

# BIOLOGY

## LAFAYETTE

VOLUME 5

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### NEW GENERAL BIOLOGY APPROACH PREPARES STUDENTS TO BE LIFE LONG LEARNERS

Gone are the days when students completed weekly labs with pre-determined outcomes designed to illustrate a specific concept. Instead, a new format in General Biology 101 allows students to have more autonomy in open-ended, interdisciplinary lab modules.

“This is crucial in our first-semester biology courses since these types of experiments form the basis of long-term research projects,” says **Laurie Caslake**, associate professor and head. “We hope that exposing students to this type of research will stimulate them to learn and improve their technical and scientific reasoning skills, as well as interest them in continuing in biology and, ultimately, performing independent research or an honors thesis in biology.”

Students work in small groups on three modules lasting three to four weeks each. In the first module, students study microbial diversity by collecting samples from their environment and cultivating them in the lab. In the second module, students investigate the cell cycle and cancer by counting tumor cells as they grow and determining the growth rate and time tumor cells require to complete cell division. They also use common chemotherapeutic drugs to inhibit tumor growth and investigate requirements cells need to progress through the cell cycle. Module three involves the exploration of genetics using fruit flies. Students try to assess whether chromosomal mutation alters the flies’ responses to alcohol.

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### PROFESSOR MANUEL OSPINA-GIRALDO AND FIVE STUDENTS CO-AUTHOR STUDY PUBLISHED IN *NATURE* MAGAZINE

**Manuel Ospina-Giraldo**, assistant professor, has co-authored a study that appeared in the journal *Nature*. Five of his student research assistants—neuroscience major **Karlyn Horn '10** and biology graduates **Megan Chawner '08**, **John Griffith '09**, **Jessica McWalters '09**, and **Lauren Seyer '08**—are included as co-authors.

Ospina-Giraldo is part of a large international research team that has decoded the genome of *Phytophthora infestans*, the notorious organism that triggered the Irish potato famine in the mid-19th century and threatened this summer’s tomato and potato crops across much of the United States.

“Our most ambitious goal is to figure out the molecular mechanisms by which this pathogen infects potatoes and causes the infamous ‘late blight’ disease. Once we have identified such mechanisms, we can attempt to devise strategies that can be successful at controlling the development of the disease,” he says.

The study reveals that the organism boasts an unusually large genome size—more than twice that of closely related species—and an extraordinary genome structure, which together appear to enable the rapid evolution of genes, particularly those involved in plant



Julie Ehrlich '11, Corey Shea '11, and Christina Mingora '11 work with Manuel Ospina-Giraldo (white coat), assistant professor, on research focusing on a pathogen that infects potatoes with the “late blight” disease.

infection. These data expose an unusual mechanism that enables the pathogen to outsmart its plant hosts and may help researchers unlock new ways to control this enduring and highly destructive pathogen.

“My research has focused on the identification of genes coding for enzymes that can degrade the plant cell wall,” says Ospina-Giraldo. “This research mostly entails computational analysis and bioinformatics [the application of information technology to molecular biology], complemented with what is called ‘wet-lab experiments,’ where we look for experimental evidence that supports the computational predictions.”

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# BIOLOGY AT LAFAYETTE

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# LAFAYETTE

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## FROM THE DEPARTMENT HEAD

I write this as the fall semester is winding down and holiday lights are being hung. The excitement among students returning from Thanksgiving break and looking forward to the end of the semester is palpable. These are a few items for which we are thankful.

**New faculty.** In other places in this newsletter you will meet our newest additions—Prof. Anna Edlund and Megan Rothenberger. Prof. Edlund, a Developmental Biologist, joins us from Spelman College in Atlanta. Prof. Rothenberger, a Conservation Biologist, joins us from the University of North Carolina at Greensboro. Our students' education will be enriched through their access to these dedicated teacher/scholars.

**Colleagues.** After a year-long sabbatical, I return as Department Head. While I had a productive sabbatical and enjoyed living in sunny Arizona for 13 months, I missed Easton and my colleagues. I am inspired by the superior teacher/scholars in the Biology Department. Many of you have fond memories of a favorite professor—you can read about their many endeavors in other sections of this newsletter. And pay attention to the articles on our students—their accomplishments are truly impressive.

