

Experiential Learning in the Biological Sciences

Making discoveries and connecting theory with practice through hands-on learning inside and outside the classroom is what experiential learning is all about. The UD department of biology provides many unique opportunities for undergraduate students to practice science through a variety of hands-on experiences.

Engaging in experiential learning encourages students to make connections between lecture material and actual scientific experimentation in the classroom laboratory, research laboratory or out in the field.

"The benefit of experiential learning to the biology students, and even to the nonmajors, is that they learn what it is like to do science," explained Dr. Jayne Robinson, biology department chair. "Almost every class that we offer has a laboratory associated with it, and so the hands-on learning in the laboratory complements the lecture material." Students also enjoy experiential learning through internships, field-based courses, study abroad courses and in the research laboratory.

Biology students, as well as other science majors, can sign up to work in a UD biology professor's lab and partake in an independent research project for academic credit, or as an honors thesis student. Undergraduates then experience writing a research report and presenting their results at the UD Stander Symposium.

"Some of our students publish their work in scientific journals and present their findings at national or even international meetings, which is a great accomplishment," said Robinson.

Within the research lab, both biology faculty and graduate students mentor students who are researching individual projects and learning lab protocols. A professor's UD lab functions as a team in a structure similar to the professional research environment. Students form

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Grace Willkomm ('14) discovers a crab while exploring a beach in Hawaii during the marine biology course

close bonds with their lab colleagues and experience firsthand research as a career. Participation in experiential learning through biological research is an invaluable asset to students pursuing graduate and medical school programs, as those schools favor students with real-world experience. "There's a lot of emphasis across the country on experiential learning,"

Robinson said. "We've been doing it here for a very, very long time. All of our majors are given the opportunity to do research and over 60 percent of our majors do a significant research project, not just for a week or a month; some of them work in the same lab for an entire four-year period. By the time they're a second- or third-year student, they're performing at the level of a graduate student

... biological research is really the training of the mind."
Learn more in the stories on pages 3-8 about the discoveries our students make through experiential learning — discoveries that impact their education and their future.



Hailey Kwon: Making connections through undergraduate research

Learning outside the classroom is all about making connections for junior Hailey Kwon. Kwon, who majors in biology and philosophy, began working in Assistant Professor Madhuri Kango-Singh's lab as a first-year student and has taken full advantage of her opportunity to conduct undergraduate research.

Kango-Singh's lab is studying the genetic basis of cancer, often indicated by the abnormal function of a signaling pathway called Hippo. Abnormal Hippo signaling function is commonly reported in liver and lung cancers. Kwon is studying the C-terminal Src kinase (*csk*) gene, previously known as a gene that is part of the Src pathway, for her UD honors thesis. She hypothesizes the tumor-suppressor gene *csk* is involved in regulating growth through the Hippo pathway.

Kwon's research experience in the lab is enhanced by the personal relationship she has developed with Kango-Singh, whom she describes as an inspirational woman and research expert, as well as a valued mentor.

"She's very inspiring because she's also a mother of two children," Kwon said. "She's handling her job along with research, classes and family. I think having a female mentor really helped me to see that it's possible for me to do this too, without sacrificing a career to have a family. ... She cares about my health, not only about my research. I'm very grateful to have her as my adviser, and I think she has been such a great influence."

Kwon was selected for a 2013 Berry Summer Thesis Institute fellowship, a program that allows honors students to develop their thesis starting the summer after sophomore year. During her fellowship, Kwon particularly enjoyed the service component of the program. She chose to volunteer at Hospice of Dayton, where she had the opportunity to connect the effects of cancer on a person with studying the disease at a molecular level.

"Being interested in medicine, I was always intrigued by cancer and how growth is regulated," Kwon said. "Patients have to suffer from all of the side effects of chemotherapy. By studying those genes at a molecular level, we can make the



Hailey Kwon

treatment more tissue specific so we don't have to compensate normal cells from being affected by cancer treatment."

