technical challenges in stride. Last year we included a quote from a student and we include it again: “The biology building is held together by bubble gum, duct tape, and Phil.”



**MIKE BUTLER** taught Human Physiology, Physiology of Extreme Animals, and General Biology (two sections). He supervised three independent study students and an honors student and served as mentor for a Nalven Scholar and an EXCEL Scholar, working on an examination of physiological control and use of bile pigments in wild birds. With Professor Dave Brandes (Civil and Environmental Engineering) he co-supervised an EXCEL student who developed solutions to address the incidence of window-strike avian mortality on campus. He had seven manuscripts accepted for publication, made an oral presentation and served as a symposium organizer at the 131st Stated Meeting of the American Ornithologists' Union (Chicago), and gave two invited seminars.



**LAURIE CASLAKE** taught Molecular Genetics and Capstone in Biology (fall) and Microbiology (spring). She supervised two research students in the fall, five during interim session (supported by the HHMI grant), and one in spring. With Professors Mary Roth and Michael McGuire (both Civil and Environmental Engineering) she advised two students doing interdisciplinary research projects in the summer. The EXCEL program supported research efforts of another summer student. The results of several projects were presented at the Annual Meeting of the Pennsylvania Academy of Science. She completed service as the chair of the Education Division of ASM and has begun serving as chair of the campus Governance Committee.

**JAMES DEARWORTH** taught Comparative Vertebrate Anatomy and Anatomy of Vision and expanded his offerings to include



Neurophysiology. He supervised two biology honors students and several other research students. Their projects used the red-eared slider turtle to investigate behavioral/hormonal measures correlated with circadian rhythms; retinal activities by calcium imaging; location of mRNA in the eye for melanopsin, a photopigment that drives circadian rhythms and slow-pupil responses; and environmental factors that correlate with its presence in Michigan, Maryland, and Pennsylvania. A highlight included publication of a manuscript in *The Journal of Comparative Neurology* showing that the red-eared slider has eye movements unexpectedly more like a human. He gave a talk at the 30th International Pupil Colloquium.



**JOHN DRUMMOND** taught Biology 101 Laboratory (seven sections) and Biology 102 Laboratory (six sections) He supervised eight teaching assistants (TAs) and eight assistant teaching assistants (TAAs) in the fall and six TAs and six TAAs in the spring, and was on hand at all times to facilitate students in the laboratory. He revamped an ecology field lab at Tobyhanna State Park (Northeastern Pennsylvania) estimating the number of red-backed salamanders per half acre. He conducted a Monarch Butterfly Day for 500 visitors at Hawk Mountain Sanctuary (Kempton, Pa.) and an all-day monarch butterfly program for second-graders at Blue Mountain Elementary East (Orwigsburg, Pa.). During Earth Week he gave a talk entitled “The Monarch Crisis: An Endangered Biological Phenomenon.”



**ANNA EDLUND** taught Biology of Women (fall) and Developmental Biology and Biological Pattern Formation (spring). She supervised four research students (fall and spring) and an EXCEL student (summer). She published two articles, one with a student co-author, about their research in Sweden and London, and served on the steering committees for two NSF grants. She presented a student co-authored poster at the Annual Pollen Research Coordination Network Meeting (Charlotte, N.C.) and attended a workshop in Maine on using scientific illustration to teach science. Her service included serving on the

Health Professions Advisory Committee, presenting a community lecture in Easton, and participating in the Emory Tibet Science Initiative.



**BERNIE FRIED** co-supervised with Professor Emeritus Joseph Sherma (Chemistry) three students on analytical chemistry projects related to the *Biomphalaria glabrata* snail during the academic year. With Sherma he supervised another three EXCEL students during the summer, with most of this work relating to the biochemistry of infected and uninfected *Biomphalaria glabrata* snails. With Sherma and Professor Justin Hines (Chemistry) he worked with Science Horizon student Quang Bui on “Lipids in Prions.” He published nine articles in refereed journals; co-edited the 2014 Special TLC issue of the *Journal of Liquid Chromatography and Related Technology*; and co-edited a book, commissioned by Springer, on Digenetic Trematodes with contributions by 20-25 international authorities.