**Interdisciplinary Interests.** We continue to support the Neuroscience program, which generates robust enrollments. Prof. Reynolds continues to be involved with the program and

also serves as the academic advisor for the Lafayette Society for Neuroscience. An outcome from the College's Strategic Plan is the new Health and Life Science Minor. Prof. Kurt has been instrumental in the design and development of this minor. We continue to be involved in both large and small ways in developing the Environmental Science and Studies programs. Both Prof. Leibel (Env. Studies) and Prof. Waters (Env. Science) are members of these advisory committees.

**Kunkel Hall.** Kunkel Hall serves us well. In celebration of its 40th birthday, we are designing a new building—called the Life, Earth, and Environmental Science Building. Lafayette has embarked on an ambitious plan to build a building to house Biology, Computer Science, and Geology and Environmental Geosciences Departments as well as our interdisciplinary interests. It has been challenging to envision future changes in teaching and learning and to design a building flexible enough to grow with us.

Enjoy the newsletter. As always, we love to hear how you are doing.



## PROFESSOR MANUEL OSPINA-GIRALDO AND FIVE STUDENTS CO-AUTHOR STUDY PUBLISHED IN *NATURE* MAGAZINE

(Continued from page 1)

Ospina-Giraldo has used 12 student research assistants on the project. Their participation has been funded in part by a \$2,130,497 National Science Foundation grant, Lafayette's EXCEL Scholars program, and student scholarships from the **David M. Nalven '88** Summer Research Fellowship and the **Roger Newton '72** Research Fund.

"I think our biology students must become familiar with the scientific method and its practice. Regardless of their career goals (life or health sciences, policy studies, etc.), they should have a

minimum understanding of how the scientific method works in real life. A project with 'real world' applications can be very appealing to them and facilitate the understanding of how scientific research is conducted," he says.

Other students who have been involved in the research are biology majors **Kristen Darragh '11**, **Julie Ehrlich '11**, **Gabriela Firak '11**, **Christina Mingora '11**, and **Corey Shea '11**; neuroscience major **Emma Laird '10**; and biology graduate **Jonathan Schimmel '09**. ■

# PROFESSOR ROBERT KURT RECEIVES \$190,000 GRANT FROM THE NATIONAL INSTITUTES OF HEALTH

**R**obert Kurt, associate professor, has received a three-year, \$190,000 grant from the National Institutes of Health/National Cancer Institute to research new ways for the human body to fight off cancer.

According to Kurt, the immune system normally responds to microorganisms because they do not look like human cells. Cancer cells are able to avoid the immune system by looking like normal cells. In short, the immune system recognizes microorganisms as dangerous and cancer as not dangerous.

“It turns out that the proteins that our immune system uses to ‘see’ microorganisms are also found on cancer cells. These proteins are called toll-like receptors. This means that if cancer cells ‘see’ microorganisms with their own toll-like receptors, they may start an immune response,” he says. “The idea of the grant is to show cancer cells parts of microorganisms so that the cancer cells start an immune response, and then we will determine how this influences tumor growth and metastasis.”

Kurt’s research program with students was instrumental in getting the grant. Some students who have worked on related projects include: neuroscience major **Christopher Blum ’10**; biology graduates **Jacqueline Golden ’07**, **Alison Huggins ’09**, **Priyanka Nair ’08**, **Monika Sajduk ’07**, **Erica Sgroe ’09**, **Emily Smith ’08**, **Casey Vasta ’09**; and neuroscience graduate **Karolina Janasek ’07**. This academic year, biology majors **Afua Akuffo ’11**, **Samantha Chalmers ’11**, **Adetutu Egunsola ’11**, and **Carolyn Zawislak ’10** will continue the project.