During summer 2014, Kwon will conduct research at MIT as part of the Amgen Scholars Program. She was one of only 25 Amgen Scholars selected from more than 1,000 highly qualified applicants. The prestigious fellowship includes research pay, housing, food and funding to attend the Amgen Scholars National Symposium at the University of California, Los Angeles.

Kwon has found her research experience invaluable, as she aspires to earn an M.D.-Ph.D. "I think the most important part of doing research was confirming that this is what I want to do for the rest of my life," Kwon said. "I find it to be one of the most rewarding experiences I could ever have in college. ... Research gave me a glimpse of the academic life, and I really enjoy it."

Learn More About Student Experiential Learning Discoveries

Biology major Madison Irwin featured in the UD Honors Program Berry Summer Thesis Institute video:
youtu.be/JVlo1xlRxxU

Biology alumna Caitlin Cipolla-McCulloch ('12) video:
www.youtube.com/watch?v=lAWPAqPg17Q

LANCASTER-MCDOUGALL AWARD FUNDING GROWS

Dr. Wayne Lancaster, who graduated from UD in 1969 with a Master of Science in biology, and his wife, Dr. Lucy Grégoire, have created a sustainable scholarship endowment to continue funding the Lancaster-McDougall Undergraduate Biological Research Award. This scholarship was developed in 2010 by Lancaster and Grégoire to award academically talented students in the biology program with summer research grants. Two awards are given annually through a competitive award application process.

The award is also named to honor the late Dr. Kenneth McDougall, Lancaster's master's thesis adviser and mentor in the biology department. During Lancaster's time at UD, McDougall inspired him to further his career and research in the field of biology. Lancaster and Grégoire

established the award to provide research opportunities for students and motivate current undergraduates the way McDougall inspired Lancaster. The students awarded with the grant conduct the research proposals they have developed in collaboration with their professors and advisers.

"The generosity of Drs. Lancaster and Grégoire is greatly appreciated by the faculty and students," said Dr. Jayne Robinson, biology department chair. "They have given their time and wisdom as well, reviewing each application and final report, providing students with valuable feedback and encouragement. The fellowships have become a highly coveted part of our culture of undergraduate research. Plus, I have had the pleasure of getting to know them!"

Lauren Shewhart: Lancaster-McDougall award spurs hands-on learning

Winning the Lancaster-McDougall Undergraduate Biological Research Award has provided senior biology major Lauren Shewhart with more than just funding. Receiving the grant has allowed Shewhart to further her education outside the classroom and gain experience with hands-on research, and



Lauren Shewhart

it has helped provide her with a stepping stone to the future.

Since winning the award in April 2013, Shewhart has been studying the relationship between the invasive plant species Amur honeysuckle and mosquito populations in the Midwest. The goal of the study is to determine if the plant is advancing the mosquito population. The grant, with additional funding from the honors program, allowed her to stay at UD over the summer to begin conducting her research. Shewhart continued this research through the fall 2013 semester.

Shewhart's undergraduate research experience has enriched her education at UD. "In general, it really helped me to connect ideas," she said. "What I learned in class, I could finally see in the real world, and I would make my own observations along with what I had learned."