**CHUCK HOLLIDAY** was an informal adviser to several Lafayette seniors and wrote letters of recommendation for six recent graduates. He continues to publish results of his research on cicada killer wasps and has two papers for 2014 submission. He conducted field research in July and August 2013 on our campus population of cicada killers, using his newly-developed trap nest technique to help a colleague who produces natural history films. He began updating his extensive cicada killer pages ([sites.lafayette.edu/hollidac](http://sites.lafayette.edu/hollidac)) continues to update the Wikipedia page that he wrote on the Eastern cicada killer ([en.wikipedia.org/wiki/Sphecius\\_speciosus](http://en.wikipedia.org/wiki/Sphecius_speciosus)).



**ROBERT KURT** taught General Biology (fall) and A Modeling Based Approach to Biology and Cell Biology (spring). He supervised two independent research students in the fall and four in the spring, plus an honors student. He published a manuscript with a Lafayette student co-author. Four research students presented their work at the Pennsylvania Academy of Science meeting and one at the National Conference on Undergraduate Research. He presented



student research results at the American Association of Immunologists meeting (Pittsburgh), served as an academic adviser to 27 students, and worked on his NIH grant with his research students. He served as chair of IACUC and Biology Department head.



**WAYNE LEIBEL** continued offering Evolution and Evolutionary Genetics, advising and mentoring students, and participating in the honors program. He published three articles on cichlid fish and attended the annual convention of the American Cichlid Association (Louisville, Ky.). He continues as associate/technical editor for the *Journal of the American Cichlid Association*. A member of the association's board of trustees, he chairs its Guy D. Jordan Endowment Fund (which awards small grants, primarily to graduate students) and continues as editor of the quarterly magazine *Cichlid News*.



**SHYAMAL MAJUMDAR** supervised two independent research students, co-authored an abstract with a research student, and co-edited a conference proceeding. A fellow of the American

Association for the Advancement of Science, he was chair of the International Scientific Advisory Committee of the Ecotoxicology and Environmental Sciences Conference (New Delhi) and presented a plenary lecture. He served on the editorial boards of the journals *In Vitro: Cellular and Developmental Biology* and *Advances in Pharmacology and Toxicology* and attended the Annual American Society for Cell Biology Meeting (New Orleans). As an external examiner, he evaluated one Ph.D. and one M.Sc. thesis of the University of Cairo.



**MANUEL OSPINA-GIRALDO** taught Phytopathology, Molecular Genetics, Genomics, and Interdisciplinary Seminar in the Life Sciences, and supervised six independent research and two honors students. He also supervised four EXCEL scholars, all funded by external grants. Some of the student research was presented at meetings of the Pennsylvania Academy of Science, American Phytopathological Society, and Oomycete Molecular Genetics Network, and resulted

in four published abstracts. He served on the Enrollment Planning and Biotechnology and Bioengineering Advisory Committees. He advised 34 students. With funding from two federal grants, he attended and supported the travel of his summer EXCEL students to the Bioinformatics Workshop (Virginia Tech), APS meeting (Austin, Texas), and OMGN meeting (Norwich, England).



**LISA PEZZINO** has settled in. As the sign in her office says, "Biology – it GROWS on you!" It has grown on Lisa, with DNA, mice, turtles, birds, frogs, fish, pigs' uterus, chicken eggs, chemicals, and kits that had been foreign to her, and of course booking environmental/ecological trips to zoos, gardens, cranberry bogs, museums, parks, Rodale Institute, etc. She has a great time working with faculty and students and is looking forward to having more things GROW on her in her second year.