Although there are many benefits stemming from this research, Kurt describes the immune response against cancer as a double-edged sword. “While the immune system can kill tumor cells and be used to save lives, there are aspects of the immune response that make cancer cells grow faster and spread (metastasize).” ■

## BIOLOGY STUDENT HONORS, AWARDS, SCHOLARS

### HONORS STUDENTS

**Megan A. Cummins ’09** “Numerical simulation of hemodynamics in patient-specific atherosclerotic carotid arteries”

**Hannah Fink ’09** “Atrazine, desethyl atrazine, and 17 $\beta$ -estradiol ecotoxicity: experimental evidence and chemical assays for endocrine disruption in the common scud, *Hyalella azteca*”

**Jessica M. McWalters ’09** “Detection of cutinase gene expression in *Phytophthora infestans*”

**Steven D. Melnic ’09** “Detection of polarized light by the freshwater turtle (*Trachemys scripta elegans*)”

**John Griffith ’09** “Investigation of the potential role of a xylanase-inhibiting protein in plant defense against *Phytophthora infestans*”

### THE WILLIS ROBERTS HUNT PRIZE

**Lisbeth Boule ’09**

**Julie McNeish ’09**

### DR. LORRAINE MINEO TEACHING ASSISTANT AWARD

**Colleen Sullivan ’09**

## STUDENTS PRESENT RESEARCH PROJECTS AT PENNSYLVANIA ACADEMY OF SCIENCE

Six biology graduates and majors and one neuroscience major presented research papers with their faculty advisers at the 85th annual meeting of the Pennsylvania Academy of Science in March.

**Julie McNeish ’09** and **Jennifer Romano ’10** worked on two related projects focusing on eye studies of turtles with **James Dearworth**, assistant professor. McNeish presented “Morphology of the superior oblique in the red-eared slider turtle, *Trachemys scripta elegans*,” and Romano presented “Pupil constriction evoked by stimulation of the ciliary nerve in the red-eared slider turtle, *Trachemys scripta elegans*.” McNeish is also a member of the College’s NCAA Division I field hockey team.

**Jessica McWalters ’09** and **Jonathan Schimmel ’09** performed related research on fungal organisms that cause potato blight with **Manuel Ospina-Giraldo**, assistant professor. McWalters presented “Analysis of cutinase gene expression in *Phytophthora infestans*,” and Schimmel presented “Investigation of a putative family 5 endoglucanase in *Phytophthora infestans*.”

**Karen LeSage ’10** presented the paper “Infectivity, growth, and development of *Zygoecotyle lunata* in Balb/c mice” with **Bernard Fried**, Kreider Professor Emeritus of Biology.

**Erica Sgroe ’09** and neuroscience major **Christopher Blum ’10** presented research they performed on cancer cells with **Robert Kurt**, associate professor. Their project is titled “Using real time Q-PCR to compare TLR gene expression in tumor cells and dendritic cells.”

### ROGER NEWTON SCHOLAR

**Kristen Darragh ’11** “Gene expression analysis in *Phytophthora infestans*, cause of potato late blight disease”

### NALVEN SUMMER 2009 RESEARCH FELLOWSHIPS

**Elizabeth L. Engoren ’12** “Generational responses to endocrine disruption exposure in *Hyalella azteca*”

**Jennifer Tillman ’10** “The role of slope aspect on lizard thermoregulatory behavior: thermal opportunity provided by north- vs. south-facing slopes” ■

# FACULTY AND STAFF UPDATE



**PHIL AUERBACH**, technician III, is an outstanding and skilled individual who continues to perform, as he has for many years, many complex and technical jobs in the department. He continues to be chief cook-and-bottle washer-utility infielder for the department, and does so with unflappable good humor. The biology staff continues to find his service and contributions invaluable. We could never do it without him!



**LAURIE CASLAKE**, associate professor and head, spent the academic year on sabbatical at Arizona State University. With support from a National Science Foundation Research

Opportunity Award, she studied the mechanism of survival of desert-crust microbes in the lab of Ferran Garcia-Pichel, associate professor of ecology, evolution, and environmental science. With support from both Lafayette and NSF, biology major **Chris Cosgrove '10** joined her at ASU for two weeks in January and five weeks in the summer. In addition to the NSF-ROA, she has an active grant with collaborators at the University of California, Davis to study microbial strengthening of soil. Caslake serves as the chair of the Undergraduate Research Fellowship Program for the American Society for Microbiology.