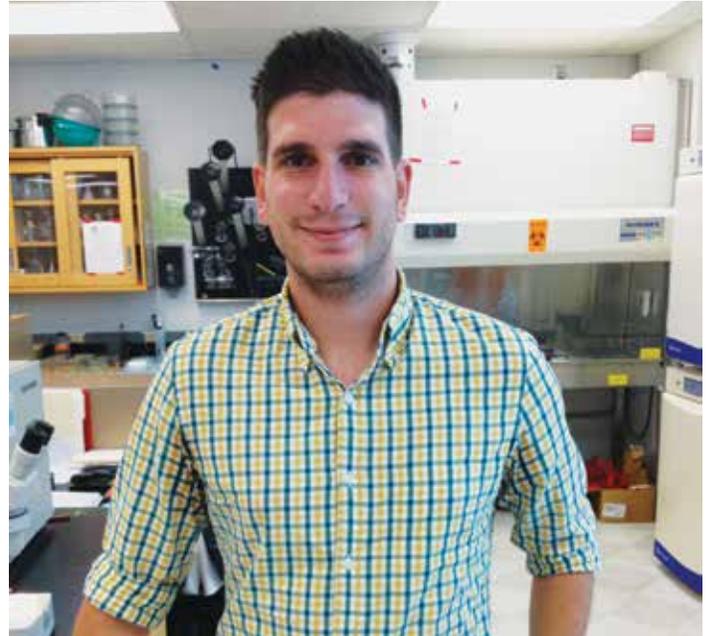
The honor of winning the award has given Shewhart a stepping stone in her academic future as she applies to graduate school. "It gave me confidence that what I'm doing, other people care about," she said. "It spurred my interest and desire to do research." Shewhart will be presenting her research at the UD Stander Symposium. She is working with her research adviser, Assistant Professor Ryan McEwan, to have her research published in a peer-reviewed journal by spring 2014 and will be completing her UD honors thesis.

Georgios Tsissios: Regeneration experience

Senior biology major Georgios Tsissios first became fascinated with molecular biology while attending a tissue regeneration seminar given by Dr. Panagiotis Tsonis, UD biology professor and director of the Center for Tissue Regeneration and Engineering at Dayton. Tsissios then began volunteering in Tsonis' lab, where he learned about tissue regeneration, gained invaluable research experience and developed an experimental proposal with Tsonis' mentorship. In spring 2013, Tsissios won a Lancaster-McDougall grant which, along with funding from Tsonis' lab, has allowed Tsissios to conduct his research project.

Tsissios' experiment involves the newt, an organism with the capability of regenerating an entire organ through transdifferentiation, a process where a cell transforms into the adult form of a different type of cell. This ability makes the newt an important organism of study in the experimental field of tissue regeneration. Tsissios' experiment focuses on two types of cells within the eye of a newt, dorsal iris cells and ventral iris cells. Dorsal iris cells are capable of regenerating a new lens on the eye, while ventral iris cells do not contribute to that process.

Tsissios' project seeks to discover the potential for ventral iris cell regeneration, which he is evaluating through the manipulation of Wnt signaling pathway-related drugs. These drugs allow Tsissios to investigate specific genes within the cell and their role during lens regeneration. A better understanding of the pathways that regulate lens regeneration from a nonregenerative tissue, like the ventral iris cells of a newt, may give insight into the regulation of tissue regeneration in general and might aid in developing novel therapies for the acceleration of wound healing in humans.



Georgios Tsissios

"I believe tissue regeneration and stem cells are the future of biology," Tsissios said. "It's very fascinating, and it would be a remarkable breakthrough for medicine. It's promising, and I want to be a part of it."

Tsissios will present his research at the 2014 UD Stander Symposium. Next year, Tsissios hopes to continue with molecular biology research and attend graduate school.

Michael Moran: Undergraduate contributes to scientific knowledge

Few undergraduate students graduate with the extensive track record of research, funding and publications that senior Michael Moran has demonstrated during his tenure at UD. Moran, a biology major, was awarded a Lancaster-McDougall fellowship in 2012 and was one of 25 students selected nationally to receive a 2013 summer research fellowship from Fight for Sight, a nonprofit organization that provides grants for vision research and children's eye clinics in the U.S. Moran co-authored one publication and is the primary author of another, and he presented his research at the national Drosophila Research Conference, sponsored by the Genetics Society of America in Washington, D.C., in April 2013.