On sabbatical for the academic year, **ELAINE REYNOLDS** supervised an honors student and eight other students in research projects, including two Preminger Scholars on research in the field of aging. She taught a course in Greece called Cultures and Landscapes of Greece: Ancient and Modern Perspectives. She co-authored a paper at the 88th Annual Conference of the Western Economics Association International (Seattle), made three poster presentations at the Society of Neuroscience meeting, and co-authored a presentation at the Lehigh Valley Society for Neuroscience. She was an invited speaker at the University City Science Center (Philadelphia), submitted grants to support collaborative research projects, and organized talks at Nurture Nature Center (Easton).



**MEGAN ROTHENBERGER** taught Conservation Biology and Environmental Issues in Aquatic Ecosystems (fall) and Plant Form, Function, & Adaptation and Edible Ethics, the department's first Science and Technology in a Social Context course (spring). During the academic year, she supervised an honors student in Biology and four other students in independent research projects. One of these presented work at the

Pennsylvania Academy of Sciences meeting, and another at the Lehigh Valley Ecology and Evolution Symposium. She also served on honors committees for students in Civil and Environmental Engineering and English.



**NANCY WATERS** taught Ecology and Environmental Biology and Capstone in Biology. Her students were among the 90+ participants in the 10th Annual Multidisciplinary Environmental Poster Session (MDEPS) Conference. As an academic adviser, she counseled approximately three dozen majors and as faculty health professions adviser mentored 50-90 students. Also with HP, she offered four lectures, hosted over a dozen speaker programs, conceived and hosted an alumni dinner panel on work/life balance in medicine, and co-sponsored a panel for life sciences. She co-wrote a Think-Tank Funding Proposal for MDEPS, attended the Council of Lafayette Women, and was an invited speaker/participant in the STEAM-funded workshop Mapping Meaning with the Art Department. She was the recipient of the Marquis Distinguished Teaching Award in the Natural Sciences. ■

## MEET OUR NEWEST MEMBER



**DANIEL STROMBOM** joins the department after working briefly as a researcher at Uppsala University in Sweden. He earned his B.S. in mathematics, M.S. in engineering physics, and Ph.D. in mathematics with specialization in applied mathematics. His research is focused on various aspects of collective motion – how animals move together (e.g., flocks of birds, schools of fish, herds of sheep, and ants on trails). His work proceeds in two main directions: modeling experiments with specific species of animals in order to decipher the interactions rules used by that particular species, and theoretical work investigating the basic requirements for formation and sustained collective motion in general particle systems. He will teach courses on biological modeling and collective animal motion and will work with faculty to infuse more mathematics into biology courses. ■

# 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.

Congratulations to **MARSHALL AUSTIN '71**, winner of the 2014 Papanicolaou Award from the American Society of Cytopathology. The society's highest award, it is presented annually to a physician or Ph.D. in recognition of meritorious contributions to the field of cytopathology.

**DAVE GROMAN '75** has fond memories of working with Bernie Fried, who helped guide him through an independent study project examining fish parasites in the Bushkill Creek. Dave is now section head of Aquatic Diagnostic Services at Atlantic Veterinary College at the University of Prince Edward Island.

**MARK BRAULT '03** left corporate life at Merck to start his own business. He is president and chief maltster of Deer Creek Malthouse ([www.deercreekmalt.com](http://www.deercreekmalt.com)).

**BENJAMIN GOLDSTEIN '07** graduated from Rainbow Babies and Children's Hospital at Case Medical Center in Cleveland and started a pediatric pulmonology fellowship at Rainbow. He was recently married. Congratulations, Ben!

**MEGAN CUMMINS '09**, who is in the M.D./Ph.D. program at the Icahn School of Medicine at Mount Sinai, spoke at Lafayette on "Cardiomyocyte Rate Dependence: Systems Biological Insight and Applications for Antiarrhythmia Therapy" and met with HHMI Science Horizons students. She co-authored a paper entitled "Comprehensive Analyses of Ventricular Myocyte Models Exhibiting Favorable Rate Dependence" in the journal *PLOS Computational Biology* (March 2014). Her cover features her own design.