This year, **JAMES DEARWORTH**, assistant professor, taught Comparative Vertebrate Anatomy, Anatomy of Vision, and Neuroanatomy. Eight students were co-authors on

four abstracts that included presentations at the Society for Neuroscience meeting, Pennsylvania Academy Science, and ARVO (Association for Research in Vision and Ophthalmology). Several students were also co-authors on a paper published in the journal of *Veterinary Ophthalmology*, and a second paper accepted for publication in the journal of *Visual Neuroscience*.



In fall 2008, **JOHN DRUMMOND**, general biology lab coordinator, taught seven laboratory sections, and in spring 2009, he taught six laboratory sections while also supervising 14 teaching assistants who helped facilitate the labs. He attended the National Association of Biology Teachers conference in October 2008 and the Association for Biology Laboratory Education conference in June 2009. In April 2009, he also attended a Monarch Butterfly Conservation workshop held in Texas.



**BERNIE FRIED**, Kreider Professor Emeritus, continues to be an asset to the biology department with his collegiality, productivity, and willingness to mentor students despite his retirement. Bernie co-edited a book on the biology of echinostomes and supervised two EXCEL students during the academic year and four EXCEL students during the summer. This past year, he published 18 articles, 14 of which included Lafayette students as co-authors.



**CHUCK HOLLIDAY**, professor, taught Comparative Animal Physiology and General Biology. He published seven papers on the biology of cicada killer wasps in 2008-09 on topics

including the use of DNA bar-coding in cicada killer systematics, how the wasps dig their burrows, mating at high wasp population densities, and the relationship between female wasp size and the size of the cicadas with which they feed their young. Holliday is on sabbatical leave this fall, doing more field work on cicada killers in Florida and in the mining ghost town of Ruby, Ariz., using his travel trailer as a field research lab, just a few miles north of the Mexican border.



**ROBERT KURT**, associate professor, was on sabbatical fall 2008, taught Immunology and a Values and Science/Technology course in spring 2009, and worked with seven

different independent research students throughout the school year. Two manuscripts were accepted for publication with Lafayette students as co-authors. Presentations were given at the Pennsylvania Academy of Science meeting by two of his students, and he presented student research results at the American Association of Immunologists annual meeting in Seattle, Wash. Kurt served on the *ad hoc* Life Sciences Initiative Committee and the Biotechnology/Bioengineering Advisory Committee.



**WAYNE LEIBEL**, Kreider Professor, taught Evolutionary Genetics, the First-Year Seminar 'Us' vs. 'Them,' The Human Group Imperative, General Biology, and Evolutionary

Biology. He also oversaw the independent research of biology major **Christine Chen '11** and biology graduate **Elizabeth Clearfield '09**. He attended two professional meetings, gave four invited talks, and also published 11 articles on cichlid fishes. He continued his work as associate editor/technical editor for the *Journal of the American Cichlid Association*, as chair of the Guy D. Jordan Endowment Fund of the American Cichlid Association (which administers small grants for cichlid research for graduate and post-doctoral students), and as a member of the editorial board of *Tropical Fish Hobbyist* magazine. He continued to serve as a member of the *ad hoc* building committee and as a member of the environmental studies working committee. He stepped down as head of biology in August after nine years, and was appointed director of research services overseeing intramural grants, particularly the EXCEL research program.



**SHYAMAL MAJUMDAR**, Kreider Professor Emeritus, attended several national and international meetings. He was awarded the E.P. Odum gold medal at the International

Symposium on Recent Trends in Life Science Research, held at Vinoba Bhave University in India in June, for his distinguished contributions in the field

of life science. Majumdar co-authored three scientific articles with his research students. He is co-editing a book titled *Avian Ecology and Conservation: A Pennsylvania Focus With National Implications*. The book is scheduled to be published in December 2009.