Moran began working in Associate Professor Amit Singh's lab in 2011, where he assists Dr. Singh and his team in examining specific genes involved in eye development and



Michael Moran

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their effect on Alzheimer's disease (AD). Moran also helps train students new to lab research about the protocols and procedures in the lab. He and Singh isolated the gene *teashirt (tsh)* and began studying its effects on AD in the eye of *Drosophila*, also known as the fruit fly. AD is caused by the accumulation of amyloid-beta 42 (A β 42) peptides, which lead to cell death. Moran studied AD expressed in a fly eye because of the functional similarity between the neurons present in the fly eye and the human brain. Moran was able to further this research when he was awarded a Lancaster-McDougall grant. This research, "Homeotic gene *teashirt (tsh)* has a neuroprotective function in amyloid-beta 42 mediated neurodegeneration," was recently accepted for publication in the peer-reviewed journal *PLOS ONE*.

Funding through the Fight for Sight fellowship allowed Moran to investigate the birth defect aniridia, which occurs when a child is born without irises in his or her eyes. As a

result, extreme exposure to light can lead to retinal malformations, cataracts and blindness. Moran is studying eye development and two specific genes within the eye to gain further understanding about aniridia.

Participating in undergraduate research has impacted Moran's plans for the future. His love for research has motivated him to pursue an M.S. in immunology before applying to medical school, where he plans to specialize in infectious diseases.

"I wouldn't have decided to get an M.S. in immunology if I didn't do undergraduate research," Moran said. "Now that I've been a part of adding to the scientific knowledge here, I really like it a lot and I want to continue doing it. I want to do medicine as a full-time career, but getting my M.S. will give me the opportunity to continue doing research in a new field."

Charles Chiara: Exploring opportunities through internships

Senior environmental biology major Charles Chiara has broadened his knowledge and professional skills in biology outside the classroom through two internships this year. As part of UD's degree requirements, all environmental biology majors are required to complete an internship in a workplace setting to gain experience solving environmental problems. The students' selected internship must be approved for credit by Environmental Biology Program Coordinator Kelly Williams.

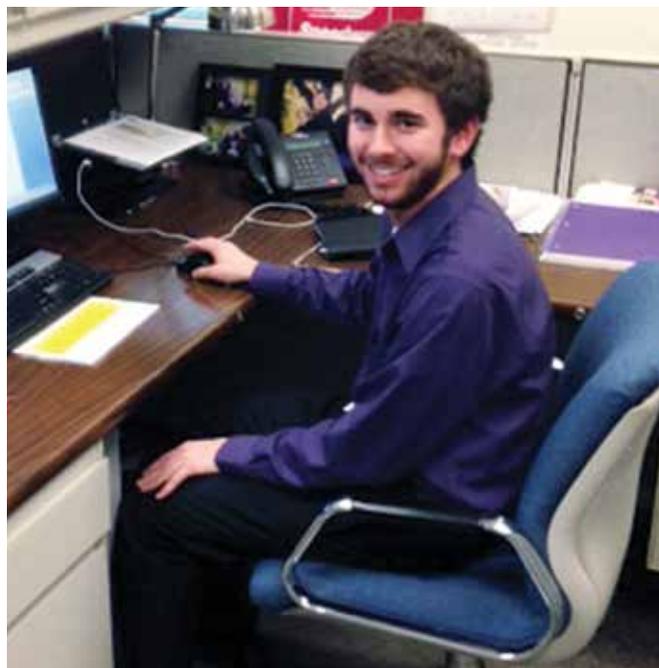
Chiara was selected for a Research Experiences for Undergraduates (REU) internship at the University of Rhode Island for summer 2013. The REU internship, funded by the National Science Foundation, is a summer program offered at various universities that allows undergraduate students to participate in both field and lab research under the mentorship of a professor at the designated university. During his internship, Chiara researched phytoplankton, the base of the marine food web. He said he appreciated the opportunity to go out in the field and collect samples by the beach, as well as on a boat. Chiara is working toward publishing the paper he wrote on this research in a peer-reviewed journal.

Chiara also served as an environmental remediation intern at Speedway headquarters in Enon, Ohio, for the fall semester. Some of his responsibilities in the office included updating the computer system containing environmental information, statistical analysis of remediation projects, and field work oversight and safety audits. Chiara cites both internships as beneficial experiences when considering his next career move.