**STEFANIE WNUCK '10** has been accepted to the Yale School of Forestry and Environmental Studies and will pursue a master's in environmental management. She plans to study climate change policy and is particularly interested in local and

state mitigation and adaptation strategies, given that action continues to stall at the national level. She attributes her passion for the subject to learning experiences at Lafayette, particularly Prof. Nancy Waters' Environmental Biology course and the VAST course on Earth's Climate and Climate Change taught by Prof. Kira Lawrence (Geology and Environmental Geosciences). She worked as an associate for policy and programs at the Product Stewardship Institute, and is looking forward to being back in an academic setting.

**CARLY DAVID '13** accepted a position as a histology technician in the Research Institute at the Children's Hospital of Philadelphia.

**ZACK ROTHKOPF '13** was accepted to Rutgers Graduate School of Biomedical Sciences.

**CHRISTINE VRAKAS '13** has begun the Ph.D. program in biomedical sciences at Temple University.

**MAUREEN CAREY '14** is a Ph.D. student in biomedical sciences at the University of Virginia. She has already published her first paper, "Bone marrow derived dendritic cells from mice with an altered microbiota provide interleukin 17A-dependent protection against *Entamoeba histolytica* colitis" (SL Burgess et al, *mBio*, volume 5, November/December 2014). ■

## 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. ■



Working with a dust-measuring apparatus are Brian Skalla '16 (L-R), Hailey Votta '15, Laurie Caslake, Michael McGuire, and Erika Hernandez '17.

## BATTLING DANGEROUS DUST

A fraction of dust seven times smaller in diameter than an average human hair can cause significant consequences to the environment and to human health. The EPA classifies the dust, known as PM<sub>10</sub>, as a key air pollutant and identifies travel along unpaved roads as the largest anthropogenic source of PM<sub>10</sub>.

An interdisciplinary research team is evaluating its hypothesis that an algae-based biofilm could be a biodegradable treatment for unpaved roads. Biology major **Erika Hernandez '17** and civil engineering majors **Hailey Votta '15** and **Brian Skalla '16** are working with Associate Professor **Laurie Caslake** and Assistant Professor **Michael McGuire** (Civil and Environmental Engineering), through the EXCEL Scholars program.

They are collaborating with Oregon State University's College of Forestry on a proposal for National Science Foundation (NSF) funding to study stabilization of unpaved roads using biologically derived materials.

There are nearly 1.4 million miles of unpaved roads nationwide, about 35 percent of all road mileage, McGuire explains. When the moisture level within an untreated gravel road drops low enough, mechanical disturbances and air currents from passing vehicles create dust clouds that include PM<sub>10</sub>. The pollutant can contribute to heart disease, asthma, emphysema, chronic bronchitis, and chronic obstructive pulmonary disease. It also increases surface water turbidity and creates a light-blocking coating on vegetation.

Solutions include treating unpaved roadways with water, which evaporates

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## EXPANDING COURSE-BASED RESEARCH

For Assistant Professor **Megan Rothenberger**, the best way to coach students as they put the scientific method into action is through course-based research.

In her course Environmental Issues in Aquatic Ecosystems, students tackle a semester-long research project that exposes them to the rigors of real-world research and teaches them how to communicate the results effectively. Students are divided into two teams to study potential management problems in the constructed wetland at nearby Sullivan Park, the presence of aggressive invasive plant species and seasonal algal blooms.

Students learn about the capacity of constructed wetlands to treat storm water and improve water quality. Rothenberger teaches about sampling and analytical techniques, and then the students collect data and compose an environmental assessment report detailing their findings and proposing potential management strategies to the City of Easton.