**PAULETTE MCKENNA** continues to run the department in her inimitable way. Keeping the faculty fed, caffeinated, and fully supplied with snacks and sweets, she is looking forward to the challenges of a new academic year especially with the arrival of two new professors. Faculty and students alike rely on her numerous abilities to keep the department functioning flawlessly.



**MANUEL OSPINA-GIRALDO**, assistant professor, taught Genetics, Genomics, and Mycology, and advised three independent research students and two honors thesis students. With funding obtained from the Oomycete Molecular Genetics Network, Ospina-Giraldo was able to support the travel of three of his research students to the Oomycete Bioinformatics Resources Training Workshop at Virginia Tech. Ospina-Giraldo attended the 2008 centennial meeting of the American Phytopathological Society in Minneapolis, Minn., and the Oomycete Molecular Genetics Network meeting in Pacific Grove, Calif., where he chaired one of the oral presentation sessions.



**ELAINE REYNOLDS**, associate professor, taught Biology 101, Intro to Neuroscience, and Neurobiology. She also supervised one honors student in neuroscience incorporating art and neuroscience, eight students in advanced research in neuroscience and one EXCEL Scholar. This summer, Reynolds continued working on a neurocomputational project with an EXCEL Scholar, **Chun Wai Liew**, associate professor and head of computer science, and Ethan Berkove, associate professor of mathematics, and she is co-supervising two additional scholars with

**Peter Zani**, visiting assistant professor of biology, on a behavioral ecology project. She co-authored a presentation with her students at the Society of Neuroscience meeting in Washington, D.C., and presented at the Drosophila Research Conference in Chicago, Ill., on a neurocomputation project with Jeff Pfaffman, assistant professor of computer science, and at the 13th International Conference on Cognitive and Neural Systems on a neurocomputation project with students in Boston, Mass. Reynolds served as chair of the neuroscience program, as a member of the Curriculum and Educational Policy Committee, and as a member of the Community Based Learning and Research Committee. In a professional capacity, she reviewed grants for the SOMAS program, several papers, and is a coordinating editor for *Biochemical Genetics*.



**NANCY WATERS**, associate professor, offered Environmental Biology, a Values and Science/Technology course "Pharmaceutical Science and Ethics, Botany and Biodiversity, and Ecology." Her honors student, biology graduate **Hannah Fink '09**, successfully defended a thesis on toxicity of the herbicide atrazine in aquatic scuds, which led to subsequent work by chemical engineering major **Elizabeth Engoren '12** supported by a Nalven Award. Two other student researchers—biology graduate **Kat Kretzmer '09** and computational biology graduate **Jackie Marchese '09**—completed related work on germination inhibition and atrazine impacts on monarch butterflies. She authored a book chapter on impacts of environmental contaminants on bird population ecology, and presented research at the Lehigh Valley Ecology and Environment symposium. With colleagues in chemistry, civil and environmental engineering, and geology, she was principal investigator on a recently submitted National Science Foundation Major Research Instrumentation Proposal. She chaired the Graduate Studies and Fellowships Advisory Committee and was appointed to the Environmental Science Advisory Committee and elected chair of the Faculty Committee on Athletics. ■

## MEET OUR NEWEST MEMBERS



**MEGAN ROTHENBERGER '02** joins the department as an assistant professor. She earned a bachelor of arts in biology from Lafayette and a Ph.D. in botany from North Carolina State University. She was a postdoctoral fellow in the biology department at the University of North Carolina at Greensboro where she taught courses in general and environmental biology and performed research in aquatic ecology. At Lafayette, she will be teaching courses in general biology and conservation biology. Her research uses a combination of modeling approaches and field experiments to advance understanding about the impacts of human activity on aquatic ecosystems.



**ANNA EDLUND** comes to the department from Spelman College where she served as an assistant professor of biology since 2003. She earned a bachelor of arts in biology from Swarthmore College and a Ph.D. in cell and developmental biology from the University of California, Berkeley. At Spelman, she taught developmental biology, and, with her undergraduate research students, studied pollen cell behaviors in flowers using the model genetic organism *Arabidopsis thaliana*. She was awarded three National Science Foundation grants for these projects. She has worked collaboratively with artists, in particular the Cirque de Soleil performance group Lelavision, with which she developed an educational video about pollen tube behavior and fertilization in flowers, titled "Fertile Eyes." The video won the grand prize in the Chlorofilms video contest. They also collaborated on a live performance piece, titled "The Anther, My Friend," which was performed in Georgia, and for over 1,200 school children in Saint Paul, Minn., in the summer of 2009. At Lafayette, Edlund will teach Developmental Biology, Introductory Biology, and a course called The Biology of Women.