"I've learned what it's like to work in an office environmental policy-related position that does not involve lab work or field work," Chiara said. "This is something that is not experienced

through taking classes. When in the field of science, I think it is important to know if you are more interested in the field and lab work, or the office and policy work. ... This is what I hoped to gain."

Chiara plans to pursue a career in science and is considering several options. In the meantime, he will take the GRE (Graduate Record Examinations) after he graduates from UD in December 2014.



Charles Chiara

Madison Irwin: Undergraduate research central to success

Junior Madison Irwin, a biology major specializing in neuroscience and minoring in psychology and chemistry, has found the undergraduate research experience central to her success at UD and to her future career plans. As a sophomore, she began working in Associate Professor Amit Singh's lab studying Alzheimer's disease (AD), and she now is focusing on her honors thesis.

In her research of AD, a progressive neurodegenerative disorder, Irwin is examining the interaction between the Hippo



Madison Irwin

signaling pathway and the c-Jun amino-terminal kinase (JNK) pathway. AD is caused by the accumulation of amyloid-beta 42 (A β 42) peptides, which lead to cell death. Irwin's research is a collaborative project between the labs of Dr. Singh and Irwin's adviser, Dr. Madhuri Kango-Singh. Irwin studies AD expressed in a fly eye because of the functional similarity between the neurons present in the fly eye and the human brain. She is investigating the effects and interactions of the Hippo and JNK pathways on the A β 42 neurodegenerative phenotype in order to generate new insight on this devastating disease.

Irwin has received funding from the University Honors Program through a Berry Summer Thesis Institute fellowship, along with a grant from the national biological honor society, Beta Beta Beta. Irwin's plan to pursue a Pharm.D. along with a Ph.D. in pharmaceutical sciences has been impacted by her experience with undergraduate research.

"It's such a valuable and central part of my education," Irwin said. "I feel that without it, my undergraduate degree would be much less valuable to me. This teaches me time management, collaboration, working on a schedule and being independent. ... Working in the lab here really solidified that I want to do research in a scientific field."

This year, Irwin presented her research at the Sigma Xi convention and Beta Beta Beta's regional conference, both hosted by UD, as well as at Neuroscience Day, hosted by the University of Cincinnati College of Medicine. In 2014 she hopes to present at the four-day annual *Drosophila* Research Conference in San Diego and at Posters on the Hill in Washington, D.C. Irwin will again be presenting her research at the UD Stander Symposium this spring.

Watch a video to learn more about Irwin and her research at UD: youtu.be/JVlo1xIRxhU.

Experiential learning for nonscience majors

The UD department of biology provides the opportunity to participate in experiential learning to all students, including nonscience majors who enjoy a variety of experiential learning projects in their biology courses. In particular, biology lecturer Mary Ellen Dillon's SCI 230 course, tailored specifically for education majors, offers a unique opportunity for students to actively engage in learning about both biology and teaching. Dillon has expanded the course to include a semesterlong project, during which students learn hands-on about biology and how to teach the subject.

Dillon's students, mostly sophomores, are required to go on a field trip as the first part of the project. They have the option of participating in river biomonitoring with a local 5th grade classroom, building an ecosystem with a local 6th grade classroom, visiting an urban farm or participating in a water workshop for current and future teachers. The students write a report about their experience and its relation to the course. The most important aspect of the project is the weeklong lesson plan created by each education student, which includes a hands-on activity for their own future students. Sophomore Allison Cleaver, one of Dillon's current

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students, is excited about her classroom experience and her project's progress.

"In our class at UD, we're learning in detail about different kingdoms and how to teach it," Cleaver said. "In the 5th grade classroom I observed, I was able to see how the teacher was educating her students and the different ways she was able to lay it out for her students so they could understand."