“Students must think critically about their observations, apply problem-solving skills, analyze data to address relevant scientific questions, and communicate the results to both scientific and non-scientific audiences,” Rothenberger says. “In my field of



Megan Rothenberger (right) and Alyssa Calomeni '11. Calomeni earned an M.S. degree in wildlife and fisheries biology from Clemson University.

environmental and conservation biology, the ability to communicate science to a non-science audience is very important. The knowledge gained through environmental monitoring and research is often applied by policymakers, park managers, and businesses to construct best-management practices, so we must be able to explain our scientific findings in an accessible way.”

Lecture and research go hand-in-hand. In the classroom, students gain a strong foundation in topics such as nutrient

pollution, algal blooms, invasive species, and wetlands loss. One group is tasked with characterizing the wetland plant community and documenting the current mean percentage coverage of invasive species while the second group assesses the relationship between nutrient concentrations and ratios and the development of algal blooms in the retention pond.

The research brings home to students the ways in which environmental issues covered in class are problematic for resource managers in the community and gives them tools to devise potential solutions. The experience motivates many students to pursue more extensive long-term research outside of class. In fact, the majority of Rothenberger’s research students have approached her about additional opportunities after taking one of her classes.

An interdisciplinary course module includes Professor **David Brandes** and Associate Professor **Art Kney** (both Civil and Environmental Engineering). Brandes and a team of Lafayette students installed a wetlands habitat at Sullivan Park, planting native vegetation and mitigating a serious water runoff problem. Their efforts helped earn the Commonwealth of Pennsylvania’s Green Park of the Year Award. ■

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quickly, or the application of a salt-, petroleum-, or plant oil-based solution, all of which can be harmful to the environment. In contrast, an algae-based dust palliative may create a slimy biofilm that may prevent them from drying out and allows colonies to form on soil and rock. The team believes that the biofilms will keep fine particles from becoming airborne and have fewer negative environmental impacts.

Hernandez is charged with finding non-pathogenic bacteria that can survive hot and dry conditions. She monitors the bacteria growth by applying the bacteria to aggregate in a closed container for seven days.

“This project is a new topic in the civil engineering discipline, which is a lot of fun and motivates us all to find a practical solution to this problem,” she says. “Never

did I think I’d learn about how dust can impact humans so much. And I am learning to think like an engineer!”

Votta and Skalla designed and built from scratch the testing apparatus, which will be a key component of the team’s NSF proposal. Using sensors to measure temperature, relative humidity, and air-flow velocity, the apparatus allows the team to observe in real time the relationship between dust production and the relative dryness of the gravel.

“The engineers know about the aggregate and the testing itself, while the biologists have a great understanding of how bacteria grow and work,” says Skalla. “Without extensive help from either side, there would be little progression.” ■

### BIOLOGY STUDENT AWARDS AND SCHOLARS

#### WILLIS ROBERTS HUNT PRIZE

Maureen Carey '14  
Melissa Homsher '14

#### JOSEPH WATT KUEBLER JR. MEMORIAL PRIZE

Emily Zangla '14

#### DR. LORRAINE MINEO TEACHING ASSISTANT AWARD

Heather Bauerle '14  
Emily Zangla '14

#### NALVEN SUMMER 2013 RESEARCH FELLOWSHIPS

Katherine Engberg '15  
Rebecca LaRosa '15  
Emily Lubas '16



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## Biology Faculty



Professor Michael Butler



Professor Laurie Caslake, Assistant Department Head



Professor James Dearworth



Professor Anna Edlund



Professor Eric Ho



Professor Robert Kurt, Department Head



Professor Wayne Leibel



Professor Manuel Ospina-Giraldo



Professor Elaine Reynolds



Professor Megan Rothenberger



Professor Daniel Strombom



Professor Nancy Waters

## Biology Staff



John Drummond  
Lab Coordinator



Phil Auerbach  
Academic Technician



Lisa Pezzino  
Secretary



Greg Biggiani  
Aquatic Specialist