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.

As a physician, **DEBBIE CIPRIANI '80** helped nurse babies back to health and support their parents through a stressful time. Now she's supporting health on a larger scale, working in the corporate world to ensure that medications are both effective and safe.

"This sounds so schmaltzy but it is the honest truth: I know what I do makes a difference," says Cipriani, who has been with Johnson & Johnson's drug safety department for about five years. "I am so proud and privileged to be able to do this work."

Cipriani studies side effects to ensure that only the safest products remain on the market. "We are a group of medical professionals—nurses, physicians, pharmacists—who help to assure the drugs we are using are safe,"



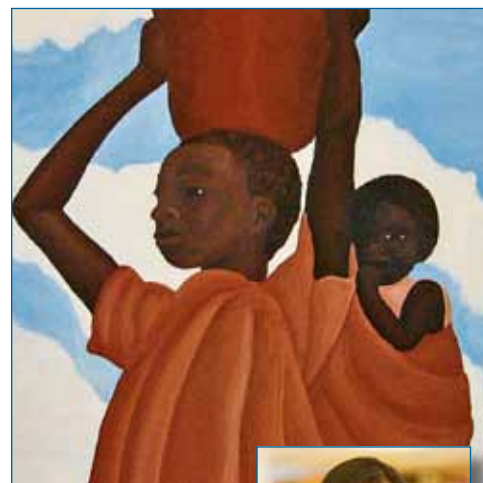
**Alfonzo Owens III '75** founded Cumberland Diagnostic and Treatment Center to tend to the oral-health needs of the underprivileged.

she says. "We assess all instances when a patient or a physician contacts our company with a concern that one of our drugs has caused a side effect, and we look at all the reports on each drug in a given year and are continually re-assessing the safety profile of each drug."

**ALFONZO B. OWENS III '75** uses his career as a dentist as a way for him to help the less fortunate. He co-founded Cumberland Diagnostic and Treatment Center to tend to the oral-health needs of the underprivileged. Owens works with three other dentists to deliver high-quality care at the center, which is part of New York City's public hospital system, the largest municipal health-care system in the country. His patients, mostly Caribbean, Hispanic, and Eastern European immigrants, cling to the promise of the American dream and hope for a better future, a hope Owens has nurtured for more than 27 years.

"I look at each person as an individual and as a child of God," Owens says. No matter their economic situation or hardships, his patients know Owens will "treat each person as I would like to be treated." Owens credits his family as the foundation of his career success and life principles. His grandmother, Emma, worked as a domestic to put Owens' father through dental school. She later lived with Owens' family and "reinforced all the values of my parents." His father's commitment to dentistry—54 years in private practice until his death in 2004—spurred Owens to follow his father's lead, a direction that began taking shape at Lafayette.

A sprinter in high school, Owens sought out Lafayette for its balance of academics and athletics. "I didn't want a program that put sports first and academics second," he says. "Lafayette helped me to look at things from a sci-



Artwork by Chiquita Palha De Sousa '08 was featured in an issue of *Dartmouth Medicine*.

entific point of view" and "allowed me to build my confidence in myself, in my own abilities and be more comfortable when interacting with people in different settings."

**CHIQUITA PALHA DE SOUSA '08**, a second-year student at Dartmouth Medical School, was featured in the summer 2009 issue of *Dartmouth Medicine*. An article focuses on "Sisters," a painting she created as part of her senior art project at Lafayette. The painting "depicts a young girl, orphaned by AIDS, fetching water to care for herself and her younger sister, whom she is carrying on her back," she explains in the article. "I tried to portray sadness, but determination and hope, as she keeps her chin up bravely and walks determinedly to the river."