Dillon's experiential learning project provides an additional value to her students by giving them hands-on experience in both biology and teaching.

"On the biological level, they understand that unit of biology a little bit better," Dillon said. "They really understand it when they experience it. On the second level, they can better present it to their students. ... I help [my students] with both the biology and with experiential learning, and how to introduce the biology to these young kids."

Learn how you can help students like these participate in experiential learning by visiting page 12.

A Pair of Patents

TWO UD BIOLOGY PROFESSORS, DR. KAROLYN HANSEN AND DR. JAYNE ROBINSON, WERE RECENTLY ISSUED PATENTS FOR THEIR INVENTIONS.

Hansen, an assistant professor in the department of biology, was recently issued a patent by the United States Patent and Trademark Office (No. 8,541,031) on her invention that allows for deposition of biocompatible nanocrystalline calcite coatings that are derived from oysters. The oyster-derived coatings are composite ceramic materials that are composed of a mineral phase (calcite) and an organic phase (protein and carbohydrate). Current ceramic coating technology uses high temperature, high pressure and chemical solvents to manufacture coatings. The oyster-derived material is a step toward development of "green" or environmentally friendly coatings and is manufactured under ambient temperature and pressure with no chemical solvents. These biocompatible coatings are mechanically tough and resistant to fracture stresses. Potential applications include corrosion-resistant coatings and improved coatings for metallic biomedical implants. Hansen's research was conducted in collaboration with Dr. Douglas Hansen (University of Dayton Research Institute) and Dr. Andrew Mount, Dr. Neeraj V. Gohad and Dr. Mary Beth Johnstone (Clemson University).

Robinson, professor and biology department chairperson, was recently notified by the United States Patent and Trademark Office that a U.S. patent (No. 8,551,456 B2) was issued on her invention that enhances the effectiveness of antibiotics. Bacterial biofilms are a very serious medical problem. Bacterial biofilm infections are the leading cause of death in cystic fibrosis patients, and the most serious antibiotic-resistant bacteria are bacterial biofilms. Robinson's invention uses light-sensitive materials to increase effectiveness of the bacterial-fighting antibiotics. These light-sensitive materials have a role in breaking up the biofilm, freeing up the antibiotic to do its work killing bacteria. Robinson is continuing her research in this area, investigating new ways to improve the overall effectiveness of the combination and expand the discovery to different kinds of infectious agents. Robinson's research was conducted in collaboration with Dr. Tracy Collins, who earned her Ph.D. under Robinson.



EXPERIENTIAL LEARNING: PAYING IT FORWARD BY PROVIDING ACCESS TO STUDENT RESEARCH



Carissa Krane, Ph.D.

Associate Professor of Biology Carissa Krane launched her career in biomedical research during her undergraduate years as an honors student at Marquette University. Her experience with hands-on learning in the laboratory has driven her to “pay it forward” by providing undergraduate and graduate students the experience of contributing to her groundbreaking research. Such experiential learning delivers opportunities for personal growth and professional development that cannot be gained in the classroom.

Krane studies how aquaporins, the water channels in cell membranes, control water movement and ion homeostasis and what role these proteins might play in the lungs of asthma patients. Krane is also interested in the cryoprotection of cells – i.e., how cells prevent

damage from freezing temperatures. Glyceroporins, from the same protein family as aquaporins, carry glycerol through cell membranes to serve as a “cryoprotectant” or antifreeze for cells. Krane and Dr. David Goldstein at Wright State University are collaborating on an NSF grant investigating the role of glyceroporins in Cope’s gray tree frogs, which freeze solid every winter and thaw every spring.

“Cryoprotectant proteins have important implications in tissue storage and may drastically improve the useful life of

organs harvested for transplant,” said Krane. “Currently, organs can only be preserved for a matter of hours before transplant occurs, creating a short timeline from time of harvest to time of implant. Understanding the natural freeze-and-thaw process in the Cope’s tree frog and how glyceroporins facilitate this process may contribute to our ability to extend the organ transplant timeline.”

Since coming to UD in 2001, Krane has mentored more than 50 undergraduate researchers and five graduate students. Much of this work has been associated with UD’s Center for Tissue Regeneration & Engineering at Dayton, or the TREND Center, which involves nearly 30 undergraduate students each year in its interdisciplinary, team-based research projects. Krane’s research

and teaching involves colleagues from other disciplines, such as engineering and math, who provide unique perspectives and new approaches to investigation and learning.

Leading interdisciplinary student experiences prepared Krane for the universitywide role she assumed in 2011: associate director for honors thesis research in the University Honors Program. This position has helped her expand her impact on undergraduate research as she interacts with students and faculty from all disciplines across campus. Her strong vision and passion for research has benefited the honors program and inspired students.

Krane’s enthusiasm and talent in communicating her ideas to a broad audience led to her selection as a speaker at the 2013 UD Spotlight on Technology, Arts, Research and Scholarship, or STARS, which showcases exciting advances in research at UD and fosters collaboration among faculty and professional researchers. During Krane’s well-attended presentation, “Frozen Alive,” she emphasized both how the research work was done by students and the key role the faculty-student relationship plays in students’ success and career development.

“I think mentorship at UD is a wonderful thing,” said Krane. “It is really critical to our students. So many of our students benefit by having faculty who are passionate about what they do and allow them to see an inward view of research and scholarly life.”

Making her research accessible to everyone has been a hallmark of Krane’s career. Her efforts over the years to challenge and inspire scores of students in her laboratory are her way of paying it forward.

BIOLOGY DEPARTMENT WELCOMES NEW PROFESSOR FROM GREECE

Dr. Pothitos Pitychoutis, a native of Greece, recalls discovering his fascination with science at a young age.

"I took biology courses in junior high, and when I learned about the cell, the organism and what happens inside, I was so amazed," Pitychoutis said. "I was able to see a whole new world, and afterwards, it was kind of a basic need to be involved in science." However, he also feels that he owes a lot to his Ph.D. mentor back in Greece, Professor Zeta Papadopoulou-Daifoti. "Dr. Daifoti believed in me in a time when I was too young to believe in my dreams."

Pitychoutis recently relocated to the United States from Greece to become an assistant professor at UD. He received a Ph.D. in neuropsychopharmacology from the medical school of the National and Kapodistrian University of Athens (NKUA) in Greece. Pitychoutis studied neuroscience as a postdoctoral research associate at NKUA; the Institut du Fer à Moulin-Université Pierre et Marie Curie in Paris, France; and the Biomedical Research Foundation of the Academy of Athens (BRFAA) in Greece.

Pitychoutis' research focuses on the study of sex differences in depression and antidepressant response. Women are more vulnerable to major depression, while the two sexes do not respond the same way to antidepressant drugs. Still, the female sex is underrepresented in both preclinical and clinical research. Pitychoutis' research aims at identifying the sex-dependent adaptations that mediate the actions of antidepressant drugs and stress at the preclinical level in order to gain a better understanding of the underlying causes and treatment of depression in men and women. The ultimate goal of his research is to identify novel targets for individualized and sex-oriented psychopharmacotherapies.

Pitychoutis is enjoying adapting to American culture and the UD experience. "UD is a very fruitful academic environment,