A native of Zimbabwe, De Sousa first felt the devastating effects of the AIDS epidemic when it took the life of the daughter of her family's domestic worker. She writes about this and her art in a first-person piece posted on the *Dartmouth Medicine* web site. ■

## GRAYSON SIPE '10 PRESENTS RESEARCH AT INTERNATIONAL VISION CONFERENCE

Neuroscience major **Grayson Sipe '10** presented research focusing on the turtle's iris and its sensitivity to light at the annual meeting of the Association for Research in Vision and Ophthalmology in May.

The conference brings together more than 10,000 vision researchers and practitioners from around the world to discuss the issues of eye disease and treatment.

Sipe's research is part of an ongoing EXCEL project under the guidance of **James Dearworth**, assistant professor. The researchers have identified that the iris of a turtle can respond intrinsically to light without feedback from the brain. This fall, Sipe is working on an honors thesis on a related topic.

Sipe believes that both the research and conference experiences will help him in the future. He plans to pursue a Ph.D. in visual neuroscience at graduate school.

Lafayette and its focus on close student/faculty interaction has been a perfect fit for Sipe, as he wants to become a professor and researcher at a small liberal arts institution.

"All the advice, experience, and guidance I receive from Professor Dearworth are indispensable, because I will hopefully be in a similar position in the future," he says.

## HONORS THESIS PREPARES HANNAH FINK '09 FOR PH.D. PROGRAM

For her honors thesis, biology graduate **Hannah Fink '09** put together lab studies that measure the toxicity of the herbicide atrazine. Fink, who is also a member of the College's women's soccer team, worked with **Nancy Waters**, associate professor of biology, and **Steve Mylon**, assistant professor of chemistry.

Atrazine is a common herbicide used in corn production that previous studies have shown to be an endocrine disruptor at low concentrations. Fink's thesis established a method to measure atrazine and desethyl atrazine, one of atrazine's degradation byproducts, for use in ecological toxicity studies on *Hyalella azteca*, a tiny crustacean related to the crayfish. I am looking at the fate of the two chemicals in the experimental aquatic system as well as the reproductive and developmental effects on the crustaceans.

"My honors thesis was a crucial first step in preparing me for a career in aquatic toxicology," says Fink. "This fall, I am in the Ph.D. program in toxicology at University of Maryland. My purpose in pursuing a doctoral degree is with the long-term objective of conducting meaningful and novel research in either an academic setting or for the Environmental Protection Agency that will positively impact the health of the human race and the environment we live in."

Her research allowed her to learn methodology and techniques that she is now applying to her graduate studies. In addition, conducting an honors thesis was beneficial in helping advance her writing skills in preparation for a Ph.D. thesis. ■

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According to Caslake, the interdisciplinary focus of the modules appeals to the approximately two-thirds of the students taking the class who are not biology majors.

"Many of the current problems facing society are interdisciplinary – health care, global warming, food production," says Caslake. "By having students working across disciplines starting in their first year, they will see biology's contribution to the solutions to these challenges."

According to **John Drummond**, general biology laboratory coordinator, the modules enable students to understand science as a process. He already is receiving positive feedback. The cancer module enabled one student whose relative is a cancer survivor to understand more about the disease. Another biology

major enjoyed the freedom to choose the lab's direction.

"One recurring theme with the new lab format is real-world applications," explains Drummond. "Here's an example: We've devised alternative forms of assessment for each module. At the conclusion of module one, students present posters summarizing their efforts. These posters are in the style presented at professional conferences. Their peers and faculty are invited to review their posters. We also feel these labs provide students with a glimpse of what conducting research in a lab is really like, hopefully stimulating interest in independent research later as juniors and seniors."

In module three, students use fruit flies as a model for alcoholism. They get fruit flies "drunk" to test the impact a particular mutation has on the flies' responses to

alcohol. Upper-level students will take the initial research and test it further in their own labs where it eventually could tie into ongoing research by **Elaine Reynolds**, associate professor of biology and chair of neuroscience.