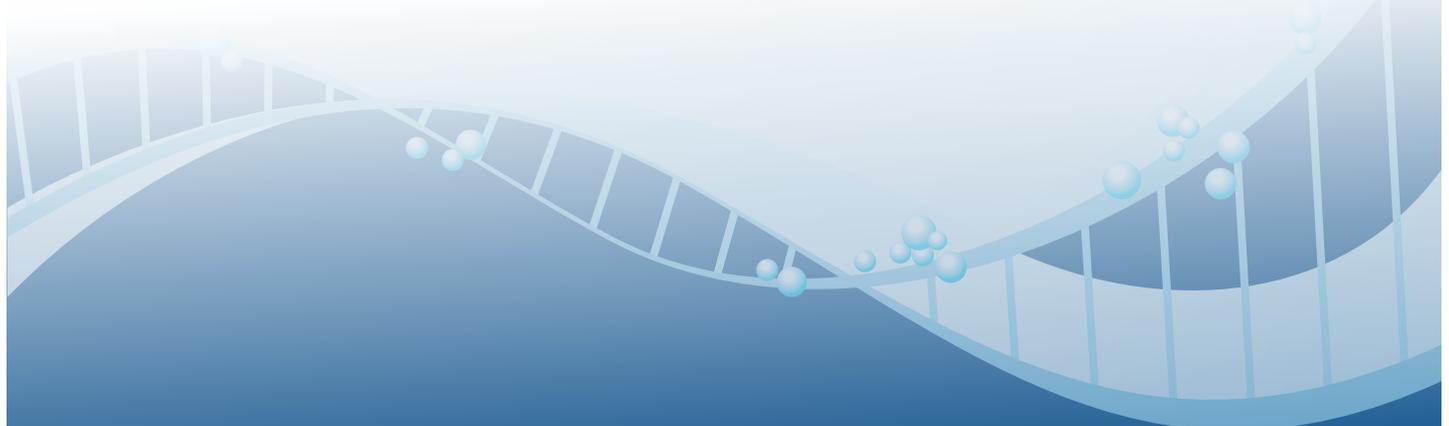


Pothitos Pitychoutis, Ph.D.

and I appreciate the opportunities provided for both students and faculty," he said. "The students here are of great quality, and the biology department faculty is like one big scientific family."

A typical day at UD is busy for Pitychoutis: creating lectures, working in the lab, advising students and teaching. He taught neuroscience in fall 2013 and is currently teaching human physiology. He describes his experience on campus and in the classroom as both enjoyable and fulfilling.

"The fact that you can see, in the eyes of students, that your enthusiasm may actually be contagious — I think that's the most rewarding thing," he said.





Faculty and staff highlights

- **Dr. Amit Singh** has been named director of the graduate program in biology.
- **Drs. Amit Singh** and **Madhuri Kango-Singh** co-edited the book *Molecular Genetics of Axial Patterning, Growth and Disease in the Drosophila Eye* (Springer, 2013). Part of the book summarizes research milestones in the field over the last century; the rest examines how the eye of a fruit fly can be used to unravel questions about human diseases. Singh and Kango-Singh also co-wrote portions of the book along with contributions from their current and former UD graduate students **Oorvashi Roy Puli**, **Dr. Meghana Tare**, **Shilpi Verghese** and **Indrayani Waghmare**.
- **Dr. Ryan McEwan** and collaborator Jyh-Min Chiang (Tunghai University, Taiwan) won an award from the Smithsonian Institution's Center for Tropical Forest Science to examine how biodiversity is linked to ecosystem function in Taiwan, with an emphasis on studying the impacts of typhoons. McEwan and co-principal investigator Dr. Don Cipollini (Wright State University) received funding from the Ohio Plant Biotechnology Consortium to assess methods of removing Amur honeysuckle and restoring those areas to native forest.



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YOU CAN MAKE A DIFFERENCE

Our alumni have often attributed their career achievements to the educational rigor of our course of study, the integral role played by faculty mentors and the opportunities to conduct acclaimed lab and field research. In turn, these alumni have shown their gratitude for their UD experience by generously sharing their time, energy and resources to make the next generation of UD biology students successful. Because of support from alumni and friends we are able to provide these opportunities to students.

If you'd like to designate your future donations directly to the biology department, you may donate online at givenow.udayton.edu. Under "Gift Information" and "Direct my gift to," select "Other." In the comments box, type "Donation to the biology department" to ensure your gift will reach us.

The experiences we are able to offer our students are possible because of the generosity of those who have made donations to the department of biology.

Thank you!

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