The labs also incorporate technology familiar to students. For module two, students use iMovie '09 to develop a five-minute movie detailing cell division and then upload it to YouTube and link it to a WordPress web page, allowing other students and faculty to comment on and critique the videos.

"By starting our students out with these hypothesis-driven experiments, we inoculate them in the scientific process at the earliest stage," says Caslake. "This experience is something we can count on in our upper-level courses and allows us to expect higher-level thought processes." ■



## THE LEGACY OF THOMAS CONRAD PORTER LIVES ON

BY WAYNE S. LEIBEL

A trove of papers belonging to **Thomas Conrad Porter**, Class of 1840 and one of Lafayette's most distinguished early professors, has been donated to Skillman Library's Special Collections and Archives.

The generous gift was provided by Porter's descendants, **Samuel Willet Martin '50**, his great-grandson, and **Kristina C. Martin Mulligan '91** and **Torrey Schlesing Martin '93**, great-great-grandchildren. The papers date from 1839-1901 and document Porter's career as botanist, theologian, poet, professor of biology at both Franklin & Marshall and Lafayette colleges, and author, best known for his book *The Flora of Pennsylvania*.

Porter, born in Alexandria, Pa., in 1822, graduated from Lafayette at the age of 18. He subsequently graduated from Princeton Theological Seminary in 1843 and was licensed to preach in 1844. In 1848 he took charge of the newly organized Second German Reformed Church in Reading, Pa. One year later, he resigned his ministerial post to become professor of natural sciences at Marshall College in Mercersburg, Pa., an appointment he continued when the institution later moved to Lancaster and consolidated with Franklin College in 1853 as Franklin & Marshall College. While there, Porter published his first botanical paper in 1850. The subject was a collection of plants by botanist T.A. Culbertson in Missouri.

In 1866, Lafayette President **William Cattell** appointed Porter as professor of botany, zoology, and general geology, a position he held for 30 years until his retirement in 1896. Porter was one of the leading botanists of his day, and his correspondence with other botanists and extensive herbarium brought the



**Thomas Conrad Porter, Class of 1840, served as professor of botany, zoology, and general geology from 1866-1896.**

College great prestige. As early as 1869, he was engaged in his botanical survey of Pennsylvania under an appropriation from the state and at the request of the Philadelphia Academy of Natural Science. Porter stuffed mammals and birds, pinned and spread insects, mounted and articulated skeletons, and put them all on public display.

Porter organized The Natural History Society in 1868, and remained its president, even as professor emeritus, until his death in 1901. Collections of fauna, flora, and minerals, which the society assembled from an area within a radius of 25 miles of Easton, were displayed in the society's dedicated 'museum' room that also housed Porter's herbarium and library and served as the official meeting room for the Natural History Society.

To this day, the biology department

still houses some of these original specimens, many of them on display in Kunkel Hall, supported by an annual endowment for their perpetual curation. Following his death, Porter's herbarium moved to the Philadelphia Academy of Sciences, which still houses its pressed botanical specimens that are available for study; we regularly receive inquiries as to their whereabouts by botanists from around the world. Less well known, but vitally important to the landscape of Lafayette, was Porter's role in the selection of the many species of trees that still grace the campus, especially on the south lawn of Pardee Hall.

As a practicing botanist, Porter's work included surveys of Colorado and Pennsylvania flora. Porter made his first visit to Colorado in 1869. For five years, he explored and collected in the central Rocky Mountains. During these trips, he and his field crew accompanied F.V. Hayden of the U.S. Geological and Geographical Survey of the Territories. As a result, he co-authored *Synopsis of the Flora of Colorado*, the first guide to the plants of Colorado, in 1874, which identified several 'new' species. Over his 50-year career, Porter added 22 new species to the North American flora and at least 15 species were named in his honor.

His lifelong wish to publish a flora of Pennsylvania was made possible by a provision in his will in 1903, two years after his death. John Kunkel Small of the New York Botanical Garden produced *The Flora of Pennsylvania* based on Porter's notes and specimens. This 361-page magnum opus, a systematic catalog with dichotomous key of the native plants of his home state, is now exceedingly rare, but may be had in facsimile reprint edition. ■